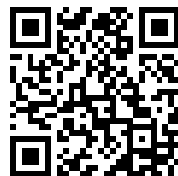


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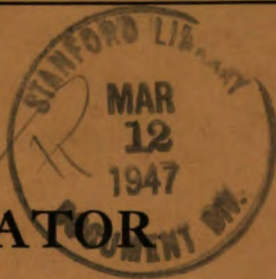
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:11-2641

# TM 11-2641

DEPARTMENT TECHNICAL MANUAL



## SIGNAL GENERATOR

I-137-B

(W.I.T. MODEL 43-41)

**RESTRICTED.** DISSEMINATION OF RESTRICTED MATTER  
No person is entitled solely by virtue of his grade or  
position to knowledge or possession of classified matter.  
Such matter is entrusted only to those individuals whose  
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also paragraph 23b, AR 380-5, 15 March 1944.)

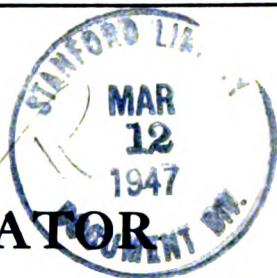
DEPARTMENT 12 JANUARY 1945



W1.35:11-2641

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WAR DEPARTMENT

12 JANUARY 1945

## ERRATA

- Page 27 Figure 17 V-105 (6J5CT/G); Change pin #2 from 6.4 V.D.C., to 6.4 V.A.C.
- Page 31 Figure 20 Change R-104 from 130 to 100 ohms;  
R-122 from 10K to 9100 ohms.
- Page 33 C-101 Change W.I.T. no. from 50-058 to 50-068.
- Page 35 C-119 Change W.I.T. no. from 50-105-3 to 50-107-3.
- Page 38 R-102 Change W.I.T. no. from 100-006 to 100-066.
- Page 38 R-104 Change stock no. and description from:  
3RC20AE131J RESISTOR, fixed: comp; 130 ohms  $\pm 5\%$ ;  $\frac{1}{2}$  w; part of  
VTVM r-f voltage divider; Erie 504; W.I.T. 100-112.
- Page 39 R-118 to: 3RC20AE101J RESISTOR, part of VTVM r-f voltage divider; same as R-103.  
Change stock no. and description from:  
3RC20AE750J RESISTOR, fixed: comp; 75 ohms  $\pm 5\%$ ;  $\frac{1}{2}$  w; part of meter  
"Zero Adjust"; Erie 504; W.I.T. 100-080.
- Page 40 R-122 to: 3RC20AE500J RESISTOR, fixed: comp; 50 ohms  $\pm 5\%$ ;  $\frac{1}{2}$  w; part of meter  
"Zero Adjust"; Erie 504; W.I.T. 100-073.  
Change stock no. and description from:  
3RC21BE103J RESISTOR, fixed: comp; 10,000 ohms  $\pm 5\%$ ;  $\frac{1}{2}$  w; part of  
bias voltage divider; IRC BT $\frac{1}{2}$ ; Erie 504; W.I.T. 100-052.
- Page 40 R-125 to: 3RC21BE912J RESISTOR, fixed: comp; 9100 ohms  $\pm 5\%$ ;  $\frac{1}{2}$  w; part of bias  
voltage divider; IRC BT  $\frac{1}{2}$ ; Erie 504; W.I.T. 100-052.
- Page 41 S-103 Change IRC type from DV to DG
- Page 42 V-103 Change W.I.T. no. from 120-008 to 120-013.
- Page 42 V-104 Change description  
from: VACUUM TUBE: voltage regulator; OB3/VR-90 Sylvania OB3/VR-90; same  
as V-105  
to: VACUUM TUBE: voltage regulator; OB3/VR-90 Sylvania OB3/VR-90; W.I.T.  
130-023-5.

**SIGNAL GENERATOR I-137-B**  
**(W.I.T. MODEL 43-41)**



WAR DEPARTMENT

12 JANUARY 1945

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WAR DEPARTMENT,  
WASHINGTON 25, D. C., 12 JANUARY 1945.

TM 11-2641, Signal Generator I-137-B (W.I.T. Model 43-41), is published for the information and guidance of all concerned.

[A. G. 300.7 (28 Aug 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL

J. A. ULIO,  
*Major General,*  
*The Adjutant General.*

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IC 4: T/O-E 4-260-1 Hq and Hq Btry Hd.

IU 4: T/O-E 4-232 CA Sector Commands; 4-240 CA Sub-sector Commands.

IC 11: T/O-E 11-107, Sig Dep Co; 11-237, Sig Co Svc GP; 11-592, Hq & Hq Co Sig Base Dep; 11-587, Sig Base Maint Co; 11-597, Sig Base Dep Co; 11-617, Sig Radar Maint Unit.

IC 44: T/O-E 44-138, AAA Searchlight Btry.

(For explanation of symbols see FM 21-6.)

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## ***DESTRUCTION NOTICE***

**WHY** —To prevent the enemy from using or salvaging this equipment for his benefit.

**WHEN**—When ordered by your commander.

- HOW** —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut —Use axes, handaxes, machetes.
  3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
  4. Explosive—Use firearms, grenades, TNT.
  5. Disposal —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

### **USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT**

- WHAT**—1. Smash—Meters, controls, panels.
2. Cut —Cables and all wiring.
  3. Burn —Resistors, capacitors, all technical manuals, instruction books, tube charts.
  4. Bury or scatter—Any or all of the above after destroying their usefulness.

## ***DESTROY EVERYTHING***

•

# **WARNING**

## **HIGH VOLTAGE**

**is used in the operation of  
the radio equipment.**

## **DEATH ON CONTACT**

**may result if personnel fail  
to observe safety precautions.**

---

**Be careful to avoid contact with high-voltage circuits or 115-volt a-c input connections while checking or servicing the radio equipment. Make certain that the power is turned off before disassembling any part of the radio equipment.**

**Dangerously high voltages are present in the power supplies of the radio equipment. Before making any service checks, manually discharge all high-voltage capacitors in these circuits after the a-c power has been removed from the components.**

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# FIRST AID TREATMENT FOR ELECTRIC SHOCK

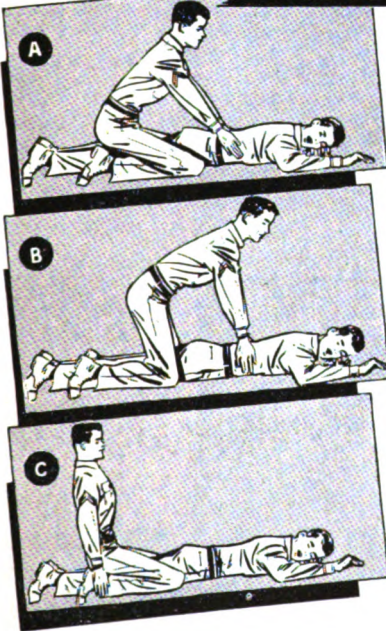
## I. FREE THE VICTIM FROM THE CIRCUIT IMMEDIATELY.

Shut off the current. If this is not **immediately** possible, use a dry nonconductor (rubber gloves, rope, board) to move either the victim or the wire. Avoid contact with the victim. If necessary to cut a live wire, use an axe with a dry wooden handle. Beware of the resulting flash.

## II. ATTEND INSTANTLY TO THE VICTIM'S BREATHING.

Begin resuscitation at once on the spot. Do not stop to loosen the victim's clothing. Every moment counts. Keep the patient warm. Wrap him in any covering available. Send for a doctor. Remove false teeth or other obstructions from the victim's mouth.

### RESUSCITATION



#### POSITION

1. Lay the victim on his belly, one arm extended directly overhead, the other arm bent at the elbow, the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing (fig. A).
2. Straddle the patient's thighs, or one leg, with your knees placed far enough from his hip bones to allow you to assume the position shown in figure A.
3. Place your hands, with thumbs and fingers in a natural position, so that your palms are on the small of his back, and your little fingers just touch his lowest ribs (fig. A).

#### FIRST MOVEMENT

4. With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the victim. Your shoulders should be directly over the heels of your hands at the end of the forward swing (fig. B). Do not bend your elbows. The first movement should take about 2 seconds.

#### SECOND MOVEMENT

5. Now immediately swing backward, to remove the pressure completely (fig. C).
6. After 2 seconds, swing forward again. Repeat this pressure-and-release cycle 12 to 15 times a minute. A complete cycle should require 4 or 5 seconds

#### CONTINUED TREATMENT

7. Continue treatment until breathing is restored or until there is no hope of the victim's recovery. Do not give up easily. Remember that at times the process must be kept up for hours.
8. During artificial respiration, have someone loosen the victim's clothing. Wrap the victim warmly; apply hot bricks, stones, etc. Do not give the victim liquids until he is fully conscious. If the victim must be moved, keep up treatment while he is being moved.
9. At the first sign of breathing, withhold artificial respiration. If natural breathing does not continue, immediately resume artificial respiration.
10. If operators must be changed, the relief operator kneels behind the person giving artificial respiration. The relief takes the operator's place as the original operator releases the pressure.
11. Do not allow the revived patient to sit or stand. Keep him quiet. Give hot coffee or tea, or other internal stimulants.

**HOLD RESUSCITATION DRILLS REGULARLY**

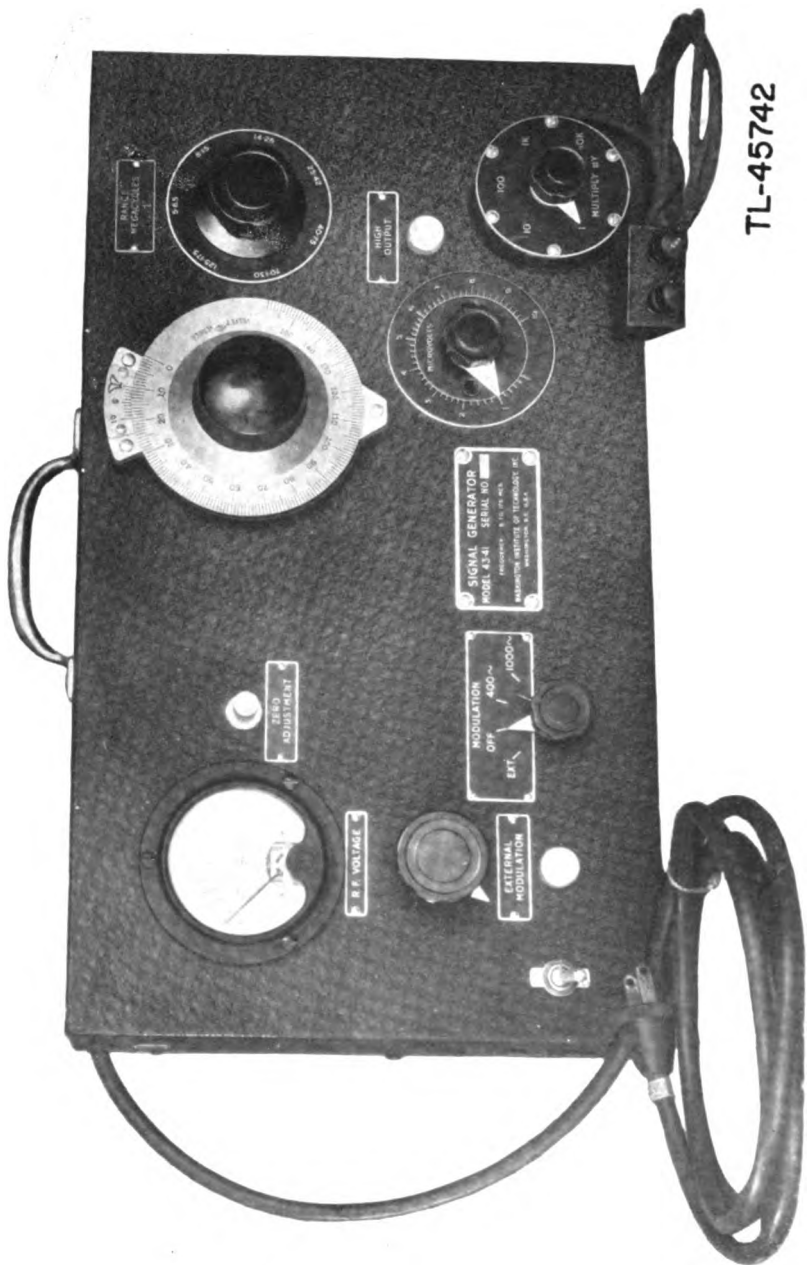


Figure 1. Signal Generator I-187-B (W.I.T. model 45-41).

# RESTRICTED

## SECTION I DESCRIPTION

### 1. GENERAL CHARACTERISTICS AND PURPOSES

a. Signal Generator I-137-B (fig. 1) is a self-contained calibrated radio-frequency generator; it has a fundamental range of 5 to 175 megacycles, with or without amplitude modulation. Operation is from a primary power source of 105 to 125 volts, 50-60 cycles. The power consumption at 115 volts is approximately 40 watts.

b. The principal purpose of this unit is to provide a source of radio-frequency voltage for use in aligning, calibrating, and measuring the sensitivity of certain amplitude-modulated types of fixed, mobile, or airborne radar and communication receiving equipment.

### 2. LIST OF COMPONENTS

Quan.	Component	Dimensions	Weight
1	Signal Generator I-137-B.	15-3/8" wd x 12" h x 8-1/4" d	20.6 lb
2	Plugs, contact male (P-101, P-102).	1-1/4" lg x 11/16" diam	0.1 ounce ea
2	Calibration charts.	6-1/8" wd x 8-1/8" h x 3/32" d	0.6 lb
7	Calibration curves.	9-1/4" wd x 11-1/2" h x 1/8" d	0.3 lb

### 3. DESCRIPTION

a. **General.** The signal generator (fig. 1) is housed in a welded aluminum case with a black wrinkle finish. It is provided with bumper feet on the bottom and a carrying handle centrally located on the top. All operating controls are located on the front panel, and the r-f cable, a coaxial line terminated in the terminal box at its end, is permanently attached to the attenuator switch (S-102) marked MULTIPLY BY.

The remaining controls are: ON-OFF power switch (S-104), ZERO ADJUSTMENT potentiometer (R-119) for setting the voltmeter to electrical zero, MODULATION switch (S-103), r-f oscillator tuning dial (C-101), band switch marked RANGE MEGACYCLES (T-101 to T-107), calibration control labeled R.F. VOLTAGE located directly beneath the R.F. VOLTAGE meter for setting the initial calibration and MICROVOLTS control (L-101) which varies r-f output in microvolts through a range of 1 to 10 times the setting of MULTIPLY BY switch. The EXTERNAL MODULATION and HIGH OUTPUT jacks are described in subparagraph c below. The permanently attached primary cable enters the left side of the case, below which is a fuse cover-plate concealing the 1-ampere fuse (F-101).

