

# Instructions 23341

for

## Type TMV-128-A Frequency Modulator

### INTRODUCTION

The Type TMV-128-A Frequency Modulator is a device for use with a test oscillator (such as the TMV-97-C or similar) to "sweep" the oscillator frequency and at the same time provide a voltage for synchronizing the timing axis of a cathode-ray oscillograph (such as the TMV-122-B) with the position of the sweep condenser. It consists of a driving motor coupled to a sweep condenser and an impulse generator. Two ranges of sweep capacity are provided, as listed below, and a cable fitted with plugs at each end is furnished for connection to the test oscillator. The unit operates entirely from a 110/120 volt, 50/60 cycle a-c supply.

### INSTALLATION

Figure 1 shows the interconnections of the Frequency Modulator with the TMV-97-C Test Oscillator and Cathode-Ray Oscillograph, Type TMV-122-B. This arrangement is commonly used for making r-f and i-f alignment of a radio receiver. For other applications, this set up may be modified according to the requirements of the particular case.

### OPERATION

When the units are properly interconnected, select the "Hi" or "Lo" position of the range switch according to the percentage sweep desired (see the curve on the back of this sheet), and turn the motor "On." When through operating, turn the motor switch to the "Off" position.

### MAINTENANCE AND SERVICE

#### Specifications

Power Supply Voltage and Freq.	110/120 Volts, 50/60 Cycles
Power Consumption	25 Watts
Drive Motor	Shaded Pole-Induction; 1/200 HP.
Drive Motor Speed	1550 R.P.M.
Sweep Condenser Capacitance	{ High Range—25 to 70 Mmfd. Low Range—15 to 37 Mmfd.
Connection Cable Capacitance	40 Mmfd.
Impulse Generator Output	1.5 Volts
Over All Dimensions	{ Height, 8½ Inches Width, 9¾ Inches Depth, 4½ Inches
Weight	5¼ Pounds

#### Bearing Lubrication

The small induction drive motor has oil holes at each of its waste-packed bearings. Light engine oil should be used at these points. A ball-bearing support is used at the impulse generator. It is packed with "vaseline," which should be replenished after every 100 hours of operation.

#### Sweep Condenser

This element of the assembly consists of two conventional type rotary condensers, each having a single rotor plate attached to a revolving shaft. The stators are wired so that one remains connected at all times and a switch is used to parallel the two in order to increase the range of sweep.

The rotor plates should be exactly centered between the stator plates when the mechanism is operating at its normal speed (1550 r.p.m.). If the plates change their relation, they should be re-centered by adjusting the drive shaft in the coupling, or shifting the rotor plates on the shaft. The line-up of the rotor plates in respect to the armature of the impulse generator is important in that it governs the synchronization of the system. The proper adjustment is obtained when the two rotor plates are either at maximum or minimum capacitance, and the armature sets horizontal (air gap minimum). A slight shift may be necessary to center the resonance curve on the screen of the TMV-122-B.

#### Impulse Generator

A small induction generator is used to furnish means of controlling the frequency of the "Saw Tooth Oscillator" of the Oscillograph. It is necessary to maintain a definite polarity on the output connec-

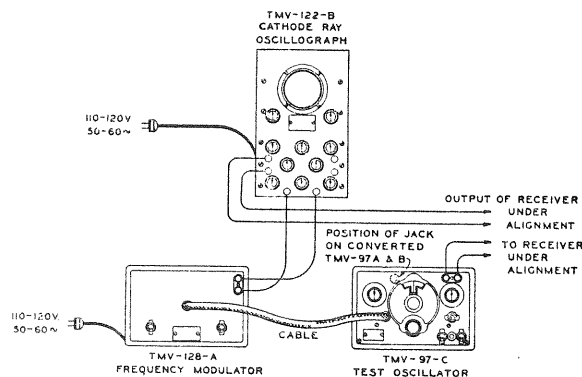


Figure 1

tions of this generator. The horse-shoe magnet should therefore be replaced as originally installed, if it has been removed for repair or service. It is also important to retain the original relation of the coils. Correct polarity exists when a positive swing is obtained on a 200 microampere d-c meter with its plus terminal connected to "high," and the mechanism rotated by hand in such a direction as to cause a decrease in air gap.

