

Price \$2.00

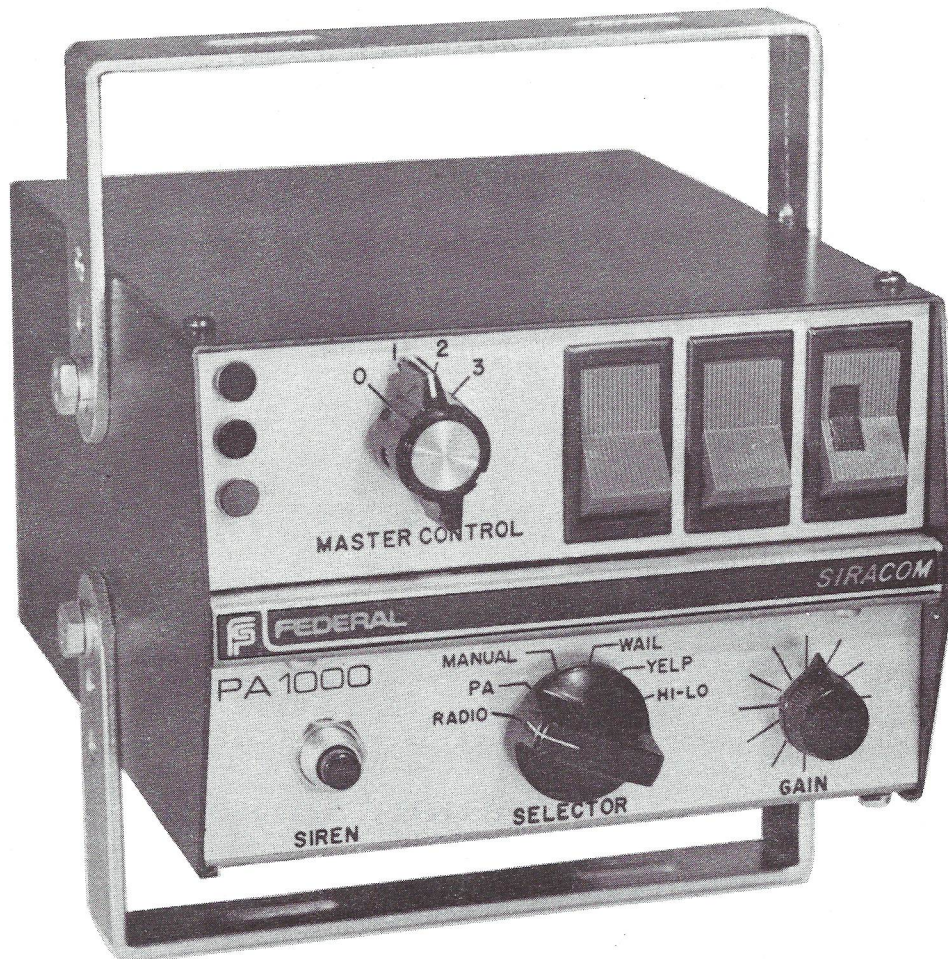


SIGNAL DIVISION  
Federal Signal Corporation

MODEL PA-1000

**SIRACOM**<sup>T.M.</sup>

SIREN/CONTROL SYSTEM



INSTALLATION AND SERVICE INSTRUCTIONS

## Warranty

*The Federal Signal Corporation warrants each of its new electronic sirens to be free from defective material and workmanship for a period of one year from date of purchase. Federal Signal Corporation will remedy any defect which under normal installation and operation discloses such defect; provided the unit is delivered, transportation prepaid by owner, to our factory for examination and such examination reveals that in our judgment a defect in material and/or workmanship exists. In all cases, Federal Signal Corporation will be sole judge of what constitutes defective material and workmanship.*

*Defects of workmanship and material under this warranty will be corrected at no cost to you for labor and material.*

*This warranty does not extend to any electronic siren which has been subjected to abuse, misuse; improper installation or violation of any instructions supplied by us, nor extended to units which have been serviced or modified at any facility other than our factory.*

*This warranty takes precedence over all other warranties expressed or implied and no representative or other person is authorized to assume for Federal Signal Corporation any other liability in connection with the sale of our electronic sirens.*

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**FEDERAL SIGNAL CORPORATION**

# SECTION I

## GENERAL DESCRIPTION

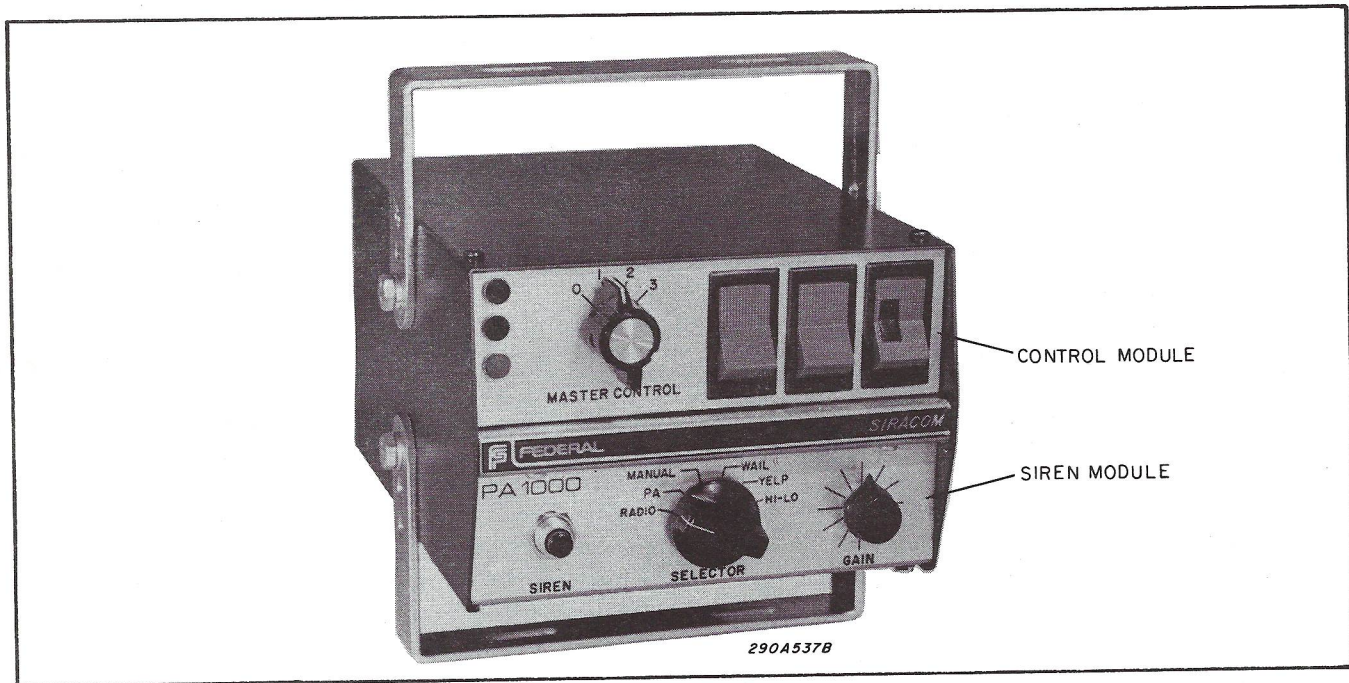


Figure 1-1. Model PA-1000 Siren Control System.

### 1-1. GENERAL.

The Federal PA-1000 SIRACOM<sup>®</sup> (figure 1-1) is a precision built, compact Siren/Control System of advanced design. It consists of a Control Module and a Siren Module.

The Control Module contains all the necessary control circuitry; switches, relay, circuit breaker, terminal blocks, etc. to control the entire emergency warning light system and vehicle accessories. It also routes power to the Siren Module.

The Siren Module provides three distinct siren sounds plus provisions for public address, manual siren operation and the amplification of radio messages. It can be easily removed without disturbing vehicle wiring to the control switches and without disabling any of the vehicle accessories (i. e. horn, lights, radio, gun lock, etc.).

The PA-1000 comes equipped for use with a 12 VDC power source (negative grounded system only). Any 58 watt or 100 watt speaker(s) may be used with the PA-1000.

### 1-2. CONTROL MODULE.

The Control Module is designed to allow simple connection and control of all

vehicle emergency warning devices, along with control and distribution of power to other safety and emergency devices normally found in an emergency vehicle.

A four position MASTER CONTROL rotary switch is used to control the emergency warning light system and the siren. Any combination of lights can be controlled by the MASTER CONTROL switch via connections made at the reliable screw-type terminals located at the rear of the unit. The MASTER CONTROL switch sequentially operates the vehicle's flashing lights (position 1), rotating lights (position 2) and rotating lights and siren (position 3). Position 0 is the "off" position. The position of the switch is shown by colored indicator lights (POS. 1 - green, POS. 2 - red, POS. 3 - red and blue). In position 3, the horn ring circuit is transferred from horn to siren.

A maximum of three rocker-type accessory switches can be provided for controlling additional functions such as spotlight, gun lock, brake lights, trunk lid, etc. Unused switch openings are provided with blank plugs for future needs. The basic types of switches and typical applications are shown on the following page.

Typical Applications	Type of Switch	Type No.
Flood lights, spotlights, etc.	DPDT (center off)	2
Brake lights and/or back-up lights cut-out	DPDT	3
Gun, trunk, and door locks	DPST (momentary)	4
Alley lights	2SPST	5
Auxiliary lights and rear light cut-off	SPDT (lighted)	6
Two-way radio re-broadcast switching, etc.	DPDT	7

The terminal positions on the rear panel (figure 1-2) are clearly designated by a brushed aluminum legend plate with black lettering below the terminal block. The electrical current capability of each individual terminal on the terminal block corresponds to the MASTER CONTROL switch as follows:

Term.	Current Limit	Switch Position
1	12A	1
1-2	12A	1 or 2
1-2-3	45A	1, 2 or 3
2-3	45A	2 or 3
3	24A	3
H L	24A	3

Along with the six terminals used with the MASTER CONTROL switch, eight other terminals are provided. Three are used for speaker connections (common, high-power, low-power) and one each for ignition, radio control, horn, horn ring and flasher.

The lower terminal block is connected directly to the accessory rocker-type switches. These switches control the additional vehicle devices. Placards below the terminals indicate switch wiring.

A built-in automatic reset fifty-ampere circuit breaker protects the vehicle lights

and accessory wiring. The Siren Module is protected by a separate 20-ampere fuse.

### 1-3. SIREN MODULE.

The Siren Module is of the latest solid-state circuit design with carefully chosen output power taps that allow the use of either 100 watt or 58 watt siren speakers. The unit provides three distinct siren sounds (Wail, Yelp, Hi-Lo) plus provisions for public address, manual siren operation and the amplification of radio messages. A manual SIREN switch is provided for controlling the siren.

By use of an auxiliary switch, such as a horn ring or foot switch, the unit can be operated manually. The unit can still be operated manually by depressing the SIREN button, after the auxiliary switch is installed. Also available is an "instant yelp" option, which causes the siren to emit a yelp signal whenever the MASTER CONTROL switch is in Position 3 and the horn ring is depressed.

The microphone plug-in convenience of the PA-1000 allows the user to utilize the vehicle's two-way radio microphone, or an independent microphone.

The PA-1000 may be used with its own separate microphone or with a two-way radio

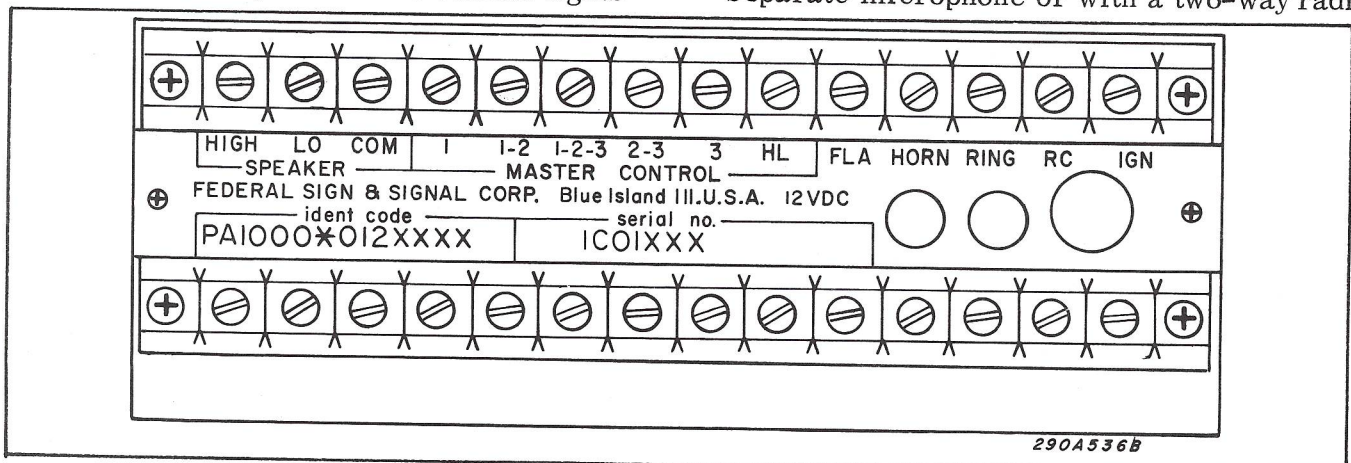


Figure 1-2. Rear View of Control Module.

microphone that operates in common with the PA-1000 and the two-way radio. A switch located at the rear of the unit is provided to convert the unit from common microphone operation to PA override operation. With the switch in the PA override position, the vehicle radio and siren have separate microphones and the public address function will be obtained in any control or function switch position except RADIO by depressing the microphone pushbutton switch. In the PA override position, the public address function will override all other siren functions, except radio re-broadcast.

In the common microphone position, the vehicle's two-way radio and siren share a common microphone. An adapter cable connects the siren directly to the two-way radio. The common microphone will be electrically connected to the two-way radio in all function switch positions except PA.

