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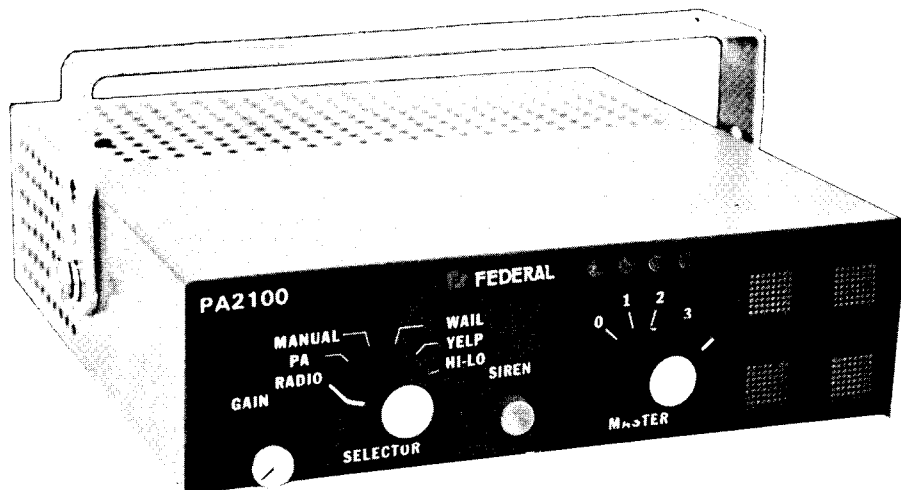
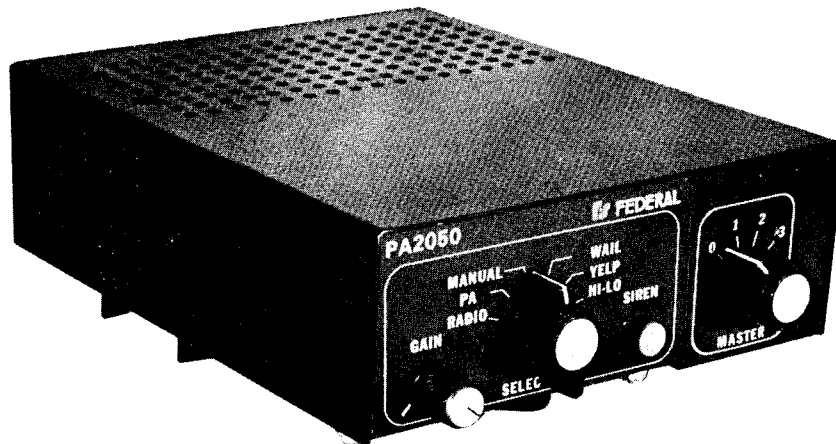


**SIGNAL DIVISION**  
Federal Signal Corporation

**MODELS PA2050 & PA2100**

***SIRACOM II***®

**SIREN/CONTROL SYSTEM**



**INSTALLATION AND SERVICE INSTRUCTIONS**

## NOTE

This service manual describes the PA2100. However, the PA2050 and PA2100 are identical except the PA2050 does not have provision for accommodating the optional lighted pushbutton switches. Therefore, all descriptions, specifications, and service data apply equally to both models.

### 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

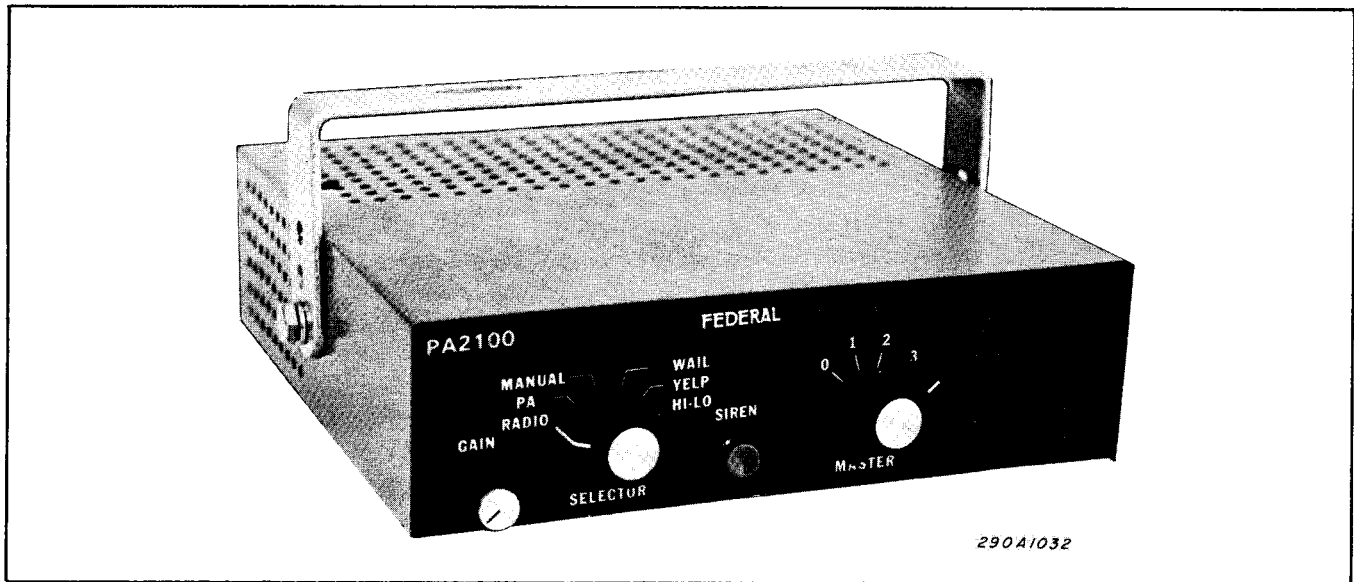


Figure 1-1. Model PA2100 Siren/Control System.

### 1-1. GENERAL.

The Federal Model PA 2100 SIRACOM II (figure 1-1) is a precision-built, compact Siren/Control System of advanced design. It consists of a Siren Module and a Control Module.

The PA 2100 is designed to operate from a nominal 12 volt DC, negative ground electrical system. The speaker terminals, on the rear panel of the unit, in conjunction with a slide switch on the rear of the siren module inside of the housing, allow the use of either 100 watt or 58 watt speakers.

The Siren Module produces three distinct sounds. This module also has provisions for public address (PA), amplification of radio messages (radio rebroadcast), and manual siren operation.

If it is desired to make use of the provisions for PA and radio rebroadcast, a Federal Model MNCT Microphone or the vehicle's two-way radio microphone and the appropriate adapter module are required. The Model MNCT Microphone and a line of adapter modules to fit most popular makes of two-way radio microphones are available as options from Federal. The adapter modules include the wiring required to interconnect the PA 2100 with the microphone and the two-way radio.

The Siren Module can be easily removed from the vehicle without disturbing the wiring to the control switches and without disabling the vehicle accessories (horn, lights, radio, gun lock, etc.).

The Control Module contains all of the circuitry and devices necessary to control the entire vehicle warning light system and accessories. The Control Module also routes power to the Siren Module.

An external 50 ampere, automatic reset circuit breaker is supplied to protect the vehicle warning light system.

A panel light and a pilot light are illuminated whenever the vehicle ignition switch is on.

### 1-2. SIREN MODULE.

Most of the solid state electronic circuitry in the Siren Module is mounted on printed circuit boards. This circuitry provides a high level of performance and reliability over a wide range of environmental conditions. The circuitry incorporates feedback that maintains high audio quality for the PA and radio rebroadcast functions. The electronic circuitry in the Siren Module is protected by a 20 ampere fuse.

The Siren Module produces three distinct siren sounds; WAIL, YELP, and HI-LO. In addition, it also has provisions for public address (PA) and radio rebroadcast. A LED indicator illuminates when the SELECTOR is set to RADIO (radio rebroadcast). A manual SIREN pushbutton switch is included for control of the Manual Wail signal.

The siren can also be operated by an auxiliary switch such as the vehicle horn switch or a foot switch. The unit can still be operated manually by depressing the SIREN button if an auxiliary switch is installed.

The TAP II Instant Yelp feature provides "push-on", "push-off" operation when the auxiliary switch is operated while the MASTER switch is in position 3 and the SELECTOR switch is in the WAIL, YELP or HI-LO positions.

The PA 2100 can be used with a Model MNCT microphone or in common with the microphone included with the two-way radio installed in the vehicle. The Model MNCT microphone is a transistorized, noise cancelling microphone that has the characteristics necessary to drive the audio amplifier in the PA 2100. A Model FN900 Adapter Module is required when the MNCT Microphone is used with the PA 2100.

In common microphone operation, an optional adapter module connects the siren directly to the two-way radio. The common microphone is electrically connected to the two-way radio in all SELECTOR switch positions except PA. When the SELECTOR switch is set to PA, the microphone is connected to the siren amplifier so that messages can be announced over the siren speaker system.

### 1-3. CONTROL MODULE.

#### A. General

The Control Module is designed to be used as a central connection and control location for all vehicle emergency warning devices along with the distribution of power and control of other emergency and safety devices normally found in an emergency vehicle.

#### B. MASTER Switch

The four position MASTER rotary switch is used to control the emergency warning light system and the siren. Any combination of lights can be controlled by the MASTER switch. For example, position 1 can be used to operate the vehicle's flashing lights; position 2 can control the rotating lights and the siren is controlled by position 3. (Position 3 also transfers the horn ring circuit from the horn to the siren). Position 0 is the "off" position.

A maximum of three switched circuits can be controlled by any given position of the MASTER switch. The actual devices controlled by a given position of the MASTER switch can be programmed by means of a nine section miniature rocker switch inside of the Control Module. The switched circuits can be reprogrammed if requirements change.

#### C. Accessory Control Switches (PA 2100 Only)

A maximum of four optional, lighted, pushbutton type switches can be provided by Federal for installation on the front panel of the Control Module. These switches can be used for controlling vehicle accessories such as the spotlight, gunlock, brake lights, trunk lid, etc. These switches are available in two types. The switch types and their typical applications are shown in Chart 1-1.

MODEL	TYPE / CONTACT ARRANGEMENT	TYPICAL APPLICATION
AS1	DPDT, PUSH-PUSH, 15AMP, LIGHTED RED 	AUXILIARY LIGHTS ALLEY LIGHTS BRAKE LIGHT OR BACK-UP LIGHT CUT-OFF
AS2	DPST, MOMENTARY, 15AMP, LIGHTED RED 	GUN LOCKS TRUNK LOCK DOOR LOCKS MECHANICAL SIREN BRAKE
NOTE: THE MODEL CLK ACCESSORY KIT IS ALSO AVAILABLE. THIS LENS KIT CONTAINS ONE EACH OF THE FOLLOWING: RED, YELLOW, GREEN, AND BLUE LENSES. THE STANDARD RED LENS PROVIDED WITH EACH SWITCH IS FACETED, WHEREAS ALL LENSES IN THE KIT ARE TRANSLUCENT.		

Chart 1-1.

#### D. Terminal Positions

Most of the electrical connections to the PA 2100 are made by means of 16 screw terminals. As indicated in figure 1 - 2, all terminal positions on the rear panel of the Control Module are clearly labeled on a legend plate. The function and current capacity of each terminal are listed in Chart 1-2.

### E. Flasher Option

An optional internal alternating flasher is available for use with the PA 2100. This flasher is capable of switching a maximum of 12 amperes. The flasher

can also be used as a single light flasher. The flash or alternating rate is approximately 90 flashes or alternations per minute. The flash or alternating rate is independent of the voltage, load, and temperature.

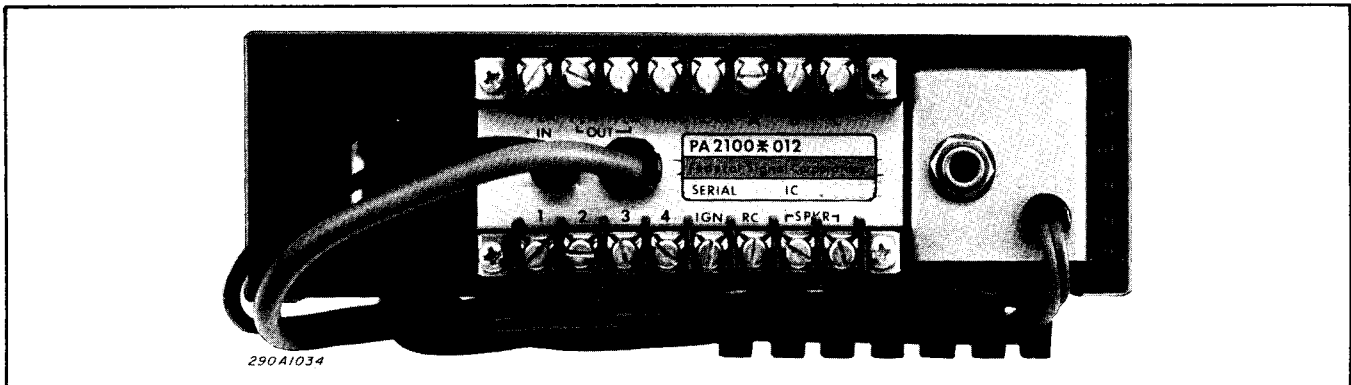


Figure 1-2. Model PA2100 Rear View.

Terminal	Function	Current Capacity
FLA IN	Flasher input	12A
FLA OUT (2)	Flasher output	12A
RING	Vehicle horn ring	2A
HORN	Vehicle horn	2A
A	Flasher Off override	-
B	Flasher On override	-
C	Not connected	-
1	MASTER Circuit 1	30A
2	MASTER Circuit 2	30A
3	MASTER Circuit 3	30A
4	Not connected	-
IGN	Ignition switch connection	10.5A
RC	Radio Control (for radio rebroadcast)	10A
SPKR	Speaker Terminals	-

Chart 1-2.

# SECTION II

## SPECIFICATIONS

### 2-1. GENERAL.

Input Voltage . . . . .	10VDC to 16VDC (16VDC operation limited to 15 min.)
Polarity . . . . .	Negative ground only
Standby Current (MASTER switch set to position 0) . . . . .	0 mA. (not including panel lamp)
Operating Temperature Range . . . . .	-30°C to +65°C
Dimensions (HWD - excluding heat sink, knob and rear trim) . . . . .	2-3/8" x 7-7/8" x 8" (6cm x 20cm x 20.3cm)
Weight (approx.) . . . . .	10 lb. (4.5kg.)

### 2-2. SIREN.

Operating Current (14.0VDC - WAIL)	
1 Low Power Speaker . . . . .	5 amperes
2 Low Power Speakers or 1 High Power Speaker . . . . .	10 amperes
2 High Power Speakers . . . . .	15 amperes
Frequency Range . . . . .	550 to 1500Hz
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

14.0VDC supply voltage. Radio potentiometer and GAIN control at maximum

Frequency Range . . . . .	300 to 10,000Hz
Harmonic Distortion . . . . .	10% max. at all power levels from .5 to 70 watts (frequency response $\pm$ 3dB)
Input Impedance . . . . .	Radio - 3.6K ohms Carbon Mic. - 3.6K ohms Magnetic Mic. - 10K ohms
Signal input voltage required to obtain 20 Vrms across a 5.5 ohm load . . . . .	Radio - 0.45 Vrms Carbon Mic. - 0.165 Vrms Magnetic Mic. - 0.025 Vrms

## 2-4. ACCESSORIES (OPTIONAL).

Model MNCT	Transistorized Noise Cancelling Microphone
Model FN900	Federal Model MNCT Microphone Adapter Module
Model FN901	Federal Model MNC or MR Microphone Adapter Module
Model FN902	Federal Model VPII Microphone Adapter Module
Model FN903	Motorola Microphone Adapter Module
Model FN904	Motorola Micor Microphone Adapter Module
Model FN905	RCA Microphone Adapter Module
Model FN906	RCA 500 Microphone Adapter Module
Model FN907	GE Microphone Adapter Module
Model FN908	GE Master II Microphone Adapter Module
Model FN909	GE TPL Microphone Adapter Module
Model FN910	Federal Duty Patrol Microphone Adapter Module
Model FN911	Aerotron MPAC 6,7 or 8. Adapter Module
Model FN912	RF Communications Model RF-498 Adapter Module
Model FN913	Motorola "Converta-Com" Microphone Adapter Module

# SECTION III INSTALLATION

## 3-1. UNPACKING.

After unpacking the Model PA 2100, 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. If an adapter module was ordered, it is packed in a separate carton.

