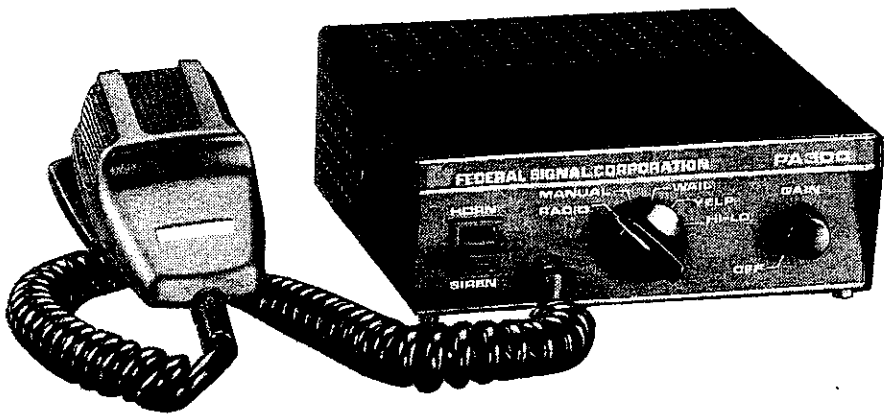


Model PA300-012MSC

ELECTRONIC SIREN



INSTALLATION AND OPERATING INSTRUCTIONS

SECTION II

SPECIFICATIONS

Input Voltage	11VDC to 16VDC.
Polarity	Negative or positive ground.
Standby Current	120ma. max. (not incl. panel light).
Operating Temperature Range	-30°C to +65°C.
Operating Current (Wail mode)	10 amperes, max. (11 ohm load, @ high power)
Frequency Range	700 to 1600Hz.
Cycle Rate	Wail- 12 cycles/min. Yelp- 180 cycles/min. Hi-Lo- 60 cycles/min.
Voltage Output (approx.)	64V peak-to-peak.
Dimensions (HWD)	2-1/2" (6.35cm) x 6-1/2" (16.51cm) x 8-1/2" (21.59cm).
Net Weight (incl. microphone)	4-1/2 lbs. (2.04kg).
Shipping Weight	6-1/2 lbs. (2.94kg).

NOTE

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

Audio Frequency Range	300 to 10,000Hz.
Harmonic Audio Distortion (300-3,000Hz)	10% max. all power levels from 1/2 to 50 watts (frequency response ± 3 dB).
Input Impedance (Radio)	2000 ohms.
Input voltage required to obtain 20VRMS across speaker load (Radio)	0.55VRMS.

3-3. POWER CABLE INSTALLATION.

CAUTION

Wiring changes have been made which requires the replacement of the old power cable, to achieve optimum siren performance. If this unit is used as a replacement in a two-speaker installation, you **MUST** remove the original power cable and install the new power cable (supplied).

The power cable included in the carton is equipped with a twelve-prong plug (P5) that mates with the connector (J5) on the rear of the electronic siren (see figure 3-2). The various wires on the connector must be connected as follows:

WARNING

Failure to observe this WARNING may result in fire, burns or blindness.

If shorted to vehicle frame, high current conductors can cause hazardous sparks resulting in electrical fires or molten metal.

DO NOT connect this system to vehicle battery until ALL other electrical connections are made and mounting of all components is complete.

Verify that no short circuits exist, before connecting to the Positive (+) battery terminal.

