

IMPORTANT INSTRUCTIONS

for Installation, Operation and Maintenance of

FEDERAL

INTERCEPTOR

Electronic Siren

MODEL PA-20



SERIES E-1-D

SIGNAL DIVISION

Federal Sign & Signal Corporation

136th and Western Avenue

BLUE ISLAND, ILLINOIS

Chicago Phone INterocan 8-4500

Blue Island FUlton 9-3400

INTRODUCTION

1.1 GENERAL The Interceptor is designed to work with negative or positive grounded systems but polarity of the power leads must be observed. It will work on 6 volt systems without change at a slight sacrifice in sound output.

The pilot lamps can be changed to one having a 6 volt rating when used on a 6 volt system.

The amplifier will deliver 75 watts to a single speaker having an impedance of 11. ohms. It will deliver 100 or more watts to two such speakers connected in parallel without electrical change in the amplifier.

UNPACKING

1.2 CONTENTS Please examine all packing materials carefully before disposing of them to be sure you do not lose any necessary components. The master carton in which your unit is packed, in addition to this instruction sheet, contains:

The amplifier carton which includes the amplifier, power cable, mounting bracket and an envelope of mounting screws.

The speaker carton which includes the speaker, mounting hardware and instructions.

The foot switch in an envelope with mounting hardware and instructions for mounting.

The radio cable carton contains the radio connecting cable and instructions for connection.

The microphone with hanging bracket and hardware (unless your order specified that no microphone be included).

An extra 6 volt pilot lamp when your order specified 6-volt operation.

2.4.1 SPEAKER CONNECTIONS (continued)

When the amplifier is used with two speakers connected in parallel, it is necessary that the speakers be phased to work in unison for optimum performance. This can be done 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 Illustrations B and C.

2.4.2 AUXILIARY SWITCH CONNECTION. The six-foot white vinyl insulated lead in the power cable can be connected to an auxiliary siren control such as a foot switch or horn ring switch. See Illustrations B and C for proper connections.

NOTE-When installing on a positive grounded vehicle, the installer should provide an auxiliary relay having a single pole, normally open switch of low capacity and a coil voltage rating corresponding to the voltage rating of the vehicle. Such relays are available at most automobile or radio supply stores.

2.4.3 POWER CONNECTION. The amplifier will work on either a negative or positive grounded system. If the negative terminal of the battery is connected to the vehicle frame, it will be necessary to connect the fused lead to the "hot" positive side of the battery, and the plain black lead must be connected to the vehicle frame. If the positive terminal of the battery is connected to the vehicle frame, it will be necessary to connect the plain black lead to the "hot" negative side of the battery and the fused lead must be connected to the vehicle frame.

2.4.4 RADIO CONNECTION. The radio interconnecting cable has a six-prong connector that plugs into the back of the amplifier. Refer to the instruction sheet furnished with the radio adapter cable for proper connection.

2.5.5 MICROPHONE CONNECTION. The microphone to be used with the Interceptor plugs into the receptacle on the bottom, front of the amplifier chassis. The amplifier will operate with a controlled magnetic, carbon or transistorized magnetic type. A slide switch located just inside the chassis in the front and to the left of the pilot light must be moved to the proper position for the type of microphone used. When a controlled magnetic microphone is used, this switch must be in the position marked "M". If a carbon or transistorized type is used, the switch must be in the position marked "C".

OPERATION

3.1 GAIN CONTROL. Clockwise rotation of this knob turns on the power to the amplifier. Further rotation of this knob increases voice volume when the amplifier is used for P. A. or Radio amplification. This knob does not control the volume of the siren.

Radial lines around the knob can be used for setting volume to some pre-selected level. The maximum clockwise position of this knob will be determined in most cases by the point at which "feedback" or "squeal" occurs. This will depend on the microphone gain, open windows, speaker placement, proximity of reflecting surfaces such as buildings or other vehicles, etc. Adjust the gain control to a position below the point at which "feedback" occurs and speak loudly with the microphone held close to your lips when maximum volume is required.

3.2 SELECTOR. The function selector switch has six positions. If a common microphone is used for the Interceptor and a radio transmitter, this switch will disconnect the microphone from the transmitter only when the switch is in P. A. position.

3.2.1 RADIO. In this position, incoming radio messages are amplified by the Interceptor. Gain (volume) may be controlled by the Gain Control. The radio volume may be adjusted to match the P. A. volume by means of the resistor control located on the back panel of the amplifier. This control may be adjusted by means of a screwdriver inserted through the hole between the two connectors on the back of the amplifier.

3.2.2 P. A. In this position the Interceptor may be used for public address. Volume is controlled by the Gain Control. In this position only, the microphone is disconnected from the transmitter, if a common microphone is used for both the Interceptor and a radio transmitter.

3.2.3 MANUAL. In this position, it is possible to operate the siren by means of the "SIREN" button on the amplifier control panel or by means of an auxiliary switch such as a foot switch or horn ring control. Operation will be similar to that of a conventional electro-mechanical siren.

3.2.4 WAIL. In this position, the siren will produce a continuous, wailing sound, up and down in frequency.

3.2.4 YELP. In this position, a continuous rapid warbled tone is generated. This distinctive tone may be reserved or used for any special indication or situation.

3.2.6 ALERT. In this position, a continuous, steady siren tone is generated.

3.3 SIREN BUTTON. This button, located on the left hand side of the control panel, is used to sound the siren tone when the Selector is in "MANUAL" position.

MAINTENANCE

4.1 ACCESS TO INTERIOR. It is unnecessary to remove the bracket from location, or to remove the amplifier case from the mounting bracket. Simply loosen the two hex head screws on the underside, near the front edge. The entire chassis and control panel like a drawer, slides out as a unit.

4.2 REMOVAL FROM CAR. To remove the entire amplifier mechanism from the vehicle, for bench inspection, simply disconnect all plug-in connectors.

4.3 REMOVAL OF CIRCUIT BOARD. This board is attached to the chassis by four Phillips-Head screws. Removing these permits the board to be swung out of the chassis without breaking any of the electrical connections, and allowing ample access to all components.