## 3-2. GENERAL.

Before connecting any wires to the PA 2100 install all revolving and flashing lights, gunlocks, trunk locks and other devices that will be controlled by the PA 2100. Route all wiring to the mounting location of the PA 2100, allowing 8 to 12 inches of extra wire at the siren location. Install the vehicle speakers and route the speaker leads (AWG 18 wire) to the siren location. Run leads to the vehicle's horn ring circuit. Install the 50 ampere circuit breaker provided between the battery and the firewall, and as close to the battery as practical. Install leads between the battery and the circuit breaker and the siren location using wire no smaller than AWG 10. Install the wiring between the ignition switch and the siren installation site. If desired, all leads at the PA 2100 may be terminated with crimp-on spade connectors.

## 3-3. CONTROL MODULE ACCESSORY SWITCHES. (PA 2100 Only)

### A. General.

The PA 2100 Control Module is designed to accommodate up to four optional customer installed pushbutton switches. These switches are used to control various vehicle mounted devices. There are two types of switches available. Switches that meet the customer's requirements are selected at the placement of the order. Switch types, their descriptions, and typical applications are listed in Chart 1-1.

### B. Installation.

If no accessory switches are to be installed in the front panel of the Control Module, disregard the procedure that follows:

#### CAUTION

Do not change any factory wiring in the PA 2100 when the optional accessory switches are being installed. Any change in the existing wiring may overload the circuitry and damage the unit.

1. In order to wire the accessory switches, it is necessary to remove the top cover from the chassis. To remove the cover, loosen the two hex head captive screws on the bottom of the unit and slide the cover off.

2. Remove one hole plug for each switch to be installed on the front panel of the Control Module. Push the plugs out from the inside of the unit.

3. Install the switches by inserting them into the desired holes in the front panel in accordance with the instructions provided with the switches. Press the switches into the front panel until they snap in place.

4. Pass all wiring to the accessory switches through the 1" hole in the rear panel of the Control Module. Refer to Chart 1-1 for information concerning the wiring of the switches. The wiring to each switch is determined by the device that the switch controls. Follow the installation instructions included with the devices and ensure that the device is properly fused.

### 3-4. BRACKET MOUNTING.

The siren is shipped with a swinging mounting bracket that makes it possible to mount the unit in a variety of positions. Positioning the bracket above the unit allows mounting on the underside of the dash. Positioning the bracket below the unit permits mounting on any horizontal surface or, in conjunction with Federal's TU70 Tunnel Mount, on the vehicle's transmission hump.

Mount the siren in a location that is convenient and comfortable to the operator and where it will not interfere with the safe operation of the vehicle. Keep visibility and accessibility of controls in mind when choosing a mounting location. To install the bracket 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 the siren near heater ducts.

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

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

C. Secure the mounting bracket to the dash using two each of the following: 1/4 - 20 x 3/4 hex head screws, 1/4" split lockwashers and 1/4 - 20 nuts as shown in figure 3-1.

D. Set the siren on the floor of the vehicle as close as possible to its final mounting location. DO NOT secure the PA 2100 to the mounting bracket at this time.

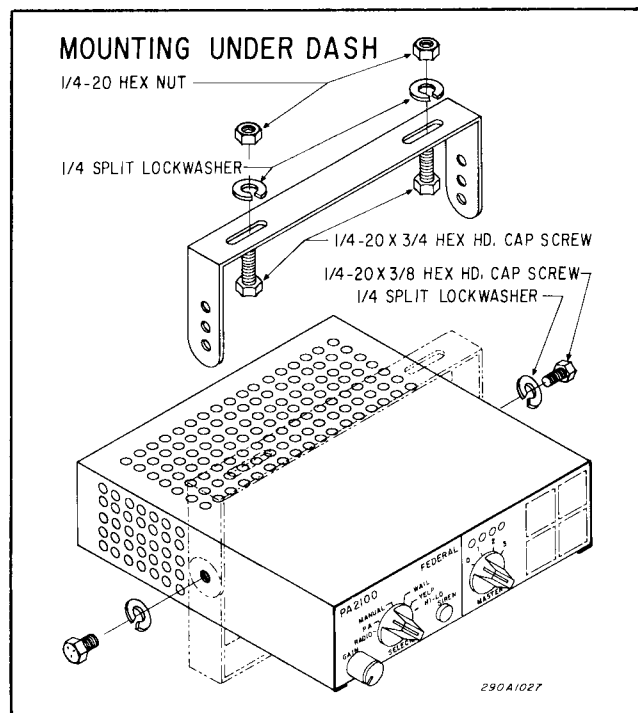


Figure 3-1. Installation of Siren Under the Dash.



When installing the PA 2100 on the transmission hump, a Federal Model TU70 Tunnel Mount is recommended. The TU70 is drilled and tapped to accept the PA 2100 mounting bracket. Follow the installation instructions packed with each unit.

### 3-5. POWER CONNECTIONS.

#### NOTE

The PA 2100 can be installed only in vehicles that have a negative ground electrical system.

A. Install the 50 ampere circuit breaker provided in the vehicle engine compartment. Mount the circuit breaker as close as practical to the battery.

B. Connect the red power lead of the PA 2100 to one side of the circuit breaker. If necessary, splice additional AWG 8, or heavier, wire to the heavy red lead using the splice connector supplied.

C. Use AWG 8, or heavier, wire to connect the other side of the circuit breaker to the vehicle battery.

D. Connect the black wire directly to the vehicle frame as close as possible to the siren.

### 3-6. SPEAKER CONNECTIONS.

Either 58 watt or 100 watt speakers may be used with the PA 2100. The PA 2100 is also capable of driving a single 200 watt speaker such as the Federal TS200.

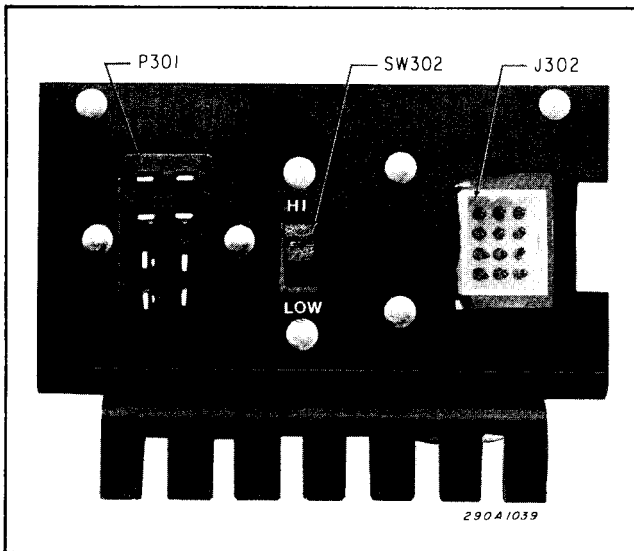


Figure 3-2. Siren Module Rear View.

If one or two 58 watt speakers such as Federal's CP 25 or TS 24 are being installed, set the speaker HI/LOW switch, SW302, to LOW. See figure 3-2 for the location of SW302. Connect the speaker leads to the SPKR terminals with AWG 18 wire, as shown in figure 3-3.

#### CAUTION

When using 58 watt speakers, ALWAYS be sure that the Speaker switch is set to LO. If the speaker switch is set to HI, the 58 watt speakers will probably be damaged or destroyed.

When 100 watt speakers such as Federal's CP100 or TS100 are being installed, set SW302 to HI before connecting the speakers to the siren. Use AWG 18 wire as indicated in figure 3-3.

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 speaker leads marked "1" to the same SPKR terminal on the siren and the two leads marked "2" to the other SPKR terminal (see figure 3-3).

The PA 2100 is capable of driving only one TS200 speaker. Therefore, if a TS200 is to be used with the siren, DO NOT connect any other speaker to the siren. Follow the instructions packed with the TS200 and set the speaker switch to HI before connecting the speaker to the siren with AWG 18 wire (see figure 3-4).

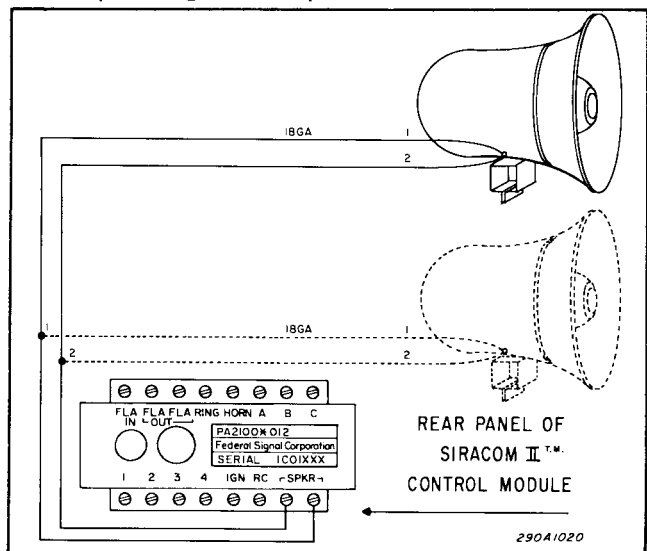


Figure 3-3. 58 Watt and 100 Watt Speaker Connections.

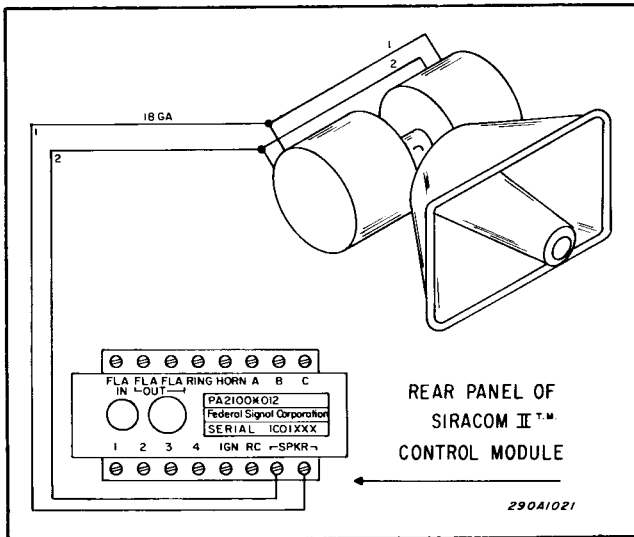


Figure 3-4. TS200 Speaker Connections.

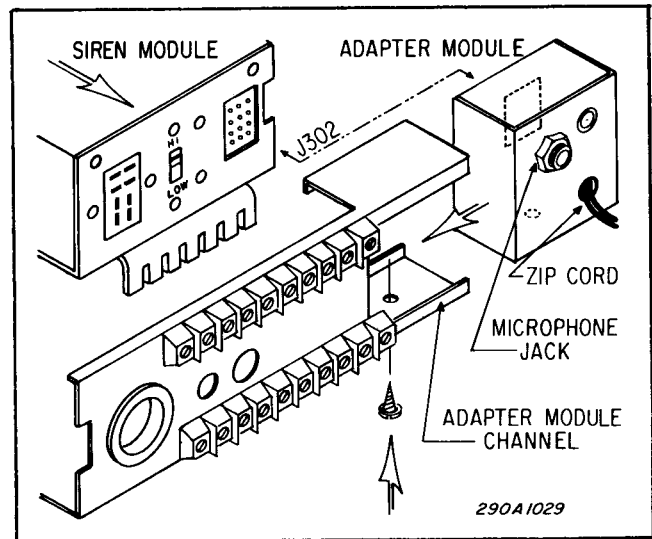


Figure 3-5. Adapter Module Installation.

### 3-7. RADIO INTERCONNECTIONS.

#### NOTE

Refer to Section IV for a description of the operation of the PA override and common microphone features. The PA 2100 can be easily set for operation in either of these modes. If required, the mode of operation can be changed at a future date.

#### A. PA Override Connections.

In order to take advantage of the PA override feature, separate microphones are required for the two-way radio and the siren PA function. If PA override operation with rebroadcast of radio messages is desired, proceed as follows (see figure 3-5):

1. Slide the Siren Module from the PA 2100 chassis.
2. Slide the optional FN900 Adapter Module into the Adapter Module Channel.
3. Start the sheet metal screw provided through the hole in the channel and into the hole in the bottom of the Adapter Module.
4. Replace the Siren Module in the PA 2100 chassis. Make sure that the connector on the Siren Module mates properly with the connector on the Adapter Module. Tighten the sheet metal screw that was inserted in step 3.

5. Connect the brown zip cord across the two-way radio's speaker voice coil terminals.

6. Plug the Model MNCT Microphone into the Adapter Module. The PA 2100 is now set for PA override operation.

#### B. Common Microphone Connections.

1. Obtain the Adapter Module that is appropriate for the make of two-way radio in the vehicle. Install the Adapter Module in accordance with the instructions supplied with the module.

2. Plug the two-way radio microphone into the receptacle on the Adapter Module. The PA 2100 is now set for common microphone operation.

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

Perform the following modification only if the radio on your vehicle has a positive PTT circuit (refer to the instructions provided with the adapter module).

1. Slide the Siren Module out of the housing.
2. Remove the Main Circuit Board from the module by removing the mounting screws and unplugging the Main Circuit Board from the Front Circuit Board. Disconnect the rear connector (J303) from the Main Board and lift the board away from the Chassis.

3. Solder a length of AWG 22 bare wire between P201 and P202 on the foil side of the Front Circuit Board in the Siren Module. See figure 3-6 for the location of P201 and P202.

4. Replace the Main Circuit Board in the Siren Module chassis. When reconnecting J303, make sure that the color dot on the connector is next to the color dot on the board.

5. Replace the Siren Module in the housing.

### 3-8. IGNITION CIRCUIT.

Connect the terminal labelled IGN to the vehicle ignition or accessory circuit using AWG 16 wire. This terminal supplies power to the panel light and pilot light as well as the radio control circuit when the ignition switch is turned on.

### 3-9. HORN RING CIRCUIT.

To connect the vehicle's horn ring circuit so that the horn ring controls the siren's Manual Wail operation in MANUAL and TAP II operation in WAIL, YELP, and HI-LO, proceed as follows (see figure 3-7):

A. Locate the wire that connects the horn ring to the horn relay or the horns. Cut this wire and, if necessary, splice additional wire to each end so that these wires can be terminated on the rear of the PA 2100.

B. Connect the wire that is connected to the horn ring switch to the PA 2100 terminal labelled RING.

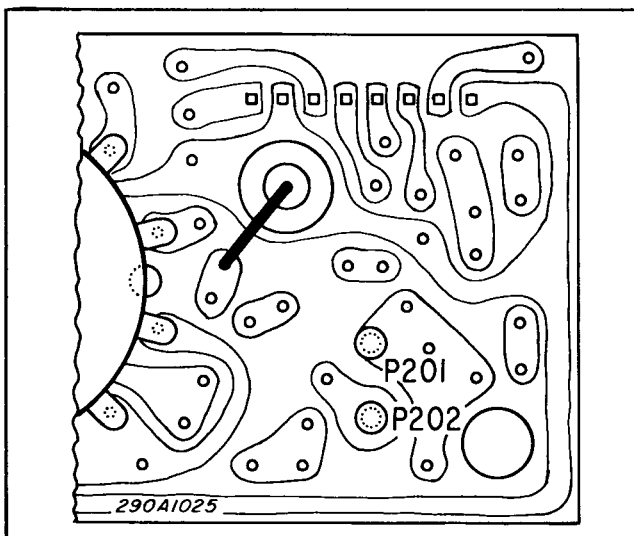


Figure 3-6. P201 and P202 Location.

