

**installation
and
operating
instructions
for model HT-18
Variable Frequency Oscillator**



JANUARY 1950
RUN NO. 2
SEE CHASSIS STAMP

94X549

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

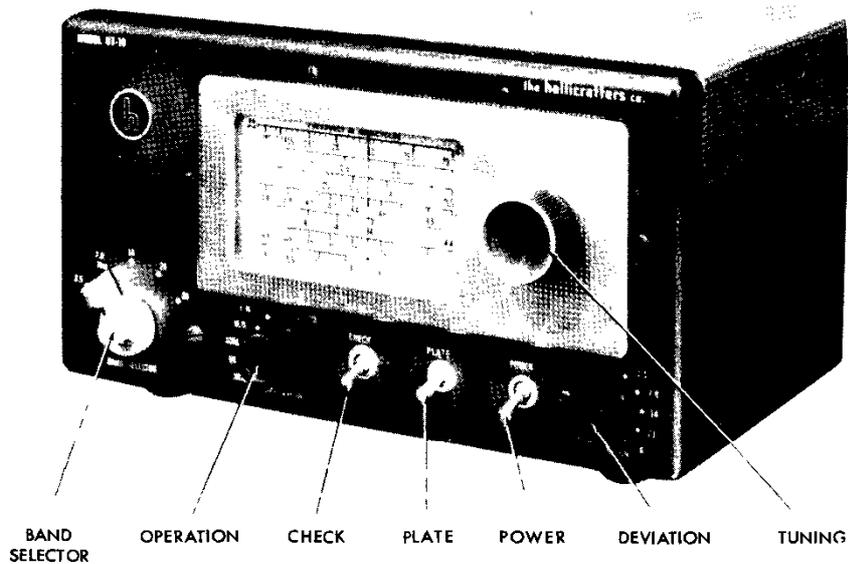


Figure 1. Front view, location of controls

92X865

DESCRIPTION

The Model HT-18 variable frequency oscillator is a calibrated exciter unit designed to drive either the oscillator stage or a buffer-amplifier stage of a conventional transmitter. Band switching permits rapid band changing on the amateur bands between 3.5 mc and 29.7 mc. Operation with narrow band frequency modulation is included for all frequencies covered by the unit. A high gain pre-amplifier provides adequate gain to handle high impedance crystal or dynamic microphones. The amount of deviation for narrow band FM is controlled by means of a five position DEVIATION control. The deviation ratio is 0.4 at a 3000 c.p.s. modulation frequency or 1200 c.p.s. either side of the center frequency, provided the DEVIATION control is positioned correctly. Audio response is essentially flat from 150 to 4500 c.p.s.

Crystal control is provided for by three 80

meter crystals which may be switched into the circuit with the OPERATION switch.

The CHECK switch turns on the V.F.O. unit only, so that the transmitter frequency may be preset before going on the air.

Keying is accomplished in the oscillator circuit enabling the use of "break-in" operation. Terminals are provided for interconnecting the unit with the receiver and transmitter control system for single control or push button operation.

The power supply for the V.F.O. unit is self contained and operates from a 105-125 volt 50/60 cycle a-c source. The power consumption is 75 watts. The power output at a 72-ohm termination is at least 4 watts from 3.5 mc to 21.0 mc and a minimum of 2.5 watts in the 28 mc band.

INSTALLATION

There are four connections to be made to completely set-up the HT-18 variable frequency oscillator. All connections are located on the rear apron of the chassis.

1. RELAY and KEY TERMINAL STRIP - For c-w operation, connect a key across terminals 4 and 5 as indicated; for strictly phone operation connect a jumper between terminals 4 and 5. If the transmitter and receiver are relay controlled refer to Fig. 2. for suggestions as to the use of terminals 1, 2, and 3 of this terminal strip. Other uses may be made of the section of the PLATE switch reserved for external switching if relays are not used in the installation.

2. OUTPUT TERMINAL STRIP - The unit has been designed to operate with a 72-ohm cable, which may be coaxial or ribbon type line. Refer to Fig. 3. for recommended connections at the transmitter end of the line. When using an unterminated line as in the case of feeding a crystal stage, avoid lengths that are multiples of a quarter wave length in the amateur bands. In general a six foot coaxial

cable made with polyethylene insulation has worked well on all frequencies. If the cable is reactive with link coupling on the 28 mc band, showing up as excessively low drive at the transmitter, connect a small variable condenser (approx. 100 mmf) in series with the center conductor of the cable at the VFO unit or between the ground end of the link coil and ground at the transmitter.

