

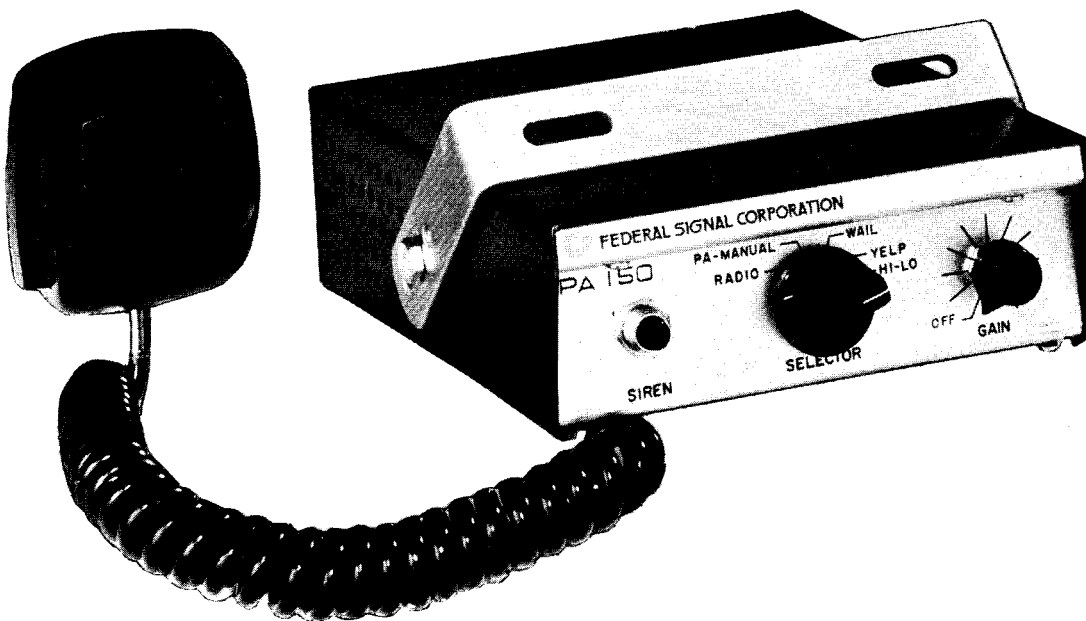
PRICE \$2.00



SIGNAL DIVISION
Federal Signal Corporation

ELECTRONIC SIREN

Model PA 150



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 two years 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.

290A389C



FEDERAL SIGNAL CORPORATION

SECTION I

GENERAL DESCRIPTION



Figure 1-1. Model PA 150 Electronic Siren.

The Federal Model PA150 solid-state electronic siren is a compact, precision-built unit that is designed to operate from a 12 volt DC negative ground electrical system.

The unit produces three distinct siren sounds: WAIL, YELP and HI-LO. There are also provisions for public address and manual siren operation as well as amplification of radio messages.

The SIREN pushbutton switch controls siren operation when the SELECTOR switch is in the PA-MANUAL position. The siren can also be operated by an auxiliary switch such as the vehicle horn switch or a foot switch.

The INSTANT YELP option causes the siren to emit a yelp signal whenever the auxiliary switch is depressed, regardless of the SELECTOR switch position.

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

The wired in microphone provided with the PA150 gives the siren a public address capability. The microphone is electrically connected to the siren amplifier when the SELECTOR switch is set to PA-MANUAL.

The siren amplifier provides a high level of performance and reliability over a wide range of environmental conditions. Negative feedback in the amplifier circuitry provides high audio quality for public address and radio rebroadcast operation. Most of the siren circuitry is mounted on a plug-in printed circuit board for ease of service.

SECTION II

SPECIFICATIONS

2-1. GENERAL.

Input Voltage	10VDC to 16VDC (16V operation limited to 15 min.)
Polarity.	Negative ground only
Standby Current	170 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 (14.0VDC - 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 1500Hz
Cycle Rate	Manual - 10 cycles/min. 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 GAIN Control at maximum.

Frequency Range	300 to 10,000Hz
Harmonic Audio Distortion (300-3,000Hz)	10% max., all power levels from $\frac{1}{2}$ to 70 watts (frequency response ± 3 dB)
Input Impedance	Radio - 500 ohms
Input voltage required to obtain 20 vrms across 2 speaker load (high power tag)	Radio - 0.55 vrms

SECTION III

INSTALLATION

3-1. UNPACKING.

After unpacking the Model PA 150, 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.

3-2. MOUNTING BRACKET.

The PA 150 is equipped with a swinging mounting bracket. This bracket makes it possible to install the siren in any one of a variety of positions. As indicated in figure 3-1, the siren can be mounted beneath the dashboard by positioning the bracket above the siren. Positioning the bracket below the siren allows mounting on any horizontal surface or, in conjunction with Federal's TU-70 Tunnel Mount, on the vehicle's transmission hump.

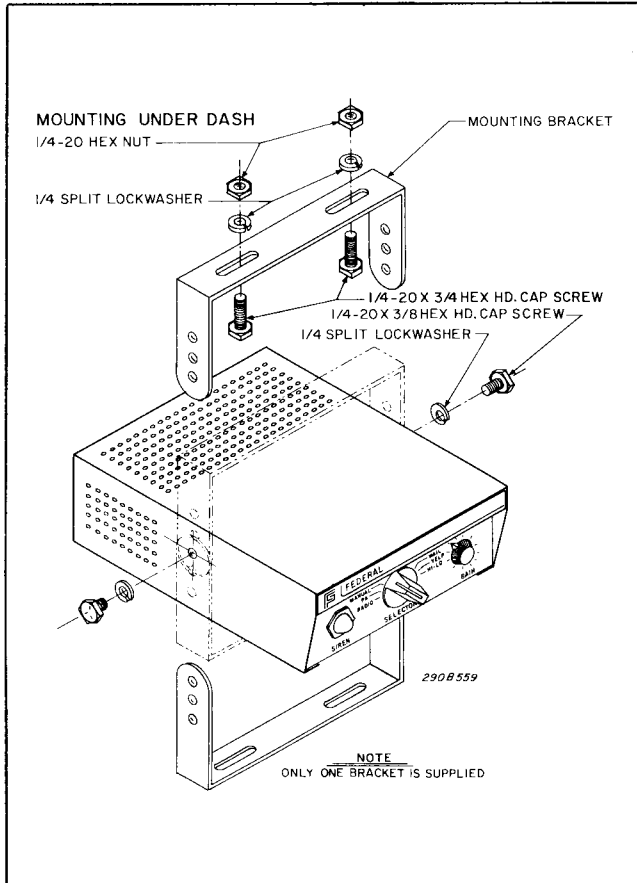


Figure 3-1. Model PA 150 Mounting Under the Dash.

Mount the siren in a location that is both comfortable and convenient to the operator and where it will not interfere with the safe operation of the vehicle. Also keep visibility and accessibility of controls in mind when choosing a mounting location.

CAUTION

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

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

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 150 unit to the mounting bracket with $\frac{1}{4}$ - 20 x $\frac{3}{8}$ hex. head screws and $\frac{1}{4}$ split lockwashers.

E. Tilt the unit to the desired position. Tighten the $\frac{1}{4}$ - 20 x $\frac{3}{8}$ hex. head screw. NOTE: When installing the PA 150 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 150 mounting bracket. Follow the installation instructions packed with each unit.

3-3. POWER CABLE INSTALLATION.

The power cable included in the carton is equipped with an eight prong plug (J3) that mates with the connector (P3) on the rear of the electronic siren (see figure 3-2). The various wires on the connector must be connected as described below.