When in the PA position the microphone will be connected to the siren amplifier for broadcast of messages on the vehicle's siren speaker system.

Other special features of the PA-1000 include:

- Siren Module can be removed for servicing without disturbing or deactivating other vehicle equipment.
- New feedback circuitry producing better audio quality for public address and radio rebroadcast.
- Newly designed solid-state amplifier which provides improved performance and durability under a wide range of environmental conditions.
- Plug-in printed circuit board for ease of service.

# SECTION II

## SPECIFICATIONS

### 2-1. GENERAL.

Input Voltage . . . . .	10VDC to 16VDC (limit 16VDC to 15 min.)
Polarity . . . . .	Negative ground only
Standby Current (MASTER CONTROL switch in POS. 0). . . . .	0 MA approx. (not incl. panel light)
Operating Temperature Range . . . . .	-30°C to +65°C
Auxiliary Switch Leakage Resistance (manual siren or instant Yelp option) . . . . .	10K ohms, minimum

### 2-2. SIREN.

Operating Current (14.0 VDC - Wail):	
1 Low Power Speaker . . . . .	5 amperes, max.
2 Low Power Speakers or/1 High Power Speaker . . . . .	10 amperes, max.
2 High Power Speakers . . . . .	15 amperes, max.
Frequency Range . . . . .	500 to 1500 Hz
Cycle Rate . . . . .	Wail - 10 cycles/min. Yelp - 180 cycles/min. Hi-Lo - 50 cycles/min.
Voltage Output (approx.)	
1 Low Power Speaker . . . . .	45V P-P
2 Low Power Speakers . . . . .	40V P-P
1 High Power Speaker . . . . .	64V P-P
2 High Power Speakers . . . . .	60V P-P

### 2-3. AUDIO.

#### NOTE

Input voltage 14.0 VDC. Radio potentiometer and Volume Control at maximum.

Frequency Range . . . . .	300 to 10,000 Hz
Harmonic Audio Distortion (300-3,000Hz) . . . . .	10% max., all power levels from $\frac{1}{2}$ to 70 watts (Frequency response $\pm 3$ dB)
Input Impedance . . . . .	Radio - 500 ohms Carbon Mic. - 3,000 ohms Magnetic Mic. - 10K ohms
Input voltage required to obtain 20 VRMS across 2 speaker load (high power tap) . . . . .	Radio - 0.55 VRMS Carbon Mic. - 0.165 VRMS Magnetic Mic. - 0.025 VRMS

# SECTION III

## INSTALLATION

### 3-1. UNPACKING.

After unpacking the Model PA-1000, 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 the damage. Carefully check all envelopes, shipping labels and tags before removing or destroying them. The radio interconnecting cable, if ordered, is packed in a separate carton.

### 3-2. GENERAL.

Before connecting any wires to the PA-1000; install all revolving and/or flashing lights, gun locks, trunk locks and other accessories that will be controlled by the PA-1000. Bring all wires to the mounting location of the PA-1000, allowing 8-12 inches of extra wire at the siren location. Also, install the vehicle speakers and run the leads (18 gauge wire) to the siren location. Run leads to the vehicle's horn ring circuit, battery (no less than 10 gauge wire) and ignition circuit (no less than 16 gauge wire). If desired, all leads at the PA-1000 can be terminated with standard crimp-on spade connectors.

### 3-3. MOUNTING BRACKET.

The PA-1000 comes equipped with two swinging brackets which enable it to be mounted in a variety of positions. Positioning one of the brackets above the unit allows mounting to the underside of the dash. Positioning the bracket below the unit will permit mounting on any horizontal surface or, by the use of Federal's TU-70 Tunnel Mount on the vehicle's transmission hump. After installation in one of these positions, the other mounting bracket can be used to secure the vehicle's two-way radio control head or other accessory.

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.

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

B. Drill two  $\frac{1}{4}$ -inch diameter holes at the position marks.

C. Secure the mounting bracket to the dash with (2 each)  $\frac{1}{4}$ -20 x  $\frac{3}{4}$  hex. head screws,  $\frac{1}{4}$  split lockwashers and  $\frac{1}{4}$  - 20 hex. nuts as shown in figure 3-1.

D. Secure the PA-1000 unit to the mounting bracket with  $\frac{1}{4}$  - 20 x  $\frac{3}{4}$  hex. head screws and  $\frac{1}{4}$  split lockwashers.

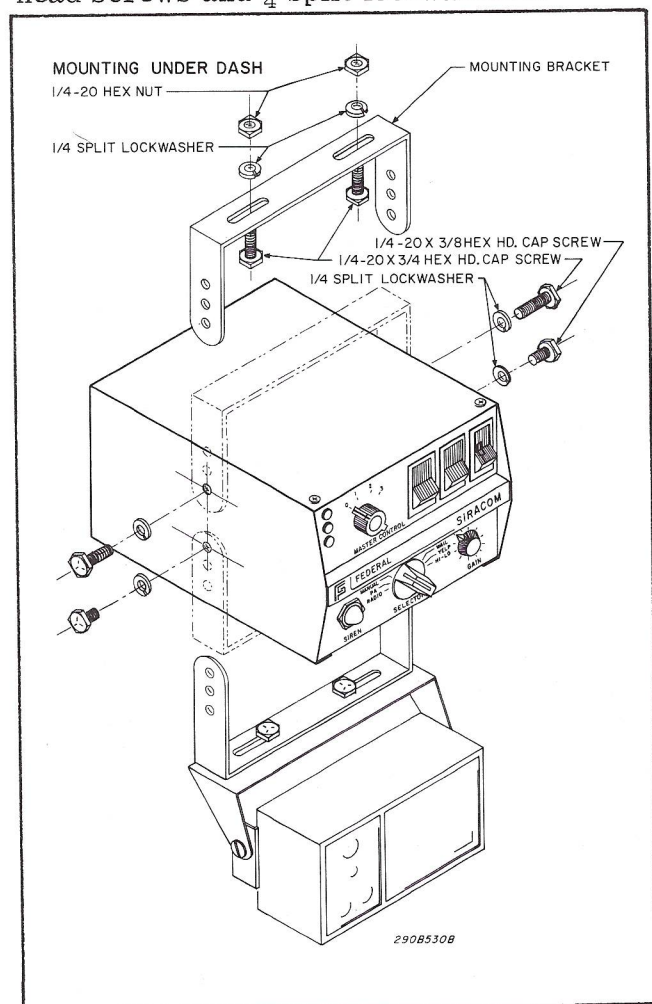


Figure 3-1. Installation of PA-1000 Under Dash.

E. Tilt the unit to the desired position. Tighten the  $\frac{1}{4}$  - 20 x  $\frac{3}{4}$  hex. head screw.

F. If a two-way radio control head is going to be installed under the PA-1000, secure the other mounting bracket to the PA-1000 with  $\frac{1}{4}$  x 20 x  $\frac{3}{8}$  hex. head screws and  $\frac{1}{4}$  split lockwashers. Federal's Model UB-70 Universal Bracket is recommended to aid installation of the control head to the lower bracket. Follow the Installation Instructions supplied with each UB-70.

NOTE: When installing the PA-1000 on the transmission hump, a Federal Model TU-70 Tunnel Mount is recommended. The TU-70 Tunnel Mount is drilled and tapped for the PA-1000 mounting bracket. Follow the installation instructions packed with each unit. Also, the two-way radio can be installed above the PA-1000 after the upper mounting bracket is secured using  $\frac{1}{4}$  - 20 x  $\frac{3}{4}$  hex. head screws and  $\frac{1}{4}$  split lockwashers.

### 3-4. POWER CONNECTIONS.

#### NOTE

The PA-1000 should be used only in a vehicle which has a negative ground electrical system.

Connect the red power lead of the PA-1000 to the vehicle's battery. If necessary splice additional #10 gauge or heavier wire to the heavy red lead using the supplied splice connector. (This wire may be fused at 50 amperes, however the PA-1000 has a 50-ampere circuit breaker in the Control Module as well as a 20-ampere fuse in the Siren Module.) It is recommended that this lead be connected directly to the battery or a distribution box which is connected directly to the battery.

The black wire should be grounded directly to the vehicle frame near the siren. Since this wire supplies the ground for only the Siren Module and indicator lights and panel lights it is only #14 gauge.

### 3-5. SPEAKER CONNECTION.

If one or two 58 watt speakers are used, such as Federal Sign and Signal Corporation's CP-25 or TS-24, connect the speaker leads (18 gauge) to the COM and LO ter-

minals, located at the rear of the unit, as shown in figure 3-2.

When two speakers are used, it is necessary to connect the speakers in parallel and in-phase for optimum performance. This can be accomplished by connecting the two speaker leads marked "1" to the same power cable lead, and the two speaker leads marked "2" to the other power cable lead (see figure 3-2 or 3-3).

#### CAUTION

When using 58 watt speakers, never connect speaker wires to the COM and HIGH terminals. Damage to the speakers may result.

If one or two 100 watt speakers are used, such as Federal's CP-100 or TS-100, the leads can be connected to either of the two output power taps. For maximum audio power output and normal speaker life, connect the speaker wires to the "COM" and "HIGH" terminals as shown in figure 3-3. For slightly longer speaker life, the speaker wires may be connected to the COM and LO terminals. Again, be sure to observe proper speaker phasing when two speakers are used.

### 3-6. RADIO INTERCONNECTIONS.

#### NOTE

Refer to Section IV for a description on the operation of the PA override and common microphone features. The PA-1000 can be easily set for operation in one of these modes. If required, the mode of operation can be changed at a future date.

#### A. PA Override Connections.

#### NOTE

If the radio broadcast function is not desired, or if the vehicle is not equipped with a two-way radio; proceed as follows, except disregard information on FN212 and FN203 adapter cables.



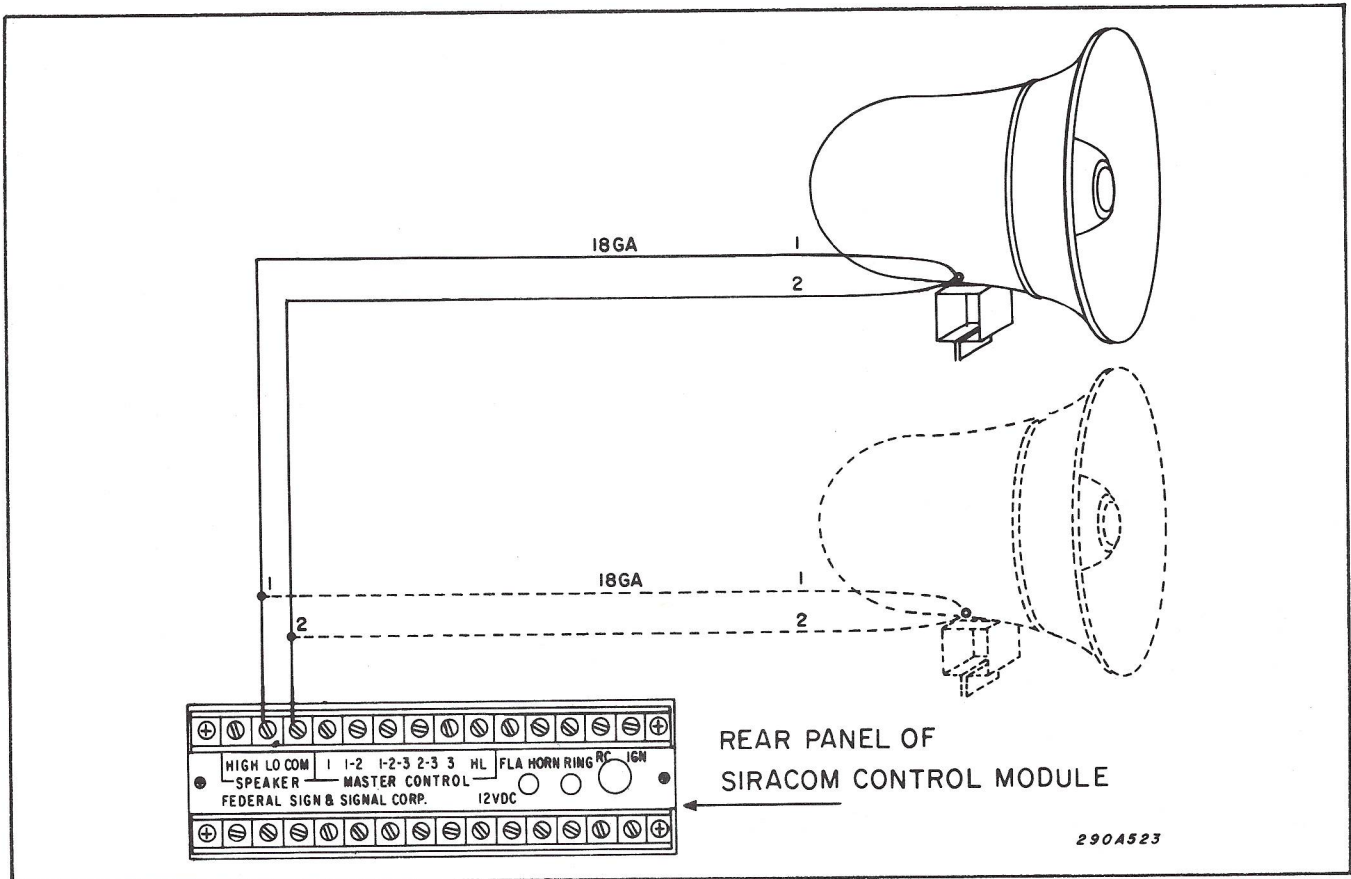


Figure 3-2. Connection of 58 Watt Speakers to PA-1000.