#### Mechanical Alignment

The drive motor, sweep condenser and impulse generator must be in correct physical relations to each other, inasmuch as they all rotate on the same shaft. The motor mounting screws are arranged to permit small lateral adjustments of the motor position. Both the stator and rotor plates of the sweep condenser may be adjusted to obtain the correct centering alignment. End-play of the shaft should be kept at a minimum without affecting the freedom of rotation.

#### Brush Connection

The point of contact between the revolving shaft and the brush of the sweep condenser circuit should be kept clean at all times. No oil or dirt should be allowed to accumulate. Poor contact is evidenced by ragged wave form on the oscillographic image.

# REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
	<b>FREQUENCY MODULATOR</b> (TMV-128-A)		7899	Coupling—Motor coupling.....	\$0.25
7905	Brush—Grounding brush—Package of 5.....	\$0.85	7901	Escutcheon—Off-On switch escutcheon.....	.28
7907	Cable—Connector cable with two plugs.....	1.50	7902	Escutcheon—High-Low switch escutcheon.....	.28
7909	Case—Case complete—Less binding posts, jack, switches and chassis.....	6.70	7903	Jack (J1).....	.45
7904	Coil—Impulse coil (L1, L2).....	1.25	7898	Motor—Motor complete (M1).....	12.00
			7908	Plug—Cable plug.....	.68
			7906	Post—Binding post engraved "High"—"Low".....	.45
			7900	Switch—Toggle switch (S1, S2)—Off-On, High-Low—Less escutcheon.....	.75

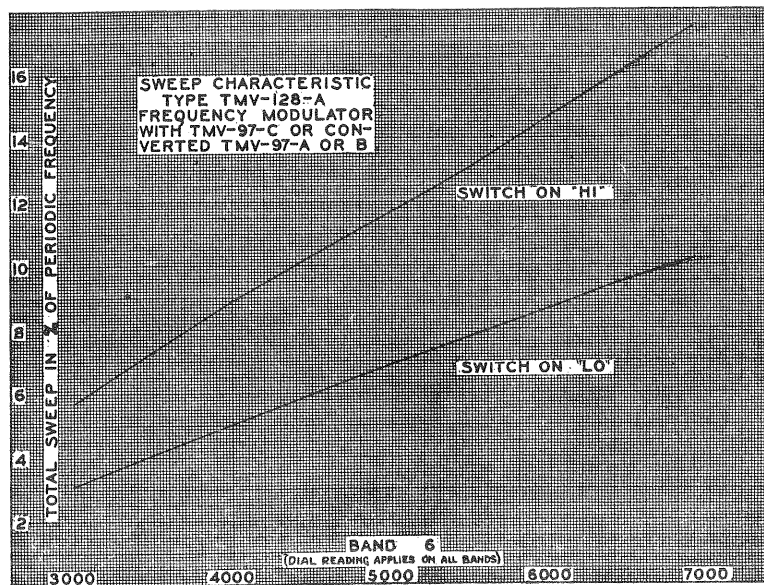


Figure 2—Sweep Characteristics of TMV-128-A with TMV-97-C

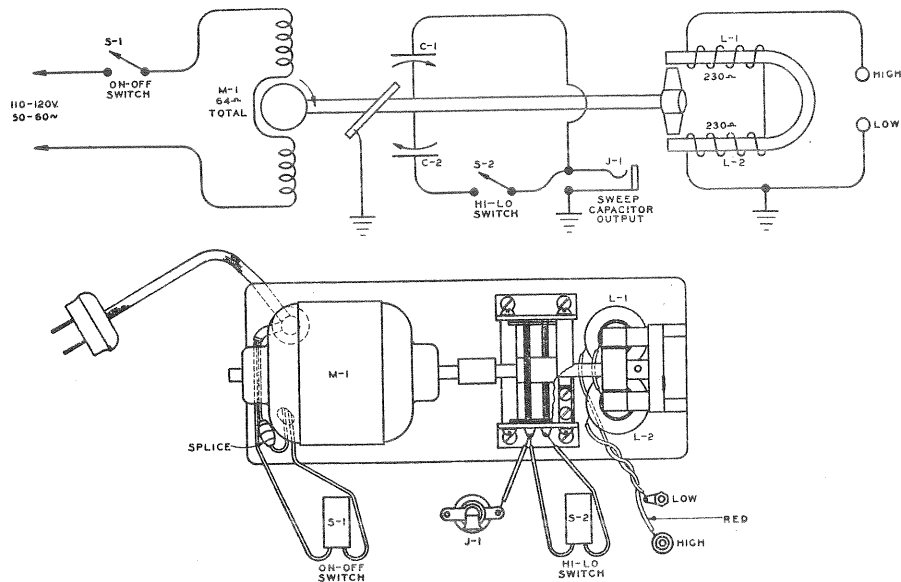


Figure 3—Schematic and Wiring Diagrams, Type TMV-128-A Frequency Modulator

# Test Oscillator Conversion Kit

Type TMV-131-A

For Use on Oscillator, Type TMV-97-A or B

(Read Carefully before making changes)