A. Speaker.

The unit is designed to operate with one 11-ohm impedance speaker, or two 11-ohm impedance speakers connected in parallel.

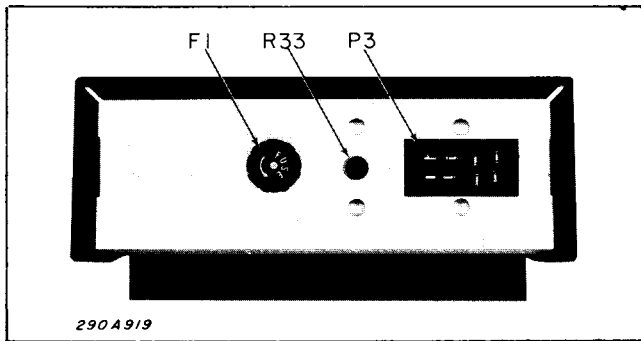


Figure 3-2. PA 150, Rear View.

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

CAUTION

When using 58 watt speakers, never connect speaker wires to the yellow power cable lead (J3, pin 7). Damage to the speaker(s) may result.

The circuitry in the Model PA 150 allows the use of either 58 watt or 100 watt speakers. If one or two 58 watt speakers are used, such as Federal Signal Corporation's CP-25 or TS-24, connect the speaker leads (18 gauge wire) to the green and brown leads of J3 (pins 5 and 6) as shown in figure 3-3. When 100 watt speakers are used, such as Federal's CP100 or TS100, connect the speaker leads to the yellow and brown leads of J3 (pins 7 and 6) as shown in figure 3-4.

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 3-3 or 3-4).

B. Connection to power Source.

The electronic siren can only be installed in vehicles having a negative ground electrical system. Connect the red power cable lead (P3, pin 1) directly to the vehicle's battery or Federal's Model PDC 70 Power

Distribution Center. The black power cable lead (P3, pin 2) should be grounded directly to the vehicle frame near the siren. To protect the wiring and battery when the wiring is connected to the battery terminal, use an inline fuseholder and 20-ampere fuse (not supplied). Install the fuseholder between the battery and firewall, and as close to the battery as practical. Though not recommended, power may also be obtained from the "hot" side of the ignition switch.

C. Auxiliary Connections.

The PA 150 has the capability to be operated from an auxiliary switch (foot switch, horn switch, etc.). To take advantage of this feature, connect the auxiliary switch to the gray power cable lead (J3, pin 4). The PA 150 will now automatically respond to both positive and negative auxiliary circuits without regard to polarity and without adjustment.

When using a horn switch to control the siren, a SPDT switch should be installed between the gray power cable lead (J3, pin 4) and the horn switch. This will allow the horn ring to be switched between the vehicle horns and the electronic siren auxiliary input.

D. Radio Input Connections.

If it is desired to rebroadcast the sound from the vehicle's two-way radio over the siren speaker system, connect the brown two-wire cord in the siren power cable to the radio speaker voice coil terminals.

3-4. RELATIVE PA LOUDNESS ADJUSTMENT.

After the PA 150 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 the desired sound level outside the vehicle. Turn on the vehicle's two-way radio and adjust the volume to a comfortable listening level inside the vehicle. Then set the SELECTOR switch to RADIO. Stand outside of the vehicle and note the radio rebroadcast loudness. If the sound volume is too loud or too soft, adjust R33 located on the rear panel of the siren to the desired sound level.

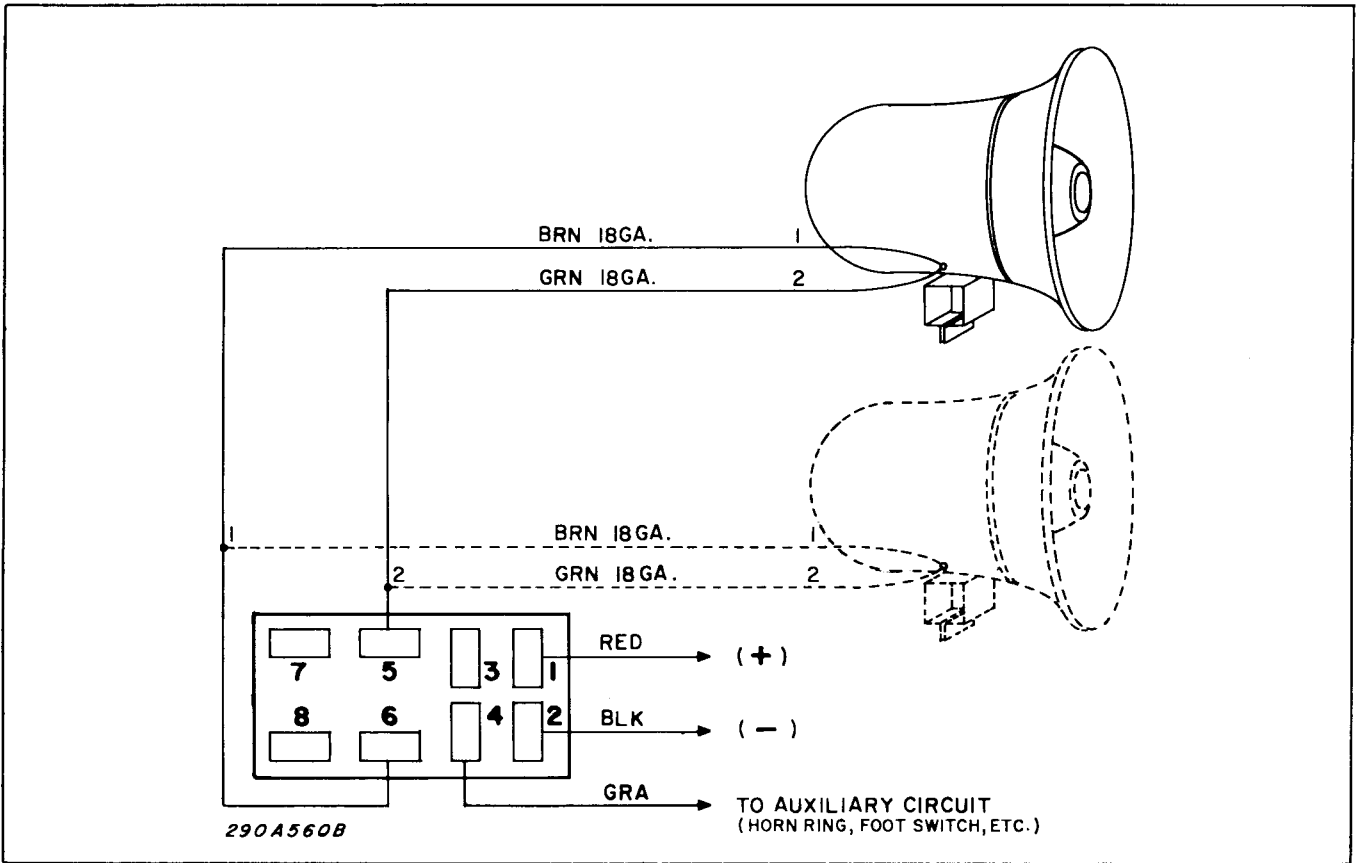


Figure 3-3. Connection of 58 Watt Speaker to the PA 150.