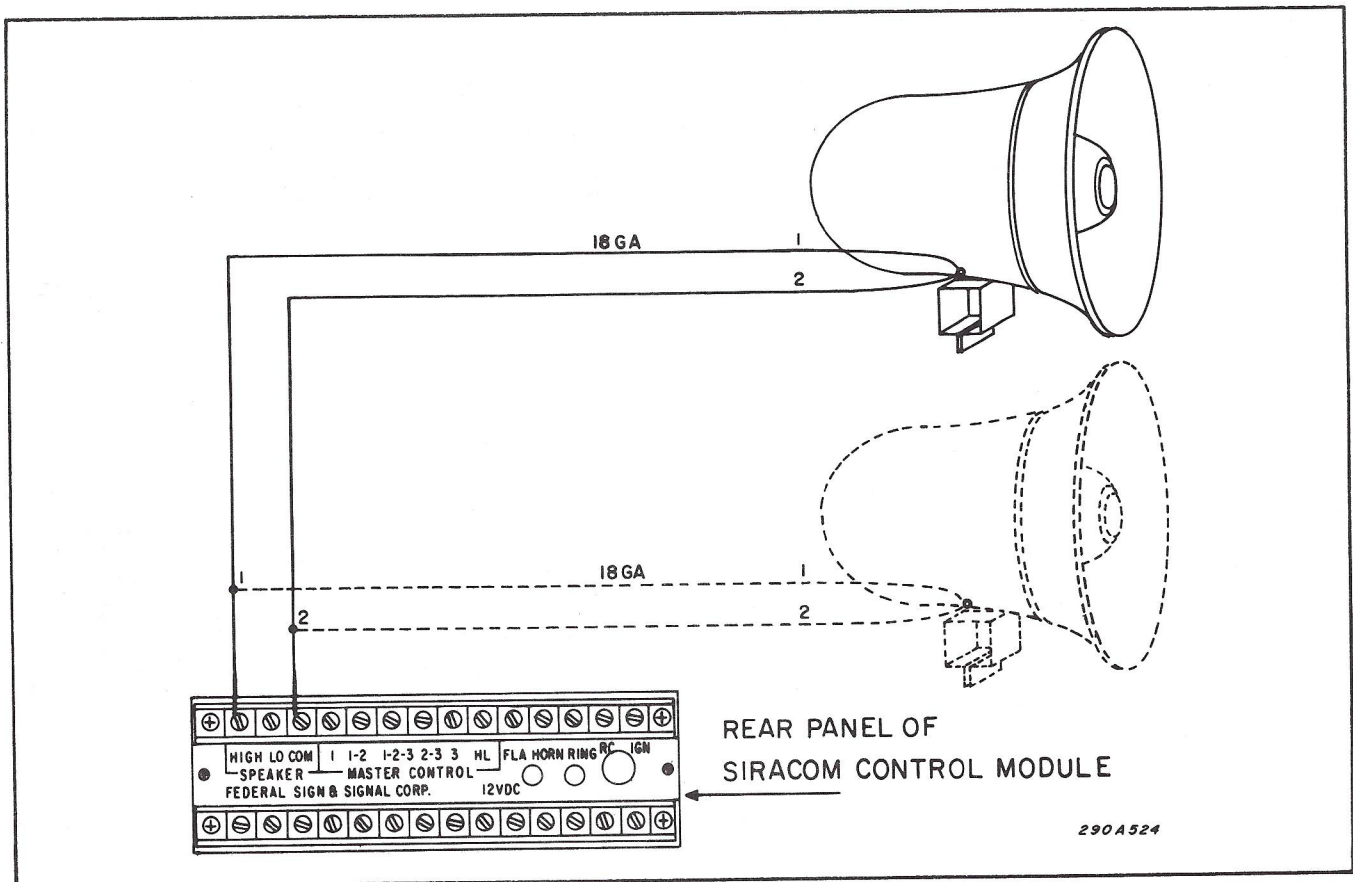


Figure 3-3. Connection of 100 Watt Speakers to PA-1000.

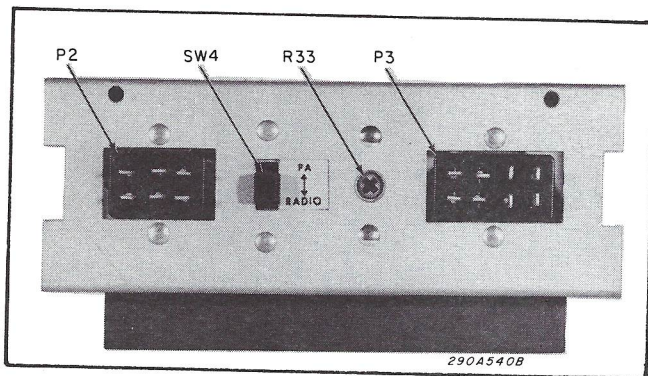


Figure 3-4. Rear View of Siren Module.

In order to take advantage of the PA override feature, separate microphones are required for the two-way radio and the siren's public address function. If PA override operation is desired, with re-broadcast of radio messages, proceed as follows:

1. Set the PA-RADIO switch, located on the rear panel of the Control Module (see figure 3-4), to PA. This sets the PA-1000 to the PA override mode of operation.

2. Obtain Federal radio cable Model FN203. Plug the cable into the 6-pin connector (P2 in figure 3-4) located at the rear of the Siren Module

3. Connect the black and red wire of the FN212 cable (or green and red wires if using FN203) across the two-way radio's speaker voice coil terminals.

4. Plug the Federal microphone (Model MNC or MR) into the microphone jack at the bottom of the Siren Module. The PA-1000 is now set for PA override operation.

#### B. Common Microphone Connections.

If common microphone operation is desired (common microphone for public address and vehicle's two-way radio) with re-broadcast of radio messages, proceed as follows:

1. Set the PA-RADIO switch, located on the rear panel of the Control Module (see figure 3-4), to RADIO. This sets the PA-1000 internal circuitry to the common microphone mode of operation.

2. Obtain the appropriate Federal radio adapter cable which corresponds to the type of two-way radio installed in your vehicle (refer to Bulletin 320). Follow the installation instructions supplied with the cable.

3. Plug the two-way radio microphone into the microphone jack at the bottom of

the Siren Module. The PA-1000 is now set for common microphone operation.

4. NOTE: If your vehicle's two-way radio utilizes a positive supply PTT circuit (such as GE Master I, GETPL and all RCA radios), the radio's microphone will not be able to operate the PA-1000 control relay when public address operation is desired. To modify your PA-1000 for use with the above radios, refer to paragraph 3-6. E., below.

#### C. Carbon or Magnetic Microphone Switch Setting.

The unit will operate with a magnetic, controlled magnetic (noise cancelling), carbon or transistorized magnetic microphone. A slide switch (S3), located on the right side of the plug-in printed circuit board (see figure 3-5) inside the Siren Module, must be set according to the type of microphone used. The switch setting (C or M) can be easily changed by placing the index finger under the PC board just in front of the driver transformer located on the front right-hand side of the chassis.

When a controlled magnetic microphone is used, set the switch to the position marked "M". (Move the switch toward the front of the panel.) If a carbon or transistorized microphone is used, set the switch to the position marked "C". (Move the switch toward the rear panel of the chassis.) The "C" and "M" markings are clearly etched into the printed circuit board.

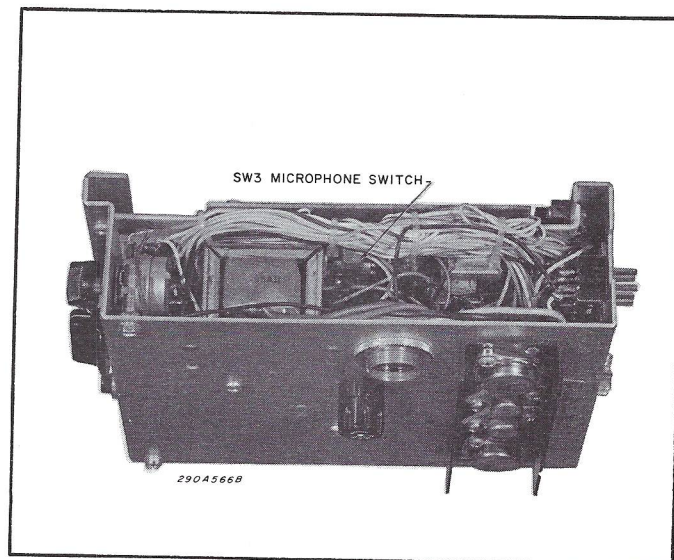


Figure 3-5. Microphone Switch Location.

#### D. Relative PA Loudness Adjustment.

After the PA-1000 is completely installed in the vehicle, set the SELECTOR switch to PA. Depress the microphone push-to-talk switch, speak in a normal voice, and adjust the GAIN control for a desirable listening 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 siren SELECTOR switch to RADIO. Stand outside the vehicle and note the radio re-broadcast loudness. If too loud or soft; adjust R33, located on the Siren Module rear panel (see figure 3-4), for the desired level. If the volume outside the vehicle was too loud, adjust the control counterclockwise. If too soft, vary the control clockwise until the desired level is obtained.

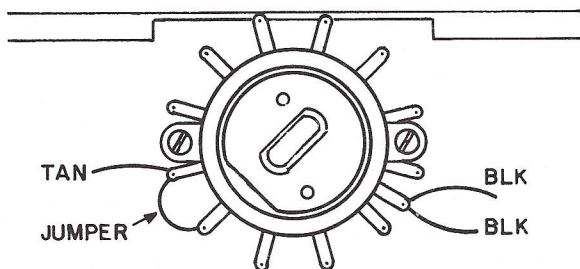
Once the adjustment is completed, the radio re-broadcast and public address loudness may be varied by using the front panel GAIN control.

#### E. Modification of Siren Amplifier for Positive PTT Circuits.

Perform the following modification only if your vehicle has a positive PTT circuit (GE Master I, GE TPL and all RCA radios).

1. Remove the siren amplifier from housing and remove PCB. Remove the SELECTOR switch knob. Loosen the SELECTOR switch by removing the mounting nut.

2. Locate the two terminals shown in the diagram below. Solder a short jumper wire between the terminals.



3. Remount the SELECTOR switch, replace knob, PCB and install siren amplifier into housing. The modification is now complete.

The siren amplifier will now be on whenever the SELECTOR switch is in either the RADIO or PA positions, as indicated by the blue panel lamp.

#### 3-7. IGNITION CIRCUIT.

Connect the terminal marked IGN to the vehicle ignition or accessory circuit. This terminal will supply power to the console panel light and two-way radio control head or control relay whenever the vehicle ignition key switch is in the "on" position.

NOTE: For normal operation of the console panel lamp, this circuit must be connected.

#### 3-8. HORN RING CIRCUIT.

To connect the vehicle's horn ring circuit so that the horn ring controls the siren's manual operation (or Instant Yelp Option), proceed as follows (see figure 3-6):

A. Locate the vehicle's horn ring wire, which runs between the horn ring circuit and the horn relay or horns. Cut this wire and splice additional wire to each end in order for the wires to terminate at the PA-1000.

B. Connect the wire which is connected to the horn ring to the terminal marked RING.

C. Connect the wire from the vehicle horn relay or horns to the terminal marked HORN. The siren will now automatically compensate for both positive and negative horn ring circuits without regard to polarity and without adjustment.

#### 3-9. RADIO CONTROL CIRCUIT.

NOTE: Prior to performing the following procedure, insure that the instructions in paragraph 3-7 have been performed.

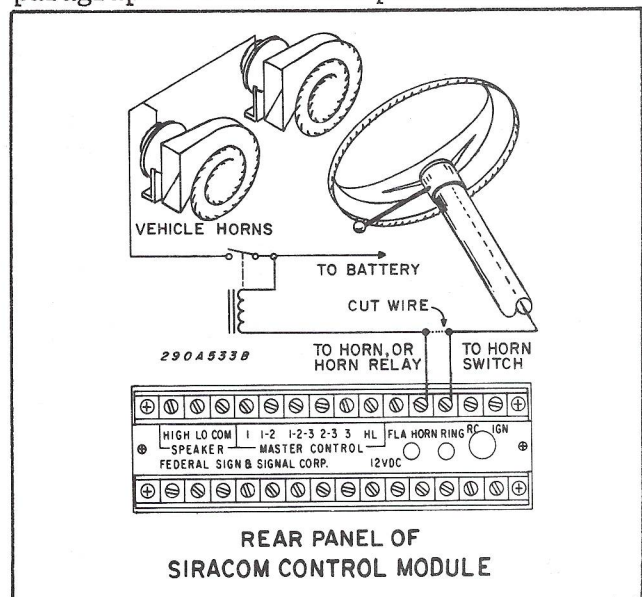


Figure 3-6. Horn Ring Connections.

Proper connection of the radio control circuitry will allow power to be supplied to the two-way radio whenever the vehicle's ignition is "on", or when the SELECTOR switch is set to RADIO (radio re-broadcast mode). Proceed as follows (see figure 3-7).

A. Connect a wire from the vehicle's two-way radio relay control circuit to the RC terminal at the rear of the Control Module. Refer to the two-way radio service manual, if necessary, to locate this wire in the radio.

B. If the vehicle's two-way radio is not controlled by a relay and it draws over one-ampere, as verified by the radio's service manual, a 12-volt relay should be installed. Use the RC terminal to control the 12-volt relay (the other relay coil terminal should be ground), which will control the radio (see figure 3-7).

NOTE: Use of a non-key lock operated circuit to control a vehicle's two-way radio transmitter violates FCC Rules and Regulations. Therefore, the PA-1000 RC terminal should be wired to control only the two-way radio's receiver. Wiring to accomplish this type of control will vary with the type of two-way radio. Refer to the radio manufacturer's service manual.

