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**INSTRUCTION MANUAL**

**SSB - 100**

**Exciter / Transmitter**

ELDICO OF NEW YORK, INC.  
72 East Second Street  
Mineola, L. I., New York

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## WARRANTY

### Eldico Amateur Equipment

Eldico of New York warrants this amateur product, manufactured by Eldico, to be free from defective material and workmanship, and agrees to remedy any defect or to furnish a new part in exchange for any part of any unit of its manufacture, which under normal installation, use and service, discloses such defect, provided:

1. Buyer has completed and returned to Eldico promptly following his purchase, the registration card included in the instruction manual furnished with the equipment.
2. Notice of the claimed defect is submitted in writing, to Eldico, within 90 days from the date of the original purchase.
3. Upon receipt of shipping instructions from Eldico, the unit is delivered by the owner to Eldico intact, for examination, with all transportation charges prepaid to our factory.
4. The examination discloses, in our judgement, that the product is thus defective.

This warranty does not extend to any Eldico product which has been subjected to misuse, neglect, accident, excessive moisture or exposure, incorrect wiring not our own, improper installation, or use in violation of instructions furnished by us, nor to units which have been repaired, rewired, or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by Eldico of New York without charge to the owner. This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products. In no event shall Eldico have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

**IMPORTANT!** It is necessary that the business reply card included herewith be filled out and mailed to the Company promptly in order for this guarantee to be effective.



SSB-100  
EXCITER-TRANSMITTER

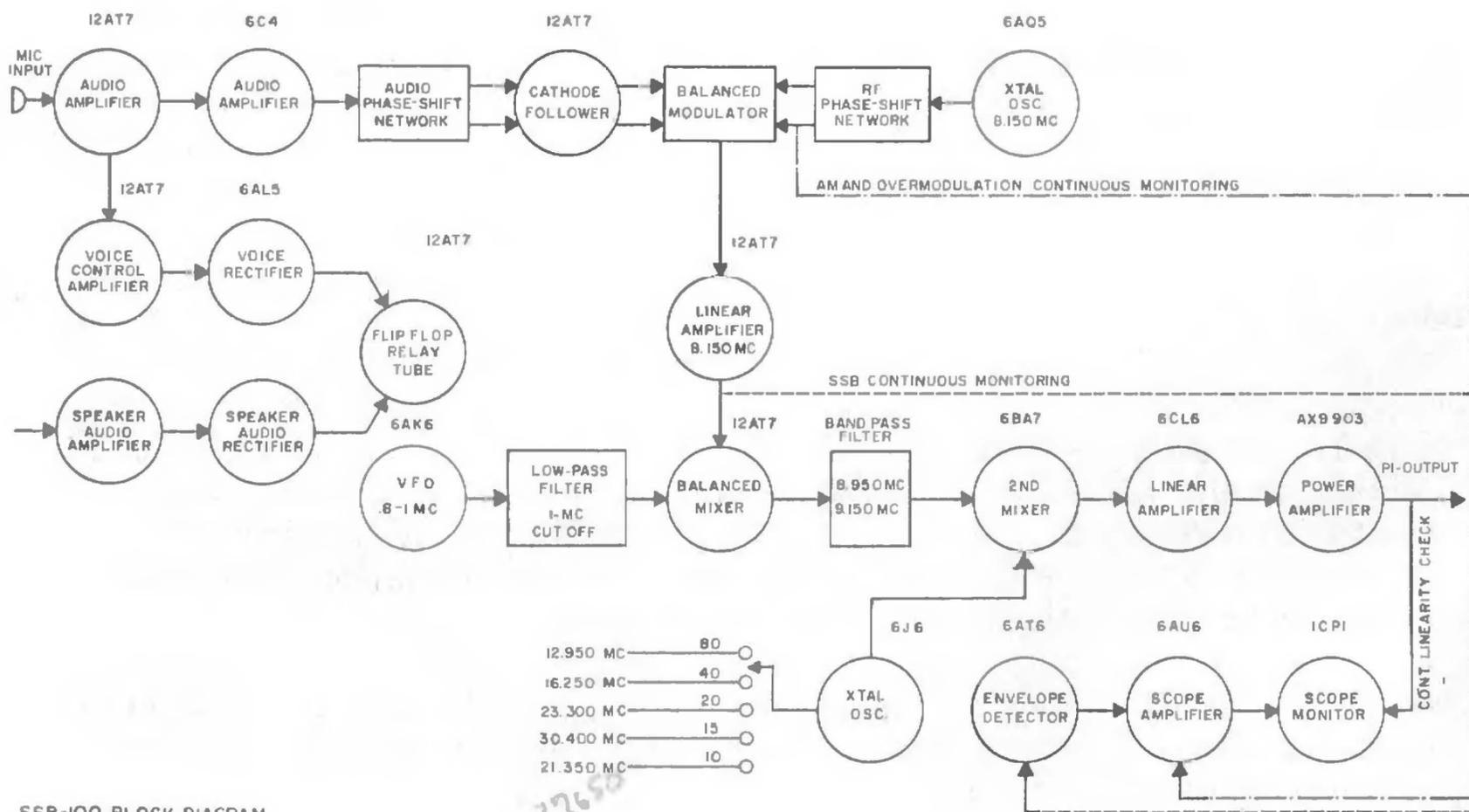


FIGURE NO. 1

SECTION I  
DESCRIPTION

1. GENERAL

The Eldico Model SSB-100 Exciter/Transmitter is the most complete and versatile piece of equipment ever built for the amateur. Together with a communications receiver, it provides plenty of talk power on the air to make a full size amateur station. Great pains have been taken to provide the utmost in convenience of operation, frequency stability, adequate suppression of carrier and unwanted sidebands, plus overall rugged construction for dependable operation. It is completely self-contained, virtually free of television interference due to its advanced design, and has talk power equal to transmitters of many times its size.

2. FEATURES

(a) **AUDIO CHARACTERISTICS.** The audio circuit is designed for high impedance crystal or dynamic microphones (-55 db) and the response is shaped to provide maximum communication efficiency with minimum band-width requirement.

(b) **VOICE BREAK-IN.** For voice break-in, the SSB-100 uses a one shot multivibrator circuit (flip-flop) for improved positive switching action. It has essentially zero attack time and a release time of .8 seconds. Minimum voltage to trip the voice break-in with maximum sensitivity is .008 volts. Separate controls for VOX gain and QT gain are provided on the rear of the chassis.

(c) **AUDIO PHASE-SHIFT NETWORK.** Covers the range from 300 to 3000 cycles for 90 degrees relative phase shift. Maximum deviation from 90 degrees phase shift within specified range is plus or minus 1.5 degrees; alignment frequencies are 326 cps, 490 cps, 1306 cps and 1960 cps, infinite attenuation frequencies are 440 cps, 1225 cps and 2500 cps.

(d) **BALANCED MODULATORS.** Two matched pairs of diodes are used in a low impedance circuit for longer life and better stability of carrier and sideband suppression.

(e) **VFO.** Covers the fundamental range from 800 kc to 1000 kc on all bands. Harmonic attenuation after built-in low pass filter is 60 db or more.

(f) **DIAL ACCURACY.** Plus or minus 2 kc after calibration. Calibration control on front panel provides a maximum deviation of plus or minus 3 kc from the center frequency.

(g) STABILITY. Drift is less than 50 cycles over any 10 minute period after three minutes warm-up. This new standard of stability was made possible through the use of a permeability tuned oscillator on a comparatively low frequency, and careful selection of the best components available.

(h) LINEAR AMPLIFIER. Uses a dual tetrode in a pi-network output circuit. Ample plate dissipation (40 watts) for rated power output together with excellent high frequency characteristics makes this tube the ideal choice for this particular application. The high power sensitivity of this tube makes Class AB1 operation feasible with little or no sacrifice in efficiency, yet with remarkably improved linearity.

(i) OSCILLOSCOPE. Internal oscilloscope continuously monitors linearity of all stages between audio amplifier and output terminal and gives positive indication of percentage of modulation on AM as well. It is a necessity in properly tuning an SSB transmitter and assures top performance of the transmitter on the air. The scope is intensity-modulated by voice to make the brightness approximately proportional to the deflection, to give good visibility of the pattern and to prevent burnout of the screen.

### 3. SPECIFICATIONS

<u>Frequency Range: *</u>	<u>Band</u>	<u>Range (mc)</u>
	80 meters	3.80 to 4.00
	40 meters	7.10 to 7.30
	20 meters	14.15 to 14.35
	15 meters	21.25 to 21.45
	10 meters	28.50 to 28.70
<u>Tube Line Up</u>	20 tubes including two rectifiers, one voltage regulator, one oscilloscope and one power amplifier.	
<u>Power Rating **</u>	DC Average input	SSB 100 watts
		AM 60 watts
		CW 60 watts
	Peak Envelope Power input SSB	144 watts
	Peak Envelope Power output SSB	100 watts

\*Note: Frequency range with crystals provided. Other 200 kc frequency ranges available by inserting proper crystal.

\*\*Note: The above ratings are with a line voltage of 115 volts AC measured across the AC input of the transmitter and will be considerably less if the line voltage drops below 110 volts due to reduced filament and plate voltage on the various amplifiers, which tends to reduce their gain.

<u>Power Input</u>	115 volts AC, 60 cycles, 300-400 watts.
<u>Types of Emission</u>	Continuous Wave, Amplitude Modulation, Higher Sideband, Lower Sideband.
<u>Audio Characteristics</u>	Input - 10 mv for rated PEP, response 300-3000 cps plus or minus 3 db, 40 db down at 100 cps and 6000 cps. Noise and hum 40 db or more below PEP level.
<u>Harmonics and Spurious Responses</u>	
Spurious mixer products	40 db or more down
Third order distortion products	35 db or more down
Carrier suppression	40 db or more down
TV interference suppression	40 db or more down, second harmonic. 60 db or more down, higher order harmonics.
<u>Frequency Stability</u>	Output frequency (including VFO and two crystal oscillators) within 500 cycles after three minutes warm-up.
<u>Dial Accuracy</u>	Plus or minus 2 kc after calibration over entire band.
<u>Output Impedance</u>	52 ohms nominal. Can be loaded into 40-200 ohms approximately.
<u>Size</u>	12-1/2" high by 21" wide by 13-1/2" deep.
<u>Weight</u>	85 pounds.
<u>Finish</u>	Black wrinkle Enamel.
<u>Cabinet</u>	Table model with 19 inch panel, having provision for relay rack mounting.

## SECTION II

### INSTALLATION

#### 1. UNPACKING

Open packing carton carefully to prevent damage to the equipment. Check the packing material carefully for small packages. Inspect the transmitter

for mechanical damage and try the various front panel controls to see that they operate properly. Any claim for damage must be filed immediately with the transportation company and the original packing material should be preserved.

## 2. EXTERNAL CONNECTIONS

(a) ANTENNA. The transmitter is equipped with an 83-1R coaxial receptacle on the rear of the chassis for use with coaxial cable output. Balanced antennas should be connected through an antenna tuner or balun coil, which in turn is fed with coaxial cable from the transmitter for best results.

CAUTION: Do not operate the transmitter unless you make sure that a proper external load is connected to it. Otherwise, excessive RF voltages may develop in the final which might cause breakdown of components.

(b) MICROPHONE. A standard microphone connector is provided on the front panel. A high impedance crystal or dynamic microphone (-55db) may be used. Typical microphones are Electro-Voice 915 or 647 or Astatic D-104. If lower level microphones are used, additional microphone gain can be achieved by placing a 14 mfd, 25 volt, electrolytic condenser from Pin 8 to ground to tube V-1, 12AT7 (across resistor R-6, 1800 ohm, 1/2 watt).

(c) KEY. A standard closed circuit jack is provided on the front panel for connection of the key. The key should be disconnected except for cw operation.

(d) VOX-QT. No external connection is necessary for voice break-in operation except where a speaker is used. Connect either a 4 ohm line to terminals 7 and 8, or a 500 ohm line to terminals 6 and 8 on terminal strip TMS-1 from the receiver audio output stage. See Fig. 4. Potentiometer R-42, QT gain, adjusts the sensitivity of the speaker quieting circuit and potentiometer R-11, Vox gain, adjusts the sensitivity of the voice control break-in circuit. Potentiometer R-58 sets the threshold sensitivity of the Vox circuit. Proper adjustment of these controls can be found under "Operation."

(e) POWER. The transmitter must be powered from a 115 volt, 60 cps source.

(f) FUSE. The fuse is an extractor type fuse post located on the rear of the chassis near the left hand corner. Use only 5 ampere fuse.

## SECTION III

### OPERATION

#### 1. CONTROLS

(a) **POWER ON-OFF.** This switch turns on the filaments as well as the DC voltage supplies.

**CAUTION:** Never work on the transmitter without making sure that the power switch is off. Even with the control switch in the STANDBY position, the high voltage supplies remain operative.