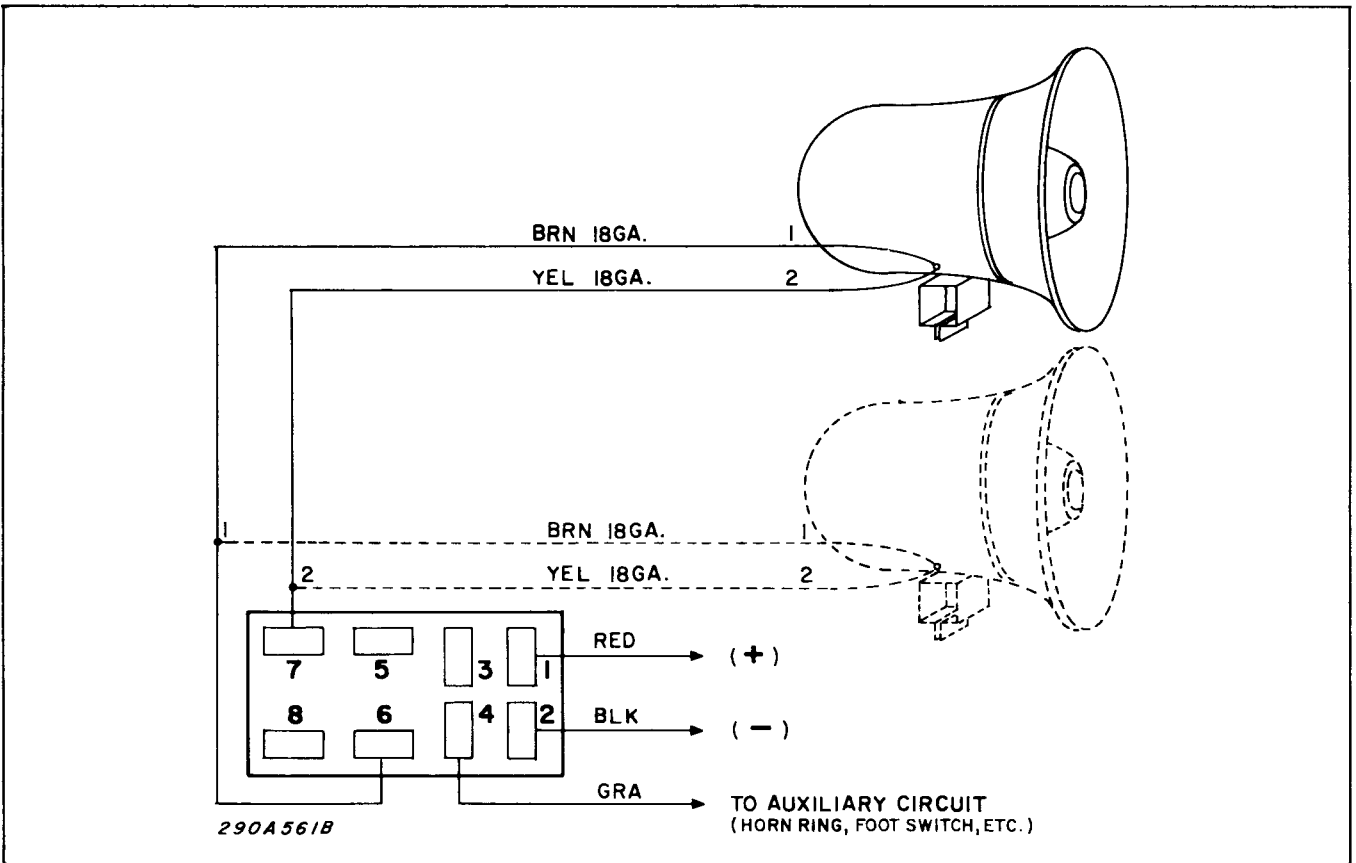


Figure 3-4. Connection of 100 Watt Speakers to the PA 150.

See figure 3-2 for the location of R33. If the volume outside the vehicle is too loud, adjust the control counterclockwise. If the volume is too soft, rotate the control clockwise until the desired level is reached.

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

SECTION IV OPERATION

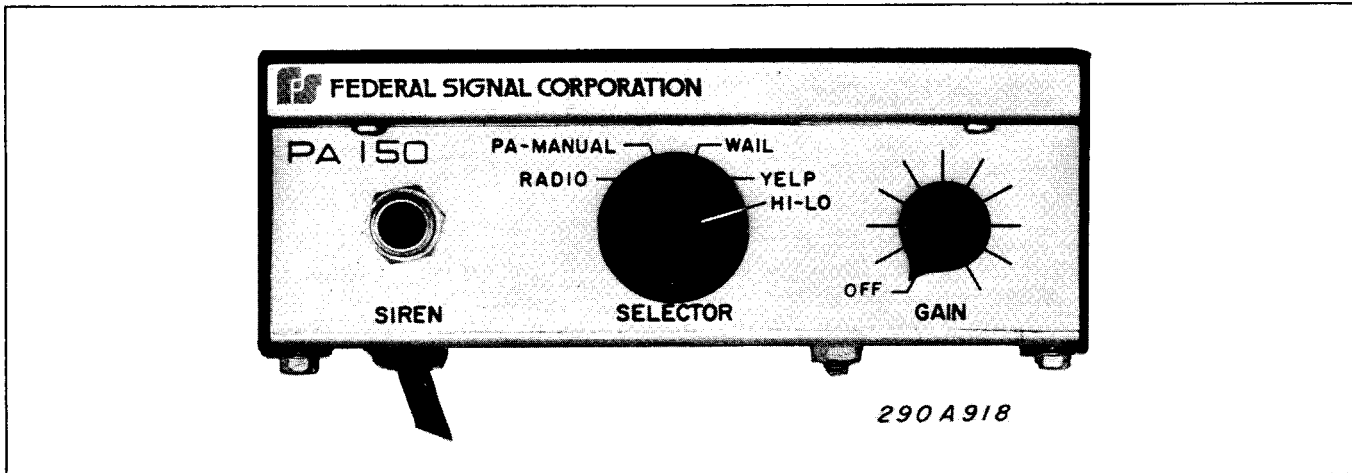


Figure 4-1. PA 150, Front View.

4-1. GENERAL.

As shown in figure 4-1, all PA 150 operating controls are located on the front panel of the siren.

A microphone is included with the PA 150. This microphone is used when the siren amplifier is in use as a public address amplifier. When the microphone push-to-talk switch is pressed, the public address function automatically overrides all other siren functions, except radio rebroadcast.

4-2. ON-OFF SWITCH AND GAIN CONTROL.

The PA 150 on-off switch is on the same control shaft as the GAIN control. The siren is off when the GAIN control is rotated fully counterclockwise. To turn the siren on, rotate the GAIN control clockwise until it "clicks". To turn the unit off, rotate the GAIN control knob fully counterclockwise until the control "clicks".

When the siren is being used as a public address or radio rebroadcast amplifier the loudness of the sound output from the speaker is controlled by the GAIN control. 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 on microphone gain, speaker placement, the proximity of reflective surfaces, open windows in the vehicle, etc. Adjust the GAIN control to the position just below the point where feedback occurs, or as desired.

4-3. SELECTOR SWITCH.

The SELECTOR switch is a five position rotary switch that selects the siren mode of operation. The following describes the six positions of the SELECTOR switch.

A. RADIO

In this switch position, incoming radio messages are amplified by the siren speaker system. Sound volume is controlled by the GAIN control.

B. PA-MANUAL

In this switch position, the siren can function either as a public address amplifier or as an electronic siren. When the microphone push-to-talk switch is depressed, the unit functions as a public address ampli-

fier. When the SIREN button is pressed, a siren tone is produced. The siren can also be activated by means of an auxiliary switch, such as a foot switch or the horn ring switch.

C. WAIL.

When the SELECTOR switch is set to WAIL, the siren produces a continuous wailing sound, up and down in frequency.

D. YELP.

When the switch is set to this position, the siren generates a rapid warbling tone.

E. HI-LO.

In this switch position, the siren generates a distinctive two-tone signal. It may be desirable to reserve this signal for special indications or situations.