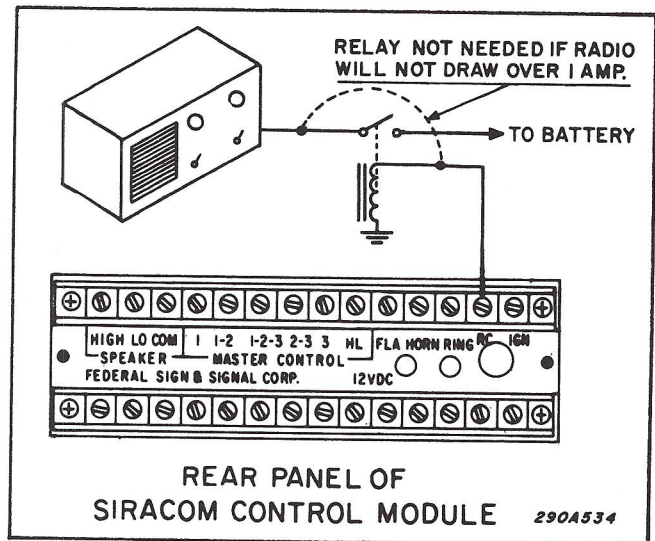


Figure 3-7. Radio Control Connections.

### 3-10. MASTER CONTROL SWITCH.

#### A. General.

The MASTER CONTROL rotary switch connections are provided on the top terminal strip (labeled MASTER CONTROL) located at the rear of the Control Module (see figure 3-8). Connecting equipment to the terminal strip that will be activated by the MASTER CONTROL switch is a simple operation. If it is required to have a particular vehicle light "on" in the No. 1 switch position only, connect the light wire to the No. 1 terminal. If the light must be "on" in switch positions 1 and 2, connect the light wire to the terminal marked 1-2, etc. Refer to Table 3-1 which illustrates equipment combinations and connections.

Table 3-1. Master Control Switch Positions and Terminals.

Terminal Marked	Master Control Switch Position				Equipment (Write-in)
	0	1	2	3	
-	Off	Off	Off	On	Siren
-	Horn	Horn	Horn	Siren	Horn Ring Operation
1	Off	On	Off	Off	
1-2	Off	On	On	Off	
1-2-3	Off	On	On	On	
2-3	Off	Off	On	On	
3	Off	Off	Off	On	
HL	Off	Off	Off	On	

B. Use of Table 3-1.

The first column refers to the terminals at the rear of the Control Module. Columns 2 thru 5 represent the four possible positions of the MASTER CONTROL rotary switch; numbered 0, 1, 2 and 3. The row under the MASTER CONTROL switch positions which corresponds to SIREN (Equipment column) represents the condition of the siren amplifier or siren with the Siren Module SELECTOR switch in any position except RADIO. The standard PA-1000 is wired so that the siren is activated only when the MASTER CONTROL switch is set to position 3. The next row (Horn Ring Operation) represents the horn ring circuit when wired thru the PA-1000. The standard PA-1000 is wired so that the horn ring operates normally except when the MASTER CONTROL switch is in position 3. In position 3 (Siren Module SELECTOR switch set to MANUAL), the manual siren (or instant yelp option) is activated.

The remainder of Table 3-1 can be used to design the vehicle's warning light system. This may be accomplished by deciding in which MASTER CONTROL switch position each warning light must be activated and then locating the corresponding terminal in Table 3-1. Write the name of that light in the Equipment column. After this has been accomplished for each warning light or other MASTER CONTROL switch operated accessory, wire each device to the corresponding terminal shown in column 1 of Table 3-1.

3-11. CONTROL MODULE ACCESSORY SWITCHES.

A. General.

All accessory switch wiring is routed, internally, to the lower fourteen connection terminal strip at the rear of the PA-1000 Control Module (see figure 3-8). The terminal groups connected to each switch will be found on the rear terminal strip in the same order (left-to-right) as the switches appear on the front panel. A labeled switch wiring diagram will be found on the label panel below the appropriate terminals. Also the rocker switch will be installed at the factory so that the "normal" or "off" condition, as shown on the switch wiring diagrams will be obtained when the top of the rocker switch is depressed.

The last three digits of the "identification code" on the rear panel of the PA-1000, identify the auxiliary switches supplied with your unit. Switch type numbers 2 thru 7 are available. The numerical portion of the switch type number is used in the last three digits of the identification code ends with the letter "Z"; the unit has special wiring, features, etc. not covered in this manual. If this is the case, a service manual supplement will be provided.

B. Type 2 Switch.

This switch can be used for controlling auxiliary flood lights, spotlights or three-way interior light switch circuits from two locations in the vehicle. It can also be used in circuits which require a switch to control battery voltage.

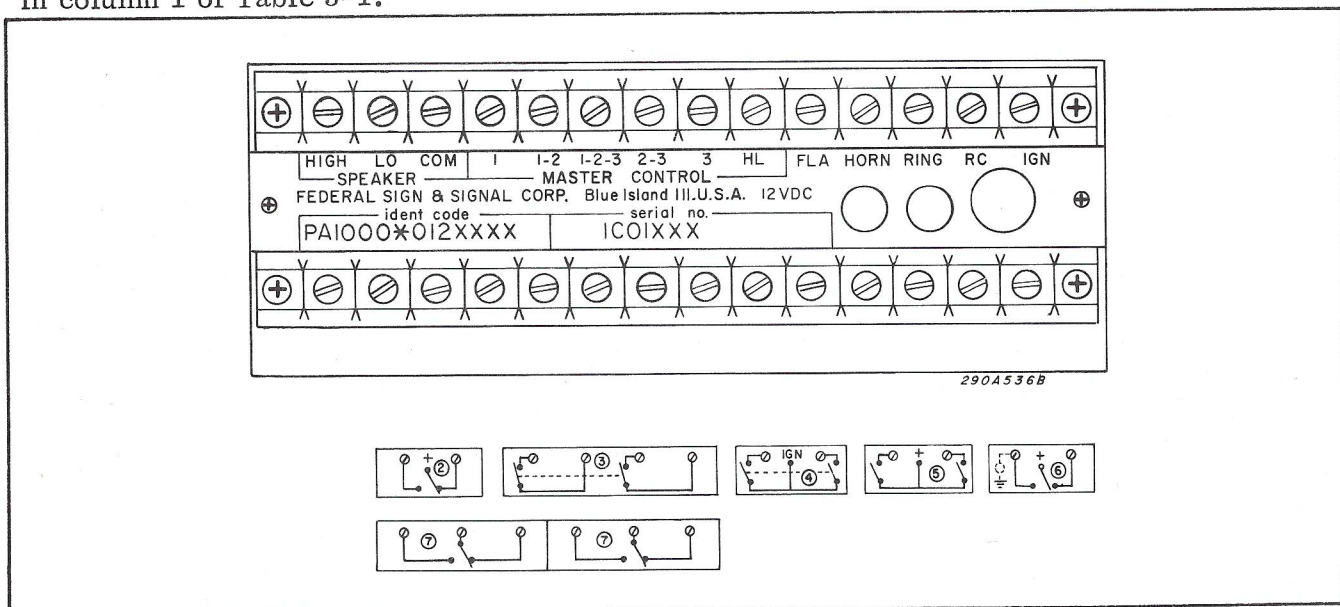


Figure 3-8. Rear View of Control Module.

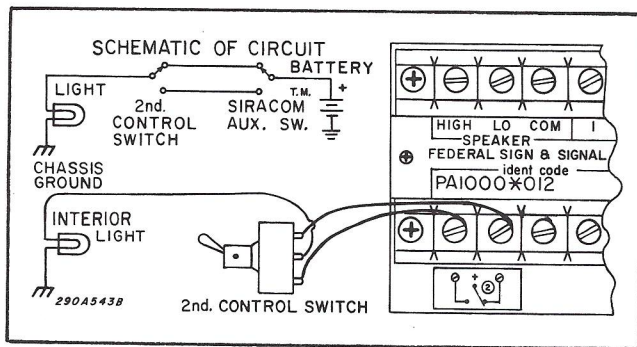
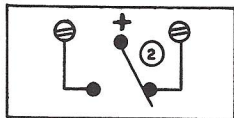


Figure 3-9. Typical Wiring Diagram for Type 2 Switch used in Three-Way Circuit.

If the identification code at the rear of the Control Module has a "2" as one of the last three digits, your siren has a Type 2 switch. The Type 2 switch is a double pole, double throw, center off rocker switch. One pole is supplied power by the battery supply circuit. The wiring label plate for this switch can be found below the appropriate terminals on the lower terminal strip and will be represented as:



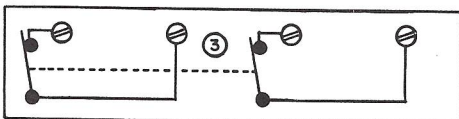
To use this switch to control auxiliary lights, simply wire the auxiliary light to the left-hand terminal.

To use the Type 2 switch to control a three-way circuit (to turn the light on or off from either of two locations) wire as shown in figure 3-9.

### C. Type 3 Switch.

This switch is ordinarily used for brake light cut-off and/or back-up light cut-off.

If the identification code at the rear of the Control Module has a "3" as one of the last three digits, your siren has a Type 3 switch. The Type 3 switch is a double pole, double throw rocker type switch wired normally closed. All switch terminals are brought out to the rear terminal strip as shown on the wiring label plate located below the appropriate terminals. The label plate will appear as:



### 1. Brake Lights Cut-Off Wiring.

To use this switch to cut-off the brake lights, proceed as follows:

a. Cut one of the wires leading to the vehicle brake light switch.

b. Splice an additional length of wire to each of the bare ends cut in the previous step. The additional lengths of wire should be long enough to terminate at the PA-1000.

c. Connect one wire to the first terminal on the left, above the Type 3 switch plate. Connect other wire to the second terminal from the left, above the switch plate.

### 2. Back-Up Lights Cut-Off Wiring.

To use this switch to cut-off the back-up lights, proceed as follows:

a. Cut the wire leading to the vehicle's back-up lights.

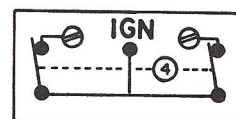
b. Splice an additional length of wire to each of the bare ends cut in the previous step. The additional lengths of wire should be long enough to terminate at the PA-1000.

c. Connect one wire to the third terminal from the left, above the Type 3 switch plate. Connect the other wire to the fourth terminal from the left, above the Type 3 switch plate label.

### D. Type 4 Switch.

This switch is ordinarily used for activating gun locks or door locks. It can also be used to control a siren brake.

If the identification code at the rear of the Control Module has a "4" as one of the last three digits, your siren has a Type 4 switch. The Type 4 switch is a DPST momentary contact normally open rocker switch with both poles supplied by the ignition circuit. The wiring label plate for this switch will be found below the appropriate terminals on the lower rear terminal strip and will appear as:

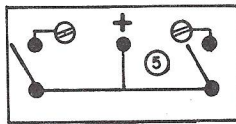


To use the switch to control gun or trunk locks, merely wire the desired device to either of the two normally open switch terminals located above the switch label plate.

#### E. Type 5 Switch.

This switch is ordinarily used to control the vehicle's alley lights or other auxiliary circuits requiring battery supply control.

If the identification code at the rear of the Control Module has a "5" as one of the last three digits, your siren has a Type 5 switch. The Type 5 consists of two SPST battery supplied rocker switches mounted side-by-side. The wiring label plate for this switch will appear as:

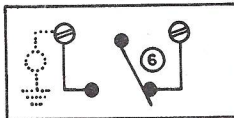


To use this switch to control alley lights, wire the left normally open switch terminal to the driver's side alley light, and the right normally open switch terminal to the passenger side alley light. This switch allows both alley lights to be controlled separately, or turned-on at the same time.

#### F. Type 6 Switch.

This switch is ordinarily used for all types of auxiliary lights and brake light cut-off.

If the identification code at the rear of the Control Module has a "6" as one of the last three digits, your siren has a Type 6 switch. The Type 6 is a SPDT (Single Pole Double Throw) lighted rocker switch with power supplied by the battery circuit. The label plate below the rear terminal strip will appear as:



To use this switch to control any auxiliary light circuit, connect the circuit to the normally open switch terminal located above the switch label plate. Whenever the device is turned-on, the built-in indicator light will illuminate. (If it is desired that the indicator light not illuminate when the controlled circuit is activated, wire the circuit to the normally closed terminal).

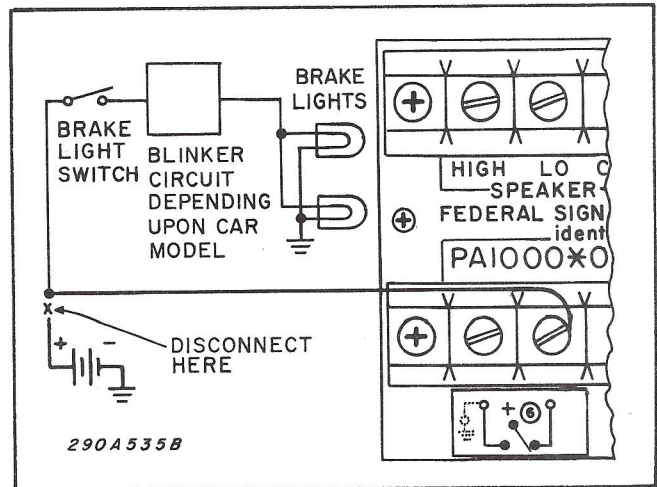


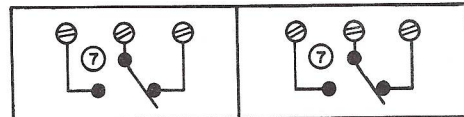
Figure 3-10. Brake Light Cut-Off using Type 6 Switch.

To control the brake light circuit with the Type 6 switch, locate the battery supply wire connected to the vehicle's brake light switch. Disconnect this lead and connect a wire from this brake light switch terminal to the normally closed switch terminal located above the switch label plate (see figure 3-10). The indicator light will illuminate when the brake lights are cut-off.

#### G. Type 7 Switch.

This switch is ordinarily used when two vehicle two-way radios are present and received messages from both radios need to be re-broadcast on the external siren speakers. The Type 7 switch may also be used with other accessory circuits requiring a double pole, double throw switch.

