

APPLICATION

The Spitfire has been designed as a compact portable or mobile RF linear amplifier capable of operating at 1000 watts PEP input SSB. Features in this new compact design permit ease of operation and compatibility with the many transceivers now on the market. When used with the DC to DC power supply, model PS-1000B, the unit becomes a kilowatt mobile linear amplifier. When used with the model PS-1000 A.C. power supply, the LA-500M becomes a compact table top SSB kilowatt amplifier. No internal changes are required when going from the AC to DC power supplies; thus the unit may be quickly removed from the vehicle for base station operation.

DESCRIPTION

The Spitfire utilizes six inexpensive type 12JB6 tubes, high mu-triode connected, in grounded grid circuitry. A 70 ohm pad is provided across the input to present a more constant load impedance to the exciter. The pi-network features pre-set antenna loading for each band 30 through 10 meters, permitting simplified tuning of the amplifier. Relay switching functions are provided to connect the exciter to the amplifier input; and the amplifier output to the antenna when transmitting; and to connect the antenna back to the exciter or transceiver while receiving. This relay can be actuated by the VOX circuit in the exciter used. This eliminates the need for two coaxial relays normally required when a transceiver is used with an amplifier. The aircraft type post light is used for meter illumination and as a pilot light. Since the unit was designed for continuous handling, the cabinet and handle are chrome plated to retain their appearance.

The radical departure from conventional construction permits free air convection cooling of the components and amplifier tubes, thus eliminating the necessity of a cooling fan. The 1/8 inch aluminum support plate for the tubes serves as a heat sink, keeping the base seal temperatures low. A zener diode in the DC cathode path provides amplifier bias. Bias generated in this fashion is ripple free and stable under the variable loads imposed by SSB type of operation. The 1/8 inch aluminum rear panel serves as a heat sink for the zener diode.

Front panel controls are described in the following paragraphs.

The operation switch performs the following functions:

1. OFF - Switches off filaments and remote power supply. The exciter, or transceiver, is connected directly to the antenna through the built in relay.
2. STANDBY - Applies filament power. The exciter or transceiver operates straight through to the antenna as in the OFF position.
3. PLATE - Switches the high voltage relay in the remote power supply to ON, applying high voltage to the plates of the amplifier tubes. The resting current can be read on the plate meter. The relay switching circuit is now activated, so that when the exciter is turned on (voice control relay is activated in exciter) the switching functions described previously occur.
4. TUNE - All functions in step three remain active except meter reads relative output. The tuning control can now be used to resonate the final amplifier.

No calibrated meter scale is provided for reading relative output as the actual reading would be of no value. The object of the reading is only to bring the final amplifier into resonance, which can be accomplished at low power levels.

The tuning control brings the semi flexible pi-network into resonance. White segments show approximate setting of the control for various bands. See operating instructions for adjustment of this control.

The band switch controls two elements of the pi-network. The correct inductance and correct output capacitance for each band are switched simultaneously. The output capacitors are set at the factory to match a 50 ohm resistive load on each band.

SPECIFICATIONS

Input and Output
Frequencies

80 meters	- 3.5 Mc. to 3.8 Mc.
75 meters	- 3.8 Mc. to 4.0 Mc.
40 meters	- 7.0 Mc. to 7.3 Mc.
20 meters	- 14.0 Mc. to 14.4 Mc.
15 meters	- 21.0 Mc. to 21.45 Mc.
10 meters	- 28.0 Mc. to 29.7 Mc.

Input Impedance: 50 ohms.

Output Impedance: 50 ohms.

Plate power Input: To final Amp. 1000 watts PEP SSB

Power Requirements: Fil. 13.5 VDC or 12.6 VAC.
Plate 900 - 1200 VDC @ 1 Amp. peak.
500 MA Avg.

Drive Requirements: 70 - 100 watts PEP

Dimensions: 14 7/8 W x 3 1/8 H x 11 3/4 D

Shipping Weight: 13 Lbs.

PS-1000B Mobile D.C. to D.C. Converter

Input: 13 to 13.5 VDC (Standby - 4 amps.
(Neg. ground) (Plate - 20 amps no sig.
60 amps avg.voice

Output: 1000 VDC @ 500 MA Average - 1 Amp peak

Mounting: Any position in dry ventilated area

Cable Requirements: Primary 2 number 8 flexible cables for battery and 2 number 8 flexible cables for ground return. See schematic for balance of cables.

Dimensions: 8 W x 4 H x 8 D

Shipping Weight: 9 lbs.

PS-1000 A.C. Power Supply

Input: 117 VAC @ 6 Amps Average 11 Amps Peak

Output: 1000 VDC @ 500 MA Average 1 Amp Peak

Cables: Cables and plugs are supplied with unit, for direct connection to LA-500M.

Dimensions: 14 W x 8 1/2 H x 7 D

Shipping Weight: 42 lbs.

INSTALLATION AND OPERATION INSTRUCTIONS

1. Remove the unit from the packing carton and inspect the unit for evidence of any physical damage. If inspection reveals damage in shipment, retain the carton and notify the shipper immediately. P & H Electronics certifies that the unit has been inspected and tested before leaving the factory. P & H Electronics is not responsible for damage due to shipping, careless handling, or failure to operate the unit in accordance with instructions contained in this manual. A one year warranty on all parts, except tubes, is provided. All tubes are warranted for 90 days. Any alteration of this unit will invalidate the warranty.
2. For mobile operation the unit can be installed in position by securing the handle to a surface under the vehicle dash, and connecting a strap from the ground lug on the rear panel to the engine firewall. Other arrangements may be made to suit the individual installation required, however, allow 1 inch space below and 2 inch space above unit for cooling.
3. Refer to the interconnection diagrams for your installation, and make proper connections.
4. With the exciter in standby, turn Spitfire operation switch to standby and allow 1 minute for the tubes to warm up. Turn operation switch to plate position and observe plate meter. Resting plate current should be 20 to 60 MA depending upon the plate voltage. If no resting current is observed check for filament power and high voltage power. Switch to standby.
5. With Spitfire operation switch in OFF or STANDBY position, exciter or transceiver is operating straight through to the antenna. Tune and load exciter or transceiver to the antenna in the usual manner. The antenna must present a 50 ohm load to the exciter. The resonant frequency of the antenna may be determined by finding the frequency at which the minimum SWR occurs using a 50 ohm bridge. An excursion higher in frequency than resonance will result in distortion of the linearity of the Spitfire. An excursion, from resonance, lower in frequency will sacrifice output, but an SWR of up to 2:1 can be tolerated and linearity will not be affected. Adjust antenna at the highest proposed operating frequency. Make an excursion lower in frequency to the point where the SWR is 2:1. Operation may then be conducted between these two frequencies without re-tuning the

antenna. Switch exciter or transceiver to Standby.

6. After completing step 5, set Spitfire band switch and tuning knobs to desired band. Set operation switch to PLATE position, insert a small amount of carrier from exciter into Spitfire, enough to make Spitfire plate current rise to 150 MA and leave exciter set at this output level for the remainder of this step. Switch Spitfire operation switch to tune. The meter will now read relative output. Resonate the Spitfire plate circuit by adjusting the tuning knob in the proximity of the position indicated for the band so that maximum relative output as seen on the meter is obtained. This will be a low reading. Do not attempt to increase this reading by increasing exciter output. The object of this adjustment is to bring final amplifier into resonance and not to see how much output can be obtained. No calibrated output scale is provided on the meter, as readings would be dependent on antenna impedance and the band used. Return Spitfire operation switch to plate position and exciter to standby.
7. The exciter or transceiver final tuning may be peaked up now by talking into microphone and rocking exciter final tuning knob slightly while observing the Spitfire plate current. This tunes out the reactance between the exciter and the amplifier. The Spitfire plate current meter will read 300 - 500 MA on voice peaks, depending upon voice characteristics, when the amplifier is operating at 1 KW PEP input.