4-4. SIREN BUTTON.

The SIREN pushbutton switch is located on the left side of the front panel. This button activates the siren when the SELECTOR switch is in the PA-MANUAL position.

4-5. INSTANT YELP (OPTION "Y").

On those sirens equipped with the INSTANT YELP option, the serial number begins with "Y". For example; Y1A5003.

PA 150 sirens equipped with the INSTANT YELP option emit a yelp signal when the auxiliary control switch is depressed regardless of the SELECTOR switch setting. The siren can be operated manually by the SIREN button when the SELECTOR is in the MANUAL position.

4-6. INSTANT YELP (OPTION "T").

If the serial number of the PA 150 begins with "T" (Example: T1A5007), the unit is equipped with the INSTANT YELP feature with "tap on" - "tap off" switching.

Sirens equipped with Option "T" emit a yelp signal when the horn ring is depressed. The Yelp continues until the horn ring is depressed again. The siren can be operated manually by pressing the SIREN button when the SELECTOR switch is set to PA-MANUAL.

SECTION V

CIRCUIT DESCRIPTION

5-1. GENERAL.

Refer to the PA 150 Functional Block Diagram, figure 5-1, and the schematic diagram, figure 6-4, while reading the following paragraphs.

5-2. WAIL-YELP TIMING OSCILLATOR.

When the SELECTOR switch, SW2, is in the WAIL or YELP position, 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 is set to WAIL and Q3 is conducting. C1 charges through R7 and the emitter-collector junction of Q1. When C1 is sufficiently charged, Q3 cuts off, 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 consisting of R16, R13 and C4 takes the sawtooth waveform from the emitter of Q4 and produces the triangular rising and falling waveform of the WAIL control voltage.

The output waveform of the YELP or WAIL RC network is applied to the sweep oscillator and determines the cycle rate of the siren.

In the YELP mode, C2 determines the repetition rate. The repetition rate in the YELP mode is approximately 180 cycles per minute. The RC network consisting of R13, R15 and C3 develops the YELP control voltage waveform.

The output waveform of the YELP or WAIL RC network is applied to the sweep oscillator and determines the cycle rate of the siren.

5-3. AUXILIARY INPUT CIRCUIT.

Transistors Q1 and Q2, and diodes CR1, CR2, CR5, and CR6 and associated resistors form the auxiliary input circuit. This circuit allows the manual wail, and Instant Yelp circuits to respond to the vehicle's horn ring circuit without regard to polarity. This circuit also prevents false triggering of siren signals by limiting the auxiliary input impedance to 10K ohms (minimum).

In the static (off) state, Q1 is conducting and Q2 is cut off. When a negative (ground) voltage is applied by the horn ring circuit, CR1 conducts and Q1 cuts off. This turns Q2 on and provides a low grounding output at the collector of Q2 and pin 24 of the printed circuit board edge connector.

A positive voltage (+14VDC) applied to the circuit by the horn ring results in a current through R3 and CR5. This turns on Q2 and provides a low, grounding output at the

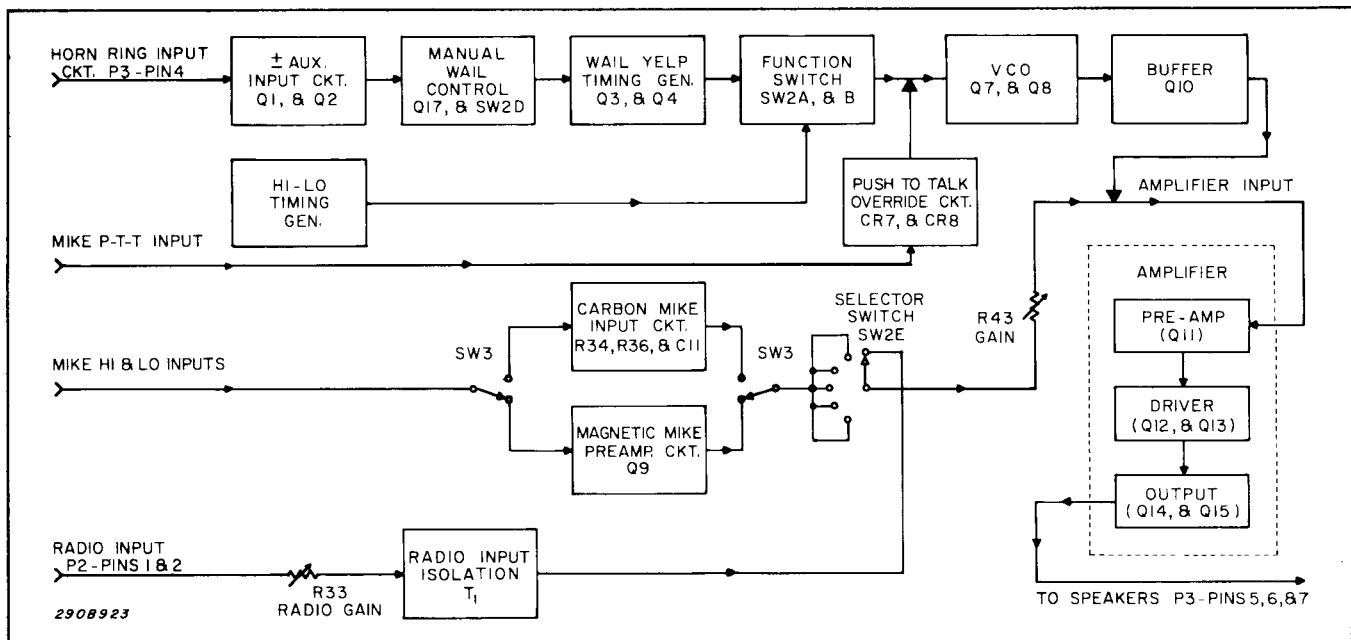


Figure 5-1. PA 150 Functional Block Diagram.

collector of Q2 and pin 24 of the edge connector. CR6 blocks any current through Q1.

The grounding output at pin 24 of the edge connector is applied to the manual Wail or "Instant Yelp" circuits.

5-4. MANUAL WAIL CONTROL.

In the MANUAL position, the Wail-Yelp timing generator (Q3, Q4) output is switched to provide the wail siren signal. However, transistor Q17 is biased on by resistors R61, R62 and R63, thus grounding the base of Q4 and preventing normal timing generator operation.

When a positive or negative horn ring circuit signal is applied to the + auxiliary circuit; the resulting grounding output is applied through CR21 to the junction of R61 and R62. This turns off Q17, allowing normal timing generator operation to commence.

When the vehicle horn ring is released, Q17 again turns on and Q3 and Q4 immediately stop oscillating. Integrating capacitor C4 is still charged, resulting in the "coast down" of the manual wail siren signal.

In Instant Yelp models, the + auxiliary circuit output turns off Q17, and turns on the Instant Yelp relay, allowing the Instant Yelp signal to operate.

In Tap II Instant Yelp models, the + auxiliary circuit is connected to the TAP II circuit. The output of the TAP II circuit turns on the Instant Yelp relay and turns off Q17.

5-5. HI-LO OSCILLATOR.

The Hi-Lo Oscillator functions when the SELECTOR switch is set to HI-LO. When the SELECTOR is 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 discharges through the anode-cathode junction of Q6. The charge and discharge of C5 generates a voltage that rises and falls at a rate of approximately 50 cycles/minute, causing Q5 to turn 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.

5-6. SWEEP OSCILLATOR.