If the identification code at the rear of the Control Module has a "7" as one of the last three digits, your siren has a Type 7 switch. The Type 7 switch is a double pole, double throw switch with all six terminals brought out to the rear terminal strip. The wiring label plate will appear as:



To use this switch to transfer the siren's radio re-broadcast function between either of two radios, connect the first and fourth terminals from the left across the first radio's speaker and the third and sixth terminals from the left across the other radio's speaker. Connect the radio input zip cord from the 6-pin Jones connector (FN212 cable) to the second and fifth terminals from the left. Connect both radio receiver circuits to the RC terminal. Insure that the combined re-

ceiver current does not exceed one ampere. If it does, install a relay to control both radios (refer to paragraph 3-9). **IMPORTANT NOTE:** When used to transfer the siren's radio re-broadcast function, the Type 7 switch should only be used when the PA-1000 Siren/Control System is connected for PA-override operation using the FN212 adapter cable. (If used with a common microphone, operator confusion could result because only one microphone circuit may be routed through the PA-1000 common microphone switching. Also, most standard radio cables do not have provisions for externally connecting the radio input.) Refer to paragraph 3-6. A. for PA-override wiring instructions.

To use the Type 7 switch to control other circuits; wire the controlled circuit

to the switch's rear terminals, using the switch label as a guide.

#### H. Model J - Accessory Power Jack.

The Model J accessory power jack is used to supply +14VDC to accessories (TV camera, tape recorder, etc.) which require 3-5 amperes (maximum). Power is supplied to this jack from the vehicle's battery through the internal PA-1000 circuit breaker.

If the identification code at the rear of the Control Module has a "J" as one of the last three digits, the Model PA-1000 is equipped with a Model "J" accessory power jack. To use this jack, the accessory must be equipped with a standard 1/4-inch phone plug. The +14VDC is available at the tip of the plug.

## SECTION IV OPERATION

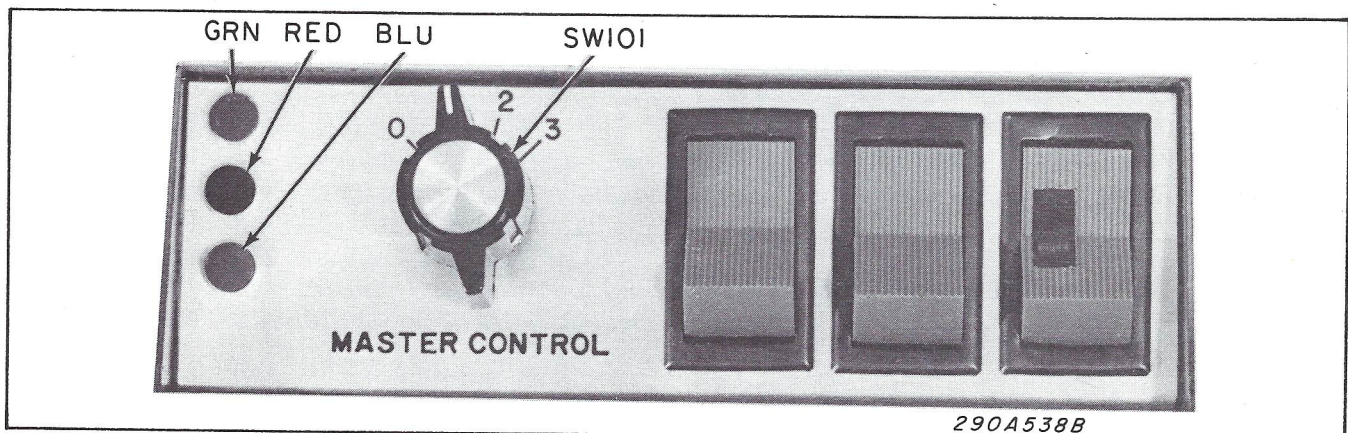


Figure 4-1. Control Module Front View.

#### 4-1. GENERAL.

All controls utilized during normal operation of the PA-1000 are located on the front panel of the Control Module (figure 4-1) and Siren Module (figure 4-2).

The microphone plug-in convenience of the PA-1000 allows the user to utilize the vehicle's two-way radio microphone, or an independent microphone.

The PA-1000 may be used with its own separate microphone or with a two-way radio microphone that operates in common with the PA-1000 and the two-way radio. A switch located at the rear of the unit is provided to convert the unit from common microphone operation to PA override operation. With the switch in the PA

override position, the vehicle radio and siren have separate microphones and the public address function will be obtained in any control or function switch position except RADIO by depressing the microphone pushbutton switch. In the PA override position, the public address function will override all other siren functions, except radio re-broadcast. In the common microphone position, the vehicle's two-way radio and siren share a common microphone. An adapter cable connects the siren directly to the two-way radio. The common microphone will be electrically connected to the two-way radio in all function switch positions except PA. When in the PA position the microphone will be connected to the siren amplifier for broadcast of messages on the vehicle's siren speaker system.



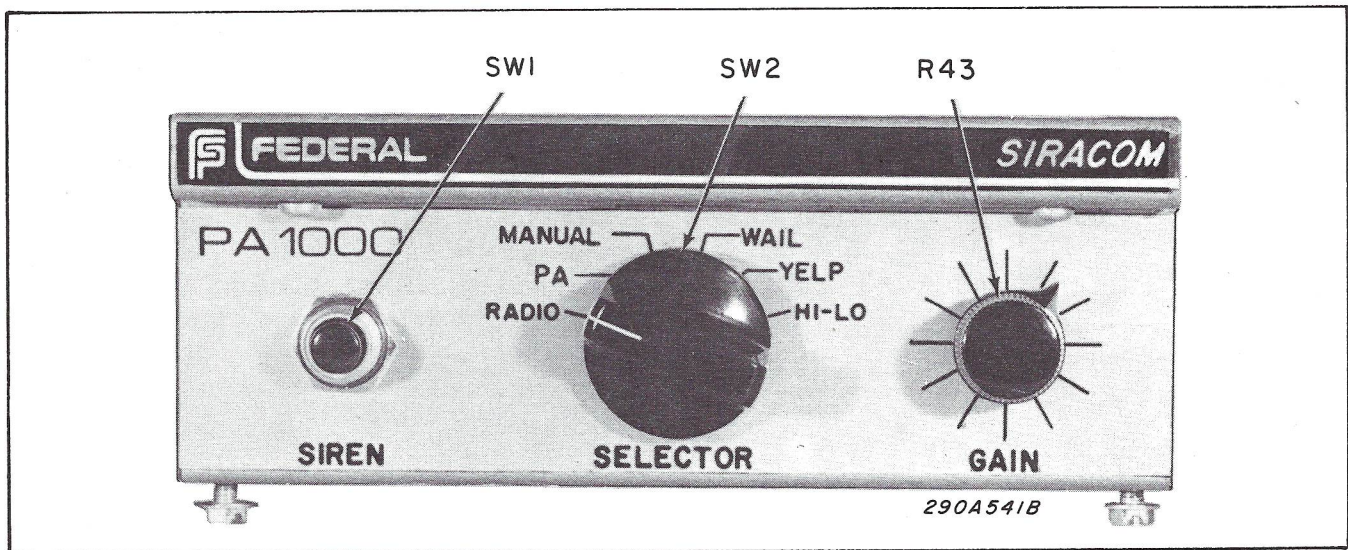


Figure 4-2. Siren Module Front View.

#### 4-2. MASTER CONTROL SWITCH.

The MASTER CONTROL switch is a four position rotary switch used to control the vehicle's emergency warning light system and electronic siren. Depending upon the equipment installed (refer to Section III), the setting of the MASTER CONTROL switch will automatically select and control the needed equipment. In a typical application, secondary warning lights (flashing lights) will be activated when the MASTER CONTROL switch is set to position 1. Primary warning lights (revolving lights) will ordinarily be installed to function in position 2. In position 3, the electronic siren can be activated, after the Siren Module's SELECTOR switch is set to one of the siren positions; and any combination of warning lights, activated in position 1 or 2, can also be "on".

Position 0 is the off position. The position of the MASTER CONTROL switch is shown by colored indicator lights to the left of the switch. In position 1, the green indicator will illuminate; position 2, the red indicator will illuminate; and in position 3, the blue and red indicators will illuminate.

In positions 1 and 2, if installed as described in Section III, depressing the horn ring will activate the horn. In position 3, the horn ring will operate the manual siren signal or optional Instant Yelp feature. (Refer to paragraph 4-6.)

#### 4-3. GAIN CONTROL.

The GAIN control is used to control the volume when the electronic 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.

Radial lines around the knob can be used for setting the volume to a predetermined level. 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 (buildings or other vehicles), etc. Adjust the GAIN control to a position just below the point at which feedback occurs or as desired.

#### 4-4. SELECTOR SWITCH.

The SELECTOR switch is a six 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 Module and re-broadcast via the external speakers. Volume can be controlled by the GAIN control (refer to paragraph 3-9. D.).

With the SELECTOR switch set to RADIO, +14VDC will be applied to the vehicle's two-way radio via the RC terminal located on the rear panel. This will allow radio messages to be re-broadcast even when the ignition switch is off (refer to paragraphs 3-7 and 3-9).

The blue indicator lamp and front panel lamp will illuminate when the SELECTOR switch is set to RADIO.

#### B. PA.

In this position the PA-1000 may be used as a public address system. Volume is controlled by the GAIN control. This is the only position in which the microphone is disconnected from the two-way radio's transmitter, if a common microphone is used for both the electronic siren and two-way radio.

#### NOTE

The MASTER CONTROL switch must be set to position 3 to activate the following siren sounds.

#### C. MANUAL.

In this position it is possible to operate the siren by depressing the front panel SIREN button. The siren can also be activated by means of an auxiliary switch such as a footswitch or horn ring button. Operation will be similar to that of a conventional electro-mechanical siren unless the optional Instant Yelp feature is provided, in which case the horn ring will only operate the Instant Yelp feature (refer to paragraph 4-6).

#### D. WAIL.

In this position the siren will produce a continuous "wailing" sound, up or down in frequency.

#### E. YELP.

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

#### F. HI-LO.

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

#### 4-5. SIREN BUTTON.

The SIREN button located on the left hand side of the front panel, is used to activate the siren when the SELECTOR switch is in the MANUAL position.

#### 4-6. INSTANT YELP (OPTION Y).

If the identification code on the rear panel of the Control Module contains a "Y" as part of the code (Example PA1000\*012 Y246), the unit is equipped with the Instant Yelp feature. When equipped, the unit will emit a "Yelp" signal whenever the horn ring is depressed and the MASTER CONTROL switch is set to position 3, regardless of the setting of the SELECTOR switch. NOTE: The manual siren button will continue to operate the manual siren signal.

#### 4-7. INSTANT YELP (OPTION T).

If the identification code on the rear panel of the Control Module contains a "T" as part of the code (Example PA1000\*012T 245) the unit is equipped with the Instant Yelp feature with "tap on" - "tap off" switching. When equipped, depressing the horn ring will turn on the Yelp signal, which will continue to sound until the horn ring is again depressed. Units equipped with OPTION T contain a small printed circuit board mounted near the front of siren chassis.

# SECTION V

## SIREN MODULE CIRCUIT DESCRIPTION

### 5-1. GENERAL.

The electronic circuitry of the PA-1000 is located in the Siren Module, which can be removed easily for servicing. Refer to the Siren Module schematic diagram while reading the following paragraphs.

### 5-2. WAIL - YELP TIMING OSCILLATOR.

In the WAIL or YELP position and the MASTER CONTROL switch in position 3, Q3 and Q4 function as a timing oscillator. The output of the timing oscillator determines the frequency of the sweep oscillator (Q7 and Q8). Initially, assume the SELECTOR switch set to WAIL, MASTER CONTROL switch in position 3 and Q3 conducting. C1 will charge through R7 and the emitter-collector junction of Q1. When C1 is sufficiently charged, Q3 cuts-off, thus turning-on Q4. C1 discharges through R14 and R9. The charge and discharge of C1 determines the repetition rate (10 cycles/minute) in the wail mode. The RC network of R16, R13 and C4 takes the sawtooth waveform of the Q4 emitter and produces the desired triangular rising and falling waveform of the wail control voltage.

In the yelp mode, C2 has a similar function as C1. The repetition rate in the yelp mode is approximately 220 cycles/minute. The RC network of R13, R15 and C3 develops the desired waveform of the yelp signal.

The output of the yelp or wail RC networks is applied to the sweep oscillator and determines the frequency of operation.

### 5-3. MANUAL SIGNAL.

With the SELECTOR switch set to MANUAL, Q3 and Q4 no longer function as a timing oscillator. When the front panel SIREN pushbutton (SW1) is depressed, Q4 conducts and allows C4 to charge. While C4 is charging, the sweep oscillator frequency increases. After releasing

SW1, Q4 turns-off and C4 discharges through R16 causing the sweep oscillator frequency to decrease.

In the standard unit (yelp option not included), a positive or negative voltage can be applied to P3, pin 4 and to the circuitry of Q1 and Q2. Q1 and Q2 activate Q3 and Q4 to produce the manual siren signal. Normally Q1 is conducting and Q2 non-conducting. A negative voltage will be applied to the base of Q1 via P3, pin 4 and CR1 which will turn Q1 off and Q2 on. When Q2 conducts, Q3 turns off as its base goes to ground and Q4 conducts producing the manual signal. Similarly, a positive voltage applied to the base of Q2 via P3, pin 4 and CR3 and CR5 will turn it on with the previously described results occurring. CR1, CR3 and CR5 serve to isolate the Q1 and Q2 inputs preventing false triggering.

If the Instant Yelp Option is included in your unit, a positive or negative voltage applied to P3, pin 4 will activate Instant Yelp Relay K1. In this case, the collector of Q2 will be connected to K1. When activated, K1's contacts will by-pass the SELECTOR switch and instantly produce the Yelp signal.

