

PRICE \$2.00



SIGNAL DIVISION
Federal Signal Corporation

ELECTRONIC SIREN

Model PA 150



INSTALLATION AND SERVICE INSTRUCTIONS

IMPORTANT INSTRUCTIONS

for Installation, Operation and Maintenance of

FEDERAL

DIRECTOR

Electronic Siren

MODEL PA-15 A



SERIES 1 D

SIGNAL DIVISION

Federal Sign and Signal Corporation

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INTRODUCTION

GENERAL; The director is designed to work with negative or positive grounded systems but polarity of the power leads must be observed.

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

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:

1. The amplifier carton which includes the amplifier with attached microphone, microphone mounting bracket, and an envelope of mounting screws.
2. The speaker carton which includes the speaker, mounting hardware and instructions.
3. The foot switch in an envelope with mounting hardware and instructions for mounting.

INSTRUCTION

AMPLIFIER INSTALLATION: The amplifier mounts readily to the underside of the dash. The two holes in the angle brackets accommodate the mounting screws. The amplifier should be mounted in a position that is both convenient and comfortable to the operator. Using the case as a template, locate the mounting holes on the mounting surface. Drill two $\frac{1}{4}$ " mounting holes and mount the case to the dash by means of the two $\frac{1}{4}$ -20 machine screws furnished. (See illustration "A".)

SPEAKER INSTALLATION: Federal Speakers are weatherproof and may be installed in any convenient location of your selection, whether on the roof, fender, behind the grille or under the hood. Any special installation instructions applicable to the model of speaker you have selected will be found in the speaker carton.

FOOT SWITCH INSTALLATION: If you prefer foot control of the siren in addition to the manual control button on the amplifier, the foot switch must be installed in a convenient position. It will be necessary to make the electrical connections before mounting. See paragraph (Auxiliary Switch Connection.)

SPEAKER CONNECTIONS: The two conductor brown vinyl insulated wire from the speaker should be connected to the terminals marked "Speaker" on the back of the amplifier. Either wire may be connected to either terminal as polarity is not a factor when using a single speaker.

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 amplifier terminal, and the two speaker leads marked "2" to the other amplifier terminal. (See illustrations B and C.)

AUXILIARY SWITCH CONNECTION: The six foot white vinyl insulated lead furnished 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.)

POWER CONNECTIONS: 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 (plus) red lead to the "hot" positive side of the battery and the (minus) 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 (plus) red lead must be connected to the vehicle frame.

RADIO CONNECTION: If you desire to amplify reception of a radio receiver, connect one end of the three foot, two conductor vinyl insulated wire to the terminals of the radio speaker voice coil. Connect the other ends of the wires to the terminals marked RADIO located on the back of the amplifier. If unit doesn't work, try reversing leads.

OPERATION

GAIN CONTROL: Clockwise rotation of this knob turns on the power 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.

SELECTOR: The function selector switch has four positions as follows:

1. **RADIO** In this position, incoming radio messages are amplified by the Director. Gain (volume) may be controlled by the Gain Control.
2. **P.A. MANUAL** In this position the Director may be used for public address. Volume is controlled by

the Gain Control. In this position it is also 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. **WAIL** In this position the siren will produce a continuous, wailing sound, up and down in frequency.
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.

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 PA - MANUAL position.

PUBLIC ADDRESS OVERRIDE: Pressing the TALK button in the microphone disconnects any circuit and "cuts in" the microphone for voice (PA) operation in any position except RADIO.

MAINTENANCE

ACCESS TO INTERIOR: It is unnecessary to remove the amplifier case from the mounting. 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.

REMOVAL FROM CAR: To remove the entire amplifier mechanism from the vehicle, for bench inspection, simply disconnect the leads from the terminal strip and the two power leads.

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.

TROUBLE SHOOTING CHART

<u>TROUBLE</u>	<u>LIKELY CAUSE</u>
Fuse blows.	One or more output transistors shorted, emitter to collector, Q5 and/or Q6. Speaker leads shorted.
No siren in any position. Radio and P.A. work.	Open capacitor C10.
No. siren. YELP OK.	Defective transistor Q12, Defective capacitor C15.
WAIL tone steady. Manual tone OK.	Defective capacitor C11.
YELP tone steady. All other tones OK.	Defective capacitor C12, C14.
Steady tone in all siren positions except MANUAL.	Defective transistors Q10, Q9.
No radio or P.A. Siren tones OK.	Open capacitor C3.
No output in any position.	Defective Diode D5.
Buzz in loudspeaker when engine or radio is operated.	Open capacitor C5.
Little or no volume in RADIO position. P.A. OK.	C7 defective. Reverse radio input leads.
Low output in all positions.	Defective transistor Q2, Q3, Q5, or Q6.
In MANUAL position, siren emits steady or intermittent tone even though auxiliary switch (horn ring or foot) is not operated.	Defective transistor Q7 or Q8. Electrical leakage at auxiliary switch due to dirt or moisture. (Switch resistance should not be less than 50K OHM) Defective transistor Q11.
Frequency of siren affected by flashing lights.	Voltage drop in power lead. Connect amplifier directly to battery terminal.
- Auxiliary doesn't work.	Defective transistor Q11.
+ Auxiliary doesn't work.	Defective diode D6.
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.