The rising and falling voltages from either the WAIL-YELP or HI-LO timing oscillators is applied to the junction of R28

and R29. The voltage at this point determines the bias voltage of astable sweep multivibrator Q7 and Q8. CR12 and CR13 control the bias voltage for Q7 and Q8. The output of the sweep oscillator, Q7 and Q8 is a series of square waves whose frequency range is from 500 to 1600Hz. The output frequency of the sweep oscillator at any given time is determined by the bias on Q7 and Q8. As the bias voltage increases the output frequency increases. Conversely, when the bias decreases, the output frequency 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 matching stage. The signal from Q10 is applied to Q11, the preamplifier stage.

5-7. MICROPHONE PREAMPLIFIER.

The microphone preamplifier 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 is coupled through SW3, SW2E and the GAIN control (R43) to the base of preamplifier Q11.

5-8. PREAMPLIFIER AND DRIVER STAGES.

All siren and audio signals are applied through C13 to the input of the preamplifier stage, Q11, via capacitor C13. Q11 amplifies the signals and applies them to T2. The push-pull output of T2 is applied to Class AB push-pull amplifier Q12 and Q13. The collector load output of Q12 and Q13 is applied to T3 and 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.

5-9. 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 developed 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 audio signal quality. C16, C17, R59, and R60 stabilize the output stage.

SECTION VI

SERVICE AND MAINTENANCE

6-1. GENERAL.

Most of the electronic component parts used in the PA 150 are standard items that can be obtained from almost any radio or electronics supply outlet.

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

Address communications and shipments to:

Service Department
Federal Signal Corporation
2645 Federal Signal Drive
Park Forest South, IL 60466

The following diagrams may be helpful to the repairman when service to the equipment is required.

Fig. Diagram

- 6-1 SELECTOR Switch, Rear View
- 6-2 PA 150 Top View Circuit Board Installed
- 6-4 PA 150 Schematic Diagram
- 6-5 PA 150 Top View, Circuit Board Removed
- 6-6 PA 150 Bottom View

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 the nature of the malfunction and, if possible, its cause.

6-2. SIREN.

A. General.

Any competent radio repairman or electronic technician should have little difficulty in tracing and correcting a malfunction. When servicing the PA 150, the troubleshooting chart (Chart 6-1) may be useful for

isolating a malfunction. For emergency replacement of any of the small components, use care when soldering. Heat easily damages transistors, capacitors and circuit boards. Therefore, it is advisable to use longnose pliers or a similar heat sink on the component lead being soldered.

When replacing output transistors Q14 and 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 insulator is installed properly. Improper installation of an insulator may cause a short circuit.

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 150.

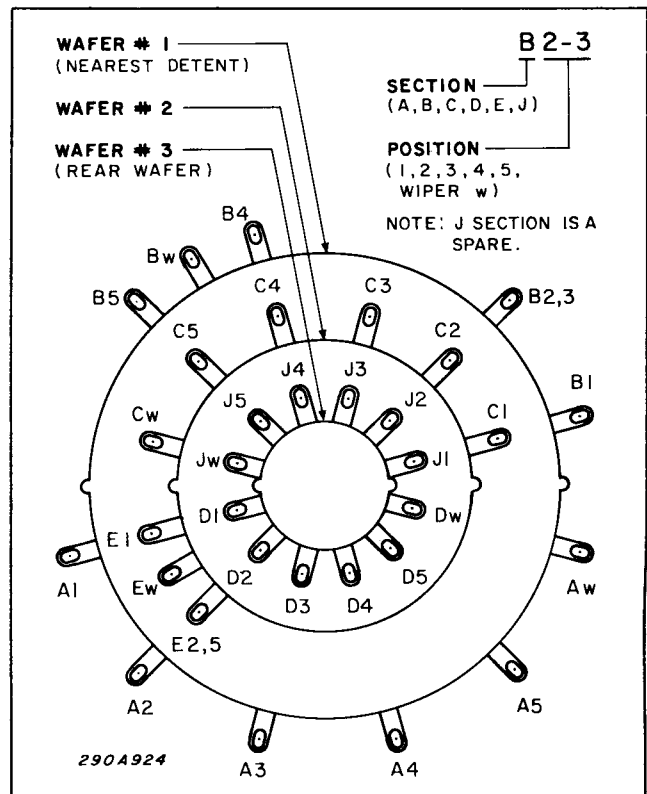


Figure 6-1. SELECTOR Switch, Rear View.

B. Removal for Servicing.

When removing the chassis for servicing, remove the four machine screws on the front of the unit. Disconnect all plug-in connectors. Slide the entire chassis out of the case.

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 a readjustment unless Q7 or Q8 or Q12, Q13, Q14 or Q15 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 or HI-LO. Adjust R25 (see figure 6-2) for a perfect square wave on the oscilloscope.

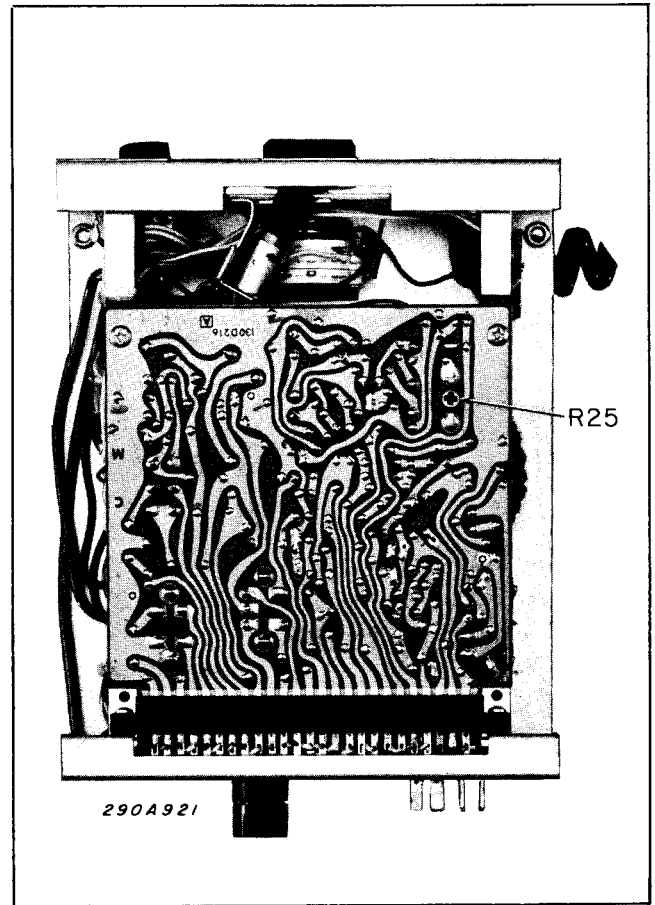


Figure 6-2. PA 150 Top View, Circuit Board Installed.

Chart 6-1. Troubleshooting Chart.