3. MIC. CONNECTOR - A standard shorting type microphone connector has been used to accommodate the popular microphone plugs. Use only a crystal or high impedance microphone. A low impedance microphone may be matched by coupling to the V.F.O. unit thru a step-up audio transformer. A microphone need only be connected when operating with narrow band FM.

4. POWER PLUG - After making all necessary connections, the power plug may be connected to the power source. Make sure of the voltage and frequency of your power source; it must be 105-125 volts, 50/60 cycle alternating current (AC).

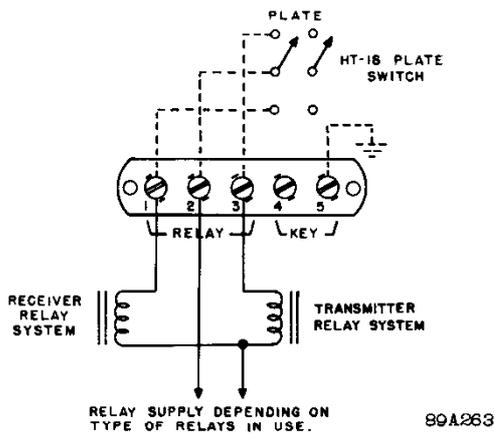


Figure 2. External relay connections

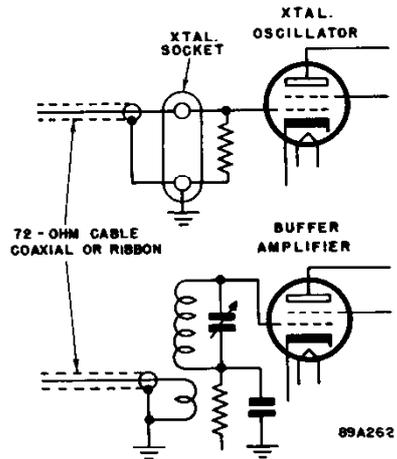


Figure 3. Methods of coupling exciter unit to transmitter

OPERATION

Set handles on the CHECK and PLATE switches at their down positions. Set POWER switch in up position and allow unit a few minutes to reach operating temperature.

V.F.O. Operation - Set OPERATION switch at M.O., BAND SELECTOR control for the band of frequencies required to obtain the desired output frequency from the final amplifier stage of transmitter being driven by the HT-18. For example, if a doubler stage follows the HT-18 unit, then the HT-18 output will have to be one-half the frequency of the final amplifier stage, etc. Referring to Fig. 4, you will note that there are five calibrated scales showing the output frequency of the V.F.O. unit. These five scales indicate carrier frequency when the transmitter being driven does not have a frequency multiplier stage. In addition to the five fundamental scales, there are three scales which are multiples of the 6.8 to 7.4 mc. scale. The harmonic scales indicate carrier frequency only when the output of the HT-18 is in the 6.8 to 7.4 mc. band. When the transmitter being driven has a doubler stage use the H-2 scale, a tripler stage use the H-3 scale, or a quadrupler or two doubler stages use the H-4 scale. To set the V.F.O. unit to the receiver frequency, set the CHECK switch handle at

CHECK (Up) and tune exciter to receiver frequency. After a check return the switch to its normal (Down) position. The PLATE switch handle must be down when setting frequency. To transmit set the PLATE switch at PLATE. If the transmitter is relay controlled this switch can control the entire operation.

Crystal Control Operation - Plug in from one to three 80 meter crystals in the sockets provided. The sockets are accessible through the hinged cover of the unit. Set the OPERATION control to the XTAL number corresponding to the socket containing the desired crystal. Set the BAND SELECTOR control for the band of frequencies required to obtain the desired output frequency from the final amplifier stage of the transmitter being driven. For example, if a doubler stage follows the HT-18 unit, then the exciter unit output will have to be one-half the frequency of the final amplifier stage, etc. Set the tuning control to the frequency of the V.F.O. unit output. This will be either equal to the crystal frequency for 80 meter output or some multiple of the crystal frequency on the higher frequency bands. Use the CHECK switch to locate the crystal frequency with the receiver and the PLATE switch for standby control as described for V.F.O. operation.