(b) **CONTROL SWITCH.** In the STANDBY position, the B-plus from the audio section is removed and blocking bias applied to cut off the final and the carrier oscillator. The CALIBRATE position removes the blocking bias from the carrier oscillator so that the complete transmitter is operative except for the audio amplifier and the final. The TRANSMIT position applies B-plus to the audio circuit and cuts the blocking bias on the final to normal operating bias.

(c) **OPERATION SWITCH.** This switch is used to select the desired mode of operation. In the CW position, the audio section of the transmitter is turned off and the carrier oscillator blocking bias is brought to the key jack. In the MANUAL position, the transmitter is turned on and off by means of the control switch (STBY-XMIT). Vox makes the voice control circuit operative and the QT is intended for loudspeaker operation with voice control. It prevents the voice control circuit from being tripped through the loudspeaker so that only the operator's voice can turn on the transmitter. (See Section III, Item 5.)

(d) **EMISSION SWITCH.** The emission switch selects the desired mode of emission. In the A-3 position, one pair of diodes in the balanced modulator is turned off to produce double sideband amplitude modulation with carrier, whereas in the LSB and HSB positions, either the Lower Sideband or the Higher Sideband with the carrier suppressed is selected through reversing of the audio polarity from the audio phase shift network.

(e) **BAND CHANGE.** This switch is used to select the desired amateur band. The amateur bands of 80, 40, 20, 15 and 10 meters can be selected by this control.

(f) **FREQUENCY MEGACYCLES.** This selects the desired operating frequency in each amateur band. The frequency should be read from the scale which corresponds to the band on which band change switch is set. The scales read directly in megacycles and divisions thereof.

(g) AUDIO GAIN. The audio gain controls the gain of the second audio stage and should be set for proper scope pattern. See "Section IV, Item 10." It is normally set from 4 to 7 for crystal microphones and slightly higher for high impedance dynamics.

(h) GRID TUNING. This control tunes the grid of the final. The capacity of the tuning condensers increases clockwise. It should be tuned for maximum current as indicated by the plate meter.

(i) PLATE TUNING. This condenser resonates the final plate circuit. It should be tuned for minimum plate current (dip) as indicated by the meter.

(j) PLATE LOADING. The loading control should always be set at the maximum clockwise position (minimum loading) when first tuning up the transmitter. It should be then gradually turned counter-clockwise and the plate tuning redipped until the final is properly loaded as explained in the next chapter.

## 2. TUNING PROCEDURE

The Eldico SSB-100 is easily tuned and operated on AM (Amplitude Modulation), SSSC (Single Sideband Suppressed Carrier) and CW (Continuous Wave). Once the unit is properly tuned and set up for operation, it is only necessary to place the EMISSION switch in the desired position for operation on AM, LSB, HSB, or CW.

Use the following procedure to tune the transmitter:

### (a) AM TRANSMISSION.

1. Switch power on, operation switch on MAN, control switch on STANDBY, Emission switch on A-3. (Dial lights and meter should be illuminated ) Wait about two minutes until all the tubes have warmed up before taking any further action.

2. Select the desired band and frequency.

3. Set control switch on XMIT, AUDIO GAIN closed. The plate current meter should now read plate current. Now tune the transmitter like any conventional AM transmitter by peaking the grid, dipping the plate and loading into the antenna. The plate current should be about 90 to 120 ma when the transmitter is properly tuned and loaded, and the off-resonance plate current should read about 20 ma higher.

4. Place EMISSION switch in AM, connect a microphone to the microphone input, adjust the microphone gain for proper scope pattern and you are ready to go on the air.

## (b) SSSC TRANSMISSION.

1. After the above tuning procedure for AM is accomplished, no special tuning is required for SSSC (Single Sideband Suppressed Carrier) operation.
2. Place EMISSION switch in either LSB (Lower Sideband) or HSB (Higher Sideband), talk into the microphone and adjust the audio gain for proper oscilloscope pattern. If VOX (Voice Break-in) is desired, place OPERATION switch in VOX; if speaker muting is desired, place OPERATION switch in QT.
3. Note: while either LSB or HSB can be used anywhere in the AM portion of the amateur bands, it is the present custom to use LSB for 80 and 40 meter operation and HSB on 20, 15, and 10 meter operation. Normally, the same sideband is used for both reception and transmission.

## (c) CW TRANSMISSION

1. After the tuning procedure for AM is accomplished, no special tuning is required for CW (Continuous Wave) operation.
2. Plug PL-55 connected to the key, bug, or electronic key into the CW jack located on the front panel. Place OPERATION switch in CW position, EMISSION switch in A-3 position. The transmitter is keyed in the conventional manner. Excellent keying without clicks plus the advantage of break-in operation is provided.
3. When the transmitter is used on A-3, LSB or HSB, the PL-55 plug must be removed from the CW jack or key must be locked in the closed position.

## 3. ADJUSTMENT OF ZERO SIGNAL PLATE CURRENT

Place EMISSION switch on LSB or HSB, Operation switch on MANUAL, Control Switch on XMIT, AUDIO GAIN closed. The zero signal plate current as indicated by plate meter should be between 30 and 50 ma. If the zero signal plate current is not between these values, it should be reset by means of bias adjustment potentiometer R-41 on the rear of the chassis (See Figure 4.) This adjustment is factory set and is usually not required. Difference in line voltage may occasionally be high enough to upset the original adjustment.

## 4. FREQUENCY CALIBRATION

Frequency readings will be more accurate if the transmitter is calibrated for each individual band. It should be checked against a 100 kc crystal

calibrator of good accuracy. The front panel calibration trimmer should be adjusted for zero beat with the calibrator on the following frequencies:

80 meters	3.9 Mc.
40 meters	7.2 Mc.
20 meters	14.3 Mc.
15 meters	21.3 Mc.
10 meters	28.6 Mc.

## 5. VOX-QT ADJUSTMENT

After making the connections as explained under "Installation", the VOX gain and QT gain (R-11 and R-42) have to be set up for proper balance for each particular installation. The following procedure should be followed for the best results:

Set the receiver at a convenient volume on some steady signal (broadcast station or amateur signal of good strength and quality). Place the OPERATION switch of the transmitter to the QT position. Then turn the control switch to XMIT. Now try to find the best balance by adjusting R-11 and R-42, so that your voice will readily start the transmitter, but the signal coming out of the speaker, does not. The microphone and the speaker, of course, should be left in the operating position while making these adjustments and the receiver has to be muted as soon as the transmitter goes on. Terminals 1, 2 and 3 on the TMS-1 terminal strip are especially provided for receiver muting purposes. These are connected to the voice relay and provide a single-pole, double-throw switch, with Terminals 1 and 2 open and 2 and 3 normally closed.

## SECTION IV

### THEORY OF OPERATION

#### 1. GENERAL

Refer to the block diagram of figure 1. Like some dual conversion receivers, the SSB-100 uses a variable low-frequency oscillator, a variable intermediate frequency, and a crystal-controlled high-frequency oscillator. The SSB-Signal is generated at 8.150 Mc, then heterodyned against the low-frequency VFO in a balanced mixer. Since the VFO covers the range from 800 kc. to 1000 kc., the sum frequencies come out between 8.950 and 9.150 Mc. These frequencies are fed through a band-pass filter, thereby eliminating all unwanted mixer products. After going through this band-pass filter, the signal is fed into a second mixer stage, together with the signal from the high frequency crystal-oscillator. The difference between the crystal-oscillator output-frequency and the SSB-Signal coming from the band-pass filter gives the actual output-frequency of the transmitter. The signal is then amplified in two linear amplifiers to the proper power level.

The correct crystal-coil combinations are selected by the band switch from the front panel.

## 2. EXCITER SECTION

The Eldico SSB-100 transmitter uses a phasing type exciter on 8.150 Mc. The audio signal coming from the preamplifiers V-1 and V-2, is fed into a 90 degree audio phase-shift network, the output of which provides two audio-components with a constant phase-difference of 90 degrees. After impedance transformation in a cathode-follower stage, V-3, these two audio-components are fed into two pair of crystal-diode balanced modulators where they are properly combined with two RF-components 90 degrees apart coming from the RF-phase-shift network. This configuration gives complete cancellation of the carrier and one or the other side-band, depending on whether the leading audio phase is combined with the leading RF-phase and the lagging audio-phase with the lagging RF-phase or vice-versa. Thus this circuit provides simple means for instantaneous switching of sidebands by just reversing the polarity from the audio-phase-shift network in SW-3 and SW-4. On A-3, one of the two audio-components is simply shorted out and the pair of balanced modulators still receiving audio is unbalanced by means of a potentiometer R-27 switched into the circuit through SW-6 and SW-7. Thus, the amount of unbalance is exactly controlable and set at the factory for the proper amount of carrier in the A-3 position.

## 3. VOICE BREAK-IN

The voice break-in circuit in the SSB-100 is unique insofar as it uses a dual triode V-7 in a one-shot multivibrator circuit. This has the advantage over conventional circuits, in that the time constants of the circuit are almost independent of the amount of control-voltage developed by the 6AL5 Audio-Rectifier, and the two channels coming from the speech-amplifier and from the receiver output stage are completely separated from each other. V-5 serves as an amplifier for the two channels whereas V-6 is used as an audio-rectifier to furnish the trip-voltage for V-7. V-7-1 is used as the relay-control tube. This section of the tube is normally cut off, since the other section receives positive voltage to the grid through R-63 and R-55, thereby drawing heavy plate current and cutting the other section off through the voltage-drop in the common cathode resistor R-60. As soon as a signal coming from the speech amplifier reaches V-6-1, a positive voltage is impressed on the grid of V-7-1, which starts conduction now, thereby causing a voltage-drop through R-61. This in turn reduces the voltage on the grid of V-7-2, so that V-7-2 stops conduction and V-7-1 takes over, thereby closing the voice relay. This condition holds on until the positive grid bias on V-7-1 has discharged through R-54, C-40 being the charging condenser. As soon as the grid of V-7-1 reaches a certain low positive value, the plate

current starts to drop and the voltage drop through R-61 decreases, thereby increasing the positive grid voltage on V-7-2, so that the original condition is restored. If the circuit is properly set up for QT operation, the signal picked up by the microphone is amplified by V-1 and V-5-1 and rectified in V-6-2. Thus, normally V-7-1 would start conduction. Since part of the receiver output is also fed into V-5-2, V-6-2 rectifies this signal and V-7-2 conducts even heavier, so that V-7-1 remains cut off, in spite of the fact that some positive voltage is applied on its grid. It becomes obvious now that the transmitter cannot be turned on by speaker noise unless the circuit is unbalanced, either by the operator's voice, by overload in either one of the two channels, or by improperly setting up the two gain controls.

#### 4. RF- OSCILLATOR

A 6AQ5(V8) is used in a modified Pierce circuit as a crystal-controlled oscillator on a 8.150 Mc. for generating the necessary RF-power for the balanced modulators. The tuned plate circuit of the tube is link coupled into the RF-phase-shift network.

#### 5. 8.150 Mc. AMPLIFIER

A 12AT7 (V-4) is used as a grounded-grid cathode-follower combination, thus providing low input and output impedance and at the same time bringing the output of the balanced modulators up to a higher power level.

#### 6. VFO

A permeability tuned high-Q circuit is used in conjunction with a 6AK6 (V-9) for maximum frequency stability. The screen voltage for the oscillator is obtained from a voltage regulator tube V-10. For CW-operation, the grid of the tube receives blocking bias through R-68 from the negative bias supply. The VFO, incidentally, proved to have better keying characteristics than could be obtained by keying any of the crystal-oscillators used in the transmitter. The plate of the variable oscillator works into the low-pass filter which has 1 Mc. cutoff and provided about 60 db. attenuation to the second harmonic. This is to prevent the generation of spurious signals in the 12 AT7 (V-16) balanced mixer stage. Condenser C-51 may be adjusted with a screwdriver from the front panel, to make up for minor errors in calibration.

## 7. BALANCED MIXER

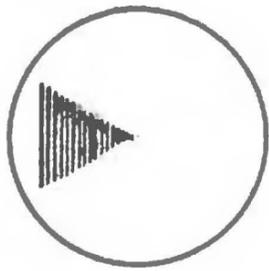
The VFO-signal and the SSB-signal coming from the 8.150 Mc. amplifier are combined in a 12AT7 (V-16) balanced mixer. It uses two unbalanced input circuits and a balanced load circuit. The 8.150 Mc. signal is fed in parallel to both tubes, since it is applied across the common cathode resistor R-99 and, of course, cancels out completely in the push-pull plate circuit. The VFO-signal, also only applied to the grid of one tube, looks like it is being applied to the two grids in push-pull, since the common cathode resistor makes the other section work like a phase inverter, so that the conditions for a balanced mixer are met. The plate circuit of the balanced mixer is part of the band-pass filter T-3, having a pass-band from 8.950 Mc. to 9.150 Mc. which is used as a variable intermediate frequency. The band-pass filter is used to eliminate all unwanted mixer products, which might otherwise lead to spurious radiation.