C. Connect the wire from the horn relay or horn(s) to the HORN terminal on the rear of the PA 2100. The siren automatically compensates for both positive and negative horn ring circuits without any adjustments.

### 3-10. RADIO CONTROL CIRCUIT.

#### NOTE

Before performing the procedure in this paragraph, ensure that the instructions in paragraph 3-8 have been performed.

Proper connection of the radio control circuitry allows 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 rebroadcast). To perform this connection, proceed as follows (see figure 3-8).

A. Connect a wire from the vehicle's two-way radio relay control circuit to the RC terminal on the rear of the PA 2100. If necessary, refer to the two-way radio service manual to locate this wire in the radio.

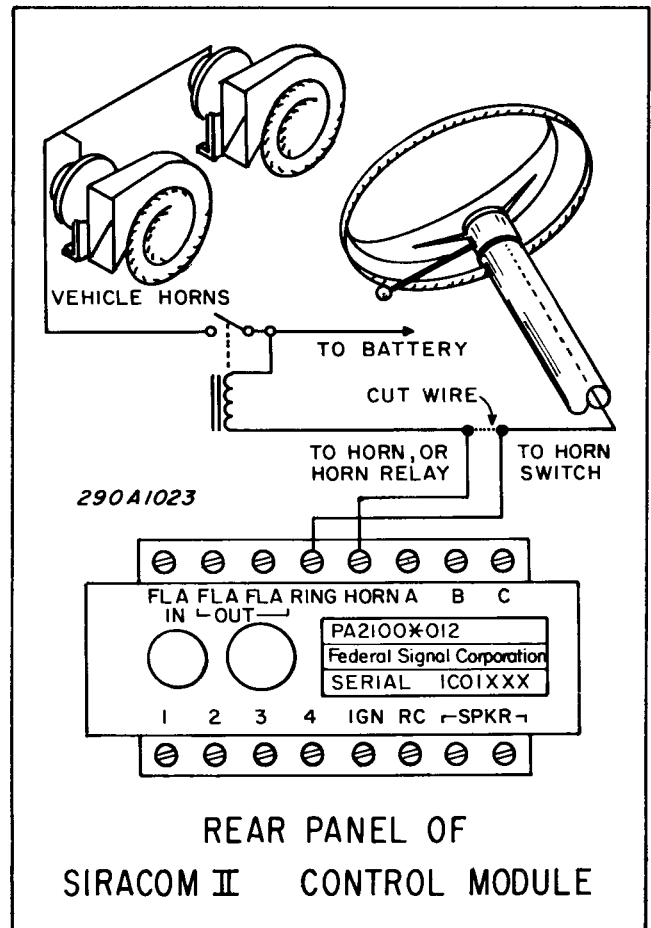


Figure 3-7. Horn Ring Connections.

B. If the two-way radio draws more than 10 amperes of current, install a 12V DC relay in the circuit. Connect one end of the relay coil to the RC terminal on the rear of the siren module. Ground the other end of the relay coil. Use the relay contacts to control power to the radio. See figure 3-8.

**NOTE**

FCC Rules and Regulations require the use of a key-lock switch to control the power to a mobile transmitter. Therefore, wire the PA 2100 RC terminal to control power to the receiver only. Wiring to accomplish this type of control varies with the type of two-way radio. Refer to the radio manufacturer's service manual.

**3-11. MASTER SWITCH.**

Terminals 1, 2, and 3, on the rear panel of the PA 2100 are controlled by the MASTER switch. Any combination of terminals can be controlled by a given position of the MASTER switch. The actual terminals controlled by a given position of the MASTER switch are programmed by means of the nine section miniature rocker switch inside of the Control Module. To make use of this capability, proceed as follows:

A. Connect the devices to be controlled by the MASTER switch, SW 401, to terminals 1, 2, or 3 on the rear of the unit (terminal 4 is not connected to SW 401). For example, flashing lights may be connected to terminal 1; rotating lights to terminal 2; and the optional flasher to terminal 3. If desired, several devices may be connected to a given terminal, provided that the 30 ampere current capacity of the terminal is not exceeded.

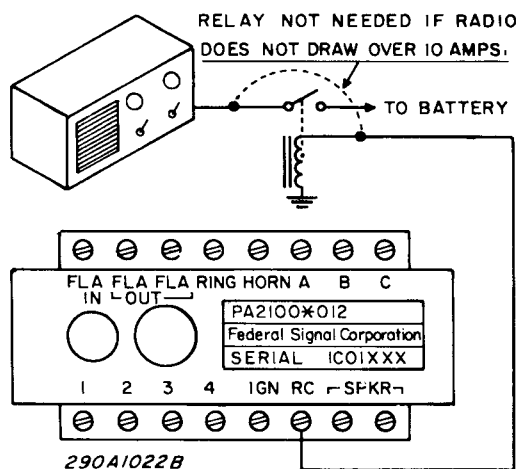


Figure 3-8. Radio Control Connections.

**NOTE**

The MASTER switch is programmed by means of the nine section miniature rocker switch, SW501. As shown in figure 3-9, each section of the switch is labeled to indicate the terminal and the MASTER position that it programs. ONE, TWO, and THREE indicate the terminal programmed by each group of three switch sections. The numerals "1", "2", and "3" denote the MASTER position controlled by the individual rocker switch sections. For example, the closed contact of ONE-1 programs terminal 1 for MASTER Position 1, the ONE-2 contact programs terminal 1 for MASTER position 2; etc. Therefore, when ONE-1 is depressed, the device(s) connected to terminal 1 is (are) energized when the MASTER switch is set to position 1; when ONE-2 is depressed, the device(s) connected to terminal 2 is(are) energized in MASTER position 2; etc.

B. Determine which device(s) is(are) to be controlled by each MASTER switch position. Using the example in step A, it may be desired to activate the flashing lights in MASTER switch position 1, rotating lights in position 2, and all three devices in position 3.

To program the example described in steps A and B of this paragraph, close switches ONE-1 and ONE-3 to program terminal 1 (flashing lights) for MASTER positions 1 and 3, respectively. Close TWO-2 and TWO-3 to program terminal 2 (rotating lights) for positions 2 and 3 respectively. Close THREE-3 to program terminal 3 (optional flasher) for MASTER position 3 (see figure 3-9).

C. Remove the top cover of the chassis by loosening the hex head captive screws and sliding off the cover.

D. Program the MASTER switch by depressing the appropriate sections of SW501 with a pencil point or similar pointed tool. As indicated in figure 3-9, the switch contacts are closed when the upper half of the rocker is pressed. Any combination of terminals can be controlled by any given MASTER switch position.

E. Replace the top cover on the chassis.

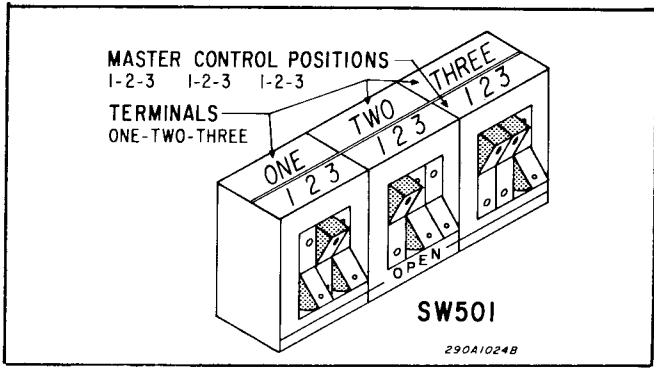


Figure 3-9. MASTER Switch Programming.

### 3-12. FLASHER OPTION.

Those sirens designated PA 2100\*012F on the rear legend plate include the factory-installed Flasher option. If your siren is NOT designated PA 2100\*012F, disregard the procedure in this paragraph.

The flasher circuitry has an On Override and an Off Override feature. When a positive voltage is applied to terminal B, on the rear panel of the PA2100, the lamp(s) connected to the FLA OUT terminals are illuminated continuously, regardless of the voltage present at FLA IN. Conversely, a positive voltage at terminal A, on the rear panel, causes the lamp(s) connected to FLA OUT to be off continuously, regardless of the voltage present at FLA OUT or terminal B.

Figure 3-10 shows the wiring diagram of a typical headlight flashing circuit. This circuit is configured so that the flasher circuitry in the siren is defeated when the headlight switch is turned on.

#### A. Single Flasher Operation.

1. Connect a flasher control switch that is capable of controlling 12VDC such as a Control Module Accessory Switch or a MASTER CONTROL switch terminal, to the FLA IN terminal on the rear of the Control Module.

2. Connect the circuit to be flashed to the FLA OUT terminal closest to the FLA IN terminal.

#### B. Alternating Flasher Operation.

1. Connect a flasher control switch that is capable of controlling 12VDC, such as a Control Module Accessory Switch or a MASTER switch terminal, to the FLA IN terminal on the rear of the Control Module.

2. Connect the circuits to be alternated to the FLA OUT terminals, one circuit to each of the terminals.

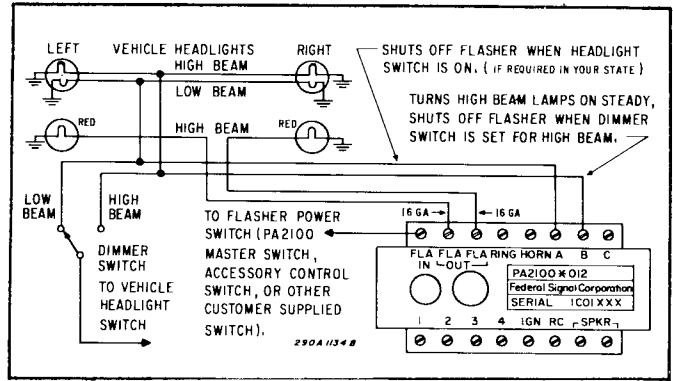


Figure 3-10. Typical Headlight Flashing Circuit.

### 3-13. RELATIVE PA LOUDNESS ADJUSTMENT.

After all of the electrical wiring to the PA2100 is complete, set the SELECTOR switch to PA. Depress the microphone push-to-talk switch, speak in a normal voice, and adjust the front panel GAIN control for the desired sound level outside the vehicle. Turn on the two-way radio and adjust the volume for a comfortable listening level inside the vehicle. Set the siren SELECTOR switch to RADIO. Stand outside of the vehicle and note the radio rebroadcast loudness. If it is too loud, or too soft, adjust R142, accessible through a hole in the top of the unit (see figure 3-11), for the desired level.

Clockwise rotation of R142 decreases the sound level. Counterclockwise rotation increases the sound level.

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

Secure the PA2100 to the mounting bracket with 1/4 - 20 x 3/4" hex head screws and 1/4" split lockwashers. Tilt the PA 2100 to the desired position and tighten the 1/4 - 20 x 3/4" hex head screws.

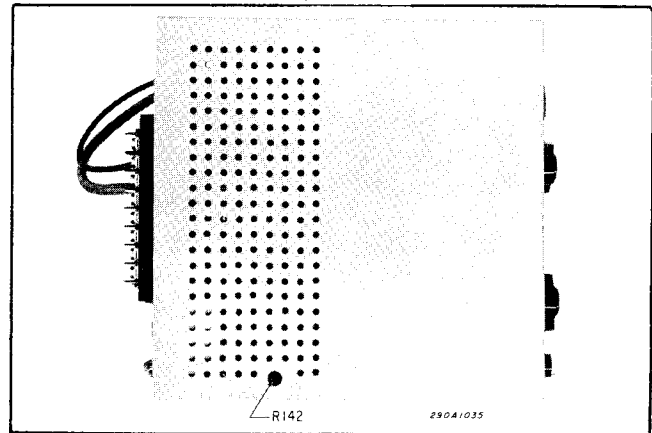


Figure 3-11. PA 2100 Top View.

# SECTION IV OPERATION

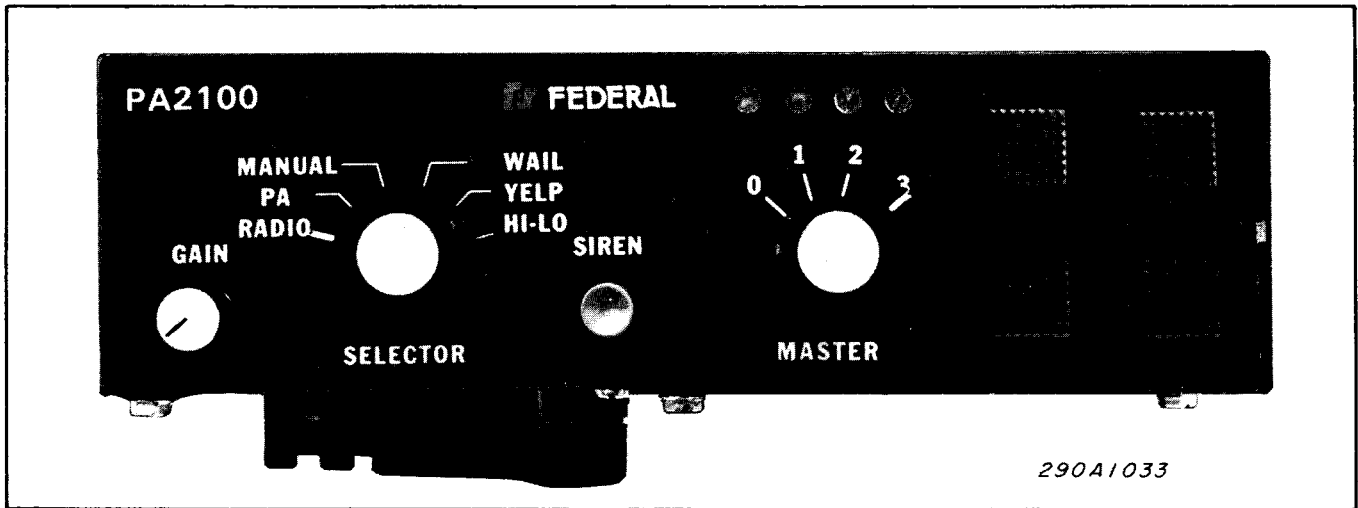


Figure 4-1. PA2100 Front View

## 4-1. GENERAL.

As shown in figure 4-1, all PA 2100 operating controls are located on the front panels of both the Siren Module and the Control Module.

A line of optional adapter modules allows the user the option of using either the siren's own microphone (PA override) or the two-way radio microphone (common microphone).

The optional Model MNCT Microphone and Model FN900 Adapter Module are required when PA override operation is used. When the siren is connected for PA override operation, the two-way radio and the siren each have their own separate microphones. In addition the public address is available in any SELECTOR switch position, except RADIO, when the microphone push-to-talk switch is depressed.

In common microphone operation, the radio microphone is used for both the siren and the two-way radio in the vehicle. A Federal adapter module, that is designed to accommodate the two-way radio microphone connects the siren directly to the radio. The common microphone is electrically connected to the two-way radio in all SELECTOR switch positions except PA. When the SELECTOR switch is set to PA, the two-way radio microphone is connected to the siren amplifier so that announcements can be made over the siren speaker system.

## 4-2. MASTER SWITCH.

The MASTER switch is a four position rotary switch that is used to control the vehicle's emergency warning light system and the electronic siren. The equipment controlled by a given MASTER switch position depends upon the configuration of the individual installation.

In a typical installation, secondary warning lights (flashing lights) are energized when the MASTER switch is set to position 1. Revolving lights are ordinarily installed so that they function in position 2. In position 3, the siren can be activated when the siren's SELECTOR switch is set to one of the siren positions. In addition, any combination of warning lights that are activated in positions 1 or 2 or additional warning lights can be energized when the MASTER CONTROL is in position 3.