### b. Tube Complement.

Quan.	Tube Type	Function	Schematic ref. No.
1	6J5GT/G	Audio oscillator.	V-106
1	955	R-f oscillator.	V-101
1	955	Vacuum tube voltmeter	V-102
2	OB3/VR90	Voltage regulator.	V-103, V-104
1	5Y3GT/G	Rectifier.	V-105

**c. Operational Characteristics.** The fundamental radio-frequency range of Signal Generator I-137-B (W.I.T. model 43-41) is divided into seven bands as follows: 5-8.5 mc, 8-15 mc, 14-26 mc, 25-42 mc, 40-75 mc, 70-130 mc, and 125-175 mc. The magnitude of r-f signal voltage at the terminal box on the end of the r-f cable may be varied continuously from 1 microvolt to 0.1 volt. An r-f signal of approximately 0.7 volt is directly available at the HIGH OUTPUT receptacle (J-101) when the R.F. VOLTAGE meter is set on the red line at 1.0; this is done by the control marked R.F. VOLTAGE. Modulation frequencies of 400 and 1,000 cycles are supplied by an internal oscillator. Other modulation frequencies may be introduced through the EXTERNAL MODULATION receptacle (J-102).

## SECTION II

### INSTALLATION AND OPERATION

#### 4. INSTALLATION

**a. Unpacking.** Remove the following from the carton: the signal generator, a cloth bag containing two plugs (P-101 and P-102), an

envelope containing two technical manuals, and an envelope which contains two calibration charts and a set of calibration curves covering the seven frequency bands. Remove all protective packing material surrounding the signal generator. Untie the coiled r-f cable and the coiled power cable.

**b. Inspection of Equipment.** Inspect all controls and parts on the outside of the case to insure that they have not been damaged during shipment. Look for broken meter glass or cracked meter case, cracked knobs, bent dials, etc. Take off the back cover by removing the 10 screws that fasten it to the case. Remove the cardboard tube retainer from the tubes of the power supply and modulator unit. Be careful not to damage the coils mounted on the meter shield (fig. 2). Unfasten and remove the shields from the vacuum tube voltmeter and r-f oscillator units. Press all tubes firmly into their sockets (fig. 3). Replace the shields which were previously removed for inspection of the tubes.

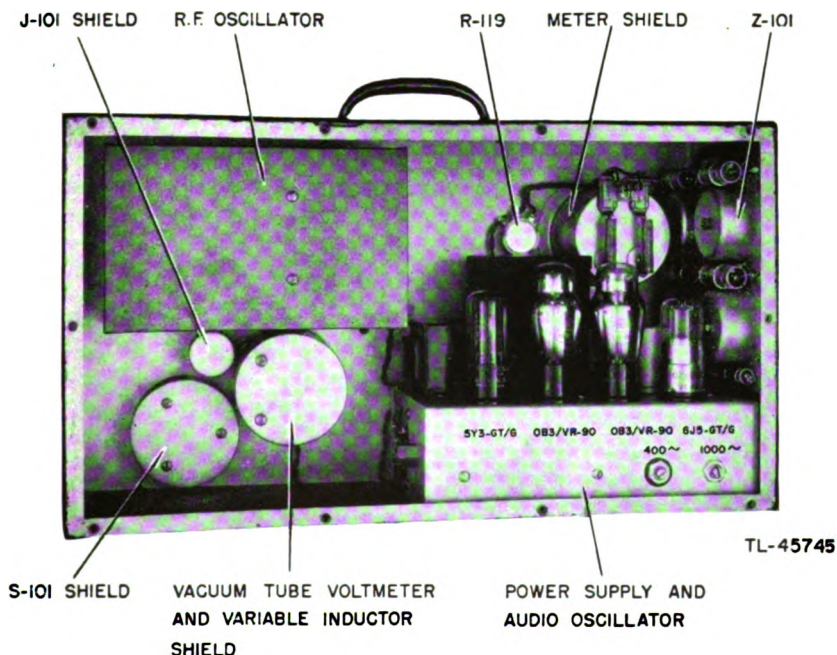


Figure 2. Signal generator cover removed, rear view.



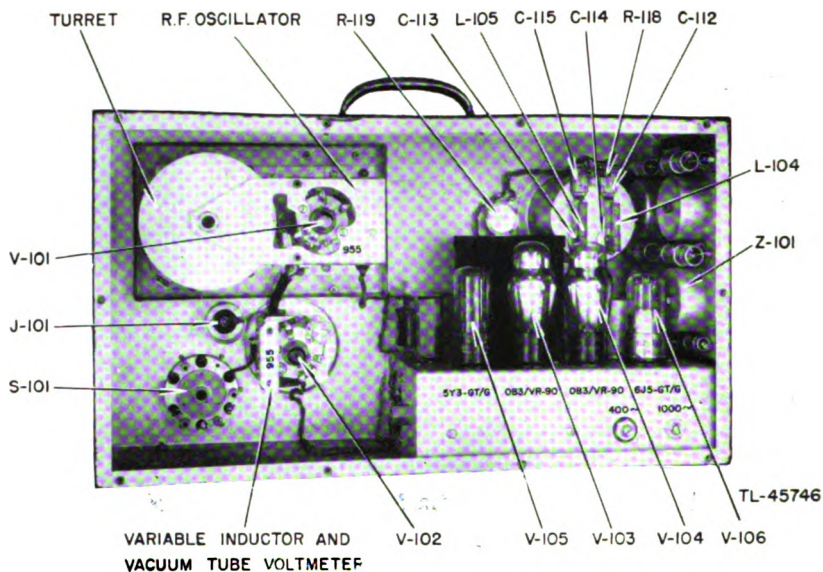


Figure 3. Signal generator cover and shields removed, rear view.

## 5. EQUIPMENT CAUTIONS

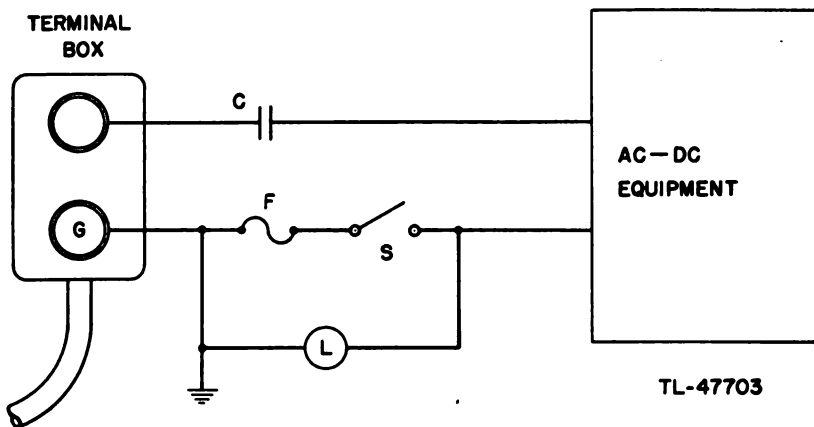
**a.** Fasten all shields securely in place, and check to insure that the mounting screws are tight. Try to avoid disturbing the location of any interconnecting wires; however, if it is necessary to move the wires, be sure to return them to their original location. Any change in the positioning of the interconnecting wires will disturb r-f fields in the set and may cause excessive r-f leakage. Do not adjust any controls on the inside of the chassis. Replace the back cover by driving all screws down tightly to reduce r-f leakage to a minimum.

**b.** Signal Generator I-137-B is supplied for 115-volts a-c 50-60 cycles. Before inserting power plug, check the supply frequency of the power line. Never connect it to a 25-cycle or a d-c supply.

**c.** When using the signal generator with other a-c operated equipment, shocks can be avoided by connecting the generator case to ground or to the case of the equipment with which it is being used.

**d.** Do not connect the terminal box or HIGH OUTPUT receptacle to a circuit having a voltage greater than 3 volts a-c or d-c without first placing capacitors in series with the terminals; the value of the capacitors is determined by the frequency being used. If this precaution is not taken, the resistors in the attenuator network may be overheated and change in value. Discrepancies in the output-voltage will result.

e. Do not use Signal Generator I-137-B with equipment designed for a-c/d-c operation unless connections are made similar to the circuit illustrated in figure 4. With switch "S" *open*, connect the equipment to the line. If lamp "L" lights, reverse the equipment line cord connection. The lamp should not light. Switch "S" may then be closed and measurements can be made safely. Make leads as short as practicable.



C- .5 MFD. CAPACITOR      S- SWITCH  
 F- 1/8 AMPERE FUSE      L- 40 WATT LAMP

Figure 4. Signal generator, connection for a-c/d-c equipment.

## 6. OPERATION

**a. Initial Adjustment.** Adjust the R.F. VOLTAGE meter for mechanical zero indication, using the screwdriver adjustment on the face of the meter. Rotate the R.F. VOLTAGE control fully counterclockwise. Plug in the power cord to the proper source of voltage, 50-60 cycles alternating current, and throw the toggle switch to ON position. The R.F. VOLTAGE meter will deflect below zero for a few seconds. Allow the equipment to warm up for 15 minutes. Remove the cap from the ZERO ADJUSTMENT control, and set the R.F. VOLTAGE meter to zero by means of the screwdriver control. Set the RANGE MEGACYCLES knob to the desired frequency range, and the tuning dial to the desired frequency as shown on the calibration chart. Set the R.F. VOLTAGE meter to 1.0 by rotating the R.F. VOLTAGE control clockwise. With the R.F. VOLTAGE meter at 1.0, the output of the generator in microvolts equals the reading of the MICROVOLTS dial times the setting of the MULTIPLY BY switch. The R.F. VOLTAGE

meter must be set to 1.0 for each different setting of the oscillator frequency dial.

**b. Impedance Matching.** (1) Use the dummy antenna or load recommended by the manufacturer of the receiver or instrument being tested when connecting the signal generator. Use the shortest leads possible to minimize any discrepancy between the voltage appearing at the terminal box and that being applied to the equipment under test. This precaution is particularly important when connecting the equipment to a reactive load such as a tube grid, when using small magnitudes of signal voltage, or when the signal frequency is high. It is preferable, if possible, to eliminate the ground lead entirely by clamping the output binding post marked GND directly to some part of the shielding structure of the equipment under test, and then using the shortest possible lead from the unmarked output terminal to the point at which the output voltage is to be applied.

**NOTE:** Output voltage errors in the order of 200 per cent may be introduced by using leads which are over 6 inches long.

(2) If no specific value is recommended for the dummy load, a non-inductive, 70-ohm resistor connected in series with the ungrounded binding post of the terminal box and the high potential side of the equipment being tested will usually give satisfactory results. Other values of dummy load may be needed; this depends on the impedance of the circuit connected to the terminal box. The output impedance at the terminal box is 30 ohms. Care should be taken when using the generator to see that external loads connected to the output terminals are not of such values as to shunt this resistance to any great extent. At higher frequencies, the reactances of even small capacitances become low, and the reactances of such loads should be calculated to be certain that they are not comparable with the generator output impedance. If the impedance is of very small magnitude, take adequate precautions to compensate for it. As explained previously in this subparagraph, this may be accomplished by inserting a dummy load in series with the equipment being tested to raise the impedance of the total load connected to the output terminals of the generator. When a dummy load is used, the output voltage of the generator is no longer the input voltage to the equipment being tested. To determine this voltage, if desired, a high impedance voltmeter should be used or the value may be calculated from the value of generator output voltage and the impedances of the load. In most cases, however, where the value of voltage input to the equipment under test is required, the input will be to a tube grid or other high impedance point to which the generator may be connected directly.

**c. Output Indication.** When using Signal Generator I-137-B in con-

junction with a communications receiver, and when a relative indication of signal output is desired, use the method recommended in the technical manual, bulletin, or instruction book of the equipment under test. A visual check of the signal generator is more accurate than a sound check. Differences in aural signal strength cannot be determined accurately by ear. In the absence of instructions, this procedure can be accomplished by either of the following: the measurement of current flow in the cathode circuit of the output stage of the receiver; the measurement of its audio output voltage.

**NOTE:** For precise adjustments, turn off the AVC (automatic volume control), and reduce the r-f and a-f gain to the lowest practicable limit.

**d. Frequency Calibration.** The frequency calibration of the signal generator for each of the seven frequency bands is supplied in the form of curves plotted on separate sheets for each band, and also in the form of two charts which consist of a tabulation of frequency increments against corresponding settings of the oscillator tuning dial.

(1) In general, the calibration curves provide the quickest means of obtaining a desired dial setting for any given frequency. The charts provide greater accuracy than the curves because dial settings are listed numerically. When the given frequency falls between two values listed, it is necessary to interpolate in order to obtain the corresponding dial setting. To illustrate the process of interpolation, consult the following sample.

Given frequency: 7.3 mc.

To find: dial setting at this frequency.

Sample chart showing portion of 5–8.5-mc. frequency band listed:

<i>Mc</i>	<i>Scale</i>
7.0	72.4
7.5	89.8

The difference between the frequencies listed nearest the given frequency is:  $7.5 - 7.0 = 0.5$  mc.

The difference between corresponding dial settings (scale) listed is:  $89.8 - 72.4 = 17.4$ .

The difference between the given frequency and the nearest lower frequency is  $7.3 - 7.0 = 0.3$  mc.

$$\text{Now } \frac{0.3}{0.5} \times 17.4 = \frac{3}{5} \times 17.4 = \frac{52.2}{5} = 10.4.$$

Then the desired dial setting equals lower dial setting listed 72.4 plus 10.4 or 82.8.

(2) If a heterodyne frequency meter of the required frequency range is available, even greater accuracy may be achieved in setting the signal generator to a desired frequency; however, the use of the calibration curves or charts will provide sufficient accuracy of setting required in most cases.

**e. R-f Output Voltage.** (1) **OUTPUT CONTROLS.** There are two output controls, the MICROVOLTS dial and the MULTIPLY BY switch. Set the MICROVOLTS dial for the first two significant figures of the microvolts output desired. Set the MULTIPLY BY switch to the position which, when used as a multiplier for the reading of the MICROVOLTS dial, will give the output in microvolts desired. For example, if 580 microvolts output is needed, set the MICROVOLTS dial to 5.8 and the MULTIPLY BY switch to 100. Use the same method when noting any output to which these controls may be adjusted; read the result obtained directly in microvolts.

(2) **SCALE ACCURACY.** Do not attempt to obtain zero microvolts output by rotating the MICROVOLTS dial fully counterclockwise. The lowest useful position of the dial on the scale is 1. The area of the scale below 1 is used to locate the pointer accurately when replacing the knob on the shaft. The r-f voltage output of the attenuator network has been tested at the factory to be within  $\pm 5$  per cent over the frequency range from 5 mc to 100 mc inclusive, and within  $-5 + 10$  per cent over the frequency range from 100 mc to 175 mc inclusive.