## —INTRODUCTION—

This kit is for the purpose of extending the use of the Full Range Oscillator, TMV-97-A or B, to permit the alignment of radio and intermediate frequency stages of a receiver by means of the Cathode Ray Oscilloscope, TMV-122-B. This is accomplished through the use of the Frequency Modulator, TMV-128-A, which sweeps the oscillator output frequency over a definite range when plugged into the jack on the front panel of the modified oscillator.

The kit includes:

- Shielded Coil Assembly with Mounting Unit.
- Attenuator High-Low Output Switch and Escutcheon.
- Modulation Switch and Escutcheon.
- Range Switch Escutcheon.
- Sweep Capacitor Jack.
- Dial Scale.
- Two Resistors, one 220,000 ohms and one 2200 ohms.
- Nut  $\frac{3}{8}$ "-32.

The controls on the front panel will now comprise the "On-Off" switch for the oscillator, the "Mod-Off" switch for the modulator tube and the "Hi-Lo" switch for attenuation of oscillator signal, all of which are toggle type. There is also a new range switch plate, a jack for plugging in the frequency modulator, and a new dial scale.

In addition to the greater field of utility for the oscillator the performance is considerably improved by the complete shielding of the coils. The converted unit operates with a maximum output increased to 0.1 volts (r.m.s.). The attenuator switch provides a stage of attenuation of 100 to 1 in addition to the variable attenuation provided by the output control. The minimum signal with the attenuation switch on "Lo" and the output control on zero will be less than 20 microvolts at any frequency setting within the range of the instrument.

## —REMODELLING—

*Note — Keep the variable capacitor (C-3, Figure 2) closed while making changes, to prevent bending or damaging the plates.*

### Dismantling

1. Take out the front panel, complete with the chassis and batteries, from the case and remove the tubes and batteries from the chassis.
2. Disconnect the chassis and remove it and all other parts and connections from the back and front of the panel leaving the panel stripped.
3. Remove the coils and their connectors and wires and also the antenna capacitors, C-1 and C-2 (see TMV-97-A or B diagram), from the chassis.
4. Take dial apart by removing the knob and extracting the pin in the shaft, thus releasing the spiral spring and freeing the plate. The center hub cap will have been taken off and the set screw loosened in dismantling the front panel. Remove the old paper scale from the dial plate.

### Re-Assembly

1. Clean the back of the front panel with coarse sandpaper at the points where contact is made with

the coil assembly, output control, phone jack, dial contact spring and ground binding post, thus assuring good electrical connections to the panel at these points.

2. Tear off the template, attached to this booklet, and cut out along the boundary lines. Place on the back of the front panel and mark for drilling. Drill holes in accordance with instructions on template. The holes for the new and old output controls and range switches run together, making it advisable to file rather than drill the new holes.

3. Mount in sequence the following parts on the front panel, in accordance with the wiring diagram, Figure 2.

- (a) Modulation Switch and Plate (Mod-Off)—S-5.
- (b) Attenuation Switch and Plate (Hi-Lo)—S-6.
- (c) Output Control, Plate and Knob.
- (d) Antenna and Ground Binding Posts.
- (e) Coil Unit, Range Switch Plate and Knob.
- (f) Sweep Capacitor Jack.

4. Cut out the new dial scale accurately around the outer and inner circles and carefully attach in

place centrally on the dial plate using gasket cement, shellac or an equivalent binder. Reassemble the dial.

