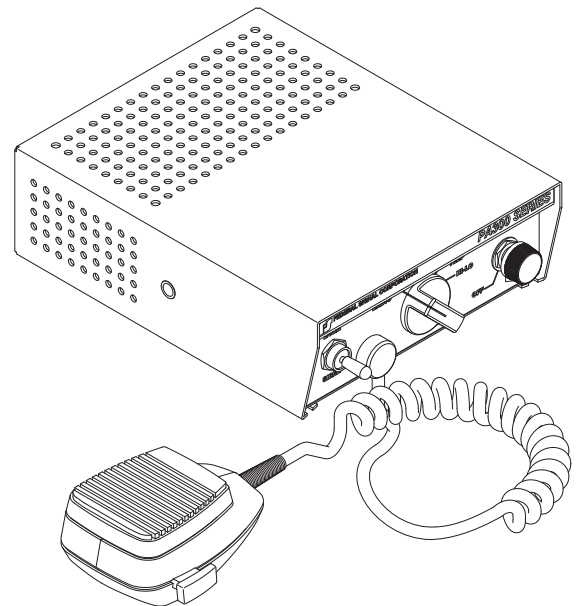




FEDERAL SIGNAL
Safety and Security Systems

Model PA300 Series Electronic Siren

Models 690000, 690001, 690002, 690004



Installation and Instruction Manual

Limited Warranty

This product is subject to and covered by a limited warranty, a copy of which can be found at www.fedsig.com/SSG-Warranty. A copy of this limited warranty can also be obtained by written request to Federal Signal Corporation, 2645 Federal Signal Drive, University Park, IL 60484, email to info@fedsig.com or call +1 708-534-3400.

This limited warranty is in lieu of all other warranties, express or implied, contractual or statutory, including, but not limited to the warranty of merchantability, warranty of fitness for a particular purpose and any warranty against failure of its essential purpose.



FEDERAL SIGNAL Safety and Security Systems

2645 Federal Signal Drive
University Park, Illinois 60484-3167

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Customer Support

Police/Fire-EMS: 800-264-3578 • +1 708 534-3400

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Safety Messages for Installers and Operators

For your safety, read and understand this manual thoroughly before installing, operating, and servicing the Pathfinder siren amplifier/relay module. The safety messages presented in this chapter and throughout the manual are reminders to exercise extreme care at all times. In addition, read and understand the safety instructions to installers (doc. no. 256A692), and keep it close at hand for reference.

To download copies of this manual, go to www.fedsig.com or call the Federal Signal Service Department at 1-800-433-9132 (708-534-3400) 7 a.m. to 5 p.m., Monday through Friday (CT).

Safety Messages to Installers of Sound Systems

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. 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 amplifier/relay modules 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. 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.
- Ensure that the siren amplifier/relay module 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, 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 that 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 airbag 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. Ensure 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 airbag.
- If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.
- Locate the control head so the vehicle, controls, and microphone can be operated safely.
- When drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. All drilled holes should be deburred and all sharp edges should be smoothed. All wires going through drilled holes should be protected by a grommet or convolute/split-loom tubing. Additionally, all exterior drilled holes must be sealed with Motorcraft seam sealer T-A-2-B or equivalent to prevent the potential exposure to carbon monoxide or other potentially harmful fumes. Failure to observe this warning could cause serious injury or death.

After Installation

- After installation, test the siren 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 or reinstalling the product.
- Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death.

RETAIN AND REFER TO THESE MESSAGES

Safety Messages to Operators of Sound Systems

WARNING

People's lives depend on your safe operation of Federal Signal products. It is important to read and follow all instructions shipped with the products. Listed below are some other important safety instructions and precautions you should follow.