WARNINGS

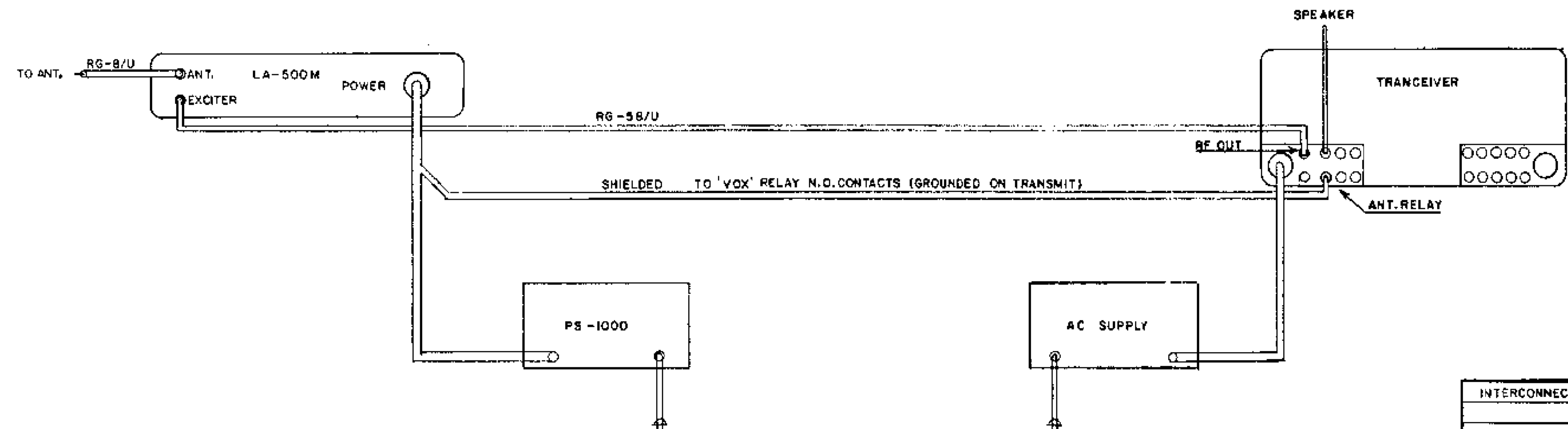
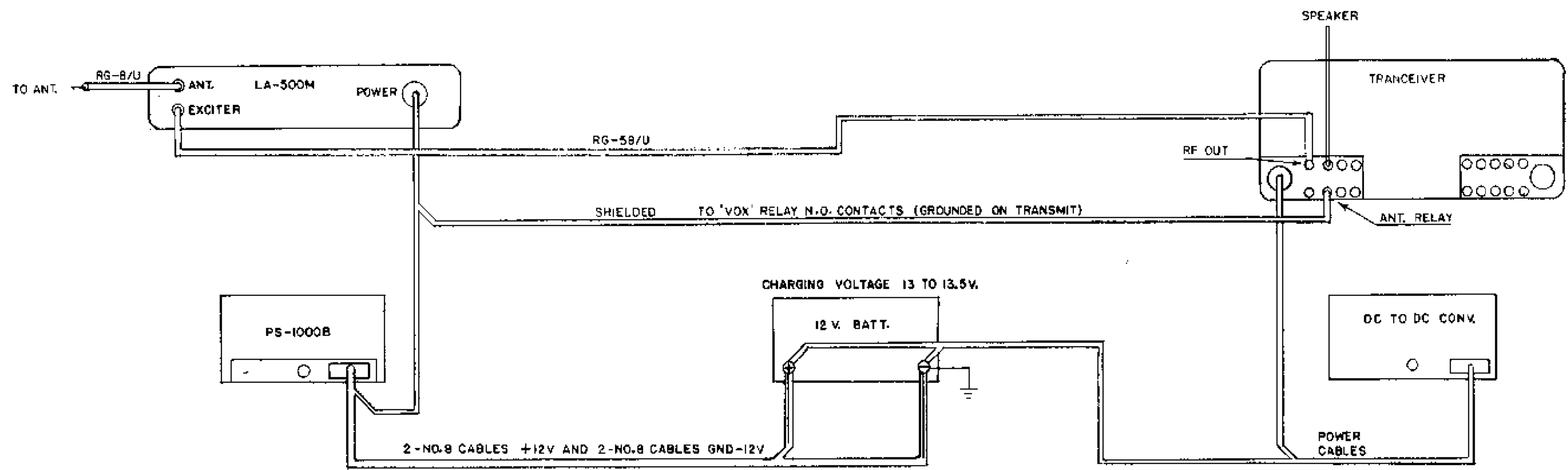
8. a. Do not whistle into microphone.
b. Do not apply a single tone full excitation into amplifier at any time.
c. On 75 and 40 meters very high RF voltages are developed at the tip of a mobile whip antenna. If corona occurs at the tip of the antenna, a large corona ball may be required for the higher power. A capacity hat may reduce this effect. Distortion of the output signal will occur if corona is allowed to develop. Operation higher than the resonant antenna frequency will increase the possibility of corona.
9. The unit is factory adjusted to match a 50 ohm load. In the event that it is desired to match the Spitfire

to an antenna impedance slightly lower or higher than 50 ohms, we recommend employing an oscilloscope such as our model DI-1 connected to show an RF trapezoid pattern. Adjustment is made while talking into microphone. The loading capacitor, for the desired band, is adjusted for best linearity while keeping the final in resonance (maximum amplitude of display) with the tuning control. The maximum amplitude of display consistent with best linearity is the condition desired. Once the proper adjustment has been obtained the oscilloscope may be removed.

Loading adjustments need not be changed providing the antenna used is not changed.

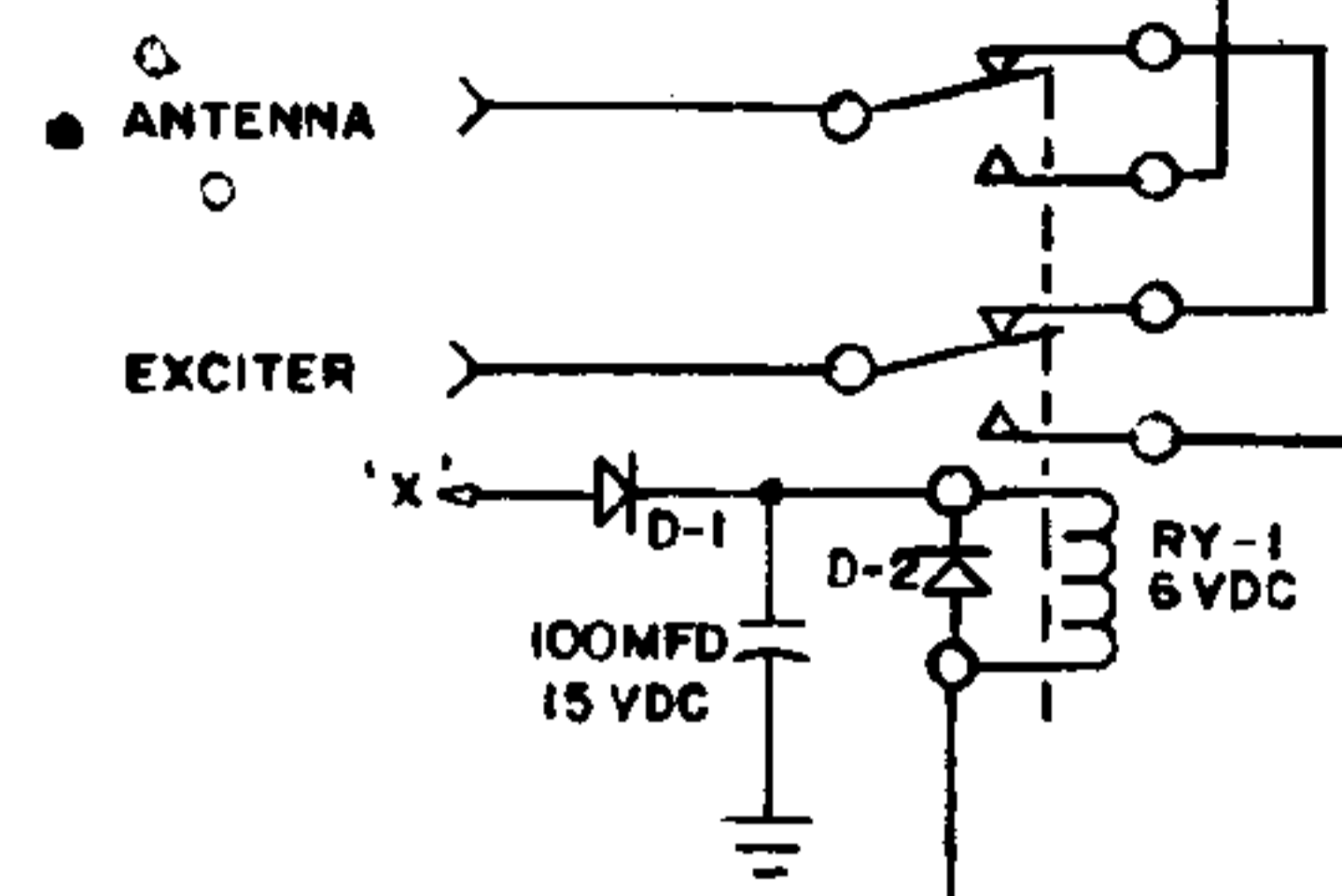
It is suggested that the antenna be matched to the amplifier rather than matching the amplifier to the antenna. This will permit using the amplifier in the mobile installation or the base station without re-adjusting the loading each time the unit is moved.