SERVICE OR REPAIR

5.1 PARTS. The component electronic parts used in the Interceptor are all Standard American made items and with very few exceptions can be procured from radio or electronic supply shops.

5.2 REPAIRS. Full schematic wiring diagram, complete parts list plus sectional sketches and other illustrated material are included in this manual. Any competent radio repairman or electronic technician should have no difficulty in tracing and correcting a malfunction, should any occur.

For emergency replacement of any of the small components by one not professionally experienced, care must be used in soldering. Heat easily impairs transistors, capacitors and circuit boards. It is therefore advisable to use a pair of long-nose pliers or similar heat-sink on the lead being soldered.

FACTORY ASSISTANCE

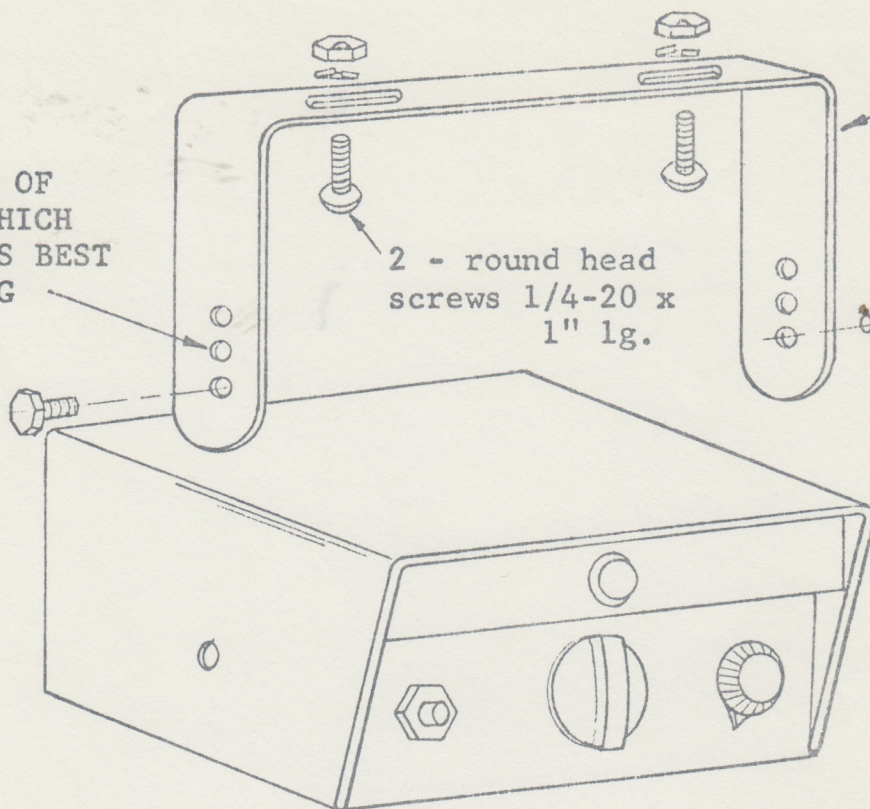
6.1 The factory can and is anxious to inspect and service your equipment, or assist you with technical problems, should any arise that cannot be handled satisfactorily and more promptly locally.

Communications and shipments should be addressed to the Signal Division, Federal Sign and Signal Corporation, 136th and Western Ave., Blue Island, Illinois.

We may be reached by phone on our Chicago Number - INterocan 8-4500 or on our Blue Island phone, FULton 9-3400.

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

USE SET OF HOLES WHICH PROVIDES BEST MOUNTING



2 - round head screws 1/4-20 x 1" lg.

USE BRACKET AS TEMPLATE FOR MOUNTING HOLE LOCATION.

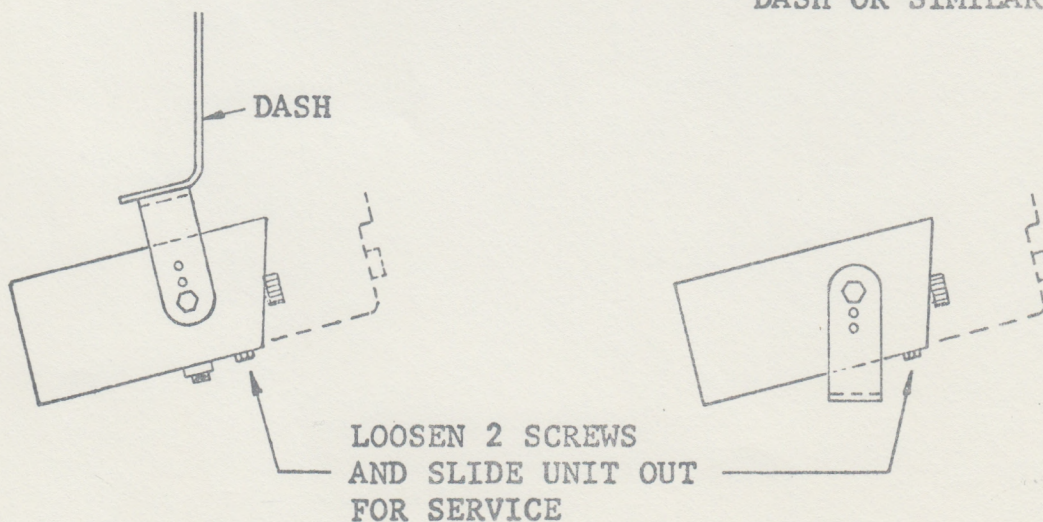
2-HEX. HEAD SCREWS

1/4-20 x 5/16 lg.