A. Speaker.

The unit is designed to operate with one 11-ohm impedance speaker or two 11-ohm impedance, low power (58W) or high power (100W), speakers connected in parallel and in phase. On FEDERAL speakers, this can be accomplished by connecting the two speaker leads marked "1" to the SPEAKER COMMON control cable lead and the two speaker leads marked "2" to the SPEAKER HIGH POWER or

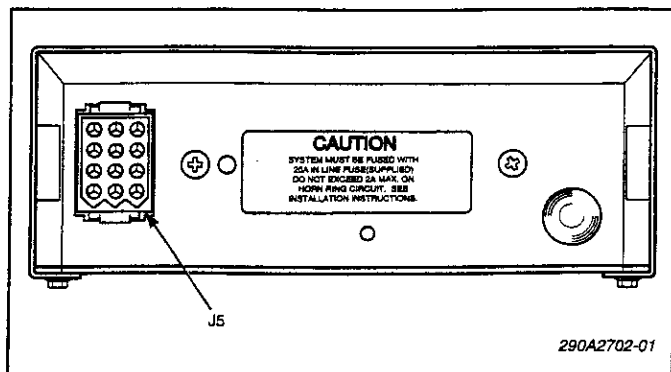


Figure 3-2. Rear View of PA300.

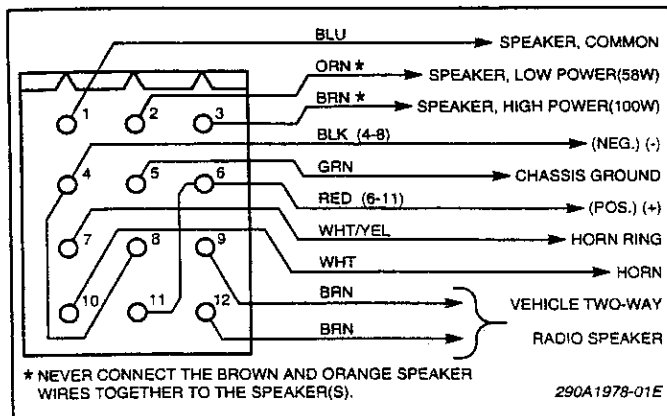


Figure 3-3. Control Cable Wiring Diagram.

SPEAKER LOW POWER control cable leads. See figure 3-3.

A speaker is not included as part of the electronic siren. FEDERAL speakers are weather-proof and may be installed in any convenient location; on the roof, fender, behind the grill, etc. Any special mounting instructions applicable to the type of speaker you have selected will be found in the speaker carton.

CAUTION

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

Using 18 gauge wire, connect the speaker leads (58W speakers to SPEAKER LOW POWER and 100W speakers to SPEAKER HIGH POWER) as shown in the Control Cable Wiring Diagram, figure 3-3.

B. Radio.

To allow incoming radio messages to be rebroadcast over the outside speakers, connect the two brown zip cord leads (P5, pins 9 and 12) across the two-way radio's speaker.

C. Horn Ring.

In order to utilize the Tap II and Press-and-Hold features of the siren, the following procedure must be performed.

1. Locate the wire that connects the vehicle horn ring switch to the horn or horn relay. Cut this wire.
2. See figure 3-4. Splice the white/yellow control cable wire (P5, pin 7) to the horn ring side of

CAUTION

Damage to unit will occur if not properly fused. If a chassis mounted fuse is NOT installed, ensure that an in-line fuse (20A) and fuseholder are installed in the red control cable lead (P5, pin 6).

3-1. UNPACKING.

After unpacking the Model PA300-012MSC, examine it for damage that may have occurred in transit. If the equipment 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.

Before proceeding with installation, ensure that the following parts have been included in the carton.

Qty.	Description
1	Cable Assembly
2	Lockwasher, 1/4
2	Screw, 1/4-20 x 1/2

3-2. MOUNTING BRACKET.

WARNING

When installing equipment inside air bag equipped vehicles, the installer **MUST** ensure that the equipment is installed **ONLY** in areas recommended by the vehicle manufacturer.

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

The electronic siren comes equipped with a swinging bracket which enables it to be mounted in variety of positions. Positioning the bracket above the unit allows mounting to the underside of the dash. Positioning the bracket below the unit will permit mounting on any horizontal surface.

The unit should be mounted in a position that is both comfortable and convenient to the operator. Keep visibility and accessibility of controls in mind. To install the unit under the dash, determine the mounting location and proceed as follows (see figure 3-1).