The MASTER switch position is indicated by three red LED'S (light emitting diodes) on the front panel of the Control Module. The "0" position of the switch is the "off" position and all of the LED'S are extinguished. When the MASTER switch is in position 1, one of the LED'S illuminate; in position 2, two LED'S are illuminated, and in position 3, all three LED'S illuminate.

If your installation was wired as described in paragraph 3-9 of this manual, the horn ring activates the vehicle's horn when the MASTER switch is set to position 0,

1, or 2. However, when the MASTER switch is set to position 3, the horn ring or other auxiliary switch operates the TAP II feature if the SELECTOR switch is set to WAIL, YELP or HI-LO. The TAP II feature is operated by actuating the auxiliary switch, causing the siren to "Yelp" until the auxiliary switch is operated again.

The Manual Wail signal is operational in all four MASTER switch positions provided that the SELECTOR switch is in the MANUAL position. When the MASTER switch is in positions 1 or 2, and the SIREN switch, SW201, is depressed, the siren sounds until SW201 is released. When SW201 is released, the siren signal ceases immediately. The operation of the Manual Wail signal when the MASTER switch is in position 3 is similar except that when SW201 is released, the frequency of the siren signal "coasts down" to approximately 550Hz before it ceases.

If your installation has been wired as described in paragraph 3-8, power is applied to the two-way radio whenever the vehicle ignition switch is on. In addition, the front panel of the PA 2100 is illuminated and the green LED above the MASTER switch is lit, indicating that power is applied to the siren.

#### 4-3. GAIN CONTROL.

The GAIN control controls the loudness of the sound output from the siren speaker(s) when the siren is being used as a public address or radio rebroadcast amplifier. Clockwise rotation of the GAIN control increases the sound level from the speaker. The GAIN control does not control the volume of the siren.

The maximum usable setting of the GAIN control is determined by the setting of the control where feedback or "squeal" occurs. The sound level at which "squeal" occurs depends upon microphone gain, speaker placement, the proximity of reflective surfaces, etc. Adjust the GAIN control to the 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 that selects the siren function. The following describes the six positions of the SELECTOR switch:

##### A. RADIO

When the SELECTOR is in this position, incoming radio messages are amplified by the siren amplifier and rebroadcast over the siren speaker system. Volume is controlled by the GAIN control. An LED indicator illuminates to indicate that the SELECTOR switch is set to RADIO.

If the system is wired as described in paragraph 3-8, power is always supplied to the two-way radio, even if the ignition switch is off.

##### B. PA

When the SELECTOR is set to the PA position, the siren amplifier may be used as a public address amplifier. In those installations where the siren and the two-way radio share the same microphone, the PA position is the only SELECTOR switch position that connects the microphone to the siren amplifier.

##### C. MANUAL

This position of the SELECTOR switch allows operation of the siren with the front panel SIREN pushbutton switch. The siren can also be activated by means of an auxiliary switch, such as a foot switch or horn ring switch.

##### D. WAIL

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

##### E. YELP

This position of the SELECTOR switch causes the siren to produce a rapid "warbled" tone.

##### F. HI-LO

In this switch position the siren produces a two-tone signal. This distinctive signal may be reserved for any special indication or situation.

#### 4-5. SIREN BUTTON.

The SIREN button activates the siren when the SELECTOR switch is set to the MANUAL position.

# SECTION V

## SIREN MODULE CIRCUIT DESCRIPTION

### 5-1. GENERAL.

Refer to the Siren Module Functional Block Diagram, figure 5-1, and the Siren Module Schematic Diagram, figure 6-4, while reading the following paragraphs.

### 5-2. TONE CONTROL OSCILLATOR.

#### A. General

When the SELECTOR switch, SW301, is set to the WAIL, YELP, or HI-LO position, IC101 and IC102 control the siren tone output. The control voltage generated by IC102 controls the output frequency of the VCO (voltage controlled oscillator).

#### B. WAIL

When SW301 is set to WAIL, the Wail tone control voltage is initiated by IC102. IC102 is basically a timing circuit whose output voltage levels are used to control the charge and discharge of timing

capacitor, C106. C106 charges through CR104 and R106 until it reaches IC102's threshold voltage (approximately 6.9 volts). When the voltage on C106 and IC102-6 reaches approximately 6.9 volts, IC102 changes states and C106 discharges through R126, R127 and R128. When the voltage on C106 reaches the trigger voltage of IC102 (approximately 3.5V), IC102 again changes states and the cycle repeats. The WAIL control voltage at IC102-6 is then applied to Emitter Follower, Q101 and to the Scaling Amplifier, IC103B.

The Scaling Amplifier expands (scales) and inverts the control voltage waveform at the emitter of Q101 to the level necessary to control the Voltage Controlled Oscillator (VCO) without significantly affecting the shape of waveform. The gain of IC103B is determined by R113 and R116. The scaled control voltage waveform at IC103B-1 is coupled through CR108 to the VCO Control Point, IC104-5.

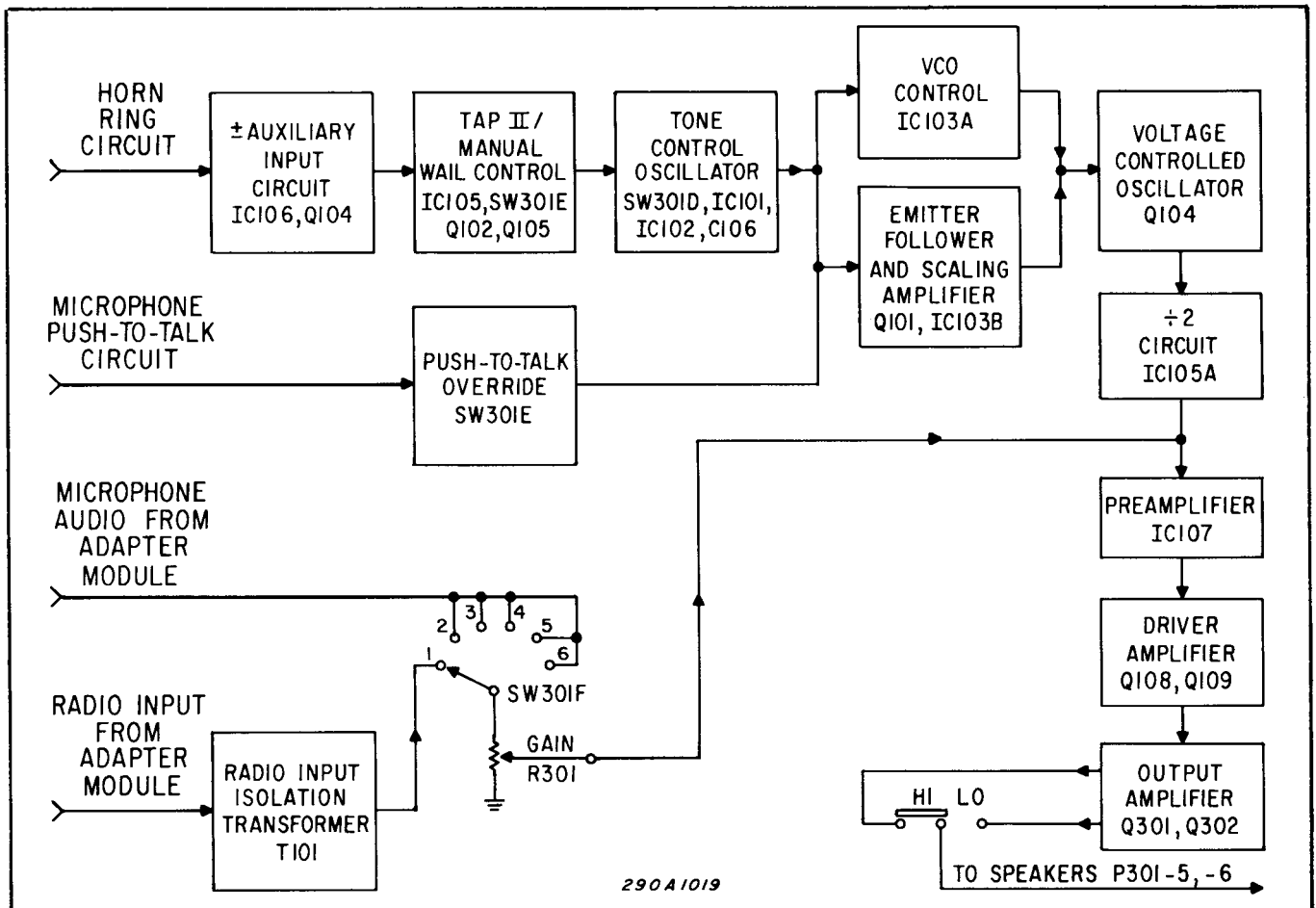


Figure 5-1. Siren Module Functional Block Diagram.



The output signal from the Voltage Controlled Oscillator, IC104, is a series of pulses whose frequency is determined by R119, R120, C105 and the control voltage at the VCO control point, IC104-5. As the control voltage at IC104-5 increases, the frequency of the output of IC104 decreases. Conversely as the control voltage decreases the output frequency increases. The output signal from IC1043 is applied to the  $\div 2$  Circuit at IC105A-13.

The  $\div 2$  Circuit, IC105A, is a toggle flip-flop that divides the pulse frequency by 2. The symmetrical output from this circuit is present at IC105A-15.

When the siren operator turns off the WAIL tone, the timing capacitor, C106 begins discharging toward zero volts. However, C106 is connected through CR105 and R109 to the regulated supply of Q101. As a result, C106 does not completely discharge to zero volts. Consequently, the residual charge on C106 is applied to Q101 and IC103B, applying a constant level control voltage to IC104-5. Simultaneously, Q101 also applies a sample of the voltage on C106 to the VCO Control Point, IC103A-5. When the voltage at IC103A-5 becomes less positive than the fixed voltage at IC103A-6, IC103A-7 goes low. This low resets the  $\div 2$  Circuit, preventing the constant level control voltage at IC 104-5 from allowing the VCO to generate an annoying and false constant frequency tone.

### C. YELP.

When SW301 is set to YELP, the operation of the circuitry is similar to WAIL, except that C106 charges through CR106 and R104 and discharges through R126 and IC101C. The charge and discharge rate of C106 is more rapid in YELP than in WAIL. Consequently, the control voltage variations and the resultant tone frequency variations are more rapid in YELP than in WAIL.

### D. HI-LO.

In HI-LO, C106 charges through CR104 and R105 and discharges through R126, R127 and IC101D, producing a symmetrical square wave at IC102-3. When the voltage at IC102-3 is high, the VCO control voltage

developed by R102 and R118 and is applied directly to the VCO control point, IC104-5. When IC102-3 is low the voltage at IC104-5 is determined by R102, R103, and R118.

### 5-3. $\pm$ AUXILIARY INPUT.

The  $\pm$  Auxiliary Input circuit consists of CR110, CR111, Q104, IC106, and associated components. This circuit allows the Manual Wail and TAP II circuits to respond to the vehicle's horn ring or other auxiliary switch without regard to polarity when the MASTER switch is set to position 3.

In the off state, Q104 is biased off, causing a low to be present at IC106-3. If a negative horn ring circuit is used to trigger the  $\pm$  Auxiliary Input Circuit, depressing the horn ring applies a negative (ground) potential to the cathode of CR111, allowing CR111 to conduct. The conduction of CR111 brings Q104 into conduction, causing IC106 to turn on and produce a high at IC106-3. This high remains at IC106-3 for the entire time that the horn ring is depressed, plus approximately 200 milliseconds after the horn ring is released. The high at IC106-3 is applied to IC102, allowing the Tone Control Oscillator to operate as previously described.

If a positive horn ring circuit is used to activate the  $\pm$  Auxiliary Circuit, the operation of the circuit is similar. When the horn ring is depressed, the positive voltage (+14VDC) causes CR110 to conduct so that a positive voltage is applied to the base of Q104, bringing Q104 into conduction. Q104 then activates IC106 and the circuitry operates as previously described.

### 5-4. MANUAL WAIL AND TAP II.

The SIREN switch, SW201, can operate the Manual Wail signal whenever the SELECTOR switch is set to MANUAL. The Manual Wail signal can also be activated by the horn ring or other auxiliary switch when the MASTER switch is set to position 3.

When SW201 is depressed, the base of Q107 is grounded through R157 and CR207, turning on Q107. The conduction of Q107 simultaneously turns on Q106, Q103, and Pre-amplifier IC107. The conduction of Q103

allows the Tone Control Oscillator to begin generating a Wail signal. The conduction of Q106 turns on the Driver Amplifier, Q108 and Q109.

As described in paragraph 5-3, if the MASTER switch on the Control Module is set to position 3, the + Auxiliary Input circuit can activate the Manual Wail signal.

TAP II operation is accomplished by the + Auxiliary Input circuit in conjunction with IC105 and IC106. When an input is applied to the + Auxiliary Input, IC106 applies a positive pulse to IC105-3 causing IC105-1 to be grounded. This ground is applied through R122 to Q102, bringing Q102 into conduction. The conduction of Q102 applies positive voltage to CR103 and R104 to start the Yelp signal. The positive voltage from Q102 also turns on IC101C. IC101C, acts as part of the discharge path for C106.

The Yelp signal continues until the + Auxiliary Input circuit causes IC106 to produce another positive pulse at IC105-3. As a result, the voltage at IC105-1 returns to its high level, turning off Q102, and normal siren operation resumes.

IC105-7 is held at ground potential for TAP II operation. However, when the SELECTOR switch, SW301, is set to RADIO, PA, or MANUAL, TAP II operation is not required. Therefore, to prevent the operation of the TAP II circuitry when SW301 is set to RADIO, PA, or MANUAL, IC105 is held reset by the application of the positive supply voltage to IC105-7. IC105-7 is also held positive between switch positions so that IC105 is held reset as the position of SW301 is changed.

#### 5-5. PREAMPLIFIER AND AMPLIFIER STAGES.

All siren and audio signals are applied to the Preamplifier, IC107. Siren signals are applied through C114 and R147 to

IC107-6. Audio signals from the microphone or radio are coupled through C115 and R145 to IC107-2. The amplified output at IC107-8 is coupled through C118 to the primary of T102. The secondary of T102 applies a push-pull input to the Driver Amplifier Q108 and Q109. The collectors of this stage are coupled to the output Amplifier, Q301 and Q302. The output of Q301 and Q302 is coupled through T301 and P301-5 and 6 to the siren speaker(s). The HI/LO switch, SW302, is set to HI when a 200 watt speaker or 100 watt speakers are connected to the siren. SW302 is set to LO when 58 watt speakers are used.

#### 5-6. PUSH-TO-TALK OVERRIDE.

When the siren and the two-way radio each have separate microphones, the siren is set for PA override operation. The PA override feature allows the siren operator to use the siren as a public address amplifier when the SELECTOR switch is set to any position except RADIO.

When the operator depresses the microphone push-to-talk switch, the Push-To-Talk Line is grounded. This ground potential is applied through SW301 to IC301A and through Q101 to IC103B. In addition, the ground potential is also applied to the Timing Capacitor, C106, preventing it from alternately charging and discharging. As a result, siren tone generation ceases, allowing microphone audio to be amplified by the Preamplifier and Amplifier stages.

#### 5-7. ALTERNATING FLASHER.

The optional Alternating Flasher is located on a printed circuit board in the Control Module. The schematic diagram of this circuit is shown in figure 6-12.

The Alternating Flasher is basically an astable multivibrator that operates at a nominal rate of 90 cycles per minute.

# SECTION VI

## SERVICE AND MAINTENANCE

### 6-1. GENERAL.

Most of the electronic component parts used in the PA2100 are standard items that are available from almost any radio or electronics supply outlet.

