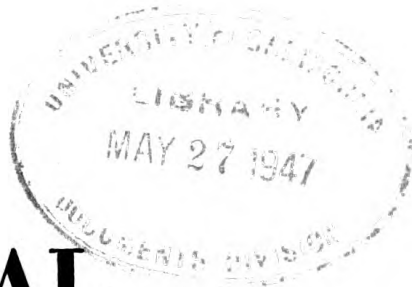


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1946

# TM 11-307

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army



## SIGNAL GENERATORS

### I-72-G, H, J, and K

WAR DEPARTMENT

• JUNE 1946

WAR DEPARTMENT TECHNICAL MANUAL  
TM 11-307

*This manual supersedes TM 11-307, 16 March 1943, including C1,  
29 November 1943; and TB 11-307-1, 25 April 1945.*

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**SIGNAL  
GENERATORS  
I-72-G, H, J, and K**

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WAR DEPARTMENT •

JUNE 1946

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TM 11-307, Signal Generators I-72-G, H, J, and K, is published for the information and guidance of all concerned.

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Refer to FM 21-6 for explanation of distribution formula.

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#### IV

## DESTRUCTION NOTICE

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**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. Explosives—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—All components, tubes, etc.  
2. Cut—Circuit wiring, cord, etc.  
3. Burn—All technical manuals, circuit diagrams, etc.  
4. Bend—Chassis.  
5. Bury or scatter—All remains.

## DESTROY EVERYTHING

## SAFETY NOTICE

---

Do not use Signal Generator I-72-(\*) for purposes for which the signal generator is not designed.

Although Signal Generator I-72-(\*) is designed to withstand shocks and vibration normally met with in service, do not handle it roughly or abuse it. Rough handling will damage the electrical instruments. Take it easy.

V

*This manual supersedes TM 11-307, 16 March 1943, including C1, 29 November 1943; and TB 11-307-1, 25 April 1945.*

## CHAPTER 1

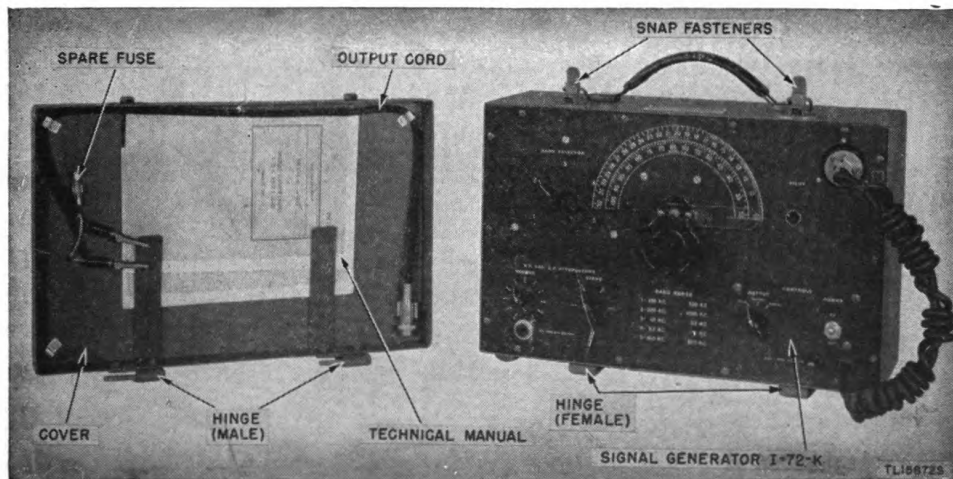
### INTRODUCTION

#### Section I. DESCRIPTION OF SIGNAL GENERATOR

##### 1. Purpose and Use

*a.* Signal Generators I-72-G, H, J, and K are portable, self-contained instruments used mainly to align radio receivers. They operate on 110- to 125-volt, 60-cycle alternating current, and deliver radio-frequency signals between 100 and 32,000 kilocycles (kc). The radio frequency output may be either unmodulated or amplitude-modulated approximately 50 percent by a 400-cycle tone. If desired, the unit can be adjusted to deliver the 400-cycle tone alone. Figure 1 shows Signal Generator I-72-K.

*b.* Official nomenclature followed by (\*) is used to indicate all models of the item of equipment included in this Technical Manual. Thus Signal Generator I-72-(\*) represents Signal Generators I-72-G, H, J, and K, which are treated together in this manual. Official nomenclature followed by ( ) with no number or symbol in the parentheses is used when making general reference to all models of the equipment, regardless of their procurement. Thus Frequency Meter Set SCR-211-( ) represents all models of the equipment including past, present, and future procurements.



*Figure 1. Signal Generator I-72-K.*

## 2. Application

The principal application of Signal Generator I-72-(\*) is in the alignment of radio-frequency (r-f) and intermediate-frequency (i-f) circuits of radio receivers. For this application, the signal generator is normally used in connection with an audio-frequency (a-f) output meter (not a part of Signal Generator I-72-(\*)). The output meter is connected to the audio output of the receiver, and the signal generator is connected to the circuit under test through a suitable isolating network. Figure 2 is a block diagram showing these connections. The signal generator is adjusted to deliver a modulated signal at the frequency on which it is desired to align the circuit, and then the circuit is adjusted to obtain maximum audio output as read on the output meter.

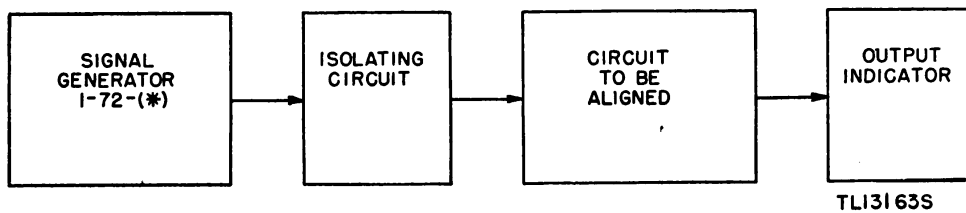


Figure 2. Connections for aligning circuit.

## 3. Technical Characteristics of Signal Generator I-72-(\*)

### Frequency range:

Band 1. ....	100 to 320kc.
Band 2. ....	320 to 1,000kc.
Band 3. ....	1,000 to 3,200kc.
Band 4. ....	3,200 to 10,000kc.
Band 5. ....	10,000 to 32,000kc.

### Output:

Radio-frequency ..... Over 30,000 microvolts ( $\mu\text{V}$ ) with attenuators set for maximum on all frequencies except in the region of 10,000 to 20,000kc where maximum output may not exceed 10,000  $\mu\text{V}$ .

Audio-frequency ..... Approximately 1.5 volts root mean square (rms) with attenuators set for maximum. No audio output is obtained with step attenuator set on position 1.

Number of tubes ..... 3

Power input ..... Approximately 25 watts, 110 to 125 volts, 60 cycles.



#### 4. Description of Major Components (figs. 1, 3, and 4)

Signal Generator I-72-(\*) is contained in a steel case which is equipped with a leather carrying handle. The front panel is protected by a steel cover which is held in place by means of snap fasteners. On the front panel are: a frequency dial, a band switch, a step attenuator and a vernier attenuator, an output selector, an output socket, a power switch, a pilot light, and a fuse. The power cord is securely attached to the front panel, but the shielded output cord may be attached or removed by means of a plug connection. These two cords are normally carried loosely folded in the space between the panel and the protective cover (in Signal Generator I-72-K a recess is provided for storing the power plug).

#### 5. List of Components

The following table gives the weights and dimensions of the major components of Signal Generator I-72-(\*) .

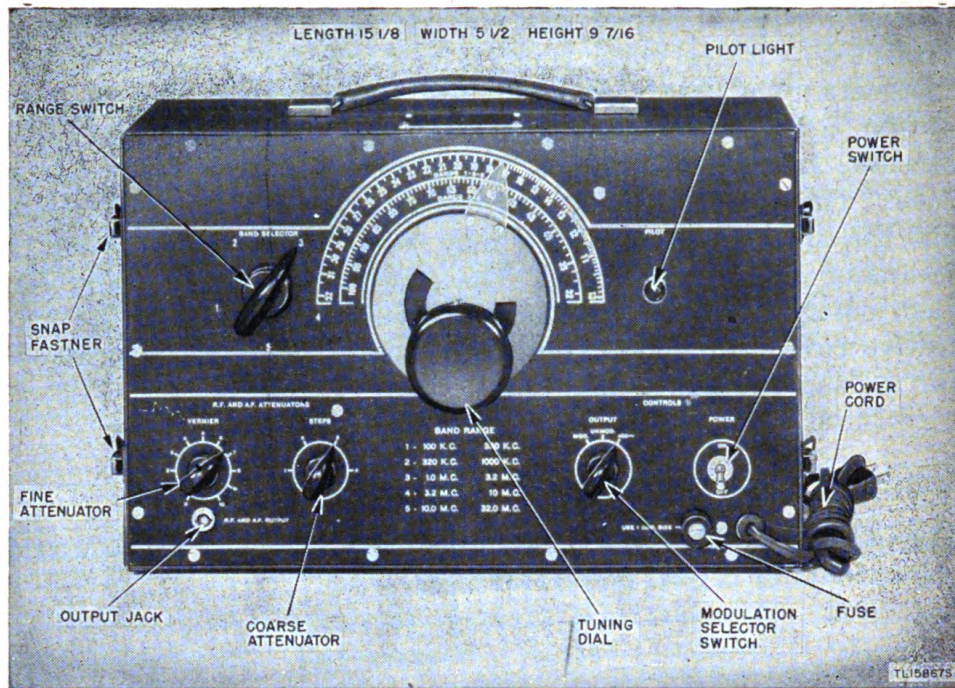
Quantity	Name of component	Dimensions (in.)				Volume (cu. ft.)	Unit weight (lb.)
		Height	Width	Depth	Length		
1	Signal Generator I-72-(*) (with cover on).	9 $\frac{7}{16}$	15 $\frac{1}{2}$	6 $\frac{3}{4}$	-----	.56	22.2
1	Cable, RF.				30		
1	Tube, JAN-80 (VT-80)*.						
1	Tube, JAN-76 (VT-76)*.						
1	Tube, JAN-6J5GT/G (VT-94D).						

\* Signal Generator I-72-K uses Tube JAN-6J5GT/G (VT-94D) in place of Tube JAN-76 (VT-76) and Tube JAN-5Y3GT/G (VT-197A) in place of Tube JAN-80 (VT-80).

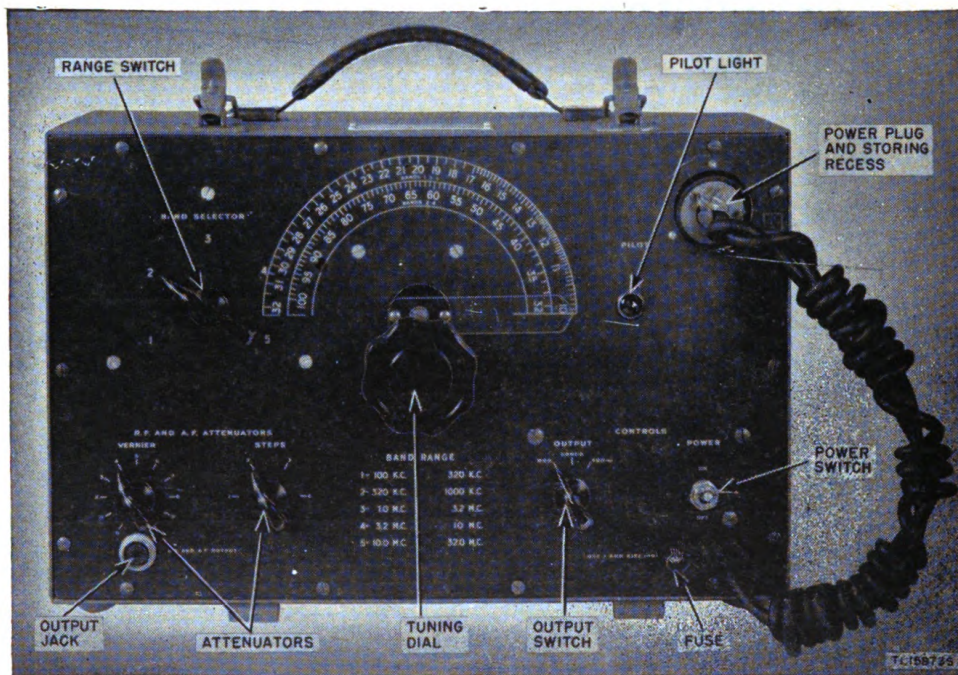
#### 6. Packaging Data

Quantity	Name of component	Dimensions (in.)				Volume (cu. ft.)	Unit weight (lb.)
		Height	Width	Depth	Length		
1	Signal Generator I-72-(*) in carton.	12	17 $\frac{1}{4}$	8 $\frac{1}{2}$	-----	1	24 $\frac{1}{2}$

*Note.* This list is for general information only. See appropriate publications for information pertaining to requisition of spare parts.



*Figure 3. Signal Generator I-72-G, H, and J, front view.*



*Figure 4. Signal Generator I-72-K.*

## 7. Differences in Models

Signal Generator I-72-K and its component parts is similar to Signal Generators I-72-G, H, and J. All parts are interchangeable with the following exceptions: Audio oscillator tube JAN-6J5GT/G (VT-94D) and its socket; rectifier Tube JAN-5Y3GT/G (VT-197A) and its socket, the band selector switch (wafer type), and the output cable and the output jack.

## Section II. INSTALLATION AND ASSEMBLY

### 8. Unpacking, Uncrating, and Checking

Be particularly careful when unpacking or handling the equipment, because it may be damaged easily when it is not protected by the packing case. In unpacking the signal generator, follow the steps outlined below:

- a. Place the packing case in a convenient location where it can be opened easily.
- b. Cut the steel straps.
- c. Remove the nails with a nail puller, and remove the top of the packing case. *Prying the top off may result in damage to the equipment.*
- d. Carefully lift the signal generator from its packing case.
- e. Thoroughly inspect all parts of the cabinet for possible damage during shipment.
- f. Check the components against the master packing slip and against the list of components in paragraph 5.
- g. Make sure that the vacuum tubes are seated properly in the correct sockets. To get at the tubes, remove the front cover, unscrew the 14 screws around the edge of the panel, tilt the case forward, and slide the unit from its case. Tubes JAN-80 and JAN-76 should be seated in the correct sockets. The socket for Tube JAN-6J5GT/G is inside the copper shield which incloses the oscillator section. This shield can be removed by unscrewing the 12 screws around its edge. On some models, the socket for Tube JAN-6J5GT/G is marked VT-94-D.