(3) **HIGH-VOLTAGE OUTPUT.** Remove the cap from the HIGH OUTPUT receptacle, and plug in a lead which must be made with the accessory plug (P-101) on one end. Adjust the R.F. VOLTAGE control for an indication of 1.0 on the R.F. VOLTAGE meter. Approximately 0.7 volt is available at all frequencies. The magnitude of the voltage output may be controlled with the R.F. VOLTAGE knob. Replace the cap when this receptacle is not in use.

(4) **APPLICATION.** Follow the method recommended in the technical manual of the instrument being tested for the proper technique in controlling r-f voltage input into the instrument under these conditions.

**f. Modulation.** Set MODULATION switch to 1000 for 1,000-cycle modulation, to 400 for 400-cycle modulation, and to OFF position when only the carrier signal is to be used. To modulate the output of the signal generator from an external source, set switch to EXT position. Remove cap from the EXTERNAL MODULATION receptacle, and plug in a lead which must be made up with the accessory plug (P-102) on one end. Connect the opposite end of the lead to an audio oscillator which is capable of a voltage output of 40 volts rms. Adjust the voltage output of the audio oscillator to approximately 38 volts rms for 30 per

cent modulation of the carrier signal. For audio frequencies above 5,000 cycles, reduce the audio voltage from the external oscillator until 30 per cent modulation is observed on an oscilloscope connected to the HIGH OUTPUT receptacle. This adjustment should be made with the signal generator set at a frequency of 5 megacycles in accordance with paragraph 12.

**g. Precautions During Operation.** (1) GENERAL. Observe the precautions outlined in this paragraph, as well as the preceding detailed operational instructions for each of the controls of the instrument.

(2) POWER SOURCE. A power source supplying 115 volts ( $\pm 2$  volts), 50-60 cycles alternating current should be used when operating the signal generator, since all calibrations and tests were performed upon it at this voltage. The equipment will operate without damage, however, over the range of 105-125 volts.

(3) R.F. VOLTAGE METER. Always check the mechanical adjustment of the meter for an indication of zero before applying power to the signal generator. Allow the equipment to warm up for 15 minutes or more before attempting to make any accurate measurements. Check the electrical zero adjustment of the meter periodically when precise measurements are being performed. Be sure that the R.F. VOLTAGE control is rotated to the extreme counterclockwise position each time the zero adjustment is checked. Set the R.F. VOLTAGE meter to 1.0 (red line on the scale) by rotating the R.F. VOLTAGE control clockwise. It is important that the meter is set exactly at this point, since a slight error in this adjustment may cause a similar or greater error in the output signal and voltage. Tapping the meter case lightly will tend to correct any slight tendency of the meter indicator to stick.

(4) TUNING. The amount of backlash in the oscillator-tuning dial is less than 0.1 of one dial division. To keep errors at a minimum, always approach the dial settings from the same direction of rotation. When switching bands, be sure that the detent mechanism is positively engaged at the band desired in order to prevent faulty operation and departures from the frequency calibration. The frequency calibration and the resetability of the signal generator to a previously selected frequency is accurate to 0.4 per cent.

(5) VOLTAGE OUTPUT. The MICROVOLTS dial can be set to readings with less than a 0.1 microvolt error. Any error in the setting of this dial is increased by the multiplication factor determined by the position of the MULTIPLY BY switch while the percentage error is constant. The voltage output controls have an accuracy of  $\pm 5$  per cent from 5 to 100 mc. and  $-5 + 10$  per cent from 100 to 175 mc. Do not connect the signal generator to any point where 3 volts or more are present, since the resistors in the attenuator network of the output cir-

cuit will change value or become defective, and the accuracy of the voltage output will be destroyed.

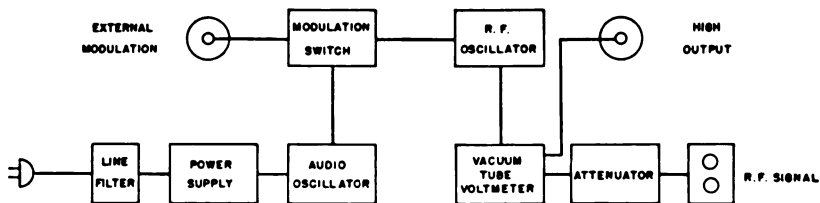
(6) CONNECTIONS TO OTHER EQUIPMENT. Connect the signal generator and any other equipment used during the test to a common external grounded point. This precaution eliminates the beat note which may exist between the ripple frequencies of different power supplies and pick-up of extraneous signals. It also protects the operator against shocks. Use the shortest possible leads when connecting the terminal box to other equipment. This minimizes any discrepancy between the voltage at the terminals and the voltage at the point where connection is made to the equipment. This precaution is particularly important when connecting equipment to a reactive load, when using small magnitudes of signal voltage, when the signal frequency is high, or when any combination of these operating conditions exists (par. 6b).

### SECTION III

## FUNCTIONING OF PARTS

### 7. FUNCTIONING OF PARTS

**a. General.** Signal Generator I-137-B consists of six basic subassemblies mounted in the case (fig. 2) and interconnected as shown in figure 18. The subassemblies are a power line filter unit, an a-c operated power supply and modulator unit, an r-f oscillator, a vacuum tube voltmeter, an indicating meter, and an attenuator. Figure 5 shows a block diagram of the subassemblies. Six vacuum tubes are utilized in the signal generator (fig. 20); one type 955 tube (V-101) as an r-f oscillator,

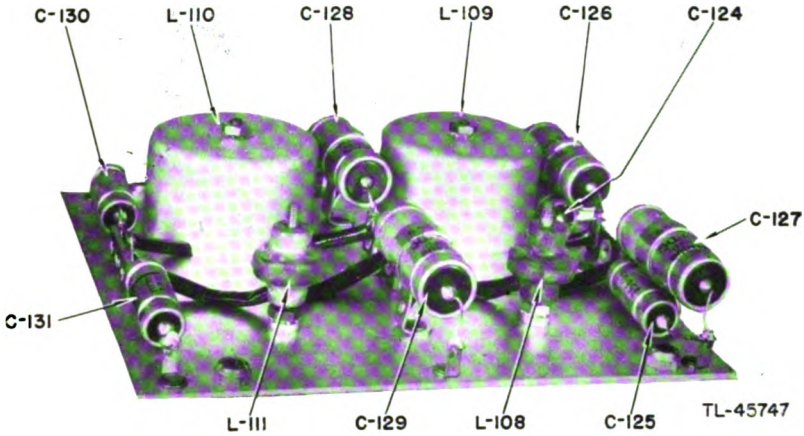


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Figure 5. Signal Generator I-137-B, block diagram.

one type 955 tube (V-102) as a vacuum tube voltmeter, two type 0B3/VR90 tubes (V-103 and V-104) as voltage regulators, one type 5Y3-GT/G (V-105) as a power supply rectifier, and one type 6J5-GT/G tube (V-106) as an audio oscillator.

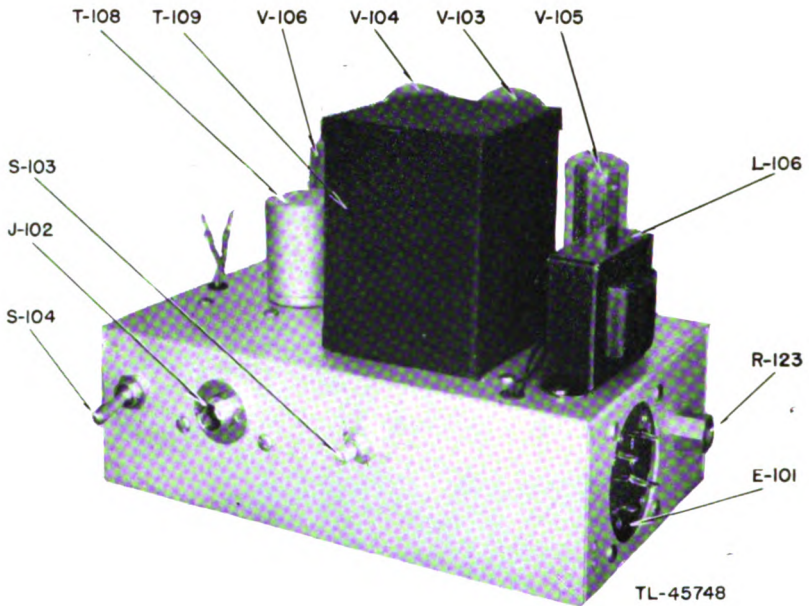
**b. Power Line Filter (figs. 2, 6, and 20).** Line filter Z-101 prevents radio-frequency signals from escaping from the signal generator through the power cord. Both sides of the line are filtered by means of r-f inductors L-108, L-109, L-110, L-111, and bypass capacitors C-124, C-125, C-126, C-127, C-128, C-129, C-130, and C-131. The 115-volt line voltage is applied to plug P-103, and the output side of the filter unit connects through switch S-104 to one side of the power transformer primary and through fuse F-101 to the other side of the power transformer primary.



*Figure 6, Line filter Z-101, two shields removed.*

**c. Power Supply and Modulator Unit (figs. 2, 7, and 8).** (1) The power supply utilizes a type 5Y3-GT/G full-wave rectifier tube to supply d-c potentials for the various vacuum tubes in the unit. Single-pole, single-throw switch S-104 and fuse F-101 in series with the transformer primary winding provide means for turning the power on and protection against overload.





*Figure 7. Power supply and audio modulator, front view.*

(2) The power transformer has three secondary windings: a high-voltage winding connected to the plates of the rectifier tube, a low-voltage winding connected to the filament of the rectifier tube, and a low-voltage winding supplying filament voltage for the remaining tubes in the signal generator.

(3) The rectified output of V-105 is filtered by a capacitance-input filter which consists of inductor L-107 and capacitors C-122 and C-123. The d-c voltage is regulated by regulator tubes V-103 and V-104 connected in series with R-125, across the output side of the filter. The high-voltage circuit between the rectifier tube and the filter is routed through the jumper connections in the bases of the regulator tubes so that plate voltage will be disconnected if the regulator tubes are removed from the sockets. The regulated voltage across V-103 (90 volts) is connected through R-121 to the minus terminal on terminal strip E-101.

(4) The audio oscillator which provides modulation voltage at 400 and 1,000 cycles utilizes a type 6J5-GT/G tube (V-106) in an inverse feedback circuit. The primary of transformer T-108 connected to the plate of V-106 is tuned to 1,000 cycles by capacitor C-118 and to 400 cycles by capacitor C-119. The low side of the primary of T-108 is connected to voltage regulator tube V-104, and a regulated d-c potential of 180 volts is applied to the plate of V-106. The secondary of T-108 is connected between the grid of V-106 and ground. A tap in the primary of T-108

is connected through resistor R-126 and inductor L-106 to potentiometer R-120 in the plate circuit of the r-f oscillator tube V-101. Capacitor C-121 provides bypassing at audio frequencies. The potential across potentiometer R-120 is therefore varied in amplitude by the audio-frequency potential across the primary of T-108. The amplitude of the audio frequency is adjusted by varying the bias voltage on the cathode of V-106. Rheostats R-128 and R-129 control the bias voltage for operation at 400 and 1,000 cycles respectively, and these were adjusted at the factory to provide 30 per cent modulation. Resistor R-127 provides protective bias voltage in the event that either rheostat is set at zero resistance. Rheostat R-129 is short-circuited in the 400-cycle position of switch S-103. Receptacle J-102 connected by capacitor C-120 to inductor L-106 provides for connection of an external modulation source. The three-section, four-position switch S-103, shown in the 1,000-cycle modulation position on the schematic diagram, (fig. 20) provides for selection of 1,000-cycle modulation, 400-cycle modulation, no modulation, or external modulation. Inductor L-106 is short-circuited in the 400- and 1,000-cycle positions, and the secondary winding of T-108 is short-circuited in the external modulation position. Inductor L-106 is the modulation choke for external modulation.

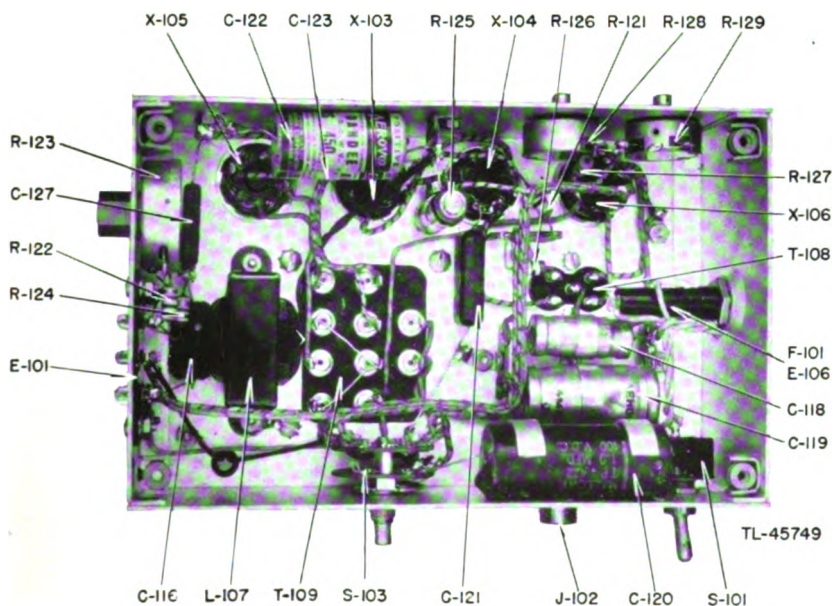


Figure 8. Audio modulator, bottom view.

(5) The resistance network, composed of R-122, R-123, and R-124 connected to the plus terminal and the C-terminal of E-101, is a part of the calibration circuit of the vacuum tube voltmeter. Potentiometer R-123 controls the vacuum tube voltmeter sensitivity by varying the cathode potential on V-102. Capacitor C-117 provides r-f bypassing.

(6) One side of the filament voltage secondary of transformer T-109 is connected to ground, and the other side is connected to the filament of V-106 and to terminal F on E-101 for distribution of voltage to the other tubes in the unit. Capacitor C-116 provides r-f bypassing.

**d. Variable R-f Oscillator (figs. 2, 9, and 10).** The r-f oscillator utilizes a type 955 tube in a series-feed Hartley oscillator circuit. R-f transformers T-101 to T-107 are housed in a turret in a manner which permits each transformer to be switched into operating position by rotation of the RANGE MEGACYCLES dial. Transformers which might cause undesirable resonance effects are short-circuited and grounded by appropriately placed contact springs. Feedback between the plate and grid circuits is obtained by connecting the cathode to a tap in the transformer winding and by using the mutual inductance between the two sections of the winding as a coupling medium. Resistor R-101 and capacitors C-102 are the grid leak and grid capacitor. Straight-line frequency type variable capacitor C-101 is the tuning capacitor; it is controlled from the front of the case by the vernier-tuning dial.