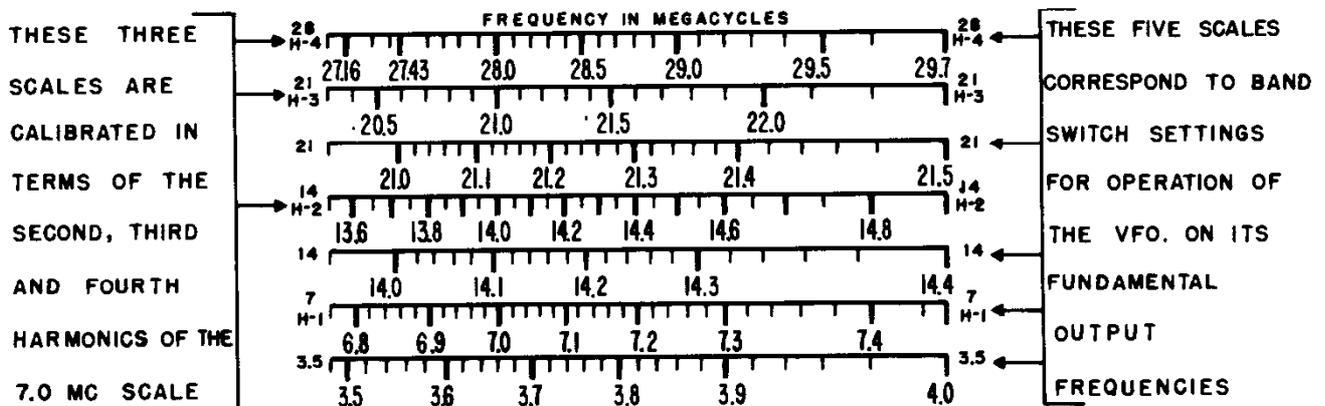


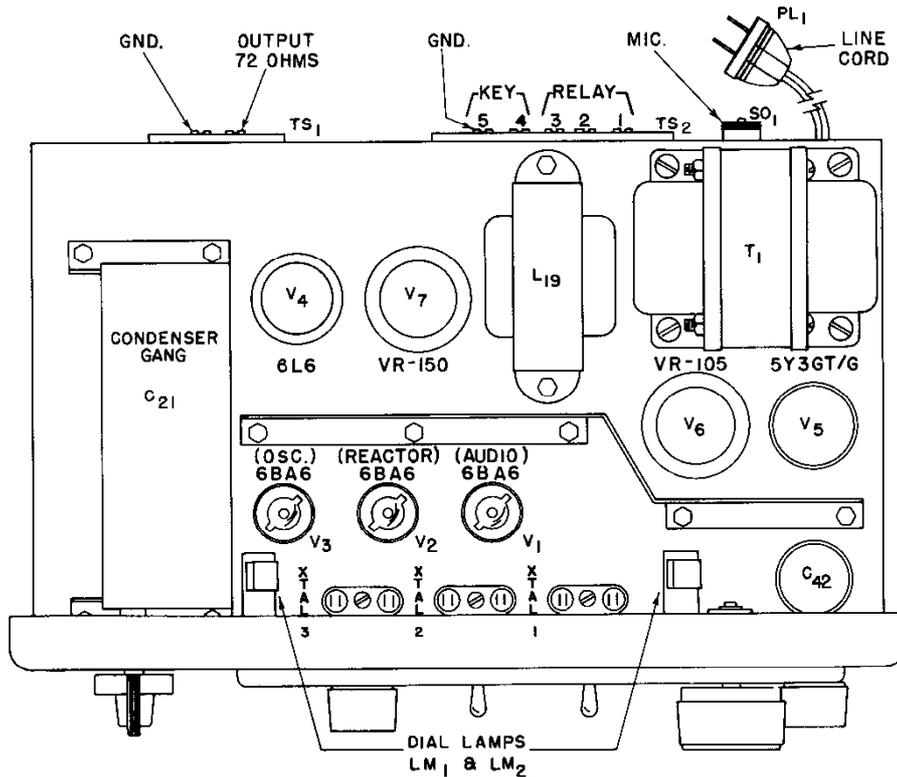
Figure 4. Dial scale calibrations

Narrow Band FM Operation - Set up the controls as described for V. F. O. operation and check the operation of the entire transmitter. When satisfactory c-w operation is established set the OPERATION control at FM and DEVIATION control to correspond to the band in which the final amplifier is tuned. The deviation setting is important as it provides the required frequency shift. The gain of the audio system in the HT-18 has been

adjusted to provide full modulation when microphones having output levels of -56 db or better are used. Nearly all crystal and communication type dynamic microphones can provide this output level. Moving about the band is accomplished as described for V.F.O. operation, however, it is not necessary to reset the OPERATION control to M.O. each time a new channel frequency is established.