### 5-4. HI-LO OSCILLATOR.

The Hi-Lo timing oscillator functions only when the SELECTOR switch is set to the HI-LO position. With this switch set to HI-LO, C5 charges through the base emitter junction of Q5. When the C5 charge voltage reaches the trip point of Q6, it immediately discharges through the anode-cathode function of Q6. The charge and discharge of C5 causes a rising and falling voltage with a repetition rate of approximately 45 cycles/minute, which turns Q5 on and off. When CR10 is not conducting the low tone is generated, and when CR10 conducts (R19 in parallel with R17) the high frequency tone is generated. The square wave at the junction of R17 and R18 is applied to the sweep oscillator.

## 5-5. SWEEP OSCILLATOR.

The rising and falling voltages from either of the timing oscillators is applied to the junction of R28 and R29. The voltage at this point determines the bias voltage at Q7 and Q8, which function as an astable multivibrator. CR12 and CR13 are used to set the DC bias of the transistors. The output of the sweep oscillator is a series of square waves, frequency determined by the bias voltage. This frequency, 500 to 1500 Hz, increases when the bias voltage increases and decreases when the bias voltage decreases. The output of the sweep oscillator is taken from the collector of Q8 and applied to the base of Q10, which functions as an emitter-follower impedance transformation stage. This signal in turn is applied to Q11, the preamplifier stage. NOTE: Q16 does not take part in normal siren operation.

## 5-6. MICROPHONE PRE-AMP.

The microphone pre-amplifier is used only when SW3 is set to the "M" position (magnetic microphone) and the siren is being used in the PA mode of operation. The signal from a magnetic microphone is applied through SW3 to the base of Q9. The low level signal is amplified by Q9 and flows through SW3, SW2E and the

GAIN control (R43) to the base of pre-amplifier Q11.

## 5-7. PRE-AMPLIFIER AND DRIVER STAGES.

All siren and audio signals are applied to the input of the pre-amplifier stage (Q11) via capacitor C13. Q11 amplifies the signals and applies them to T2. The push-pull output of T2 is applied to Q12 and Q13, which serve as a Class AB push-pull amplifier. The collector load output of Q12 and Q13 is applied to T3 and again supplied as a push-pull signal to the output stage, Q14 and Q15. R48, R49, R56, RT1 and CR14 form a highly stable, temperature compensated bias network for Q12 and Q13.

## 5-8. OUTPUT AMPLIFIER.

Transistors Q14 and Q15 form a Class B emitter follower push-pull amplifier. The drive signal is coupled to the bases of Q14 and Q15 by driver transformer T3. The output is formed and coupled to the speaker by T4. R50, C15, R55 and C18 sample the output waveform and feed a portion of it back to Q12 and Q13 for better signal (audio) quality. Likewise R51, CR15, C16, and C17 and R54 and CR16 stabilize the output stage.

# SECTION VI

## SERVICE AND MAINTENANCE

### 6-1. GENERAL.

Most of the component electronic parts used in the PA-1000 are standard items that can be obtained from any radio or electronics supply shop.

The following diagrams should be an aid to the repairman in isolating a malfunction and locating components:

<u>Fig.</u>	<u>Diagram</u>
6-1	Siren Module Removal.
6-2	PC Board Removal.
6-3	Bottom View of Control Module.
6-4	Control Module Schematic.
6-5	Bottom View of Siren Module.
6-6	Internal View of Siren Module.
6-7	Siren Module Component Location.
6-8	Siren Module Schematic.

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

Communications and shipments should be addressed to:

Customer Service Dept.  
Signal Division  
Federal Signal Corporation  
136th and Western Ave.  
Blue Island, Illinois 60406

If any unit is returned for adjustment or repair, it can be accepted only if we are notified by letter or phone in advance of its arrival. Such notice should clearly indicate the service requested and give all pertinent information regarding nature of malfunction and, if possible, its cause.

All power is supplied to the PA-1000 by the red #10 gauge wire at the rear of the unit. Insure that this wire, or an additional length of #10 gauge or heavier wire, is connected directly to the vehicle's battery. If necessary, the supplied wire clamp can be used to splice the wire.

### 6-2. CONTROL MODULE.

When the MASTER CONTROL switch is in the "0" (off) position, and the

Siren Module SELECTOR switch is not in the RADIO position, all indicator lights should be off. If any indicator lights illuminate, the Control Module wiring should be checked. In position 1, only the green light should illuminate. The red light should be the only light illuminated in position 2. The red and blue lights should both be illuminated in position 3. If the indicator lights fail to illuminate as described, check for lamp failure as well as the associated circuitry.

If trouble is encountered, always check the associated vehicle circuit which correspond to the PA-1000 circuitry. When servicing the Control Module, the Troubleshooting Chart (Table 6-1) can be useful in isolating a malfunction.

### 6-3. SIREN MODULE.

#### A. General.

Any competent radio repairman or electronic technician should have little difficulty in tracing and correcting a malfunction, should any occur. When servicing the PA-1000 Siren Module, the troubleshooting chart (Table 6-2) can be useful in isolating a malfunction. 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.

An optional special right angle PCB edge connector is available from the factory for use in servicing the circuit board while connected to the siren. The adapter allows the printed board to be installed in the circuit in an upright position, with access to both sides and all chassis mounted components. Order Part No. 8536A050.

When replacing output transistors (Q14, Q15), insure that a matched pair is used. Use a heat sink compound on both sides of the Q12 and Q13 mica insulators. Insure that the mica is installed properly. Improper installation of mica could cause a short circuit.

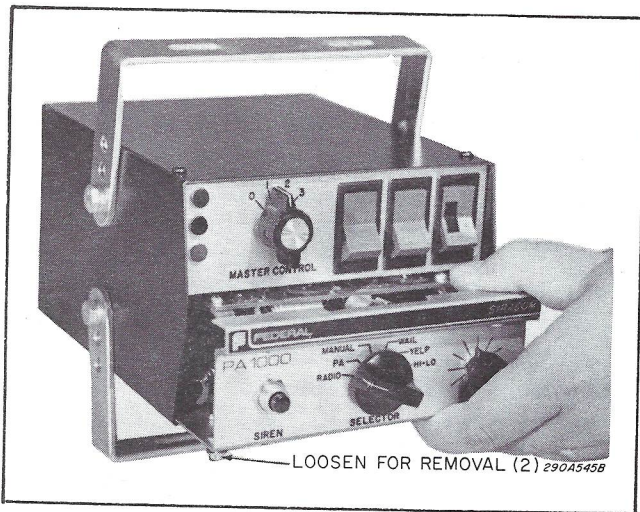


Figure 6-1. Siren Module Removal.

**NOTE**

Most cases of defective output transistors are caused by a defective speaker (short circuited voice coil). Make certain that the speaker is not defective prior to installing the repaired PA-1000.

**B. Removal for Servicing.**

The unique construction of the PA-1000 permits removal of the Siren Module for servicing without disturbing any of the wiring connected to the vehicle lights and accessory equipment.

When removing the Siren Module for servicing, loosen the two hexagon head screws on the underside of the unit, near the front edge. Disconnect all plug-in connectors. Slide the entire chassis out of the case as shown in figure 6-1.

**C. Removal of Circuit Board.**

The PC Board is secured to the chassis by two Phillips-head screws (figure 6-2). Removing these screws allows the board to be pulled out of its edge connector.

**D. Symmetry Adjustment.**

The symmetry of the output waveform has been preadjusted at the factory and will not ordinarily require readjustment unless Q7, 8, 12, 13, or 15 have been replaced. To perform the symmetry adjustment, proceed as follows:

1. Remove the speaker leads connected to P3. Connect a 5.5 ohm load across pins 7 and 6.

2. Connect an oscilloscope across pins 7 and 6.

3. Set the SELECTOR switch to WAIL, YELP or HI-LO. Adjust R25 (see figure 6-2) for a perfect square wave on the oscilloscope.

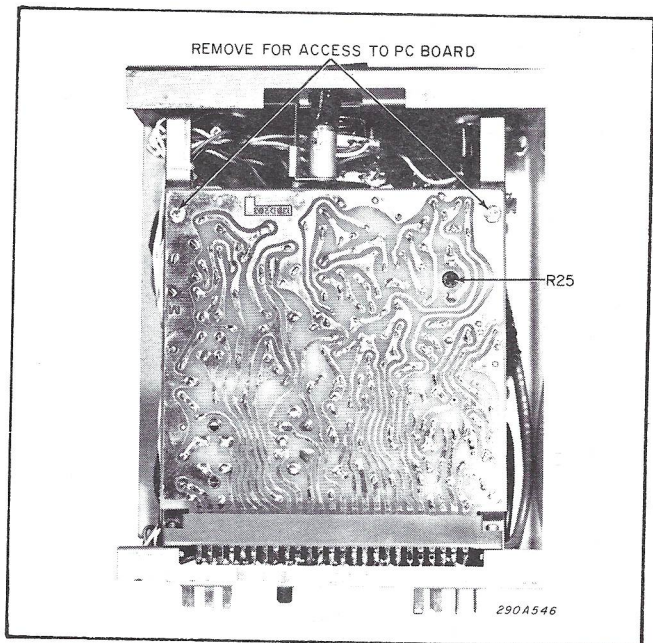


Figure 6-2. PC Board Removal.

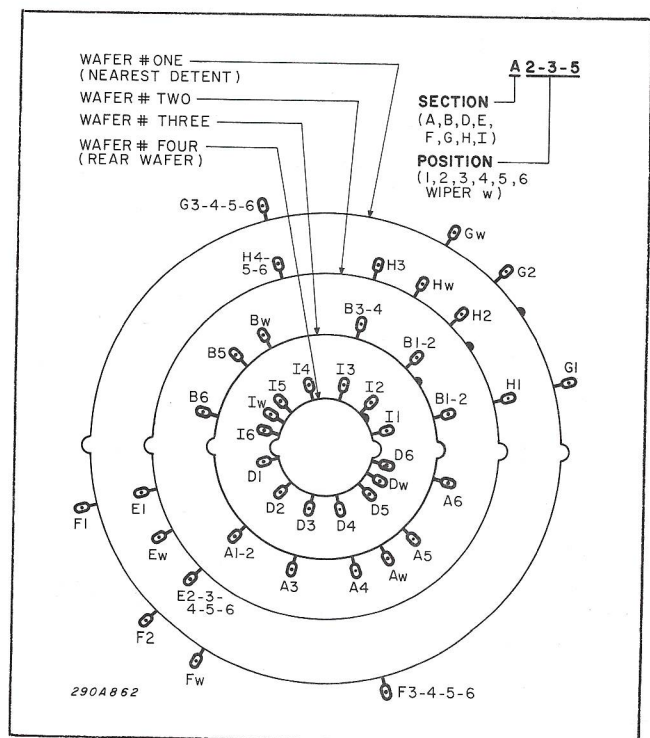


Figure 6-2A. Rear View, Selector Switch.

Table 6-1. Control Module Troubleshooting Chart.

TROUBLE	PROBABLE CAUSE
All warning lights and Siren inoperative.	Check 50-ampere circuit breaker (CB101).
Green lamp does not illuminate in position 1. Red lamp does not illuminate in position 2 or 3.	Check for defective indicator lamp.
Car ignition can not be shut off when SELECTOR switch is in radio position.	Defective diode CR103 and CR20 (in Siren Module).
Radio control terminal (RC) is not connected to 12-volts when SELECTOR switch is in "RADIO" or when vehicle ignition is "on".	Defective diode CR103 or CR20.
Blue lamp does not illuminate when MASTER CONTROL switch is set to position 3. Siren functions normally.	Defective blue lamp.
Siren does not activate when MASTER CONTROL switch is set to position 3 and SELECTOR switch is set to WAIL. Blue lamp illuminates.	Defective interconnecting cable between Control Module and Siren Module. (Also, refer to Table 6-2.)
Siren does not activate when MASTER CONTROL switch is set to position 3 and SELECTOR switch is set to WAIL. Blue lamp does not illuminate.	Defective relay control circuit. Check CR101, CR102 and K101. Check junction of CR101 and CR102 for positive supply voltage when the positive battery supply is applied to unit. Check other side of K101 for ground potential (Pin 8 of P3) when: (1) MASTER CONTROL switch is set to 3, or (2) SELECTOR switch set to RADIO, or (3) microphone push-to-talk is depressed and SELECTOR switch is set to PA.

Table 6-2. Siren Module Troubleshooting Chart.

NOTE

Assume MASTER CONTROL switch set to position 3 when Siren Module is installed in console.

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>
Fuse blows.	One or more output transistors (Q14, Q15) defective resulting from any one of the following causes: 1) Defective speaker. Check for short-circuited voice coil before replacing transistor(s). 2) Excessive battery charging voltage (over 14.6 VDC). 3) Improper output transistor used for replacement. Use Federal replacement or Delco DTG 600 only. 4) Unit exposed to excessive ambient temperatures. <u>Never install electronic siren in the path of heater ducts or in an unventilated console.</u> 5) Improper driver stage transistors, resulting in adequate drive to output stage. Use Federal transistors or RCA 40327, min. $h_{FE}$ 100 at 100MA. 6) Symmetry adjustment changed or not adjusted properly. Refer to paragraph 6-3.D.
No siren in any position. Radio and PA function normally.	Open capacitor C12.
No siren. Unit "chirps" in YELP position.	Open capacitor C7 or C8.
Intermittent output.	Loose connection or defective interconnecting cable.
Low or no output in all positions.	Defective transistor Q14, Q15 or interconnecting cable.
Little or no volume in RADIO position. PA is OK.	Improper adjustment of R33.
Little or no output when magnetic microphone is used.	Microphone pre-amp switch in "C" position. Open capacitor C9. Defective microphone. Open capacitor C11 or C13.
No output from carbon or transistorized microphone.	Microphone pre-amp. switch in "M" position. Open capacitor C11 or C13. Defective microphone.
No radio or PA. Siren tones OK.	Defective GAIN control R43.