5. Attach the chassis to the front panel and mount the Power Switch and Plate (On-Off), S-4, in position.

6. Solder the resistors R-4 and R-5 (Figures 2 and 3) in place at the Attenuator Switch and make the necessary connections and grounds in accordance with the diagrams (Figures 1, 2 and 3). New wiring is shown in heavy lines on the General Wiring Diagram (Figure 2). The shielded lead from the coil assembly should pass below the shaft of the tuning capacitor (C-3). The lead to the jack should be spaghetti covered bus wire. The lead from S-6 to R-1 if shielded will give improved performance. The

shielding should be soldered to case of R-1 and to ground binding post. All other additional wiring should be done with flexible hook-up wire.

7. Mount the dial assembly in place on the front panel, leaving the hub screw untightened. Set the dial scale by turning the knob until the indicator line at the outer circle coincides with the hairline on the transparent window. Set the variable capacitor (C-3) by hand to its closed position of maximum capacity. Check alignment, tighten up dial hub set screw, making sure that the movable part of the tuning capacitor revolves freely. Replace hub cover.

8. Replace the tubes and batteries and assemble the unit in the outer case.

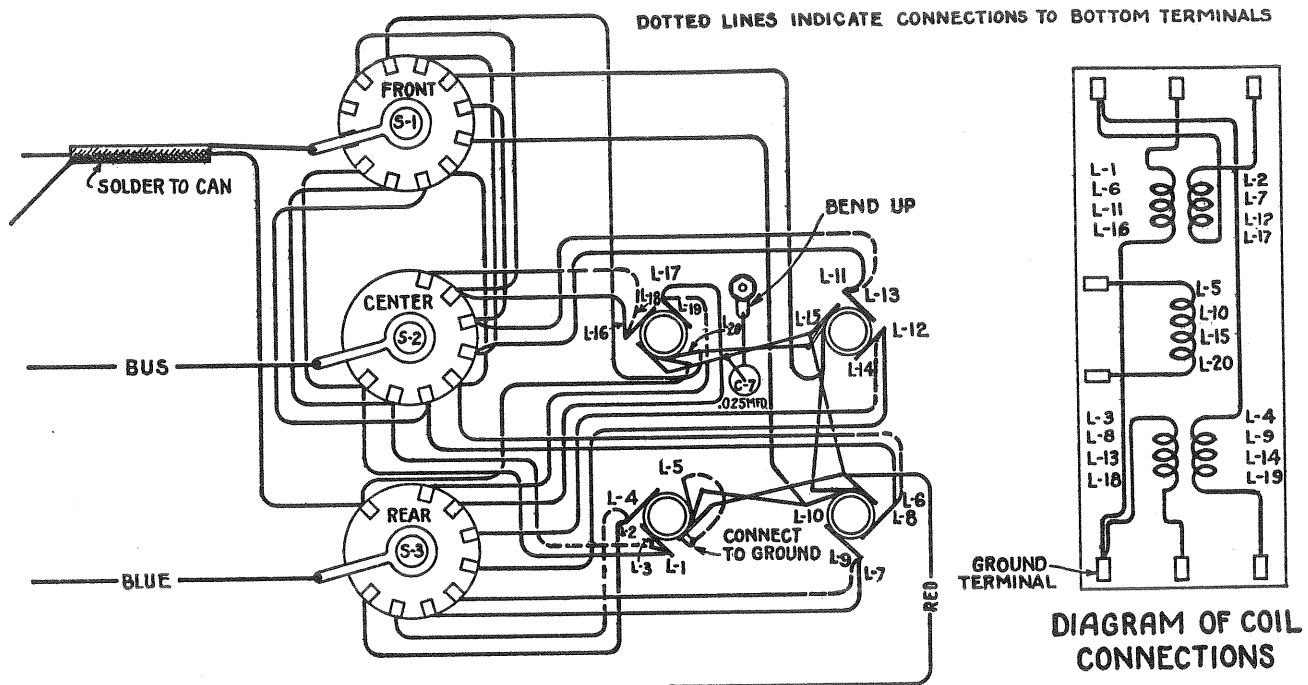


Figure 1—Coil and Switch Assembly

## REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
7918	Base — Coil mounting base — Complete — With bushings and terminal.....	\$0.22	5159	Resistor — 2,200 ohms — Carbon type — ¼ watt (R4)—Package of 5.....	\$1.00
4870	Capacitor—.025 mfd. capacitor (C7).....	.20	5158	Resistor—220,000 ohms—Carbon type—¼ watt (R5)—Package of 5.....	1.00
7914*	Coil—Oscillator coil (L1, L2, L3, L4, L5)....	1.06	7922	Scale—Attenuator switch dial scale.....	.16
7915*	Coil—Oscillator coil (L6, L7, L8, L9, L10)...	.80	7923	Scale—Modulator switch dial scale.....	.16
7916*	Coil—Oscillator coil (L11, L12, L13, L14, L15).....	.65	7921	Scale—Range switch dial scale.....	.20
7917*	Coil—Oscillator coil (L16, L17, L18, L19, L20).....	.65	7912	Shield—Coil assembly shield (top).....	.20
7911*	Shielded coil assembly—Complete with mounting unit.....	9.00	7913	Shield—Coil assembly shield (bottom).....	.30
7924	Dial—Tuning condenser drive dial scale....	.16	7919	Switch—Range switch—Leas coil, mounting base (S1, S2, S3).....	1.85
7903	Jack (J1).....	.45	7925	Switch—Single pole, double throw, toggle switch (S5, S6).....	.52
7920	Lead—Shielded lead.....	.18			

\*FOR REPLACEMENT PURPOSES ONLY—ITEM TO BE REPLACED MUST BE RETURNED WITH ORDER.