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

Address all communications and shipments to:

Service Department  
Signal Division  
Federal Signal Corporation  
136th and Western Avenue  
Blue Island, Illinois 60406

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

The following diagrams are provided to assist repair personnel when service to the equipment is required.

Fig.	Diagram
6-1	SELECTOR Switch Diagram
6-2	Siren Module Printed Circuit Board Removal
6-3	Siren Module Internal View
6-4	Siren Module Schematic Diagram
6-5	Siren Module Main Circuit Board Parts Location Diagram
6-6	Siren Module Front Circuit Board Parts Location Diagram
6-7	PA2100 Bottom View
6-8	Control Module Internal View
6-9	Control Module Schematic Diagram
6-10	Control Module Relay Circuit Board Parts Location Diagram
6-11	Control Module LED Circuit Board Parts Location Diagram
6-12	Control Module Optional Flasher Board Schematic Diagram
6-13	Control Module Optional Flasher Circuit Board Parts Location Diagram

### 6-2. SIREN MODULE.

#### A. General

Any competent electronic technician should have little difficulty in tracing and correcting a malfunction. When troubleshooting the PA2100 Table 6-1 may be useful for isolating a malfunction.

When replacing small components, use care when soldering. Heat easily damages integrated circuits, transistors, capacitors and circuit boards. Therefore, it is advisable to use longnose pliers or similar heat sink on the component lead being soldered.

When replacing the Driver Amplifier transistors, Q108 and Q109, or the Output Amplifier transistors, Q301 and Q302, insure that a matched pair is used. In addition, always replace the mica insulators. Use heat sink compound on both sides of the mica insulators and ensure that they are properly installed. Improper installation of the insulator could cause a short circuit.

Always adjust the symmetry of the output waveform when Q108 and Q109 or Q301 and Q302 are replaced. To perform this adjustment, disconnect the speaker(s) and connect a 5.5 ohm 200 watt dummy load across the speaker terminals. Connect an oscilloscope across the dummy load and activate the Yelp signal. Adjust R158 for the best possible square wave. See figure 6-2 for the location of R158.

#### B. Removal for Servicing.

The Siren Module is easily removed from the PA2100 chassis. To remove the Siren Module, loosen two of the hex head screws on the bottom of the unit, and slide the Siren Module out (see figure 6-7).

#### C. Circuit Board Removal.

1. To remove the Main Circuit Board remove the three screws that hold the board in the Siren (see figure 6-2). Disconnect the socket at the rear of the board and lift the board out of the module. When replacing the Main Circuit Board, align the socket at the

rear so that the color dot on the socket is adjacent to the color dot on the circuit board. Also be sure that the two plugs on the front of the circuit board mate properly with sockets on the Front Circuit Board.

2. To remove the Front Circuit Board, remove the Main Circuit Board as described in subparagraph 6-2.C.1. Loosen all control knob set screws and slide the knobs from their control shafts. Remove the spanner nuts that hold the SELECTOR and the GAIN control to the front panel of the module. Remove the screw that holds the siren button bracket in place (see figure 6-7) and lift out the Front Circuit Board.

### 6-3. CONTROL MODULE.

To gain access to the interior of the Control Module, loosen two hex head screws on the bottom of the PA2100 (see figure 6-7). Slide cover off the unit.

Most of the circuitry in the Control Module is used to control power to vehicle accessories. Therefore, if a malfunction occurs in a given circuit the prob-

lem is probably external to the Control Module. However, before troubleshooting the external circuitry always be sure that rear panel of the Control Module is properly wired.

If a malfunctioning device is controlled by the MASTER switch, SW401, make sure that SW401 is properly programmed by the nine section miniature rocker switch, SW 501 (refer to paragraph 3-11).

To remove the Control Module from the PA2100 housing, it is only necessary to loosen one hex head screw (see figure 6-7).

If optional accessory switches are installed to control other vehicle accessories always check the switches for proper operation before troubleshooting the external devices.

The optional Alternating Flasher operates by use of electronic circuitry. If this circuitry fails, see the schematic diagram figure 6-12 and the parts location diagram figure 6-13.

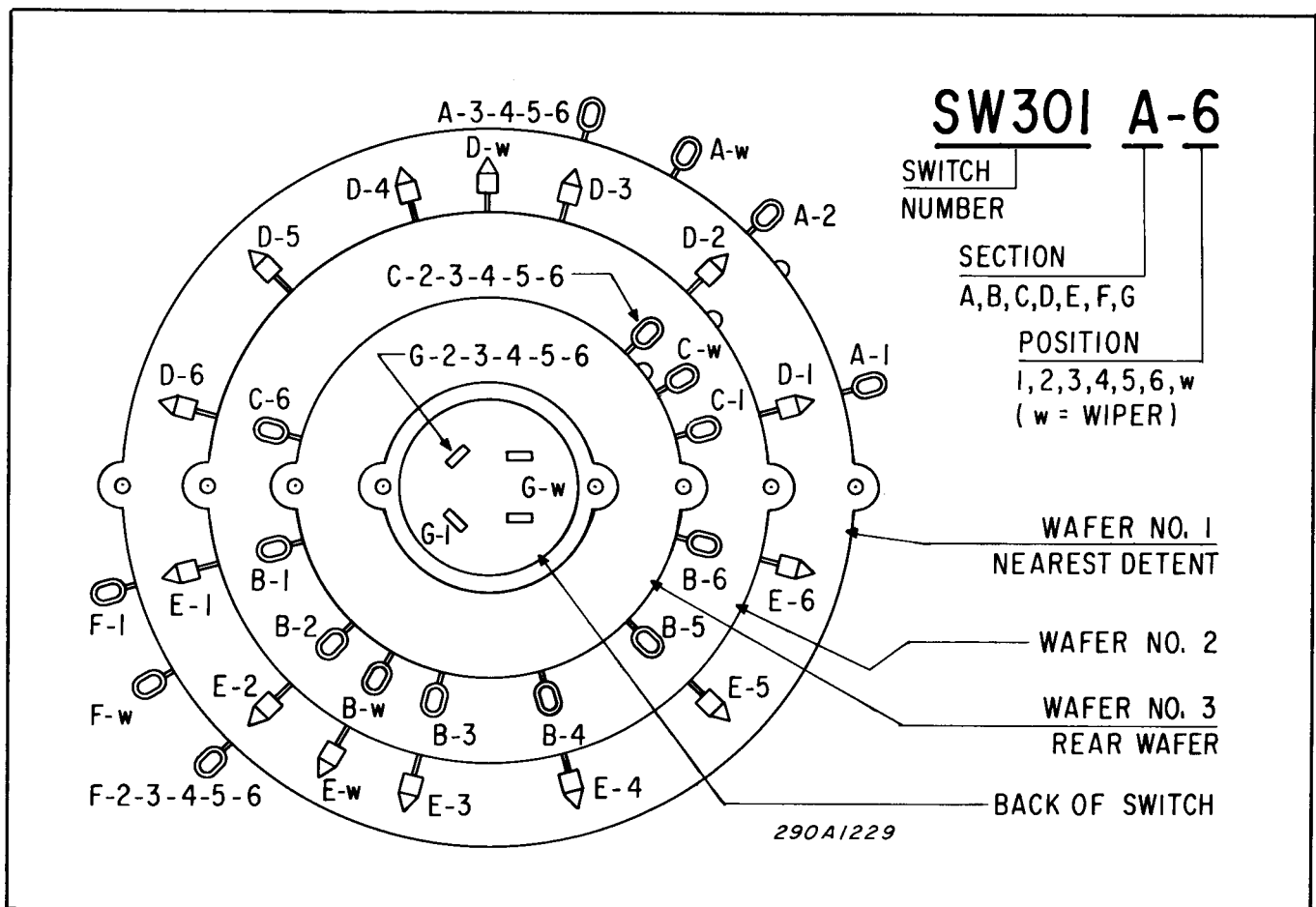


Figure 6-1. MASTER Switch Diagram.

Table 6-1 lists voltages and waveforms, that appear on the integrated circuits and transistors in the PA2100 when the SELECTOR switch is set to its various positions. Abbreviations are used to describe the SELECTOR position. These abbreviations and their meanings are as follows:

R = RADIO	W = WAIL
P = PA	Y = YELP
M = MANUAL	H = HI-LO

Table 6-1. PA2100 Voltages and Waveforms.

When a waveform is present at a given point, the waveform is listed by a capital letter, its cycle rate and its peak-to-peak voltage. For example, the waveform at IC101-3 is listed as A/45-55,1. Therefore, when an oscilloscope is connected to IC101-3, waveform A having a cycle rate of 45-55 cycles per minute (or Hz, if specified) and a nominal amplitude of 1 volt peak-to-peak (Var. = varying) should be observed. All waveforms are illustrated at the end of this table.

IC101

Pin	SELECTOR Position	Voltage or Waveform
1	All	10.5VDC
2	H	10.5VDC
3,4	H	A/45-55,1
5	H	10VDC
6	H	10VDC
8	H	OV
11	Y	OV
12	Y	10.5VDC
13	H	10.5VDC
14	All	10.5VDC

IC102

Pin	SELECTOR Position	Voltage or Waveform
2,6	W	B/10,3
2,6	Y	B/160-190,3
2,6	H	B/45-55,3
3	W	A/109.8
3	Y	A/160-190,9.8
3	H	A/45-55,9.8
4	All	10.5VDC
5	All	7VDC
7	W	C/10,7
7	Y	C/160-190,7
7	H	C/45-55,7
8	All	10.5VDC
2	M	1.9VDC
6	M	1.9VDC
7	M	OV

IC103

1	W, Y	B/10,2.8
2	H	10.5VDC
3	All	5.25VDC
5	W	B/10,3
5	Y	B/160-190,3
5	H	B/45-55,3
6	All	2.7VDC
7	W, Y, H	9.0VDC, min.
7	M, P, R	0.5VDC
8	All	10.5VDC

IC104

2,6	W, Y, H	C/1000-3000Hz, Var.
3	W, Y, H	D/1000-3000Hz, 9.8
4	All	10.5VDC
5	W	B/10,3
5	Y	B/160-190,3
5	H	A/45-55, 0.9
7	W, Y, H	E/1000, 3000Hz, Var.
8	All	10.5VDC

IC105

Pin	SELECTOR Position	Voltage or Waveform
1	All	10.5VDC
3	All	OV
5	All	10.5VDC
6	All	10.5VDC
7	W, Y, H	OV
7	M, P, R	10.5VDC
10	W, Y, H	9.0VDC
10	M, P, R	0.5VDC
11	W, Y, H	9.0VDC
11	M, P, R	0.5VDC
12	All	1.0VDC max.
13	W, Y, H	D/1000-3000Hz, 10
15	W, Y, H	A/500-1500Hz, 10.5
16	All	10.5VDC

IC106

Pin	SELECTOR Position	Voltage or Waveform
2	All	10.0VDC
3	All	OV
4	All	10.5VDC
5	All	7.0VDC
6	All	OV
7	All	OV
8	All	10.5VDC
IC107		
1	All	6.3VDC
8	W, Y, H	F/500-1500Hz, 10
8	P, R	G/1000Hz, 1.8
14	All	13.6VDC

Q101

B, E	W	B/10, 3
B, E	Y	B/160-190, 3
B, E	H	B/45-55, 3
B, E	P, R	1.5VDC
B, E	M	1.9VDC
C	All	10.5VDC

Q103

B	All	11.0VDC
E	All	10.5VDC
C	All	13.6VDC

Q108, 109

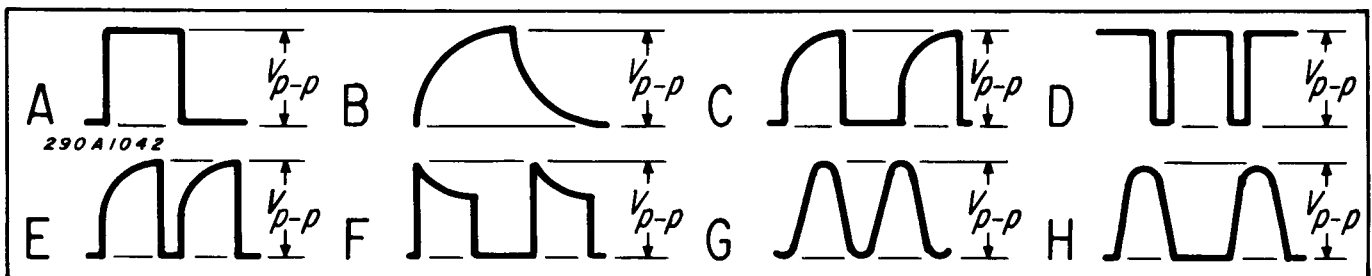
B	W, Y, H	A/500-1500Hz, 30
B	P, R	G/1000Hz, 5
E	W, Y, H	A/500-1500Hz, 23
E	P, R	G/1000Hz, 5
C	W, Y, H	A/500-1500Hz, 1.5
C	P, R	H/1000Hz, 0.8

Q106

B	All	0.7VDC
E	All	OV
C	All	0.3VDC

Q107

B	All	12.9VDC
E	All	13.6VDC
C	All	13.5VDC



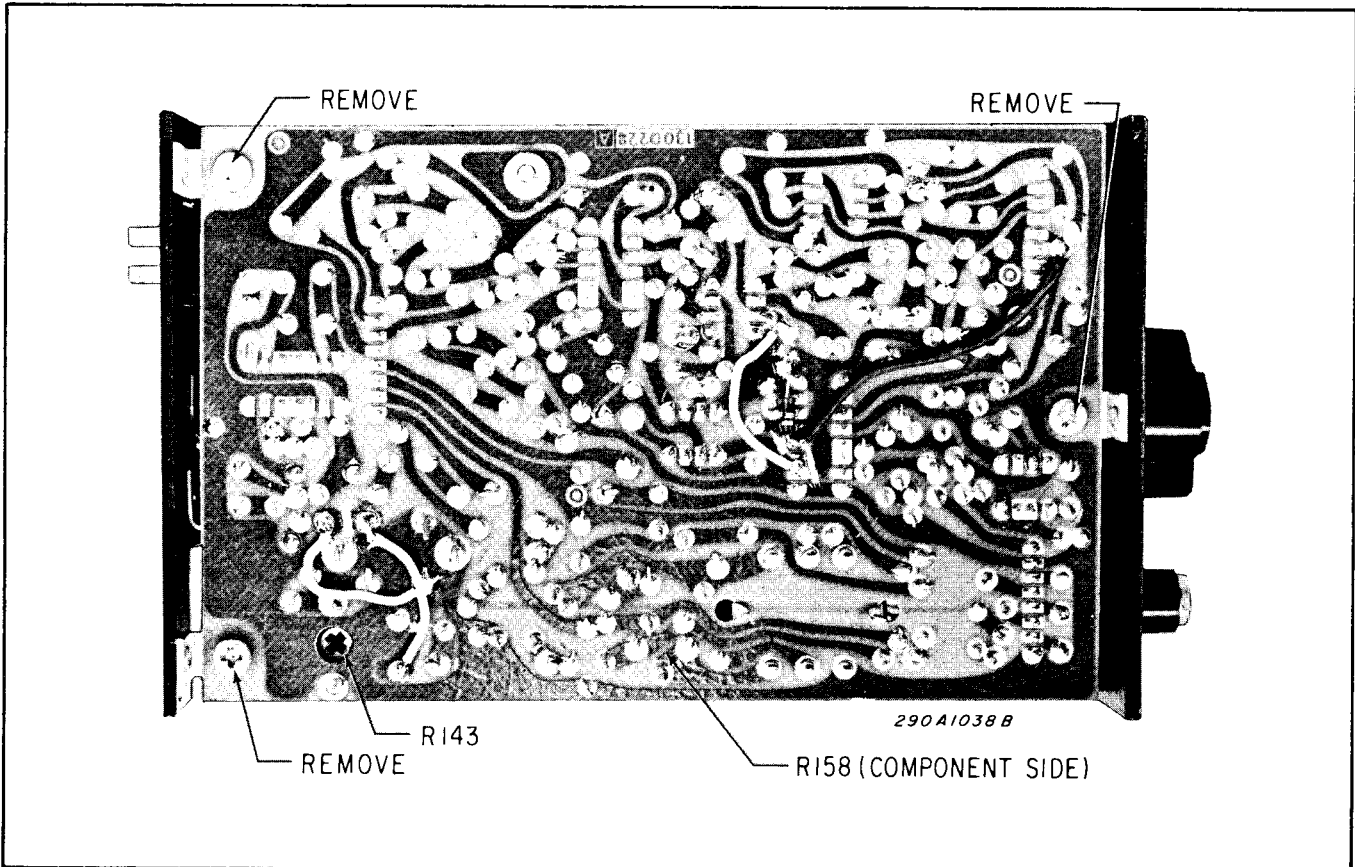


Figure 6-2. Siren Module Printed Circuit Board Removal.