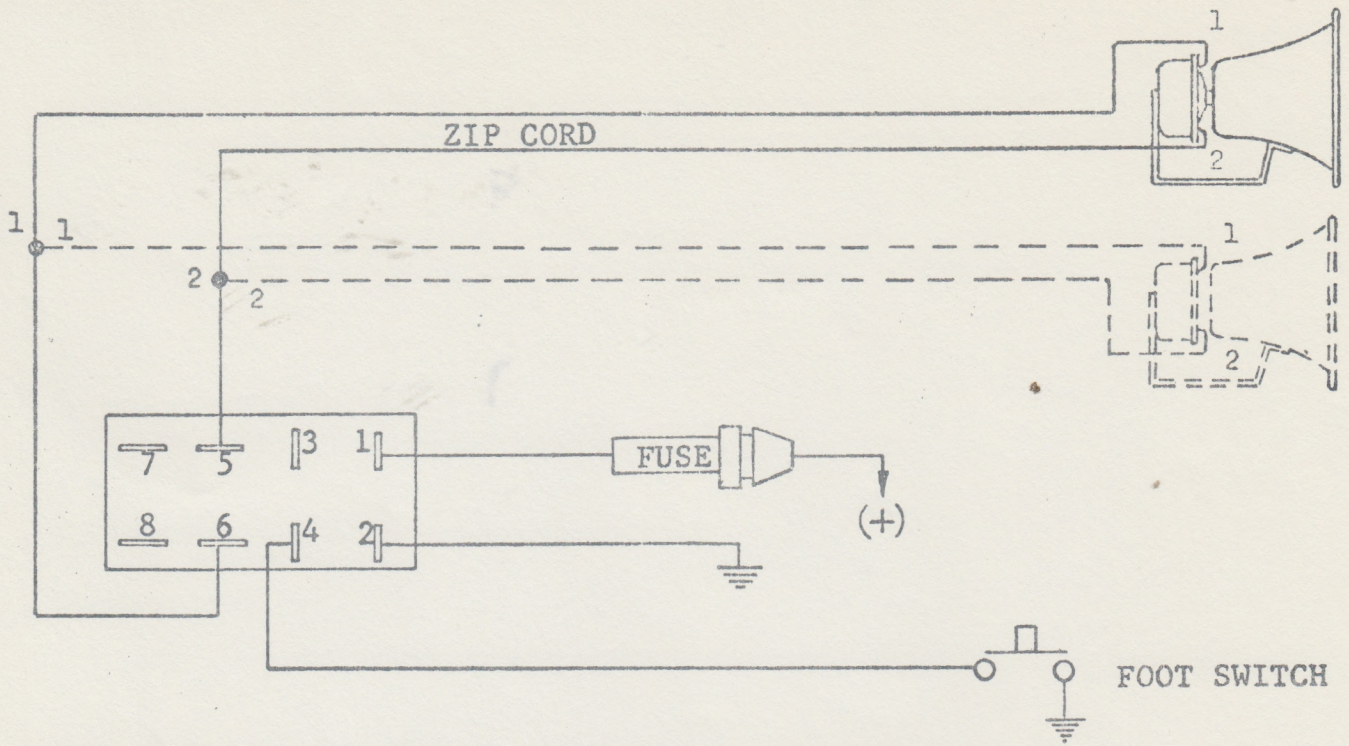
AMPLIFIER UNIT

THE BRACKET SERVES AS A HANGER FOR MOUNTING UNDER DASH

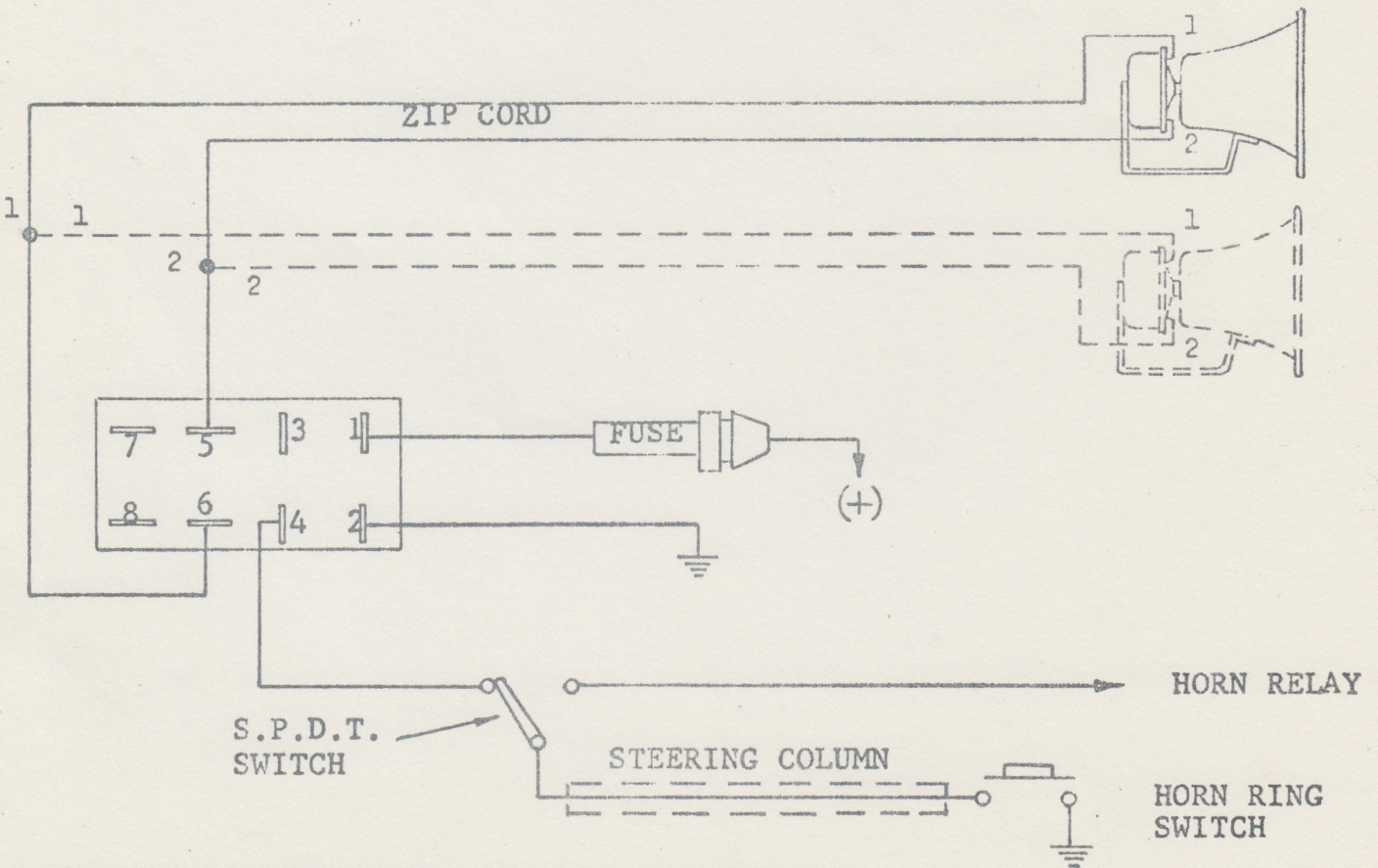
BRACKET BENEATH UNIT CAN SERVE AS A MOUNTING BASE FOR MOUNTING ON FLOOR, TOP SURFACE OF DASH OR SIMILAR AREA