See schematic diagram for the location of loading capacitor for each band.

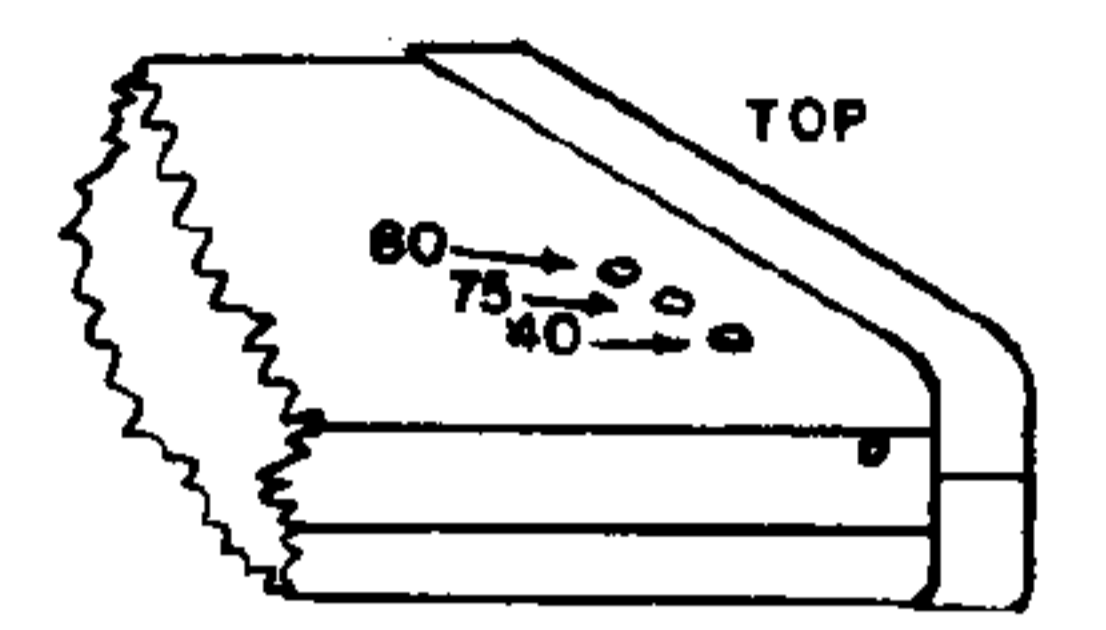
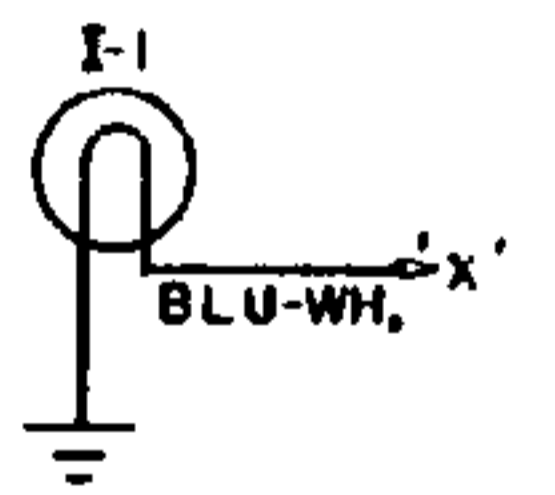