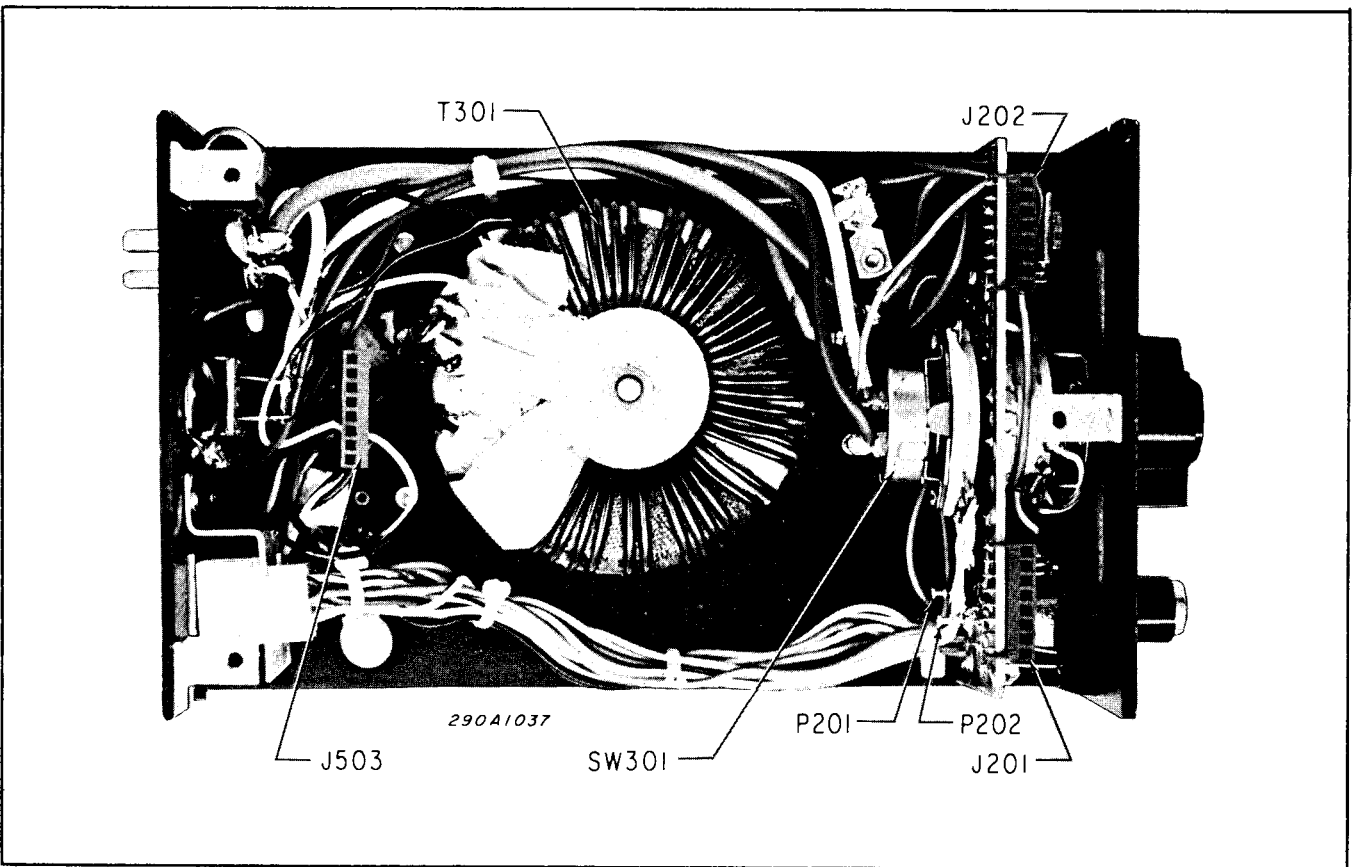
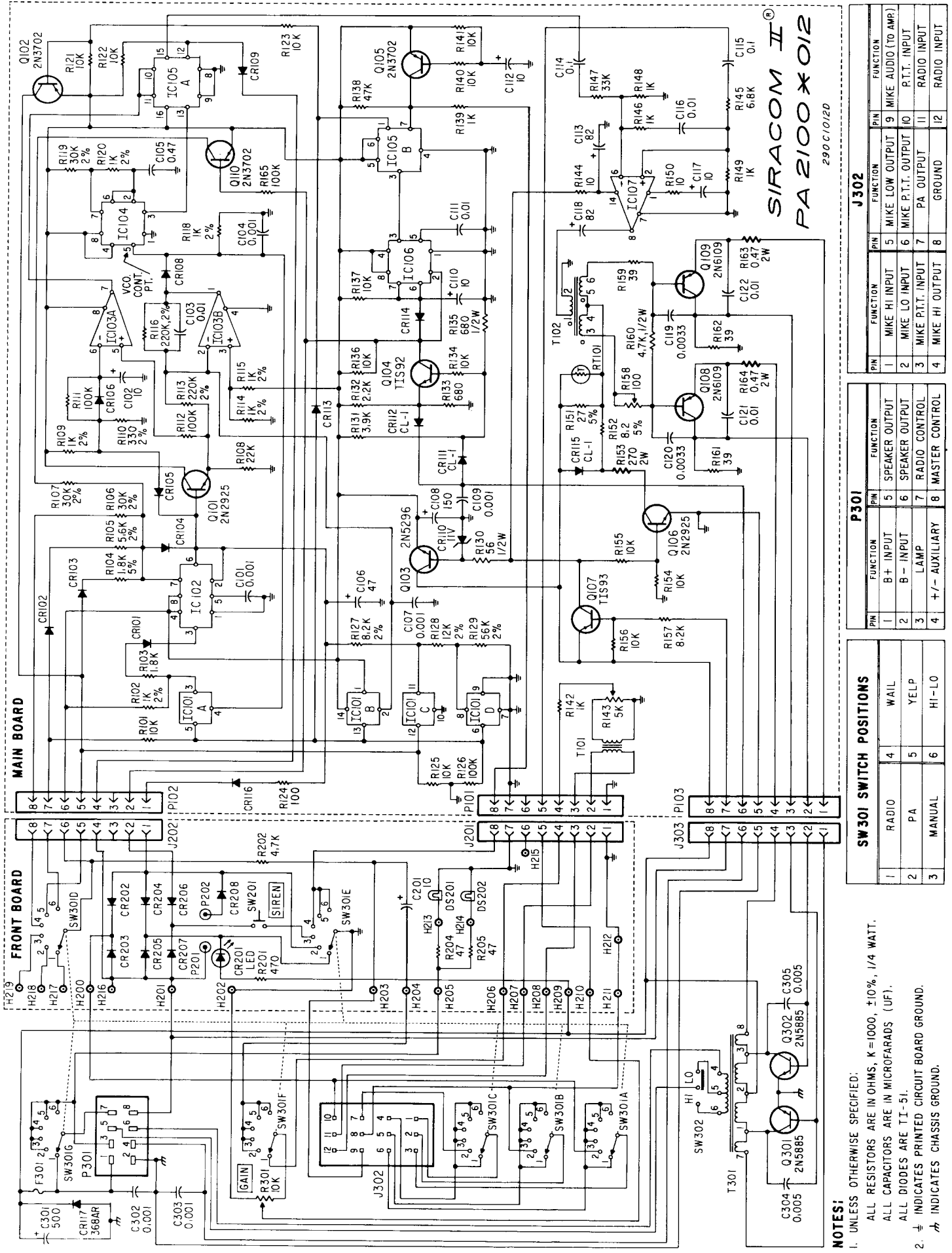


Figure 6-3. Siren Module Internal View.



**SIRACOM II<sup>®</sup>**  
**PA 2100 X 012**  
 290 C10120

**J302**

PIN	FUNCTION	PIN	FUNCTION
1	MIKE HI INPUT	5	MIKE LOW OUTPUT
2	MIKE LO INPUT	6	MIKE P.T.T. OUTPUT
3	MIKE P.T.T. INPUT	7	PA OUTPUT
4	MIKE HI OUTPUT	8	GROUND
9	MIKE AUDIO (TO AMP)	10	P.T.T. INPUT
11	RADIO INPUT	12	RADIO INPUT

**P301**

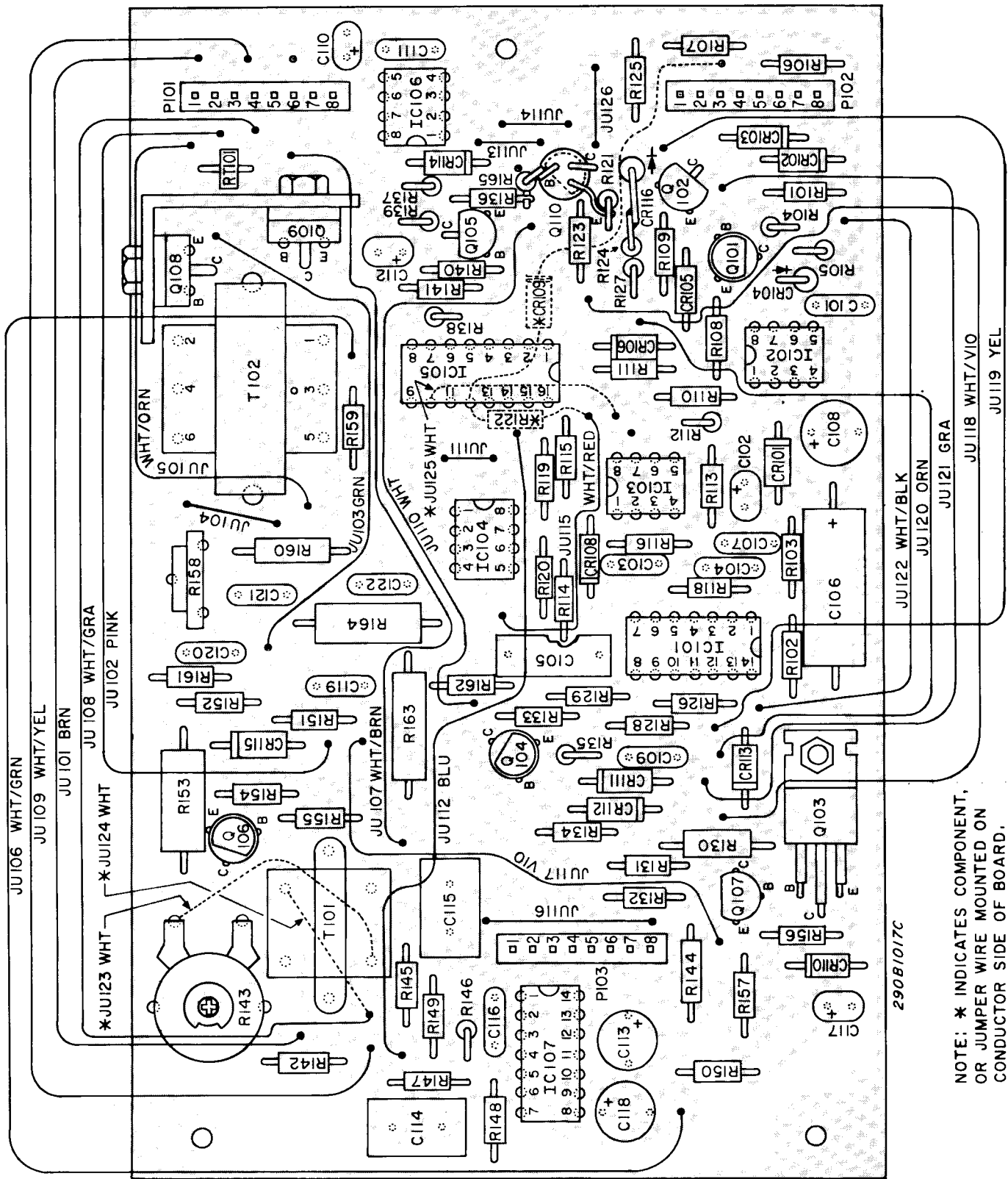
FUNCTION	FUNCTION
1 B+ INPUT	5 SPEAKER OUTPUT
2 B- INPUT	6 SPEAKER OUTPUT
3 LAMP	7 RADIO CONTROL
4 +/- AUXILIARY	8 MASTER CONTROL

**SW301 SWITCH POSITIONS**

POSITION	FUNCTION
1	RADIO
2	PA
3	MANUAL

- NOTES:**
- UNLESS OTHERWISE SPECIFIED:  
 ALL RESISTORS ARE IN OHMS, K=1000, ±10%, 1/4 WATT.  
 ALL CAPACITORS ARE IN MICROFARADS (UF).  
 ALL DIODES ARE 1N-51.
  - ⊕ INDICATES PRINTED CIRCUIT BOARD GROUND.  
 ⊕ INDICATES CHASSIS GROUND.





NOTE: \* INDICATES COMPONENT,  
OR JUMPER WIRE MOUNTED ON  
CONDUCTOR SIDE OF BOARD.

Figure 6-5. Siren Module Main Circuit Board Parts Location Diagram.