(1) Capacitor C-103 provides r-f bypassing for the plate of V-101. Inductor L-102 and capacitors C-105, C-106, and C-107 provide r-f filtering in the filament circuit of V-101. Filter network Z-102, which is composed of resistor R-102 and inductor L-103 in parallel, together with capacitors C-104 and C-108, provides r-f filtering in the plate circuit of V-101.

(2) Oscillator output voltage is developed across a low-impedance winding which is mutually coupled to the oscillator tank winding in each transformer. This output voltage is connected to the vacuum tube voltmeter and the attenuator system by a short length of two-wire shielded line.

(3) The oscillator unit is completely inclosed in a copper shield to prevent radiation of r-f signal to other parts of the unit. This shield must be securely fastened at all times for proper operation of the signal generator.

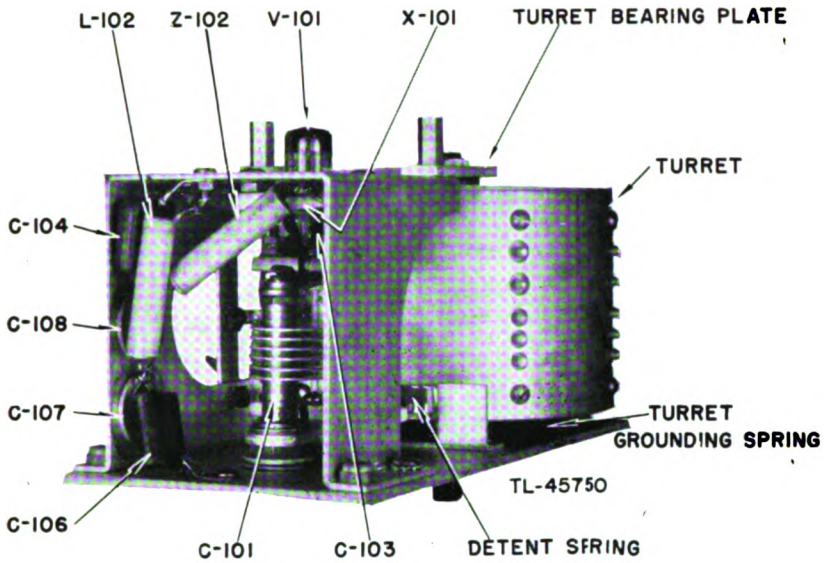


Figure 9. R-f oscillator, side view.

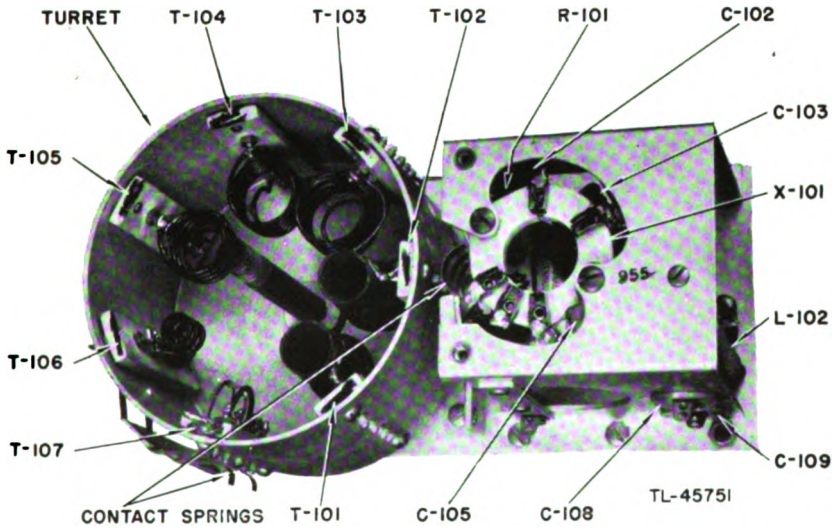


Figure 10. R-f oscillator, less turret cover, back view.

e. **Vacuum Tube Voltmeter (figs. 2, 11, 13, 18, and 20).** The variable inductor L-101 used to vary the magnitude of the r-f output is made a part of the vacuum tube voltmeter assembly because of the necessity for keeping lead lengths to a minimum at high frequencies. The r-f components of the vacuum tube voltmeter are mounted in this assembly; the calibrating and indicating components are located elsewhere.

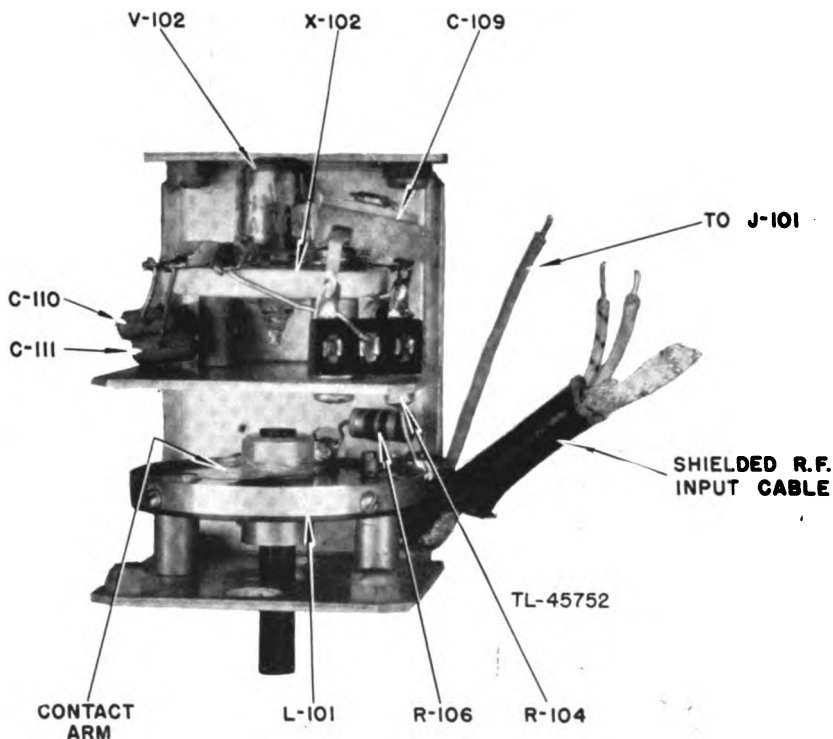


Figure 11. Vacuum tube voltmeter and variable inductor, side view.

(1) Figure 13 is a functional diagram of the complete vacuum tube voltmeter circuit. A type 955 vacuum tube having the plate and grid connected together is used as a diode-rectifier. The tubes used have been properly aged and selected for uniformity of "contact" or "drift" current. This current is caused by the random flow of electrons across a vacuum tube which has a heated cathode and is commonly known as the Edison effect. This drift current is used as a basis for zero setting the voltmeter. The d-c circuit for V-102 (fig. 13) consists of the variable inductor L-101, resistor R-104, and resistor R-124 shunted by the meter circuit. Capacitors C-110 and C-117 provide r-f bypassing. Drift current in V-102 establishes a voltage drop across resistor R-124. A similar voltage drop is established by the voltage-divider network resistors, R-118, R-121, and rheostat R-119 connected across voltage

regulator tube V-103. Meter M-101 and its associated filter network is connected in series with resistor R-122 and rheostat R-123 between these two points of similar potential. If rheostat R-119 (zero adjustment control) is adjusted so that the potential across the combination R-118 and R-119 is exactly equal to the potential across R-124, the meter will indicate zero. This establishes the initial operating point of the vacuum tube voltmeter. The oscillator output is impressed across variable inductor L-101 (fig. 13). The resistance-capacitance network composed of resistors R-104 and R-105 and trimmer-capacitor C-109 forms a voltage-divider network which may be adjusted to compensate for undesirable frequency effects which influence the voltmeter indication at higher frequencies. V-102 is connected to the junction of R-104 and R-105, and the direct current flowing through R-124 causes a voltage drop which is measured by the meter. The indication on a meter for a given voltage is proportional to the resistance in series with the meter and in calibrating the signal generator output voltage, R-123 is adjusted so that an indication of 1.0 on the meter corresponds to 0.1 volt rms as measured by a high-impedance vacuum tube voltmeter connected to the terminal box of the output cable. This calibration adjustment is made at 5 mc with the attenuator controls set to maximum output.

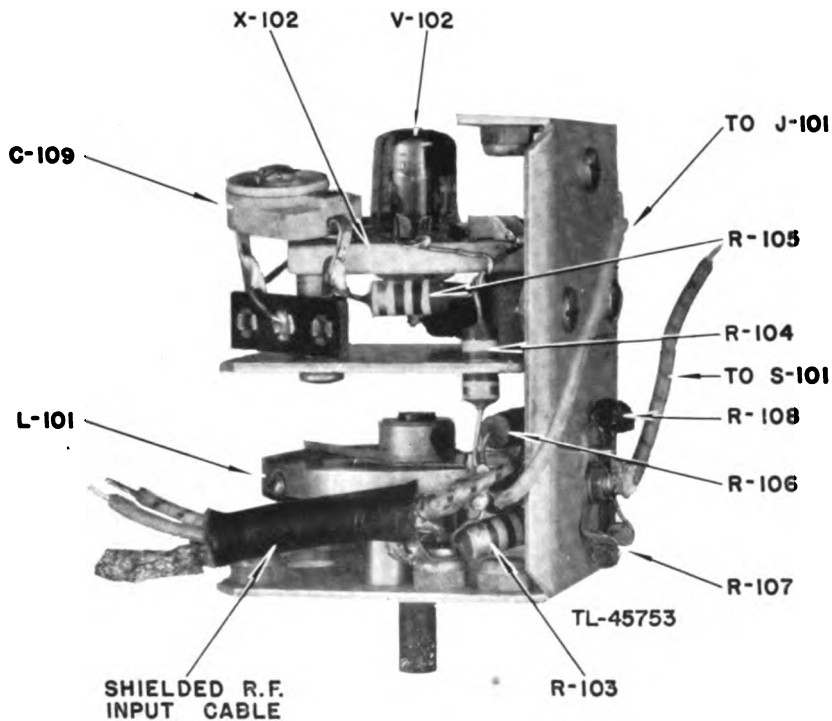


Figure 12. Vacuum tube voltmeter and variable inductor, top view.

(2) The variable inductor consists of approximately one turn of silver ribbon on a phenolic form; a contact arm with a coin-silver contact point provides positive smooth-action contact with the ribbon. Resistors R-103 and R-106 act to minimize the variations in loading as a result of different positions of the variable-inductor contact arm. Resistors R-107 and R-108 form a voltage divider, and the junction of the two resistors is connected to the input of the decade step attenuator. The impedance at this junction point is approximately 30 ohms for proper matching to the step attenuator input.

(3) HIGH OUTPUT receptacle J-101 is connected to the high potential side of the variable inductor. This receptacle is inclosed in a shield, and a cap covers the extension external to the case. Such protection minimizes stray r-f leakage.

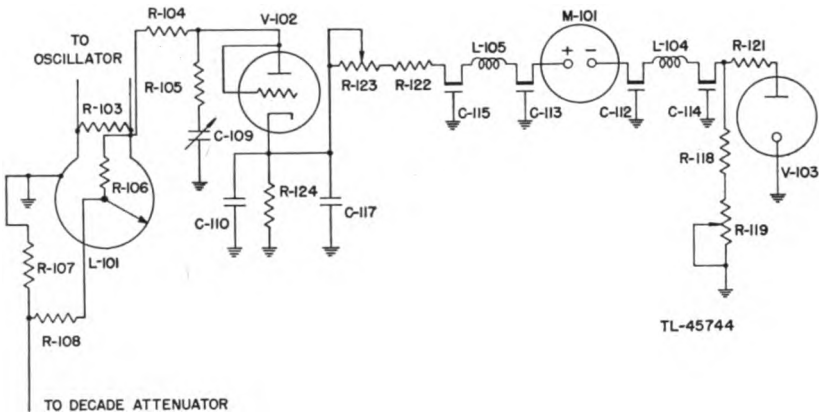


Figure 13. Vacuum tube voltmeter circuit.

**f. Meter (figs. 1 and 2).** (1) R-f voltage meter M-101 is a 50-micro-ampere instrument with a scale calibrated in terms of the r-f voltage appearing at the terminal box at the end of the output cable. The vacuum tube voltmeter circuit has been adjusted so that the meter indicates 1.0 when the output voltage is 0.1 volt rms. For other scale indications, the output is proportional to the scale reading.

(2) Circuits to the meter are filtered by the inductance-capacitance filters which are composed of inductors L-104, L-105, and capacitors C-112, C-113, C-114, C-115. The meter is housed in a shield to prevent stray r-f leakage. The filters and resistor R-118 are mounted on the meter shield assembly.

**g. Decade Step Attenuator (figs. 2, 14, and 15).** The attenuator assembly consists of a specially constructed switching arrangement (switch S-102, fig. 20) to which the resistors comprising the constant

impedance multiple-pi attenuator network are connected. The construction used reduces mutual coupling between resistors to a minimum.

(1) The front section of the attenuator housing (fig. 15) contains the contact arm, to which the r-f cable is connected by a contact plate, and the six contact studs. Series resistors R-113, R-114, R-115, R-116 are connected between the contact studs which project through insulating buttons into the rear section; the resistors lie in a groove (fig. 14) for shielding purposes. The shunt resistors R-109, R-110, R-111, and R-112 lie in cut-outs in the housing and are connected to the housing (fig. 14).

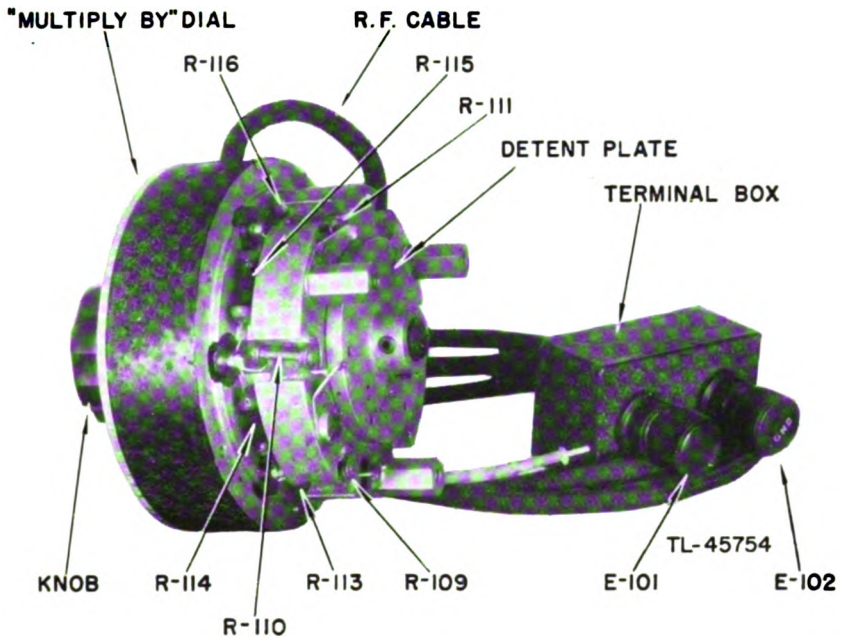


Figure 14. Attenuator S-102.