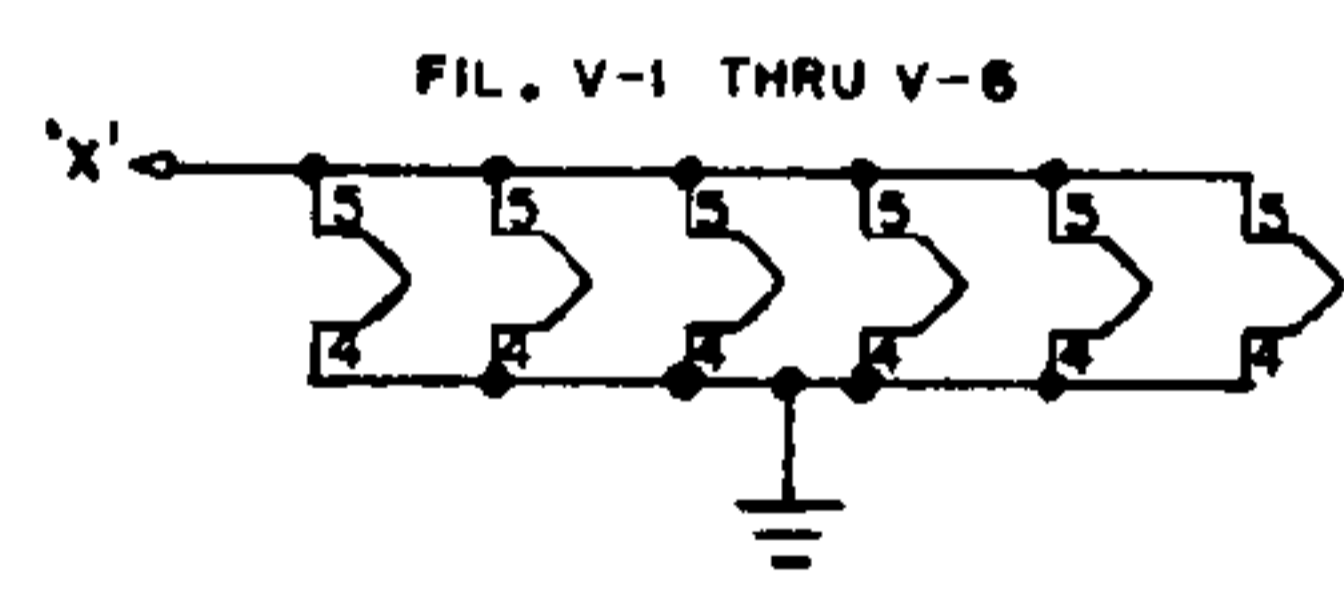
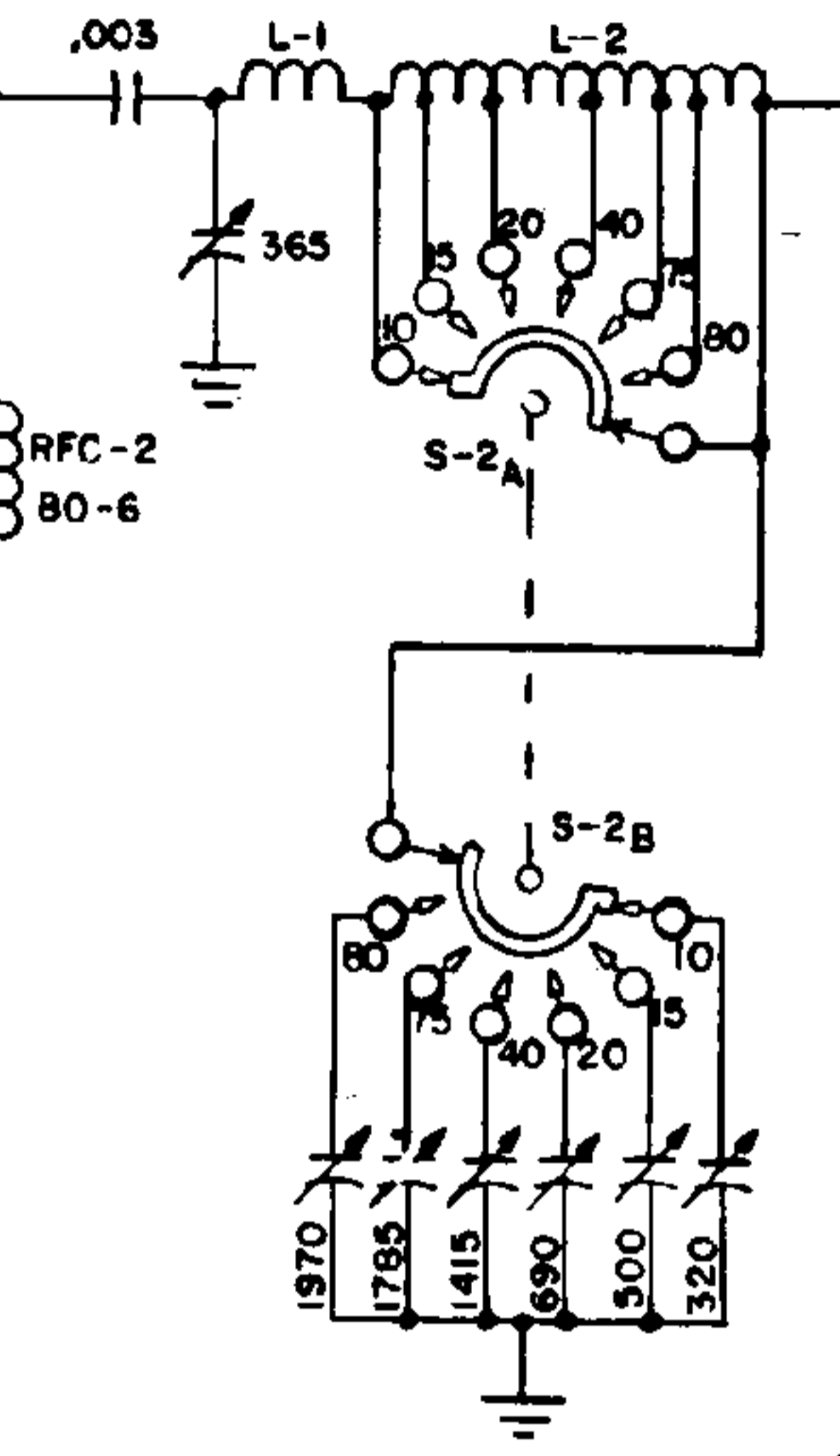
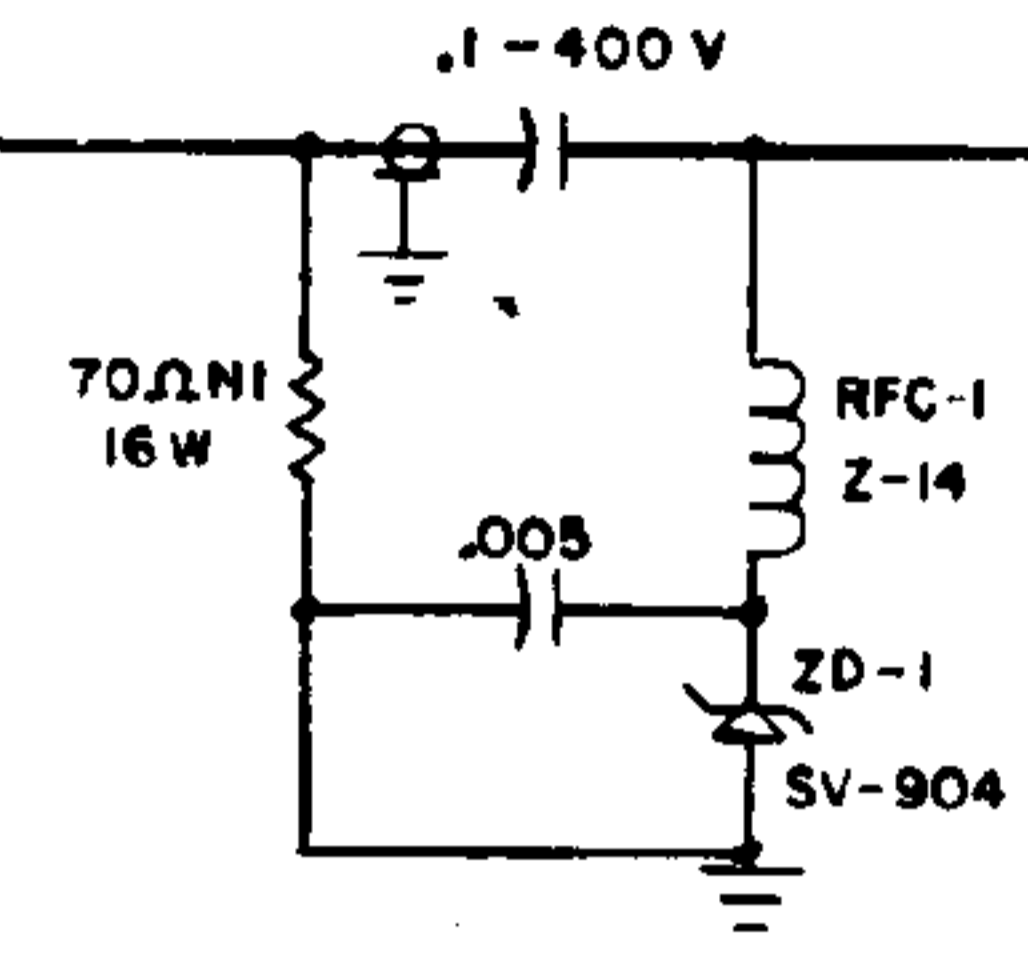
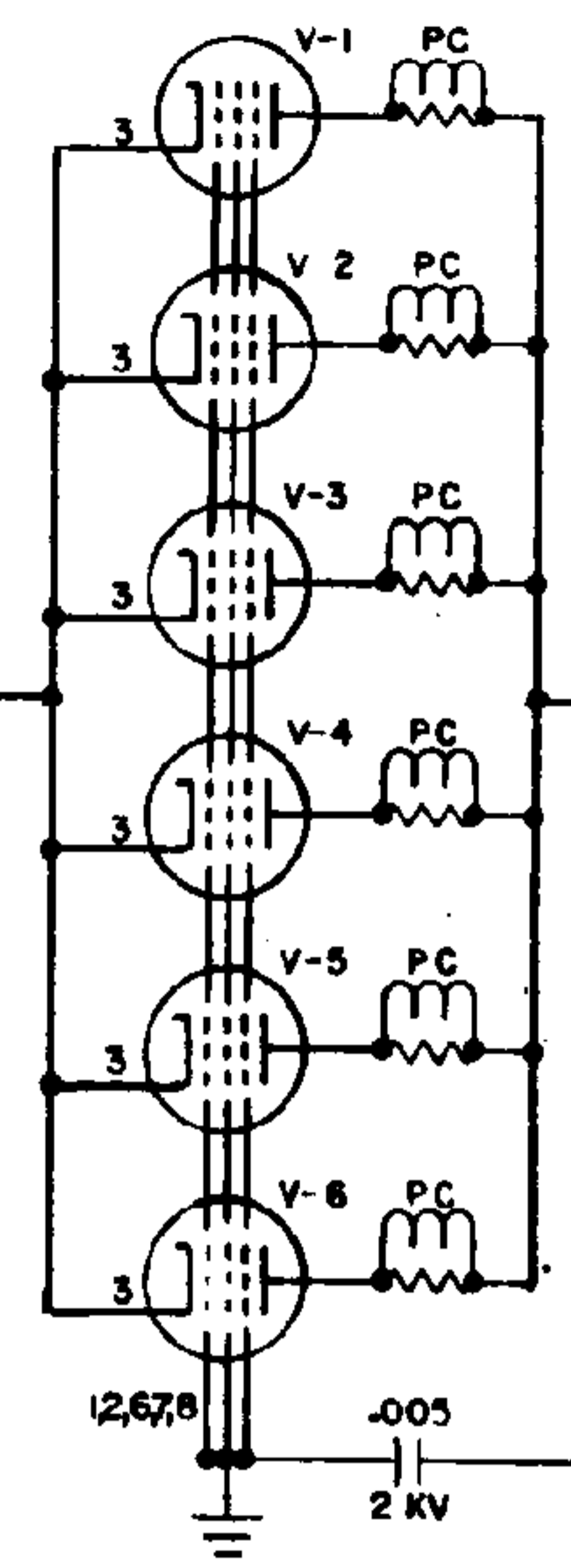