- Do not attempt to activate or deactivate the system control while driving in a hazardous situation.
- Although your warning system is operating properly, it may not be completely effective. People may not see or heed your warning signal. You must recognize this fact and continue to drive cautiously.
- Situations may occur that obstruct your warning signal when natural and manmade objects are between your vehicle and others, such as raising your hood or trunk lid. If these situations occur, be especially careful.
- All effective sirens and horns produce loud sounds that may cause, in certain situations, permanent hearing loss. You and your passengers should consider taking appropriate safety precautions, such as wearing hearing protection.
- It is important that you fully understand how to safely operate this warning system before use.
- Operate your vehicle and its sound system in accordance with your department's Standard Operating Procedures.
- If a selected function does not perform properly or if any of the lamps remain illuminated when the control is off, disconnect the power connector from the control unit and contact the nearest service center.
- At the start of your shift, ensure that the entire warning light system and the siren system are securely attached and operating properly.
- Failure to follow these precautions may result in property damage, serious injury, or death.

RETAIN AND REFER TO THESE MESSAGES

Overview

The Federal Model PA300 Series is a precision built, efficient and economical, full-featured electronic siren of advanced design. It provides wail, yelp, hi-lo (Models 690000 and 690001) or priority (Models 690002 and 690004) siren tones, as well as the Tap II feature, public address (PA), radio rebroadcast and an air horn sound.

The siren should be installed in negative ground vehicles with 12-volt electrical systems. It is protected against failure modes (including reversed polarity) by a fuse that is replaceable without tools. No components protrude from the bottom of the siren to interfere with mounting arrangements.

A noise cancelling microphone is wired in (Models 690000 and 690002) to prevent loss or theft. It provides high quality voice reproduction without feedback “squeal.” The microphone push-to-talk switch overrides any siren signal for instant PA use. PA and radio volume are adjustable by means of a front panel GAIN control. Radio interconnect wires are built in. No additional cables are required. Models 690001 and 690004 are supplied with a microphone jack. To use the PA functions, order the optional Model MNCT-SC microphone.

The Model PA300 Series can drive one 11-ohm impedance, high power (100 W) or low power (58 W) speaker.

The Tap II feature enables the driver to change the siren sound from wail to yelp (or vice versa) via the vehicle’s horn ring. Tap II provides especially effective traffic clearing capability. In addition to Tap II, additional alternate sounds can be activated in two other selector switch positions by pressing and holding the horn ring for as long as the alternate sound is desired. The charts in Section IV of this manual illustrate the operation of these features more fully.

Other special features of the Model PA300 Series include:

- A high degree of reliability is achieved through the use of integrated circuits and silicon output transistors.
- The control panel is illuminated with LEDs.
- The printed circuit board provides improved performance and durability under a wide range of environmental conditions.

PA300 Series Models

- 690000: 12 V, 100 W, HI-LO with microphone
- 690001: 12 V, 100 W, HI-LO with microphone jack
- 690002: 12 V, 100 W, PRIORITY with microphone
- 690004: 12 V, 100 W, PRIORITY with microphone jack

Table 1 Specifications

Input Voltage	11 Vdc to 15 Vdc
Polarity	Negative ground only
Standby Current (MANUAL)	60 ma (typical)
Operating Temperature Range	-30°C to +65°C
Operating Current (Wail mode)	10 amperes, max (at 13.6 Vdc) (11 ohm load at high power)
Frequency Range (typical)	725 Hz to 1800 Hz
Cycle Rate (typical)	Wail- 15 cycles/min Yelp- 220 cycles/min Hi-Lo 70 cycles/min (690000 and 690001) Priority 1300 cycles/min (690002 and 690004)
Voltage Output (approx.)	64 V _{P-P}
Dimensions (HWD)	2-1/2 x 6-1/2 x 8-1/2 in (6.35 x 16.51 x 21.59 cm)
Net Weight (incl. microphone)	4-1/2 lb (2.04 kg)
Shipping Weight	6-1/2 lb (2.94 kg)

NOTE: The following parameters were obtained with the radio input potentiometer and GAIN control set at maximum.