(2) The voltage output from the variable inductor L-101 is applied to the 10 K position by the connection of the junction of resistors R-107 and R-108 to resistor R-113. The impedance at each step of the network is approximately 30 ohms, and the attenuation ratio is approximately 10/1 for each step.

(3) The total attenuation is 100,000/1 divided into five decade steps of 20 decibels each (10/1 voltage ratio). The variable inductor L-101 calibrated from 1 to 10 provides vernier control of the attenuation between the decade steps. The output is therefore continuously variable over a range from 1 microvolt to 100,000 microvolts, since 0.1 volt of signal is applied to the 10 K position.

(4) The cable attached to the attenuator is a shielded r-f transmission



line with a characteristic impedance of 30 ohms. The cable terminates in a 30-ohm resistor (R-117); therefore, the line is properly matched. Resistor R-117 is mounted in a terminal box provided with terminals for connection to circuits under test. The impedance as measured at the terminal box is approximately 15 ohms for all attenuator steps. If the matching impedance at the terminal box is appreciably altered by external loads, standing waves result, and this materially affects the accuracy of the output.

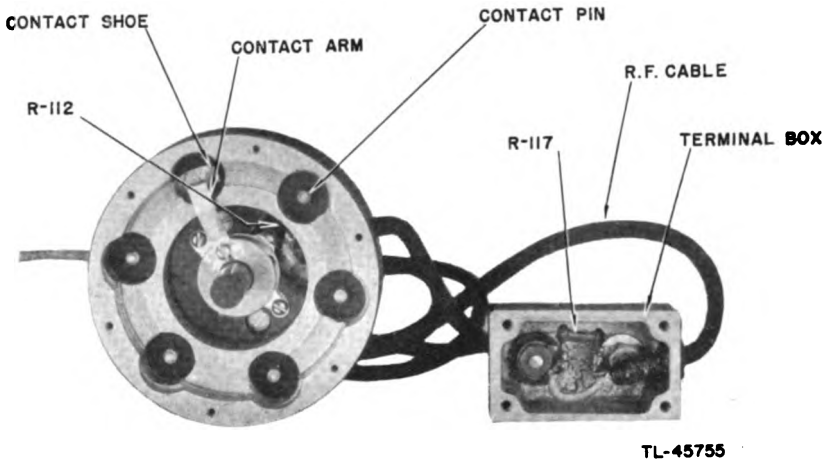


Figure 15. Attenuator S-102, cover removed.

## SECTION IV

### MAINTENANCE

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**NOTE:** Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W. D., A. G. O. Form No. 468 (Unsatisfactory Equipment Report). If Form No. 468 is not available, see TM 38-250. Failure or unsatisfactory performance of equipment used by Army Air Forces will be reported on Army Air Forces Form No. 54 (Unsatisfactory Report).

#### 8. GENERAL

The exact placement of parts in the signal generator is much more critical than the placement of parts in instruments intended for lower frequencies. If any parts are removed for inspection or replacement, they must be replaced in exactly the same positions, and all wiring must

be replaced exactly as found. Neglect of this precaution may result in output voltage errors of many hundred per cent, or perhaps this may set up leakage fields so great as to make the instrument unfit for use. The following subparagraphs contain suggestions for tests which may be made in order to determine whether or not the instrument is working properly.

**a. Meter Reading Low.** (1) Determine if the zero of the meter is properly set, as described in paragraph 6.

(2) With the zero properly set, see if output of 1.0 on the R.F. VOLTAGE meter can be obtained on all coils.

(3) If this is not obtained, check to see if the aging of the oscillator tube is the source of trouble. Replace it with a new tube.

(4) If a new tube is not available, the instrument can be operated at a R.F. VOLTAGE value lower than 1.0, such as 0.5. In this case output values must be multiplied by 0.5.

(5) Low output may also be caused by dirty contacts on the coil drum.

**b. Meter Cannot be set to Zero.** With the R.F. VOLTAGE control set fully counterclockwise or the RANGE switch set between points, the R.F. VOLTAGE meter should read zero. This meter is a diode type of vacuum tube voltmeter. The ZERO ADJUSTMENT screw controls the biasing voltage for balancing out the initial or drift current. A meter reading higher than zero indicates a failure of this biasing voltage. This failure may be caused by an open resistor, an open connection, or possibly, failure of entire B+ supply. A meter reading below zero indicates excessive biasing voltage, which may be caused by failure of the biasing potentiometer, a defective contact, or a bad voltmeter tube. See if the tube is operating by looking for the glow of the heater.

**c. Discrepancies in Output Voltage.** Errors in output voltage may be due to defective resistors in the step attenuator. The operation of this attenuator can be checked as follows. Connect the output of the generator through the usual dummy antenna to a receiver with a manual volume control. Set the signal generator for 10 microvolts output (set MICROVOLTS at 10, MULTIPLY BY switch set at 1). Tune the receiver and adjust the volume control to give a suitable output which can be read on an output meter connected to the receiver. Then turn the output dial of the generator to zero, set the switch on MULTIPLY BY 10, and increase the MICROVOLTS dial setting until the same output is obtained as before. Check to see that the R.F. VOLTAGE meter is set at 1.0. The MICROVOLTS dial should read 1.0 (since this would give 10 microvolts indicated output, as before). Similar checks by reducing the receiver sensitivity can be made between other attenuator ranges at 10,000 and 1,000 microvolts. These tests check the attenuation of each successive step in the attenuator. Keep the receiver gain

steady during this test. If line voltage or anything else varies, repeat the test.

**d. Other troubles.** The above paragraphs describe the troubles most likely to occur. The schematic diagram (fig. 20) shows values of components of the circuit which will be helpful in locating other troubles, should they occur. The voltage of the B+ terminal should be 170-180 volts; the VR-90 tube regulates the voltage to this value for greater stability in operation. Heater voltages are about 6.3 volts a-c, and the modulation voltage at the B+ terminal should be about 37 volts a-c rms, when read on a high-impedance a-c voltmeter. This meter should have provision for stopping d-c currents so that it will read a-c voltage only. Resistance and voltage charts are given on figures 16 and 17.

## 9. STANDARDS OF NORMAL OPERATION

If the signal generator is performing normally, the following conditions will prevail:

**a.** When the power switch is first turned on, the r-f voltage meter M-101 deflects off-scale below zero momentarily.

**b.** With the R.F. VOLTAGE control R-120 fully counterclockwise, adjust the ZERO ADJUSTMENT R-119 for an indication of zero on the R.F. VOLTAGE METER M-101. It is normal for this adjustment to drift gradually.

**c.** Within the calibrated limits of each band for any signal output, adjust the R.F. VOLTAGE meter to 1.0. It is normal for the R.F. VOLTAGE indication to drift slightly, but it is not normal for this indication to be erratic or jumpy.

**d.** The RANGE MEGACYCLES and MULTIPLY BY knobs have positive detent action for each position, and operate with a stiffer action than the other controls.

## 10. LUBRICATION

All exposed wiping contacts have been lubricated at the factory. If there is faulty operation which can be attributed to poor electrical contacts, wipe off what remains of the old grease with a clean soft cloth, and with a toothpick or other soft instrument apply a thin film of Grease, Lubricating, Special, GL, Specification Ordnance No. AXS-637.

## 11. REPLACEMENT OF FUSE AND TUBES

**a. Fuse.** (1) Remove screws in fuse cover plate from the left side of the case.

(2) Unscrew the red insert from the extractor-type fuse post E-106.

(3) If fuse is found to be defective, replace with Littell-fuse type 8AG 1-ampere fuse.

(4) Replace cover plate; be sure to tighten screws securely.

**b. Tubes.** (1) Remove the 10 screws from the rear cover plate.

(2) Tubes V-103, V-104, V-105, and V-106 are located on the power supply chassis (fig. 3).

(3) Remove the two screws holding the r-f oscillator shield cover (fig. 2) for access to oscillator tube V-101 (fig. 3).

(4) Remove the two screws holding the vacuum tube voltmeter cover (fig. 2) for access to vacuum-tube-voltmeter tube V-102 (fig. 3).

(5) Replace the shields, taking special care to avoid damaging the wiring. Fasten the screws securely to insure accuracy of this instrument.

## 12. AUDIO-FREQUENCY MODULATION ADJUSTMENTS

**a. Internal Audio Oscillator (400 and 1,000 cycle).** (1) The percentage modulation for 400 cycles is controlled by R-128, and the percentage modulation for 1,000 cycles is controlled by R-129 (fig. 9). Varying the 400-cycle voltage will have some effect on 1,000-cycle voltage; therefore, always adjust the 400 cycles first. These controls vary the a-f volts.

(2) Percentage modulation is calculated from a-f and d-c voltage measurements taken between ground and the B-terminal board E-101, located on the side of the power supply (fig. 7).

$$\text{Percentage Modulation} = \frac{\text{Peak a-f volts}}{\text{D-c volts}} \times 100$$

**NOTE:** Peak a-f volts = 1.41 × rms volts.

(3) Measurements should be taken at signal generator setting as follows:

FREQUENCY	5 megacycles
MULTIPLY BY	10-K
MICROVOLTS	10
R.F. VOLTAGE	1.0
MODULATION	400 ~ (for 400-cycle setting)
MODULATION	1000 ~ (for 1,000-cycle setting)

**b. External Modulation.** (1) Modulation percentage is controlled by the amount of a-f voltage supplied to the EXTERNAL MODULATION receptacle.

(2) Modulation percentage is calculated as in paragraph 12a (2) and (3) except that the MODULATION is set at EXT.

**c. Modulation Observation.** The modulated output of the signal generator may be viewed on an oscilloscope if a tuned r-f transformer is inserted between the HIGH OUTPUT and the vertical deflection plates. The transformer should be tuned to 5 mc.

## SECTION V

### SUPPLEMENTARY DATA

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#### 13. REMOVAL AND REPLACEMENT OF LINE FILTER Z-101 (FIG. 6)

- a. Unsolder the two wires going to the power supply.
- b. Remove the four mounting screws, located on the outside of the signal generator case.
- c. Replace the line filter by reversing the above procedure.

#### 14. REMOVAL AND REPLACEMENT OF POWER SUPPLY CHASSIS (FIG. 7)

- a. Unsolder the two wires going to the line filter.
- b. Remove the following from the front panel:
  - (1) The nut holding the ON-OFF switch.
  - (2) EXTERNAL MODULATION cap.
  - (3) MODULATION knob.
- c. Unscrew the four screws on the under side of the signal generator.
- d. Remove the chassis carefully, taking precautions not to damage meter shield and components located on the under side of the power supply (fig. 8).
- e. Replace the power supply by reversing the above procedure.

#### 15. REMOVAL AND REPLACEMENT OF METER M-101

- a. Unscrew the three screws on the front of the meter; at the same time hold the nuts located inside the chassis. This loosens both the meter shield and the meter.
- b. Take off the meter shield.
- c. Loosen the two nuts on the rear of the meter.

#### 16. REMOVAL OF OTHER SUBASSEMBLIES

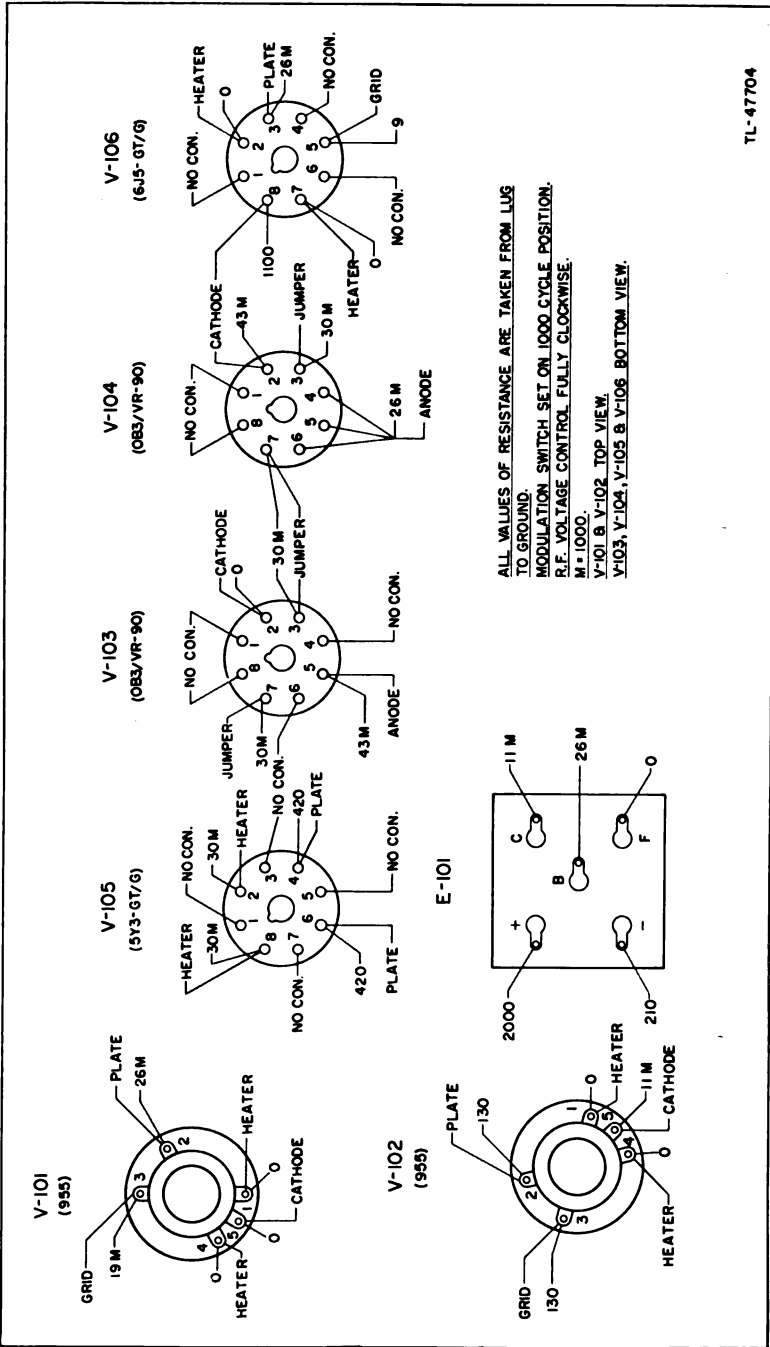
- a. The r-f oscillator, vacuum tube voltmeter, and attenuator should not be removed unless qualified personnel and adequate laboratory test equipment are available. Removal and reassembly will affect the accuracy of the signal generator.