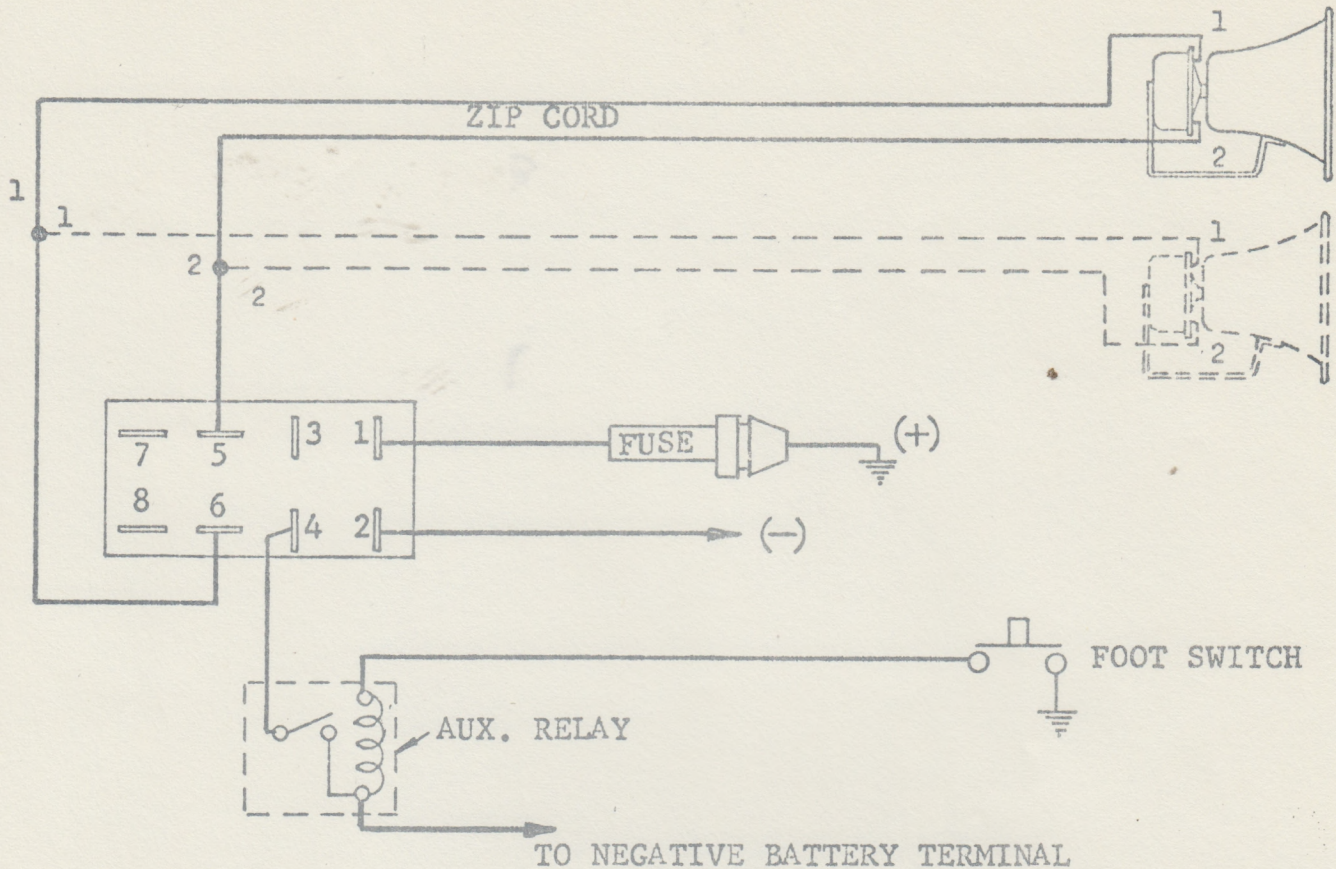
LOOSEN 2 SCREWS AND SLIDE UNIT OUT FOR SERVICE