Table 2 Parameters

Audio Frequency Range	300 to 10,000 Hz
Harmonic Audio Distortion (300 Hz to 3,000 Hz)	10% max. all power levels from 1/2 to 50 W (frequency response ±3 dB).
Input Impedance (Radio)	2000 ohms
Input voltage required to obtain 20 V _{RMS} across speaker load (Radio)	0.3 V _{RMS}

Unpacking

After unpacking the Model PA300 Series, examine it for damage that may have occurred in transit. If it has been damaged, do not attempt to install or operate it. 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 in the Kit Contents List are included in the package. Disposal of all shipping materials must be carried out in accordance with national and local codes and standards. If you are missing any parts, contact Customer Support at 1-800-264-3578, 7 a.m. to 5 p.m., Monday through Friday (CT).

Table 3 Kit Contents List

Qty.	Description	Part No.
1	Cable Assembly	1461360
2	1/4-inch Lockwasher	7074A015
2	1/4-20 x 1/2-inch screw	7002A008-08
1	Mouting Bracket	85361059
1	Warning Label	1612339

To install the unit under the dash:

1. Use the mounting bracket as a template and scribe two drill positioning marks at the selected mounting location under the dash.

⚠ WARNING

DRILLING PRECAUTIONS: When drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. All drilled holes should be deburred and all sharp edges should be smoothed. All wires going through drilled holes should be protected by a grommet or convolute/split-loom tubing. Additionally, all exterior drilled holes must be sealed with Motorcraft seam sealer T-A-2-B or equivalent to prevent the potential exposure to carbon monoxide or other potentially harmful fumes. Failure to observe this warning could cause serious injury or death.

2. Drill two 1/4-inch diameter holes at the position marks.
3. Secure the mounting bracket to the dash with user-supplied 1/4-20 by 3/4-inch hex head screws, 1/4-inch split lockwashers and 1/4-20 hex nuts as shown in Figure 1.
4. Secure the electronic siren to the mounting bracket with 1/4-20 by 1/2-inch hex head screws and 1/4-inch split lockwashers as shown in Figure 1.

NOTICE

To avoid damage to the unit, the 1/4-20 by 1/2-inch hex head cap screws and the 1/4-inch split lockwashers must be used as shown in Figure 1.

5. Tilt the unit to the desired position. Tighten the 1/4-20 by 1/2-inch hex head screws.

Power Cable

⚠ WARNING

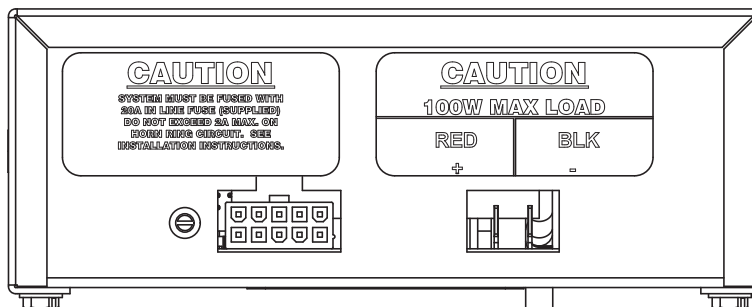
Wiring changes have been made that utilize a new type of power cable. If this unit is used to replace an older PA300, use the optional cable adaptor (761300) to connect the originally installed power cable to the new siren.

This unit is NOT designed as a replacement in a two-speaker installation. The siren amplifier WILL be damaged if two speakers are installed.

Speaker

The unit is designed to operate with one 11-ohm impedance speaker or one low power (58 W) speaker. See Figure 2.