### 9. Installation, Assembly, and Interconnections

Since Signal Generator I-72-(\*) is a portable, self-contained unit, the only special precautions necessary when installing the unit are to see that the power source is 110- to 125-volt, 60-cycle alternating current and that the signal generator is placed on a surface from which it will not fall. The front cover may be completely removed by unfastening the snap fasteners. The shielded output

cable will be found clipped to the inside of the front cover. It should be plugged into the socket marked *R.F. AND A.F. OUTPUT* at the lower left corner of the panel. The type of circuit to which the other end of the output cable is connected will depend upon the type of circuit being aligned, as discussed in paragraphs 14 and 15.

## 10. Removal from Service

When the signal generator is not in use, always replace the front cover to protect the panel from accidental damage. First, turn the power switch *OFF*. Then, set the signal generator on its back, remove the power cord from its outlet, and coil the cord loosely on top of the panel. Remove the output cable from its socket on the panel. If desired, this cable may be clipped to the inside of the front cover; otherwise, it may be coiled on the panel with the power cord. Take care not to bend it sharply or in any way damage the shielding. In addition, in the K model it will be necessary to place the power plug in its recess before the cover can be put on. When replacing the cover, make sure that it fits in place easily before closing the snap fasteners. If the cover does not fit, rearrange the power cord and the output cord around the knobs on the panel until the cover fits in place without forcing.

## CHAPTER 2

# OPERATING INSTRUCTIONS

*Note.* For information on destroying the equipment to prevent enemy use, see the destruction notice at the front of the manual.

---

### Section I. OPERATIONAL PROCEDURES

#### 11. Preparation for Use

*a.* Before handling any component of Signal Generator I-72-(\*), carefully read the instructions covering its use. The components are delicate electrical instruments and must be handled with care.

*b.* From time to time, the calibration of Signal Generator I-72-(\*) should be checked against a suitable frequency standard, such as Frequency Meter Set SCR-211-( ). Calibration should be undertaken only by a competent repairman. For a detailed description of the calibration process see paragraphs 48 to 52, inclusive.

#### 12. Starting

*a.* Set the power switch to the ON position. The red pilot light should light.

*b.* Set the OUTPUT control to MOD. (modulated), UNMOD. (unmodulated), or to 400—depending on the type of output desired. With the OUTPUT control set at MOD., the signal generator gives an r-f output with 400-cycle amplitude modulation. With the OUTPUT control set at UNMOD., the output of the signal generator is an unmodulated r-f carrier. With the OUTPUT control set at 400—, the output is a 400-cycle a-f signal without r-f carrier.

*c.* Set the signal generator to any desired frequency within its range by determining the band in which the desired frequency occurs and adjusting the BAND SELECTOR switch and frequency dial pointer for the frequency desired.

*Example.* Assume that the desired frequency is 7.0 megacycles (mc). On the legend BAND RANGE this frequency occurs in band number 4 (3.2mc to 10.0mc) and, therefore, is read on the lower scale at 70. Adjust

the main tuning control to 70 on the lower scale, and set the BAND SELECTOR to 4.

*d.* Adjust the STEPS and VERNIER controls of the R. F. and A. F. ATTENUATORS to minimum values to make sure that the output signal will not overload the circuit to which it will be connected.

**Caution:** Pay particular attention to the detents when adjusting the BAND SELECTOR and the STEPS attenuator controls. If these controls are not clicked firmly into their detent positions or if they are set to any position between numbers, no output will be obtained.

## Section II. OPERATION

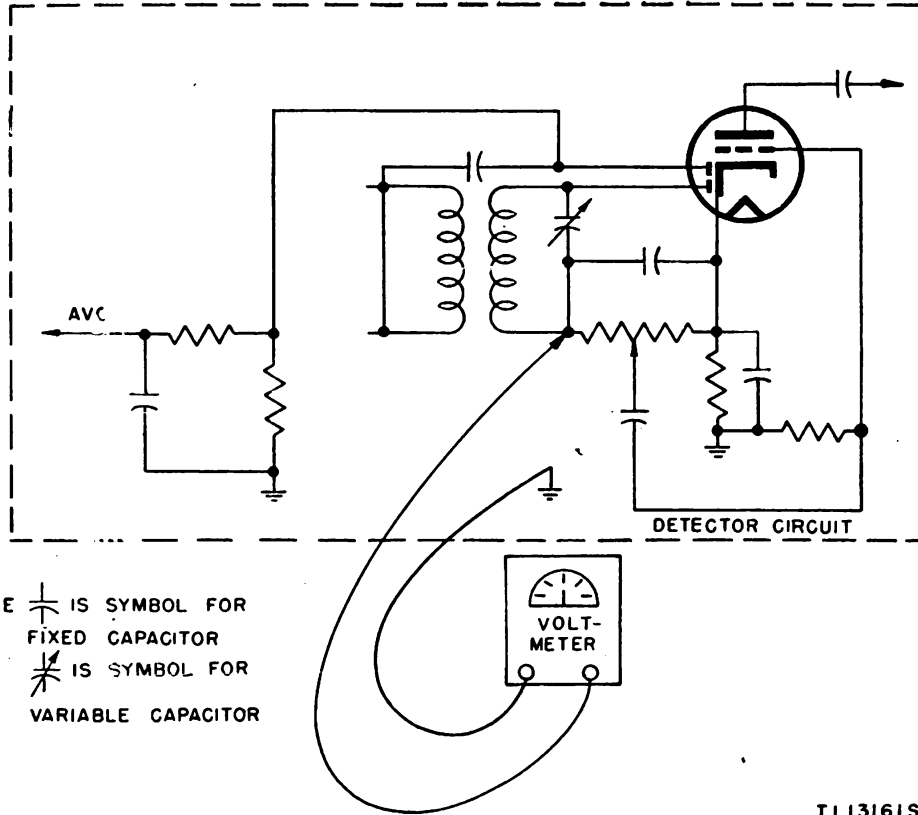
*Note.* The details of alignment procedure for various Signal Corps receivers will be different for different receivers. The appropriate Technical Manual should be consulted when preparing to align a receiver. The steps shown in this section are general and will apply when more specific information is not available.

### 13. Selection of Output Indicator

The selection of the output indicator (fig. 2) will determine, to some extent, the manner in which Signal Generator I-72-(\*) is operated. If a copper-oxide rectifier type alternating-current (a-c) output is used, it is connected to the audio output of the receiver. A cathode-ray oscilloscope is another type of output indicator, and it may be connected to any point in the audio circuit of the receiver. On very selective receivers, where the selectivity is of the order of a few hundred cycles, a sensitive direct-current (d-c) voltmeter should be used as the output indicator. It is connected into the detector circuit as shown in figure 5. If the output indicator that is used is connected in the audio circuit of the receiver (as mentioned above for the a-c output meter and the oscilloscope), set the OUTPUT control on Signal Generator I-72-(\*) at MOD. If a d-c meter is used as an output meter and connected in the detector circuit, set the OUTPUT control at UNMOD.

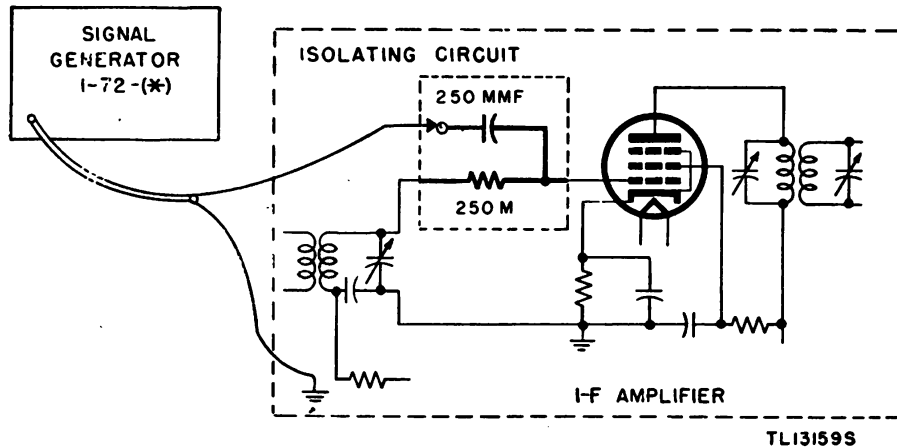
### 14. I-F Alignment

*a.* Ordinarily, the i-f stages of a receiver are aligned in order, beginning with the stage just preceding the detector and progressing toward the mixer or converter stage. If the i-f stages are known to be fairly close to correct alignment, the signal generator can be connected to the signal grid of the mixer or converter stage and the various stages aligned in order without re-



TL13161S

Figure 5. Connection of output indicator to detector stage.



TL13159S

Figure 6. Connections of signal generator to i-f amplifier.

connections. If, however, the i-f stages are badly out of alignment, it will be necessary to connect the signal generator to each individual stage in turn.

b. Connect the signal generator to the grid of the desired i-f stage through an isolating circuit as shown in figure 6. The

values for the isolating resistor and the coupling capacitor are not critical.

*c.* Make sure that the R. F. and A. F. ATTENUATORS on the signal generator are set at minimum values. Then set the signal generator to the frequency on which it is desired to align the i-f amplifiers.

*d.* Advance the R. F. and A. F. ATTENUATORS until a reading is obtained on the output indicator.

*Note.* Do not advance the R. F. and A. F. ATTENUATORS more than necessary to obtain a readable indication on the output indicator. If too much signal is fed into the circuit, the automatic-volume-control (a-v-c) action of the receiver will broaden the response and cause misalignment.

*e.* If no output is obtained with the R. F. and A. F. ATTENUATORS set at maximum values, the receiver circuits may have been aligned on a slightly different frequency. Rock the tuning dial of the signal generator back and forth to see if results can be obtained. If there is still no output indication, it means that too many out-of-line stages are between the signal generator and the detector.

*f.* Adjust the trimmers on the circuit under alignment to get maximum indication on the output indicator. As the circuit comes into alignment, the output indicator may tend to go off scale. It is important to reduce the output of the signal generator to keep the reading on the output indicator low, not only to prevent overloading of the indicator but also to prevent misalignment, as noted in *d* above.

*g.* Adjust the trimmers on all the i-f stages to be aligned in the correct order from the detector to the mixer. The first i-f amplifier will be aligned with the signal generator connected to the signal grid of the mixer or converter circuit.

*h.* With the signal generator connected to the signal grid of the converter or mixer, readjust all i-f trimmers as a final check of over-all alignment.

## 15. R-F and Oscillator Alignment

*a.* Before proceeding to align the r-f and oscillator circuits of a superheterodyne receiver, consult the service notes and circuit diagram of the receiver for the correct frequencies at which the alignment should be made and for the proper connection of the signal generator to the receiver antenna terminals. In the absence of such instructions, select two frequencies, one slightly above the low end of the receiver dial, and the other slightly below the high end. Construct a standard I.R.E. dummy antenna, as shown in figure 7. The 20 microhenry ( $\mu$ h) inductor for this antenna can be made from 43 turns of No. 34 wire, close-



wound on a  $\frac{1}{2}$ -inch form. Connect the dummy antenna between the signal generator output and the receiver antenna terminals. When the materials needed to construct the dummy antenna are not available, a small capacitor (about 200 micromicrofarads (mmf)) may be used in series with the *hot* lead of the signal generator and the antenna binding post.

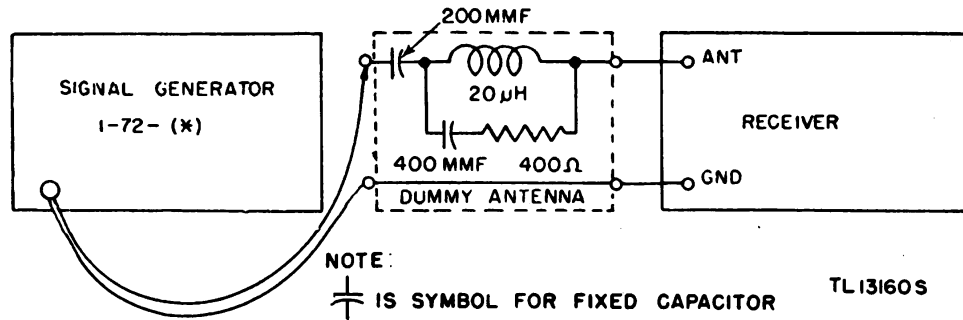


Figure 7. Connections of signal generator to input of receiver.

b. Set both the signal generator and receiver dial to the higher frequency alignment point first, and adjust the oscillator trimmer until maximum response is indicated on the output indicator. Then adjust the mixer and r-f trimmers for maximum response. The output of the signal generator must be reduced as the various circuits are brought into alignment.

c. Set the signal generator at the low-frequency point and tune the receiver dial until a response is indicated. This point on the receiver dial should agree with the setting of the frequency dial on the signal generator. If an oscillator padder capacitor is used in the receiver, adjust it while slowly rocking the tuning dial of the receiver back and forth until maximum output is indicated.

d. Recheck the oscillator trimmer at the high-frequency point and readjust if necessary. The low-frequency point should also be rechecked, as these two oscillator adjustments are not independent.

e. The receiver dial calibration should now check with that of the signal generator. If the calibration does not check, one of the following faults is indicated:

- (1) The i-f amplifier was not aligned on the frequency for which it was designed.
- (2) The oscillator was aligned on the image of the signal; that is, it was set at a frequency lower than the signal frequency where it should have been higher, or vice versa.
- (3) Components in the receiver are incorrect or defective.
- (4) The signal generator is off calibration. (For details on calibration of the signal generator see pars. 48 to 52 inclusive.)

## CHAPTER 3

# MAINTENANCE INSTRUCTIONS

---

### Section I. PREVENTIVE MAINTENANCE TECHNIQUES

#### 16. Meaning of Preventive Maintenance

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major breakdowns, unwanted interruptions in service, and to keep equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent break-downs* and, therefore, the need for repair. On the other hand, the prime function of trouble-shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. A system of radio communication depends on the performance of every set. It must be *ready* to go on the air when it is needed, and it *must* operate efficiently. Therefore, it is vitally important that radio operators and repairmen maintain their radio sets properly. In a similar manner, the test equipment by which this condition of readiness in communications equipment is realized must be kept in excellent operating condition at all times.

*Note.* The operations in paragraphs 18 to 23, inclusive, are user maintenance operations. Some operations in paragraphs 24 to 27, inclusive, and paragraphs 37 and 38, are higher echelon maintenance.