#### 17. AVERAGE PERFORMANCE DATA

Frequency calibration	$\pm 0.4\%$ (from calibration chart)
R-f voltage output	5-100 mc $\pm 5\%$
	100-175 mc $-5 + 10\%$
Audio frequencies	400 cycles $\pm 10\%$
	1,000 cycles $\pm 10\%$

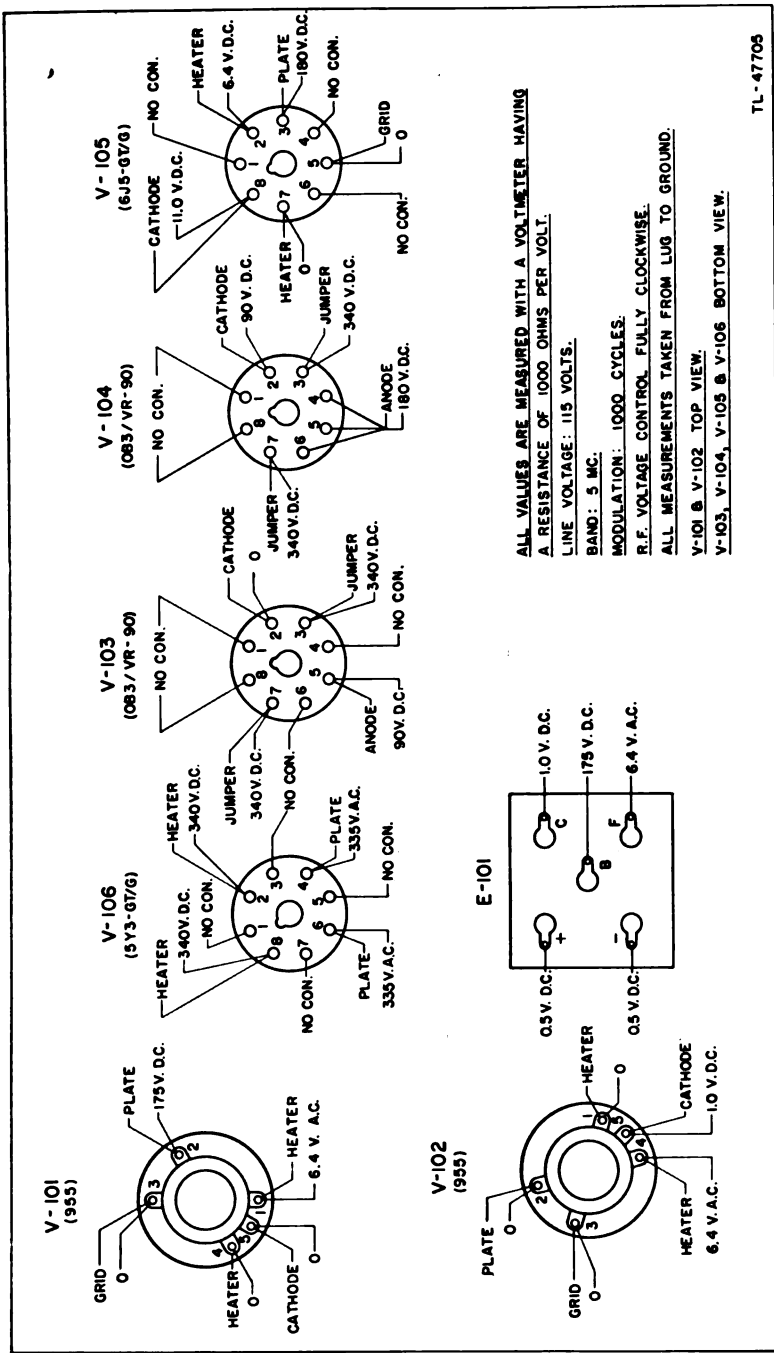
## 18. MINIMUM PERFORMANCE DATA

Frequency calibration	0.6% (from calibration chart)
R-f voltage output	5-100 mc $\pm 10\%$ 100-175 mc -10 + 15%
Audio frequencies	400 cycles $\pm 15\%$ 1,000 cycles $\pm 15\%$



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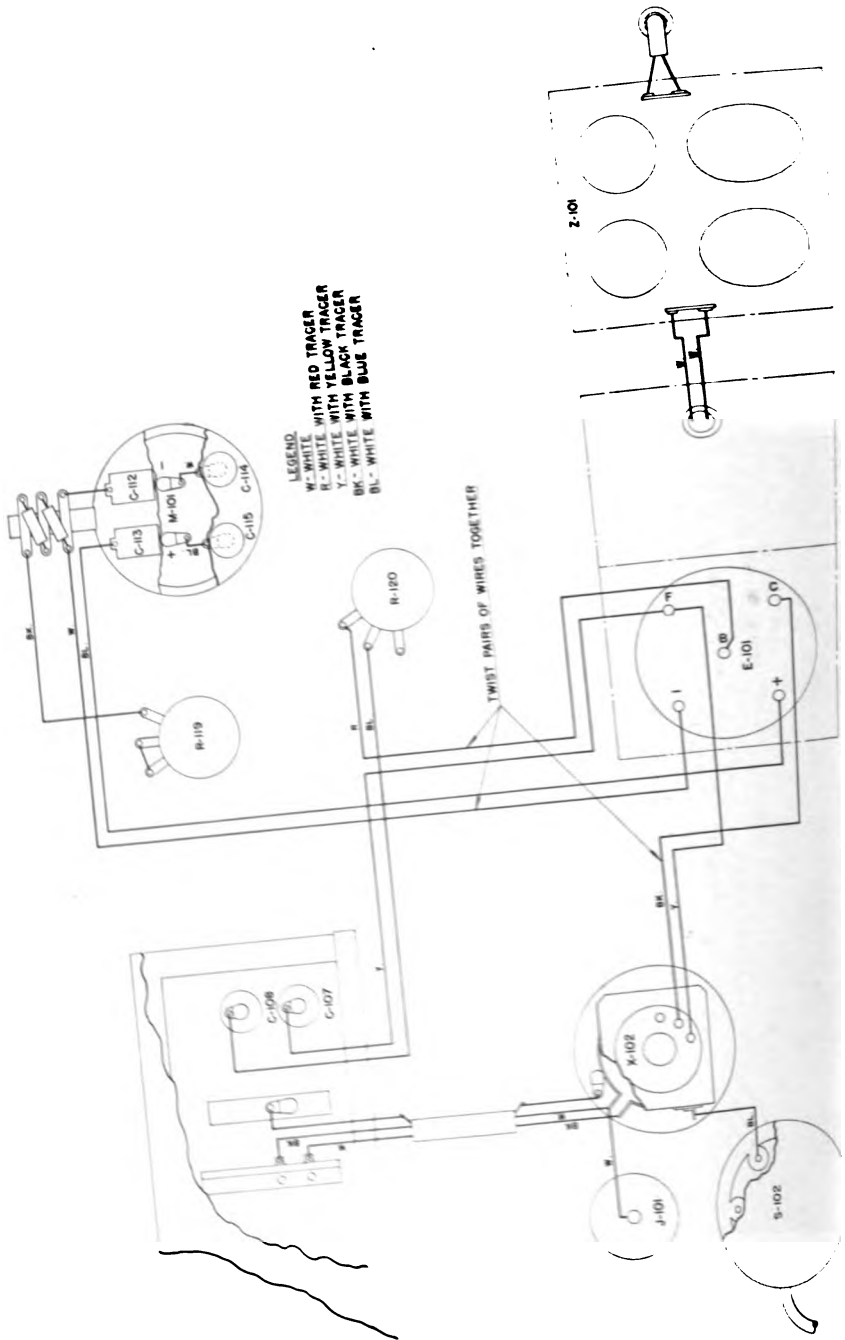
Figure 16. Signal Generator I-187-B, resistance chart.



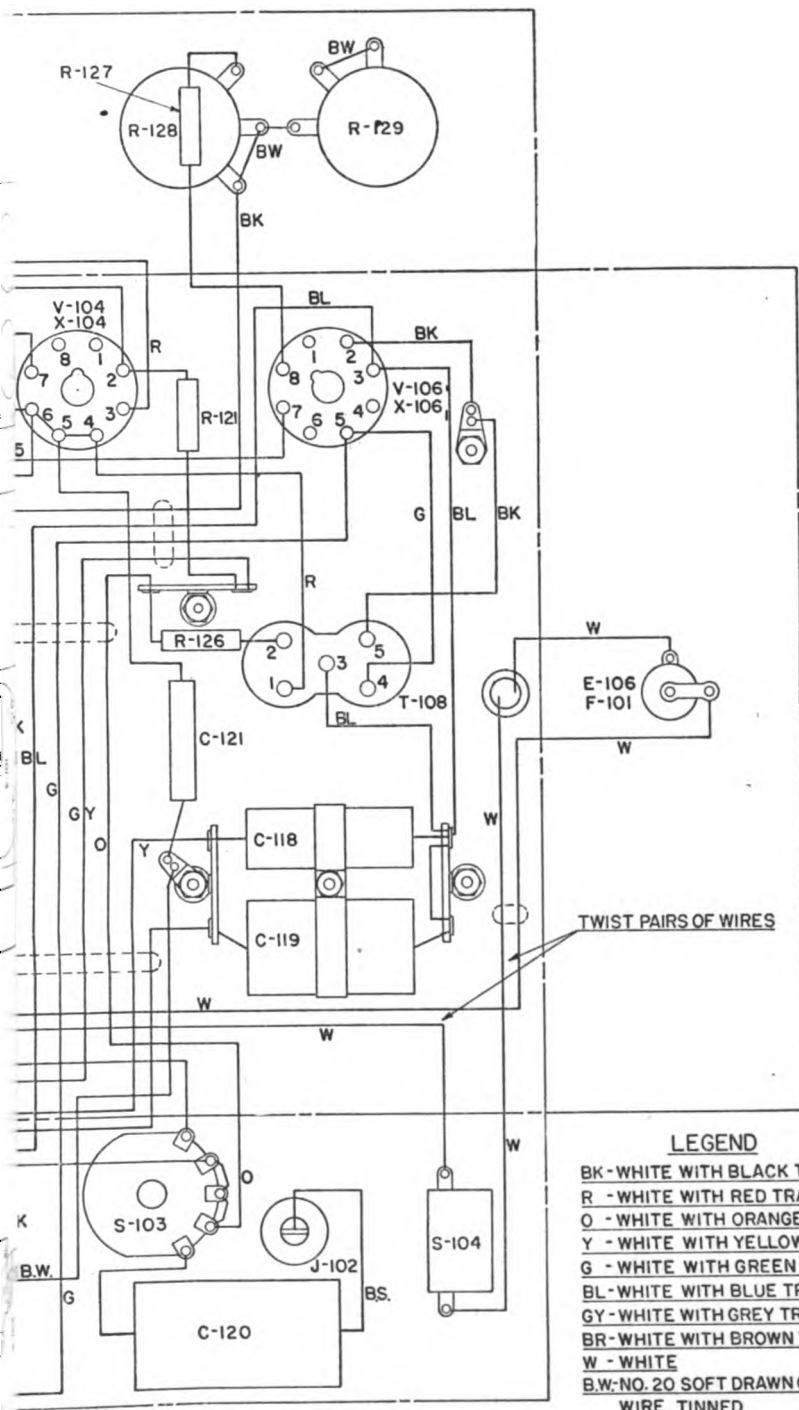
TL-47705

Figure 17. Signal Generator I-157-B, voltage chart.





TL-47702 111



TL-47701

**LEGEND**

- BK - WHITE WITH BLACK TRACER**
- R - WHITE WITH RED TRACER**
- O - WHITE WITH ORANGE TRACER**
- Y - WHITE WITH YELLOW TRACER**
- G - WHITE WITH GREEN TRACER**
- BL - WHITE WITH BLUE TRACER**
- GY - WHITE WITH GREY TRACER**
- BR - WHITE WITH BROWN TRACER**
- W - WHITE**
- B.W. - NO. 20 SOFT DRAWN COPPER WIRE, TINNED**
- B.S. - NO. 11 BLACK SPAGETTI**

*modulator wiring diagram.*

TL-47702

Figure 18. Interunit wiring diagram.