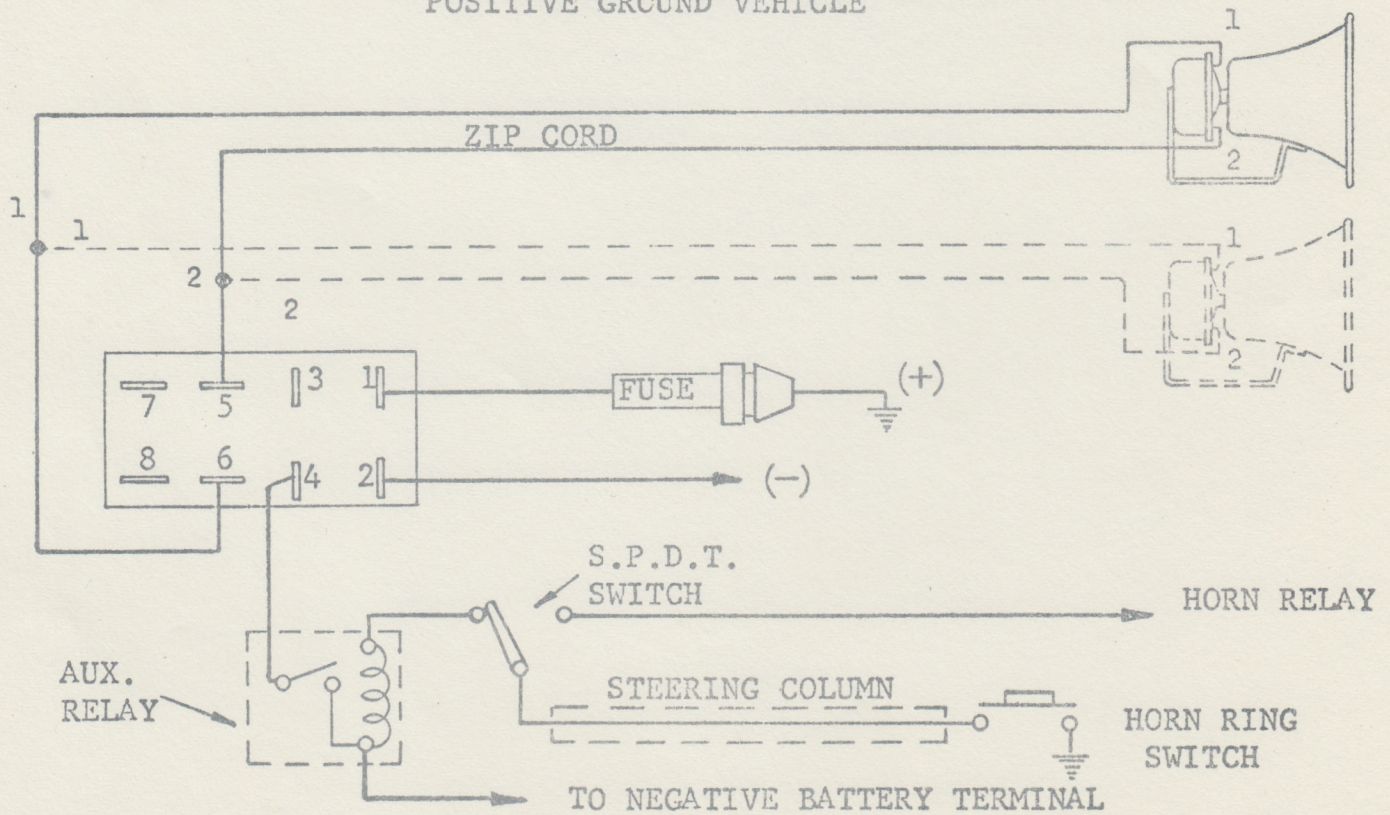
POWER CABLE CONNECTIONS - FOOT SWITCH CONTROL
NEGATIVE GROUND VEHICLE



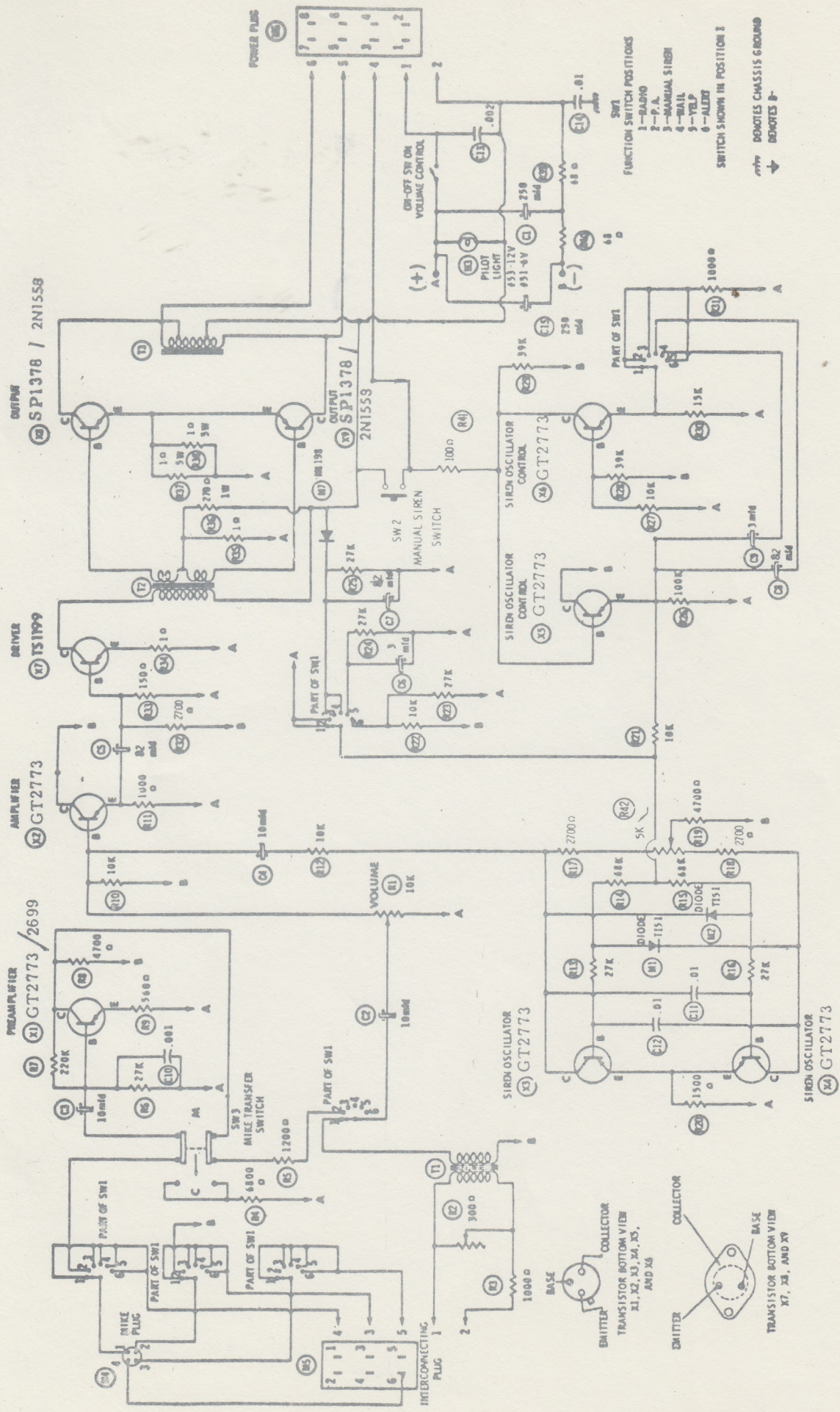
POWER CABLE CONNECTIONS - HORN RING CONTROL
NEGATIVE GROUND VEHICLE



POWER CABLE CONNECTIONS - FOOT SWITCH CONTROL
POSITIVE GROUND VEHICLE



POWER CABLE CONNECTIONS - HORN RING CONTROL
POSITIVE GROUND VEHICLE

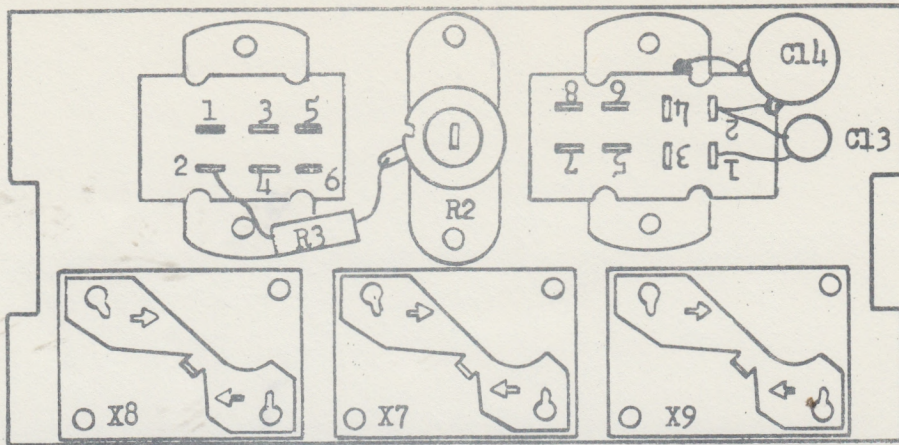


INTERCEPTOR WIRING DIAGRAM MODEL PA-20 SERIES EID

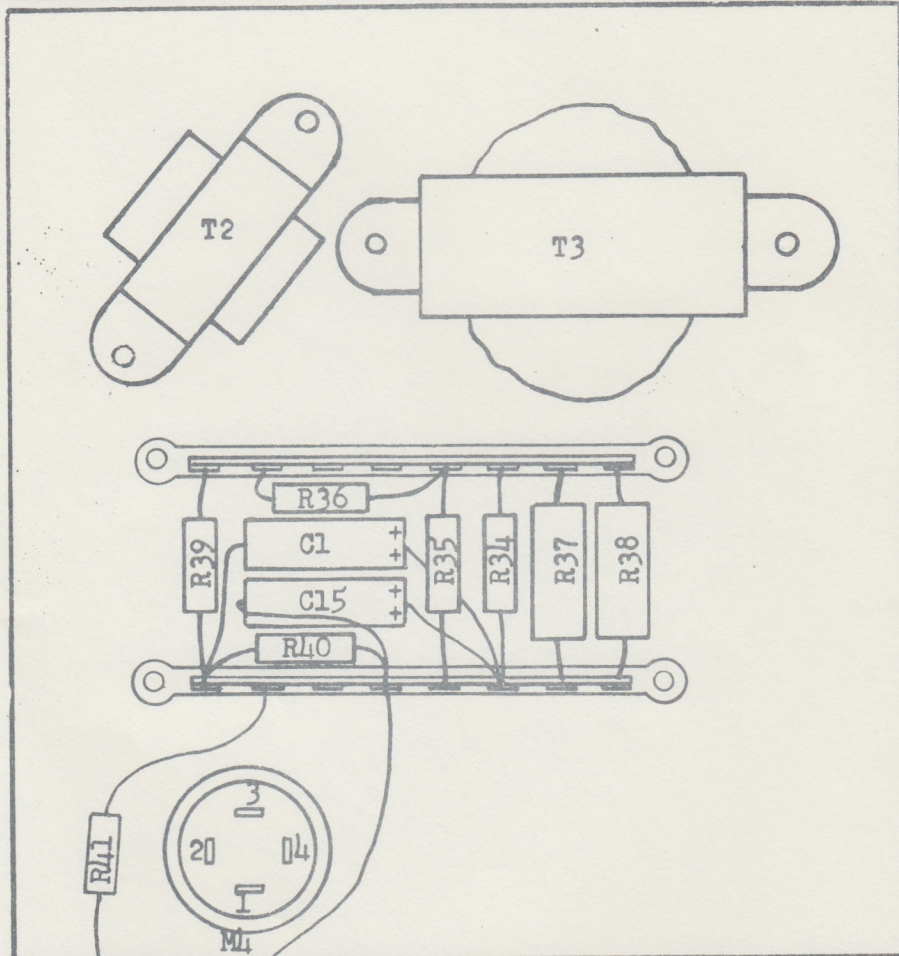
PARTS LIST - MODEL PA-20

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
TRANSISTORS			CONTROLS AND RESISTORS (Cont'd.)		
X1	GT2773/2699	Preamplifier	R22	1024-5	10K, 10%, 1/2 Watt
X2	GT2773	Amplifier	R23	1024-8	27K, 10%, 1/2 Watt
X3	GT2773	Siren Oscillator	R24	1024-8	27K, 10%, 1/2 Watt
X4	GT2773	Siren Oscillator	R25	1024-8	27K, 10%, 1/2 Watt
X5	GT2773	Siren Oscillator Control	R26	1024-10	100K, 10%, 1/2 Watt
X6	GT2773	Siren Oscillator Control	R27	1024-5	10K, 10%, 1/2 Watt
X7	TS1199	Driver	R28	1003-83	39K, 10%, 1/2 Watt
X8	SP1378 /2N1558	Output	R29	1003-83	39K, 10%, 1/2 Watt