TROUBLE	PROBABLE CAUSE
Fuse blows.	one or more output transistors (Q14, Q15) defective resulting from any one of the following causes: <ol style="list-style-type: none">1) Defective speaker. Check for a short-circuited voice coil before replacing transistor(s).2) Excessive battery charging voltage (over 14.6VDC).3) Improper output transistor used for replacement. Use Federal replacement or Delco DTG 600 only.4) Unit exposed to excessive ambient temperatures. Never install the electronic siren in the path of heater ducts or in an unventilated console.5) Improper driver stage transistors, resulting in inadequate drive to the output stage. Use Federal transistors or RCA 40316, min. h_{FE} 100 at 100MA.6) Symmetry adjustment changed or not adjusted properly. Refer to paragraph 6-2. D. C12 open. Also check Q16, Q10.
No siren in any siren position, Radio and PA function normally.	
No siren. Unit "chirps" in YELP position.	C7 or C8 open.
Intermittent output.	Loose connection or defective interconnecting cable.
Short siren blast in MANUAL position. Sometimes heard when vehicle is being started or shut off.	Defective capacitor C6 and/or defective diode CR11.
WAIL tone falls only. Manual tone only when SIREN button is held (does not coast down, but stops immediately when SIREN button is released).	C4 open
WAIL tone rises to steady tone and holds. All other tones OK.	C1 open
YELP tone falls only. All other tones OK. Steady tone in YELP position. All other tones OK.	C3 open
No YELP or WAIL, HI-LO functions normally.	Check Q3, Q4, Q17.
HI-LO tone holds low or high tone (WAIL and YELP operate correctly).	Check CR10, Q5, C5, Q6

Chart 6-1. Troubleshooting Chart (continued)

TROUBLE	PROBABLE CAUSE
In MANUAL position, siren produces the Manual WAIL signal or an intermittent tone even though auxiliary switch (horn ring or foot) is not operated. (Standard unit only).	Defective transistor Q1 through Q4 or Q17. Check C25. Check diodes CR1 to CR6 and CR21 and CR22, Check circuit by disconnecting horn ring or auxiliary switch circuit. Electrical leakage at auxiliary switch or horn ring due to dirt or moisture. Switch leakage 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. Check diodes CR16, CR6, CR21 and CR22. Check circuit by disconnecting horn ring or auxiliary switch circuit. Electrical leakage at auxiliary switch or horn ring due to dirt or moisture. Switch leakage resistance should not be less than 10K ohms.
Low or no output in all positions of the SELECTOR switch.	Defective transistor Q14, Q15 or interconnecting cable.
Little or no volume in RADIO position. PA is OK.	R33 improperly adjusted.
Little or no output when magnetic microphone is used.	Microphone pre-amp switch (SW4) not in M position. SW4 MUST be in M position in PA 150. C9, C11 or C13 open. Defective microphone.
No radio or PA. Siren tones OK.	Defective GAIN control, R43.
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.	C20 open. Amplifier housing not grounded.

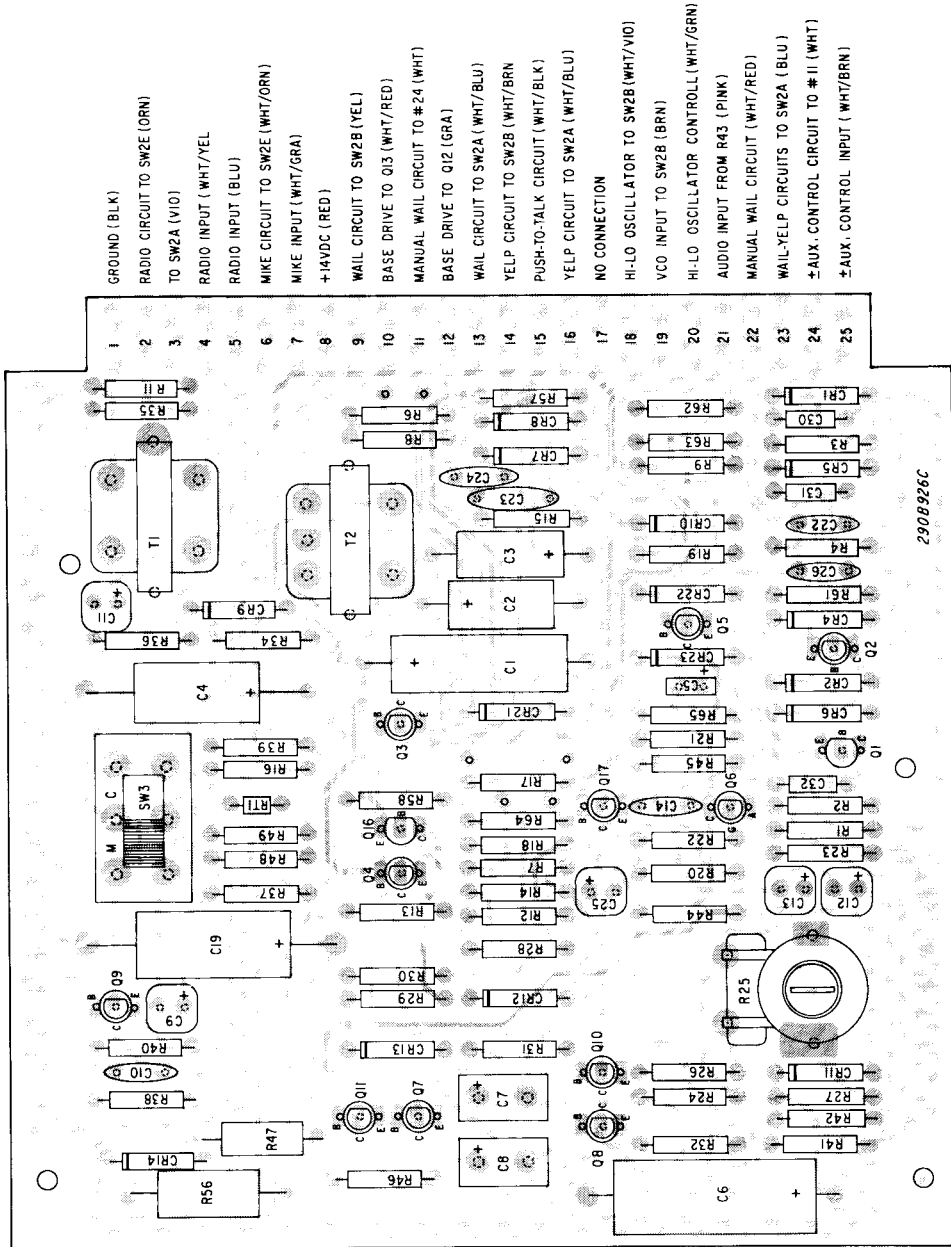


Figure 6-3. Circuit Board Parts Location Diagram.