INTERCONNECTION DIAGRAM

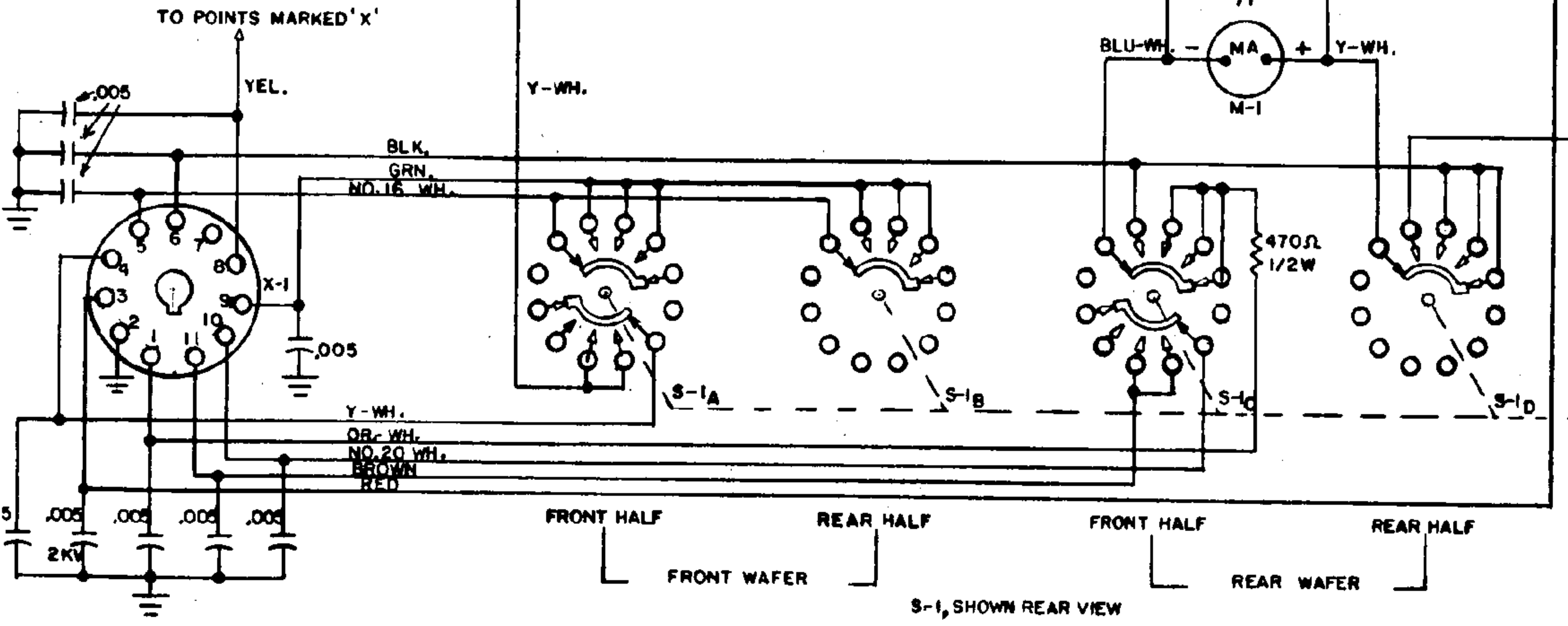
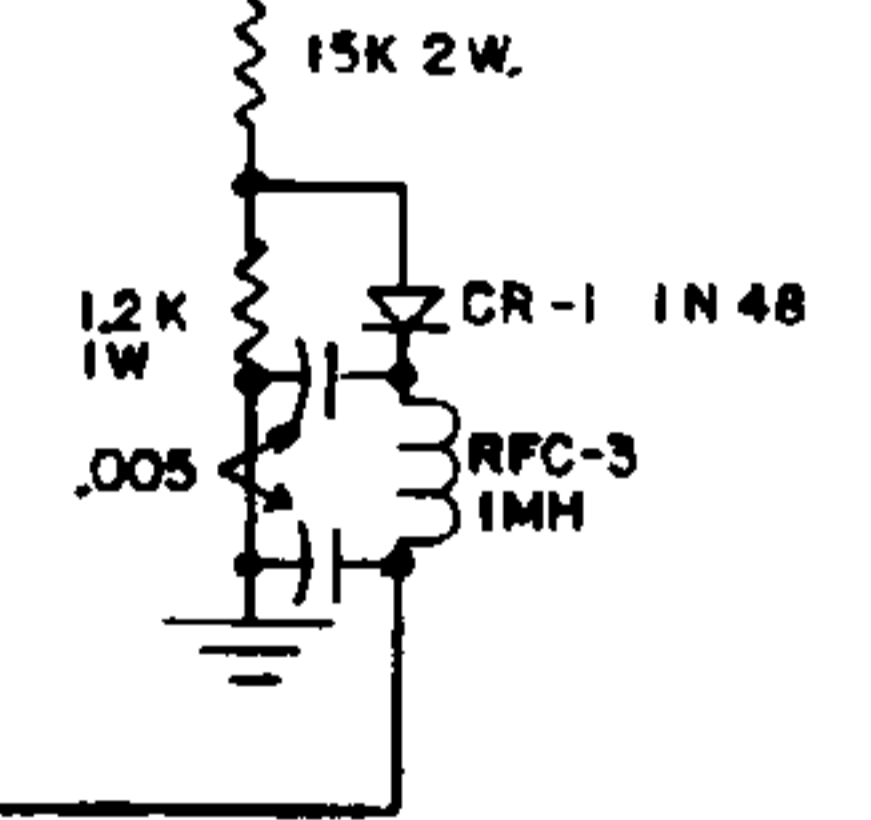
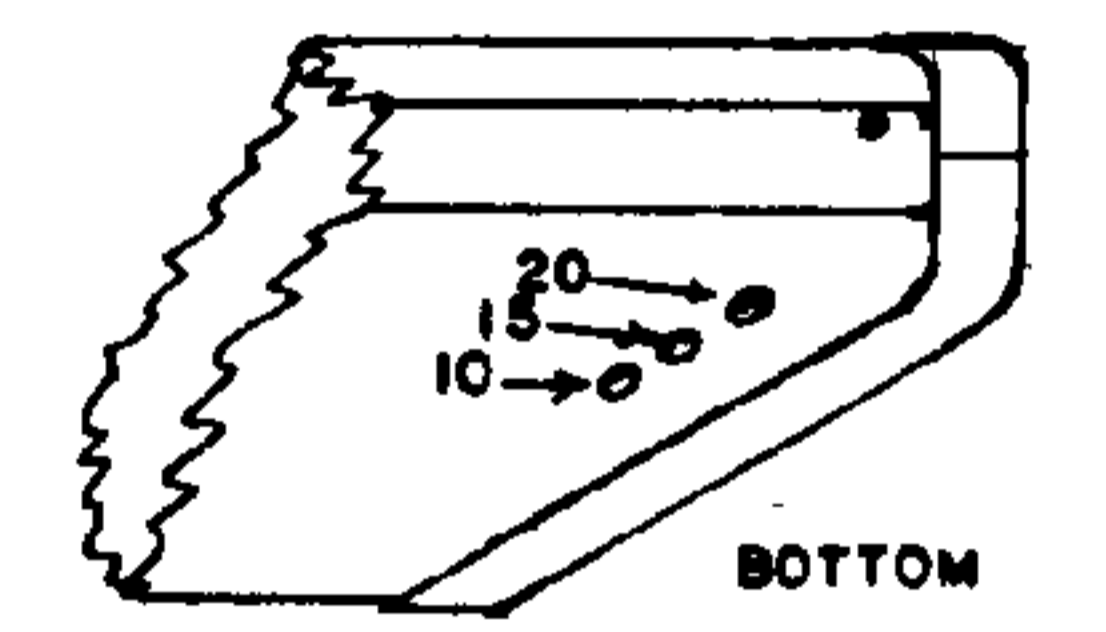
MODEL LA-500M