CAUTION

The unit must be installed in an adequately ventilated area. Never install near heater ducts.

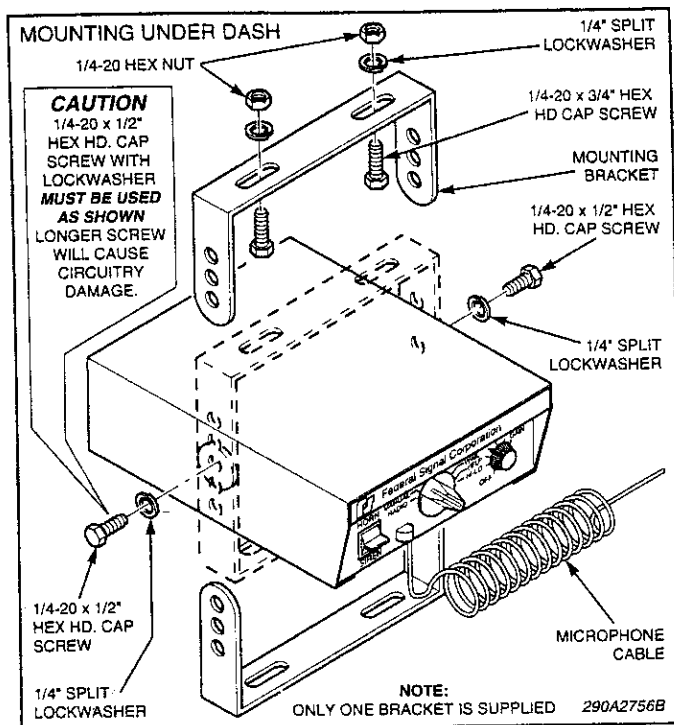


Figure 3-1. Installation of PA300 Under Dash.

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

CAUTION

Before drilling holes in ANY part of a vehicle, be sure that both sides of the mounting surface are clear of parts that could be damaged; such as brake lines, electrical wiring or other vital parts.

B. Drill two 1/4-inch diameter holes at the position marks.

C. Secure the mounting bracket to the dash with user-supplied 1/4-20 x 3/4 hex head screws, 1/4 split lockwashers and 1/4-20 hex nuts as shown in figure 3-1.

D. Secure the electronic siren to the mounting bracket with 1/4-20 x 1/2 hex head screws and 1/4 split lockwashers as shown in figure 3-1.

CAUTION

To avoid damage to the unit, the 1/4-20 x 1/2 hex head cap screws and the 1/4 split lockwashers must be used as shown in figure 3-1.

E. Tilt the unit to the desired position. Tighten the 1/4-20 x 1/2 hex head screws.

SECTION III

INSTALLATION

SAFETY MESSAGE TO INSTALLERS OF ELECTRONIC SIRENS

WARNING

The lives of people depend on your safe installation and servicing 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:

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.

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 which may, in certain situations, cause permanent hearing loss. You should minimize your exposure times and wear suitable hearing protection.

During Installation

- 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.
- 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 a solid chassis component and not to an insulated point.

- 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) in a location which provides maximum signaling effectiveness and minimizes the sound reaching the vehicle's occupants.
- Installation of two speakers requires wiring speakers in phase.
- 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.
- If wiring is shorted to vehicle frame, high current conductors can cause hazardous sparks resulting in electrical fires or flying molten metal.

After Installation

- After installation, test the electronic siren, speaker system, and light system to ensure that it is operating properly.
- Test all vehicle functions, including horn operation and vehicle light systems, to ensure proper operation.
- 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 re-installing the product.