X9	SP1378 /2N1558	Output	R30	1024-11	15K, 10%, 1/2 Watt
CAPACITORS			R31	1003-86	1000Ω, 10%, 1/2 Watt
C1	1003-11	250 mfd, 15V, Electrolytic	R32	1024-12	2700Ω, 10%, 1/2 Watt
C2	1003-52	10 mfd, 15V, Electrolytic	R33	1003-63	150Ω, 10%, 1/2 Watt
C3	1003-52	10 mfd, 15V, Electrolytic	R34	1003-49	1Ω, 10%, 1 Watt Wirewound
C4	1003-52	10 mfd, 15V, Electrolytic	R35	1003-49	1Ω, 10%, 1 Watt Wirewound
C5	1024-36	82 mfd, 10V, Electrolytic	R36	1024-13	270Ω, 1 Watt
C6	1024-1	3 mfd, 10V, Electrolytic	R37	1024-34	.1Ω, 5 Watt Wirewound
C7	1024-36	82 mfd, 10V, Electrolytic	R38	1024-34	.1Ω, 5 Watt Wirewound
C8	1024-36	82 mfd, 10V, Electrolytic	R39	1024-35	68Ω, 1/2 Watt
C9	1024-1	3 mfd, 10V, Electrolytic	R40	1024-35	68Ω, 1/2 Watt
C10	1024-2	.001 mfd, Ceramic Disc	R41	1024-38	100Ω, 1/2 Watt
C11	1024-3	.01 mfd, Dipped Paper Tubular 10%	R42	1024-40	5K, Control
C12	1024-3	.01 mfd, Dipped Paper Tubular 10%	TRANSFORMERS		
C13	1003-78	.002 mfd, Ceramic Disc	T1	1024-15	Interstage
C14	1024-22	.01 mfd, Ceramic Disc	T2	1024-16	Driver
C15	1003-11	250 mfd, 15V, Electrolytic	T3	1024-17-B6	Output
CONTROLS AND RESISTORS			SWITCHES		