PA - 15A VOLTAGE READINGS

13.0 Volts D. C. Input

All measurements made with VTVM from negative power lead, selector switch in Yelp position and one speaker load.

Component	Point	DC Voltage	AC Voltage
Q 2	B	1.14	.68
Q 2	C	11.6	0
Q 2	E	1.7	.68
Q 3	B	1.15	.68
Q 3	C	11.6	8.6
Q 3	E	.77	.46
Q 4	B	12.4	11.7 av.
Q 4	C	12.8	11.0 av.
Q 4	E	12.8	11.0 av.
Q 5	B	12.8	1.8
Q 5	C	.19	8.8
Q 5	E	12.4	1.6
Q 6	B	12.8	.9
Q 6	C	.10	8.6
Q 6	E	2.4	1.6
Q 7	B	1.5	1.1
Q 7	C	3.6	1.23
Q 7	E	1.7	.08
Q 8	B	1.5	1.0
Q 8	C	3.6	1.34
Q 8	E	1.7	.08
Q 9	B	-	*
Q 9	C	-	2. av.
Q 9	E	0	0
Q 10	K	0	0
Q 10	A	3.5 av.	1.0 av.
Q 10	G	5.0 av.	1.7 av.
Q 11	B	11.8	0
Q 11	C	4.7	0
Q 11	E	12.3	0
Q 12	B	6.5	.23
Q 12	C	0	0
Q 12	E	4.8	0

* Do not measure. Normal operation is upset if you try to measure this point.

PARTS LIST - MODEL PA - 15A

Ref No.	Part No.	Description
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TRANSISTORS

Q2	125-118	2N2926 Transistor
Q3	125-410	RCA 40316 Transistor
Q4	125-406	2N1560 Transistor
Q5	125-403	2N1560 Transistor
Q6	125-403	2N1560 Transistor
Q7	125-118	2N2926 Transistor
Q8	125-118	2N2926 Transistor
Q9	125-118	2N2926 Transistor
Q10	125-310	D13TI PUT
Q11	125-113	2N3702 Transistor
Q12	125-113	2N3702 Transistor

DIODES

D1	115-101	T151 Diode
D2	115-101	T151 Diode
D3	115-101	T151 Diode
D5	115-301	1 Amp Rect Diode
D6	115-101	T151 Diode

CAPACITORS

C3	107-405	.47 MFD 100V
C4	108-107	250 MFD 15V Electrolytic
C5	108-107	250 MFD 15V Electrolytic
C6	107-223	.01 Disc Ceramic
C7	107-618	.47 MFD Tantalum
C8	107-404	.01 50V Mylar
C9	107-404	.01 50V Mylar
C10	107-406	.1 100V Mylar
C11	107-639	68 MFD 15V Tantalum
C12	107-625	3.9 MFD 15V Tantalum
C14	107-628	10 MFD 15V Tantalum
C15	107-629	220 MFD 15V Tantalum
C16	107-405	.47 MFD 100V
C17	107-214	.05 MFD Disc
C18	107-211	.005 MFD Disc

TRANSFORMERS

T1	120-118	Driver Transformer
T2	120-111	Output Transformer

Ref No.	Part No.	Description
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SWITCHES

SW3	122-117	Pushbutton Switch
SW4	106-201	On-Off (on Volume Control)
SW5	122-118	1 Deck Rotary Switch