## 8. CRYSTAL OSCILLATOR AND SECOND MIXER

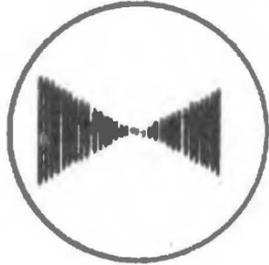
A parallel connected 6J6 is used as a high-frequency crystal-oscillator. It receives its plate voltage from the voltage-regulator tube V-10. Its plate output is coupled to the injection grid of a 6BA7 (V-17) mixer stage. It should be noted that the crystals used on 80 and 40 meters are of fundamental type, whereas on 20 meters and higher, overtone crystals are used. The crystal frequencies are selected in such a manner that the difference between the crystal and the intermediate frequency results in output on the desired band. The mixer plate circuit is broadly tuned to the center of the band being used and condenser C-97 is connected directly from the plate of the tube to ground to provide a low impedance path to ground for crystal-oscillator components showing up in the plate circuit.

## 9. LINEAR AMPLIFIERS

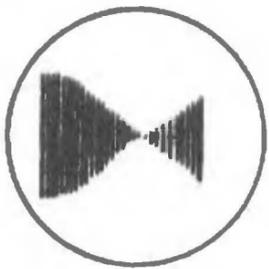
A 6CL6 (V-18) is used as a Class A amplifier to bring the low output of the 6BA7 up to the level required to drive the 9903 (V-19). The 9903 is a parallel connected twin tetrode, using a Pi-network output circuit and bridge-neutralization. Regeneration is reduced to the absolute minimum rigorous shielding, bypassing, and circuit layout. The amplifier does not show any sign of instability even when completely unloaded and unneutralized.



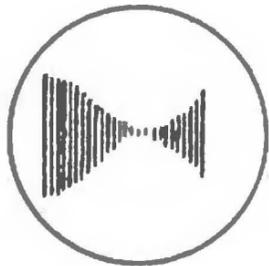
AM pattern, 100% modulation with good linearity.



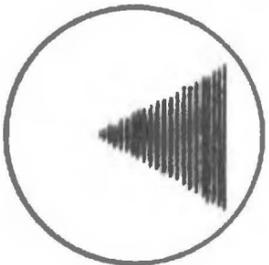
AM pattern, overmodulation with good linearity.



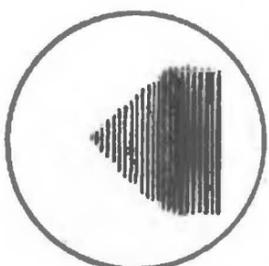
AM pattern, overmodulation with peak flattening.



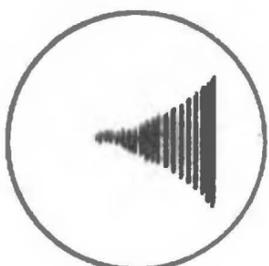
AM pattern, overmodulation with excessive bias on linear amplifier.



SSB pattern, transmitter properly adjusted.



SSB pattern, transmitter not properly loaded or excessive drive.



SSB pattern, excessive bias on linear amplifier.

OSCILLOSCOPE PATTERNS

FIGURE NO. 2

4-13

## 10. OSCILLOSCOPE

A RF-Signal coming from the V-19 Final Amplifier is fed to the vertical deflection plate of a 1CP1 oscilloscope tube (V-13). The input to the horizontal deflection plate is picked up in the cathode circuit of V-3 and then amplified in the deflection amplifier V-12 for AM operation of the transmitter. On single-sideband, an envelope detector has to be used since the envelope of the audio-signal feeding the balanced modulator is not in direct relation with the resulting RF-envelope and a worthless pattern would result. Therefore, a small part of the RF-signal coming from the 8.150 Mc. amplifier is fed into the cathode of 6AT6 (V-11) grounded grid triode, the amplified signal from the tuned plate circuit being fed into one diode of the tube and the resulting audio-envelope, after being amplified in V-12, is applied to the horizontal deflection plate of V-13. This results in trapezoidal patterns on both AM and single-sideband. It should be noted that overmodulation on AM does not increase the band width of this transmitter, provided that the linearity of all amplifiers is good. This is due to the fact that the AM signal is generated in a pair of balanced modulators and the carrier for AM is obtained by a small amount of unbalance. In the extreme case, this would result in a double sideband suppressed carrier signal. This signal would take exactly twice the spectrum of the single-sideband case, but the percentage of modulation with regard to the suppressed carrier would be in the order of several hundred per cent, depending on the amount of carrier suppression. However, such a signal would result in severe distortion at the receiver second detector unless some sort of exalted carrier reception is used. Thus, in order to keep distortion produced at the receiving end low, the modulation should not be allowed to go much in excess of a one hundred per cent on peaks.

## 11. POWER SUPPLY

The power supply consists of three separate supplies: a bias supply, a low voltage supply and a high voltage supply. The bias supply delivers 150 volts negative. The low-voltage supply furnishes the B-plus to all tubes except the final plate and the oscilloscope, which are fed from the high voltage supply, delivering an operating voltage of about 720 volts. A 5R4 (V-14) is used for the high voltage, whereas the low voltage uses a 5U4GA (V-15) and a selenium rectifier SR-1 for the bias. The low voltage supply delivers approximately 300 volts under full load. It should be noted that part of the voltage of the low voltage supply appears on the filaments in the exciter section in order to reduce hum caused by heater-cathode leakage. The proper amount of voltage is obtained through voltage divider R-96 and R-97 and is bypassed to ground by C-2.

SECTION V  
MAINTENANCE

1. TROUBLE SHOOTING

Some of the troubles most likely to occur in the transmitter are listed below, together with the symptoms and remedies.

<u>TUBE</u>	<u>SYMPTOM</u>	<u>CAUSE AND REMEDY</u>
V-1	No output, no scope deflection on both AM and SSB, voice break-in not working.	Bad tube, bad condenser or open resistor. Replace defective component.
V-2 or V-3	Symptoms as above, but voice break-in works.	Check V-2 and V-3, look for open or shorted transformer T1.
V-4 or V-8	No output, horizontal deflection of scope on AM only.	Bad tube V-4, open coaxial connector. Check with the receiver on 8.150 Mc. to see if the V-8 crystal oscillator is working. If not, readjust the slug of L-4 for easy starting of crystal and maximum AM carrier level. If no results are obtained, try new tube and check crystal.
V-9 V-16 through V-20	No output, horizontal deflection on both AM and SSB.	Try to find the VFO between 800 kc. and 1000 kc. by unplugging the coaxial in VFO chassis and bringing a lead from there close to the receiver antenna input. If nothing is heard, try new 6AK6 (V-9). If the VFO is found to work properly, the trouble may be anywhere between V-16 and V-20. If the transmitter works properly on some bands but not on others, the trouble is in V-20. Try to realign the crystal oscillator plate coil of whatever band may not work. Tune the coil to the point where the crystal will readily start oscillation. If the crystal oscillator is found to be working properly by checking with a receiver on the various frequencies, try new tubes in

- V-16, V-17 and V-18. When the crystal oscillator is not heard on any of the five frequencies, replace V-20.
- V-19 Plate meter goes offscale or does not read at all. No grid bias or excessive grid bias. Check bias potentiometer R-41 and Condenser C-32. If the two checked ok, measure bias from terminal 5 of the power supply terminal strip TMS-2 to ground. If a bias of about 150 volts is obtained, the relay may be defective. If not, check C-75 and C-77.
- V-11 Transmitter seems to work normally, but no pattern on SSB, only bright spot. Replace V-11,
- V-12 No pattern on SSB and AM, only bright spot, transmitter performance otherwise ok. Bad 6AU6, replace V-12.
- V-13 No indication on scope screen at all or very distorted pattern, otherwise normal operation. Bad 1CP1 or static charge on screen surface. In the second case, operation will be back to normal after a few minutes. In most cases, the picture can be immediately restored to a normal pattern by wiping the screen surface with a piece of cloth.
- V-15 or V-16 ✓ 7 Voice break-in not working. Try new tubes.
- Fuse Meter illumination and scale illumination not working. Transmitter completely dead. Replace fuse (3AG, 5 Amps), but check the rectifier tubes for open filaments first, because they have a tendency to short out the plate transformer if one of their filaments is open.

## 2. FACTORY SERVICE

If the trouble is of more complex nature and has different symptoms or the remedies given do not cure it, it is suggested that a letter be sent to the factory giving the following information:

- (a) Item, type number and serial number of the equipment.
- (b) From whom the item was purchased, and the date of delivery.
- (c) The date on which the item was placed into service and the number of hours of service.
- (d) Nature of trouble and the cause if known.
- (e) Remarks.

If necessary, authorization will be given to return the unit to the factory for servicing. The unit should be properly packed for shipment and shipped prepaid by Railway Express, insured for full value. If the unit is with Eldico's standard warranty, Eldico will repair or replace without charge, any equipment, parts, or accessories which are defective as to design, workmanship or materials. If not within the guarantee, parts will be billed at amateur costs, and labor at \$3.50 per hour.

When ordering replacement parts, you should direct your order to the factory and furnish the following information:

- (a) Quantity required
- (b) Part name and number (taken from parts list in instruction manual)
- (c) Eldico's type number, item, and serial number of the equipment.
- (d) Remarks

### 3. REALIGNMENT OF THE EXCITER SECTION

It may become necessary after a certain period of time that the exciter section has to be realigned. The audio-phase-shift network should not require adjustment for the life of the unit, therefore, it is suggested not to touch the audio phase-shift network unless there is serious reason to believe that it is out of alignment.

(a) **ADJUSTMENT OF THE CARRIER SUPPRESSION.** The carrier balance is adjusted by means of R-28 and R-32 and these controls may be set by listening to the output frequency and then tuning for ~~the~~<sup>min</sup>imum signal in a receiver.

(b) **ADJUSTMENT OF THE SIDEBAND SUPPRESSION.** For realignment of the audio balance and the RF-phase-shift network a good quality audio-oscillator and an oscilloscope are required. The audio-oscillator should be set at 1225 cps at an output of about 15 mv with the audio-gain in the transmitter wide open. Then a dummy load should be connected to the transmitter

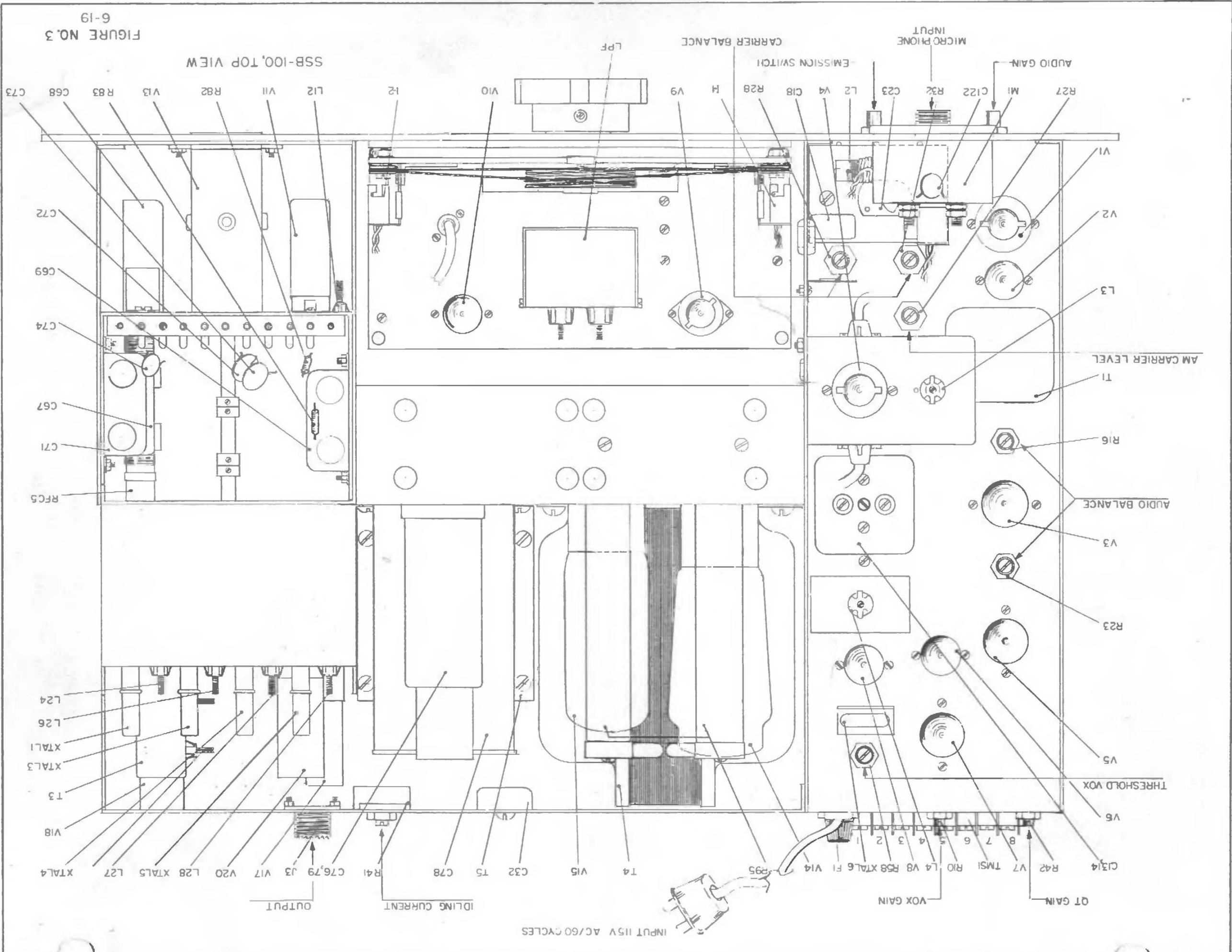
and enough of the output coupled directly to the vertical plates of the oscilloscope to give a reasonable vertical deflection. Then, the sweep-oscillator should be synchronized at some convenient fraction of 1225 cps. The grid of the final should be tuned to the point where the tube draws about 120 ma of plate current when properly loaded. Then the two potentiometers, R-23 and R-28, should be adjusted for minimum ripple of the scope-pattern. In other words, the transmitter output should look very much like an unmodulated RF-carrier, if the input from the audio-oscillator is a pure sine wave. When making adjustments, frequent switching back and forth between the two sidebands should be used to make sure that the best compromise is found. The trimmers, C-13 and C-14, on the RF-phase-shift network, may also require adjustment. It is suggested that after one of the trimmers has been moved, the carrier suppression should be checked, because this adjustment will also affect the carrier-suppression to some extent.