SERVICE INFORMATION

Tube Complement-Refer to Fig. 5. for tube location.



TUBE TYPE	FUNCTION
6BA6	Oscillator
6BA6	Speech Amplifier
6BA6	Frequency Modulator
6L6	Power Amplifier
OD3/VR-150	Voltage Regulator
OC3/VR-105	Voltage Regulator
5Y3GT/G	Rectifier

Pilot Lamps - The two pilot lamps are accessible through the hinged cover. Replace with 6-8 volt, 150 milliamperes lamps or if green tinted lamps are desired refer to the parts list for Hallicrafters stock number.

Restranging Dial Cord - Restranging with 30 lb. test dial cord or fish line. Tie one end of a 30 inch length of line to the wire hook and follow the stringing path outlined in Fig. 6 ending at the spring. To position the pointer, close the gang and line up the pointer with the left hand dial index lines of each scale. It would be well to check the dial calibration against a known standard frequency as a final check on the pointer position.

Figure 5. Top view of chassis, location of component parts

92C322-A

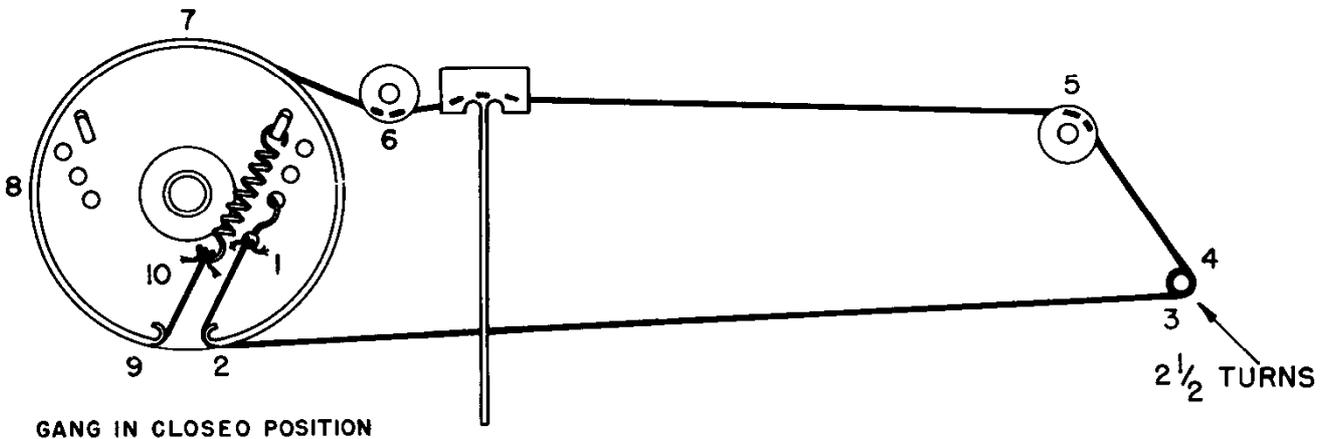


Figure 6. Dial stringing detail

Alignment -

Equipment required:

1. Calibrated signal generator or frequency meter covering 3.5 to 30 mc.
2. Receiver capable of tuning 3.5 to 30 mc.
3. 72-ohm dummy load or 10 watt lamp.
4. Insulated screw driver.

Procedure - Connect dummy load to the OUTPUT terminal strip. Set OPERATION switch at M.O., and pointer to right hand index line. Make following adjustments as indicated in the chart below using CHECK switch in CHECK Position:

Refer to Figure 7. for location of trimmers.