Figure 2 Rear View of PA300

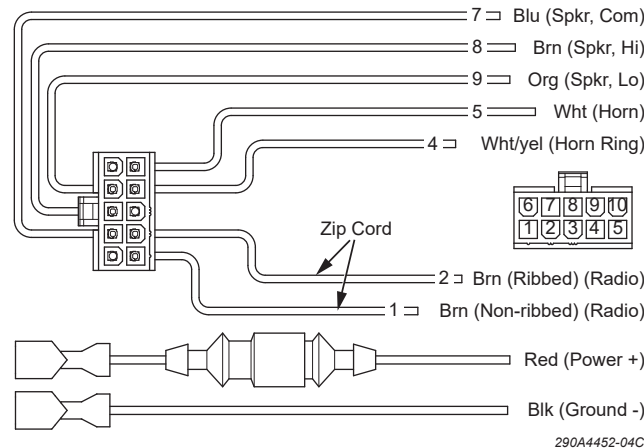


NOTICE

Damage to the unit will occur if speaker wires are improperly connected. NEVER CONNECT the brown SPEAKER HIGH POWER (100 W) wire and orange SPEAKER LOW POWER (58 W) wire together to the speaker(s).

Using 18 AWG wire, connect one speaker lead (58 W speaker to SPEAKER LOW POWER or 100 W speaker to SPEAKER HIGH POWER) as shown in the Control Cable Wiring Diagram, Figure 3. Connect the other speaker wire to the blue (SPKR, COM) wire.

Figure 3 Control Cable Wiring Diagram



Radio

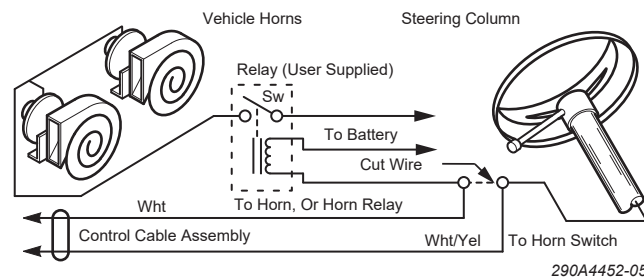
To allow incoming radio messages to be rebroadcast over the outside speakers, connect the two brown zip cord leads (pins 1 and 2) across the two-way radio's speaker.

Horn Ring

To use the siren's Tap II and Press-and-Hold features:

1. Locate the wire that connects the vehicle horn ring switch to the horn or horn relay. Cut this wire.
2. Splice the white/yellow control cable wire (pin 4) to the horn ring side of the wire that was cut in step 1. Insulate the splice with user-supplied wire nuts. See Figure 4.

Figure 4 Horn Ring Connections



⚠ WARNING

The horn ring transfer circuit of the siren is capable of switching 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 the procedure in step 3. If it is greater than 2 A, perform steps 4 through 10.

3. Splice the white control cable wire (pin 5) to the horn side of the cut wire. Insulate the splice with a user-supplied wire nut.
4. Obtain a SPST relay of sufficient contact current capacity to activate the vehicle horn. Refer to Figure 4 while performing the following steps.
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 relay wiper terminal to the positive or negative potential determined in step 7.
9. Connect the white control cable wire 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 wiper in step 8.

Connecting to the Power Source

NOTICE

PROPER FUSING: To avoid damage to unit, ensure that it is properly fused, with an 20 A in-line fuse and fuseholder installed in the red power cable lead.

The PA300 Series can operate only from a 12-volt negative ground vehicle electrical system. Therefore, before making any electrical connections, determine the polarity of the vehicle electrical system ground.

Power for the siren can be obtained from the vehicle’s power distribution center or directly from the vehicle battery. If power is going to be obtained directly from the vehicle battery, drill a hole in the vehicle firewall for the power lead to enter the engine compartment. Place a grommet or similar device in the hole to protect the wire against damage from rough edges.

⚠ WARNING

DRILLING PRECAUTIONS: When drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. All drilled holes should be deburred and all sharp edges should be smoothed. All wires going through drilled holes should be protected by a grommet or convolute/split-loom tubing. Additionally, all exterior drilled holes must be sealed with Motorcraft seam sealer T-A-2-B or equivalent to prevent the potential exposure to carbon monoxide or other potentially harmful fumes. Failure to observe this warning could cause serious injury or death.