(c) ADJUSTMENT OF AM CARRIER LEVEL. The amount of AM carrier is controlled by the potentiometer R-27. If the off resonance plate current of the transmitter when properly tuned for AM is not between 100 to 140 ma, R-27 should be readjusted for the right amount of AM carrier. It should be set so that the off resonance plate current on the 80 meter band is 130 ma. This setting will provide the correct carrier modulation ratio for AM operation.

#### 4. REPLACEMENT - VFO DIAL CORD

Disconnect the wires of the VFO-cable from the terminal-board TMS-2. Then remove the 12 Phillips head screws and all knobs except the VFO knob from the front panel. Disconnect the leads from the final plate meter and the front panel should come off without any trouble. Remove defective dial cord and put new cord on, according to figure 7. Reassemble the unit, set the receiver up to exactly 900 kc. by means of a crystal-calibrator or other frequency-standard, couple some signal from the VFO to the receiver and zero-beat the VFO with the calibrator. Then set up the pointer to be exactly in line with the middle of the scale (3.9 Mc).

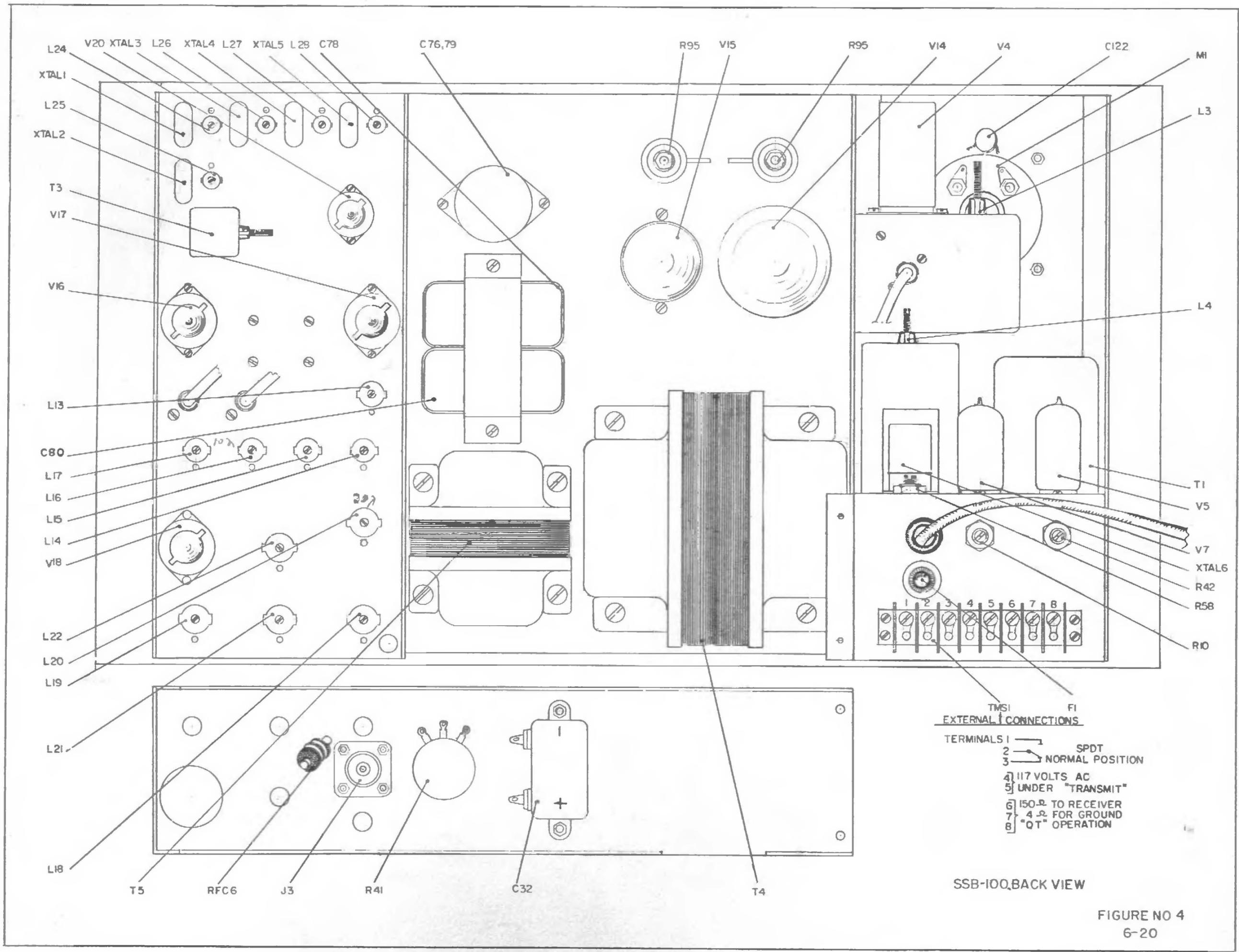
INPUT 115V AC/60 CYCLES



SSB-100, TOP VIEW

FIGURE NO. 3

6-19



TMS1 F1  
EXTERNAL CONNECTIONS

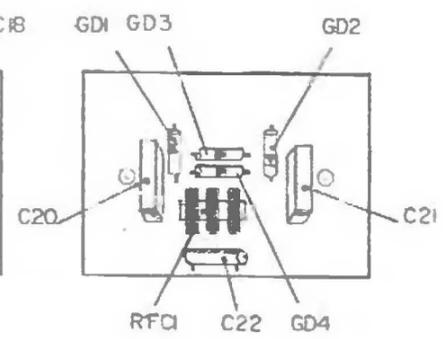
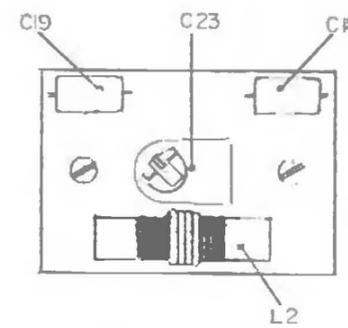
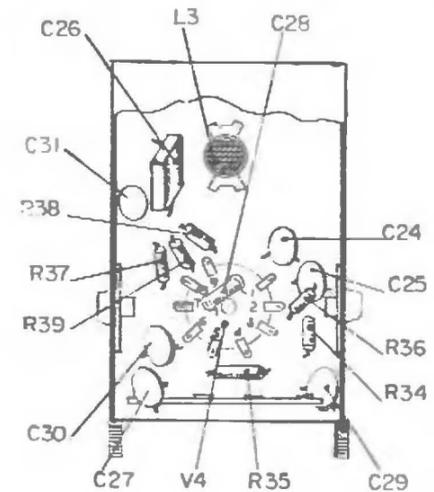
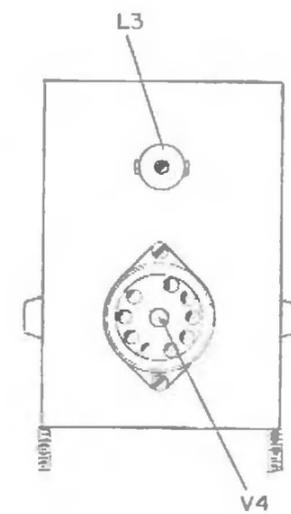
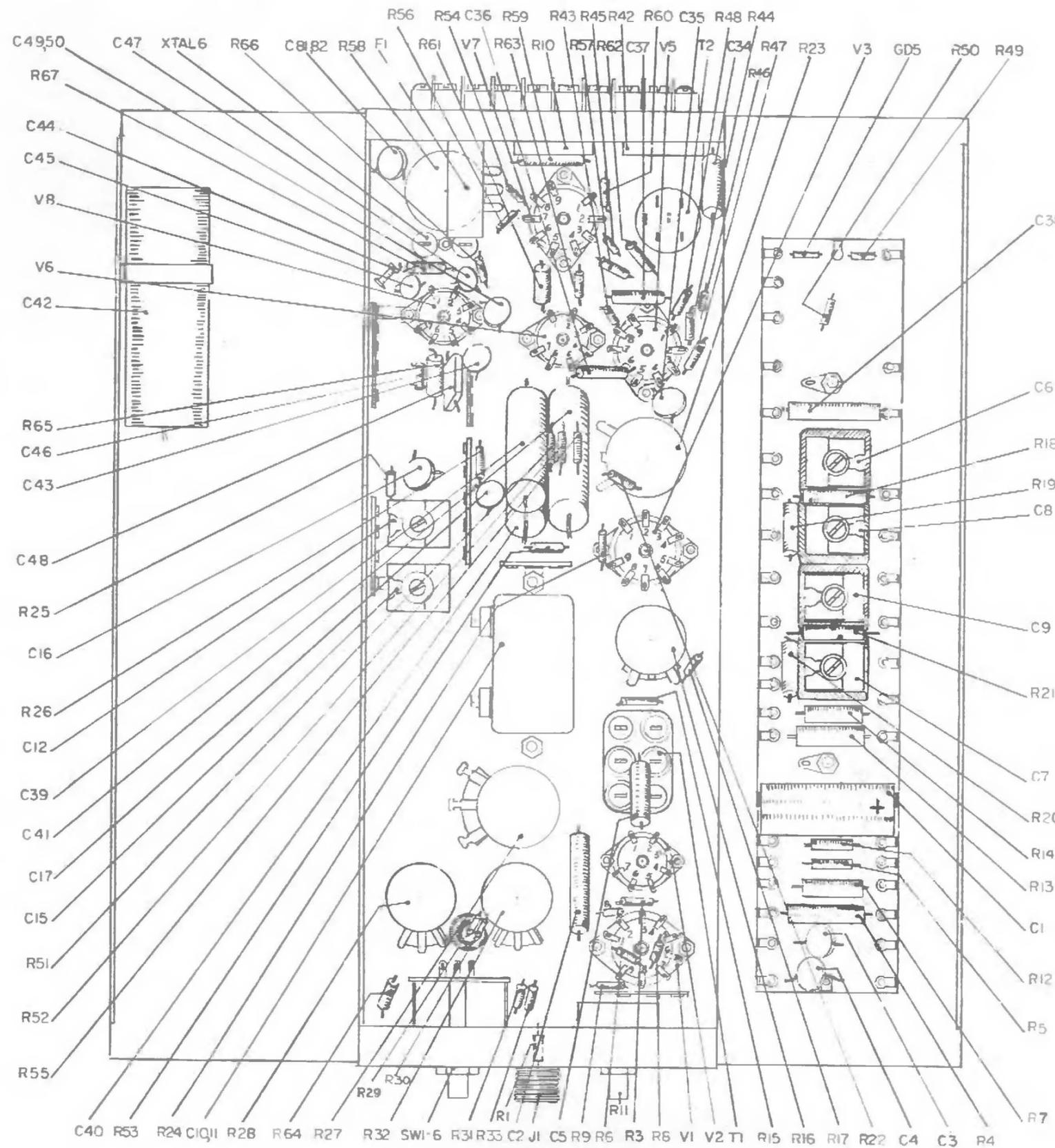
TERMINALS 1 — SPDT  
2 — NORMAL POSITION  
3 —