BAND SELECTOR POSITION	SIGNAL GENERATOR AND RECEIVER FREQUENCY	ZERO BEAT WITH TRIMMER	PEAK OUTPUT WITH TRIMMER
3.5	4.0 mc.	1	2
7.0	7.425 mc.	3	4
14	14.4 mc.	5	6 and 7
21	21.5 mc.	8	9 and 10
28	29.7 mc.	11	12 and 13

Circuit Voltages - Refer to the schematic diagram, Fig. 9., for pertinent circuit voltages necessary to check power supply operation. The voltages shown are based on an a-c source voltage of 117 volts.

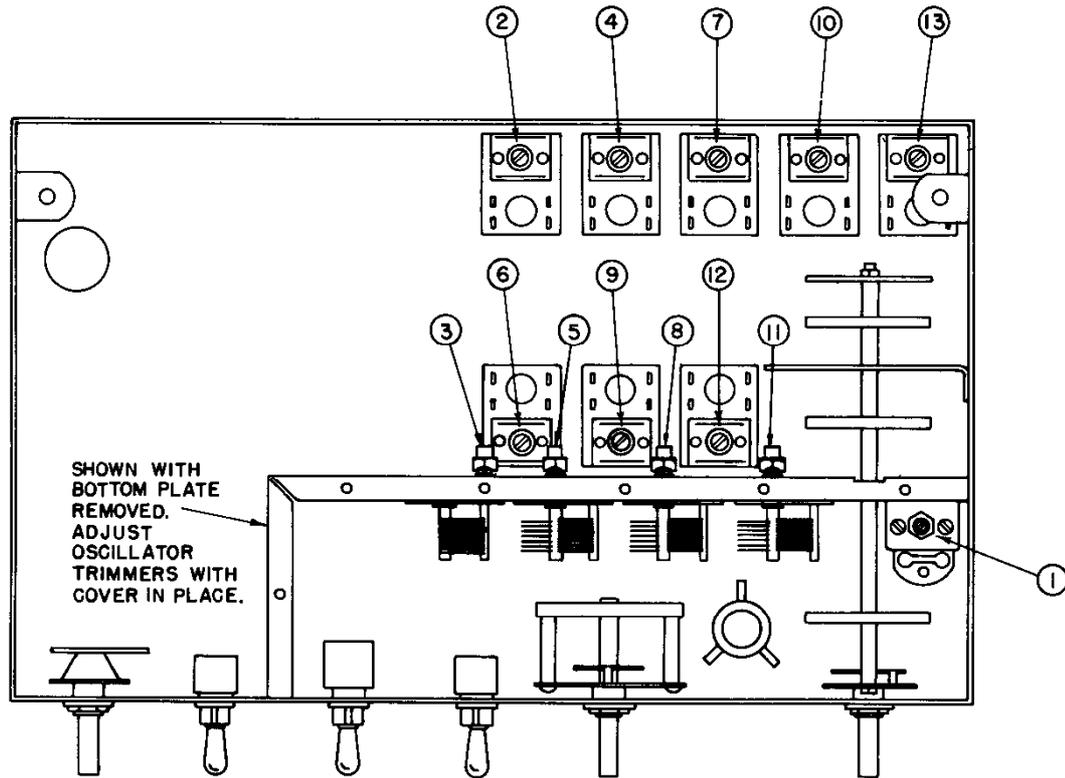


Figure 7. Location of alignment adjustments

REPLACEMENT PARTS LIST

RESISTORS			CAPACITORS		
REF. NO.	DESCRIPTION	STOCK NO.	REF. NO.	DESCRIPTION	STOCK NO.
R-1	2.2 MEGOHM, ±W, CARBON	RC2DAE225M	C-1	.02 MFD., TUB. PAPER, 400V.	46AW203J
R-2	1 MEGOHM, ±W, CARBON	RC20AE105M	C-2.5, 10, 26,		
R-3	220,000 OHM 10%, ±W, CARBON	RC20AE224K	32, 41, 43, 44	.01 MFD., TUB. PAPER, 400V.	46AW103J
R-4	100,000 OHM 10%, ±W, CARBON	RC20AE104K	C-3, 12	39 MMF., MICA, 500V.	CM20A390K
R-5	39,000 OHM 10%, ±W, CARBON	RC2DAE393K	C-4	6 MMF., CERAMIC, 500V.	CC210K060D
R-6	18,000 OHM 10%, ±W, CARBON	RC20AE183K	C-6, 23, 24	470 MMF., MICA, 500V.	CM20A471M
R-7	56,000 OHM 10%, ±W, CARBON	RC20AE563K	C-7	330 MMF., MICA, 500V.	CM20A331K
R-8	470,000 OHM, ±W, CARBON	RC2DAE474M	C-8	100 MMF., CERAMIC, 500V.	CC35NG101J
R-9	1.5 MEGOHM, ±W, CARBON	RC2DAE155M	C-9	300 MMF., CERAMIC, 500V.	47A166
R-10	8200 OHM 10%, ±W, CARBON	RC2DAE822K	C-11	160 MMF., MICA, 500V.	CM20A161J
R-11	560 OHM 5%, ±W, CARBON	RC2DAE561J	C-13, 19	68 MMF., CERAMIC, 500V.	CC35CG680J
R-12, 13, 14	33,000 OHM 10%, ±W, CARBON	RC20AE333K	C-14, 16, 18,	VARIABLE AIR CAPACITOR	48A195
R-15	39,000 OHM 10%, ±W, CARBON	RC2DAE393K	20		