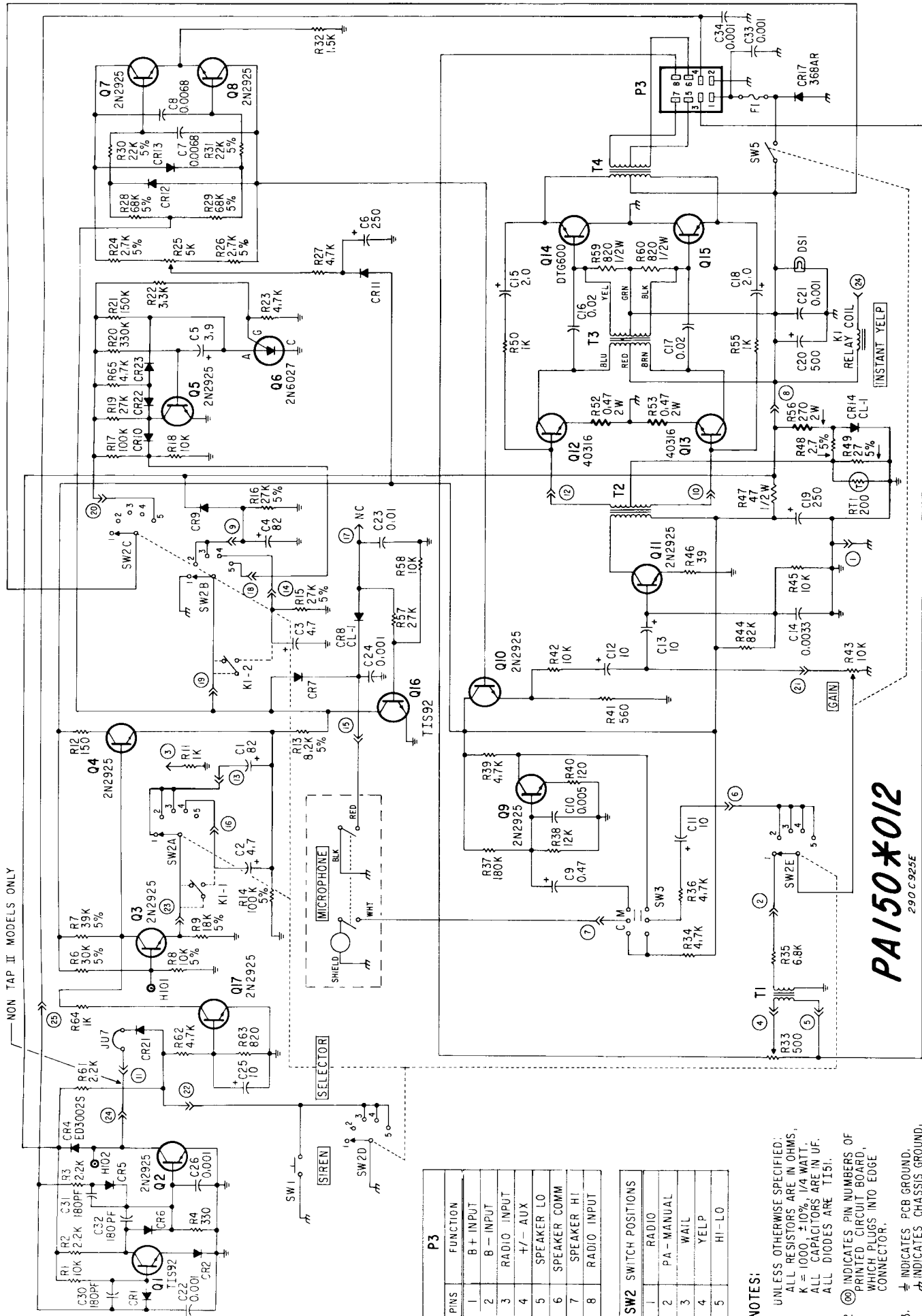


Figure 6-4. PA 150 Schematic Diagram.

P3	
PINS	FUNCTION
1	B + INPUT
2	B - INPUT
3	RADIO INPUT
4	+/- AUX
5	SPEAKER LO
6	SPEAKER COMM
7	SPEAKER HI
8	RADIO INPUT

SW2 SWITCH POSITIONS	
1	RADIO
2	PA - MANUAL
3	WAIL
4	YELP
5	HI-LO

- NOTES:**
- UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE IN OHMS,
K = 1000, ±10%, 1/4 WATT,
ALL CAPACITORS ARE IN UF.
ALL DIODES ARE TI51.
 - Ⓜ INDICATES PIN NUMBERS OF PRINTED CIRCUIT BOARD, WHICH PLUGS INTO EDGE CONNECTOR.
 - ⊥ INDICATES PCB GROUND, ↗ INDICATES CHASSIS GROUND.

PA150X012
290 C9255

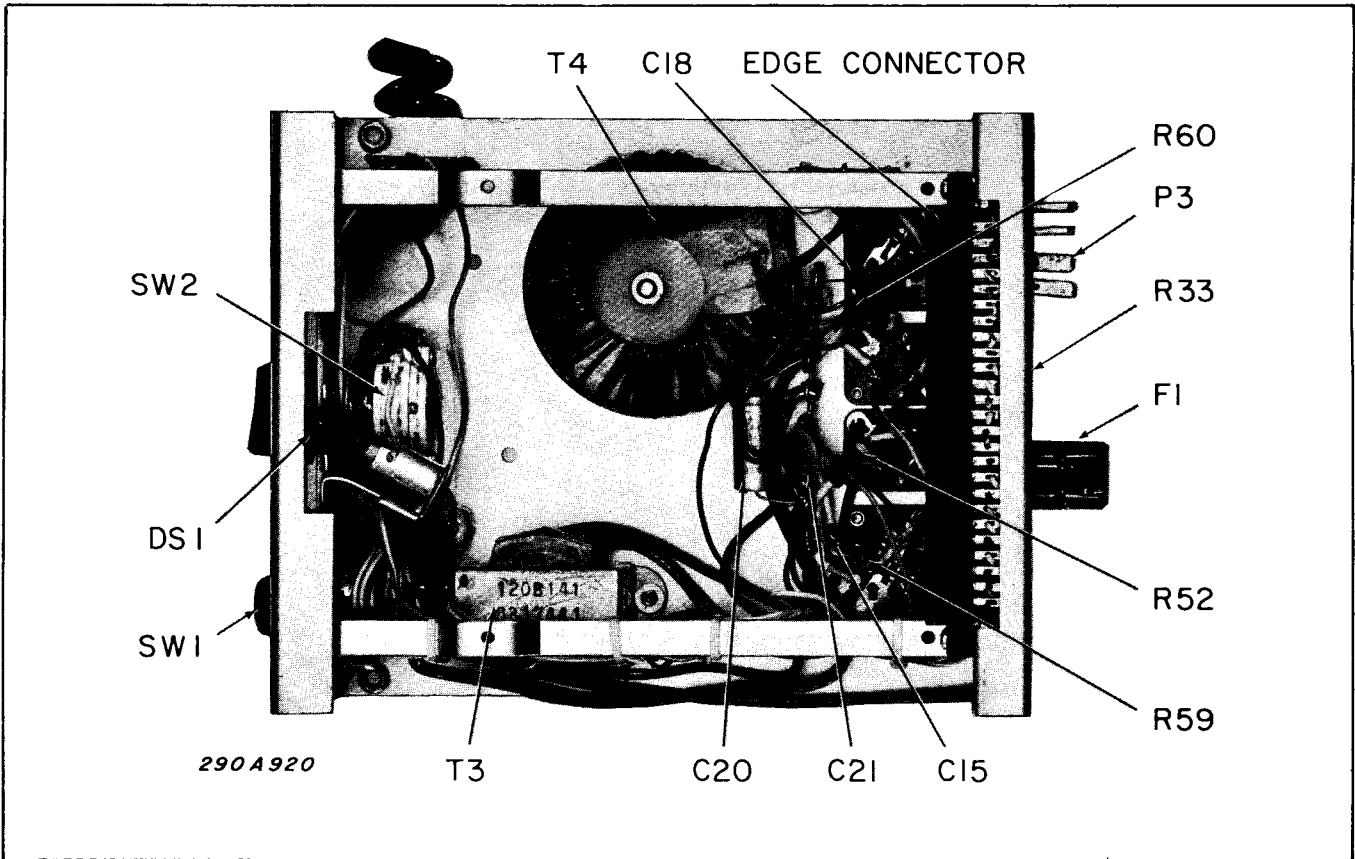


Figure 6-5. PA 150 Top View, Circuit Board Removed.