4] 117 VOLTS AC  
5] UNDER "TRANSMIT"  
6] 150Ω TO RECEIVER  
7] 4Ω FOR GROUND  
8] "QT" OPERATION

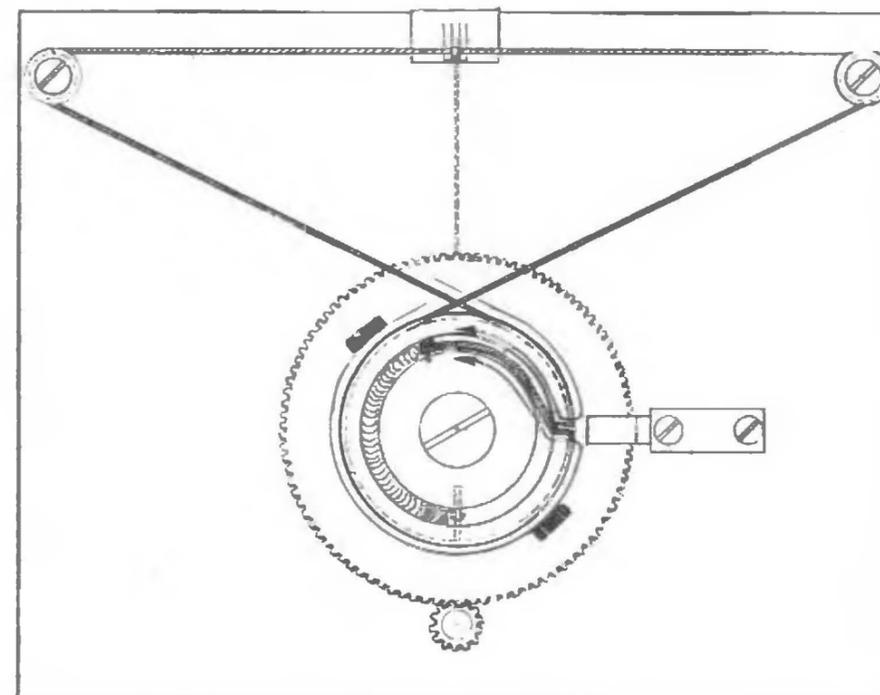
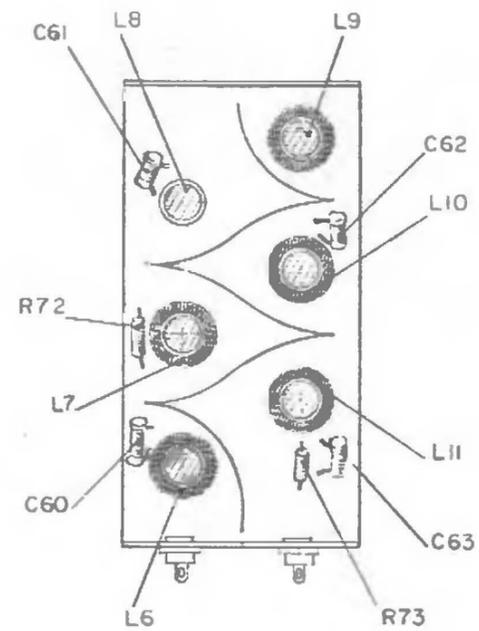
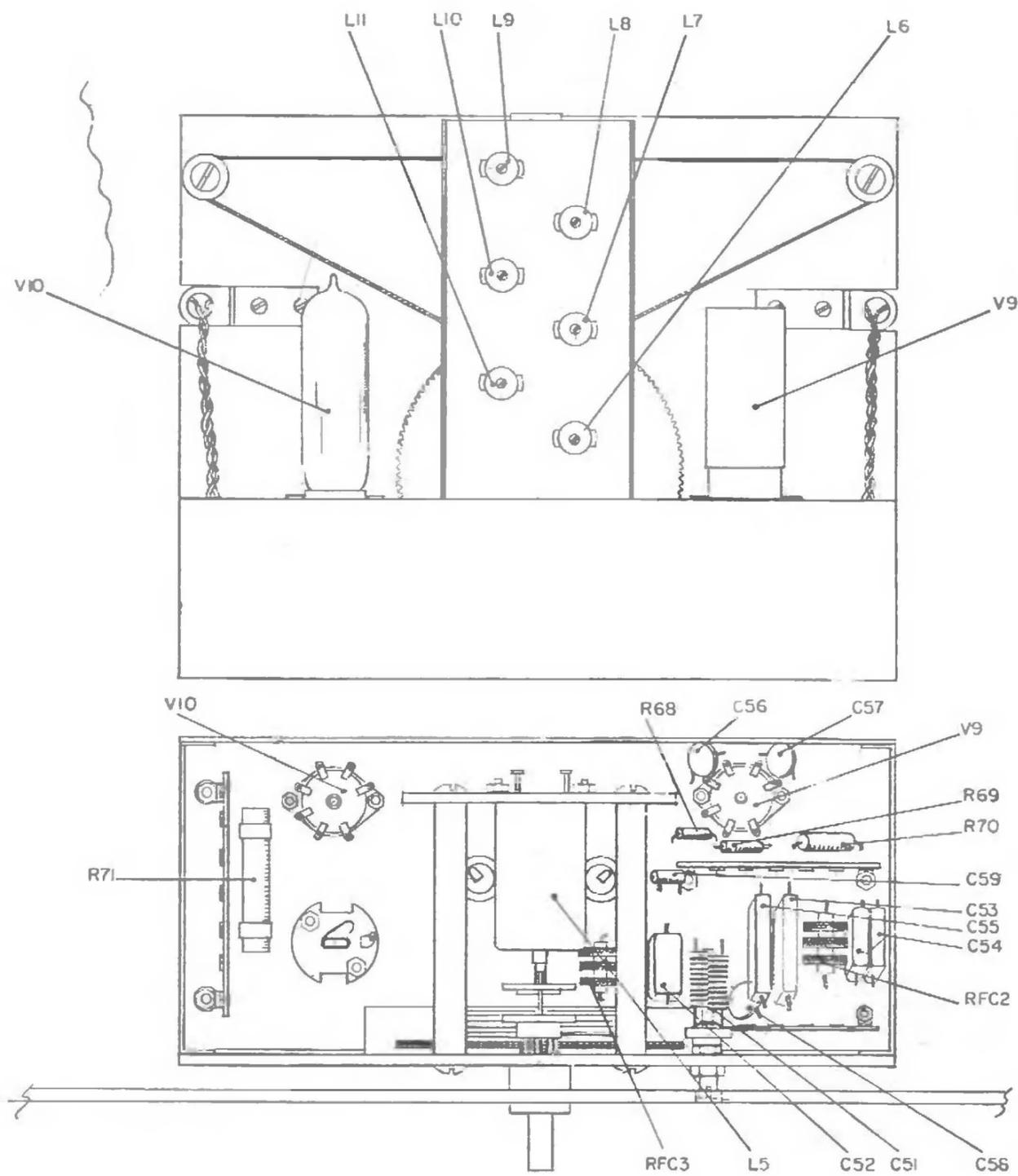
SSB-100, BACK VIEW

FIGURE NO 4  
6-20

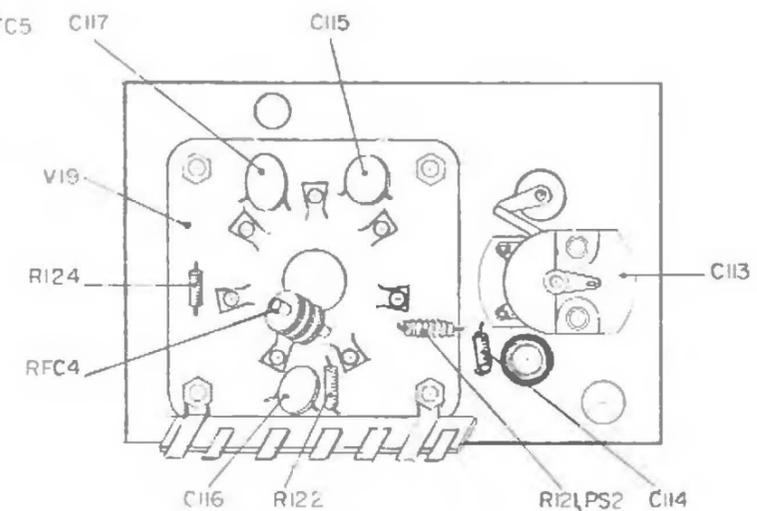
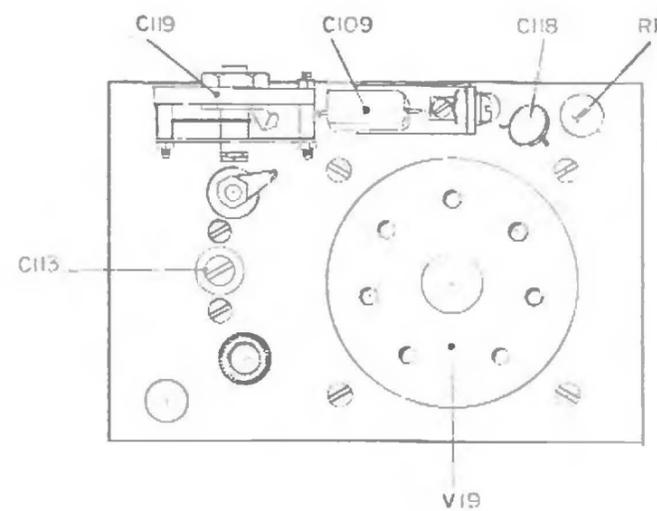
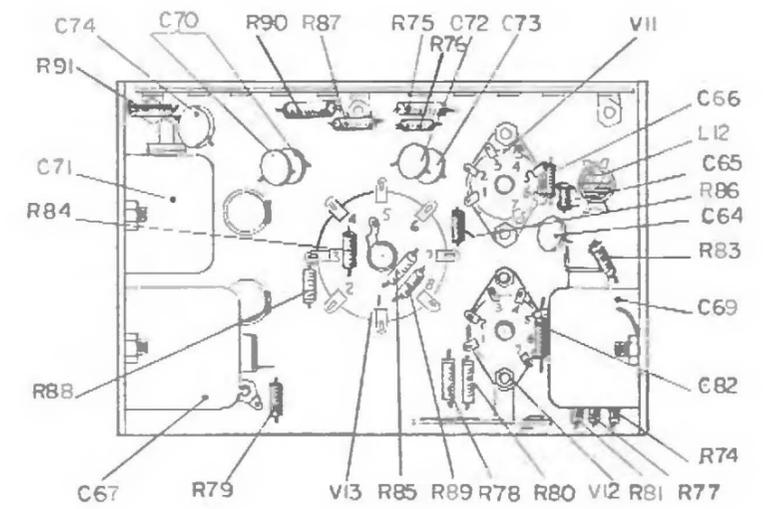
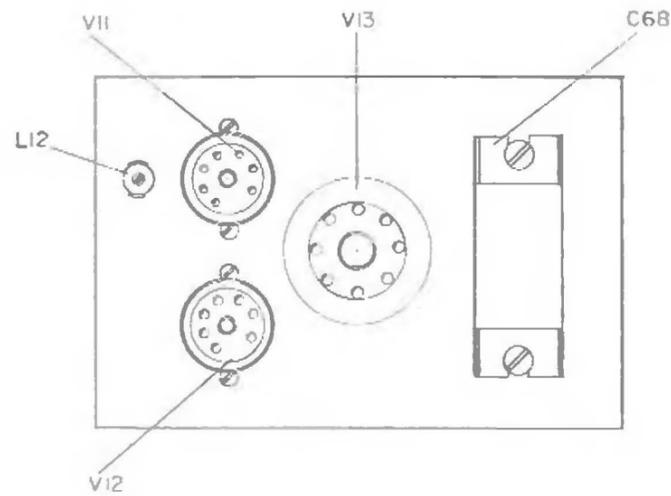
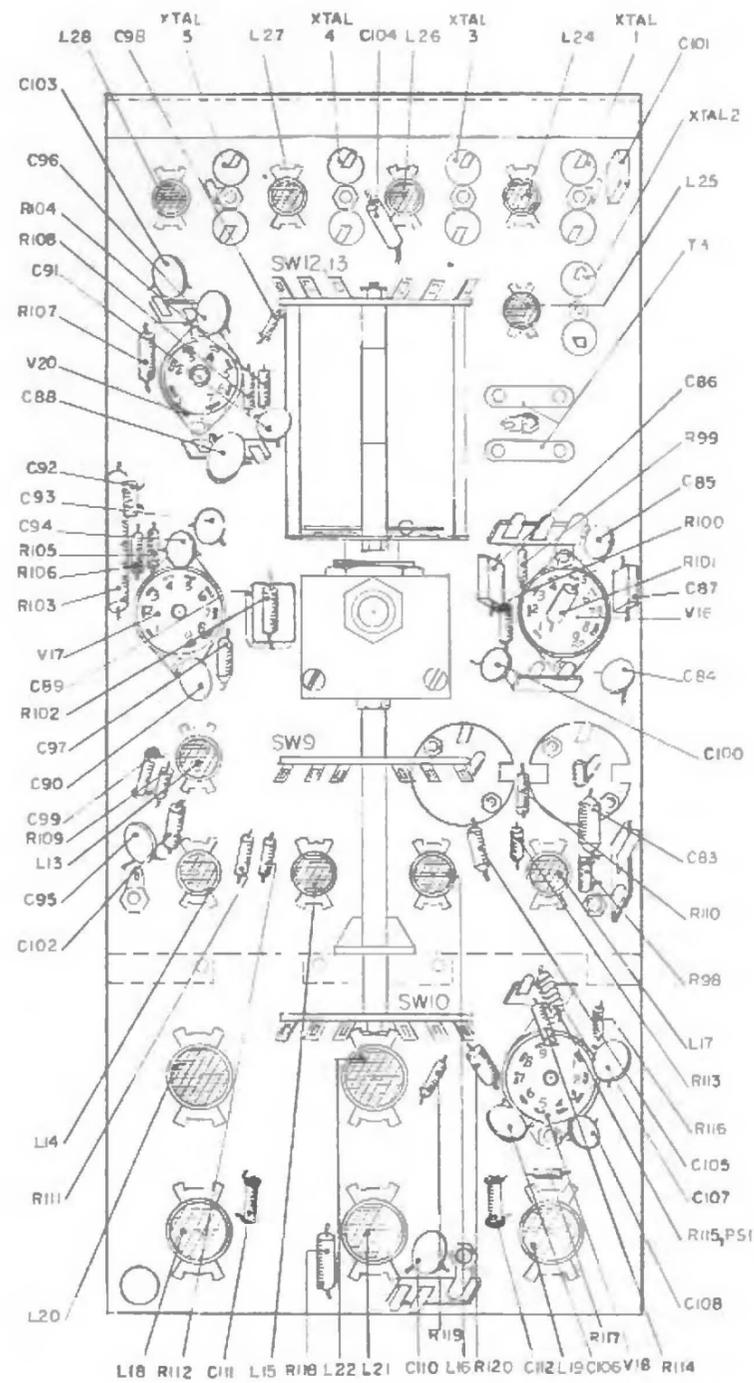