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

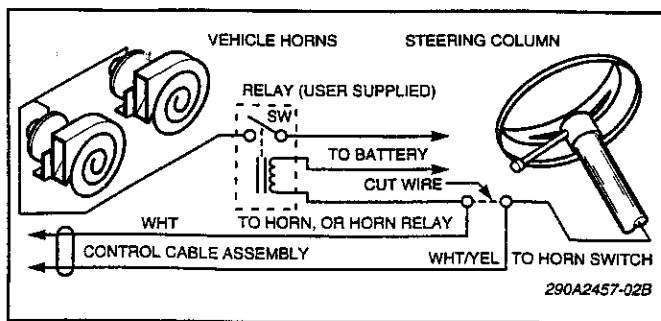


Figure 3-4. Horn Ring Connections.

the wire that was cut in step 1. Insulate the splice with the wire nuts (supplied).

CAUTION

The horn ring transfer circuit of the siren is capable of switching a maximum of 2-amperes. Some vehicles do not have a horn relay and, consequently, will draw more than 2-amperes 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-amperes, perform the procedure in step 3. If it is *greater* than 2-amperes, perform steps 4 through 10.

3. Splice the white control cable wire (P5, pin 10) to the horn side of the cut wire. Insulate the splice with a wire nut.

4. Obtain a SPST relay of sufficient contact current capacity to activate the vehicle horn. Refer to figure 3-4 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, i.e., 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.

D. Connection to Power Source.

CAUTION

Damage to unit will occur if not properly fused. A chassis mounted fuse is NOT installed. Ensure that an in-line fuse (20A) and fuseholder are installed in the red control cable lead (P5, pin 6).

The PA300-012MSC can operate from any 12-volt positive or 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.

CAUTION

Before drilling holes in ANY part of the vehicle, ensure that both sides of the surface are clear of parts that could be damaged; such as brake lines, fuel lines, electrical wiring or other vital parts.

If your vehicle has a negative ground electrical system, perform the procedure in paragraph 1. Perform the procedure in paragraph 2, if the vehicle has a positive ground system.

1. Negative Ground.

a. Connect the green (P5, pin 5) and black (P5, pin 4) control cable leads to the vehicle chassis as close as practical to the siren. Scrape paint away from the selected bolt hole to ensure a good electrical connection to the chassis.

b. Route the red control cable lead (P5, pin 6), through the previously drilled hole, into the engine compartment. Route the wire through existing clamps and holders toward the battery.

c. To protect the 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 gauge or heavier wire can be spliced to the red lead.

d. Connect the in-line fuseholder lead to the positive (+) battery terminal.

2. Positive Ground.

a. Connect the green (P5, pin 5) and red (P5, pin 6) control cable leads to the vehicle chassis as close as practical to the siren. Scrape paint away from the selected bolt hole to ensure a good electrical connection to the chassis.

b. Route the black control cable lead (P5, pin 4), through the previously drilled hole, into the engine compartment. Route the wire through existing clamps and holders toward the battery.

c. To protect the 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 gauge or heavier wire can be spliced to the black lead.

d. Connect the in-line fuseholder lead to the negative (hot) battery terminal.

3-4. AIR HORN PRESS-AND-HOLD MODIFICATION.

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 JU1 and JU2 from the "PEAK" position on the P.C. board to the "AIR" position (see figure 3-5).

3-5. RELATIVE PA LOUDNESS ADJUSTMENT.

After the electronic siren is completely installed in the vehicle, set the Selector switch to MANUAL. Depress 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, adjust R11 through the hole at the bottom of the siren (see figure 3-6) to the desired sound level.