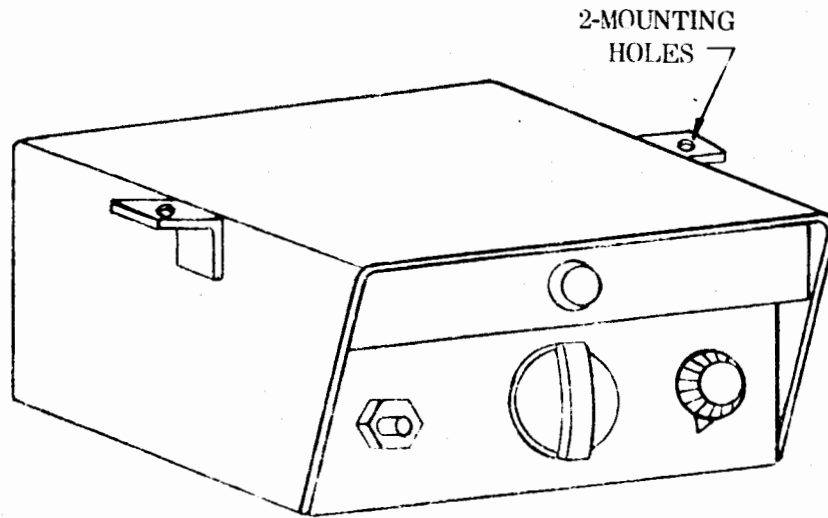
RESISTORS

R2	106-201	50 K ohm Control
R3	105-204	5 K ohm Control
R4	100-320	4.7 K ohm
R5	100-326	27 K ohm
R9	100-352	270 K ohm
R10	100-313	680 ohm
R11	100-316	1.5 K ohm
R12	100-308	220 ohm
R13	103-101	1 ohm 1 watt
R14	103-113	180 ohm 2 watt
R15	100-316	1.5 K ohm
R16	100-325	22 K ohm
R17	100-325	22 K ohm
R18	100-325	22 K ohm
R19	100-330	68 K ohm
R20	100-330	68 K ohm
R21	100-318	2.7 K ohm
R22	100-318	2.7 K ohm
R23	100-323	10 K ohm
R24	100-364	82 K ohm 5%
R26	100-365	33 K ohm 5%
R27	100-313	680 ohm
R28	100-314	1 K ohm
R29	100-323	10 K ohm
R30	100-350	390 K ohm
R31	100-502	270 ohm 1 watt
R32	100-317	2.2 K ohm
R33	100-317	2.2 K ohm
R34	100-317	2.2 K ohm
R35	100-502	270 ohm 1 watt
R36	100-343	82 K ohm
R37	100-329	47 K ohm
R40	100-331	100 K ohm
R41	100-320	4.7 K ohm
R42	100-603	470 ohm 2 watt
R43	100-317	2.2 K ohm
R48	100-302	10 ohm
R50	100-339	1.8 K ohm

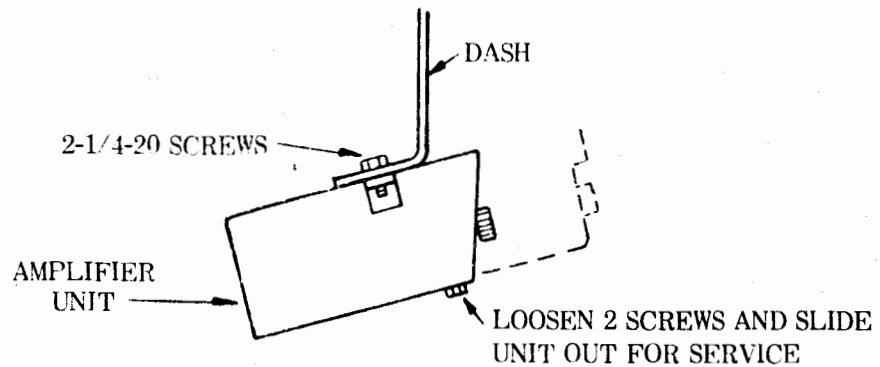
MISCELLANEOUS

M4	149-101	#53 Pilot Light
M5	148-107	15 Amp 3AG Fuse
	143-106	Fuseholder
	141-102	Knob-Volume Control
	141-103	Knob-Function Switch
	229-109	Terminal Strip
M6		Microphone 137C 108
M7	229-111	Barrier Strip