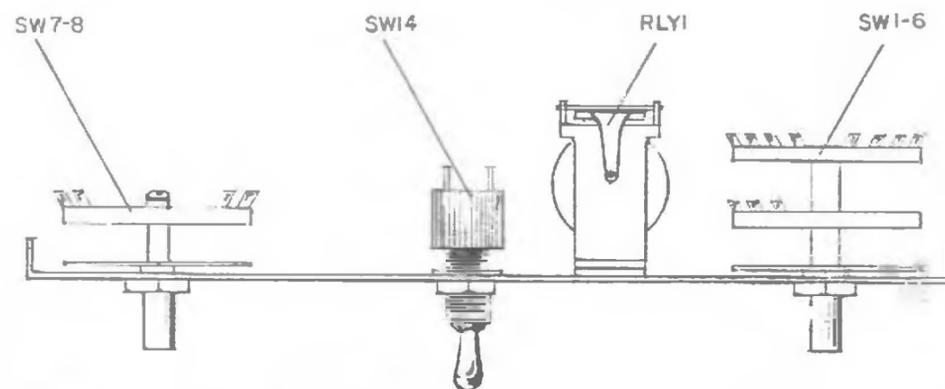
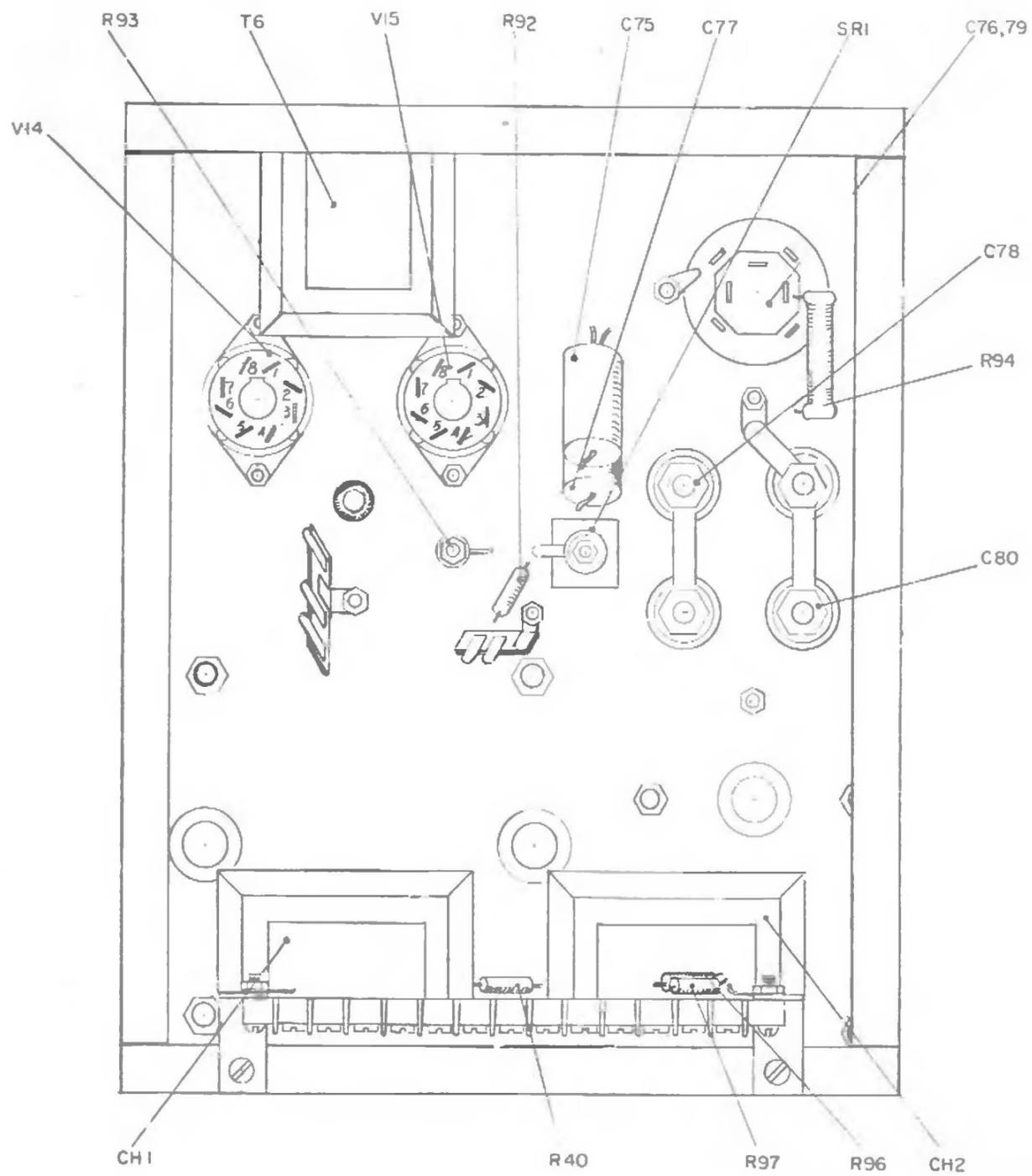
EXCITER BOTTOM VIEW AND B150 AMPLIFIER