#### 17. Description of Preventive Maintenance Techniques

*a. GENERAL.* Most of the electrical parts used in Signal Generator I-72-(\*) require routine preventive maintenance. This preventive maintenance varies. Some parts require a different kind of maintenance than others. Some require more, some less. Definite and specific instructions must be followed. Hit-or-miss techniques cannot be applied. This section of the manual contains these specific instructions to guide personnel assigned to perform the six basic maintenance operations: Feel, Inspect,

Tighten, Clean, Adjust, and Lubricate. Throughout this manual the lettering system for the six operations will be as follows:

F—Feel\*  
I—Inspect  
T—Tighten  
C—Clean  
A—Adjust  
L—Lubricate\*

The first two operations if the other four are needed. Selection of operations is based on a knowledge of field needs. For example, dust encountered on dirt roads during cross-country travel filters into equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is needed most.

*b. FEEL.\** The feel operation is used most often to check rotating machinery, such as dynamotors, blower motors, and drive motors, also to determine whether electrical connections and bushings are overheated. Feeling will show the need for lubrication or the existence of other defects requiring correction. The maintenance man *must* become familiar with the normal operating temperatures of motors, transformers, and other parts, to recognize signs of overheating.

*Note.* It is important to perform the feel operation as soon as possible after shut-down and always before any other maintenance is done.

*c. INSPECT.* Inspection is the most important operation in preventive maintenance. A careless observer will overlook evidences of minor trouble. Although these defects may not at the moment interfere with performance of the equipment, invaluable time and effort can be saved if they are corrected *before* they lead to major and costly break-downs. To be able to recognize the signs of a defective set, make every effort to become thoroughly familiar with indications of *normal* functioning. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

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\* The Feel and Lubricate operations do not apply to Signal Generator I-72-(\*).

(2) Placement, by observing that all leads and cabling are in their original positions.

(3) Cleanliness, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals and binding posts. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity areas, look for fungus growth and mildew.

(4) Tightness, by testing any connection or mounting which appears to be loose.

*d.* TIGHTEN, CLEAN, AND ADJUST. These operations explain themselves. Specific procedures to be followed in performing them are given wherever necessary throughout this chapter.

**Caution:** Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

Whenever a loose connection is tightened, it should be moisture-proofed and fungiproofed again by applying the varnish with a small brush. See paragraphs 35 and 36 for details of moisture-proofing and fungiproofing.

*e.* LUBRICATE.\* Lubrication refers to the application of grease or oil to the bearings of motors or rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment. When the need for lubrication is indicated, see paragraphs 24 to 27, inclusive.

## Section II. ITEMIZED PREVENTIVE MAINTENANCE

### 18. Introduction

For ease and efficiency of performance, preventive maintenance on Signal Generator I-72-(\*) will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed at the specific time intervals is broken down into units of work called items. The general techniques involved and the application of the FIT-CAL operations in performing preventive maintenance are discussed in paragraphs 16 and 17. These general instructions are not repeated in this section. When performing preventive maintenance, see paragraphs 16 and 17 if more information is required for the following items. Perform all work with the power removed from the equipment. After preventive maintenance has been performed on a given day, put the equipment into operation and check it for satisfactory performance.

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\* The Lubricate operation does not apply to Signal Generator I-72-(\*).

## 19. Preventive Maintenance Tools and Materials

The following preventive maintenance tools and materials will be needed:

- Common hand tools.
- Clean cloth.
- #0000 sandpaper.
- Crocus cloth.
- Dry-cleaning solvent (SD).

*Note.* Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-Cleaning, is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel, may be used for cleaning purposes when dry-cleaning solvent (SD) is not at hand. Carbon tetrachloride will be used as a cleaning fluid only in the following cases: when inflammable solvents cannot be used because of the fire hazard, and for cleaning electrical contacts including relay contacts, plugs, commutators, etc.

## 20. Item 1, Exterior of Signal Generator I-72-(\* )

At the end of each day's operations, inspect the exterior of the signal generator to determine if it has been damaged in any way. Inspect the cabinet for scratches in the paint and for dents. Check the operation of control knobs and switches to make sure that they are tight on their shafts and not broken. Inspect the power cord and the output cable to locate any kinks, breaks in shielding, or deterioration of insulation. Tighten loose screws and control knobs. Clean the outside of the cabinets; never allow dust to accumulate on this equipment.

## 21. Item 2, Interior of Signal Generator I-72-(\* ) (figs. 8, 9, and 10)

Approximately once every month, remove the signal generator from its cabinet and check the interior. Remove the copper shield around the oscillator assembly, but do not disturb any wires within this unit. Do not remove the shields from around the R. F. AND A. F. ATTENUATORS unless there are definite signs of trouble within them. Check the vacuum tubes. Inspect all capacitors for signs of melted wax. Inspect all resistors for signs of having been overheated. Check the power transformer, filter choke, and audio transformer for melted wax caused by overheating. If any part has been overheated or burned out, determine the source of the trouble before replacing the burned-out part and putting the signal generator in service again. Tighten loose mounting bolts and nuts, but do not attempt to tighten any of the alignment screws in the coil assembly. Clean out any accumulated dust.

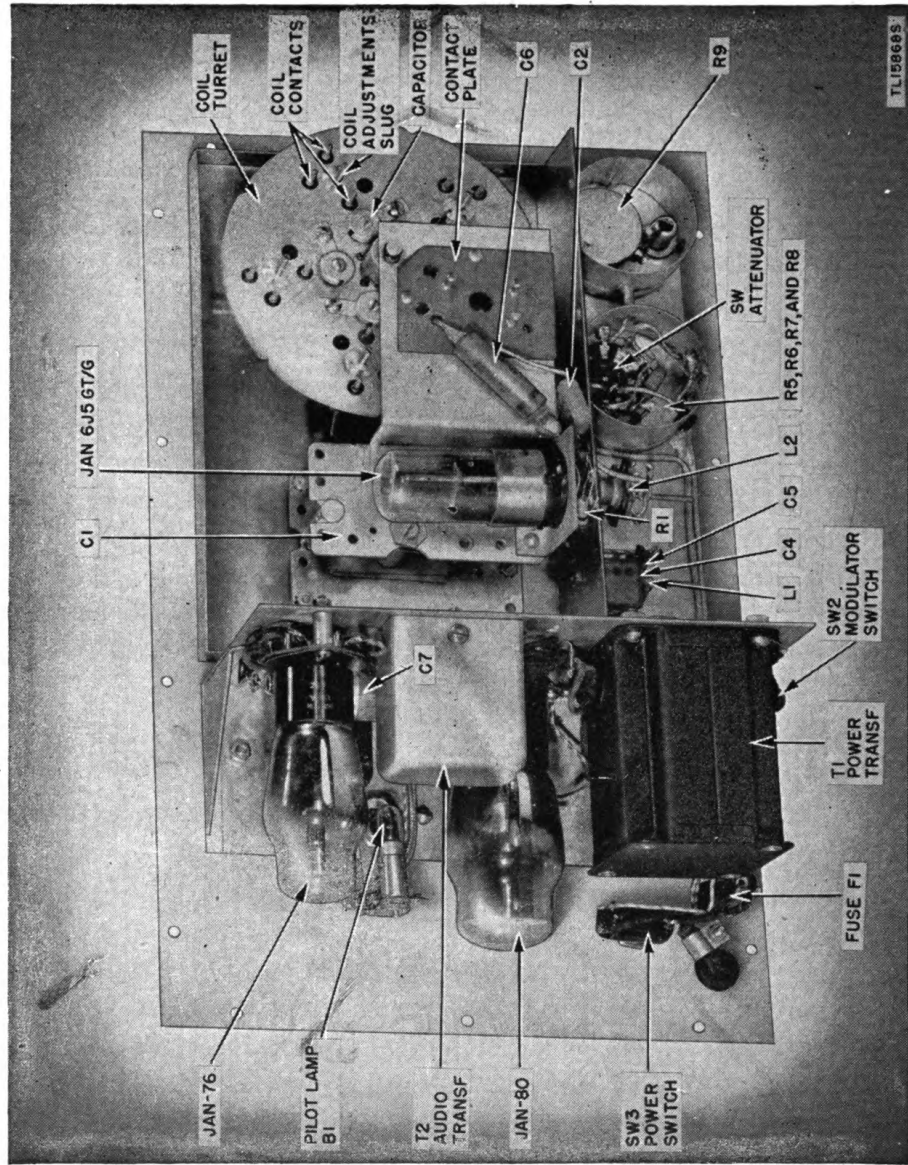


Figure 8. Signal Generator I-72-G, H, and J, rear interior view.

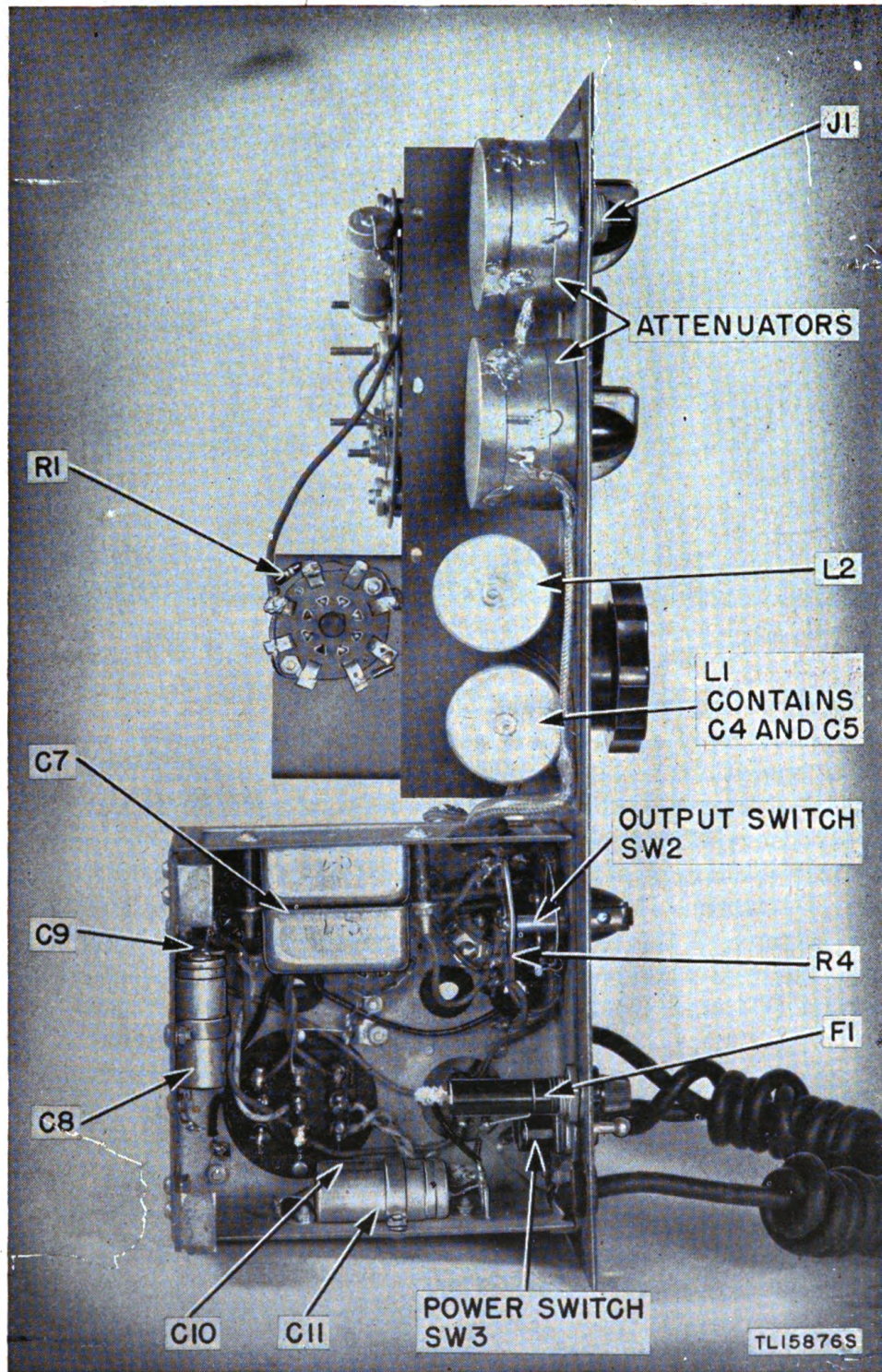


Figure 9. Signal Generator I-72-K, top interior view.

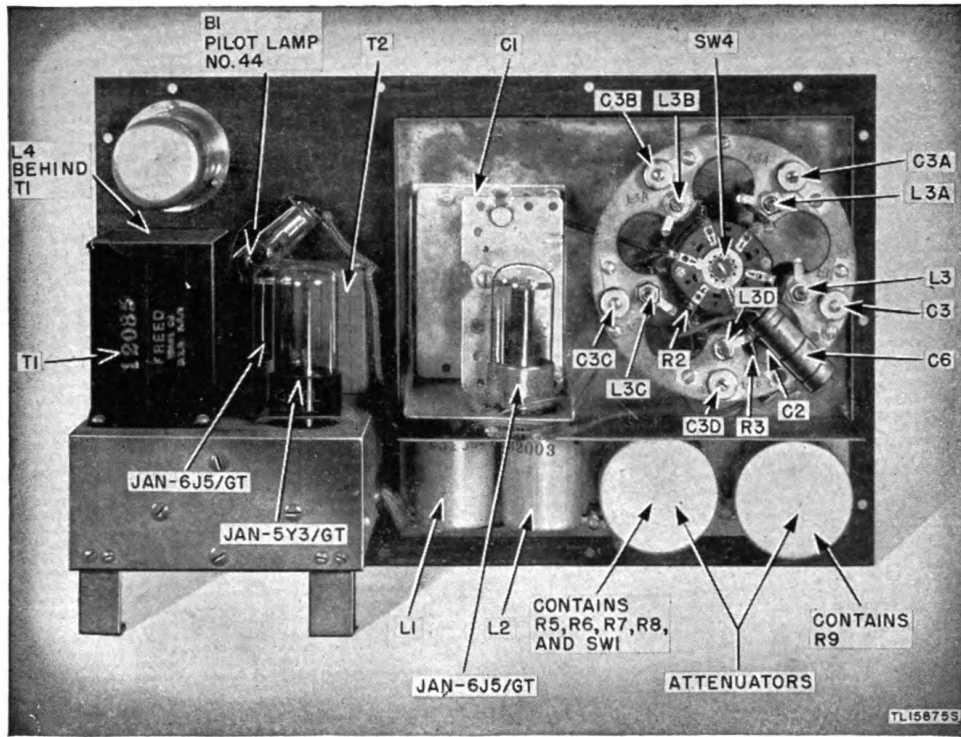


Figure 10. Signal Generator I-72-K, rear interior view.