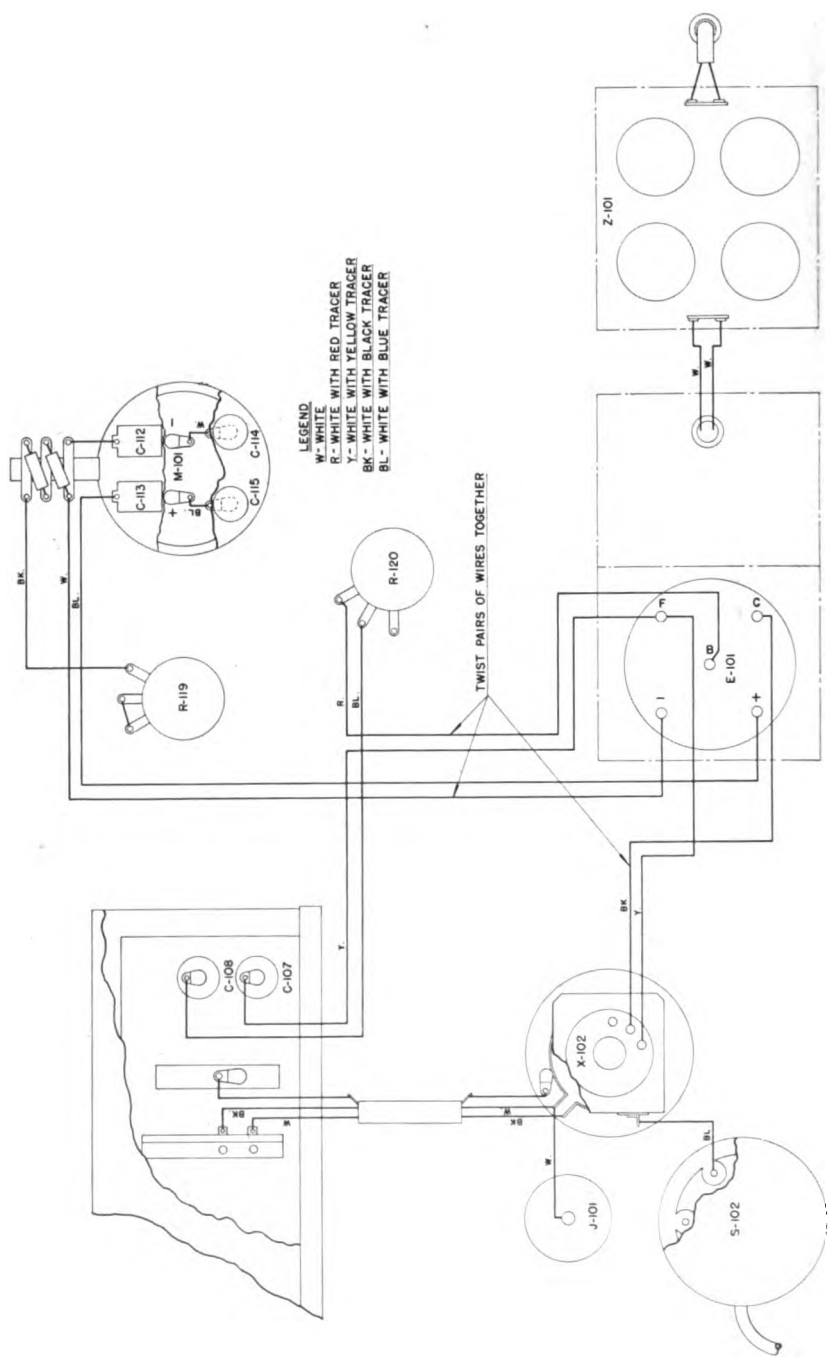
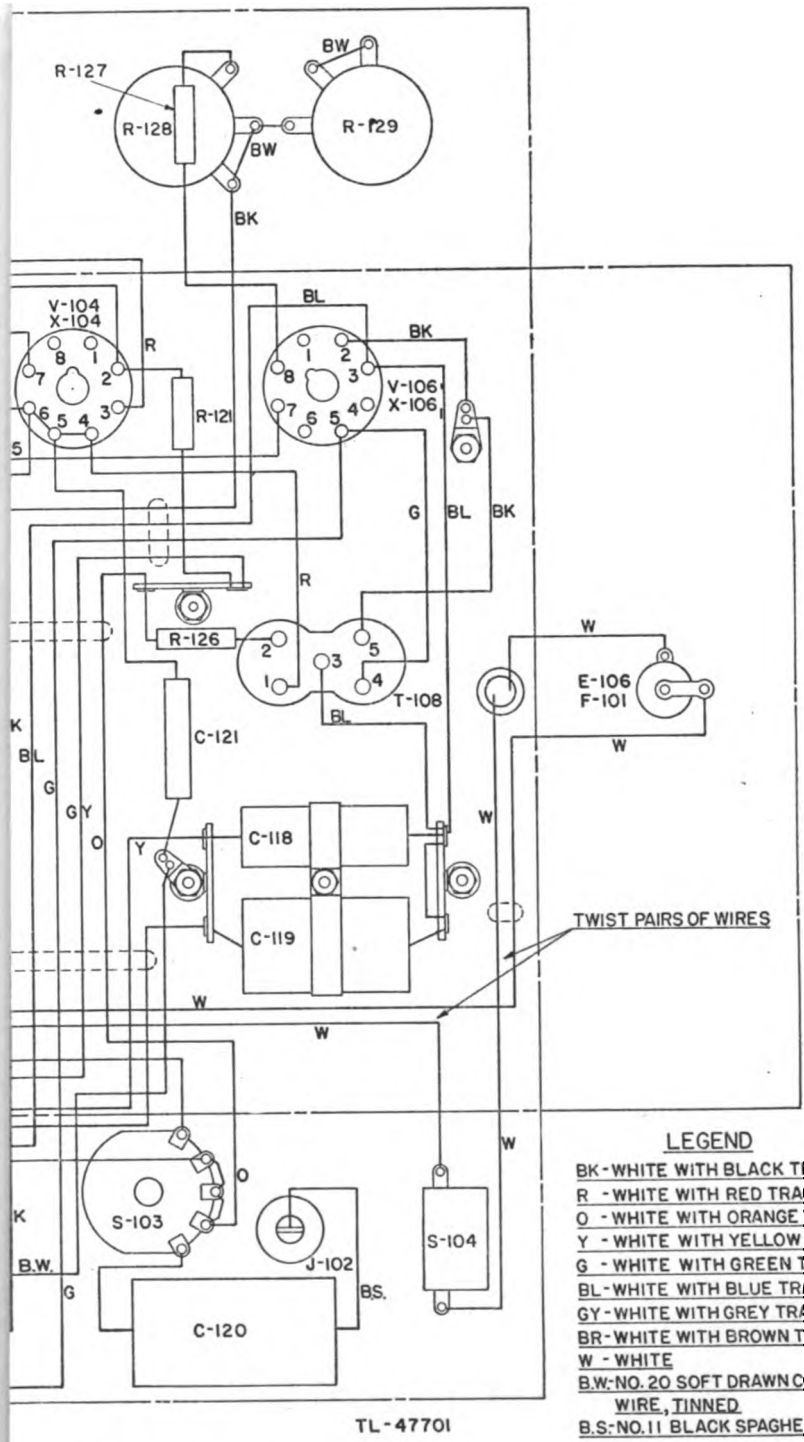


Figure 18. Interunit wiring diagram.



modulator wiring diagram.

113  
MMF.

105

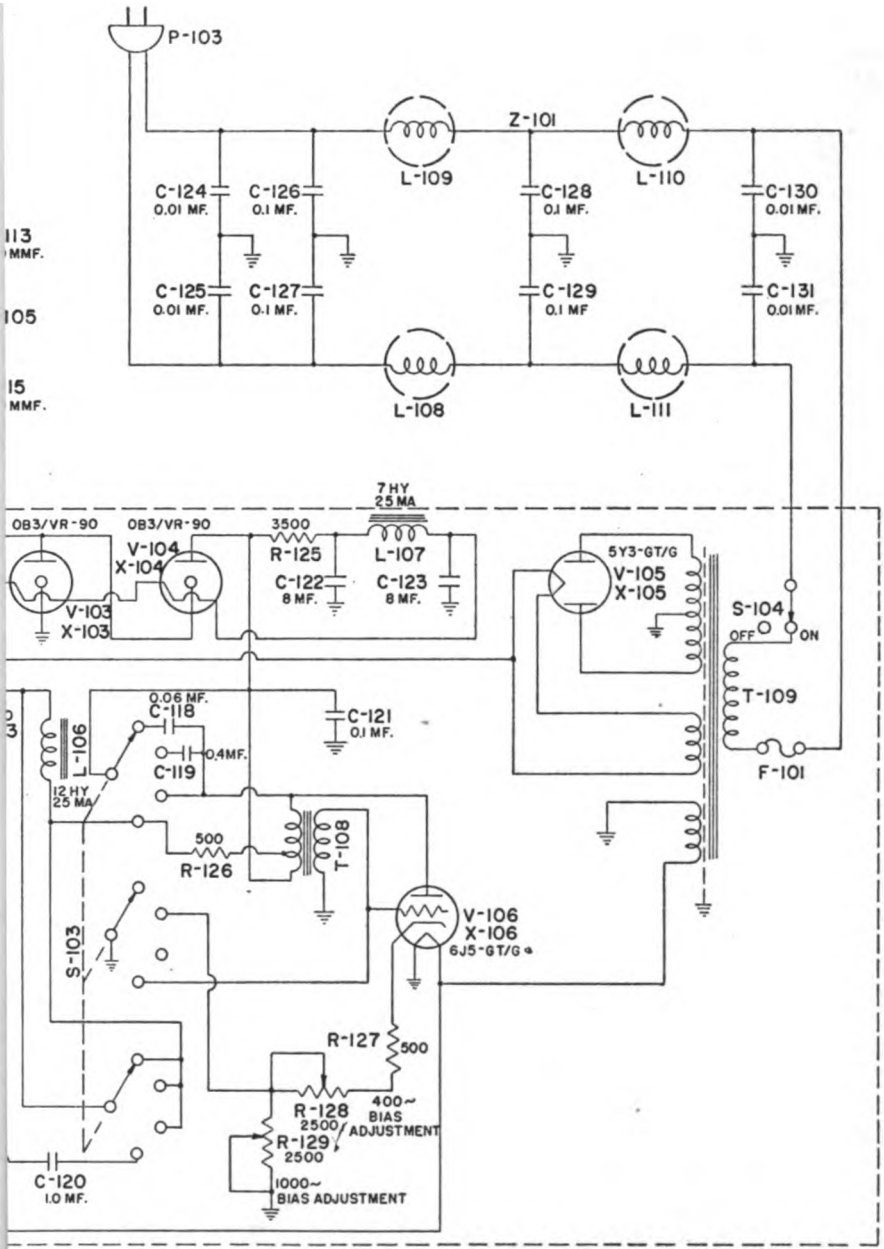
15  
MMF

083



3

ch



TL-45756

*Schematic diagram.*



## 19. MAINTENANCE PARTS LIST FOR SIGNAL GENERATOR I-137-B.

Ref symbol	Signal Corps stock No.	Major comp	Name of part and description	Quan per unit	Orgn stock			3d ech	4th ech	Depot stock
					1st ech	2d ech				
C-101	3D9055V-14		<b>CAPACITOR, variable:</b> 50 mmf max; straight line frequency; r-f tuning; National SEC-50; W.I.T. #50-058.	1				*	*	*
C-102	3DK9025-42		<b>CAPACITOR, fixed:</b> mica; 25 mmf $\pm 10\%$ ; 500 vdcw; low loss; grid leak by-pass; Dubilier 5WL-5Q25; Aerovox 1468L; W.I.T. #50-058-3.	1				*	*	*
C-103	3DK9300-22		<b>CAPACITOR, fixed:</b> mica; 300 mmf $\pm 10\%$ ; 500 vdcw; low loss; plate r-f bypass; Dubilier 5WL-573; Aerovox 1468L; same as C-110, C-111; W.I.T. 50-059-3.	1				*	*	*
C-104	3DA2-50		<b>CAPACITOR, fixed:</b> mica; 2,000 mmf $\pm 10\%$ ; 500 vdcw; low loss; B + r-f bypass; Dubilier 1WLS; Aerovox 1467LS; W.I.T. 50-060-3.	1				*	*	*
C-105	3K9300-10.1		<b>CAPACITOR, fixed:</b> mica; 300 mmf $\pm 10\%$ ; 300 vdcw; metal clad; filament r-f bypass; Dubilier 742B; same as C-114, 115; W.I.T. 50-061-3.	1				*	*	*
C-106	3DA100-209.1		<b>CAPACITOR, fixed:</b> paper; 100,000 mmf $\pm 10\%$ ; 120 vdcw; filament audio bypass; Micamold 340-22; Solar MPW-5157-1020; same as C-116; W.I.T. 50-055-3.	1				*	*	*
C-107	3D9300-36		<b>CAPACITOR, fixed:</b> h-f; mica; 300 mmf; spcl; A + r-f bypass; Wash Inst of Tech 50-062; same as C-108.	1				*	*	*

\* Indicates stock available.



32 19. MAINTENANCE PARTS LIST FOR SIGNAL GENERATOR I-137-B. (cont'd)

Ref symbol	Signal Corps stock No.	Major comp	Name of part and description	Quan per unit	Orgn stock			4th ech	Depot stock
					1st ech	2d ech	3d ech		
C-108	3D9300-36		<b>CAPACITOR:</b> B + r-f bypass; same as C-107.	1			*	*	
C-109	3D9001VF5-1		<b>CAPACITOR, variable:</b> ceramic; 1.5-7 mmf; part of VTVM r-f voltage divider; Erie style TS-2A, type NPO; W.I.T. 50-079.	1			*	*	
C-110	3DK9300-22		<b>CAPACITOR:</b> filament r-f bypass; same as C-103, C-111.	1			*	*	
C-111	3DK9300-22		<b>CAPACITOR:</b> cathode r-f bypass; same as C-103, C-110.	1			*	*	
C-112 C-113	3D9300-35		<b>CAPACITOR, fixed:</b> h-f; mica; 300 mmf; spl; meter r-f bypass; Wash Inst of Tech 50-064.	2			*	*	
C-114 C-115	3D9300-10.1		<b>CAPACITOR:</b> meter lead r-f bypass; same as C-105.	2			*	*	
C-116	3DA100-209.1		<b>CAPACITOR:</b> A + a-f bypass; same as C-106.	1			*	*	
C-117	3DA10-140		<b>CAPACITOR, fixed:</b> molded paper; 10,000 mmf -10 +20%; 400 vdcw; VTVM, cathode bias bypass; Mica-mold 340-21; Solar MPW-5141-1020; W.I.T. 50-047-3.	1			*	*	
C-118	3DA60-11		<b>CAPACITOR, fixed:</b> paper; 60,000 mmf $\pm$ 10%; 1,000 cycle tuning; 400 vdcw; mineral oil filled; metal tubular case; Aerovox Type 489MY; W.I.T. 50-106-3.	1			*	*	

C-119	3DA400-28	<b>CAPACITOR, fixed:</b> paper; 400,000 mmf $\pm 10\%$ ; 400 cycle tuning; 400 vdew; mineral oil filled; metal tubular case; Aerovox 489MY; W.I.T. 50-105-3.	1	*	*
C-120	3DB1.1-1	<b>CAPACITOR, fixed:</b> paper; 1.0 mf; $\pm 20\%$ ; 400 vdew; external modulation coupling; Dubilier DT-4W1; Mallory TP-422; W.I.T. 50-063-3.	1	*	*
C-121	3DA100-112	<b>CAPACITOR, fixed:</b> molded paper; 100,000 mmf $-10 +20\%$ ; 400 vdew; B + a-f bypass; Micamold 345-21; Solar MPW-5147A-1020; W.I.T. 50-056-3.	1	*	*
C-122	3DB8-31	<b>CAPACITOR, fixed:</b> electrolytic; 8 mf; 450 vdew; power supply filter; tubular can with tangential mtg strap; Aerovox PRS-SP; Dubilier BR845; same as C-123; W.I.T. 50-040-3.	2	*	*
C-123					
C-124	3DA10-30.6	<b>CAPACITOR, fixed:</b> paper; 10,000 mmf $-10 +20\%$ ; 600 vdew; mineral oil filled metal tubular case; power line r-f filter Z-101; Sprague PX24B; Solar XTM6-.01-1020; W.I.T. 50-054-3.	4	*	*
C-125					
C-130					
C-131					
C-126	3DA100-26.11	<b>CAPACITOR, fixed:</b> paper; 100,000 mmf $-10 +20\%$ ; 600 vdew; mineral oil filled; power line, r-f filter Z-101; metal tubular case; w mtg strap; Sprague PX24B; Solar XTM6-.1-1020; W.I.T. 50-053-3.	4	*	*
C-127					
C-128					
C-129					
E-101	2Z9405.89	<b>TERMINAL BOARD:</b> 5 term; power supply output; W.I.T. 70-011.	1	*	*

\* Indicates stock available.