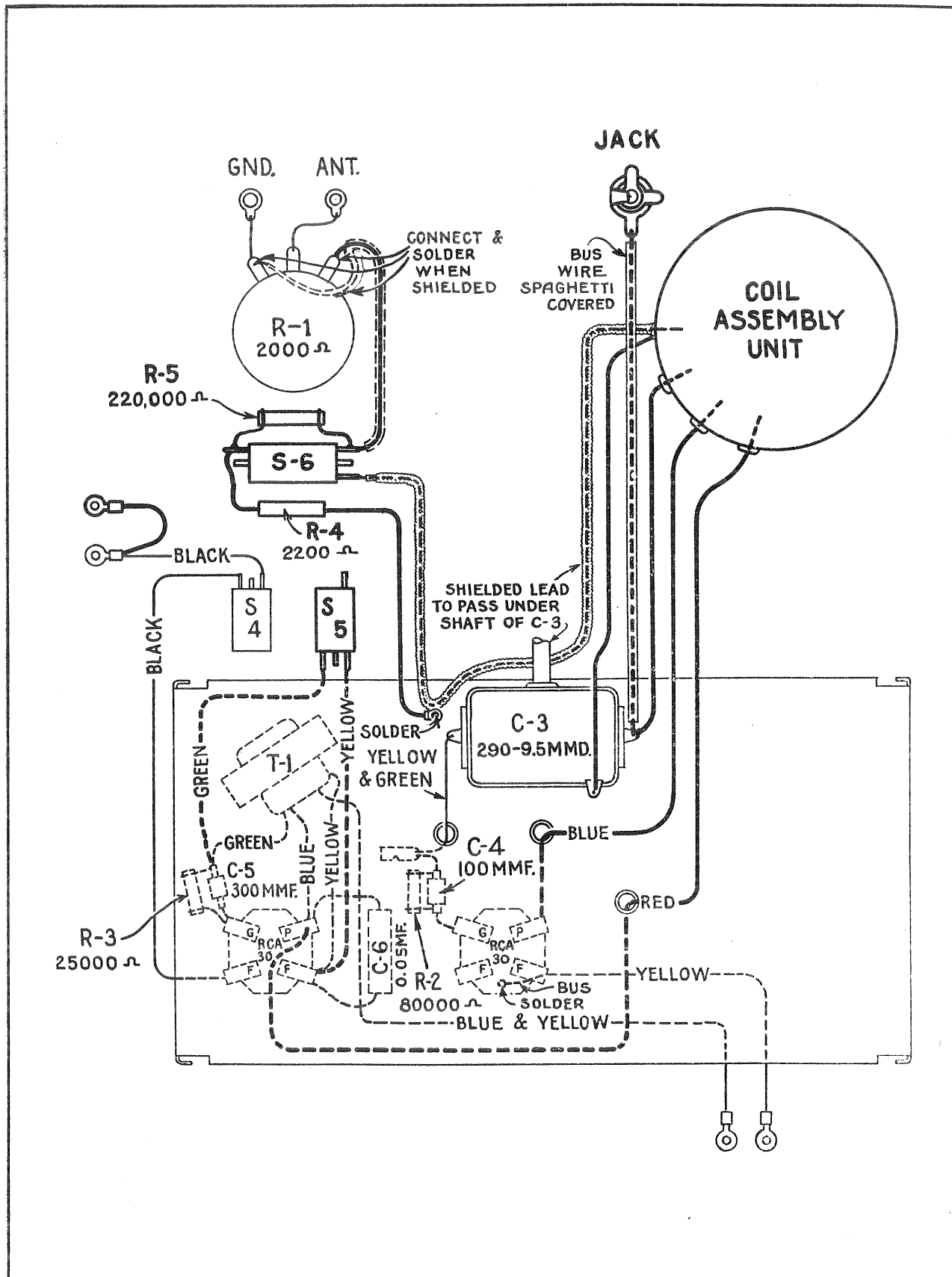