## 22. Preventive Maintenance Check List

The following check list is a summary of the preventive maintenance operations to be performed on Signal Generator I-72-(\*). The time intervals on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No.	Operations	Description of item	When performed			
			Daily	Weekly	Monthly	Semi-annually
1	ITC	Exterior of Signal Generator I-72-(*).	X			1
2	ITC	Interior of Signal Generator I-72-(*).			X	

Note: X indicates when operations are to be performed.

F            I            T            C            A            L  
 Feel        Inspect      Tighten     Clean       Adjust       Lubricate



## Section III. LUBRICATION

### 23. Lubrication

No lubrication is required for Signal Generator I-72-(\*) or its associated equipment.

## Section IV. MOISTUREPROOFING AND FUNGIPROOFING

### 24. General

When operated in tropical areas where temperature and relative humidity are extremely high, Signal Corps equipment requires special attention. These are some of the problems met:

a. Resistors, capacitors, coils, chokes, transformer windings, etc., fail because of the effects of fungus growth and excessive moisture.

b. Electrolytic action, often visible in the form of corrosion, takes place in resistors, coils, chokes, transformer windings, etc., causing eventual break-down.

c. Hook-up wire insulation and cable insulation break down. Fungus growth accelerates deterioration.

d. Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs and crosstalk.

e. Moisture provides leakage paths between battery terminals.

### 25. Treatment

A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. See TB SIG 13 for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in this treatment.

**Caution:** Varnish spray may have poisonous effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise fasten cheesecloth or other cloth material over nose and mouth. Never spray varnish or lacquer near an open flame. Do not smoke in a room where varnish or lacquer is being sprayed. The spray may be highly explosive.

### 26. Signal Generator I-72-(\*)

a. PREPARATION. Make all repairs and adjustments necessary for proper operation of the equipment.

b. DISASSEMBLY.

(1) Remove cover by disengaging the snap fasteners.

- (2) Remove 14 screws on the front panel.
- (3) Remove the unit from its case.
- (4) Remove the 12 screws from the oscillator assembly shield and remove the shield.

(5) Remove one nut from each of the shields on the two r-f filters and remove the shields.

*c. CLEANING.* Clean all dirt, dust, rust, fungus, oil, grease, etc., from equipment to be processed.

*d. MASKING.* Mask the following components:

- (1) R-f filters. (See fig. 11.)
- (2) Output switch. (See fig. 11.)
- (3) Frequency capacitor. (See fig. 12.)
- (4) Contacts on coil contact plate. (See fig. 12.)
- (5) Contact pins on coils mounted on turret assembly. (See fig. 12.)
- (6) Coil windings and contact pins. (See fig. 12.)

*Note.* In Signal Generator I-72-K the turret switch has been replaced by a wafer switch. Therefore, instead of masking contact pins and plate, the wafer-switch should be masked.

*e. DRYING.* (1) Place the equipment in a drying oven and bake at 160°F. for a period of 2 to 3 hours.

(2) If the wax should begin to melt on any of the components, decrease the temperature and increase the baking time approximately 1 hour for each 10° drop in temperature.

*f. VARNISHING.* Using a spray gun, apply three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Spec. No. 71-2202 (Stock No. 6G1005.3), or equal), to all parts of the equipment, including inside of case and cover. Allow each coat to air-dry for 15 to 20 minutes before applying the next coat. With a brush, touch up the parts not reached with the spray gun.

*g. REASSEMBLY.* (1) Remove all masking tape, being careful not to peel varnish from nearby areas.

(2) Reassemble unit by following instructions for disassembly in reverse order.

(3) Reassemble the equipment and test its operation.

*h. MARKING.* Mark the letters MFP and the date of treatment on or near the name plate after receiving moistureproofing and fungiproofing treatment.

EXAMPLE: MFP—22 Sept 45.

## 27. Moistureproofing and Fungiproofing after Repairs

If, during repair, the coating of protective varnish has been punctured or broken, and if complete treatment is not needed to reseal

the equipment, apply a brush coat to the affected part. Be sure the break is completely sealed.

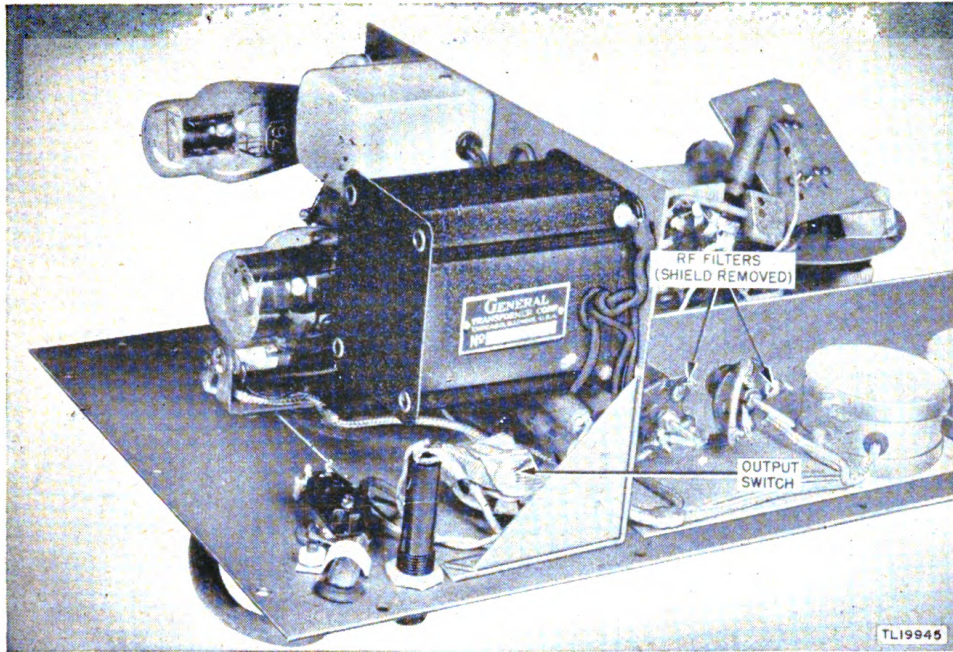


Figure 11. Signal Generator I-72-G, H, and J, interior view showing masking of output switch and r-f filters.

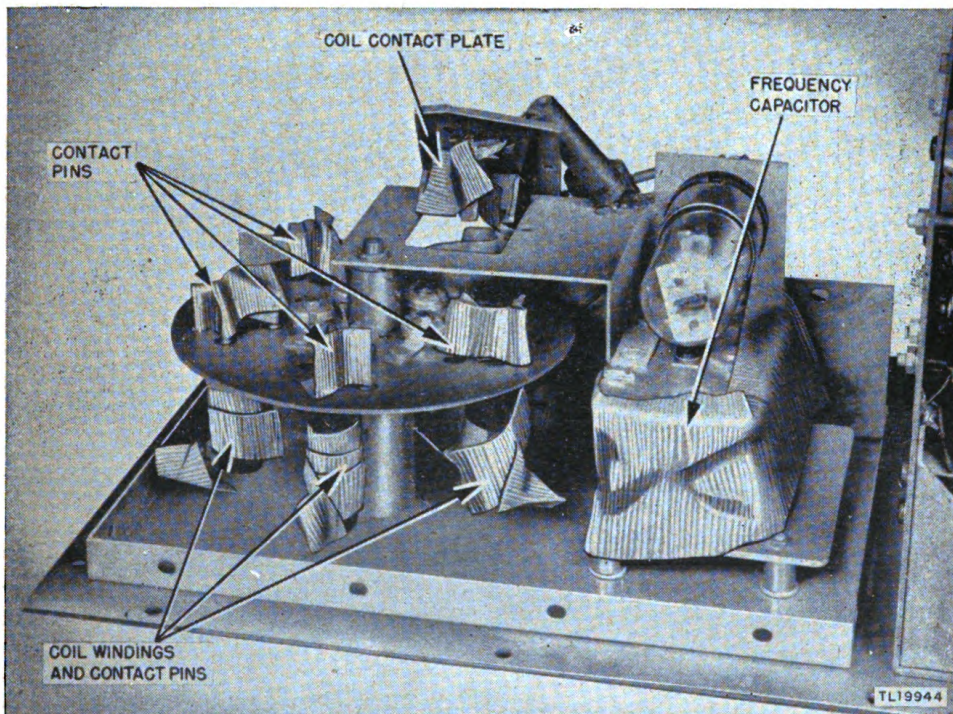


Figure 12. Signal Generator I-72-G, H, and J, interior view showing various parts masked.

# CHAPTER 4

## AUXILIARY EQUIPMENT

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### 28. Output Indicator

When Signal Generator I-72-(\*) is used to align radio receivers, some form of output indicator is required. In general, one of the following three types of output meter may be used.

a. **COPPER-OXIDE RECTIFIER OUTPUT METER.** Typical output meters of this type are Voltmeter TS-396/U and TS-376/U either of which is included in Test Set I-56-( ). When used in receiver alignment, this type of meter is connected to the audio output of the receiver under test.

b. **CATHODE-RAY OSCILLOSCOPE.** A cathode-ray oscilloscope is a more sensitive type of output indicator than a copper-oxide rectifier meter, and it is not damaged by excessive input signal. It may be connected to any point in the audio circuit of the receiver. It can also be used to compare the waveform of the audio voltage as it is detected by the receiver with the waveform of the modulated signal put out by the signal generator. A typical oscilloscope is Oscilloscope BC-1060 or Oscilloscope I-245.

c. **SENSITIVE D-C VOLTMETER.** A sensitive d-c voltmeter is connected directly into the detector circuit as an output indicator when the selectivity of the receiver to be aligned is so great that it will not pass a 400-cycle modulated signal. A typical voltmeter of this type is that found in Test Set TS-397/U or TS-393/U, parts of Test Sets I-56-C, D, H, and J; Test Unit I-176, part of Test Set I-56-K; Electronic Voltohmmeter (Radio City Products Model 664), part of Test Equipment IE-9-( ); and Alignment Indicator I-210-A.

### 29. References

For further information on output indicators, consult the following publications:

- TM 11-303.....Test Sets I-56-C, I-56-D, I-56-H,  
and I-56-J.
- TM 11-2613.....Voltohmmeter I-166.
- TM 11-2624.....Electronic Voltohmmeter, Radio  
City Products Model 664.
- TM 11-2626.....Test Unit I-176.
- TM 11-316.....Alignment Indicator I-210-A.
- TM 11-487.....Electrical Communication Systems  
Equipment.

# CHAPTER 5

## REPAIR INSTRUCTIONS

*Note.* Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on WD AGO Form 468 (Unsatisfactory Equipment Report); by Army Air Forces, on AAF Form 54 (Unsatisfactory Report).

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### Section I. THEORY OF EQUIPMENT

#### 30. Oscillator

The radio-frequency oscillator in Signal Generator I-72-(\*) uses triode Tube JAN-6J5GT/G (VT-94D) in a tuned-plate circuit. A schematic diagram is shown in figure 19. The frequency of oscillation is determined by the resonant circuit consisting of main tuning capacitor C1; trimmer capacitor C3; and the primary of coil L3. The secondary of core L3 feeds a signal back into the grid circuit through the coupling circuit consisting of capacitor C2 and resistor R1. Bias voltage for the tube is developed by rectified grid current flowing through resistor R1. Resistor R2, which is in series with the secondary of L3 for band 5 only, is used to suppress parasitic oscillations. Capacitor C6 bypasses r-f current to ground from the low r-f potential end of the primary of core L3. Oscillator output is taken from the secondary of core L3 through isolating resistor R3. The entire r-f unit is inclosed in a shield to keep stray r-f signals from appearing in other parts of the signal generator or in the receiver being aligned. Two filters, one consisting of L1, C4, and C5, and the other of L2, keep r-f signals from going into the filament supply and the high-voltage supply, respectively.

#### 31. Attenuators

The R. F. AND A. F. ATTENUATORS, consisting of resistors R5, R6, R7, R8, and potentiometer R9, are inclosed in shields which are part of the over-all r-f shielding. The STEPS attenuator, consisting of R5, R6, R7, and R8, varies the output by a factor of 10 per step. At position No. 1, the signal is grounded and the only output that will be obtained is the little radio frequency voltage which may leak through. The VERNIER attenuator provides a continuous variation of output between the values that are obtained by the use of the STEPS attenuator.

### 32. Modulator

The modulator is a tuned-plate, 400-cycle, audio oscillator whose function is to modulate the r-f output of the oscillator or to provide a 400-cycle test tone, depending on the position of the OUTPUT switch. Tube JAN-76 (VT-76) is used. The frequency of oscillation is determined by the inductance of transformer T2 and the capacitance of capacitors C7 and C12. C12 may be any value between 0.1 and 0.25 microfarads (mf), in order to give a frequency of 400 cycles. Audio signal is fed back into the grid circuit through the coupling between the two windings of T2. Resistor R4 limits the plate voltage on the tube and maintains the amplitude of oscillation at the value necessary to modulate the oscillator about 30 percent.

### 33. Output Switch

The output switch is used to select modulated output (MOD.), unmodulated output (UNMOD.), or 400-cycle output (400~), When it is set at MOD., the oscillator gets its high voltage through transformer T2, in which 400-cycle oscillations are taking place. Thus the plate voltage on the oscillator is varied at the rate of 400 cycles per second, and its output is modulated. When the switch is set at UNMOD., the same connections to the oscillator are maintained, but the tap on transformer T2 is grounded, preventing the 400-cycle oscillations, and the output is unmodulated. With the OUTPUT switch at 400~, high voltage is removed from the oscillator tube, and the modulator functions alone. The 400-cycle output voltage is taken from the tap on transformer T2 and fed into the output of the signal generator through the attenuators.

### 34. Power Supply

The power supply uses Tube JAN-80 (VT-80) in a full-wave rectifier circuit. High voltage (positive) is taken from one side of the filament of Tube JAN-80; filter choke L4 and capacitors C8 and C9 filter the output. A third secondary winding on transformer T1 supplies 6.3 volts ac for the filaments of Tubes JAN-6J5GT/G and JAN-76, and the pilot lamp. Capacitors C10 and C11 balance the primary of transformer T1 to ground to minimize interference entering the signal generator from the power line and to keep radio frequency voltage from leaving the signal generator along the power line. The power switch and a 1-ampere fuse are in series with the primary.

## Section II. MECHANICAL INSPECTOR

### 35. Purpose

This inspection should be performed on Test Set I-72-(\*) when the set is brought in for repair or whenever it is suspected that the set has suffered substantial mechanical damage. Its purpose is to locate all points of mechanical trouble. This inspection should be performed before making any electrical tests, since a defective switch, fuse, or other component could cause the set to burn out as soon as it is plugged in. Moreover, a good mechanical inspection will often make further electrical tests unnecessary by disclosing faults in switches, bent plates in variable capacitors, and burned-out circuit elements.