R-16	10 OHM, ±W, CARBON	RC2DAE100M	C-15, 17	120 MMF., CERAMIC, 500V.	CC40CG121J
R-17	180,000 OHM 10%, ±W, CARBON	RC2DAE184K	C-21	MAIN TUNING GANG CONDENSER	48C191
R-18	470 OHM 10%, ±W, CARBON	RC4DAE471K	C-22	VARIABLE AIR CAPACITOR	48A190
R-19	4700 OHM ±W, CARBON	RC20AE472M	C-25	1000 MMF., CERAMIC, 350V	47A165
R-20	1200 OHM 10%, ±W, CARBON	RC30AE122K	C-27-40	6800 MMF., MICA, 500V.	CM40A682M
R-21	3000 OHM 10%, ±W, CARBON	248G302E	C-28	47 MMF., MICA, 500V.	CM20A470K

CAPACITORS (Cont'd)

REF. NO.	DESCRIPTION	STOCK NO.
C-29,30,31,33 34,35,38,39	PART OF COIL ASSEMBLY	
C-36	15 MMF., MICA, 500V.	CM20A150K
C-37	10 MMF., MICA, 500V.	CM20A100K
C-42	20-20 MFD., ELECTROLYTIC 450V.	45A077-I
C-45	.05 MFD., TUB. PAPER, 200V.	46AU503J

COILS AND TRANSFORMERS

REF. NO.	DESCRIPTION	STOCK NO.
L-1,4	R.F. CHOKE, 2.5 MH	53A033
L-2,15,18	R.F. CHOKE, 165 UH	53A013
L-3	OSCILLATOR PLATE COIL	51A977
L-5	PLATE COIL, 3.5 MC WITH C-33	51B942
L-6	PLATE COIL, 7 MC WITH C-34	51B943
L-7	PLATE COIL, 14 MC WITH C-35	51B944
L-8	PLATE COIL, 21 MC WITH C-38	51B946
L-9	PLATE COIL, 28 MC WITH C-39	51B947
L-10	GRID COIL, 3.5 MC	53A119
L-11	GRID COIL, 7 MC	53A109
L-12	GRID COIL, 14 MC WITH C-29	51B948
L-13	GRID COIL, 21 MC WITH C-30	51B949
L-14	GRID COIL, 28 MC WITH C-31	51B950
L-16	OSCILLATOR COIL	51B951
L-17	TRI-TET CATHODE COIL	53A110
L-19	FILTER CHOKE, 10 H, 85 MA.	56B084
T-1	POWER TRANSFORMER, 115V. 50-60 CY.	52B144

LAMPS

REF. NO.	DESCRIPTION	STOCK NO.
LM-1,2	PILOT LAMP, .15 AMP, 6-BV.	39A019

SWITCHES

REF. NO.	DESCRIPTION	STOCK NO.
SW-1	DEVIATION SWITCH	60B301
SW-2	OPERATION SWITCH	60B300
SW-3	BAND SWITCH	60C289
SW-4	CHECK SWITCH, 2 CKT	60A327
SW-5	PLATE SWITCH, DPDT	60A277
SW-6	POWER SWITCH, SPST	60A281