PA-15A DIRECTOR ILLUSTRATION A

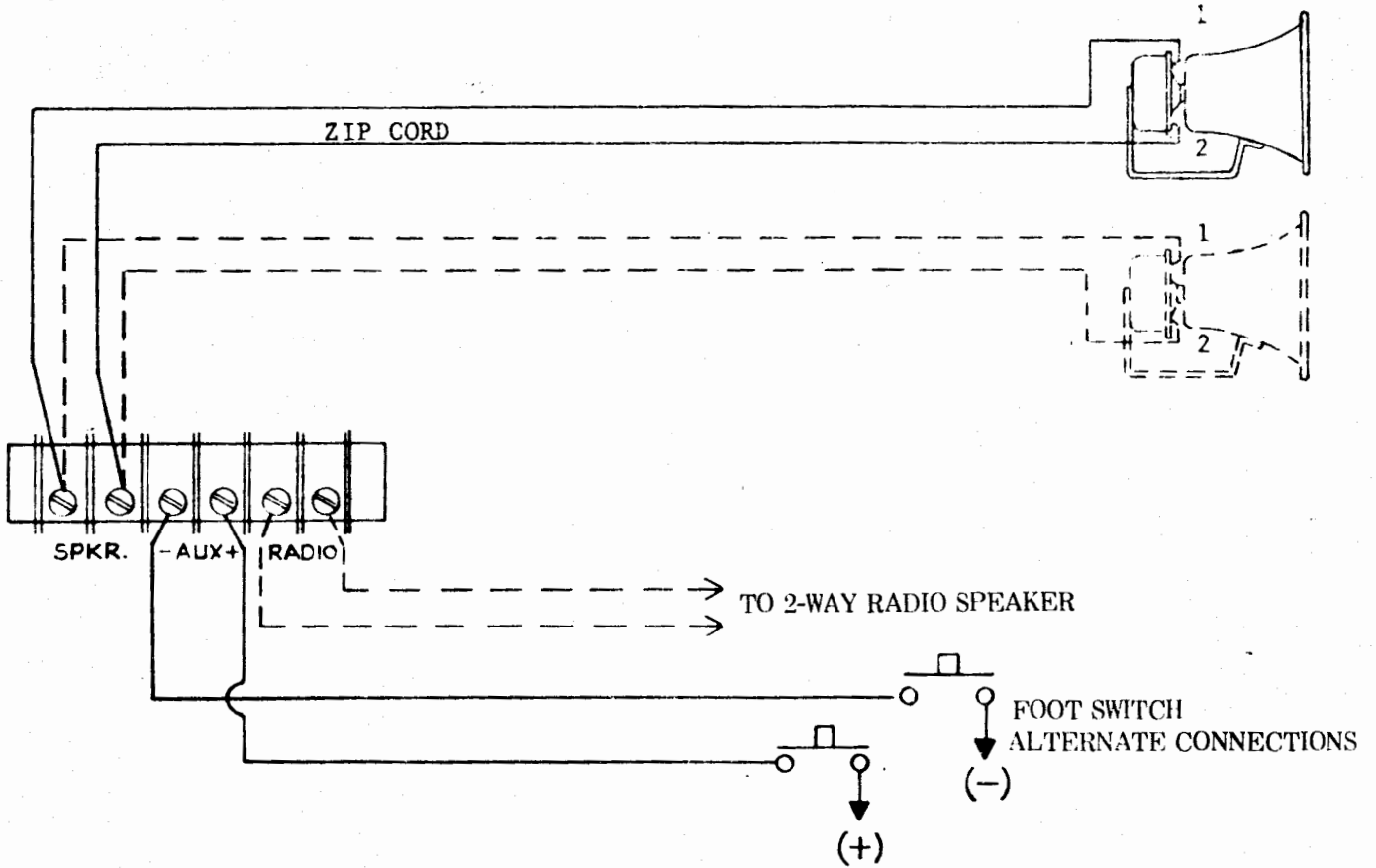


AMPLIFIER UNIT

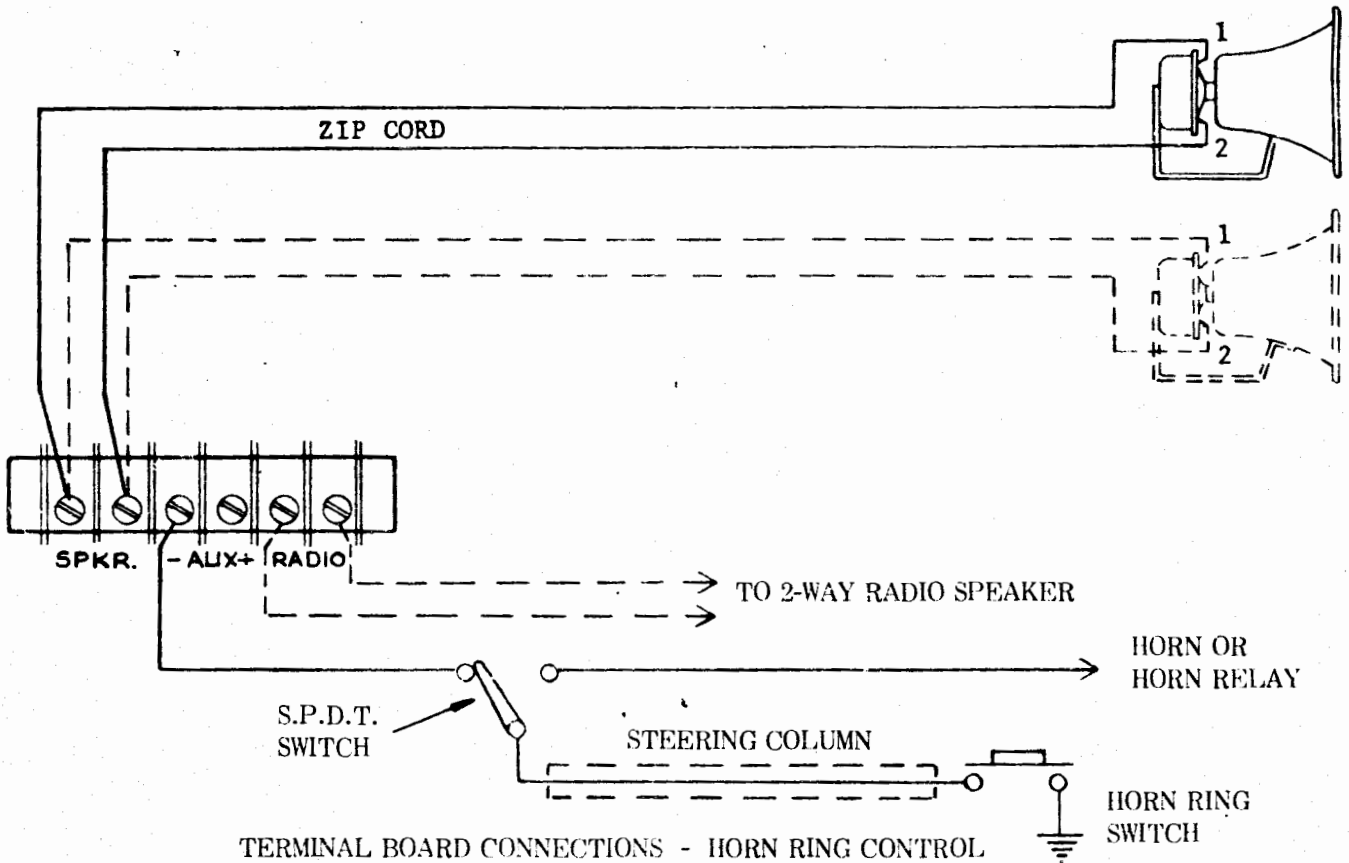