R1	1024-4	10K, Volume	SW1	1024-18	Function
R2	1003-85	300Ω, Control	SW2	1003-39	Manual Siren
R3	1003-86	1000Ω, 10%, 1/2 Watt	SW3	1024-19	Mike Transfer
R4	1024-6	6800Ω, 10%, 1/2 Watt	MISCELLANEOUS		
R5	1024-7	1200Ω, 10%, 1/2 Watt	M1	1024-20	Diode 1N151
R6	1024-8	27K, 10%, 1/2 Watt	M2	1024-20	Diode 1N151
R7	1003-47	220K, 10%, 1/2 Watt	M3	1003-67	Pilot Light #53-12V, #51-6V
R8	1003-58	4700Ω, 10%, 1/2 Watt	M4	1003-74	Mike Plug
R9	1024-32	560Ω, 10%, 1/2 Watt	M5	1003-76	Interconnecting Plug
R10	1024-5	10K, 10%, 1/2 Watt	M6	1024-21	Power Plug
R11	1003-86	1000Ω, 10%, 1/2 Watt		1024-23	Fuse, 15 Amp.
R12	1024-5	10K, 10%, 1/2 Watt		1024-24	Fuse Holder
R13	1024-8	27K, 10%, 1/2 Watt		1024-25	Power Cable Assembly
R14	1024-33	68K, 10%, 1/2 Watt		1024-26	Knob, Volume Control
R15	1024-33	68K, 10%, 1/2 Watt		1024-27	Knob, Function Switch
R16	1024-8	27K, 10%, 1/2 Watt		1024-28	Printed Circuit Board
R17	1024-12	2700Ω, 10%, 1/2 Watt		1024-29	Terminal Strip
R18	1024-12	2700Ω, 10%, 1/2 Watt	M7	1024-37	Diode 1N198
R19	1003-58	4700Ω, 10%, 1/2 Watt			
R20	1003-84	1500Ω, 10%, 1/2 Watt			
R21	1024-5	10K, 10%, 1/2 Watt			