### 36. Procedure

Follow the orderly procedure outlined below for best results. Items to be checked are in the first column; the manner of testing and points to inspect are in the second column. See figure for location of controls.

Check	Procedure
Frequency tuning dial	Rotate the tuning knob so that the pointer travels its full course and back. Turning should be smooth and even, without binding or slipping. Shake the knob in a plane perpendicular to the shaft. There should be no excessive play in this shaft. The knob should not slip on the capacitor shaft.
BAND SELECTOR	Turn the band selector knob several times in both directions. The turret or switch should definitely snap into position with the knob pointer indicating the band number. There should be no movement of the shaft perpendicular to the panel.
VERNIER control	Turn the knob from 0 to 10 and back. The attenuator should turn easily and smoothly without binding or scraping. The knob should not turn past the end points or slip on the shaft.
STEPS control	Turn the knob fully in both directions. It should definitely snap into position and have a positive mechanical index. The knob should not slip and turn on the shaft nor should it turn past the end point.
OUTPUT control	Same as above for STEPS control.

Check	Procedure
Fuse and fuse holder-----	Remove the fuse from the panel by using a screw driver. Test the holding power of the fuse clip by pulling out the fuse. Check for cracks in the metal in the fuse holder. Check the fuse cap by grasping the ends in both hands and exerting a light twisting and pulling force on them.
POWER SWITCH-----	Turn the switch on and off several times. The switch should have a positive click contact action and should not bind. Movement of the switch arm should be vertical (directly in line with ON-OFF markings).
Tube Socket-----	Check to see that the tube clamps hold the tubes securely. Check the contact lugs of the sockets for cleanliness and holding power.
* Coil contact plate-----	This should be securely fastened to the metal mounting plate and should not move.
* Turret assembly-----	The coil pins should be firm. This can be determined by attempting to turn the pins with the figures. The spring lock washer should be tight. The tightness is indicated by the flatness of the washer.
* Coil spring contacts-----	The right side of the chassis is raised to permit a clear view of the spring contacts. The pins and upper coil contacts should fall into the center of the two parts of the spring which exerts equal pressure on both sides. The tuning screw should clear the springs. The upper coil contact is staked with its nut tightened against the coil form to prevent shaking of the pin. The lead to the upper part of the coil should be securely soldered to its lug.
Variable capacitor gears-----	The two large capacitor gears should be close together so that they both make contact with the turning gear. If there is slipping or backlash, disassemble the gears and move them closer together for greater spring tension.
Power supply mounting plate--	All nuts and screws must be tight and secure.
Pilot lamp socket-----	This must be mounted securely with a lock washer.
Attenuator cans-----	Check the soldering of the cover cans to make sure the cans will not come off.
Connections-----	Check all joints and connections to see that they are secure. Look for possible shorts.

\* Does not apply to K model.



Check	Procedure
Electrical components-----	Check for broken, burned out, or disconnected components.
Shielding-----	All shields should make clean contact with their covers to insure good grounding.

### Section III. TROUBLE-SHOOTING PROCEDURES

#### 37. General Trouble-Shooting Information

No matter how well equipment is designed and manufactured, faults occur in service. When such faults occur, the repairman must locate and correct them as rapidly as possible. This section contains general information to aid personnel engaged in this highly important duty of trouble-shooting.

*a.* TROUBLE-SHOOTING DATA. Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

- (1) Complete schematic diagrams. (See figs. 19 and 20.)
- (2) Voltage and resistance data for all socket connections. (See figs. 13 and 14.)
- (3) Illustrations of components—front, top, and bottom views which aid in locating and identifying parts.
- (4) Pin connections. Pin connections on sockets, plugs, and receptacles are numbered or lettered on the various diagrams. Seen from the bottom, pin connections are numbered in a *clockwise* direction around the sockets. On octal sockets, the first pin clockwise from the keyway is the No. 1 pin.

*b.* TROUBLE-SHOOTING STEPS. The first step in servicing a defective set is to sectionalize the fault. Sectionalization means tracing the fault to the component or *circuit* responsible for the abnormal operation of the set. The second step is to localize the fault. Location means tracing the fault to the defective *part* responsible for the abnormal condition. Some faults such as burned-out resistors, r-f arcing, and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be located by checking voltage and resistance.

*c.* SECTIONALIZATION. Careful observation of the performance of the equipment while operating the OUTPUT switch will often determine the stage at fault. If the equipment does not operate on any position of the OUTPUT switch, check the output voltage of the power supply to determine whether the power supply is operating. By following the start-stop procedure given in para-

graph 38 and by using the voltage and resistance chart in figures 13 and 14 the trouble can quickly be traced to the defective part.

*d. VOLTAGE MEASUREMENTS.* Voltage measurements are an almost indispensable aid, for most troubles either *result* from abnormal voltages or *produce* abnormal voltages. Voltage measurements are taken easily, because they are always made between two points in a circuit. The circuit need not be interrupted.

(1) Unless otherwise specified, voltages listed on the voltage charts are measured between the indicated points and ground.

(2) Always begin by setting the voltmeter on the *highest* range so that the voltmeter will not be overloaded. Then, if it is necessary to obtain increased accuracy, set the voltmeter to a lower range.

(3) When checking cathode voltage, remember that a reading can be obtained when the cathode connection to ground is actually open as the resistance of the meter may act as a cathode resistor. Thus, the cathode voltage may be approximately normal only as long as the voltmeter is connected between cathode and ground. Before cathode voltage is measured, first make a resistance check with the power off to determine whether the cathode resistor is normal.

*e. PRECAUTIONS AGAINST HIGH VOLTAGE.* Certain precautions *must* be followed when measuring voltages above a few hundred volts. High voltages are dangerous and can be fatal. When it is necessary to measure high voltages, observe the following rules:

(1) Connect the ground lead to the voltmeter.

(2) Place one hand in your pocket. This will eliminate the possibility of making accidental contact with another part of the circuit thus causing the electricity to travel from one hand to the other through the body.

(3) Connect the test lead to the hot terminal (which may be either positive or negative with respect to ground).

*f. VOLTMETER LOADING.* Voltmeter resistance must be at least 10 times as large as the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is nearly equal to the circuit resistance, the voltmeter will indicate a voltage *lower* than the actual voltage present when the voltmeter is removed from the circuit.

(1) The resistance of a voltmeter on any range can be calculated by this simple rule: Resistance of the voltmeter equals its ohms per volt multiplied by the full-scale range in volts. For example: The resistance of a 1,000-ohm-per-volt meter on the 300-volt range is 300,000 ohms ( $R = 1,000 \text{ ohms per volt times } 300 \text{ volts} = 300,000 \text{ ohms}$ ).

(2) To minimize voltmeter loading in high-resistance circuits, use the highest voltmeter range. Although only a small deflection will be obtained (possibly only 5 divisions on a 100-division scale), the electrical accuracy of the voltage measurement will be increased. The decreased loading of the voltmeter will more than compensate for the visual inaccuracy which results from reading only a small deflection on the voltmeter scale.

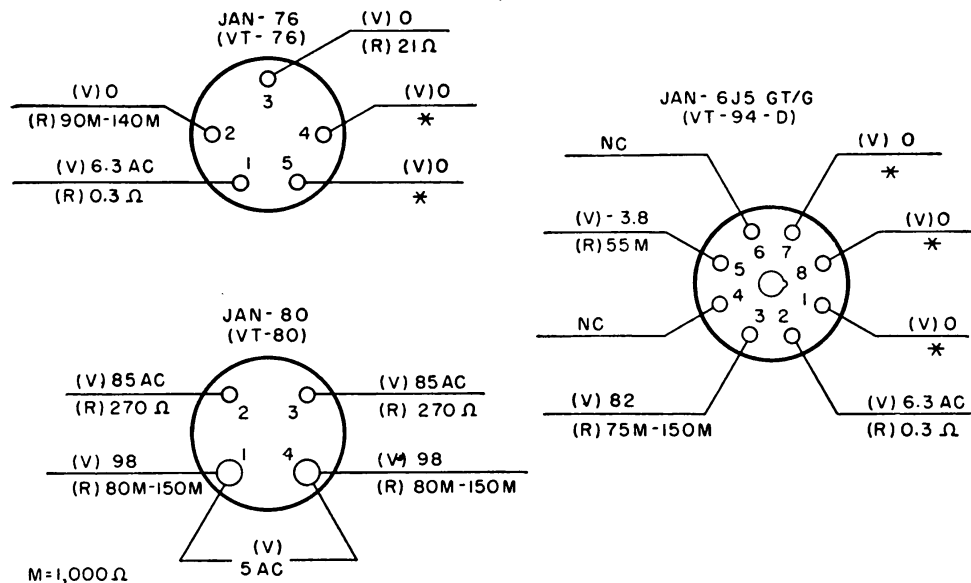
(3) Close observation of the meter when switching voltage ranges will show if the voltmeter is loading the circuit under test.

(a) *Extremely heavy loading* is indicated when the deflection of the pointer on the meter (not the voltage reading) is nearly the same for different ranges.

(b) *Appreciable loading* is indicated when the voltage readings (not the deflection) for different ranges do not agree.

(c) *Negligible loading* is indicated when the voltage readings (not the deflection) for different ranges do agree.

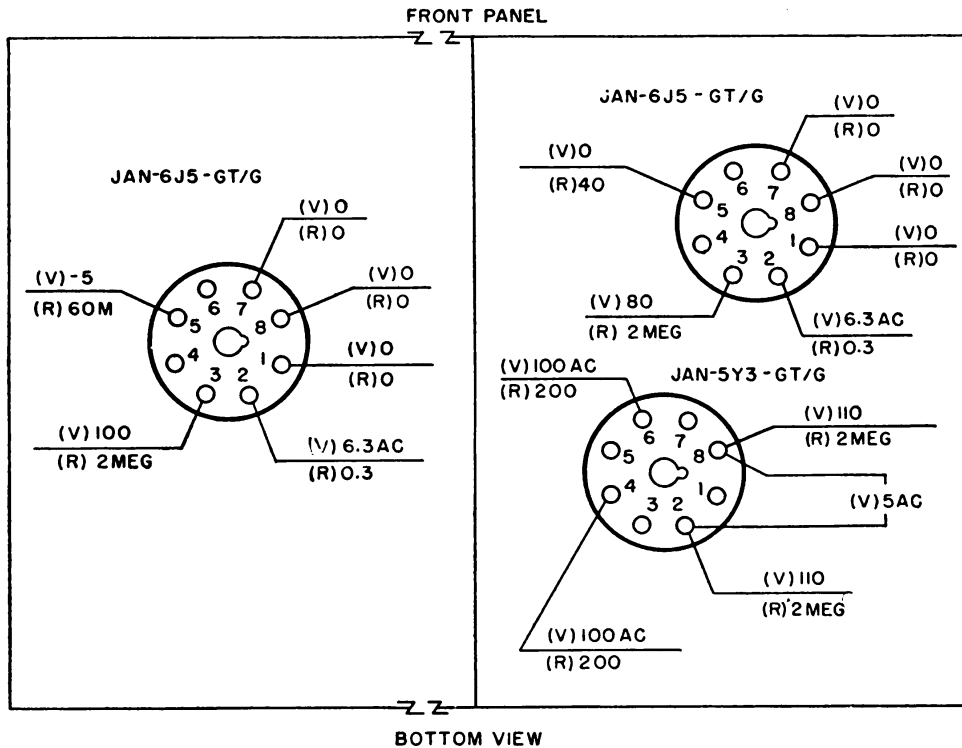
(4) The ohm-per-volt sensitivity of the voltmeter used to obtain the readings recorded on the voltage and resistance charts in this manual is printed on each chart. Use a meter having the same ohm-per-volt sensitivity. Otherwise it may be necessary to consider the effect of loading.



\* NEGLIGIBLE RESISTANCE.  
 BOTTOM VIEWS OF SOCKETS SHOWN.  
 ALL VOLTAGES MEASURED WITH 1,000 OHMS PER VOLT METER WITH TUBES IN SOCKETS.  
 ALL VOLTAGES DC AND MEASURED TO GROUND UNLESS OTHERWISE INDICATED.  
 RESISTANCES MEASURED WITH POWER PLUG OUT AND UNIT COLD.

CONTROLS SET AS FOLLOWS:  
 BAND SELECTOR - BAND I      STEP CONTROL - 4  
 VERNIER CONTROL - 10      MAIN TUNING DIAL - 200KC  
 TL 15869S

Figure 13. Voltage and resistance chart for Signal Generator I-72-G, H, and J.



**NOTE:**  
 ALL VOLTAGES DC UNLESS OTHERWISE SHOWN.  
 D-C MEASUREMENTS MADE WITH 1,000 OHMS -PER- VOLT METER.  
 ALL VOLTAGES MEASURED TO GROUND UNLESS OTHERWISE SHOWN.  
 ALL MEASUREMENTS MADE WITH TUBES IN SOCKETS.  
 RESISTANCE MEASURED WITH POWER PLUG DISCONNECTED AND UNIT COLD

**CONTROLS SET AS FOLLOWS:**  
 BAND SELECTOR SWITCH - I    STEP CONTROL - 4    VERNIER CONTROL - 10  
 TUNING DIAL - 200 KC    OUTPUT - UNMOD.    TL15870S

Figure 14. Voltage and resistance chart for Signal Generator I-72-K.

### 38. Start-Stop Procedure Analysis

This start-stop procedure analysis will help in sectionalization and localization of trouble.

**a. PREPARATION.** Obtain a receiver known to be in good operating condition. Connect it to Signal Generator 1-72-(\*) through a dummy antenna circuit (see par. 15) or, if such a circuit is not available, a small capacitor (about 200mmf). Turn the receiver on.

**b. ANALYSIS CHART.**

**Step 1. Turn the POWER switch ON.**

*Normal Indication:* Pilot lamp should light.

*Abnormal indication*

(1) Pilot lamp does not light.

*Probable location of fault*

- (a) Pilot lamp burned out.
- (b) Defective POWER switch.
- (c) Line cord not plugged in properly.
- (d) Fuse burned out.

*Note.* Do not replace until cause for burning out has been remedied. Make resistance checks to locate short. Resistance between terminals of power cord should be about 60 ohms.

- (e) Defective transformer T1.

*Step 2.* Set BAND SELECTOR switch to band 1, set tuning dial to some frequency within the band, and tune the receiver to the same frequency. Set the R. F. AND A. F. ATTENUATORS and STEPS control at maximum output positions. Set the OUTPUT switch at UNMOD., and turn the receiver beat-frequency oscillator on. Rock the tuning dial on the signal generator back and forth.

*Normal Indication.* Beat note should be picked up in receiver.