INSTALLATION OF UNIT

ILLUSTRATION B

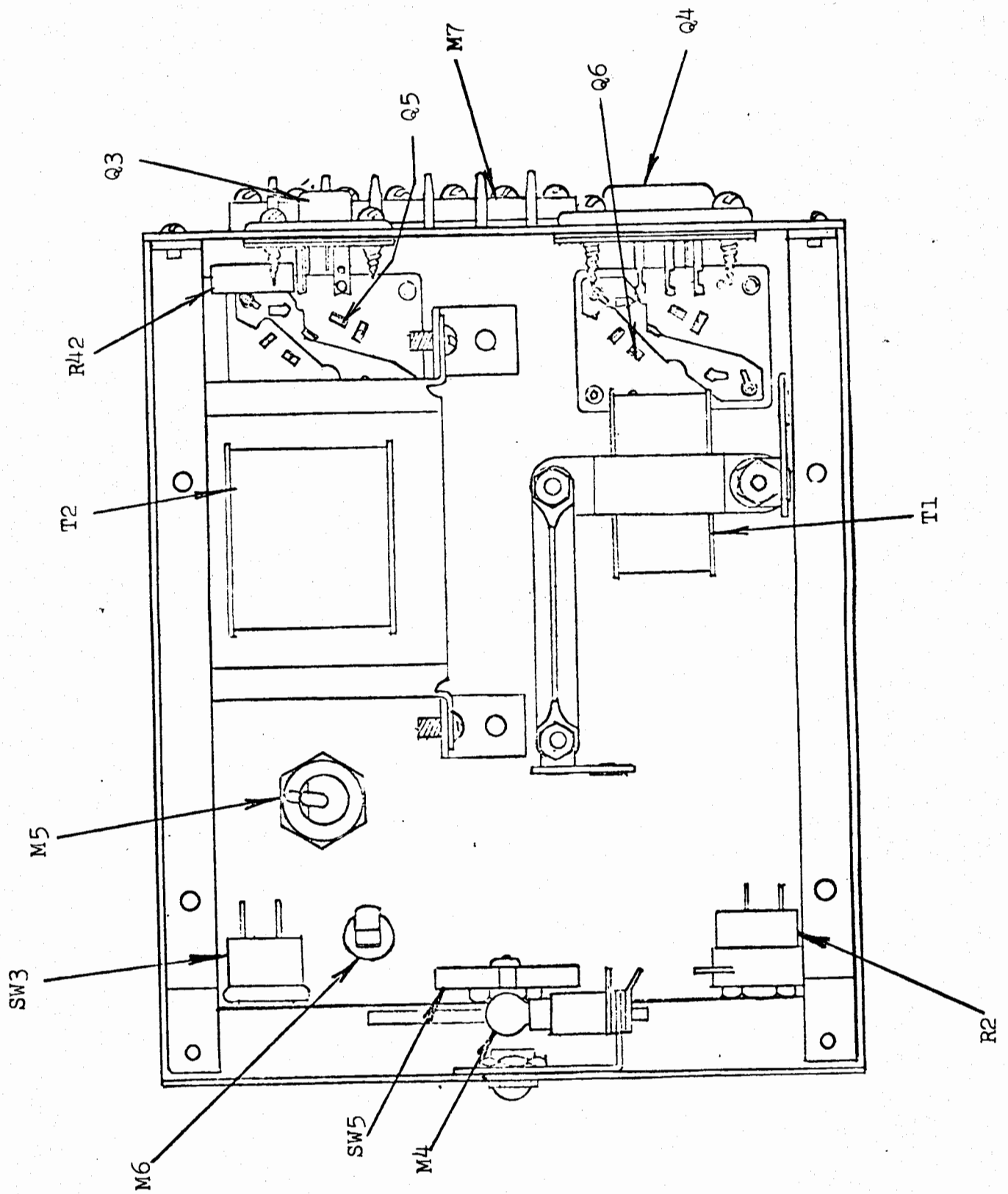


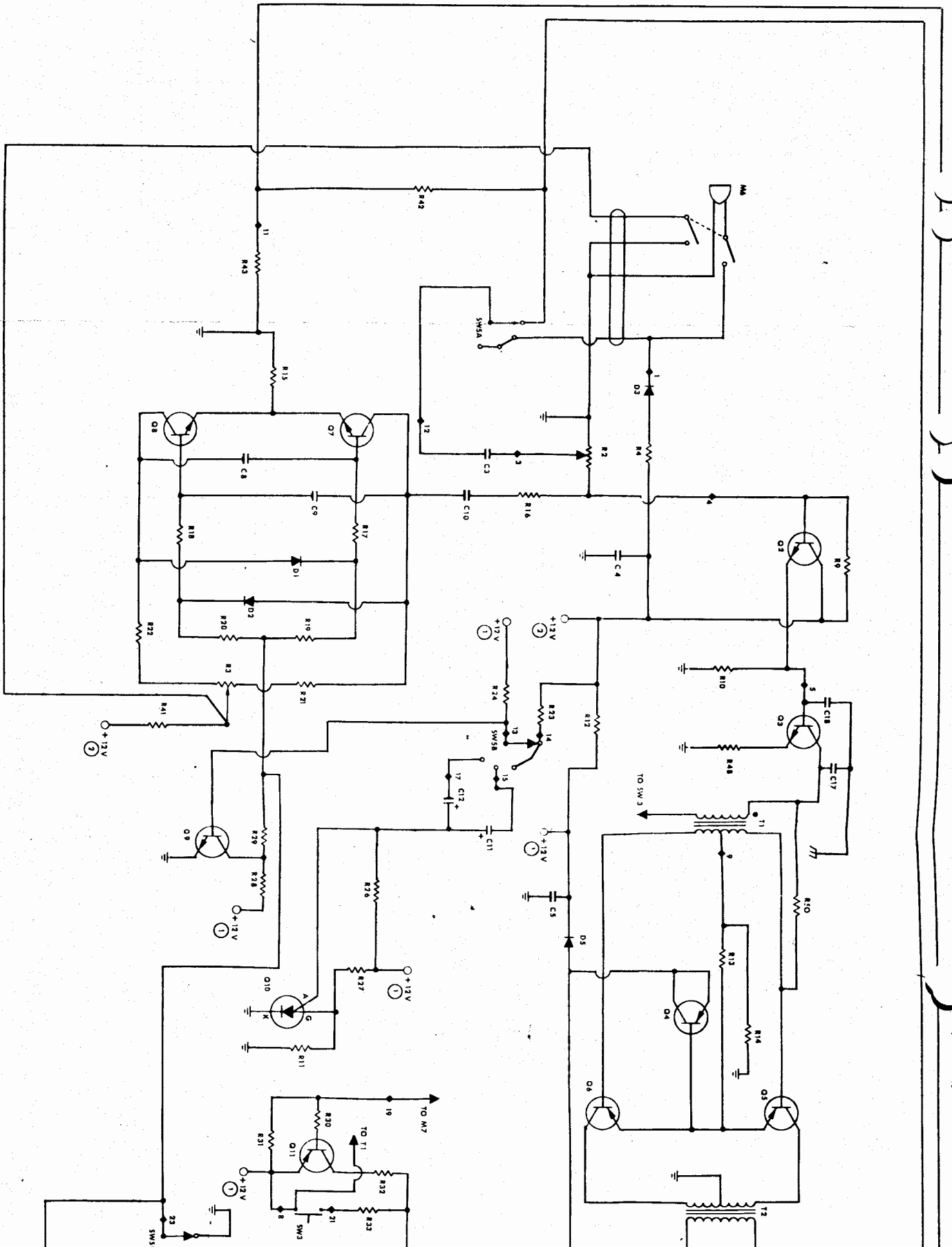
TERMINAL BOARD CONNECTIONS - FOOT SWITCH CONTROL



TERMINAL BOARD CONNECTIONS - HORN RING CONTROL

Negative ground vehicle with grounded horn ring.