If your vehicle has a negative ground electrical system, perform the procedure as follows:

NOTE: This unit is NOT designed to operate with positive ground.

1. Route the red power (+) and the black power (-) control cable leads through the previously drilled hole and into the engine compartment. Route the wires through existing clamps and holders toward the battery.
2. To protect the red wire when connected to the battery terminal, use an in-line fuseholder and 20-ampere fuse (not supplied). The fuseholder should be installed as close as practical to the battery. If necessary, additional #14 AWG or heavier wire can be spliced to the red lead.

⚠ WARNING

SPARK 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.*

⚠ WARNING

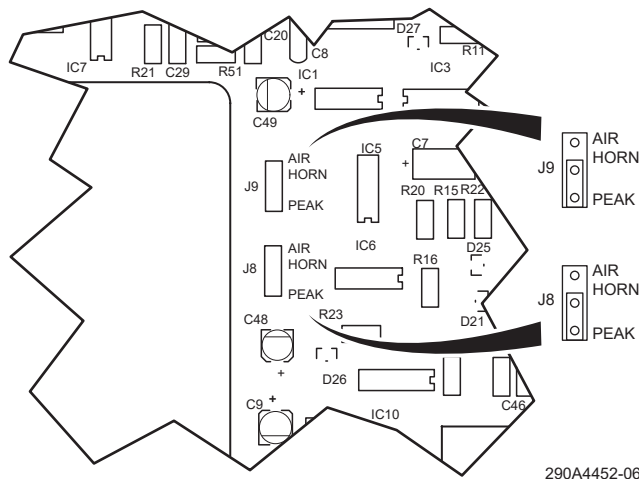
FIRE HAZARD: *DO NOT connect this system to the vehicle battery until ALL other electrical connections are made and mounting of all components is complete. Failure to observe this warning may result in fire, burns, and blindness.*

3. Connect the in-line fuseholder lead to the positive (+) battery terminal.
4. Connect the black wire to the negative terminal of the battery.

Modifying Air Horn Press-and-Hold

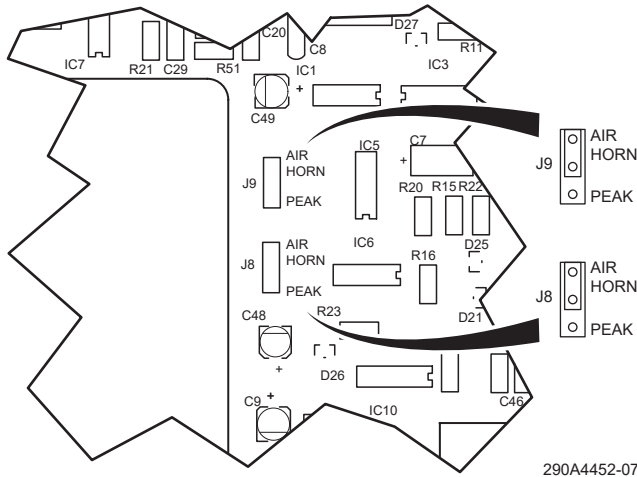
The unit comes from the factory set so that the peak-and-hold sound will be heard when the Selector switch is set to MANUAL and the vehicle horn ring is activated. To change the sound to air horn, merely move jumpers J8 and J9 from the PEAK position on the PC board to the AIR position. See Figure 5.