*Abnormal indication*

(2) No beat note heard.

*Probable Location of Fault*

- (a) Defective Tube  
JAN-6J5GT/G.
- (b) Defective OUTPUT switch. (Try MOD. position.)
- (c) Band contacts in BAND SELECTOR switch.
- (d) Defective attenuator controls. (Try other positions of R. F. AND A. F. ATTENUATORS.)
- (e) Defective coil L4, capacitors C8 or C9, or Tube JAN-80.
- (f) Defective component in oscillator circuit.

*Step 3.* Set R. F. AND A. F. ATTENUATORS at all possible positions.

*Normal Indication:* Signal in the receiver will vary in strength as attenuator controls are varied. (No output is obtained when the STEPS attenuator is set between numbered points.)

- | <i>Abnormal indication</i>   | <i>Probable location of fault</i> |
|--|-----------------------------------|
| (3) No variation of signal strength as attenuator control is varied. | Defective attenuator.             |
| (4) No output on some position of one of the attenuator controls.    | Defective attenuator.             |

*Step 4.* Repeat step 2 for several frequencies with band 1.  
*Normal Indications:* 1. Output is obtained at all frequency settings.  
 2. Tuning dial on signal generator moves freely without sticking.

- | <i>Abnormal indication</i>                         | <i>Probable location of fault</i>                                 |
|--|---|
| (5) No output obtained at some frequency settings. | Bent plates on capacitor C1.                                      |
| (6) Tuning dial sticks.                            | (a) Defective dial mechanism.<br>(b) Bent plates on capacitor C1. |

*Step 5.* Repeat step 2 for all five bands of Signal Generator I-72-(\*).

*Step 6.* Set the signal generator and receiver to the same frequency on any band, leaving the receiver beat-frequency oscillator on. Turn the OUTPUT switch to MOD.  
*Normal Indication:* With the OUTPUT switch turned to UNMOD. only a beat note should be heard in the receiver. When the OUTPUT switch is set to MOD., a two-tone signal (400 cycles and the beat note) should be heard.

- | <i>Abnormal indication</i>   | <i>Probable location of fault</i>  |
|--|--|
| (7) Beat note but no 400-cycle tone is heard when OUTPUT switch is at MOD. | (a) Defective tube JAN-76.<br>(b) Resistor R4 open.<br>(c) Capacitor C7 or C12, or transformer T2 shorted. |
| (8) No output when OUTPUT switch is at MOD.                                | Defective OUTPUT switch.   |

**Step 7.** Connect the lead from the signal generator to the grid of the first audio tube of the receiver through a 0.1-mf coupling capacitor. Set the OUTPUT switch at 400 ~. Advance the receiver audio volume control.

*Normal Indication:* A 400-cycle tone is heard in the receiver output.

<i>Abnormal indication</i>	<i>Probable location of fault</i>
(9) No 400-cycle tone heard.	Band contact on OUTPUT Switch.
(10) Tone appreciably higher than 400 cycles is heard.	Capacitor C7 or C12 open.

## Section IV. TEST AND ANALYSIS DATA

### 39. Voltages Measured from Tube Socket (figs. 13 and 14)

Figures 13 and 14 show a view of the bottom of the tube sockets as they appear from the bottom of the chassis. Voltage measurements to ground are indicated at each of the tube elements.

**Caution:** Be sure to puncture the fungi-resistant varnish at the points of measurements with the sharp points of the test probes. This varnish is a good electrical insulator. Any sizable deviation from the voltages indicated on the chart should be investigated as a possible source of trouble. Check for loose or broken connections.

### 40. Resistance Measured from Tube Socket (figs. 13 and 14)

Figures 13 and 14 show a view of the bottom of the tube sockets as they appear from the bottom of the chassis. Resistance measurements to ground are indicated at each of the tube elements. Investigate any sizable deviation for trouble.

### 41. Resistance of Coils

The following table lists the d-c resistance values of the various coils found in Signal Generator I-72-(\*). See the schematic diagrams (figs. 19 and 20) to determine the proper ohmmeter connections for making these measurements.

*Note.* Where a dash (—) appears for the value of resistance of a coil, it means that the coil has less than one ohm resistance.

Reference symbol	Function	Resistance (ohms)	Remarks
L1	Filament choke	(—)	
L2	Plate choke	20	
L3	Oscillator plate	Band 1, 60 Band 2, 5 Band 3, 1.5 Band 4, (—) Band 5, (—)	
	Oscillator grid	Band 1, 5  Bands 2 through 5, (—).	50-ohm resistor in series with this coil on band 5.
L4	Filter choke	1500	
T1	Power transformer primary.	52	
	High voltage secondary.	270	Each half.
	6.3-volt secondary	(—)	Remove tubes and pilot lamp.
	5-volt secondary	(—)	Remove tubes and pilot lamp.
T2	A-f transformer grid	21	
	A-f transformer grid tap to ground.	5	
	A-f transformer plate.	18	

## Section V. REPAIRS

### 42. Servicing

Be careful in maintaining and servicing this equipment. Servicing and repair other than the replacement of tubes and fuses should be performed only by competent personnel supplied with adequate tools and instruments. An inexperienced operator attempting to locate and repair troubles may damage the equipment to such an extent that shipment to a higher repair echelon will be necessary.

### 43. General Repair

Removal and replacement of defective parts or circuit elements in this equipment are very difficult, and great care must be taken to avoid further damage to the equipment or to the part being replaced. Before attempting repairs, make every effort to obtain the proper tools for the job.

*a.* IDENTIFICATION OF LEADS. Often it may be necessary to remove other circuit elements to reach the defective part. To



insure proper reinstallation, make record of the connections to each removed element and of the position of the element in the equipment.

b. **ELECTRICAL CONNECTIONS.** When replacing leads, clip them as short as possible for satisfactory connection and avoid using more solder than necessary to make a secure connection. A very slight amount of excess solder dropped accidentally inside the equipment may cause other circuits or circuit elements to be short-circuited. Some clearances are very small, and must be very carefully soldered. Do not heat the lug or connection more than is absolutely necessary because damage to nearby elements such as chokes, capacitors, coil forms, resistors, and wiring may result. When a wire is connected to a tube socket, the connecting wire should be long enough to prevent pull on the socket. Save time and trouble by making a thorough electrical check of any part that appears to be defective *before* removing it from the equipment.

*Caution: Never change the location of parts or wiring leads. Such a change may necessitate complete recalibration of the equipment. Never change the length of wiring leads in the r-f section.*

#### **44. Mechanical Repairs**

When replacing mechanical parts in the equipment, use extreme care in disassembling and reassembling any mechanical units. Use screw drivers and other tools that fit the job at hand. Secure bolts snugly, but do not overtighten them.

#### **45. Removing Main Tuning Assembly**

When major repairs or replacement are necessary for any part of the main tuning assembly, remove the entire assembly as a unit. The following procedure is recommended for Signal Generators I-72-G, H, and J:

- a. Set the BAND SELECTOR switch to some point between numbers.
- b. Remove the main tuning knob and the BAND SELECTOR switch control knob with a small screw driver.
- c. Remove the signal generator from its case by removing the 14 screws around the panel; remove the oscillator shield by removing the 12 screws around its edge.
- d. Remove the indicator for the main tuning dial by taking out the screw at its center.
- e. Remove the three screws that are grouped closely around the shaft of the BAND SELECTOR switch.

f. Remove the three countersunk screws that are set in a triangular pattern around the main tuning shaft. Do not lose the bushings that fit over these screws behind the panel.

g. Carefully push the entire assembly back from the panel, being careful not to break any of the wires which connect the tuning assembly to the rest of the signal generator. The tuning capacitor and coils are now accessible for repair.

h. When replacing the tuning assembly, make sure that the small detent roller rides on the edge of the turret assembly.

i. Any relocation of parts within the tuning assembly, any changes in length of leads, or replacements of major items (except tubes) will necessitate recalibration of the instrument.

## 46. Repairing R. F. and A. F. Attenuators

The attenuator controls are mounted within shield cans and will ordinarily not require attention. If they do, the following procedure is recommended for removal:

a. Obtain a large, heavy-duty soldering iron and a small rag. A large iron should be used so that it will heat the solder rapidly without heating the rest of the unit.

b. Apply heat to each of the two points at which the shield cover is attached to the shield can. While the solder is still melted, wipe it off with a rag. The shield cover can then be removed, and the attenuator will be accessible for inspection.

c. Using a small soldering iron, unsolder those connections that are necessary to remove the switch or potentiometer.

d. Remove the control knob with a small screw driver, and remove the nut which holds the potentiometer or switch to the panel. The unit can then be slipped out.

## 47. Painting and Refinishing

If the finish on the case has been badly scarred or damaged, the repairman should touch up the bared surface of the case to prevent rust and corrosion. When painting and refinishing are necessary, proceed as follows:

a. Clean the scarred surface down to the bare metal. Use #00 or #000 sandpaper to obtain a bright, smooth finish. To remove rust, first clean the corroded metal with dry-cleaning solvent (SD). For severe rust, use dry-cleaning solvent (SD) to soften the rust and then use sandpaper to remove the rust.

**Caution:** *The use of steel wool instead of sandpaper is not recommended. Minute particles of the metal frequently enter the case and cause harmful internal electrical shorting or grounding of circuits.*

b. When a touch-up job is necessary, apply paint with a small brush. When numerous scars and scratches warrant a complete repainting job, remove the chassis from the case and spray-paint the entire case. Use authorized paint consistent with existing regulations.

## Section VI. CALIBRATION

### 48. General

a. FREQUENCY VARIATION. A variable-frequency oscillator of the type used in Signal Generator I-72-(\*) is subject to small variations in frequency with changes in temperature, humidity, and characteristics of tubes. This variation should not exceed 1 percent of the frequency to which the signal generator is set. For instance, if the signal generator had to be set for 10.2 megacycles in order to deliver a frequency of 10 megacycles, the error (0.2mc) would be greater than 1 percent of the frequency (10mc), and the signal generator would need calibration. See paragraph 50 for details on making spot checks to determine the need for calibration.

b. REPLACEMENT OF OSCILLATOR TUBE. Replacement of the oscillator tube (Tube JAN 6J5GT/G) will often throw the calibration of Signal Generator I-72-(\*) off by more than 1 percent. In such cases, allowing the set to run for 24 to 48 hours will usually age the tube enough to restore calibration.

### 49. Frequency Standard

Never attempt to calibrate or check Signal Generator I-72-(\*) unless a frequency standard of known accuracy is available. A Frequency Meter Set SCR-211-( ) in good condition is suitable for use in calibration. Other frequency standards of equivalent accuracy or better may also be used. Paragraph 51 indicates the procedure with Frequency Meter Set SCR-211-( ); paragraph 52 indicates modifications in this procedure when other frequency standards are to be used.

### 50 Spot Checks with Frequency Meter Set SCR-211-( )

a. Frequency Meter Set SCR-211-( ) is particularly useful for making rapid spot checks of frequency. In this application, the frequency meter is set for a frequency considerably lower than any frequency within the band being tested, thus producing a number of check points along the band without necessity for re-setting the frequency meter. As the tuning dial of Signal Generator I-72-(\*) is rotated past each check point, the setting at

which a zero beat is heard in the headset of the frequency meter will indicate the extent of the error in calibration.

*b.* Connect the output cable of the signal generator to the antenna post of the frequency meter through a small capacitor of about 200mmf. Turn both units on and allow them to warm up for at least ten minutes. Use the following chart in making the test:

<i>Band number</i>	<i>Frequency meter setting</i>	<i>Check points</i>
1	200kc	100kc, 200kc, 300kc
2	200kc	400kc, 600kc, 800kc
3	200kc	Every 200kc between 1,000 kc and 3,200kc
4	2.0mc	4mc, 6mc, 8mc
5	4.0mc	12mc, 16mc, 20mc, 24mc, 28mc

### 51. Calibration of Signal Generators I-72-G, H, J, and K with Frequency Meter Set SCR-211-()

*a.* Remove the signal generator from its cabinet, but do not remove any of the shields. Connect the output cable of the signal generator to the antenna post of the frequency meter through a small capacitor of about 200 mmf. Turn on both units, set the R.F. AND A.F. ATTENUATORS to maximum values, and set the OUTPUT switch at UNMOD. Allow both units to warm up for at least 10 minutes.

*b.* Set the frequency meter to 125kc, and set the signal generator to the same frequency (in band 1). Rock the tuning dial of the signal generator back and forth until a zero beat is heard in the headset of the frequency meter. Note whether the signal generator is set higher or lower than 125kc. Return the setting of the signal generator to 125kc.

*c.* Pry off the covers of the adjustment ports on the back of the oscillator shield. (See figs. 8 and 15.) Insert a small screw driver through the lower adjustment port in the case of the G, H, and J models or through the port marked LOW for the band being adjusted in the case of the K model. Adjust the tuning slug inside to get zero beat in the frequency meter headset. In general, if the setting noted in *b* above was higher than 125kc, the slug will have to be turned to the left, and vice versa.

*Note:* A screw driver in the adjustment port will affect the frequency. Make adjustments so that zero beat is obtained when the screw driver is removed.

*d.* Repeat the procedure in *b* above for a frequency of 300kc (still in band 1).

*e.* Insert a small insulated screw driver through the upper (for G, H, and J models) or HIGH (for K model) adjustment port (fig. 15), and adjust the trimmer capacitor inside to get zero beat in the frequency meter headset. In general, if the setting noted in *d* above was higher than 300kc, the screw will have to be turned to the left, and vice versa. An insulated screw driver must be used in making this adjustment because there is danger of shorting the high voltage.

*f.* Since the adjustments of the tuning slug and the trimmer capacitor are not independent, repeat steps in *c* and *e* above once or twice to make sure that the calibration holds for both ends of the dial.

*g.* After the ends of the dial have been calibrated, check the calibration at the center of the dial (200kc). If the calibration at this point is correct within 1 percent, the band can be considered to be calibrated correctly. If the error is only slightly more than 1 percent, a recheck of calibration should be made at the end of the band. If the error is appreciably greater than 1 percent, investigate the oscillator circuit for defective components.