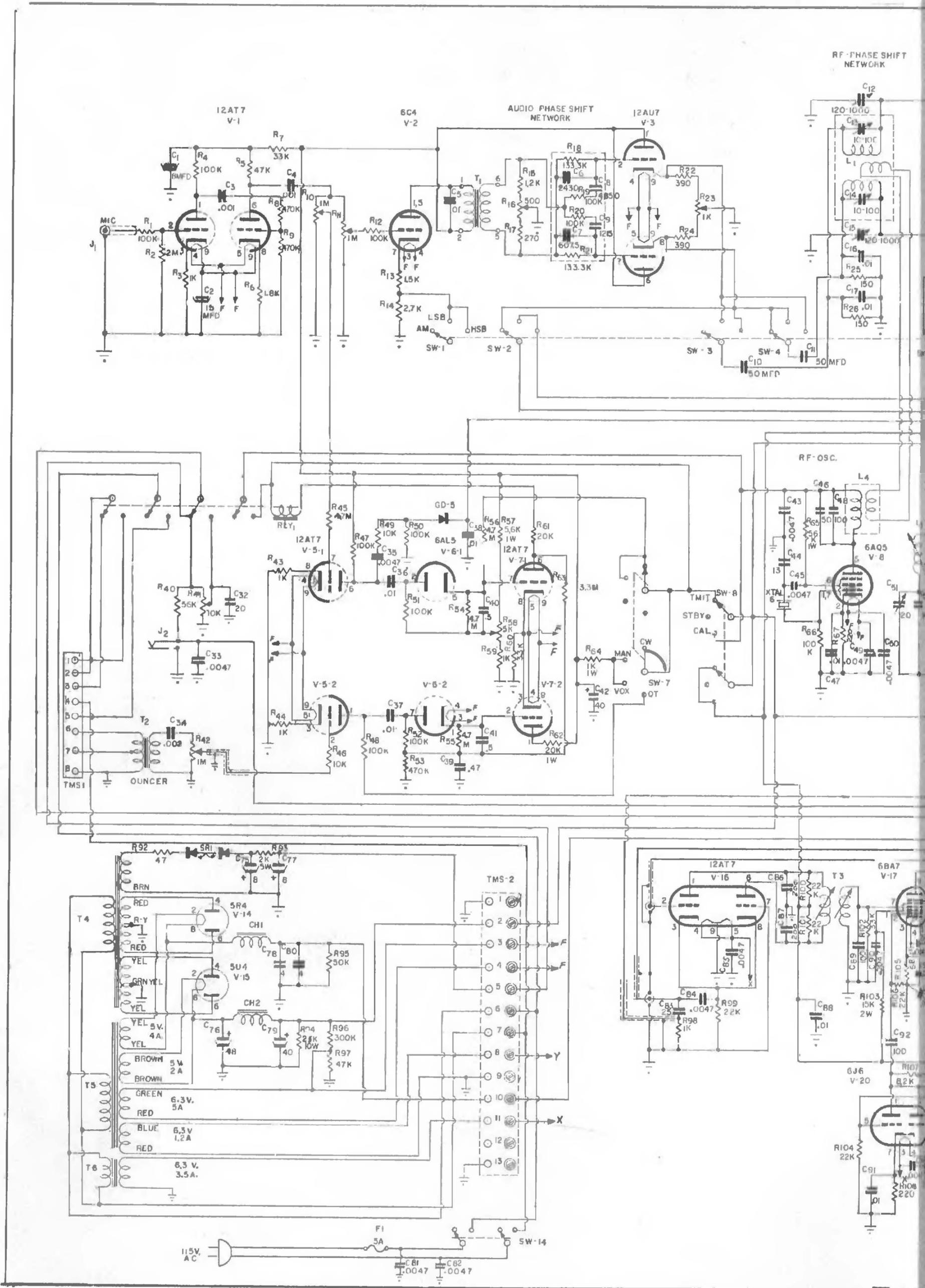
VFO AND LOW PASS FILTER

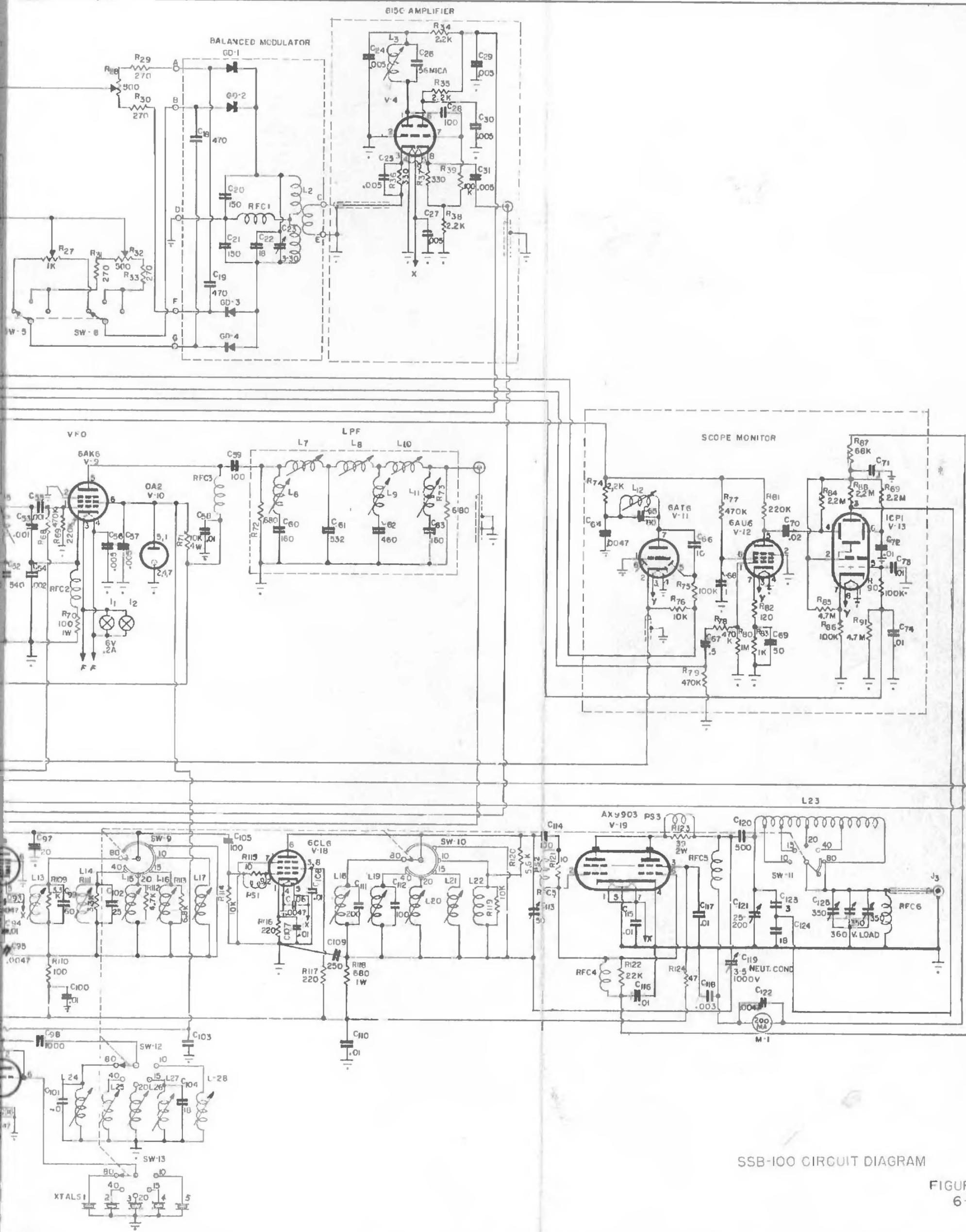


MIXER FINAL AND OSCILLOSCOPE



POWER SUPPLY BOTTOM VIEW





SSB-100 CIRCUIT DIAGRAM

## SECTION VII

## PARTS LIST

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>ELDICO PART NUMBER</u>
C-1	Condenser - Electrolytic 8 mfd 300 volt	100-001
C-2	Condenser - Electrolytic 15 mfd 100 volt	100-002
C-3	Condenser - Disc Ceramic .001 mfd 600 volt	100-003
C-4	Condenser - Disc Ceramic .001 mfd 600 volt	100-004
C-5	Condenser - Paper .01 mfd 300 volt	100-005
C-6	Condenser - Mica 2430 mmfd 1% 300 volt	100-006
C-7	Condenser - Mica 607.5 mmfd 1% 300 volt	100-007
C-8	Condenser - Mica 4850 mmfd 1% 300 volt	100-008
C-9	Condenser - Mica 1215 mmfd 1% 300 volt	100-009
C-10	Condenser - Electrolytic 50 mfd 25 volt	100-010
C-11	Condenser - Electrolytic 50 mfd 25 volt	100-011
C-12	Condenser - Mica Trimmer 120-1000 mmfd 300 volt	100-012
C-13	Condenser - Mica Trimmer 10-100 mmfd 300 volt	100-013
C-14	Condenser - Mica Trimmer 10-100 mmfd 300 volt	100-014
C-15	Condenser - Mica Trimmer 120-1000 mmfd 300 volt	100-015
C-16	Condenser - Disc Ceramic .01 mfd 400 volt	100-016
C-17	Condenser - Disc Ceramic .01 mfd 400 volt	100-017
C-18	Condenser - Mica 470 mmfd 300 volt	100-018
C-19	Condenser - Mica 470 mmfd 300 volt	100-019
C-20	Condenser - Mica 150 mmfd 300 volt	100-020
C-21	Condenser - Mica 150 mmfd 300 volt	100-021
C-22	Condenser - Ceramic 18 mmfd 300 volt	100-022
C-23	Condenser - Ceramic Trimmer 3-30 mmfd 300 volt	100-023
C-24	Condenser - Disc Ceramic .005 mfd 600 volt	100-024
C-25	Condenser - Disc Ceramic .005 mfd 600 volt	100-025
C-26	Condenser - Mica 56 mmfd 300 volt	100-026
C-27	Condenser - Disc Ceramic .005 mfd 600 volt	100-027
C-28	Condenser - Ceramic 100 mmfd 600 volt	100-028
C-29	Condenser - Disc Ceramic .005 mfd 600 volt	100-029
C-30	Condenser - Disc Ceramic .005 mfd 600 volt	100-030
C-31	Condenser - Disc Ceramic .005 mfd 600 volt	100-031
C-32	Condenser - Electrolytic 20 mfd 150 volt	100-032
C-33	Condenser - Disc Ceramic .0047 mfd 600 volt	100-033
C-34	Condenser - Paper .002 mfd 300 volt	100-034
C-35	Condenser - Disc Ceramic .0047 mfd 600 volt	100-035
C-36	Condenser - Paper .01 mfd 300 volt	100-036
C-37	Condenser - Paper .01 mfd 300 volt	100-037
C-38	Condenser - Paper .01 mfd 300 volt	100-038
C-39	Condenser - Paper .47 mfd 100 volt	100-039
C-40	Condenser - Paper .5 mfd 100 volt	100-040

C-41	Condenser - Paper .5 mfd 100 volt	100-041
C-42	Condenser - Electrolytic 40 mfd 350 volt	100-042
C-43	Condenser - Disc Ceramic .0047 mfd 600 volt	100-043
C-44	Condenser - Ceramic 13 mmfd 600 volt	100-044
C-45	Condenser - Disc Ceramic .0047 mfd 600 volt	100-045
C-46	Condenser - Ceramic 50 mmfd 600 volt	100-046
C-47	Condenser - Disc Ceramic .01 mfd 400 volt	100-047
C-48	Condenser - Mica 100 mmfd 300 volt	100-048
C-49	Condenser - Disc Ceramic .0047 mfd 600 volt	100-049
C-50	Condenser - Disc Ceramic .0047 mfd 600 volt	100-050
C-51	Condenser - Variable 3-20 mmfd 300 volt	100-051
C-52*	Condenser - Silver Mica 540 mmfd 300 volt	100-052
C-53	Condenser - Silver Mica .001 mfd 300 volt	100-053
C-54	Condenser - Silver Mica .002 mfd 300 volt	100-054
C-55	Condenser - Silver Mica .001 mfd 300 volt	100-055
C-56	Condenser - Disc Ceramic .005 mfd 600 volt	100-056
C-57	Condenser - Disc Ceramic .005 mfd 600 volt	100-057
C-58	Condenser - Disc Ceramic .01 mfd 400 volt	100-058
C-59	Condenser - Ceramic 100 mmfd 600 volt	100-059
C-60	Condenser - Ceramic 160 mmfd 600 volt	100-060
C-61	Condenser - Ceramic 532 mmfd 600 volt	100-061
C-62	Condenser - Ceramic 460 mmfd 600 volt	100-062
C-63	Condenser - Ceramic 160 mmfd 600 volt	100-063
C-64	Condenser - Disc Ceramic .0047 mfd 600 volt	100-064
C-65	Condenser - Ceramic 80 mmfd 600 volt	100-065
C-66	Condenser - Ceramic 10 mmfd 600 volt	100-066
C-67	Condenser - Bath-tub .5 mfd 600 volt	100-067
C-68	Condenser - Bath-tub 1 mfd 400 volt	100-068
C-69	Condenser - Electrolytic 50 mfd 25 volt	100-069
C-70	Condenser - Disc Ceramic .02 mfd 400 volt	100-070
C-71	Condenser - Bath-tub .1 mfd 600 volt	100-071
C-72	Condenser - Disc Ceramic .01 mfd 400 volt	100-072
C-73	Condenser - Disc Ceramic .01 mfd 400 volt	100-073
C-74	Condenser - Disc Ceramic .01 mfd 400 volt	100-074
C-75	Condenser - Electrolytic 8 mfd 150 volt	100-075
C-76	Condenser - Electrolytic 48 mfd 400 volt	100-076
C-77	Condenser - Electrolytic 8 mfd 150 volt	100-077
C-78	Condenser - Oil 4 mfd 1000 volt	100-078
C-79	Condenser - Electrolytic 40 mfd 400 volt	100-079
C-80	Condenser - Oil 4 mfd 1000 volt	100-080
C-81	Condenser - Disc Ceramic .0047 mfd 600 volt	100-081
C-82	Condenser - Disc Ceramic .0047 mfd 600 volt	100-082
C-83	Condenser - Ceramic 25 mmfd 600 volt	100-083
C-84	Condenser - Disc Ceramic .0047 mfd 600 volt	100-084
C-85	Condenser - Disc Ceramic .0047 mfd 600 volt	100-085
C-86	Condenser - Silver Mica 200 mmfd 300 volt	100-086

C-87	Condenser - Silver Mica 200 mmfd 300 volt	100-087
C-88	Condenser - Disc Ceramic .01 mfd 400 volt	100-088
C-89	Condenser - Silver Mica 100 mmfd 300 volt	100-089
C-90	Condenser - Disc Ceramic .0047 mfd 600 volt	100-090
C-91	Condenser - Disc Ceramic .01 mfd 400 volt	100-091
C-92	Condenser - Ceramic 100 mmfd 600 volt	100-092
C-93	Condenser - Disc Ceramic .0047 mfd 600 volt	100-093
C-94	Condenser - Disc Ceramic .01 mfd 400 volt	100-094
C-95	Condenser - Disc Ceramic .0047 mfd 600 volt	100-095
C-96	Condenser - Disc Ceramic .0047 mfd 600 volt	100-096
C-97	Condenser - Ceramic 20 mmfd 600 volt	100-097
C-98	Condenser - Ceramic 1000 mmfd 400 volt	100-098
C-99	Condenser - Ceramic 60 mmfd 400 volt	100-099
C-100	Condenser - Disc Ceramic .01 mfd 400 volt	100-100
C-101	Condenser - Mica 40 mmfd 300 volt	100-101
C-102	Condenser - Ceramic 25 mmfd 400 volt	100-102
C-103	Condenser - Disc Ceramic .01 mfd 400 volt	100-103
C-104	Condenser - Ceramic .18 mmfd 600 volt	100-104
C-105	Condenser - Ceramic 100 mmfd 600 volt	100-105
C-106	Condenser - Disc Ceramic .0047 mfd 600 volt	100-106
C-107	Condenser - Disc Ceramic .01 mfd 400 volt	100-107
C-108	Condenser - Disc Ceramic .01 mfd 400 volt	100-108
C-109	Condenser - Mica 250 mmfd 300 volt	100-109
C-110	Condenser - Disc Ceramic .01 mfd 400 volt	100-110
C-111	Condenser - Ceramic 200 mmfd 600 volt	100-111
C-112	Condenser - Ceramic 100 mmfd 600 volt	100-112
C-113	Condenser - Variable 5-50 mmfd 300 volt	100-113
C-114	Condenser - Ceramic 100 mmfd 600 volt	100-114
C-115	Condenser - Disc Ceramic .01 mfd 400 volt	100-115
C-116	Condenser - Disc Ceramic .01 mfd 400 volt	100-116
C-117	Condenser - Disc Ceramic .01 mfd 400 volt	100-117
C-118	Condenser - Disc Ceramic .003 mfd 2000 volt	100-118
C-119	Condenser - Neutralizing 3-5 mmfd 1000 volt	100-119
C-120	Condenser - Button Ceramic 500 mmfd 2000 volt	100-120
C-121	Condenser - Variable 25-200 mmfd 1000 volt	100-121
C-122	Condenser - Disc Ceramic .0047 mfd 600 volt	100-122
C-123	Condenser - Ceramic 3 mmfd 600 volt	100-123
C-124	Condenser - Ceramic 18 mmfd 600 volt	100-124
C-125	Condenser - Loading 3 x 350 mmfd 600 volt	100-125
F-1	Fuse - Type 3AG, 5 Amp.	100-126
GD-1	Germanium-diode - 1-N-60	100-127
GD-2	Germanium-diode - 1-N-60	100-128
GD-3	Germanium-diode - 1-N-60	100-129
GD-4	Germanium-diode - 1-N-60	100-130
GD-5	Germanium-diode - 1-N-60	100-131
J-1	Microphone connector	100-132

J-2	Key - Jack	100-133
J-3	83-1R coax-receptacle	100-134
L-1	RF-Phase-shift network assembly	100-135
L-2	Balanced modulator coil assembly	100-136
L-3	8.150 Mc amplifier coil	100-137
L-4	RF-Oscillator plate-coil assembly	100-138
L-5	VFO-coil	100-139
L-6	Low-pass-filter coil	100-140
L-7	Low-pass-filter coil	100-141
L-8	Low-pass-filter coil	100-142
L-9	Low-pass-filter coil	100-143
L-10	Low-pass-filter coil	100-144
L-11	Low-pass-filter coil	100-145
L-12	Scope amplifier coil	100-146
L-13	Mixer plate coil, 80 m	100-147
L-14	Mixer plate coil, 40 m	100-148
L-15	Mixer plate coil, 20 m	100-149
L-16	Mixer plate coil, 15 m	100-150
L-17	Mixer plate coil, 10 m	100-151
L-18	Driver plate coil, 80 m	100-152
L-19	Driver plate coil, 40 m	100-153
L-20	Driver plate coil, 20 m	100-154
L-21	Driver plate coil, 15 m	100-155
L-22	Driver plate coil, 10 m	100-156
L-23	Final plate coil assembly	100-157
L-24	Crystal oscillator plate coil, 12.950 Mc	100-158
L-25	Crystal oscillator plate coil, 16.250 Mc	100-159
L-26	Crystal oscillator plate coil, 23.300 Mc	100-160
L-27	Crystal oscillator plate coil, 30.400 Mc	100-161
L-28	Crystal oscillator plate coil, 37.650 Mc	100-162
M-1	Final-plate meter, 0-200 MA DC	100-163
PS-1	Parasitic suppressor	100-164
PS-2	Parasitic suppressor	100-165
PS-3	Parasitic suppressor	100-166
R-1	Resistor - 100 K $\Omega$ - 1/2 W	100-167
R-2	Resistor - 2 Meg. $\Omega$ - 1/2 W	100-168
R-3	Resistor - 1 K $\Omega$ - 1/2 W	100-169
R-4	Resistor - 100 K $\Omega$ - 1/2 W	100-170
R-5	Resistor - 47 K $\Omega$ - 1/2 W	100-171
R-6	Resistor - 1.8 K $\Omega$ - 1/2 W	100-172
R-7	Resistor - 33 K $\Omega$ - 1 W	100-173
R-8	Resistor - 470 K $\Omega$ - 1/2	100-174
R-9	Resistor - 470 K $\Omega$ - 1/2 W	100-175
R-10	Potentiometer - 1 Meg. $\Omega$ - 1/2 W	100-176
R-11	Potentiometer - 1 Meg. $\Omega$ - 1/2 W	100-177
R-12	Resistor - 100 K $\Omega$ - 1/2 W	100-178