Figure 5 Press-and-Hold Modification - Factory Configuration



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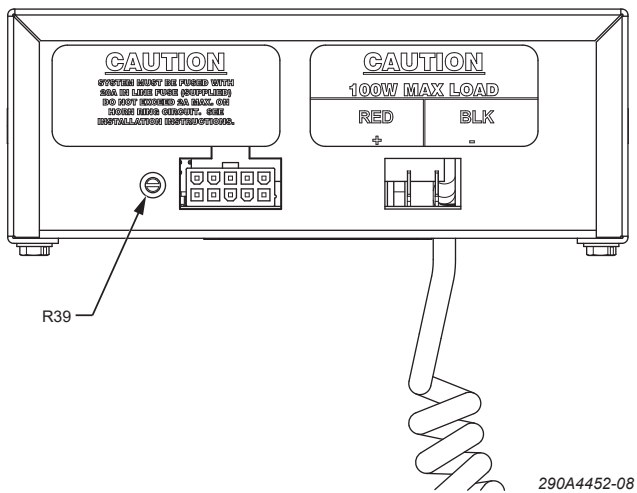
Figure 6 Press-and-Hold Modification - Air Horn Configuration



Adjusting Relative PA Loudness

After the electronic siren is completely installed in the vehicle, set the Selector switch to MANUAL. Press the microphone push-to-talk switch, speak in a normal voice, and adjust the GAIN control for the desired sound level outside the vehicle. Turn on the vehicle’s two-way radio and adjust the volume to a comfortable listening level inside the vehicle. Then set the Selector switch to RADIO. Stand outside of the vehicle and note the radio rebroadcast loudness. If the sound volume is too loud or too soft, using a small, flat blade screwdriver, adjust R39 from the back of the siren to the desired sound level. See Figure 7.

Figure 7 Relative PA Loudness



After the adjustment is completed, the loudness of the radio rebroadcast and public address may be varied with the front panel GAIN control.

Testing the Installation

⚠ WARNING

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.

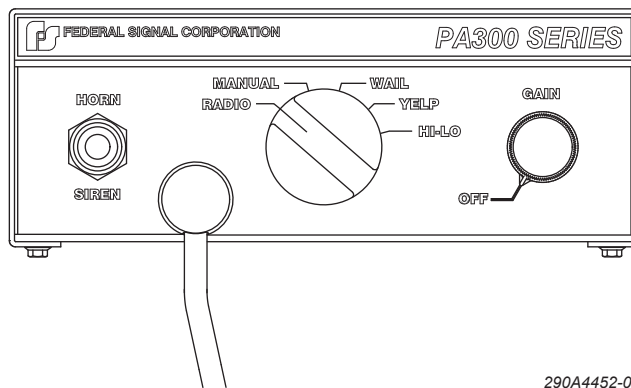
After installation, test the electronic siren, including horn operation, to ensure that it is operating properly.

After testing is complete, provide a copy of this manual to all operating personnel.

Operating the Unit

All controls used during normal operation of the Model PA300 are located on the front panel. See Figure 8.

Figure 8 Front View



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The wired-in noise cancelling microphone provides high quality voice reproduction in the public address mode. The microphone push-to-talk switch will override all siren functions, except radio rebroadcast, for instant PA use.

Gain Control

The GAIN control is used to turn the siren on and off. It is also used to control the volume when the siren is used for public address or radio amplification. Clockwise rotation of the knob increases voice volume in the public address or radio amplification mode. The GAIN control does not control the volume of the siren signals.

The maximum clockwise setting of the control will be determined, in most cases, by the point at which feedback or “squeal” occurs. This will depend upon the microphone gain, open windows, speaker placement, proximity of reflecting surfaces (building or other vehicles), etc. Adjust the GAIN control to a position just below the point at which feedback occurs or as desired.

Selector Switch

The Selector switch is a five-position rotary switch used to select the mode of operation. The following are positions on the Selector switch.

Radio

In this position, incoming radio messages are amplified by the siren and rebroadcast over the outside speaker.

Manual

In this position it is possible to operate the siren by activating the HORN/SIREN switch. The siren can also be activated by means of an auxiliary switch, such as the horn ring button.

Wail

In this position the siren produces a continuous “wailing” sound, up and down in frequency.