19. MAINTENANCE PARTS LIST FOR SIGNAL GENERATOR I-137-B. (cont'd)

Ref symbol	Signal Corps stock No.	Major comp	Name of part and description	Quan per unit	Orgn stock			4th ech	Depot stock
					1st ech	2d ech	3d ech		
E-102	3Z737-23		<b>TERMINAL POST:</b> 1 term; 1/16" extension; r-f output; marked GND; 5/16" stud; Eby #31 Junior, P-4; W.I.T. 70-007.	1			*	*	
E-103	3Z737-23		<b>TERMINAL POST:</b> 1 term; 1/16" extension; r-f output; no marking; 5/16" stud; Eby #31 Junior, P-4; W.I.T. 70-006.	1			*	*	
E-105	2Z9404.156		<b>TERMINAL STRIP:</b> 3 term; component connections; A.R.H. Co 503; W.I.T. 70-008.	1			*	*	
E-106	3Z3275-8		<b>FUSE:</b> extractor post; power line fusing; Littelfuse 1087; W.I.T. 70-000.	1			*	*	
F-101	3Z2601.1		<b>FUSE:</b> 1 amp; power line fuse; type 8AG, Littelfuse 1008; W.I.T. 70-013.	1	*		*	*	
J-101	2Z8799-213		<b>RECEPTACLE:</b> 1 cont; female; r-f high output; Jones S-101-D 1/4; W.I.T. 75-010.	1			*	*	
J-102	2Z3062-59		<b>RECEPTACLE:</b> external modulation input; same as J-101, modified; W.I.T. 75-012.	1			*	*	
L-101	2Z394.27		<b>INDUCTOR:</b> variable; microvolt control; W.I.T. 85-018.	1			*	*	
L-102	3C323-108B		<b>INDUCTOR, r-f:</b> 42 turns #22 DCC; 1/4" ID; filament r-f choke; W.I.T. 85-017; same as L-103, L-104, L-105.	1			*	*	

L-103	3C323-108B	<b>INDUCTOR:</b> part of plate r-f filter Z-102; same as L-102, L-104, L-105.	1	*	*
L-104 L-105	3C323-108B	<b>INDUCTOR:</b> meter r-f choke; same as L-102, L-103.	2	*	*
L-107	3C323-108A	<b>INDUCTOR:</b> 7 hy; 50 ma; 500 ohms d-c resistance; 3-1/8" wd, 1-1/2" d, 1-3/4" h; power supply filter; W.I.T. 85-027.	1	*	*
L-106	3F3872-1/1	<b>INDUCTOR:</b> 12 hy; 25 ma; 400 ohms d-c resistance; 3-1/2" wd, 1-1/2" d, 2" h; external modulation choke; W.I.T. 85-028.	1	*	*
L-108	3C323-108C	<b>INDUCTOR, r-f:</b> 50 $\mu$ h at 1,000 cyc; power line r-f filter; #26 wire; wood core; W.I.T. 85-014, same as L-109, L-110, L-111.	4	*	*
M-101	3F865-12	<b>MICROAMMETER:</b> 0-50 $\mu$ a; spcl scale; r-f voltmeter; AWSC39.2-1943 type MR35W***DCUA; spcl scale; W.I.T. dwg #10797, W.I.T. 90-004.	1	*	*
P-101	2Z7111.51	<b>PLUG:</b> 1 cont; male; r-f high output; Jones P-101-D1/4, same as P-102; W.I.T. 95-010.	1	*	*
P-102	2Z7111.51	<b>PLUG:</b> external modulation input; same as P-101; W.I.T. 95-010.	1	*	*
P-103	6Z7591-7.1	<b>PLUG:</b> 2 cont; male; rubber capped; power cord plug; Belden H-1047; W.I.T. 95-011.	1	*	*

\* Indicates stock available.

19. MAINTENANCE PARTS LIST FOR SIGNAL GENERATOR I-137-B. (cont'd)

Ref symbol	Signal Corps stock No.	Major comp	Name of part and description	Quan per unit	Orgn stock			3d ech	4th ech	Depot stock
					1st ech	2d ech				
R-101	3RC21BE203J		<b>RESISTOR, fixed:</b> comp; 20,000 ohms $\pm 5\%$ ; 1/2w; r-f grid leak; IRC BT 1/2; Erie 504; W.I.T. 100-070.	1				*	*	
R-102	3Z6050-32		<b>RESISTOR, fixed:</b> comp; 500 ohms $\pm 5\%$ ; 1/2w; part of Z-102; IRC BT 1/2; Erie 504, same as R-105, R-126; W.I.T. 100-006.	1				*	*	
R-103	3RC20AE101J		<b>RESISTOR, fixed:</b> comp; 100 ohms $\pm 5\%$ ; 1/2w; r-f pick-up loop load; Erie 504; W.I.T. 100-072.	2				*	*	
R-104	3RC20AE131J		<b>RESISTOR, fixed:</b> comp; 130 ohms $\pm 5\%$ ; 1/2w; part of VTVM r-f voltage divider; Erie 504; W.I.T. 100-112.	1				*	*	
R-105	3Z6050-32		<b>RESISTOR:</b> part of VTVM r-f voltage divider; same as as R-102, R-126.	1				*	*	
R-106	3RC20AF201J		<b>RESISTOR, fixed:</b> comp; 200 ohms $\pm 5\%$ ; 1/2w; variable inductor shunt; Erie 504; W.I.T. 100-071.	1				*	*	
R-107	3RC16CE430J		<b>RESISTOR, fixed:</b> comp; 43 ohms $\pm 3\%$ ; 1/3w; part of var ind voltage divider; Ohio Carbon, type K; W.I.T. 100-079.	1				*	*	
R-108	3RC16CE101J		<b>RESISTOR, fixed:</b> comp; 100 ohms $\pm 3\%$ ; 1/3w part of var ind voltage divider; Ohio Carbon, type K; W.I.T. 100-086.	1				*	*	

R-109	3RC16CE330J	<b>RESISTOR, fixed:</b> comp; 33 ohms $\pm 3\%$ ; 1/3w; attenuator X1K shunt; Ohio Carbon, type K, same as R-110, R-111; W.I.T. 100-077.	1	*	*
R-110	3RC16CE330J	<b>RESISTOR:</b> attenuator X100 shunt; same as R-109, R-111.	1	*	*
R-111	3RC16CE330J	<b>RESISTOR:</b> attenuator X10 shunt; same as R-109, R-110.	1	*	*
R-112	3RC16CE300J	<b>RESISTOR, fixed:</b> comp; 30 ohms $\pm 3\%$ ; 1/3w; attenuator X1 shunt; Ohio Carbon, type K, same as R-117; W.I.T. 100-078.	1	*	*
R-113	3R16CE271J	<b>RESISTOR, fixed:</b> comp; 270 ohms $\pm 3\%$ ; 1/3w; attenuator X1K series; Ohio Carbon, type K, same as R-114, R-115, R-116; W.I.T. 100-075.	1	*	*
R-114	3RC16CE271J	<b>RESISTOR:</b> attenuator X100 series; same as R-113, R-115, R-116.	1	*	*
R-115	3RC16CE271J	<b>RESISTOR:</b> attenuator X10 series; same as R-113, R-114, R-116.	1	*	*
R-116	3RC16CE271J	<b>RESISTOR:</b> attenuator X1 series; same as R-113, R-114, R-115.	1	*	*
R-117	3RC16CE300J	<b>RESISTOR:</b> r-f cable termination; same as R-112.	1	*	*
R-118	3RC20AE750J	<b>RESISTOR, fixed:</b> comp, 75 ohms $\pm 5\%$ ; 1/2w; part of meter "Zero Adjust"; Erie 504; W.I.T. 100-080.	1	*	*

\* Indicates stock available.

19. MAINTENANCE PARTS LIST FOR SIGNAL GENERATOR I-137-B. (cont'd)

Ref symbol	Signal Corps stock No.	Major comp	Name of part and description	Quan per unit	Orgn stock			4th ech	Depot stock
					1st ech	2d ech	3d ech		
R-119	2Z7278-60		<b>POTENTIOMETER:</b> WW; 200 ohms; 1/8" slotted shaft; meter "Zero Adjust" control; Centralab V 123; W.I.T. 100-062.	1			*	*	
R-120	2Z7281-45		<b>POTENTIOMETER:</b> WW; 25,000 ohms; 5/8" shaft; "r-f voltage" control; Clarostat P58-25000; CTS Series 25; Mallory M25P; W.I.T. 100-081.	1			*	*	
R-121	3Z6640-54		<b>RESISTOR, fixed:</b> comp; 40,000 ohms $\pm 10\%$ ; 1/2w; bias voltage dropping; IRC BT 1/2; Erie 504; W.I.T. 100-083.	1			*	*	
R-122	3RC21BE103J		<b>RESISTOR, fixed:</b> comp; 10,000 ohms $\pm 5\%$ ; 1/2w; part of bias voltage divider; IRC BT 1/2; Erie 504; W.I.T. 100-052.	1			*	*	
R-123	2Z7280-16		<b>POTENTIOMETER:</b> WW; 5,000 ohms; 1/8" slotted shaft; r-f voltmeter sensitivity control; Mallory M-5MP; W.I.T. 100-061.	1			*	*	
R-124	3Z6635-1		<b>RESISTOR, fixed:</b> comp; 35,000 ohms $\pm 5\%$ ; 1/2w; part of bias voltage divider; IRC BT 1/2; Erie 504; W.I.T. 100-116.	1			*	*	
R-125	3Z6350-46		<b>RESISTOR, fixed:</b> WW; 3,500 ohms $\pm 10\%$ ; 20w; voltage regulator tube loading; Ohmite BROHI; Concarbon type WV20; IRC Type DV; W.I.T. 100-085.	1			*	*	

R-126	3Z6050-32	<b>RESISTOR:</b> audio voltage dropping; same as R-102, R-105.	1	*	*
R-127	3Z4524	<b>RESISTOR, fixed:</b> comp; 500 ohms $\pm 10\%$ ; 1/2w; V-106 cathode bias; IRC BT 1/2; Erie 504; Concarbon C 1/2; W.I.T. 100-105.	1	*	*
R-128	2Z7280-143	<b>POTENTIOMETER:</b> WW; 2,500 ohms; 1/8" slotted shaft; 400 cyc bias adjustment; WIRT 802, same as R-129; W.I.T. 100-082.	1	*	*
R-129	2Z7280-143	<b>POTENTIOMETER:</b> 1,000 cyc bias adjustment; same as R-128.	1	*	*
S-102	2Z394.28	<b>SWITCH:</b> attenuator; "Multiply By" switch; W.I.T. 120-007.	1	*	*
S-103	3Z9826-48	<b>SWITCH:</b> 2 sect, nonshorting type; 3/8" shaft; modulation selector; Oak type 53; W.I.T. 120-008.	1	*	*
S-104	3Z9863-12A	<b>SWITCH:</b> SPST toggle; bat handle; power on-off switch; AH&H 82301-B; W.I.T. 120-012.	1	*	*
T-101	3F3872-1/2	<b>TRANSFORMER:</b> oscillator, r-f; 5-8.5 mc; W.I.T. 125-004.	1	*	*
T-102	3F3872-1/5	<b>TRANSFORMER:</b> oscillator, r-f; 8-15 mc; W.I.T. 125-005.	1	*	*
T-103	3F3872-1/6	<b>TRANSFORMER:</b> oscillator, r-f; 14-26 mc; W.I.T. 125-006.	1	*	*
T-104	3F3872-1/7	<b>TRANSFORMER:</b> oscillator, r-f; 25-42 mc; W.I.T. 125-007.	1	*	*

\* Indicates stock available.



## 19. MAINTENANCE PARTS LIST FOR SIGNAL GENERATOR I-137-B. (cont'd)

Ref symbol	Signal Corps stock No.	Major comp	Name of part and description	Quan per unit	Orign stock			4th ech	Depot stock
					1st ech	2d ech	3d ech		
T-105	3F3872-1/8		<b>TRANSFORMER:</b> oscillator, r-f; 40-75 mc; W.I.T. 125-008.	1			*	*	
T-106	3F3872-1/3		<b>TRANSFORMER:</b> oscillator, r-f; 70-130 mc; W.I.T. 125-009.	1			*	*	
T-107	3F3872-1/4		<b>TRANSFORMER:</b> oscillator, r-f; 125-175 mc; W.I.T. 125-010.	1			*	*	
T-108	2Z9637-40		<b>TRANSFORMER, A-F:</b> 400-1,000 cyc; in audio oscillator; W.I.T. 125-003.	1			*	*	
T-109	2Z9613-356		<b>TRANSFORMER, power:</b> pri 105-125v; 60 cyc; power supply plate and filaments; W.I.T. 125-017.	1			*	*	
V-101	2J955		<b>VACUUM TUBE:</b> r-f oscillator; 955 (spcl) W.I.T. 130-010-5.	1	*		*	*	
V-102	2J955		<b>VACUUM TUBE:</b> vacuum tube voltmeter; 955 (spcl) W.I.T. 130-017-5.	1	*		*	*	
V-105	2J5Y3GT/G		<b>VACUUM TUBE:</b> power supply rectifier; 5Y3-GT/G, RCA 5Y3-GT/G; W.I.T. 130-005-5.	1	*		*	*	
V-103 V-104	2J0B3/VR90		<b>VACUUM TUBE:</b> voltage regulator; 0B3/VR-90, Sylvania 0B3/VR-90, same as V-105.	2	*		*	*	

V-106	2J6J5GT/G	<b>VACUUM TUBE:</b> audio oscillator; 6J5-GT/G, RCA or Sylvania 6J5-GT/G; W.I.T. 130-024-5.	1	*			*
X-101	3ZK8671.7	<b>SOCKET, tube:</b> 5 pin; ceramic; r-f oscillator tube socket; Hammarlund UHS-900X; Franklin AW 62A-10, same as X-102; W.I.T. 135-005.	1				*
X-102	2ZK8671.7	<b>SOCKET:</b> vacuum tube voltmeter tube socket; same as X-101.	1				*
X-103	2Z8795.9	<b>SOCKET, tube:</b> octal; voltage regulator tube socket; molded phenolic for mtg on 1/16" material; Amphenol S-8M, same as X-104, X-105; W.I.T. 135-004.	1				*
X-104	2Z8795.9	<b>SOCKET:</b> voltage regulator tube socket; same as X-103, X-105.	1				*
X-105	2Z8795.9	<b>SOCKET:</b> rectifier tube socket; same as X-103, X-104.	1				*
X-106	2Z8795.9	<b>SOCKET:</b> audio oscillator tube socket; same as X-103, X-104, X-105.	1				*
Z-101	3Z1892-16.1	<b>FILTER, r-f:</b> a-c power line r-f filter; W.I.T. 70-009.	1				*
Z-102	3Z1892-16	<b>FILTER, r-f:</b> r-f oscillator plate filter; W.I.T. 70-010.	1				*

\* Indicates stock available.







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