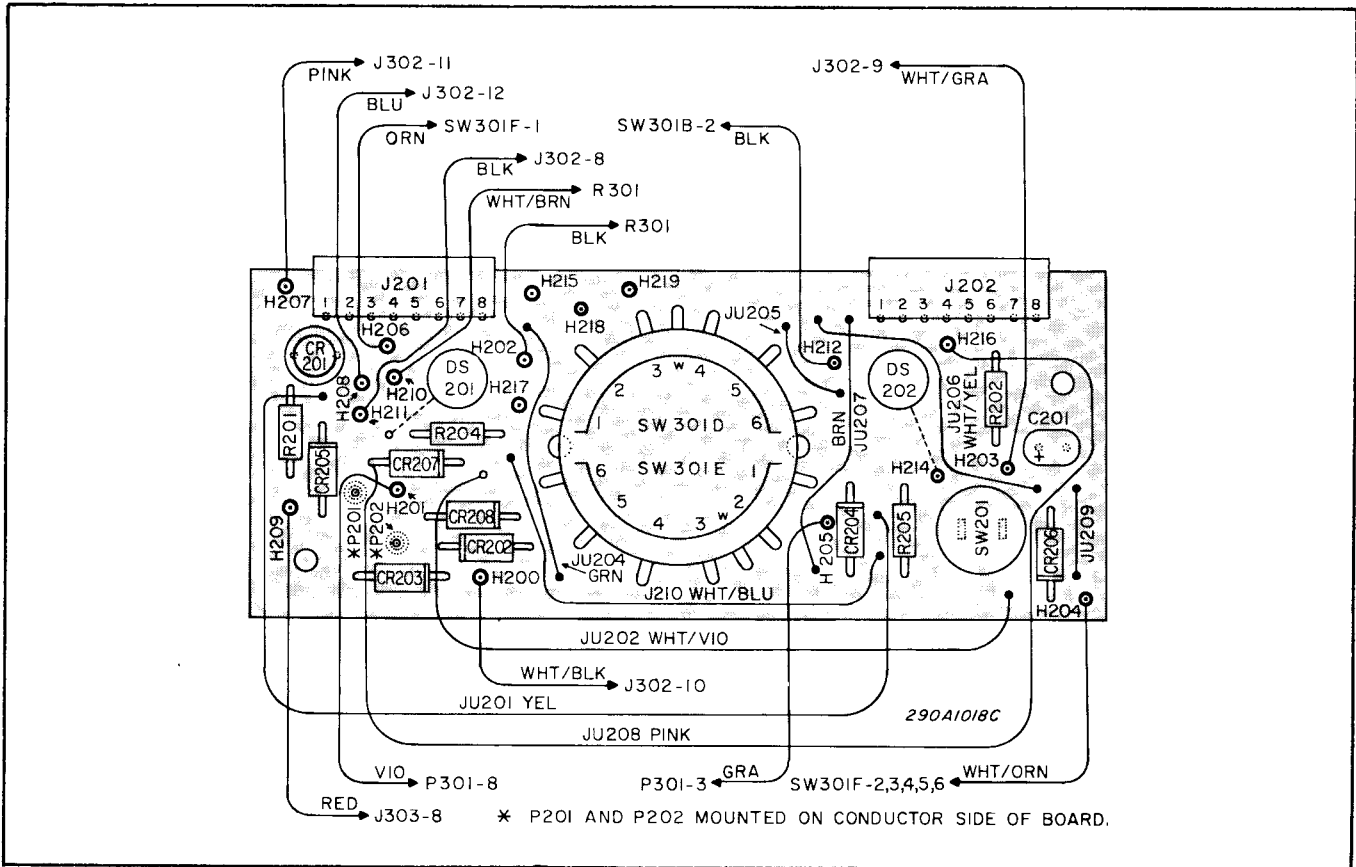


Figure 6-6. Siren Module Front Circuit Board Parts Location Diagram.

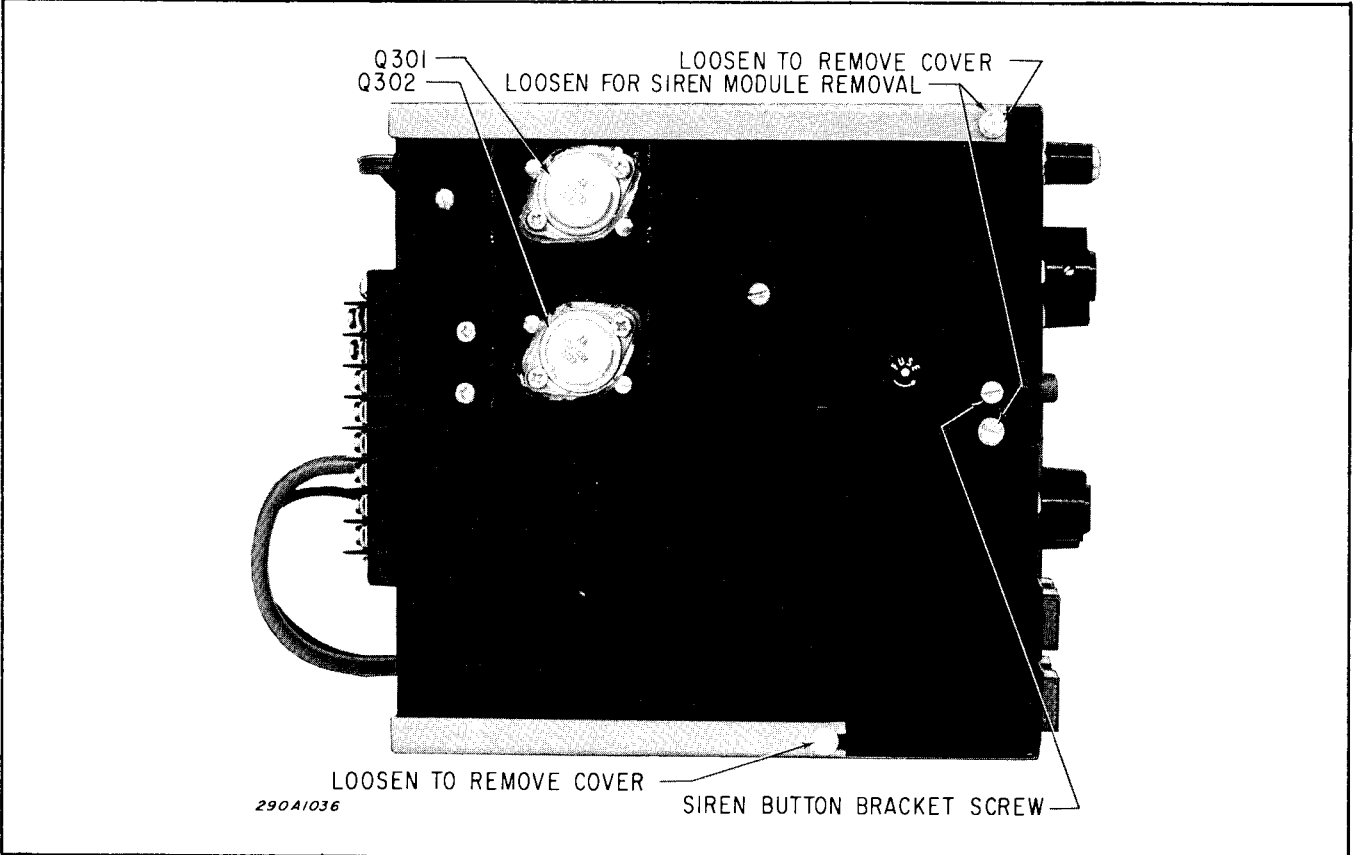


Figure 6-7. PA2100 Bottom View.

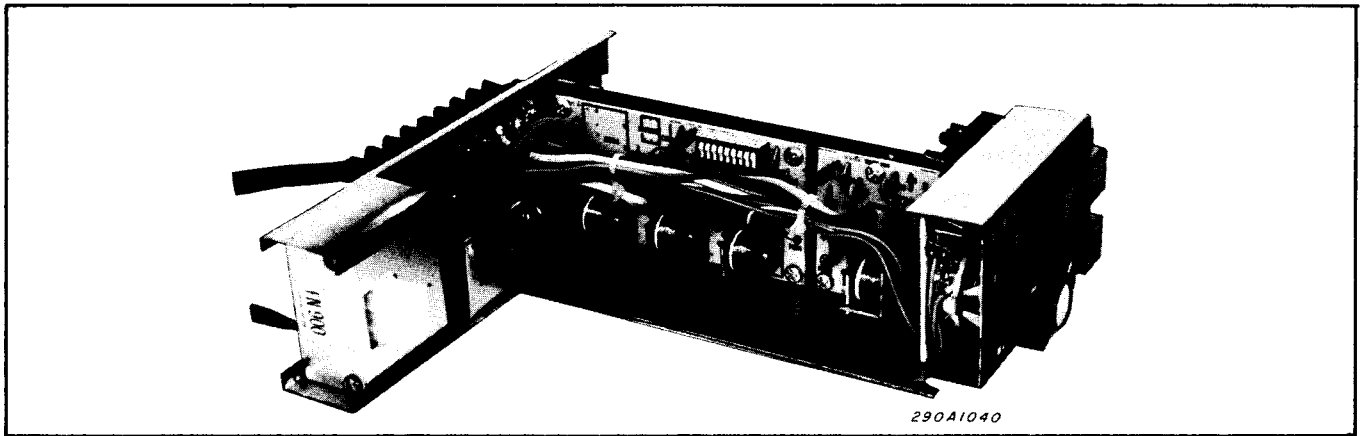


Figure 6-8. Control Module Internal View.

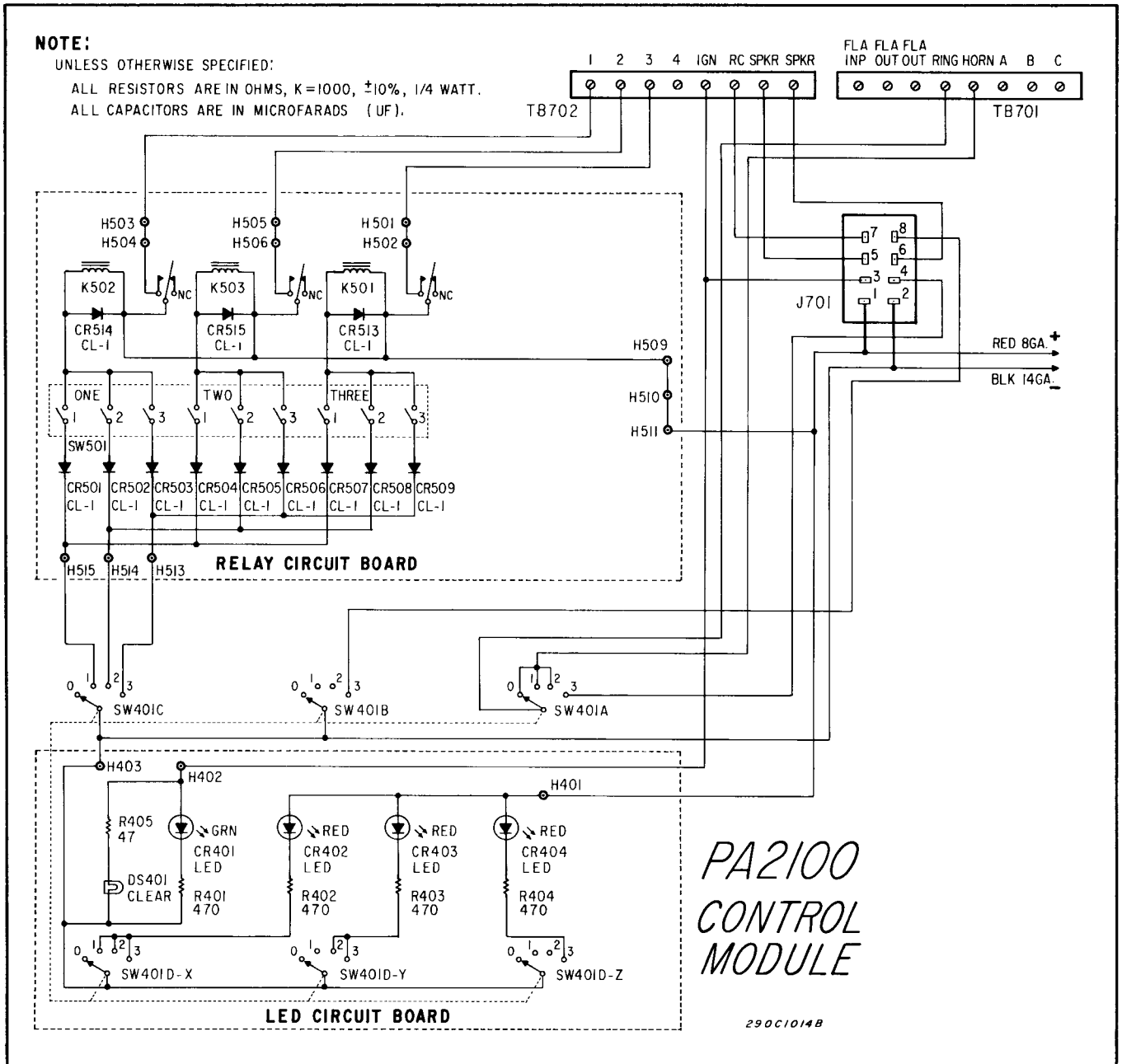


Figure 6-9. Control Module Schematic Diagram.

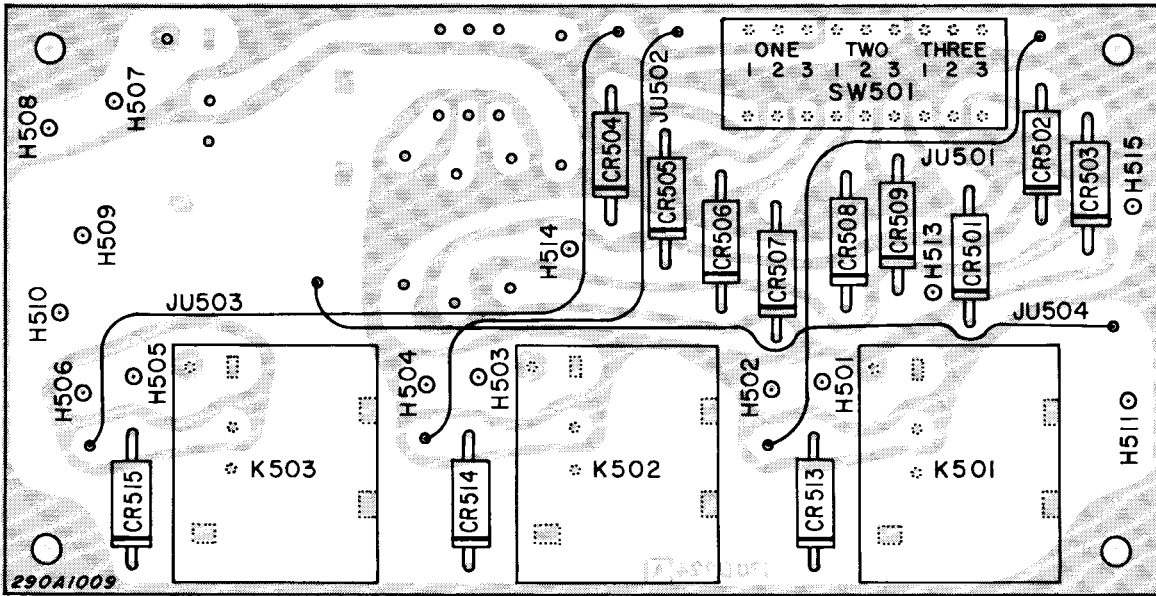


Figure 6-10. Control Module Relay Circuit Board Parts Location Diagram.

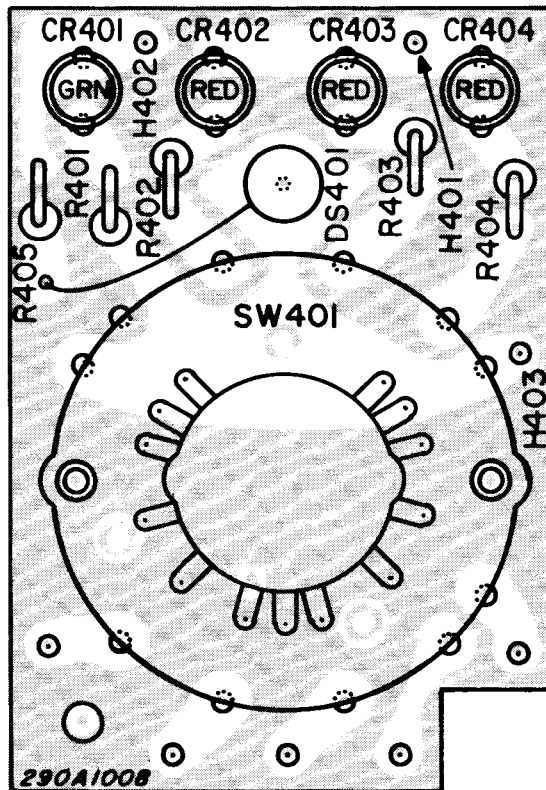


Figure 6-11. Control Module LED Circuit Board Parts Location Diagram.