R-13	Resistor - 1.5 K $\Omega$ - 1/2 W	100-179
R-14	Resistor - 2.7 K $\Omega$ - 1/2 W	100-180
R-15	Resistor - 1.2 K $\Omega$ - 1/2 W	100-181
R-16	Potentiometer - 500 $\Omega$ - 1/2 W	100-182
R-17	Resistor - 270 $\Omega$ - 1/2 W	100-183
R-18	Resistor - 133.3 K $\Omega$ - 1/2 W 1%	100-184
R-19	Resistor - 100 K $\Omega$ - 1/2 W 1%	100-185
R-20	Resistor - 100 K $\Omega$ - 1/2 W 1%	100-186
R-21	Resistor - 133.3 K $\Omega$ - 1/2 W 1%	100-187
R-22	Resistor - 390 $\Omega$ - 1/2 W	100-188
R-23	Potentiometer - 1 K $\Omega$ - 1/2 W	100-189
R-24	Resistor - 390 $\Omega$ - 1/2 W	100-190
R-25	Resistor - 150 $\Omega$ - 1/2 W	100-191
R-26	Resistor - 150 $\Omega$ - 1/2 W	100-192
R-27	Potentiometer - 1 K $\Omega$ - 1/2 W	100-193
R-28	Potentiometer - 500 $\Omega$ - 1/2 W	100-194
R-29	Resistor - 270 $\Omega$ - 1/2 W	100-195
R-30	Resistor - 270 $\Omega$ - 1/2 W	100-196
R-31	Resistor - 270 $\Omega$ - 1/2 W	100-197
R-32	Potentiometer - 500 $\Omega$ - 1/2 W	100-198
R-33	Resistor - 270 $\Omega$ - 1/2 W	100-199
R-34	Resistor - 2.2 K $\Omega$ - 1/2 W	100-200
R-35	Resistor - 2.2 K $\Omega$ - 1/2 W	100-201
R-36	Resistor - 330 $\Omega$ - 1/2 W	100-202
R-37	Resistor - 330 $\Omega$ - 1/2 W	100-203
R-38	Resistor - 2.2 K $\Omega$ - 1/2 W	100-204
R-39	Resistor - 100 K $\Omega$ - 1/2 W	100-205
R-40	Resistor - 56 K $\Omega$ - 1/2 W	100-206
R-41	Potentiometer - 10 K $\Omega$ - 2 W	100-207
R-42	Potentiometer - 1 Meg. $\Omega$ - 2 W	100-208
R-43	Resistor - 1 K $\Omega$ - 1/2 W	100-209
R-44	Resistor - 1 K $\Omega$ - 1/2 W	100-210
R-45	Resistor - 100 K $\Omega$ - 1/2 W	100-211
R-46	Resistor - 10 K $\Omega$ - 1/2 W	100-212
R-47	Resistor - 100 K $\Omega$ - 1/2 W	100-213
R-48	Resistor - 100 K $\Omega$ - 1/2 W	100-214
R-49	Resistor - 10 K $\Omega$ - 1/2 W	100-215
R-50	Resistor - 100 K $\Omega$ - 1/2 W	100-216
R-51	Resistor - 100 K $\Omega$ - 1/2 W	100-217
R-52	Resistor - 100 K $\Omega$ - 1/2 W	100-218
R-53	Resistor - 470 K $\Omega$ - 1/2 W	100-219
R-54	Resistor - 4.7 Meg. $\Omega$ - 1/2 W	100-220
R-55	Resistor - 4.7 Meg. $\Omega$ - 1/2 W	100-221
R-56	Resistor - 4.7 Meg. $\Omega$ - 1/2 W	100-222
R-57	Resistor - 5.6 K $\Omega$ - 1 W	100-223
R-58	Potentiometer - 5 K $\Omega$ - 2 W	100-224

R-59	Resistor - 1 K $\Omega$ - 1/2 W	100-225
R-60	Resistor - 3.3 K $\Omega$ - 1/2 W	100-226
R-61	Resistor - 20 K $\Omega$ - 1 W	100-227
R-62	Resistor - 20 K $\Omega$ - 1 W	100-228
R-63	Resistor - 3.3 Meg. $\Omega$ - 1/2 W	100-229
R-64	Resistor - 1 K $\Omega$ - 1 W	100-230
R-65	Resistor - 56 K $\Omega$ - 1 W	100-231
R-66	Resistor - 100 K $\Omega$ - 1/2 W	100-232
R-67	Resistor - 220 $\Omega$ - 1/2 W	100-233
R-68	Resistor - 470 K $\Omega$ - 1/2 W	100-234
R-69	Resistor - 220 K $\Omega$ - 1/2 W	100-235
R-70	Resistor - 100 $\Omega$ - 1 W	100-236
R-71	Resistor - 10 K $\Omega$ - 4 W	100-237
R-72	Resistor - 680 $\Omega$ - 1/2 W	100-238
R-73	Resistor - 680 $\Omega$ - 1/2 W	100-239
R-74	Resistor - 2.2 K $\Omega$ - 1/2 W	100-240
R-75	Resistor - 100 K $\Omega$ - 1/2 W	100-241
R-76	Resistor - 10 K $\Omega$ - 1/2 W	100-242
R-77	Resistor - 470 K $\Omega$ - 1/2 W	100-243
R-78	Resistor - 470 K $\Omega$ - 1/2 W	100-244
R-79	Resistor - 470 K $\Omega$ - 1/2 W	100-245
R-80	Resistor - 1 Meg. $\Omega$ - 1/2 W	100-246
R-81	Resistor - 220 K $\Omega$ - 1/2 W	100-247
R-82	Resistor - 120 $\Omega$ - 1/2 W	100-248
R-83	Resistor - 1 K $\Omega$ - 1/2 W	100-249
R-84	Resistor - 2.2 Meg. $\Omega$ - 1/2 W	100-250
R-85	Resistor - 4.7 Meg. $\Omega$ - 1/2 W	100-251
R-86	Resistor - 100 K $\Omega$ - 1/2 W	100-252
R-87	Resistor - 68 K $\Omega$ - 1/2 W	100-253
R-88	Resistor - 2.2 Meg. $\Omega$ - 1/2 W	100-254
R-89	Resistor - 2.2 Meg. $\Omega$ - 1/2 W	100-255
R-90	Resistor - 100 K $\Omega$ - 1/2 W	100-256
R-91	Resistor - 4.7 Meg. $\Omega$ - 1/2 W	100-257
R-92	Resistor - 47 $\Omega$ - 1/2 W	100-258
R-93	Resistor - 2 K $\Omega$ - 5 W	100-259
R-94	Resistor - 25 K $\Omega$ - 10 W	100-260
R-95	Resistor - 50 K $\Omega$ - 50 W	100-261
R-96	Resistor - 300 K $\Omega$ - 1/2 W	100-262
R-97	Resistor - 47 K $\Omega$ - 1/2 W	100-263
R-98	Resistor - 1 K $\Omega$ - 1/2 W	100-264
R-99	Resistor - 2.2 K $\Omega$ - 1/2 W	100-265
R-100	Resistor - 22 K $\Omega$ - 1/2 W	100-266
R-101	Resistor - 22 K $\Omega$ - 1/2 W	100-267
R-102	Resistor - 33 K $\Omega$ - 1/2 W	100-268
R-103	Resistor - 15 K $\Omega$ - 1/2 W	100-269
R-104	Resistor - 22 K $\Omega$ - 1/2 W	100-270
R-105	Resistor - 68 $\Omega$ - 1/2 W	100-271

R-106	Resistor - 22 K $\Omega$ - 1/2 W	100-272
R-107	Resistor - 8.2 K $\Omega$ - 1/2 W	100-273
R-108	Resistor - 220 $\Omega$ - 1/2 W	100-274
R-109	Resistor - 3.3 K $\Omega$ - 1/2 W	100-275
R-110	Resistor - 100 $\Omega$ - 1/2 W	100-276
R-111	Resistor - 3.3 K $\Omega$ - 1/2 W	100-277
R-112	Resistor - 4.7 K $\Omega$ - 1/2 W	100-278
R-113	Resistor - 6.8 K $\Omega$ - 1/2 W	100-279
R-114	Resistor - 10 K $\Omega$ - 1/2 W	100-280
R-115	Resistor - 10 $\Omega$ - 1/2 W	100-281
R-116	Resistor - 220 $\Omega$ - 1/2 W	100-282
R-117	Resistor - 220 $\Omega$ - 1/2 W	100-283
R-118	Resistor - 680 $\Omega$ - 1 W	100-284
R-119	Resistor - 10 K $\Omega$ - 1/2 W	100-285
R-120	Resistor - 5.6 K $\Omega$ - 1 W	100-286
R-121	Resistor - 10 $\Omega$ - 1/2 W	100-287
R-122	Resistor - 22 K $\Omega$ - 1/2 W	100-288
R-123	Resistor - 39 $\Omega$ - 2 W	100-289
R-124	Resistor - 47 $\Omega$ - 1/2 W	100-290
RFC-1	3 mh RF-choke	100-291
RFC-2	3 mh RF-choke	100-292
RFC-3	3 mh RF-choke	100-293
RFC-4	3 mh RF-choke	100-294
RFC-5	.5 mh RF-choke	100-295
SR-1	Selenium - Rectifier 200 V, 65 ma	100-296
SW-1-6	Emission switch assembly	100-297
SW-7	Operation switch assembly	100-298
SW-8	Control switch assembly	100-299
SW-9-13	Band switch assembly	100-300
SW-14	Power switch	100-301
T-1	Audio-transformer	100-302
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T-3	Band-pass filter assembly 8.950 - 9.150 Mc	100-304
T-4	Power Transformer, bias, high voltage, low voltage	100-305
T-5	Filament transformer	100-306
T-6	Filament transformer	100-307
TMS-1	Terminal strip, external connections	100-308
TMS-2	Terminal strip, power supply	100-309
V-1	Tube - 12AT7 Audio-amplifier	100-310
V-2	Tube - 6C4 Audio-amplifier	100-311
V-3	Tube - 12AU7 Cathode-follower	100-312
V-4	Tube - 12AT7 8.150 Mc amplifier	100-313
V-5	Tube - 12AT7 VOX-QT amplifier	100-314
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V-7	Tube - 12AT7 Relay	100-316
V-8	Tube - 6AQ5 RF-oscillator, 8.150 Mc	100-317

V-9	Tube - 6AK6 VFO	100-318
V-10	Tube - OA2 Voltage-regulator 150 V, 30 ma	100-319
V-11	Tube - 6AT-6 Scope amplifier, envelope detector	100-320
V-12	Tube - 6AU-6 Deflection amplifier	100-321
V-13	Tube - 1CP1 1" Oscilloscope	100-322
V-14	Tube - 5R4GY High-voltage rectifier	100-323
V-15	Tube - 5U4GA Low-voltage rectifier	100-324
V-16	Tube - 12AT7 Balanced Mixer	100-325
V-17	Tube - 6BA7 Mixer	100-326
V-18	Tube - 6CL6 Linear Driver	100-327
V-19	Tube - AX-9903 Linear power amplifier	100-328
V-20	Tube - 6J6 Crystal oscillator	100-329
Xtal-1	12.950 Mc fundamental	100-330
Xtal-2	16.250 Mc overtone	100-331
Xtal-3	23.300 Mc overtone ✓	100-332
Xtal-4	30.400 Mc overtone ✓	100-333
Xtal-5	37.650 Mc overtone	100-334
Xtal-6	8.150 Mc fundamental	100-335

All Resistors  $\pm$  10% unless indicated otherwise.

All Condensers in mfd  $\pm$  10% unless indicated otherwise.

\* Condenser adjusted value to fulfill requirements.