PA15A SCHEMATIC

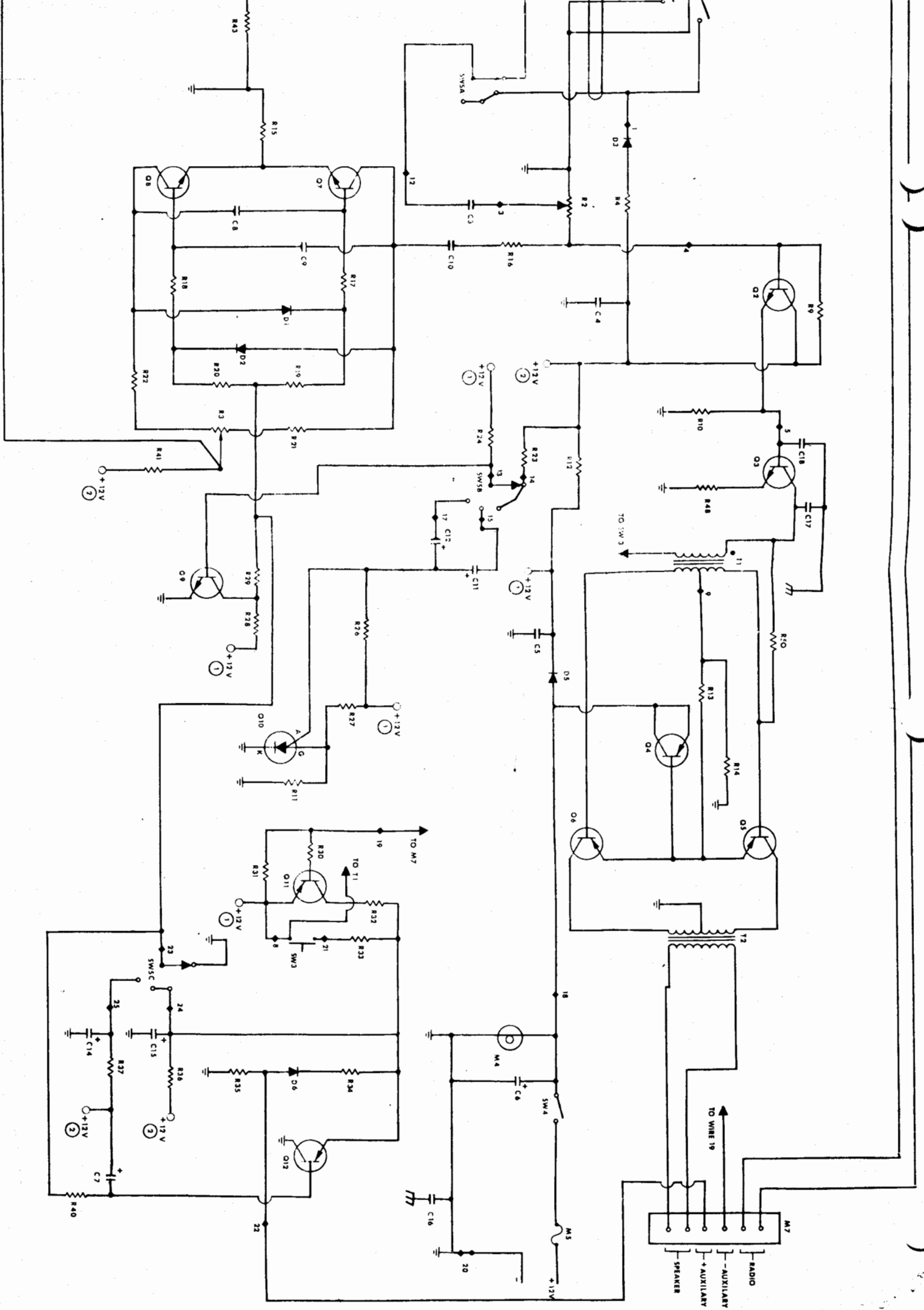
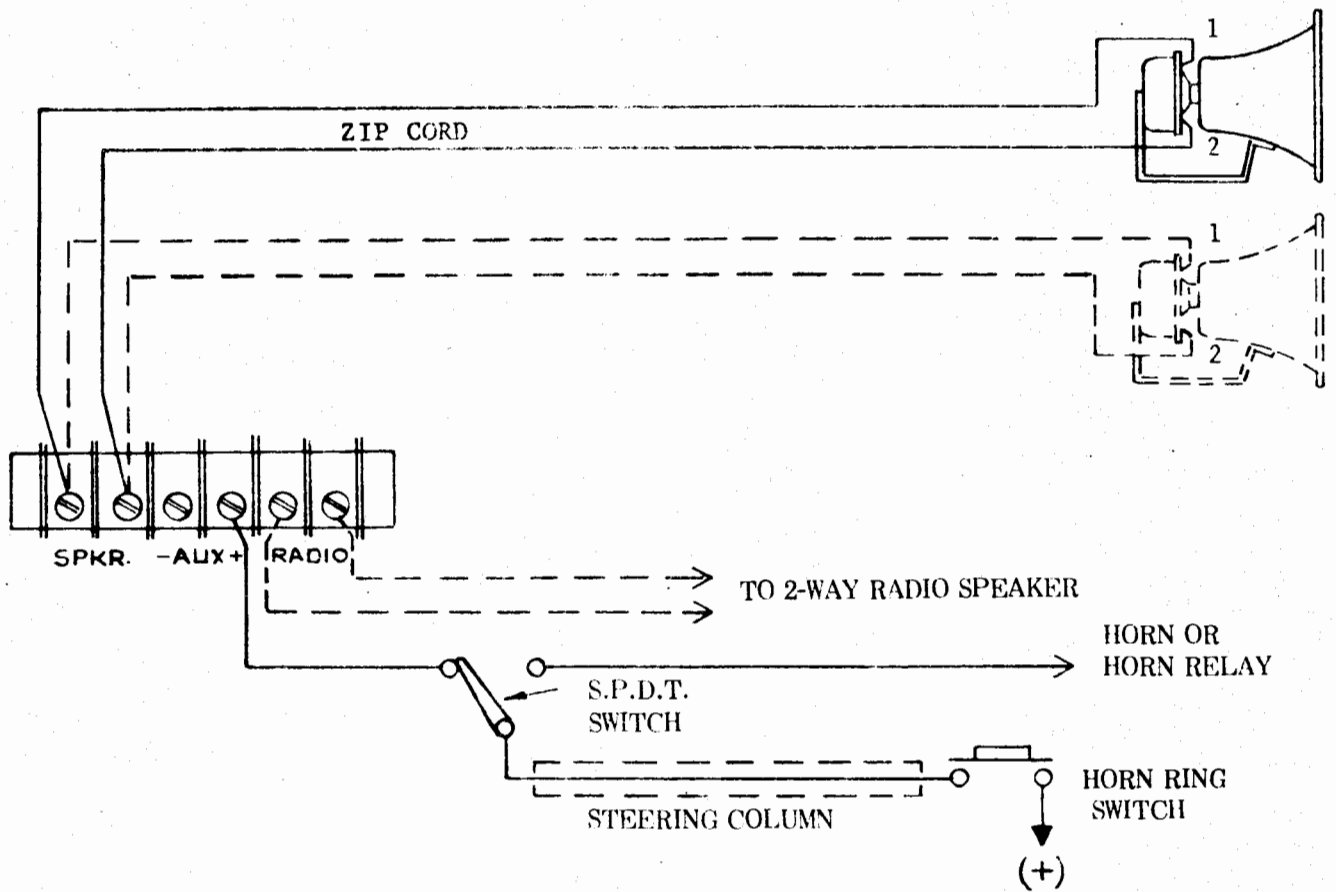


ILLUSTRATION C



TERMINAL BOARD CONNECTIONS - HORN RING CONTROL

Positive ground vehicle with grounded horn ring or
negative ground vehicle with ungrounded horn ring.