*h.* Repeat the above calibration procedure for all bands. Use the following table:

Band number	Frequency	Frequency meter setting
1	Low—125kc	125kc
	High—300kc	150kc
	Check—200kc	200kc
2	Low—340kc	170kc
	High—960kc	160kc
	Check—640kc	160kc
3	Low—1,200kc	240kc
	High—3,000kc	250kc or 3.0mc
	Check—2,000kc	250kc or 2.0mc
4	Low—3.5mc	3.5mc
	High—9.6mc	3.2mc
	Check—6.4mc	3.2mc
5	Low—12.0mc	4.0mc
	High—28.0mc	4.0mc
	Check—20.0mc	4.0mc

## 52. Calibration with Other Frequency Standards

Any frequency standard whose accuracy is equal to or better than that of Frequency Meter Set SCR-211-( ) may be used to calibrate signal Generator I-72-(\*), following the same general procedure outlined in paragraph 51. Since most frequency standards do not contain a built-in detector, as does Frequency Meter

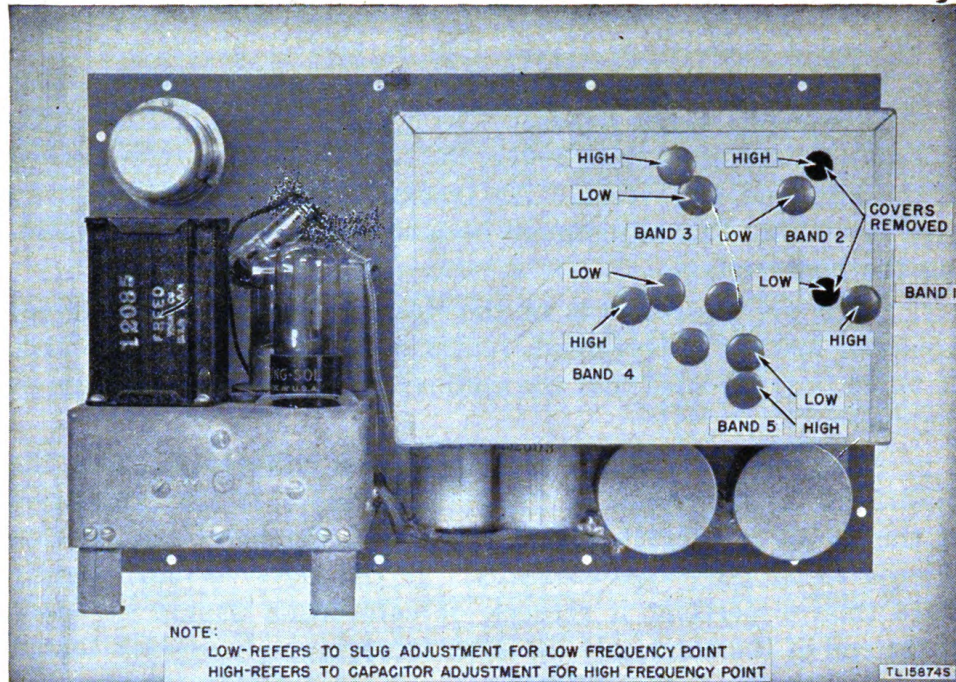


Figure 15. Signal Generator I-72-K, rear view showing tuning slots.

Set SCR-211-( ), it is necessary to use a receiver which can cover the frequency range of Signal Generator I-72-(\*) in conjunction with such standards.

a. DIRECT CALIBRATION. In this application, Signal Generator I-72-(\*) and the standard signal generator should each be connected to a dummy antenna and the two dummy antennas connected in parallel to the receiver. (See fig. 16.) The frequencies on which Signal Generator I-72-(\*) is aligned should be essentially the same as those shown in the table in paragraph 51. For each frequency, set the standard to the desired frequency or some subharmonic of that frequency, and set the signal generator and the receiver to the desired frequency. The receiver, with its beat frequency oscillator off, can then be used to detect the beat note between the signal generator and the standard.

b. INDIRECT CALIBRATION. When two dummy antennas are not available, the receiver may be used as a secondary standard. (See fig. 16.) First, connect the receiver to the standard through either a dummy antenna or a small capacitor of about 200mmf. Set the standard to the desired frequency (or some subharmonic), and tune the receiver to the signal from the standard, using the beat frequency oscillator in the receiver to get zero beat. Without touching the receiver, connect Signal Generator I-72-(\*) in place of the standard, set its dial to the desired frequency, and adjust the proper calibrating screw until zero beat is again obtained.

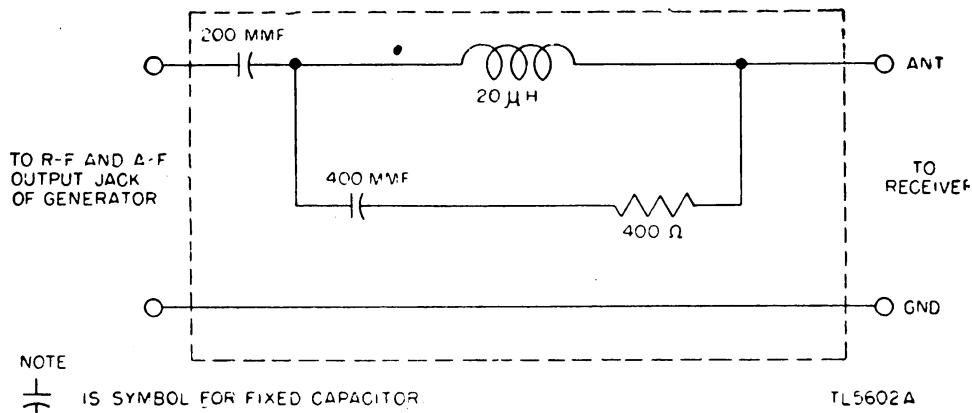


Figure 16. Dummy antenna.

## Section VII. PERFORMANCE TESTS

### 53. Purpose

The tests in this section constitute a final and conclusive check on the performance of Signal Generator I-72-(\*). When proper equipment is available, they should be made after any major repairs or when it is desired to determine that a signal generator in questionable condition is suitable for issue. For ease in making the tests, it is recommended that one signal generator known to be accurately calibrated and in good condition be set aside as a standard against which other signal generators can be compared. The following paragraphs indicate the method of making the tests when no standard Signal Generator I-72-(\*) is available. For each test, the minimum requirements are indicated.

### 54. Equipment

The following table indicates the equipment which will be required in order to make the performance tests. When specific equipment mentioned is not available, similar equipment of equivalent accuracy may be used.

<i>Type of Equipment</i>	<i>Example</i>
Ohmmeter.....	Test Unit I-176.
A-c voltmeter.....	Test Unit I-176.
Receiver (to cover frequency range of Signal Generator I-72-(*)).	Radio Receivers BC-779-B, BC-794-B, and BC-1004-C.
Signal generator with calibrated output.	Ferris, Microvolter.
Variable-voltage a-c source.....	General Radio, Variac.
Dummy antenna.....	See paragraph 15a.
Cathode-ray oscilloscope.....	DuMont Type 208.

## 55. Output Resistance Test

Disconnect Signal Generator I-72-(\*) from any power source. Connect an ohmmeter to the output jack and measure the resistance as the VERNIER control is turned from 0 to 10. The maximum resistance should not be more than 100 ohms.

## 56. Audio Output Test

Connect Signal Generator I-72-(\*) to its proper power source (110 to 125 volts, 60-cycle, a-c) and connect the output cable to the signal generator. Set the OUTPUT switch at 400 $\sim$ , and turn the R.F AND A.F. ATTENUATORS to maximum values. Measure the audio frequency output voltage with an a-c voltmeter. The output voltage should not be less than 1 volt.

## 57. R-F Output Test

Connect a signal generator whose output can be calibrated in microvolts to a receiver through a dummy antenna. The receiver must cover the frequency range of Signal Generator I-72-(\*) and must have a signal strength meter. If no signal strength meter is included as part of the receiver, a high-resistance d-c voltmeter may be connected into the detector circuit of the receiver, as shown in figure 5. Select some frequency within band 1 of Signal Generator I-72-(\*). Set the standard signal generator to that frequency and adjust it to deliver 30,000 microvolts. Carefully tune the receiver to the signal generator and adjust its r-f gain control until the signal strength meter indicates a convenient reference signal level. Without touching the receiver, substitute Signal Generator I-72-(\*) for the standard signal generator. With the OUTPUT control at UNMOD. and the R. F. AND A. F. ATTENUATORS set for maximum values, set Signal Generator I-72-(\*) to the frequency being tested and carefully tune it for maximum indication on the receiver's signal strength meter. The signal strength meter should read higher than the reference level previously established. Repeat the entire procedure for several frequencies in all bands. The output of Signal Generator I-72-(\*) should be higher than 30,000 microvolts for all frequencies except those between 10 and 20 mc, where the output should be greater than 10,000 microvolts.

## 58. Leakage Test

Follow the same general procedure as for the output test (par. 57), with the exception that the receiver and signal strength indicator should be adjusted to a reference signal level of 3 microvolts.



When Signal Generator I-72-(\*) is connected and its R.F. AND A.F. ATTENUATORS are set for minimum values, the maximum signal leakage should not exceed 3 microvolts for any frequency.

### 59. Modulation Test

Connect the vertical deflection system of a cathode-ray oscilloscope to the plate of the last i-f stage of a receiver through a small capacitor (about 200mmf). Remove the detector tube of the receiver. Connect Signal Generator I-72-(\*) to the receiver. Set the OUTPUT switch at MOD., and set both receiver and signal generator to the same frequency. Tune the receiver to get the highest pattern on the cathode-ray oscilloscope. Compute the percentage of modulation by the following formula :

$$\% \text{ modulation} = \frac{E_{\max} - E_{\min}}{E_{\max} + E_{\min}} \times 100$$

The percentage of modulation should be greater than 30 percent for all frequencies.

### 60. Spurious Frequency Test

Obtain a standard signal generator whose wave shape is known to be pure. Connect it to a receiver through a dummy antenna. Tune in a signal from the standard generator on the receiver, using the beat frequency oscillator in the receiver. Tune each side of the center frequency and note the presence of any side frequencies. Ascertain that these side frequencies are coming from the signal generator by turning the unit on and off. Replace the standard signal generator with Signal Generator I-72-(\*), and note the relative amount of side frequencies produced by this generator. Signal Generator I-72-(\*) should generate no more side frequencies than the standard.

### 61. Frequency Stability Test

Obtain a receiver known to have stable frequency characteristics, and allow it to warm up for at least 1 hour. Connect the receiver to Signal Generator I-72-(\*) through a dummy antenna. Connect the signal generator to a variable-voltage a-c power source, and fix the a-c voltage input at 117.5 volts, 60 cycles, a-c.

a. Set the signal generator to deliver a modulated signal at 15mc, and tune in the signal on the receiver. Disconnect the generator from the receiver and change the a-c voltage input to 110 volts, 60 cycles, a-c. Keep the generator at this voltage for three minutes, and reconnect it to the receiver. The receiver re-

WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT									
<b>FOR</b>	TECHNICAL SERVICE Signal Corps	<b>MATERIEL</b>	DATE 1 Feb 45						
<b>FROM</b>	ORGANIZATION 175 Signal Repair Co		STATION APO 102						
<b>TO</b>	NEXT SUPERIOR HEADQUARTERS Supply Sec, Hq Fourth Army Sig Sv	STATION APO 110	TECHNICAL SERVICE Signal Corps						
COMPLETE MAJOR ITEM									
NOMENCLATURE Radio Transmitter BC-123-A		TYPE Ground, vehicular	MODEL A						
MANUFACTURER American Radio Corp	U. S. A. REG NO 1234-Phila-45	ORDER NO 12345	DATE RECEIVED 5 Jan 45						
EQUIPMENT WITH WHICH USED (if applicable) Radio Set SCR-456-A in Tank, Medium, M4									
DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE									
PART NO. Sig C	TYPE Capacitor C20; fixed;	MANUFACTURER American Radio Corp	DATE INSTALLED When manufactured						
DESCRIPTION OF FAILURE AND PROBABLE CAUSE (If additional space is required, use back of form) Capacitor C20 shorts out due to humid operating conditions									
DATE OF INITIAL TROUBLE 15 Jan 45	TOTAL TIME INSTALLED		TOTAL PERIOD OF OPERATION BEFORE FAILURE						
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
	-	-	-	0	0	5		-	-
BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN Operation in tropics; heavy rainfall. Was replaced and set given moistureproofing and fungiproofing treatment, 20 Jan 45.									
TRAINING OR SKILL OF USING PERSONNEL		RECOMMENDATIONS (If additional space is required, use back of form)							
POOR	FAIR	GOOD	Substitute capacitor designed for tropical operation						
		X							
ORIGINATING OFFICER									
TYPED NAME, GRADE, AND ORGANIZATION E. A. Wilson, 1st Lt, Sig C 175 Signal Repair Co				SIGNATURE <i>E. A. Wilson</i>					
FIRST ENDORSEMENT									
TO CHIEF	TECHNICAL SERVICE	OFFICE							
NAME, GRADE, AND STATION			STATION	DATE					
Instructions									
<ol style="list-style-type: none"> <li>1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in material. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.</li> <li>2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.</li> <li>3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.</li> <li>4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 780-10 (change No. 3).</li> <li>5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.</li> <li>6. When cases arise where it is necessary to communicate with a chief of service in order to secure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.</li> <li>7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.</li> <li>8. Necessity for using this form will be determined by the using or service troops.</li> </ol>									
W. D., A. G. O. Form No. 468 20 August 1944			This form supersedes W. D., A. G. O. Form No. 468, 1 December 1944, which may be used until existing stocks are exhausted.						
U. S. GOVERNMENT PRINTING OFFICE 16-41849-1			TL19589C						

Figure 17. WD AGO Form 468 (Unsatisfactory Equipment Report).