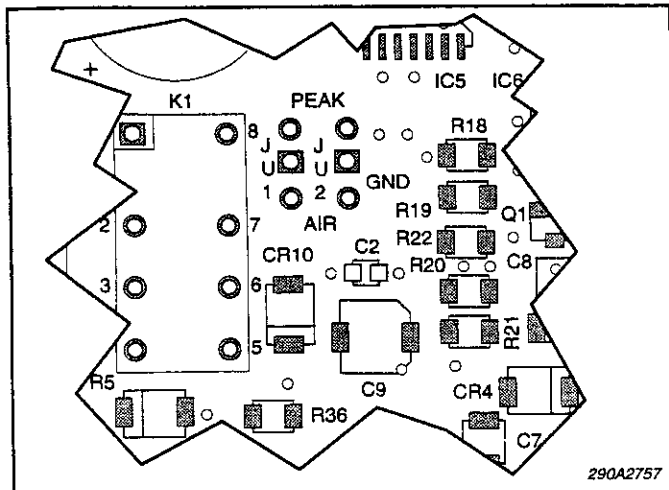


Figure 3-5. Press and Hold Modification.

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

3-6. TESTING AFTER INSTALLATION.

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.

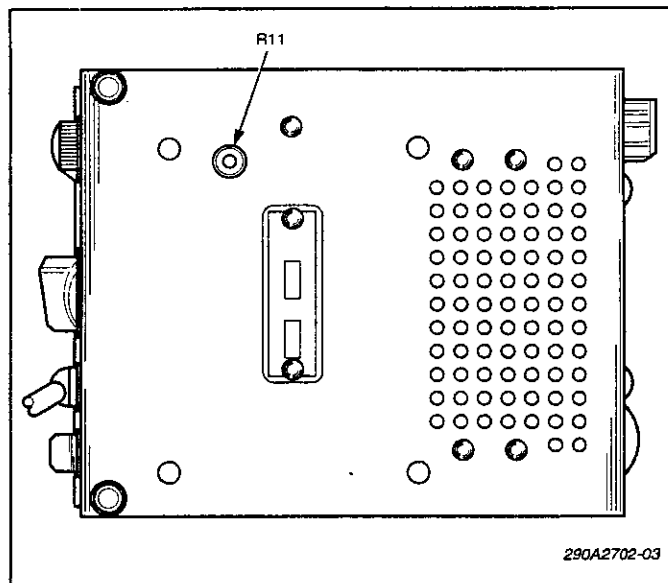


Figure 3-6. Relative PA Loudness Adjustment.

SECTION IV OPERATION

SAFETY MESSAGE TO OPERATORS OF FEDERAL SIGNAL ELECTRONIC SIRENS AND LIGHT/SOUND 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 which may, in certain situations, cause permanent hearing loss. You should minimize your exposure times and wear suitable hearing protection.

Sound Limitations

- 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, such as 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.

4-1. GENERAL.

All controls utilized during normal operation of the Model PA300-012MSC are located on the front panel (see figure 4-1).

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.

4-2. GAIN CONTROL.

The GAIN control is used to turn the siren on and off. Also, it is 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.

4-3. 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.

A. RADIO.

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

B. 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 (refer to paragraph 4-6).

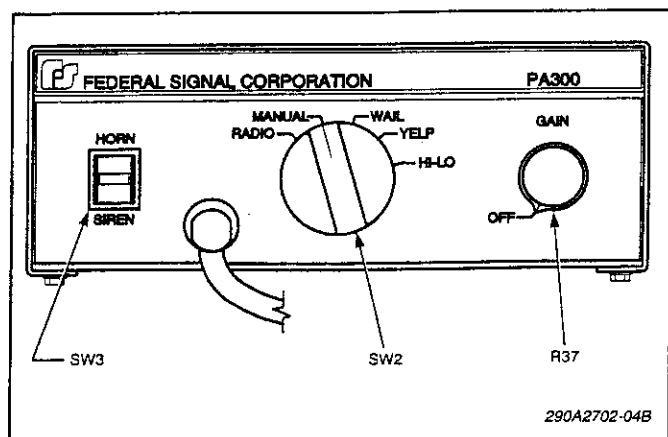


Figure 4-1. Front View.

C. WAIL.

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

D. YELP.

In this position; a continuous, rapid "warbled" tone is generated.

E. HI-LO.

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

4-4. 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.