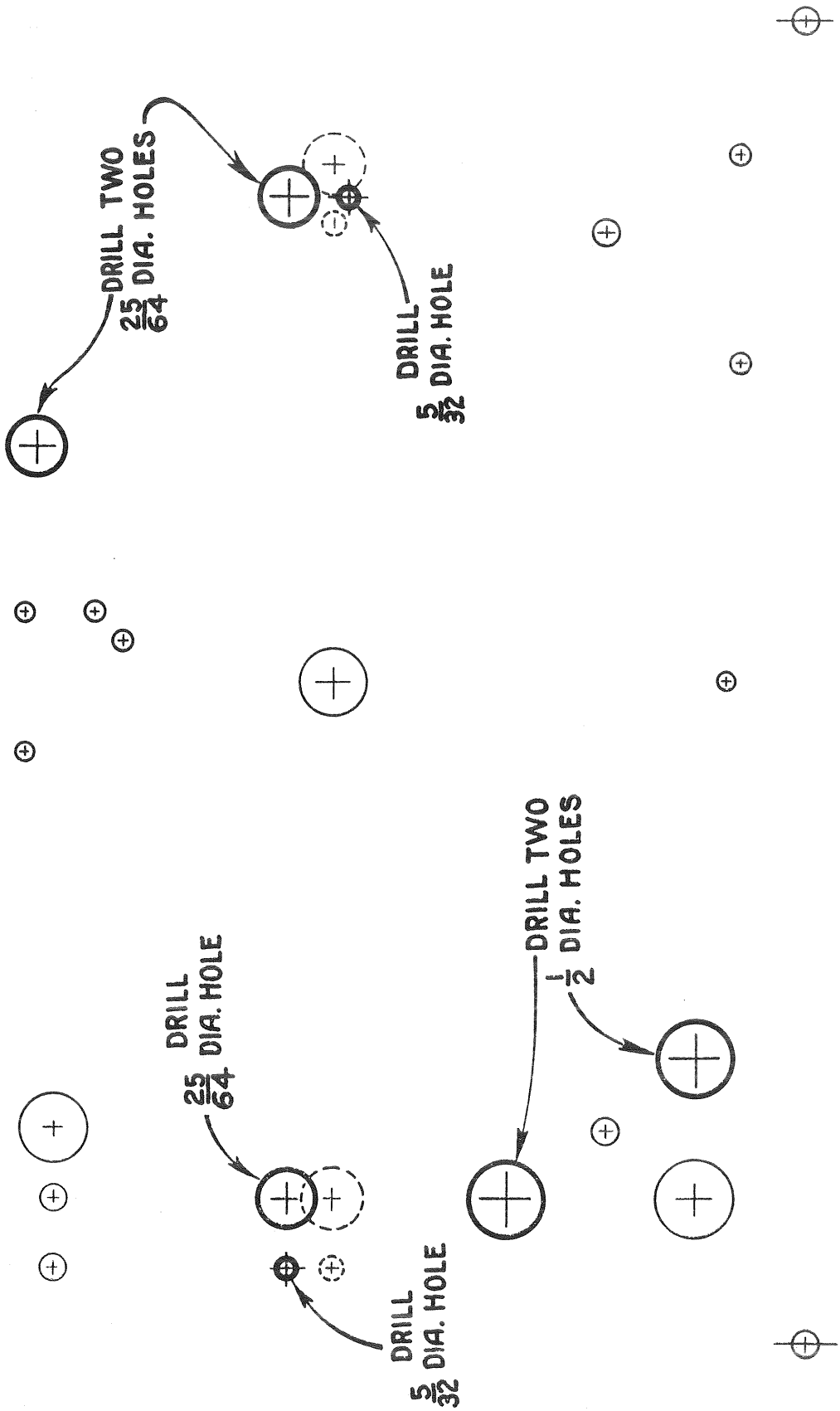