SOCKETS

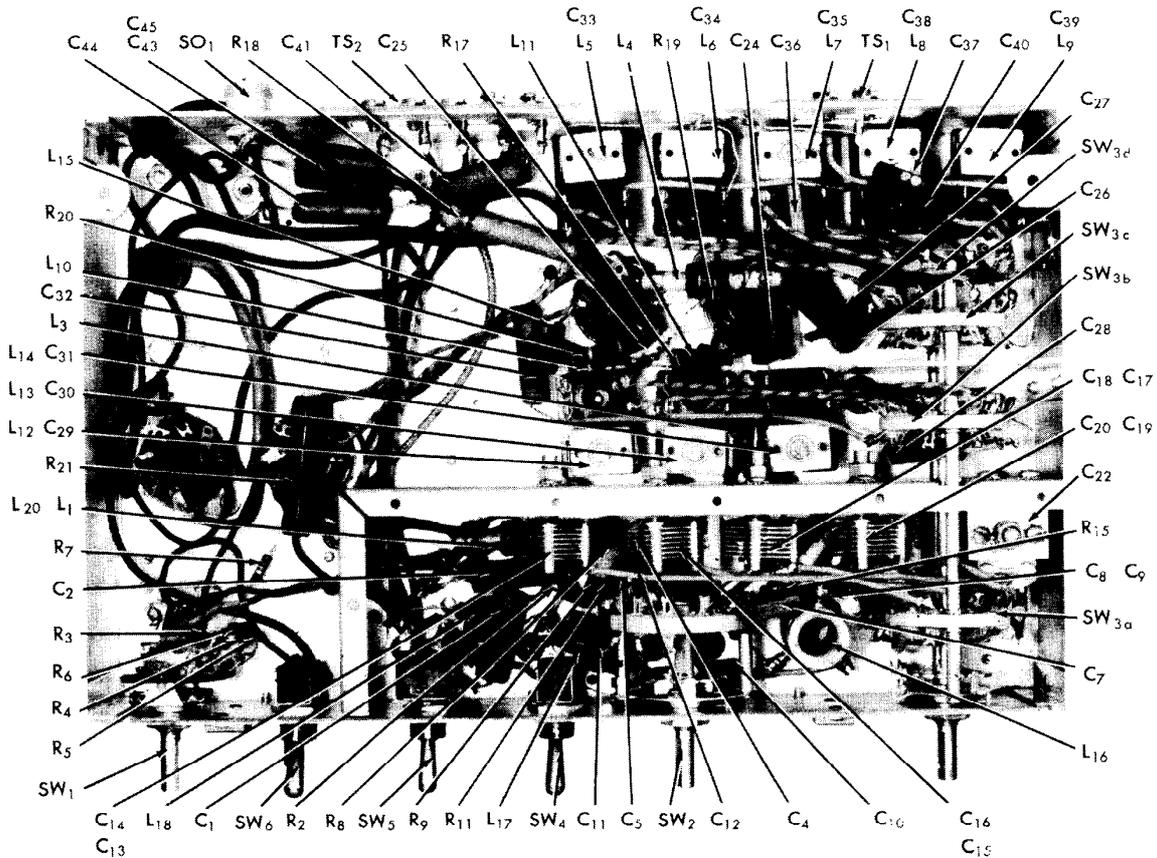
REF. NO.	DESCRIPTION	STOCK NO.
S0-1	CONNECTOR, MIC.	29A127
	SOCKET, OCTAL	6A035
	SOCKET, MIDGET	6A193
X-1,2,3	SOCKET, CRYSTAL HOLDER	6A286

TUBES

REF. NO.	DESCRIPTION	STOCK NO.
V-1,2,3	TYPE 6BA6, SPEECH AMP., MODULATOR AND OSCILLATOR	90X6BA6
V-4	TYPE 6L6, POWER AMPLIFIER	90X6L6
V-5	TYPE 5Y3GT/G, RECTIFIER	90X5Y3GT/G
V-6	TYPE 0C3/VR-105, VOLTAGE REGULATOR	90XVR-105
V-7	TYPE 0D3/VR-150, VOLTAGE REGULATOR	90XVR-150