4-5. 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:

TAP II FUNCTIONS

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

4-6. PRESS AND HOLD FUNCTIONS.

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

PRESS AND HOLD FUNCTIONS

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

SECTION V

SERVICE AND MAINTENANCE

SAFETY MESSAGE TO PERSONNEL SERVICING FEDERAL SIGNAL ELECTRONIC SIRENS

WARNING

The lives of people depend on your safe servicing of Federal 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 electronic siren.
- To properly service 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.
- Electronic circuit 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 which may cause, in certain situations, permanent hearing loss. You should take appropriate safety precautions such as wearing hearing protection.
- 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 fusible link at the front fender between the negative (-) battery terminal and chassis ground.
- After repair, test the electronic siren and speaker system to ensure that it is operating properly.

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

5-1. GENERAL.

Most of the component electronic parts used in the Model PA300-012MSC are standard items that can be obtained from any TV or electronics shop. In order to reduce equipment down-time, Federal recommends that the entire printed circuit board (Part No. 2001220) be replaced. The printed circuit boards are relatively inexpensive allowing you to keep an adequate supply in your repair shop.

For warranty service, contact your local Distributor.

The factory can and will service your equipment or assist you with technical problems that cannot be handled satisfactorily and promptly locally.

Communications and shipments should be addressed to:

Service Department
Federal Signal Corporation
2645 Federal Signal Drive
University Park, IL 60466

1-800-433-9132

5-2. SIREN.

A. General.

Any competent TV repairman or electronic technician should have little difficulty in tracing a malfunction, should any occur. For emergency replacement of any of the small components, care must be used when soldering. Heat easily impairs transistors, capacitors and circuit boards. It is therefore advisable to use longnose pliers or a similar heat sink on the lead being soldered.

B. Removal for Servicing.

When removing the chassis for servicing, loosen the two hexagon head screws on the underside of the unit, near the front edge. Slide the entire chassis out of the case.

C. Removal of Circuit Board.

Unplug the connectors and plug-in type terminals from the PC board. The PC board is secured to the chassis by four standoffs. Depress the locking tab on each standoff and gently lift the board out of the chassis.

D. *Replacement of Output Transistors.*

Failure of one or both of the output transistors (Q7, Q8) is usually the result of a defective speaker (short circuited voice coil). Rebroadcast of unsquelched radio or music for long periods will also have a detrimental effect on the output transistors, and is therefore not recommended.

Federal recommends that both output transistors be replaced should only one device prove to be defective. This practice will ensure long periods of service between failures.

When installing new output transistors, ensure that the Sil-Pad insulators are installed between the heat-sink and transistors.

CAUTION

Make certain that the speaker is not defective prior to installing the repaired PA300-012MSC.

5-3. REPLACEMENT PARTS LIST.

Reference Designation	Description	Part Number
Q7, Q8	Transistor, TIP35C, NPN, Power	125B437B
T2	Transformer, Output	120C165A-04
F1	Fuse, 20A, 3AG, 32V	148A127
DS1	Lamp, 14V, #1893	149A121A
SW2	Switch, Rotary	122B215A
SW3	Switch, Paddle	122A214A
TB1	Terminal Strip	229A127
J5	Connector, 12-pin Molex (Chassis Mount)	139A152
	Molex Pin, Male (Use with 139A152)	233A129A
	Insulator, TIP35C	235163A
	Microphone	258B577B-02
	Microphone Clip	159A101
	Microphone Strain Relief	231A148A
	Knob, GAIN control	141A102
	Knob, Selector	141A111
	Circuit Board (with parts installed)	2001220A
	Gain Control	106A116
	Harness, Wiring	175822A
	Installation Accessory Kit	8537316A
	Bracket, Mounting	8536B022
	Face Plate Logo	8146B892B-01
	Face Plate	8146C893B