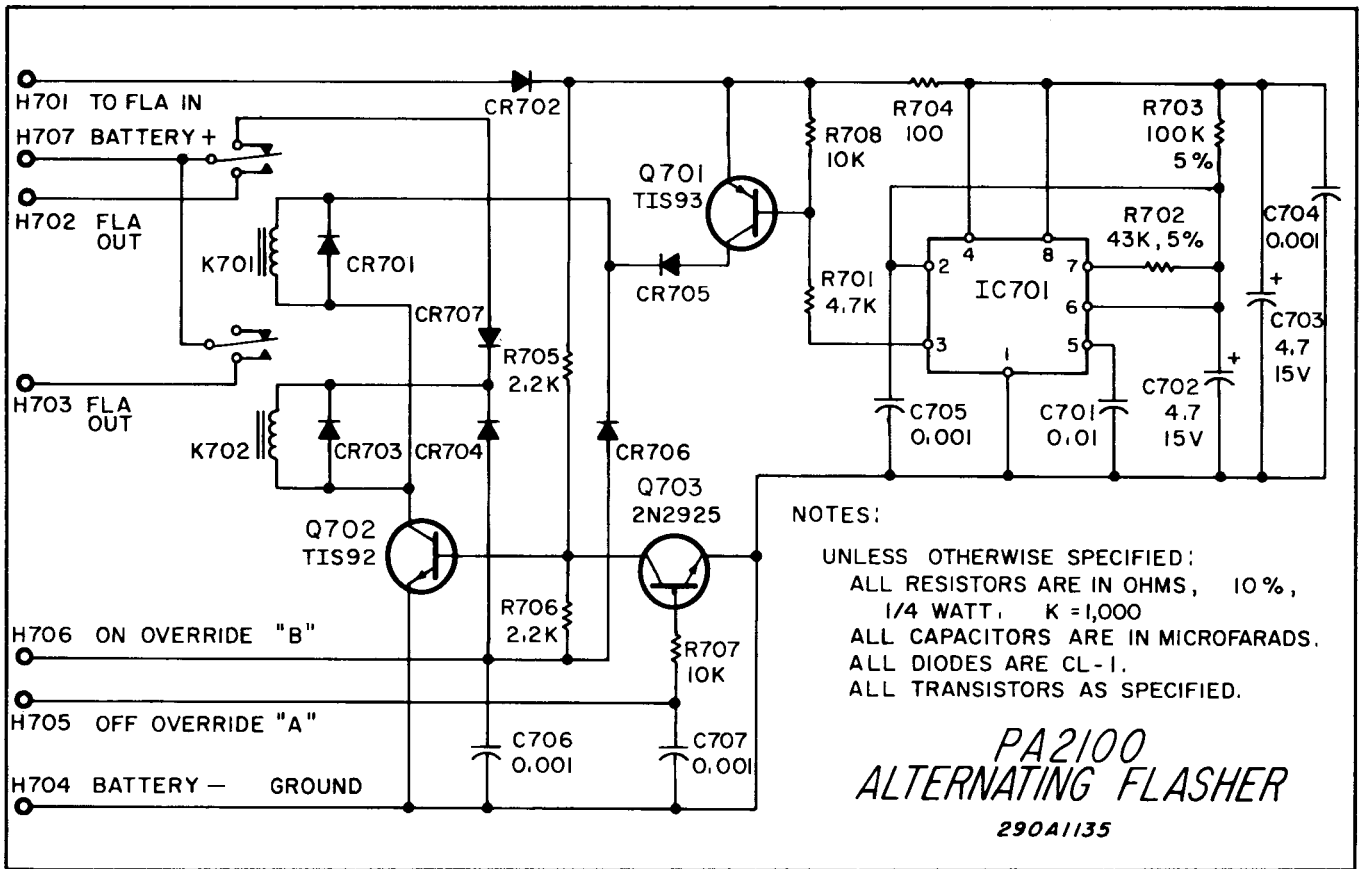


Figure 6-12. Control Module Optional Flasher Circuit Board Schematic Diagram.

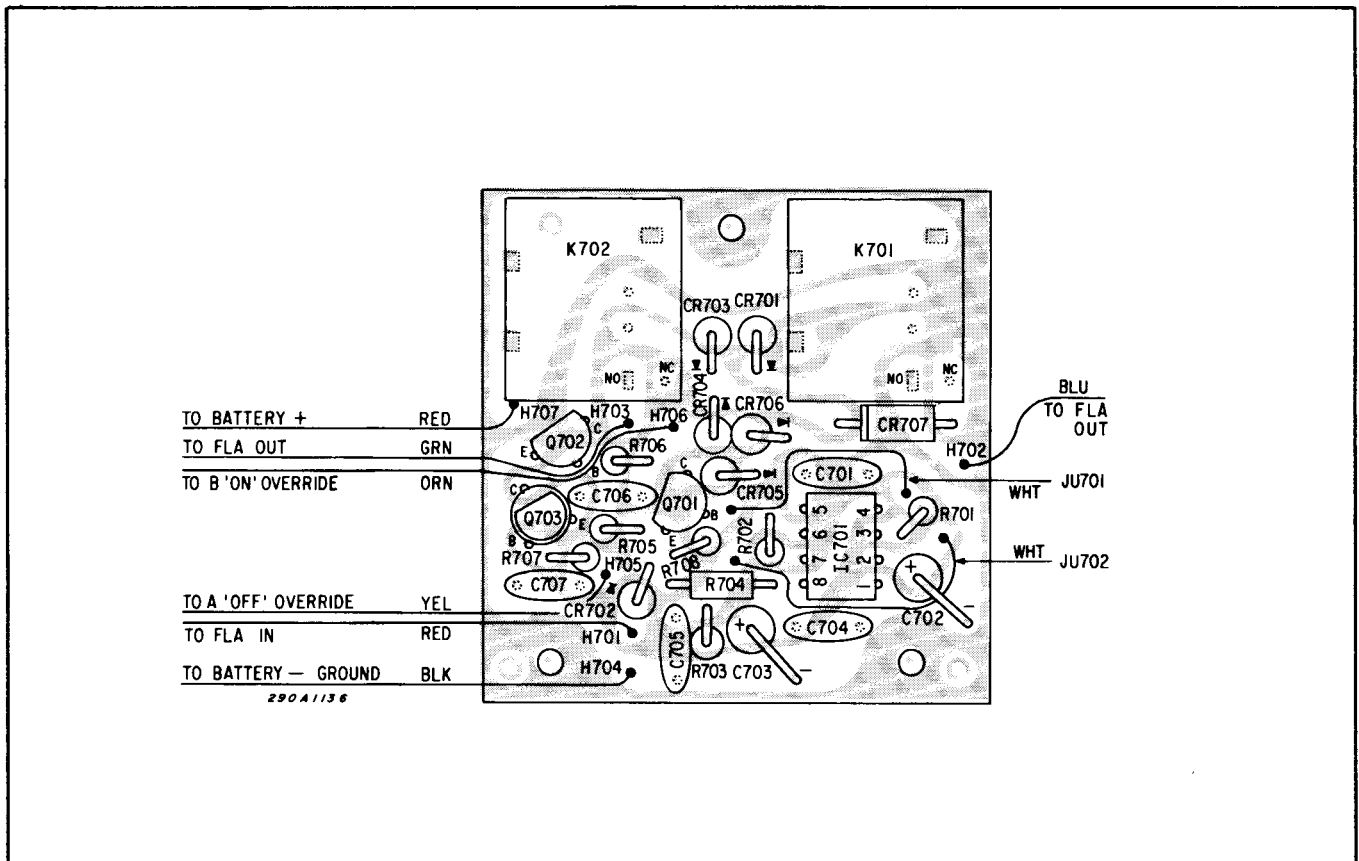


Figure 6-13. Control Module Optional Flasher Circuit Board Parts Location Diagram.

**MAIN CIRCUIT BOARD  
PARTS LIST**

Schematic Symbol	Description	Part No.	Schematic Symbol	Description	Part No.
	<b>RESISTORS</b>			<b>CAPACITORS (Continued)</b>	
R101,121,122,123, 125,134,136,137, 140,141,154,155, 156	10K Ohm	100A207	C105	.047UF, 50V, Mylar	107A418
R102,109,114, 115,118,120	1K Ohm, 2%	100A712	C106	.47UF, 15V tantalum	107A621
R103	1.8K Ohm	100A205	C108	150UF, 15V, tantalum	107A680
R104	1.8K Ohm, 5%	100A705	C113,118	82UF,15V, tantalum	107A650
R105	5.6K Ohm, 2%	100A714	C114,115	.1UF, 100V, Mylar	107A406
R106,107,119	30K Ohm, 2%	100A717	C119,120	.0033UF, 100V, disc	107A271
R108	22K Ohm	100A208		<b>SEMICONDUCTORS</b>	
R110	330 Ohm	100A201	IC101	Circuit Integrated, RCA,	128A047
R111,112,126	100K Ohm	100A222		CD4066 AE	
R113,116	220K Ohm, 2%	100A719	IC102,104,106	Circuit Integrated, National,	128A043-02
R124	100 Ohm	100A236		LM555C	
R127	8.2K Ohm, 2%	100A715	IC103	Circuit, Integrated, National,	128A045
R128	12K Ohm, 2%	100A716		LM358	
R129	56K Ohm, 2%	100A718	IC105	Circuit, Integrated, RCA,	128A044
R130	56 Ohm, 1/2 Watt	100A414		CD4027AE	
R131	3.9K Ohm	100A273	IC107	Circuit, Integrated, National,	128A046
R132	2.2K Ohm	100A221		LM380N	
R133	680 Ohm	100A231	Q101,106	Transistor, NPN, Silicon,	125A119
R135	680 Ohm, 1/2 Watt	100A313		2N2925	
R138	47K Ohm	100A228	Q102,105,110	Transistor,PNP, Silicon,	125A113
R139,142,146 148,149	1K Ohm	100A233		2N3702	
R143	Potentiometer 5K Ohm	105B204	Q103	Transistor, NPN, Silicon,	125B415
R144,150	10 Ohm	100A251	Q104	2N5296	
R145	6.8K Ohm	100A210		Transistor,NPN,Silicon,	125B132
R147	33K Ohm	100A211	Q107	TIS92	
R151	27 Ohm, 5%	100A290		Transistor, PNP, Silicon,	125A133
R152	8.2 Ohm, 5%	100A724	Q108,109	TIS93	
R153	270 Ohm, 2 Watt, WW	103A128		Transistor,PNP,Silicon,	125B431
R157	8.2K Ohm	100A268	CR101,102,103	2N6109	
R158	Potentiometer, 100 Ohm	105A244		Diode, T151	115B101
R159,161,162	39 Ohm	100A286	104,105,106, 108,109,113 114,116		
R160	4.7K Ohm, 1/2 Watt	100A320	CR110	Diode, Zener,11V,1 Watt	115A245
R163,164	.47 Ohm, 2 Watt, WW	103A130	CR111,112,115	Diode ED 3002S (CL-1)	115B301
R165	100K Ohm	100A222		<b>MISCELLANEOUS</b>	
RT101	Thermistor,200 Ohm	104A111	T101	Transformer, Audio	120B123
	Unless otherwise specified, all resistors are carbon composition, 10%, 1/4 watt.		T102	Transformer, Driver	120B145
			P101,102,103	Connector, Wafer	140A170
				Main Circuit Board (without parts	130D228
				parts	
				Main Circuit Board (with parts installed)	200D703

**FRONT CIRCUIT BOARD  
PARTS LIST**

Schematic Symbol	Description	Part No.
R201	Resistor, 470 Ohm, FC, 10%, 1/4 Watt	100A255
R202	Resistor, 4.7K Ohm, FC, 10%, 1/4 Watt	100A224
R204,205	Resistor, 47 Ohm, FC 10%, 1/4 Watt	100A237
C201	Capacitor, 10UF, 10V, tantalum	107A634
CR201	Pilot Light, LED, Red	147A113A-01
CR202,203,204 205,206,207,208	Diode, TI51	115B101
DS201,202	Lamp, 14V, CM382	8469A665
SW201	Switch, Pushbutton	122A167
SW301D,E	Switch, Rotary	122B164
J201,202	Connector, Right Angle	139A161
P201,202	Terminal, USECO 1280BI	233A103
	Front Circuit Board (without parts)	130D229
	Front Circuit Board (with parts installed)	200D702

**RELAY CIRCUIT BOARD  
PARTS LIST**

CR501-509, 513-515	Diode, ED3002S (CL-1)	115B301
K501,502,503	Relay, SPDT, 12V	8536A401
SW501	Switch, Rocker, 9 Section, Miniature	122A165A-02
	Relay Circuit Board (without parts)	130D224
	Relay Circuit Board (with parts installed)	200D699

CHASSIS MOUNTED COMPONENTS  
PARTS LIST

Schematic Symbol	Description	Part No.
R301	Potentiometer, 10K Ohm	106A121
C301	Capacitor, 500 UF, 15V, electrolytic	108A122
C302,303	Capacitor, .001UF, 100V, disc	107A207
C304,305	Capacitor, .005,100V, disc	107A211
CR117	Diode, 368AR	115A311
Q301,302	Transistor, NPN, Silicon 2N5885	125B432
T301	Transformer, Output	120C146
SW302	Switch, Slide, DPDT	122A144
F301	Fuse, 20 Ampere, 3AG	148A127
P301	Connector, 8-contact (Cinch-Jones) P308-AB	140A114
J302	Connector, 12 Contact (Molex 03-06-212)	140A168
	Fuseholder, 342002	143A106
	Knob, Control	141A117
	Knob, GAIN	141A118
	Connector, PC Board	233A126

ACCESSORY KIT

Qty.	Description	Part No.
1	Straight Connector, Two Collar N-35	8536A440
2	1/4" - 20 x 3/8 Hex. Head Screw	7002A000-06
2	1/4" - 20 x 1/2" Hex. Head Screw	7003A307-08
2	1/4" - 20" Hex. Nut	7059A018
4	Split Lockwasher, 1/4"	7074A015
2	8A x 1/2" Phillips, Pan Head, Thread Forming Screw	7011A012-08
1	Circuit Breaker, 12V, 50 Amp	8474A138
1	Item Sheet	8536A418
	Accessory Kit, Complete	8536A405

MISCELLANEOUS PARTS

Assembly, Housing	8536C408
Bracket, Mounting	8536A420

LED CIRCUIT BOARD  
PARTS LIST

Schematic Symbol	Description	Part No.
R401, 402, 403, 404	Resistor, 470 Ohm, FC, 10%, 1/4 Watt	100A255
R405	Resistor, 47 Ohm, FC, 10%, 1/4 Watt	100A237
CR401	Pilot Light LED, Green	147A113A-02
CR402, 403, 404	Pilot Light, LED, Red	147A113A-01
DS401	Lamp, Clear, 14V, CM 382	8469A665
SW401	Switch, Rotary	122B166
	LED Circuit Board (without parts)	130C226
	LED Circuit Board (with parts installed)	200C701

OPTION F (ALTERNATING FLASHER)  
PARTS LIST

R701	Resistor, 4.7K Ohm, FC, 10%, 1/4 Watt	100A224
R702	Resistor, 43K Ohm, FC, 5%, 1/4 Watt	100A710
R703	Resistor, 100K Ohm, FC, 5%, 1/4 Watt	100A262
R704	Resistor, 100 Ohm, FC, 10%, 1/4 Watt	100A236
R705,706	Resistor, 2.2K Ohm, FC, 10%, 1/4 Watt	100A221
R707,708	Resistor, 10K Ohm, FC, 10%, 1/4 Watt	100A207
C701	Capacitor, 0.01 UF, 25V, Disc	107A226
C702,703	Capacitor, 4.7 UF, 15V, Tantalum	107A678
C704,705,706,707	Capacitor, 0.001UF, 500V, Disc	107A263
IC701	Integrated Circuit, LM555C	128A043-02
Q701	Transistor, PNP, T1S93	125B133
Q702	Transistor, NPN, T1S92	125B132
Q703	Transistor, NPN, 2N2925	125A119
CR701,702,703,704,705,706,707	Diode, ED 3002S	115B301
K701,702	Relay, SPST, Bosch	131A125
	Printed Circuit Board (without parts)	130C239
	Printed Circuit Board (with parts installed)	200C722