Table 6-2. Siren Module Troubleshooting Chart (continued).

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>
Steady tone in all siren positions except manual.	Defective resistor R8 or R9.
WAIL tone falls only. Manual tone only when SIREN button is held (does not coast down, but stops immediately when SIREN button is released).	Open capacitor C4.
WAIL tone rises to steady tone and holds. All other tones OK.	Open capacitor C1.
YELP tone falls only. All other tones OK.	Open capacitor C3.
Steady tone in YELP position. All other tones OK.	Open capacitor C2.
In MANUAL position, siren emits a steady or intermittent tone even though auxiliary switch (horn ring or foot) is not operated. (Standard unit only.)	Defective transistor Q1 through Q4. Defective diode CR3. Electrical leakage at auxiliary switch or horn ring due to dirt or moisture. Switch resistance should not be less than 10K ohms.
Instant yelp (option) operates when horn ring or auxiliary switch is not activated and SELECTOR switch is not in YELP position.	Defective transistor Q1 or Q2. Defective diode CR3. Electrical leakage at auxiliary switch or horn ring due to dirt or moisture. Switch resistance should not be less than 10K ohms.
Excessive noise in PA position only.	Short-circuit in microphone. There should be an open-circuit between pin 2 and shell of microphone plug.
Buzz in loudspeaker when engine is "running".	Open capacitor C20. Amplifier housing not grounded to B-.
Short siren blast in MANUAL position. Sometimes heard when vehicle is being started or shut off.	Defective capacitor C6 and/or defective diode CR11.
Frequency of siren affected by flashing lights.	Inadequate wiring between vehicle battery and console battery supply wire. Use minimum of #10 gauge wire, or heavier if vehicle is equipped with a large number of lights or accessories. Current drain total of lights should not exceed 45 amperes.

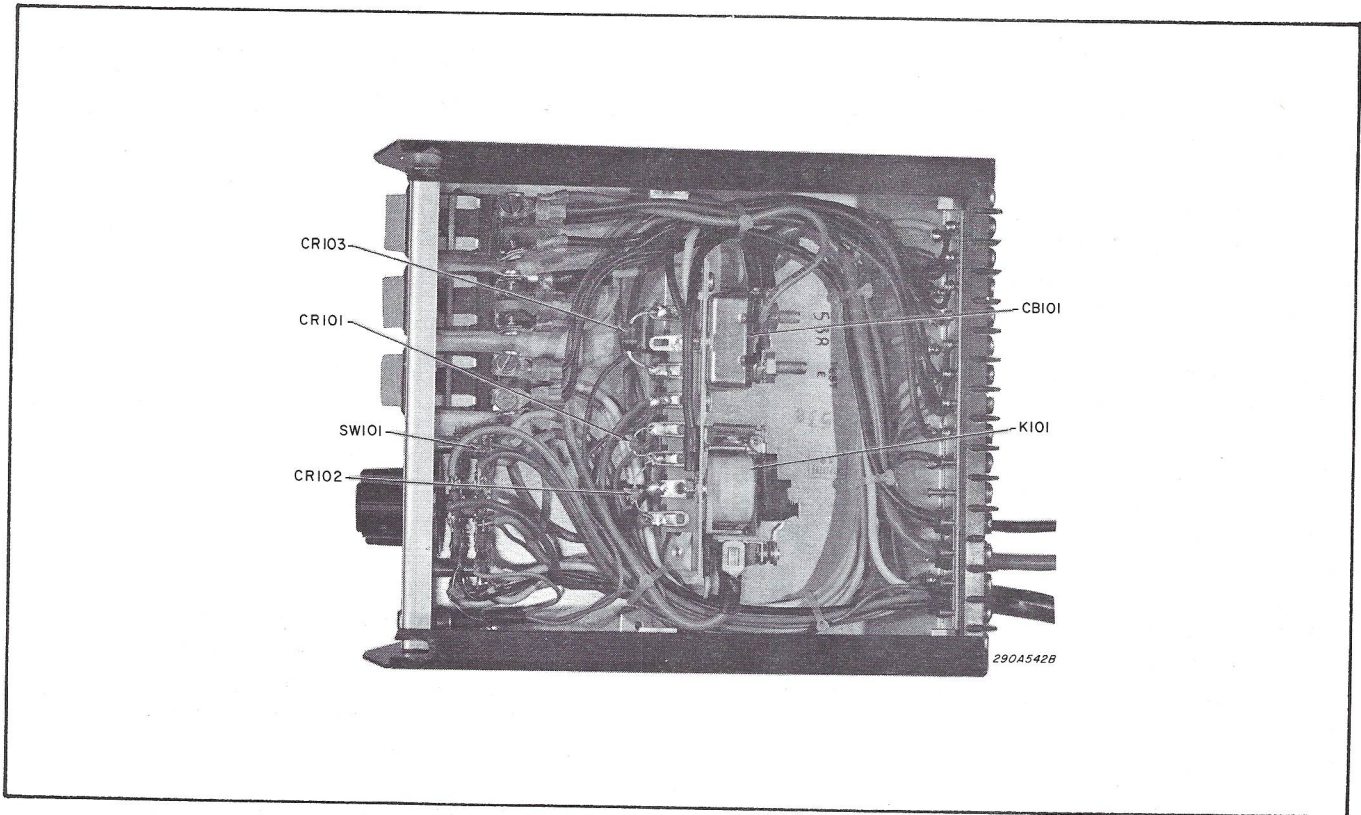


Figure 6-3. Bottom View of Control Module.

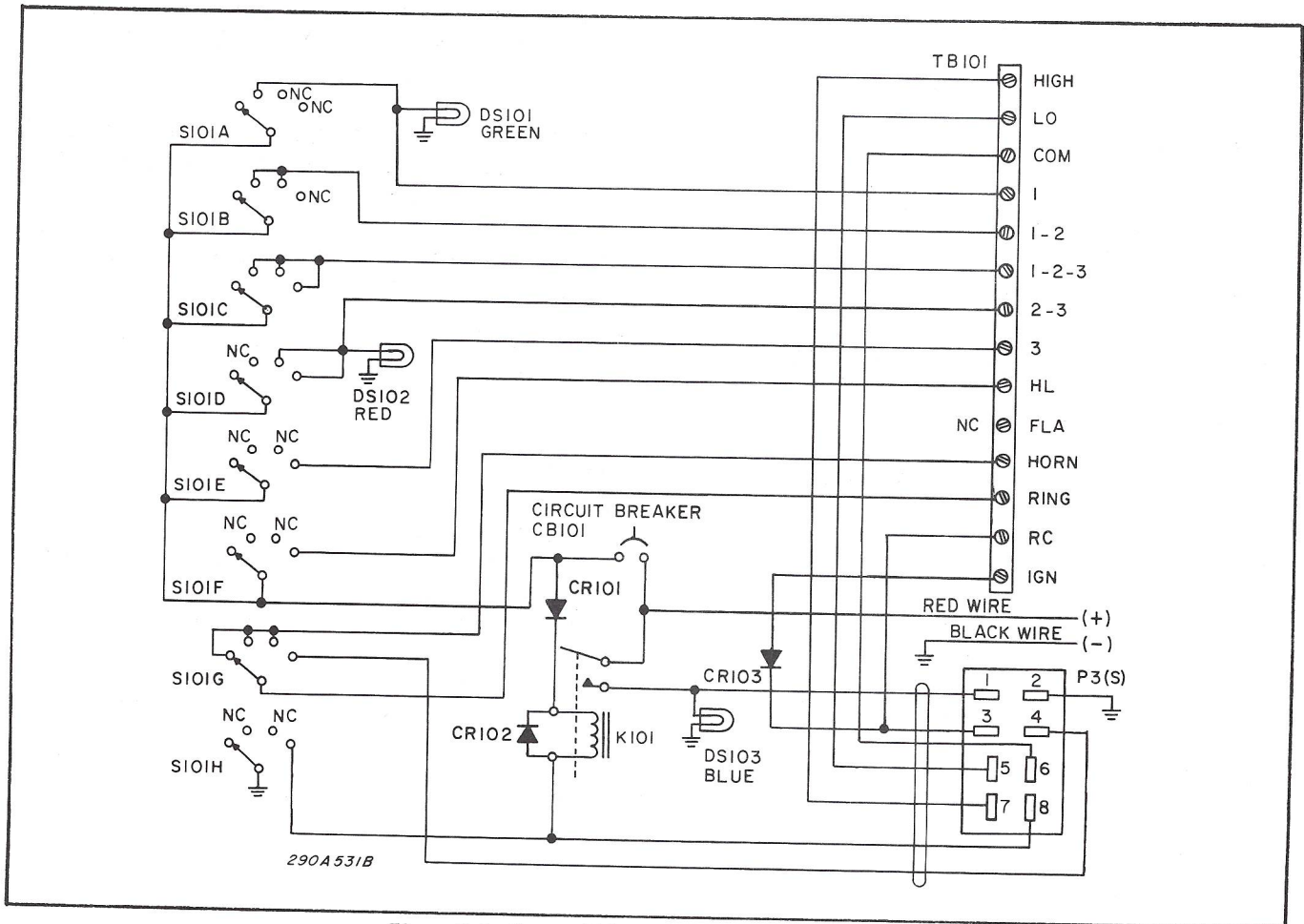


Figure 6-4. Control Module Schematic Diagram.

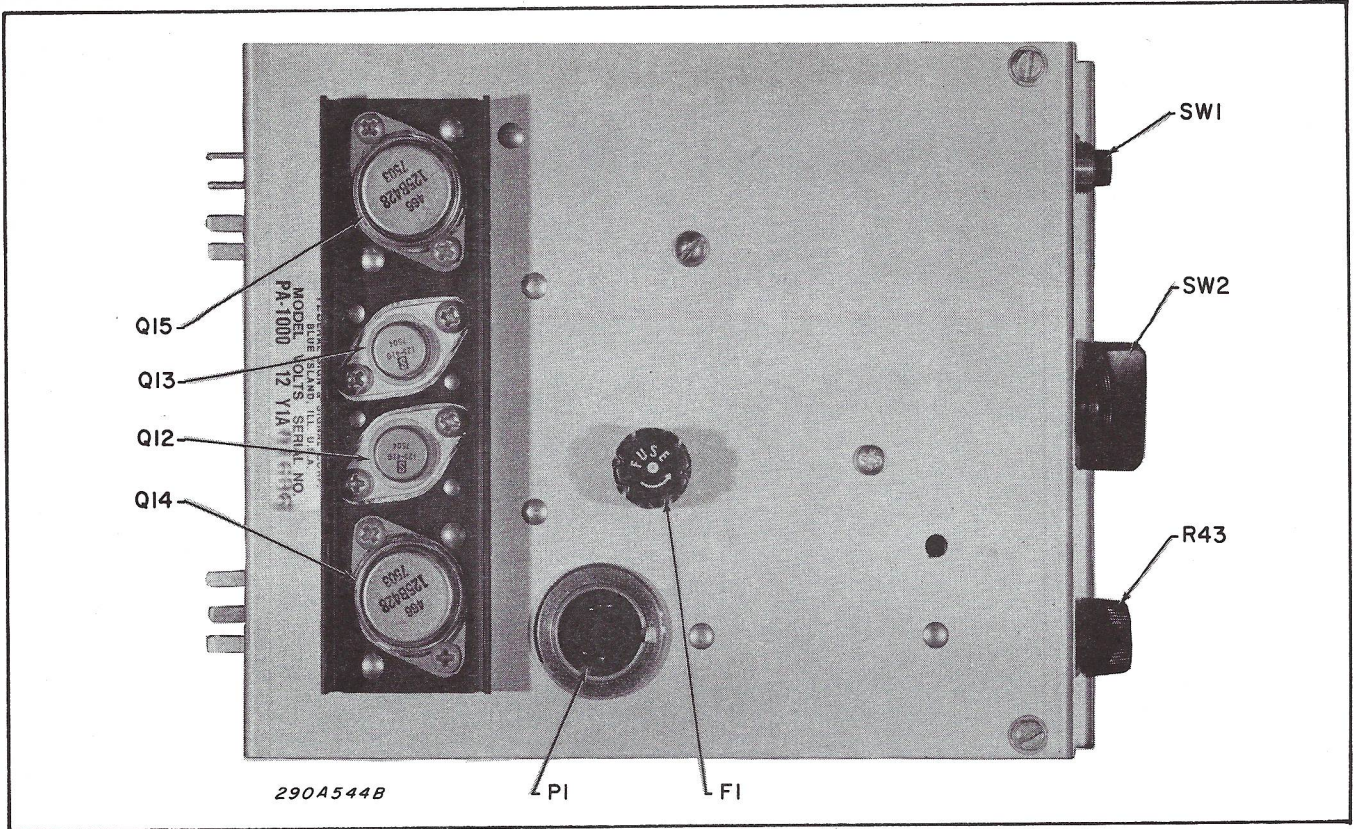


Figure 6-5. Bottom View of Siren Module.