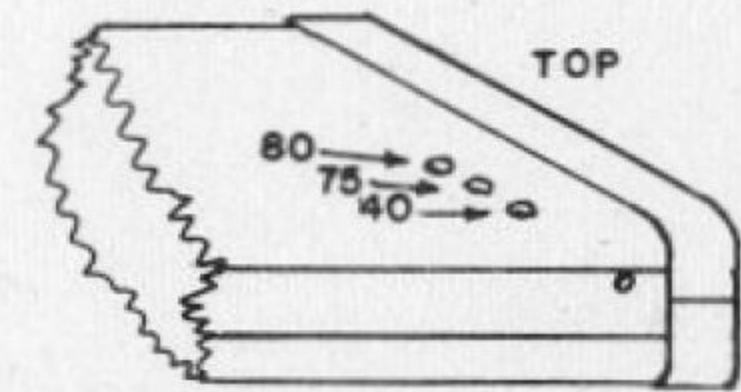
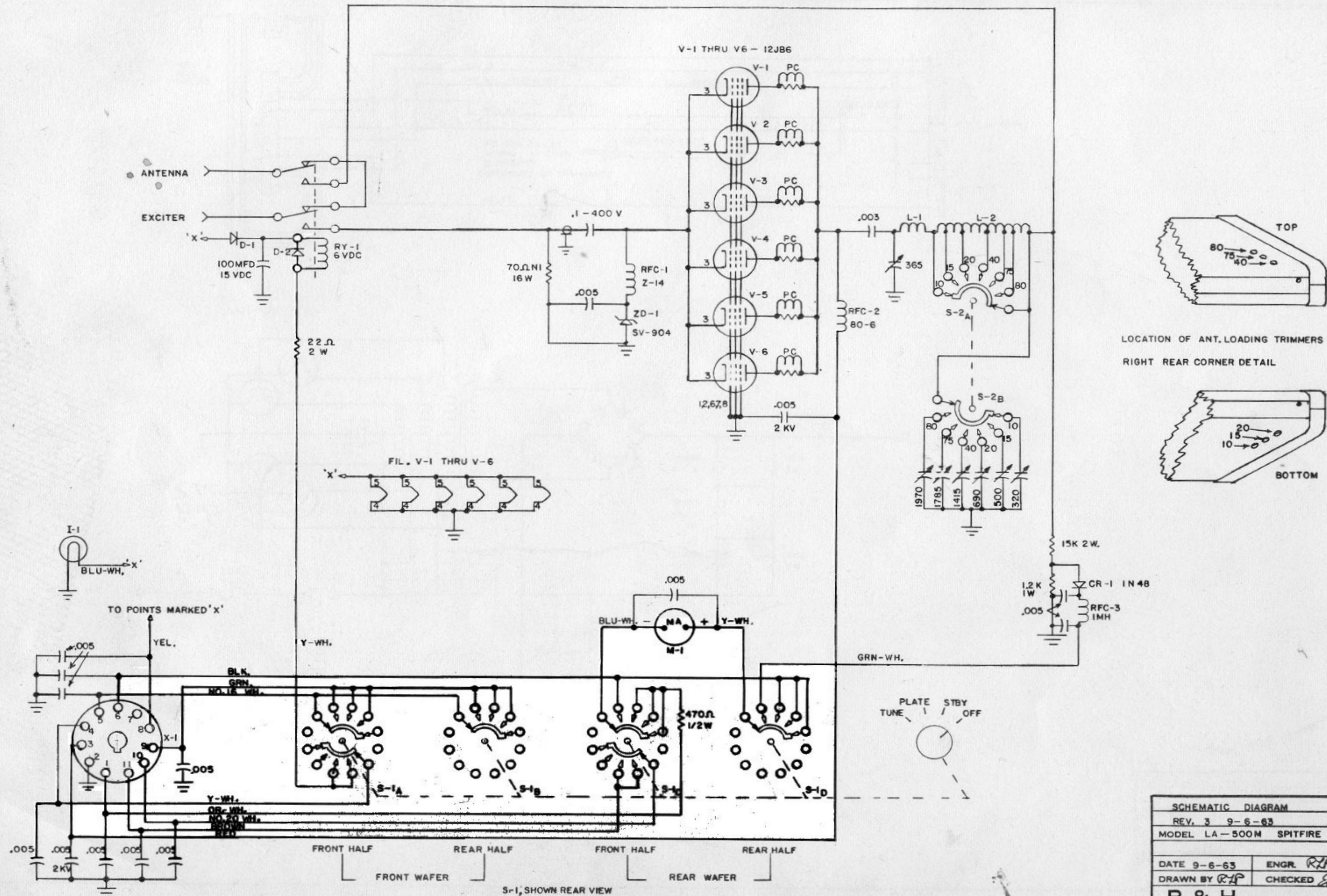
V-1 THRU V6 - 12JB6



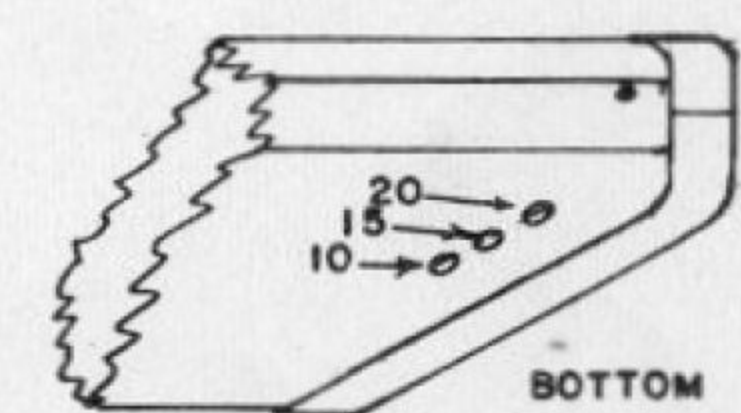
LOCATION OF ANT. LOADING TRIMMERS
RIGHT REAR CORNER DETAIL



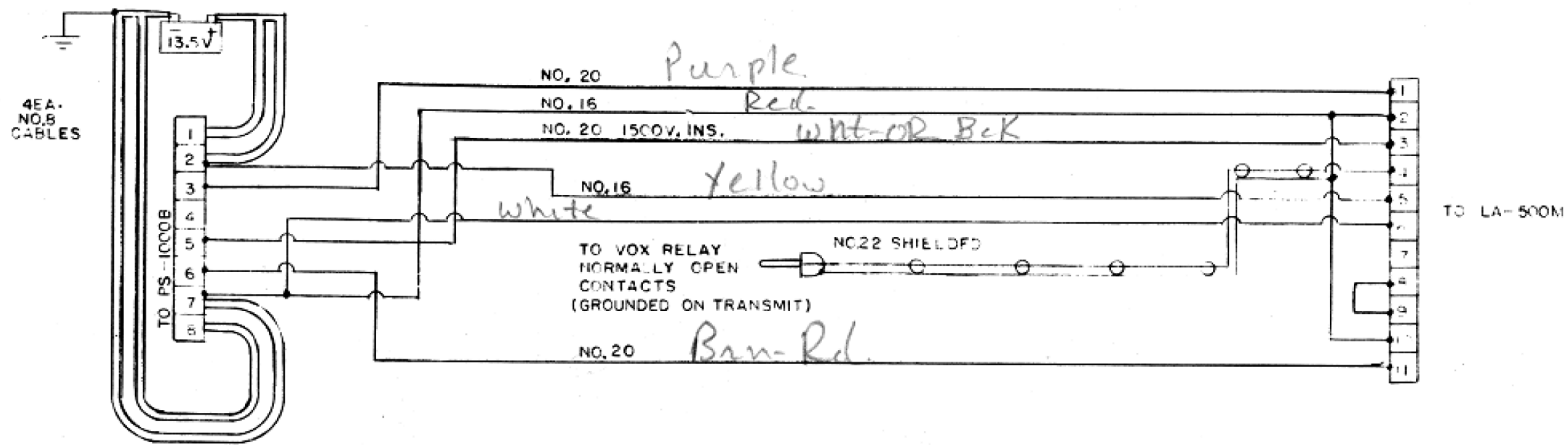
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REV. 3 9-6-63	
MODEL LA-500M SPITFIRE	
DATE 9-6-63	ENGR. RJP
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P & H	