Figure 2—General Wiring Diagram

TRIM AROUND THIS OUTLINE →



BACK OF PANEL

*Cut out along boundary lines and attach to back of panel for drilling Template*

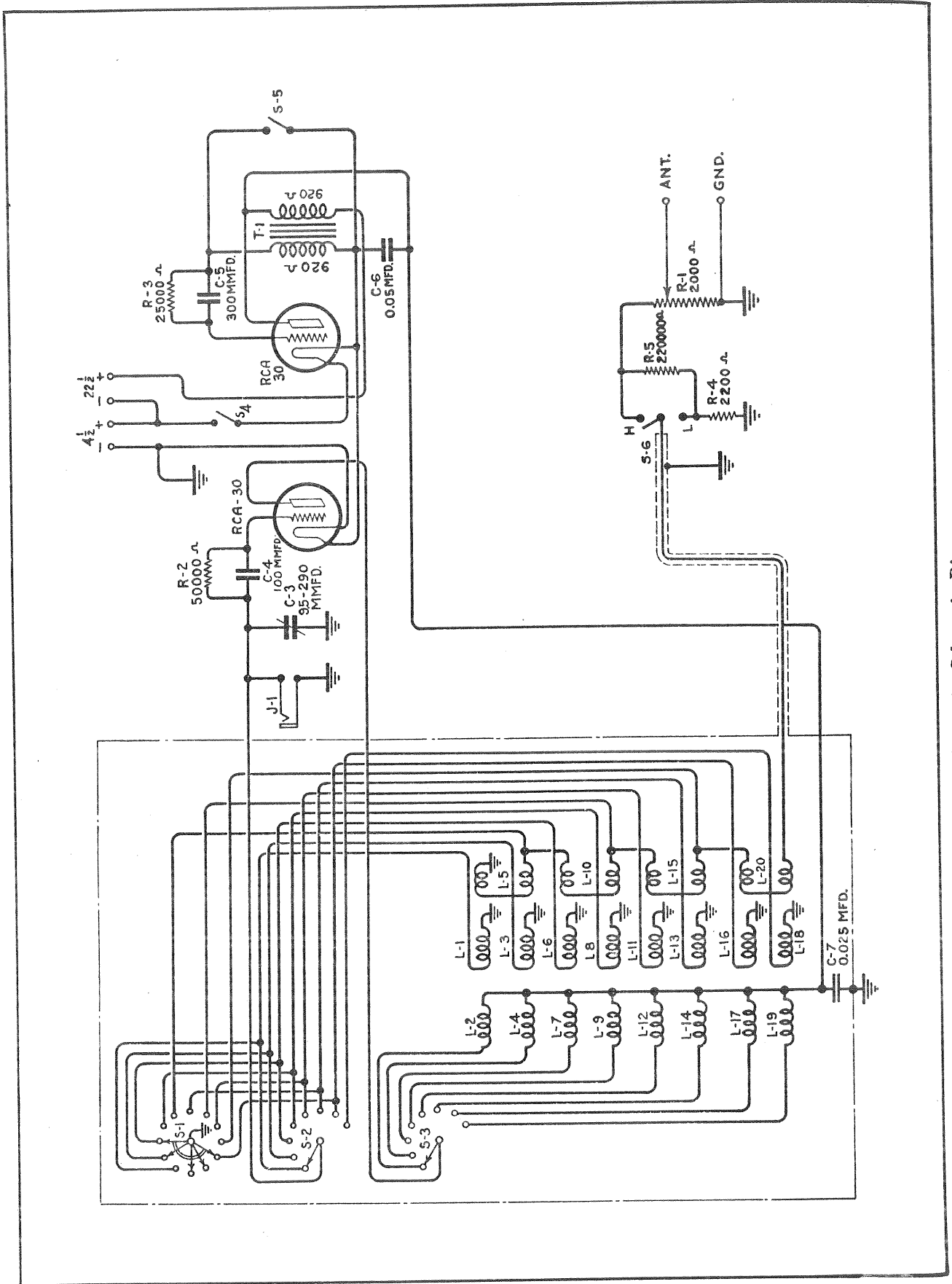


Figure 3—Schematic Diagram