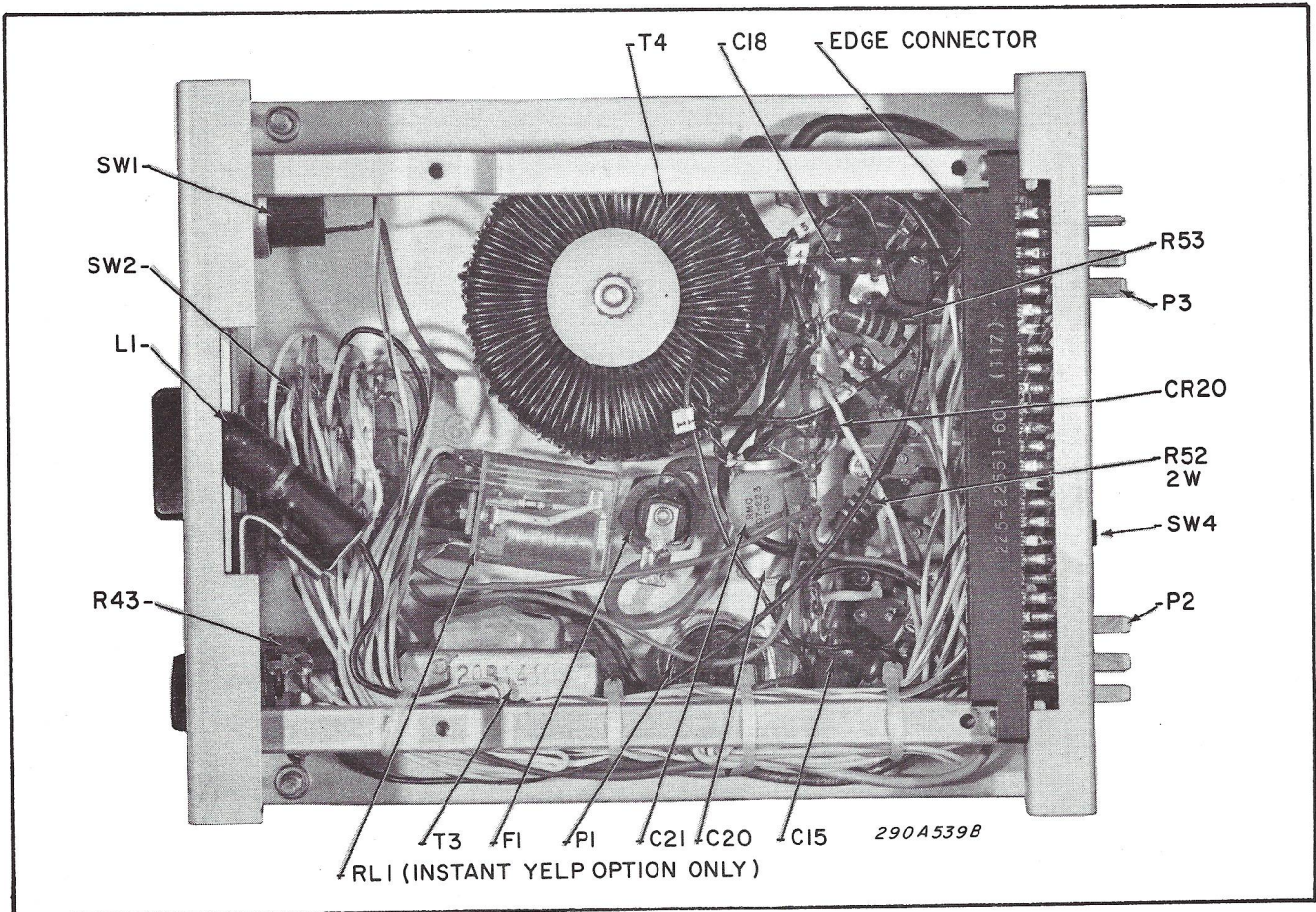


Figure 6-6. Internal View of Siren Module.

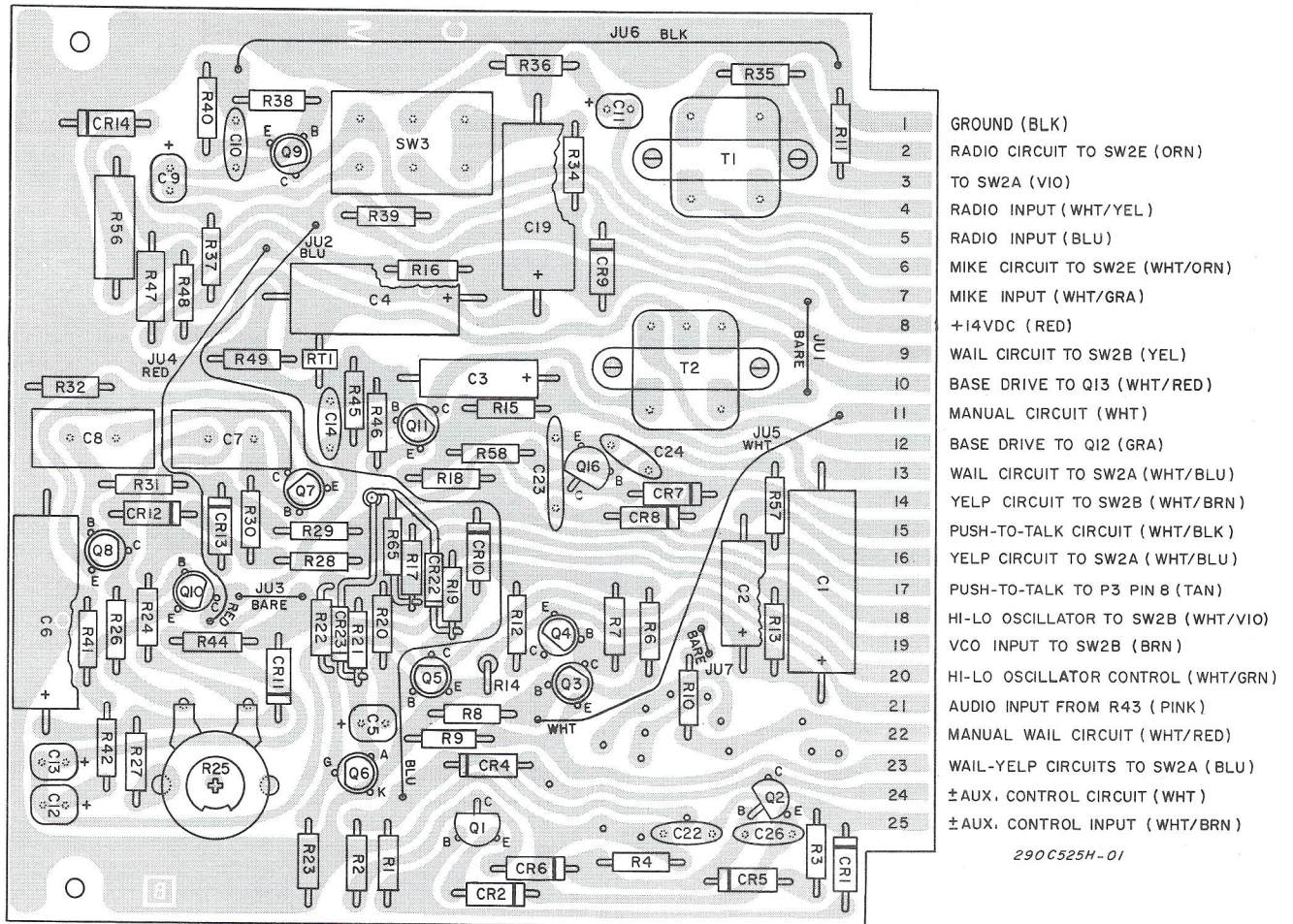
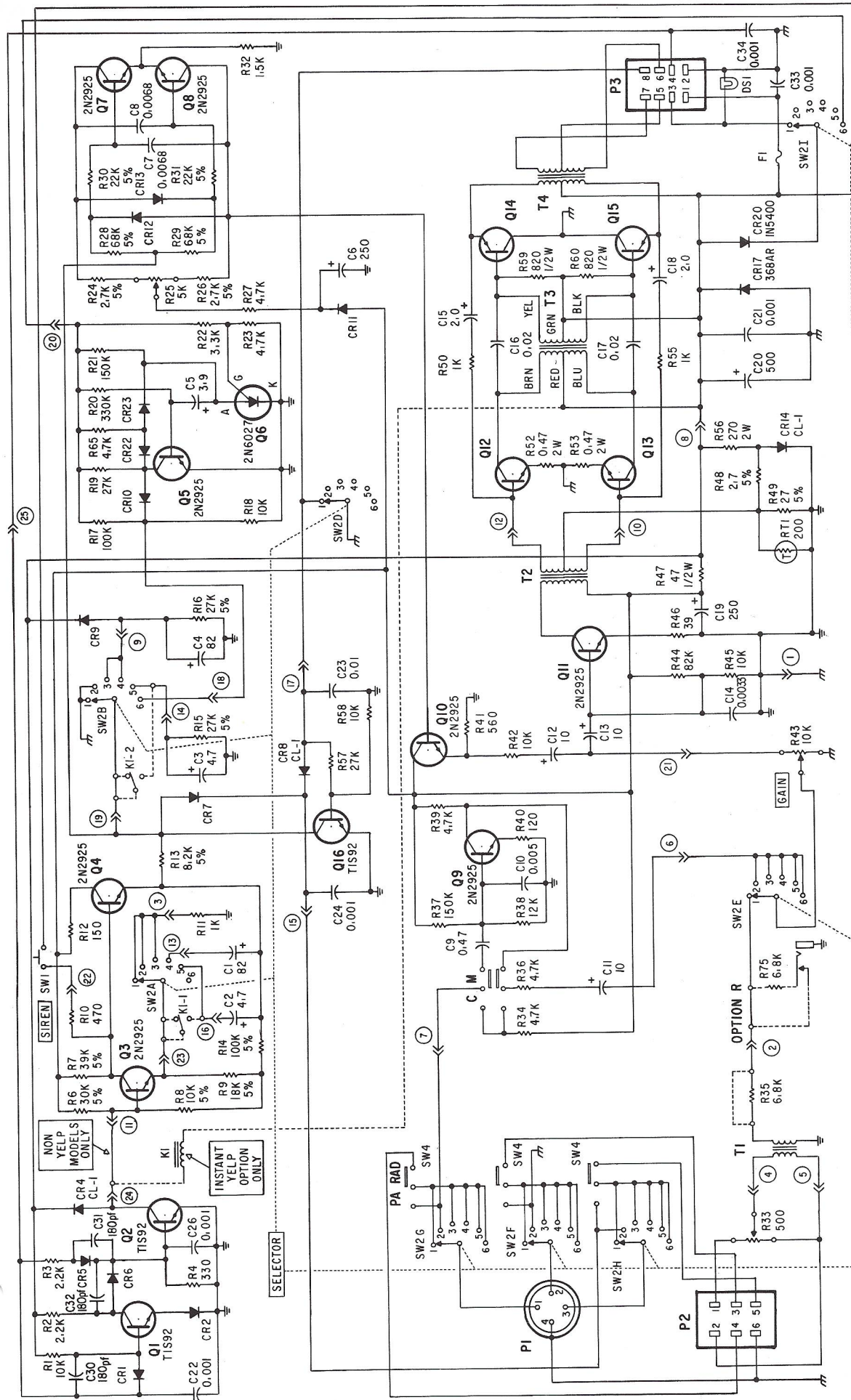


Figure 6-7. Siren Module Component Location Diagram.



**NOTES:**

- UNLESS OTHERWISE SPECIFIED:  
ALL RESISTORS ARE IN OHMS; K=1000, ±10%, 1/4 WATT.  
ALL CAPACITORS ARE IN MICROFARADS (UF). ALL DIODES ARE T155.  
① INDICATES PIN NUMBER OF PRINTED CIRCUIT BOARD.
- WHICH PLUGS INTO EDGE CONNECTOR.  
3. ⊥ INDICATES PRINTED CIRCUIT BOARD GROUND.  
⊕ INDICATES CHASSIS GROUND.

**SW2 SWITCH POSITIONS**

POSITION	RADIO	PA	MANUAL	WAIL	YELP	HI-LO
1						
2						
3						
4						
5						
6						

**PI**

PINS	FUNCTION
1	MIKE HI FROM MIKE
2	MIKE LO FROM MIKE
3	MIKE SWITCH
4	MIKE SWITCH RETURN

**P2**

PINS	FUNCTION
1	RADIO INPUT
2	RADIO INPUT
3	MIKE LO OUT
4	MIKE HI OUT
5	MIKE SWITCH
6	MIKE SWITCH RETURN

**P3**

PINS	FUNCTION	PINS	FUNCTION
1	B + INPUT	5	SPEAKER LO
2	B - INPUT	6	SPEAKER COMM
3	LAMP	7	SPEAKER HI
4	+/- AUX	8	RELAY CONTROL

**PA1000X012**

290c5196

Figure 6-8. Siren Module Schematic Diagram.



<u>Schematic Symbol</u>	<u>Description</u>	<u>Part No.</u>	<u>Schematic Symbol</u>	<u>Description</u>	<u>Part No.</u>
SWITCHES			CONTROL MODULE		
SW1	Pushbutton, SIREN	122A117	S101	Switch	122B152B
SW2	Rotary, SELECTOR	122B151	CR101,102	Diode, ED3002S	115B301
SW3	Slide, DPDT	122B119	CR103	Diode IN5400	115A105
SW4	Slide, TPDT	122A153	K101	Relay	131A117
MISCELLANEOUS			TB101	Terminal Block (same part no. for accessory switch terminal block)	229A129
RT1	Thermistor, 200 Ohm	104A111	CB101	Circuit Breaker, 12V, 50A	8474A138
P1	Connector, Microphone	139B134	DS101	Lamp, Green	8536A028-02
P2	6-Pin Jones Plug	140A113	DS102	Lamp, Red	8536A028-01
P3	8-Pin Jones Plug	140A114	DS103	Lamp, Blue	8536A028-04
K1	Relay	131A118		Knob	141A117
F1	Fuse, 20-Ampere, 3AG	148A127		Terminal Strip	229A130
DS1	Lamp, 14-volt	8107A085		Holder, Data Lamp (3)	147B107
	Connector, Edge, 25-Contact	139A156			
	Holder, Fuse	143A106			
	Knob, GAIN Control	141A102			
	Knob, SELECTOR	141A103			
	Bracket, Relay	8474A144			
	Heatsink	8536B023			
	Bracket, Lamp	8535A025			
	Socket, Lamp	138A115			
	PC Board (without parts)	130D216B			
	PC Board (with parts installed)	8536D011-01			