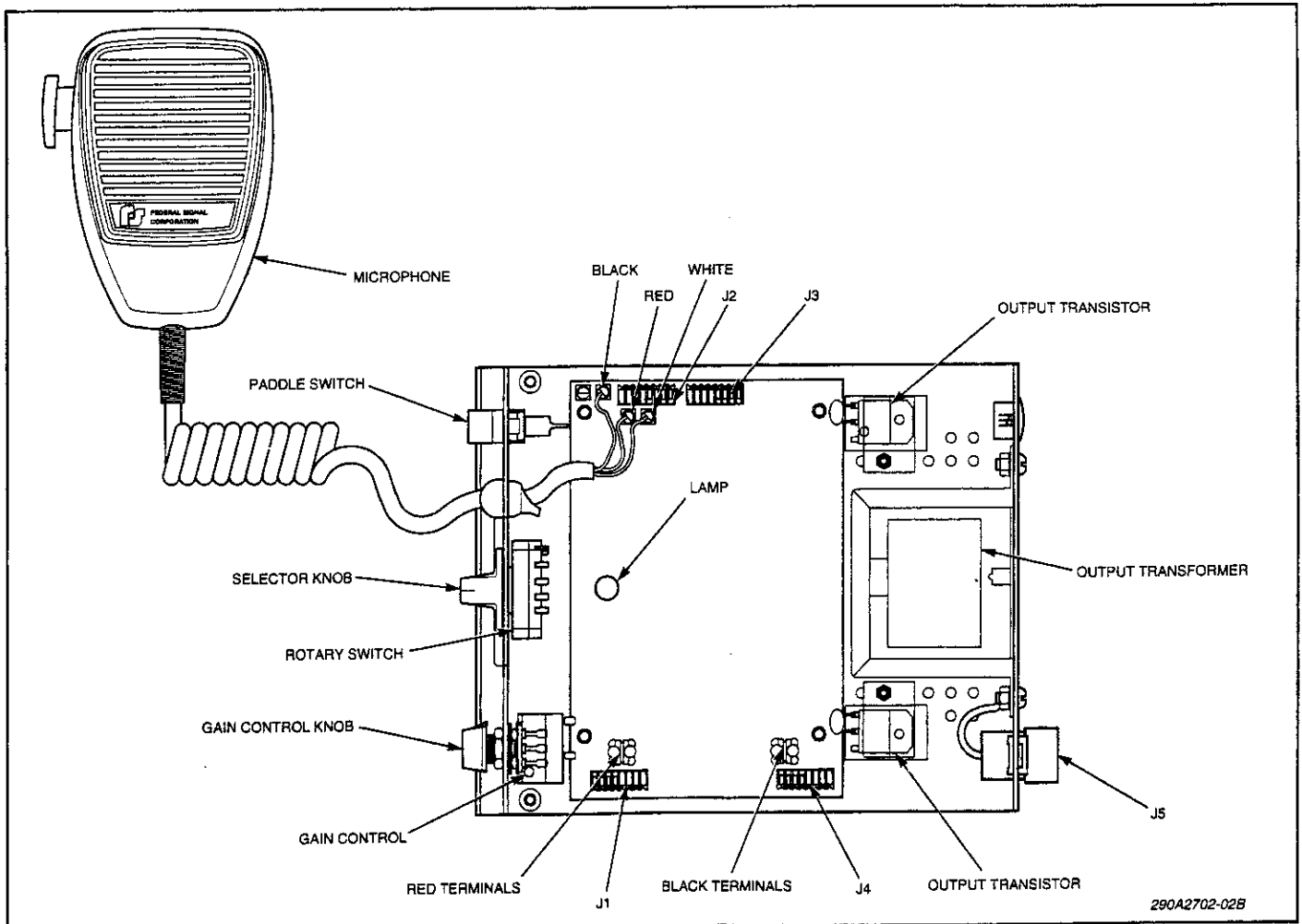


Figure 5-1. Internal View.