Yelp

In this position a continuous, rapid “warbled” tone is generated.

Hi-Lo (Models 690000 and 690001)

In this position a two-tone sound will be heard. This distinctive tone may be reserved for any special indication or situation.

Priority (Models 690002 and 690004)

In this position a rapid YELP sound will be heard. This distinctive tone may be reserved for any special indication or situation.

Horn/Siren Switch

The HORN/SIREN switch, located on the left side of the front panel, activates the electronic air horn sound (up) or peak-and-hold sound (down) in any siren mode except radio.

Tap II Functions

Tap II allows the driver to change the siren sound via the vehicle’s horn ring. This feature is especially effective for clearing traffic. The chart below demonstrates how the horn ring can be used to change the siren sound.

Table 4 TAP II Functions

Selector Switch Position	First Horn Ring Tap Produces	Second Horn Ring Tap Produces
Wail	Yelp	Wail
Yelp	Wail	Yelp

Press and Hold Functions

Additional alternate sounds can be activated in two other Selector switch positions by pressing and holding the horn ring for as long as the alternate sound is desired. The chart below shows these additional Press and Hold functions.

Table 5 Press and Hold Functions (Models 690000 and 690001)

Selector Switch Position	Press on Horn Ring Produces	Release of Horn Ring Produces
Hi-Lo	Air Horn	Hi-Lo
Manual	Peak and Hold or Air Horn	Coast Down and Silence or Silence

Table 6 Press and Hold Functions (Models 690002 and 690004)

Selector Switch Position	Press on Horn Ring Produces	Release of Horn Ring Produces
Priority	Air Horn	Priority
Manual	Peak and Hold or Air Horn	Coast Down and Silence or Silence

Getting Technical Support and Service

For technical support and service, please contact:

Service Department
 Federal Signal Corporation
 Phone: 1-800-433-9132
 Email: empserviceinfo@fedsig.com
www.fedsig.com

Getting Repair Service

The Federal Signal factory provides technical assistance with any problems that cannot be handled locally.

Any units returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization (RMA). Obtain a RMA from a local Distributor or Manufacturer’s Representative.

Provide a brief explanation of the service requested, or the nature of the malfunction.

Address all communications and shipments to the following:

Federal Signal Corporation
 Service Department
 2645 Federal Signal Drive
 University Park, IL 60484-3167