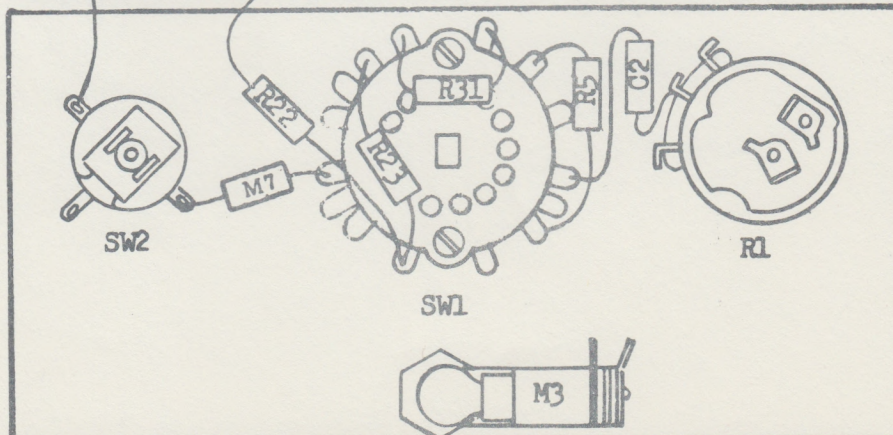
INTERCEPTOR MODEL PA-20 SERIES EID



REAR
PANEL

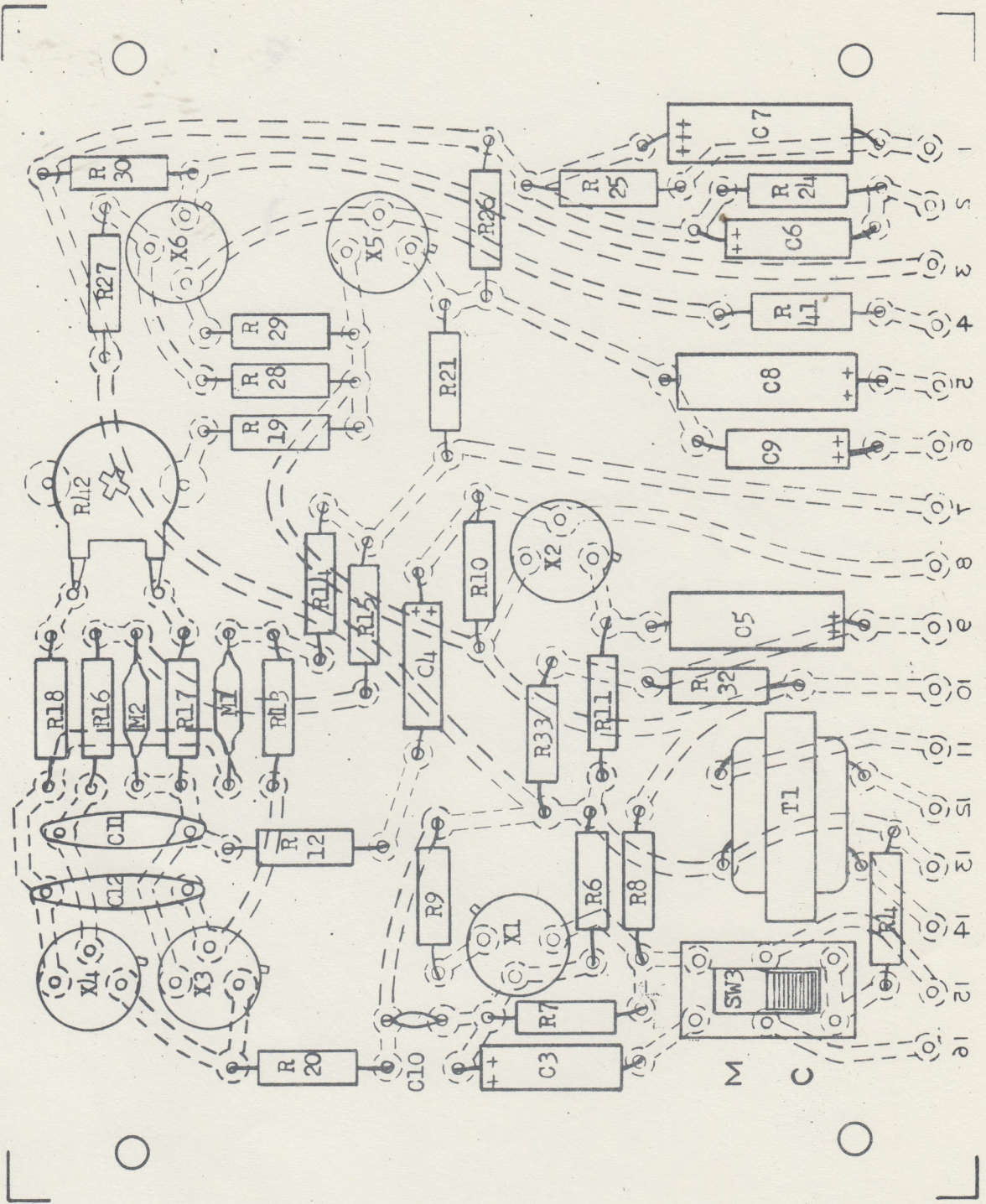


BOTTOM
PANEL



FRONT
PANEL

COMPONENT LAYOUT
MODEL PA-20
SERIES EICA



MODEL PA-20
 COMPONENT BOARD
 LAYOUT

VOLTAGE READINGS

14.0 Volts Input
Made with V. T. V. M.
From Plug M6-Pin 1

Component	Point	D. C. Voltages	A. C. R. M. S. Voltages Siren in "ALERT"
X1	E	0.25	
X1	B	0.45	
X1	C	9.5	
X2	E	6.0	0.43
X2	B	6.3	0.52
X2	C	13.0	
X3	E	1.76	0.18
X3	B	1.94	1.30
X3	C	1.78	1.8
X4	E	1.76	0.18
X4	B	1.50	0.92
X4	C	5.8	2.2
X5	E	1.3	
X5	B	0.5	
X5	C	13.0	
X6	E	0.5	
X6	B	0.7	
X6	C	0.5	
X7	E	0.1	0.28
X7	B	0.35	0.38
X7	C	11.5	10.0
X8	E		0.12
X8	B		2.5
X8	C	14.0	13.5
X9	E		0.12
X9	B		2.8
X9	C	14.0	13.8

TROUBLE SHOOTING CHART

<u>TROUBLE</u>	<u>LIKELY CAUSE</u>
Fuse blows.	One or more output transistors shorted, emitter to collector, X8 and/or X9.
No siren in any position. Radio and P. A. work.	Open capacitor C4. Open resistor R10, 12, 13, 14, 18, 19, 20, 21.
No siren. Chirps in YELP position.	Open capacitor C11.
ALERT siren works. No other siren positions work.	Open resistor R 21.
WAIL tone falls only. Manual tone only when siren button is held.	Open capacitor C 7.
WAIL tone rises to steady tone and holds. All other tones OK.	Open capacitor C 8.
YELP tone falls only. All other tones OK.	Open capacitor C 6.
Steady tone in YELP position. All other tones OK.	Open capacitor C 9.
Steady tone in all siren positions except MANUAL.	Open resistor R 27 or R 30.
Crackles and whistles in YELP.	Open capacitor C 12.
No RADIO or P. A. Siren tones OK.	Open capacitor C 2.
Little or no volume in all positions.	Open capacitor C 5. Defective loudspeaker.
Little or no output when magnetic microphone is used.	Mike transfer switch in "C" position. Open capacitor C 3. Defective microphone.
No output from carbon or transistorized microphone.	Mike transfer switch in "M" position.

(continued next page)

TROUBLE

LIKELY CAUSE

Buzz in loudspeaker when engine or radio is operated.

Open capacitor C 1.

Little or no volume in RADIO position. P.A. - OK.

Improper adjustment of R 2.

Low output in all positions.

Defective transistor X7, X8 or X9.

In MANUAL position, siren emits steady or intermittent tone even though auxiliary switch (horn ring or foot) is not operated.

Defective transistor X3 or X4. Electrical leakage at auxiliary switch due to dirt or moisture. (Switch resistance should not be less than one megohm)

Excess noise in "PA" position only.

Short in microphone. There should be no connection between pin #2 and shell of microphone plug.

Frequency of siren affected by flashing lights.

Voltage drop in power lead. Connect amplifier directly to battery terminal.

Steady tone in all siren positions

Defective transistor X5.

Low sound output or fuzzy tone or one output transistor heats up more than the other one.

Oscillator balance control out of adjustment. To adjust, connect oscilloscope to speaker leads and adjust control for symmetrical square wave. Caution: Do not allow case of oscilloscope to come in contact with siren chassis or power supply. Such contact will burn out output transistors.