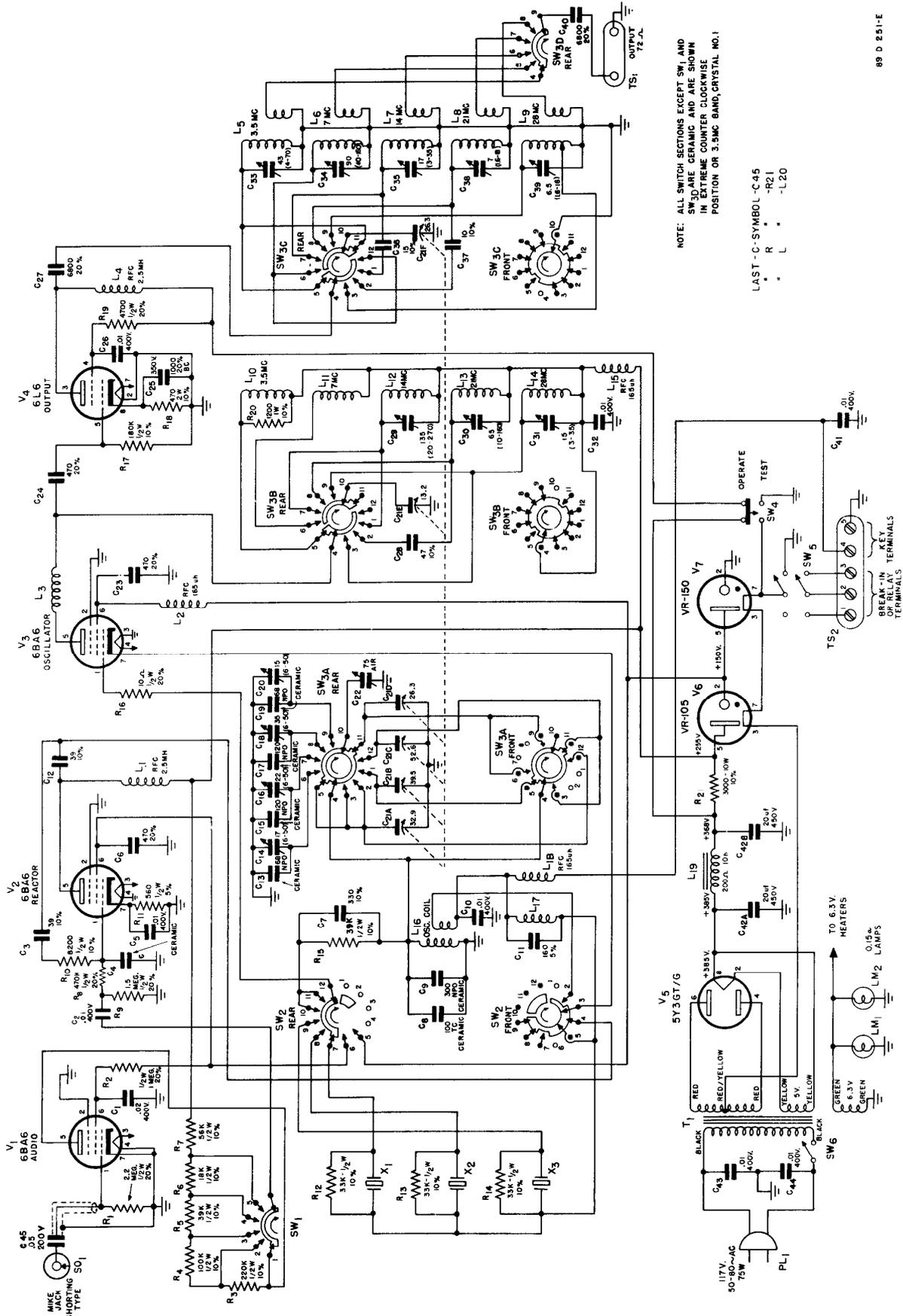
MISCELLANEOUS COMPONENTS

DESCRIPTION	STOCK NO.
BAND SWITCH KNOB	15B088-1
MAIN TUNING KNOB	15A047
OPERATION AND DEVIATION KNOB	15A049
DIAL POINTER	82A133
TUBE SHIELD, SPRING RETAINER	69A160
DIAL SCALE	22D191
ESCUTCHEON	7C049
Line CORD, 6 FT.	87A078



92X864-A

Figure 8. Bottom view of chassis, location of component parts.



89 D 251-E

Figure 9. Schematic diagram