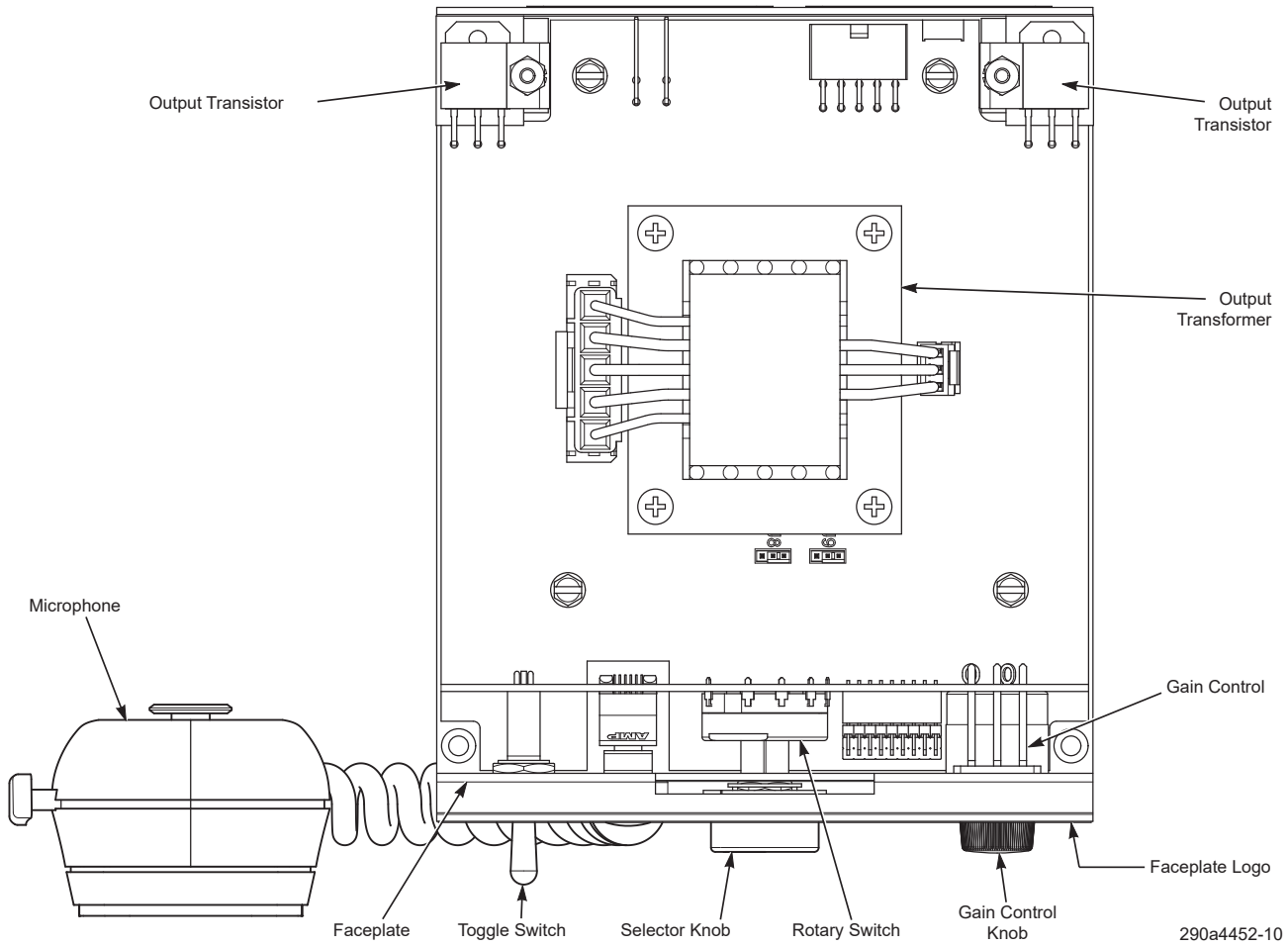
Ordering Replacement Parts

To order replacement parts, call Customer Support at 1-800-264-3578, 7 a.m. to 5 p.m., Monday through Friday (CT) or contact your nearest distributor.

Table 7 Replacement parts

Description	Part No.
Transistor, Output, BUT 70 W	125467
Transformer, Output	1461357
Fuse, 20 A, 3 AG, 32 V	148A127
Switch, Rotary	122376
Switch, Toggle	122377
Header, 10-Pole Molex	140454-05
Microphone (690000 and 690002)	258B577-03
Optional Microphone (690001 and 690004)	MNCT-SC
Microphone Clip	85361082
Microphone Strain Relief	231A148
Knob, Gain Control	141A102
Knob, Selector	141A111
Circuit Board Assy. (690000)	2005183-1234
Circuit Board Assy. (690001)	2005183-123
Circuit Board Assy. (690002)	2005183-124
Circuit Board Assy. (690004)	2005183-134
Switch, Gain Control	106128
Harness, Wiring	1461360
Kit, Installation Accessory	8537561
Bracket, Mounting	8536B022
Faceplate, Logo PA300	81461864
Faceplate, PA300 (690000 and 690001)	81461865
Faceplate, PA300 (690002 and 690004)	81461865-01
Adapter Cable	761300

Figure 9 Internal View



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University Park, Illinois 60484-3167

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Customer Support

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Work Truck: 800-824-0254 • +1 708 534-3400

Technical Support 800-433-9132 • +1 708 534-3400