LOCATION OF ANT. LOADING TRIMMERS
RIGHT REAR CORNER DETAIL

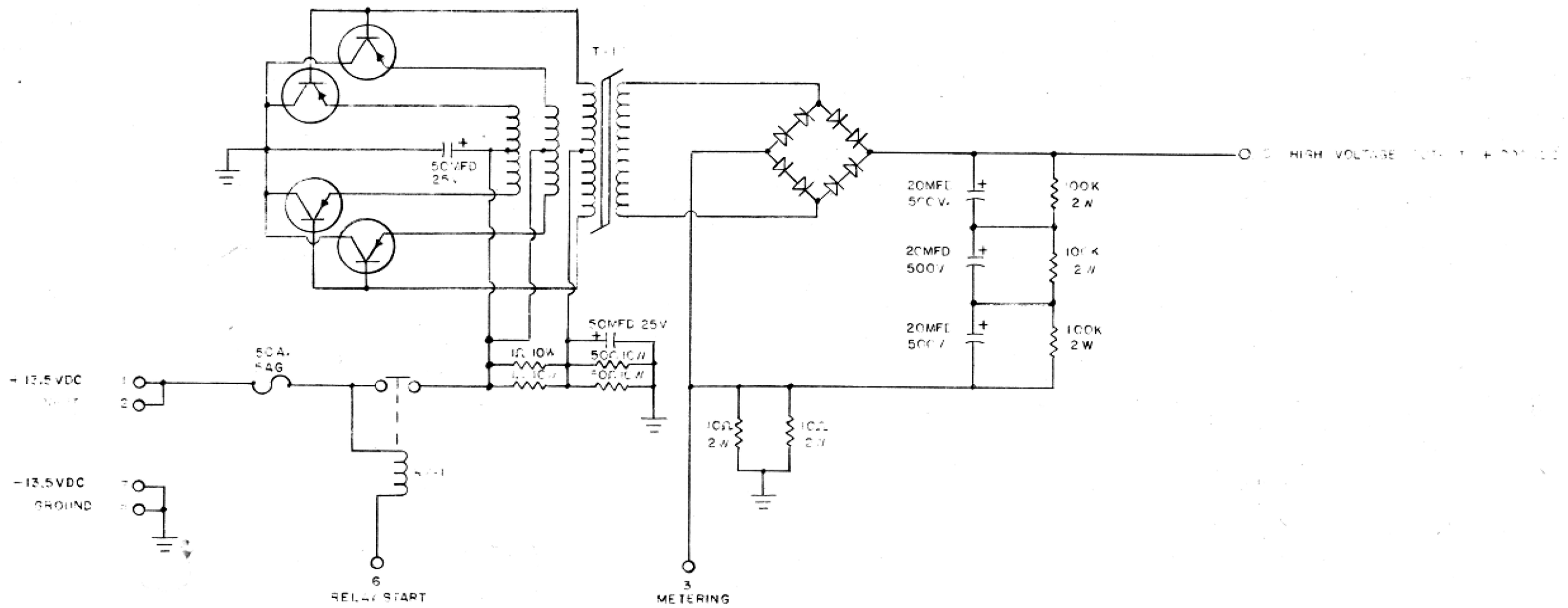


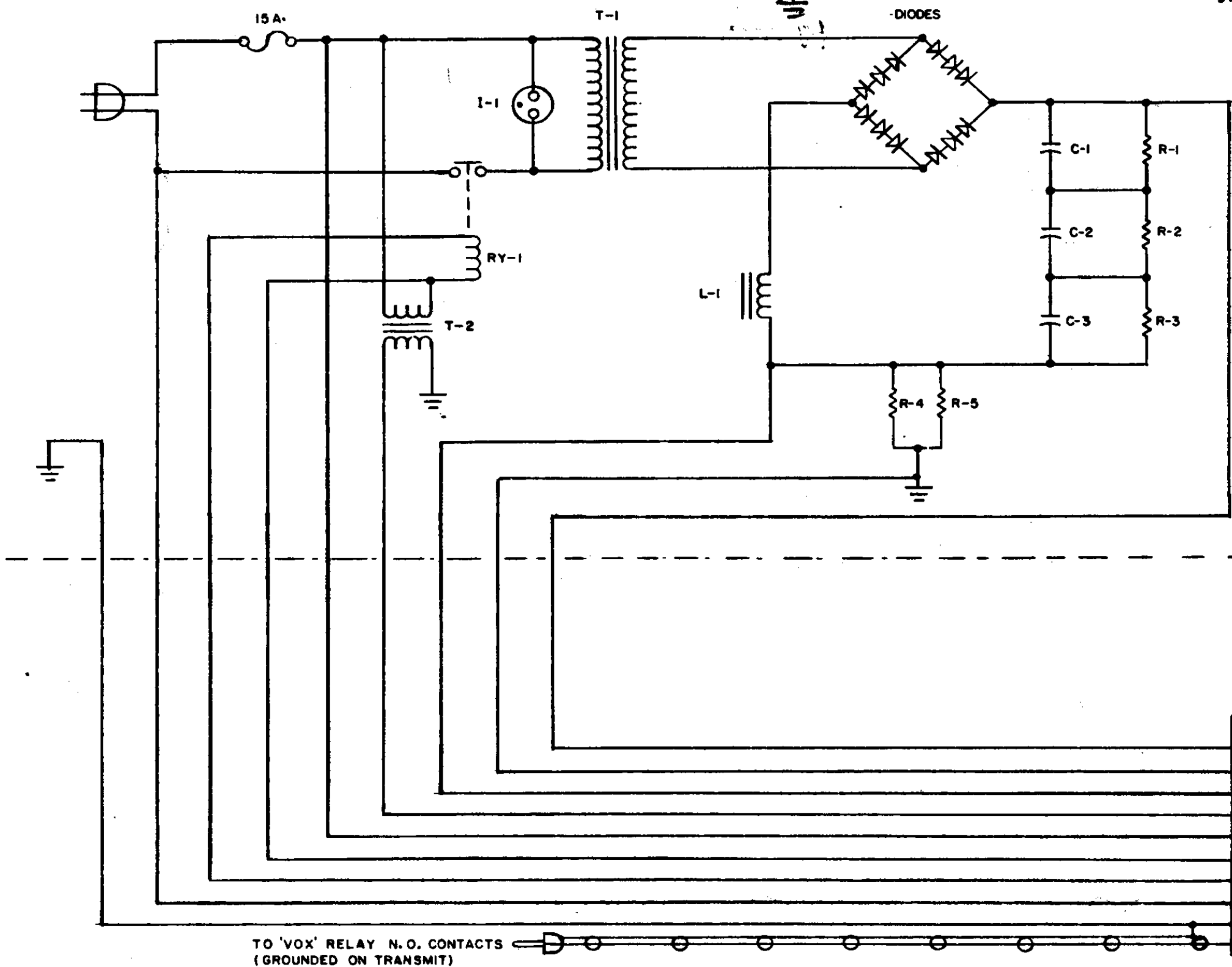
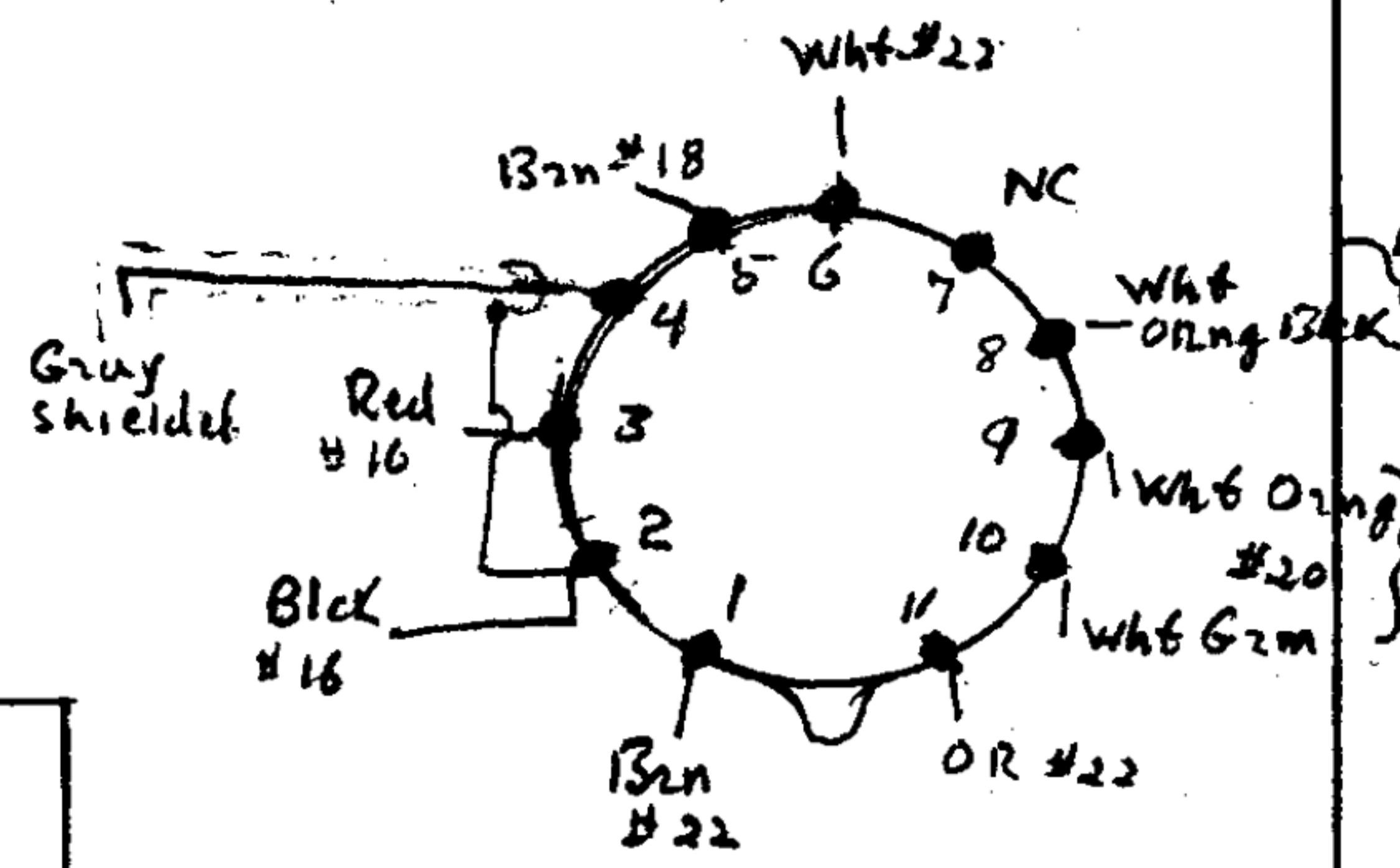
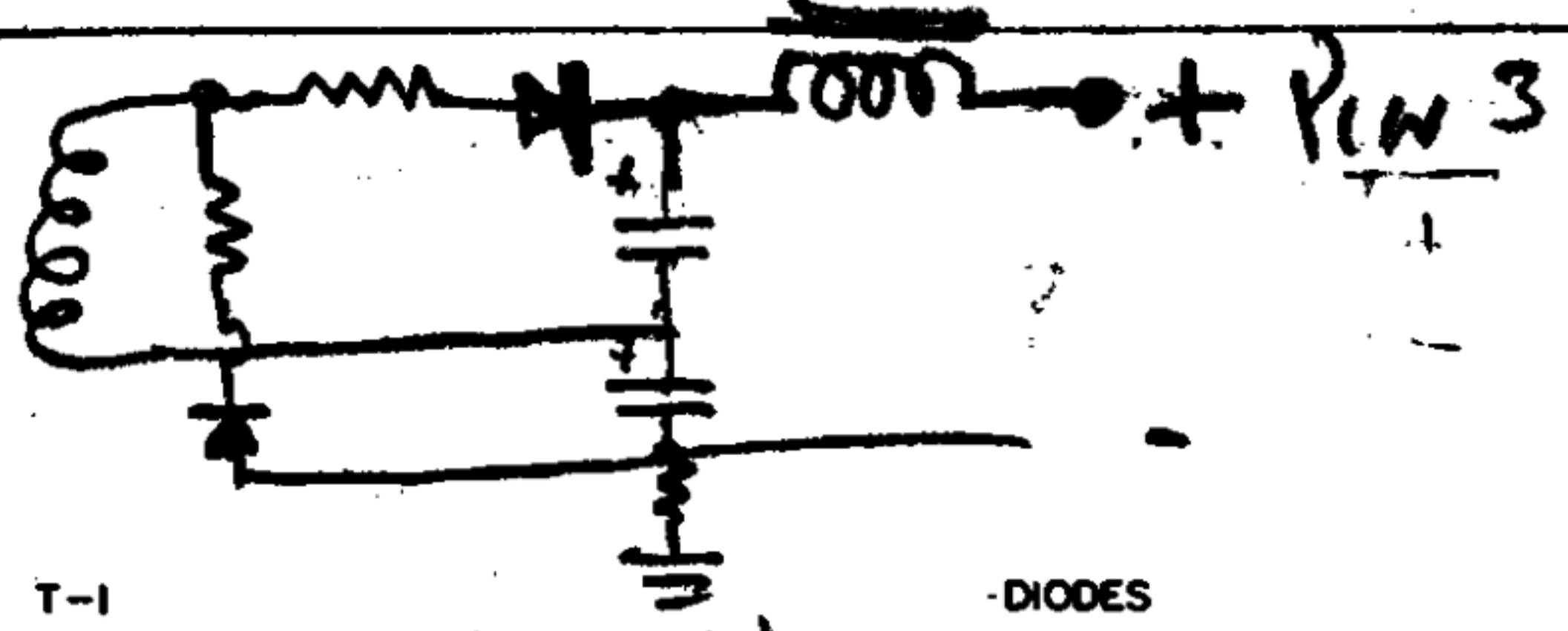
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MODEL LA-500M SPITFIRE	
DATE 9-6-63	ENGR. RLP
DRAWN BY RLP	CHECKED SMH
P & H ELECTRONICS LAFAYETTE INDIANA	