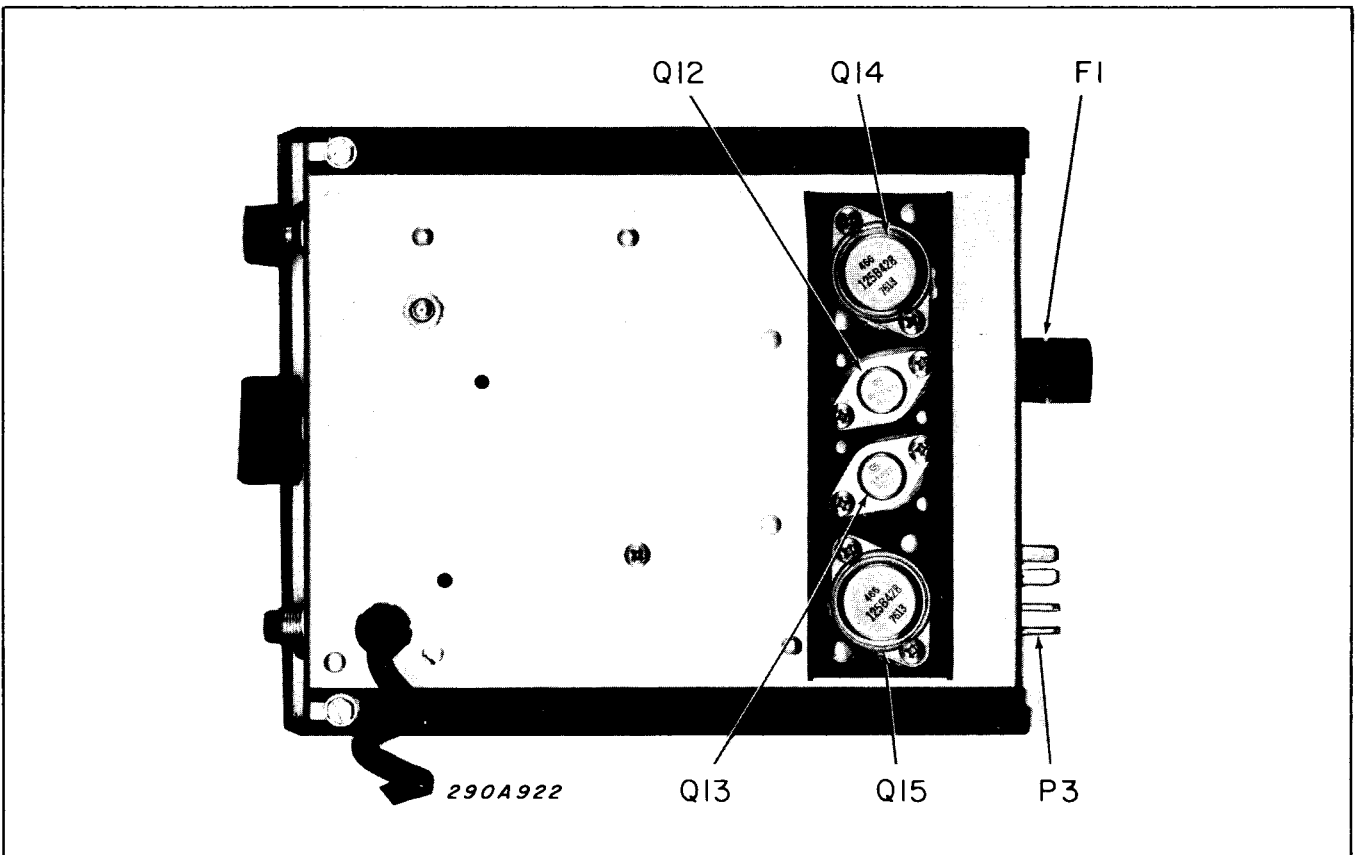


Figure 6-6. PA 150, Bottom View.

PA 150 ELECTRONIC SIREN
PARTS LIST

Schematic Symbol	Description	Part No.	Schematic Symbol	Description	Part No.
RESISTORS (See NOTE)			CAPACITORS (Continued)		
R1, 18, 42, 45, 58	10K Ohm	100A207	C9	.47UF, 35V, tantalum	107A645
R2, 3, 61	2.2K Ohm	100A221	C10	.005 UF, 100V, disc	107A211
R4	330 Ohm	100A201	C14	.0033UF, 100V, disc	107A271
R6	30K Ohm, 5%	100A293	C15, 18	2.0UF, 25V, electro-lytic	108A131
R7	39K Ohm, 5%	100A260	C16, 17	.02UF, 25V, disc	107A261
R8	10K Ohm, 5%	100A257	C20	500UF, 15V, electro-lytic	108A122
R9	18K Ohm, 5%	100A258	C23	.01UF, 100V, disc	107A223
R11, 50, 55, 64	1K Ohm	100A233	C21, 22, 24, 26, 33, 34	.001UF, 100V, disc	107A263
R12	150 Ohm	100A238	C30, 31, 32	180PF, 160V, disc	107A710
R13	8.2K Ohm, 5%	100A223	SEMICONDUCTORS		
R14	100K Ohm, 5%	100A262	CR1, 2, 5, 6, 7	Diode, TI51	115B101
R15, 16	27K Ohm, 5%	100A244	9, 10, 11, 12, 13, 21, 22, 23		
R17	100K Ohm	100A222	CR4, 8, 14	Diode, CL-1(ED3002S)	115B301
R19, 57	27K Ohm	100A254	CR17	Diode, 368AR	115A311
R20	330K Ohm	100A212	Q1, 16	Transistor, NPN, T1S92	125B132
R21	150K Ohm	100A226	Q2, 3, 4, 5, 7, 8, 9, 10, 11, 17	Transistor, NPN, 2N2925	125A119
R22	3.3K Ohm	100A209	Q6	Transistor, PNP, D13T1	125C310
R23, 27, 34, 36, 39, 62, 65	4.7K Ohm	100A224	Q12, 13	Transistor, NPN, Silicon, 40316	125B410
R24, 26	2.7K Ohm, 5%	100A256	Q14, 15	Transistor, PNP, Power, DTG600	125B428
R25	Potentiometer, 5K Ohm	105B204	TRANSFORMERS		
R28, 29	68K Ohm, 5%	100A261	T1	Audio	120B123
R30, 31	22K Ohm, 5%	100A259	T2	Preamplifier	120B142
R32	1.5K Ohm	100A220	T3	Driver	120B141
R33	Potentiometer, 500 Ohm	105A212	T4	Output	120B140
R35	6.8K Ohm	100A210	SWITCHES		
R37	180K Ohm	100A706	SW1	Pushbutton, SIREN	122A228
R38	12K Ohm	100A269	SW2	Rotary, SELECTOR	122B159
R40	120 Ohm	100A232	SW3	Slide, DPDT	122B119
R41	560 Ohm	100A274	MISCELLANEOUS		
R43	Potentiometer, 10K Ohm, GAIN	106A116	RT1	Thermistor, 200 Ohm	104A111
R44	82K Ohm	100A230	P3	8-pin Jones Plug	140A114
R46	39 Ohm	100A286	K1	Relay, DPDT, 12VDC	131A118
R47	47 Ohm - 1/2 Watt	100A304	F1	Fuse, 20 ampere, 3AG	148A127
R48	2.7 Ohm, 5%	100A294	DS1	Lamp, 14 Volt	8107A085
R49	27 Ohm, 5%	100A290		Connector, edge, 25 contact	139A156
R52, 53	0.47 Ohm, 2 Watt	103A130		Holder, fuse	143A106
R56	270 Ohm, 2 Watt wirewound	103A128		Knob, GAIN control	141A102
R59, 60	820 Ohm, 1/2 Watt	100A403		Knob, SELECTOR	141A111
R63	820 Ohm	100A267		Bracket, Relay	8474A144
				Heat Sink	8536B023
				Socket, Lamp	138A115

NOTE: Unless otherwise specified, all resistors are carbon composition ±10%, 1/4 Watt

CAPACITORS

C1, 4	82UF, 10V, tantalum	107A624
C2, 3	4.7UF, 15V, tantalum	107A678
C5	3.9UF, 15V, tantalum	107A642
C11, 12, 13, 25	10UF, 10V, tantalum	107A634
C6, 19	250UF, 15V, electro-lytic	108A107
C7, 8	.0068, 50V, Mylar	107A413