4 TRANSISTORS 2P 500

8 DIODES DI 45

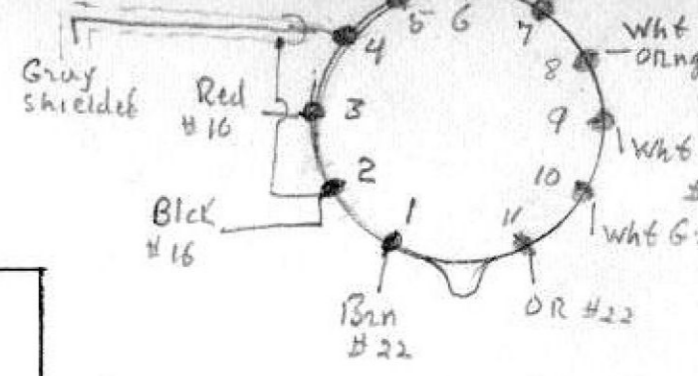
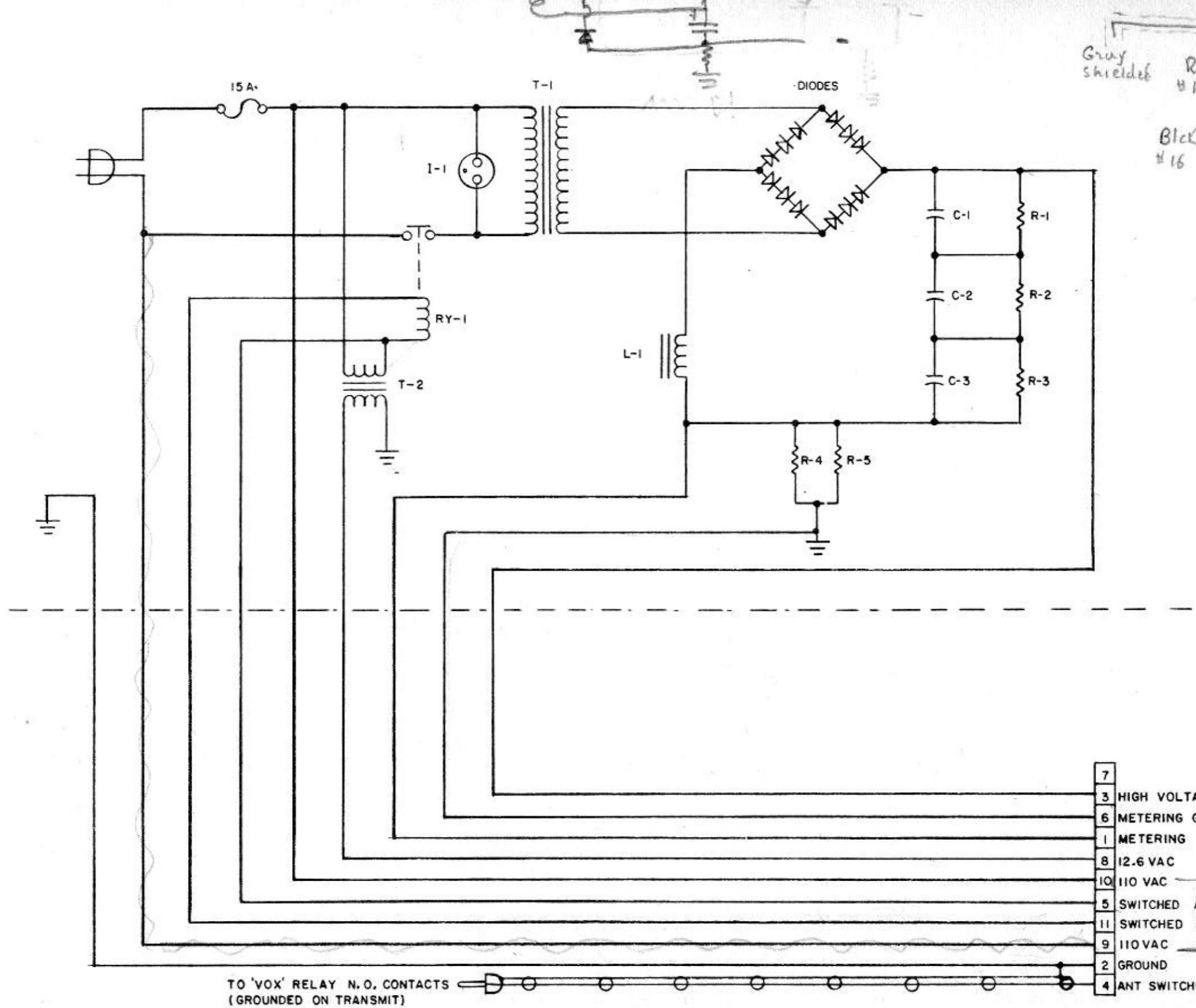




- 7
 - 3 HIGH VOLTAGE
 - 6 METERING GROUND
 - 1 METERING
 - 8 12.6 VAC
 - 10 110 VAC
 - 5 SWITCHED AC (FIL)
 - 11 SWITCHED AC (HW)
 - 9 110 VAC
 - 2 GROUND
 - 4 ANT SWITCHING
- HV - ON
FIL ON

R-1,2,3 — 40K 10W
 R-4,5 — 10Ω 2W
 C-1,2,3 — 100MFD 450 WVDC

AC POWER SUPPLY
MODEL PS-1000



R-1,2,3 —40K 10W
 R-4,5 —10Ω 2W
 C-1,2,3 —100MFD 450WVDC

AC POWER SUPPLY	
MODEL PS-1000	
DATE 7-5-63	ENGR. <i>RSP</i>
DRAWN BY <i>RSP</i>	CHECKED <i>EMH</i>
P & H	