WAR DEPARTMENT AAF FORM No. 54 (Rev. 2-15-43)		WAR DEPARTMENT ARMY AIR FORCES		LEAVE BLANK	
TO BE FILLED IN BY STATION		UNSATISFACTORY REPORT		A. S. C. SERIAL No.	REFER TO
STATION SERIAL No.	DATE SUBMITTED	(See AAF Reg. 15-54 for Information on Proper Use of this Form)		CLASS	
46-133	31 Mar 43				
STATION Dusty AAF, Dry Point, Arizona		ORGANIZATION 314th Specialized Depot			
SUBJECT Property Class—Name Signal Generator I-72-J		Manufacturer Eggy Mfg. Co.			
AIRCRAFT—Model & AAF Serial No.		SERIES—Model & AAF Serial No.			
AIRCRAFT REPORTS ONLY		LAST R. L. R.—Sheet		Total Flying Time	
ENGINE REPORTS ONLY		LAST OVERHAUL—Sheet		Hours Since	
Name Signal Generator I-72-J		Part Drawing, Serial and Specification No. Serial No. 213, Stock # 3F38521			
Type in Use New		Quantity on Hand Unknown	Quantity Known Defective 9	No. Previous Failures 0	Manufacturer's No. or Identification Eggy Mfg. Co. 9C132A
Subject to "I" Inspection of 1-15-43		<input type="checkbox"/> Photographed and Photo Reduced	<input type="checkbox"/> Test Under Instructions	<input type="checkbox"/> Last Under Separate Cover	<input checked="" type="checkbox"/> Inspected and Reported in Package
GIVE COMPLETE DETAILS, PROBABLE CAUSES AND RECOMMENDATIONS BELOW: (Use Only Applicable Spaces Above—Omit Unnecessary Repetitions)		<b>EXPEDITE</b>			
<p>1. DESCRIPTION OF UNSATISFACTORY CONDITION: Backlash causing difficulty in setting of dial to the desired frequency. Main dial knob, reference # K-3, badly warped and rubs against bakelite dial disc, reference D-1, causing additional difficulty in setting the dial to the desired frequency. Main dial knob manufactured by Crowe Name Plate and Mfg. Co, Chicago, Illinois.</p> <p>2. PROBABLE CAUSES:</p> <p>a. Rotor shaft grounding washer, between Frequency Control Condenser, Reference C-1, and panel jammed too tightly against condenser.</p> <p>b. Main dial knob constructed of material which becomes warped at reasonably high temperature.</p> <p>3. RECOMMENDATIONS:</p> <p>a. Installation of additional spacer, approximately .030" thickness, on the Condenser, Reference #C-1, mounting screws, which sets condenser farther from panel and prevents jamming of grounding washer on rotor shaft.</p> <p>b. Main dial knob to be constructed of bakelite or equal material that will withstand temperatures ranging from 100°F to 150°F or above.</p> <p>4. DISPOSITION: Spacers were installed as noted under Recommendations in paragraph above. Since replacement knobs were not available, distorted knobs were repaired by heating to 150°F and reshaped.</p> <p>5. REMARKS: All reference numbers taken from TM 11-307J, 14 Apr 43.</p>					
				<i>James M. Pierce</i> JAMES M. PIERCE, Lt Col, Air Corps Communications Officer	
<b>ROUTING</b>		SEND ORIGINAL AND TWO COPIES DIRECT TO COMMANDING GENERAL, HQ. AIR SERVICE COMMAND, PATTERSON FIELD, FARMFIELD, OREG. <small>U. S. AIR SERVICE COMMAND OFFICE - 104 38-3483-1</small>			

Figure 18. AAF Form 54 (Unsatisfactory Report).

adjustment necessary to bring in the signal again should not be more than 0.01% of the frequency (1.5kc).

*b.* Repeat the test in *a* above with the input to the signal generator kept at 125 volts, 60 cycles, a-c for 3 minutes.

*c.* Repeat the test with the input kept at 117.5 volts, 60 cycles, a-c for 1 hour. The maximum frequency drift after this test should not be more than 0.2% of the frequency (30kc).

## **62. Unsatisfactory Equipment Report**

*a.* When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, WD AGO Form 468 (Unsatisfactory Equipment Report) (fig. 17) should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C.

*b.* When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, AAF Form 54 (Unsatisfactory Report) (fig. 18) should be filled out and forwarded to the Commanding General, Air Matériel Command, Wright Field, Dayton, Ohio. If form is not available, prepare letter containing the data elicited by the sample form shown in figure 18 without reproducing copies of the form.

# APPENDIX I.

## REFERENCES

*Note.* For availability of items listed, check FM 21-6 and ASF Catalog SIG 2. Also see FM 21-6 for applicable Technical Bulletins, Supply Bulletins, Modification Work Orders.

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### 1. Army Regulations

AR 380-5, Safeguarding Military Information.

### 2. Supply Publications

SIG 1, Introduction to ASF Signal Supply Catalog.

SIG 3, List of Items for Troop Issue.

SIG 4-1, Allowances of Expendable Supplies.

SIG 4-2, Allowances of Expendable Supplies for Schools, Training Centers, and Boards.

SIG 5, Stock List of All Items.

SB 11-76, Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

SB 11-17, Electron Tube Supply and Reference Data.

### 3. Technical Manuals on Auxiliary Equipment and Test Equipment

TM 11-300, Frequency Meter Sets SCR-211-( ).

TM 11-303, Test Sets I-56-C, I-56-D, I-56-H, and I-56-J.

TM 11-315, Maintenance Equipment ME-40-(\*), and Maintenance Kit ME-53-(\*).

TM 11-321, Technical Manual for Test Set I-56-E.

TM 11-472, Repair and Calibration of Electrical Measuring instruments.

TM 11-487, Electrical Communication Systems Equipment.

TM 11-2613, Voltohmmeter I-166.

TM 11-2626, Test Unit I-176.

TM 11-2627, Tube Tester I-177.

### 4. Painting, Preserving, and Lubrication

TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment.

## 5. Camouflage

FM 5-20, Camouflage, Basic Principles.

## 6. Shipping Instructions

U. S. Army Spec. No. 100-14A, Army-Navy General Specification for Packaging and Packing and Marking for Oversea Shipment.

## 7. Decontamination

TM 3-220, Decontamination.

## 8. Demolition

FM 5-25, Explosives and Demolition.

## 9. Other Publications

FM 24-18, Radio Communication.

TB SIG 25, Preventive Maintenance of Power Cords.

TB SIG 66, Winter Maintenance of Ground Signal Equipment.

TB SIG 72, Tropical Maintenance of Ground Signal Equipment.

TB SIG 75, Desert Maintenance of Ground Signal Equipment.

TB SIG 123, Preventive Maintenance Practice for Ground Signal Equipment.

TM 1-455, Electrical Fundamentals.

TM 11-453, Shop Work.

TM 11-455, Radio Fundamentals.

TM 11-483, Suppression of Radio Noises.

TM 37-250, Basic Maintenance Manual.

## 10. Forms

WD AGO Form 468 (Unsatisfactory Equipment Report).

AAF Form 54 (Unsatisfactory Report).

## 11. Abbreviations

a-c.....alternating-current

a-f.....audio-frequency

a-v-c.....automatic-volume-control

d-c.....direct-current

i-f.....intermediate-frequency

JAN.....	Prefix designation for radio electron tubes procured under Joint Army-Navy Specification JAN-1A.
kc.....	kilocycle
mc.....	megacycle
mf.....	microfarad
mmf.....	micromicrofarad
r-f.....	radio-frequency
$\mu$ V.....	microvolt

## 12. Glossary

See the glossary in TM 11-455.

## APPENDIX II.

### MAINTENANCE PARTS

The following information was compiled on 16 November 1945. The appropriate pamphlet of the ASF Signal Supply Catalog for Signal Generator I-72-G, H, J, and K is:

#### SIG 8-I-72 Higher Echelon Spare Parts

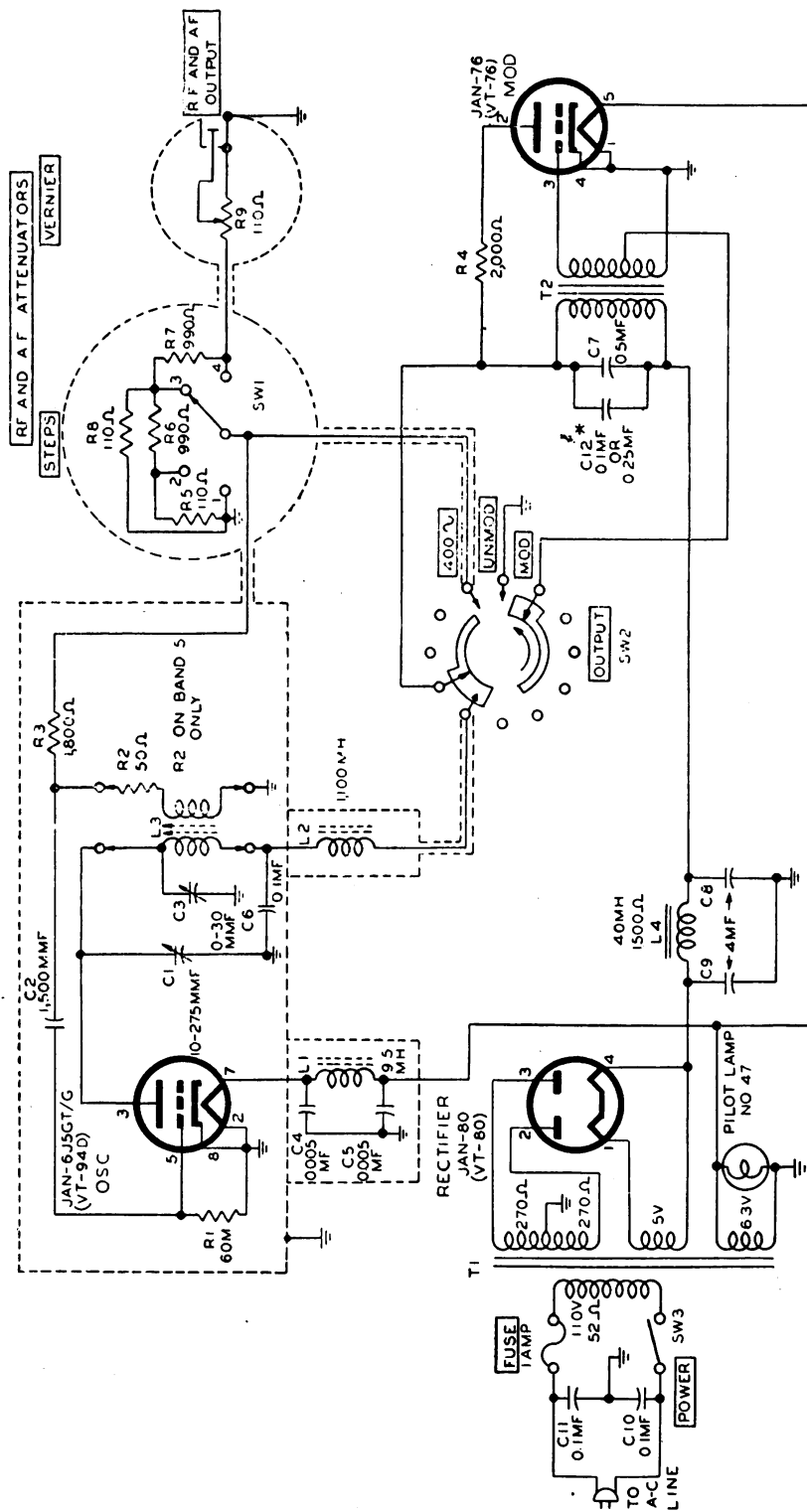
For an index of available catalog pamphlets, see the latest issue of ASF Signal Supply Catalog SIG 2.

Reference symbol	Models *			Signal Corps stock No.	Name
	1	2	3		
Fig 1	X	X	X	3E4060	CABLE ASSEMBLY
Fig 1	X	X		3F3852H/C3	CABLE ASSEMBLY
Fig 1			X	3F3852K/C1	CABLE ASSEMBLY
C8,C9	X	X	X	3DB4-78	CAPACITOR
C2	X	X	X	3K3015221	CAPACITOR
C4,C5	X	X	X	3K3551222	CAPACITOR
C6,C10,C11	X	X	X	3DA100-47	CAPACITOR
C7	X	X	X	3DA500-57.3	CAPACITOR
C3,A,B,C,D	X	X	X	3D9012V-3	CAPACITOR
C1	X	X	X	3D9010V-7	CAPACITOR
Fig. 1	X	X	X	3Z1013.6	CLIP, fuse
L4	X	X	X	3C321	COIL, AF
L1	X	X	X	3C323-79A	COIL, RF
L2	X	X	X	3C323-79B	COIL, RF
L3-2	X			3F3852J/3	COIL, RF
L3-1	X			3F3852J/2	COIL, RF
L3-3	X			3F3842J/1	COIL, RF
L3		X	X	3F3842J/C3	COIL, RF
L3A		X	X	3F3842J/C4	COIL, RF
L3B		X	X	3F3842J/C5	COIL, RF
L3C		X	X	3F3852J/C1	COIL, RF
L3-4	X			3F3842J/4	COIL, RF



Reference symbol	Models *			Signal Corps stock No.	Name
	1	2	3		
L3D		X	X	3F3842J/C2	COIL, RF
L3-5	X			3F3842J/5	COIL, RF
J-1	X			2Z5572.2	CONNECTOR, female contact
J1		X	X	2Z7235-1	CONNECTOR, female contact
P1		X	X	2Z7235	CONNECTOR, male contact
F1	X	X	X	3Z1926	FUSE
Fig. 1	X	X	X	6Z4996	HANDLE, case
Fig. 9	X	X	X	3Z3275	HOLDER, fuse
Fig. 3	X	X	X	2Z5848	KNOB, bar
Fig. 4	X	X	X	2Z5822-3	KNOB, bar
Fig. 4	X	X	X	2Z5822-10	KNOB, round
B1	X	X	X	2Z5927	LAMP
Fig. 4	X	X	X	2Z5985.4	LIGHT, indicator
Fig. 3		X	X	3F3852J/P1	POINTER, dial
Fig. 4	X			3F3852H/P	POINTER, dial
R2	X	X	X	3RC20BF510J	RESISTOR
R-3	X	X	X	3RC20BE182K	RESISTOR
R-4	X	X	X	3RC20BE222K	RESISTOR
R-1	X	X	X	3RC20BE563K	RESISTOR
R-5, R-8	X	X	X	3Z6010-18	RESISTOR
R-6, R-7	X	X	X	3Z6100-164	RESISTOR
R-9	X	X	X	2ZK7263-8	RESISTOR
Fig. 8	X			2Z8674.71	SOCKET, tube
Fig. 8	X			2Z8675.65	SOCKET, tube
Fig. 9	X	X	X	2Z8796	SOCKET, SO-96
SW4			X	3Z9825-55.25	SWITCH, rotary
SW1	X	X	X	3Z9825-20	SWITCH, rotary
SW2	X	X	X	3Z9825-19	SWITCH, rotary
SW3	X	X	X	6C201C/S2	SWITCH, toggle
T2	X	X		2Z9943-6	TRANSFORMER, AF
T1	X	X	X	2Z9955.1	TRANSFORMER, power
Fig. 9		X	X	2J5Y3GT/G	TUBE
Fig. 9	X	X	X	2J6J5GT/G	TUBE
Fig. 8	X			2J76	TUBE
Fig. 8	X			2J80	TUBE

\* Models column 1 refer to I-72-G, H, J, manufactured by Espey Mfg. Co.; models column 2 refer to I-72-J, manufactured by Templetone Radio Co.; models column 3 refer to I-72-K, manufactured by Templetone Radio Co.



NOTES \* C12 IS A 400Ω ADJUSTMENT, USED ONLY ON SIGNAL  
 GENERATOR I-72-J  
 † IS SYMBOL FOR FIXED CAPACITOR  
 ‡ IS SYMBOL FOR VARIABLE CAPACITOR

TL 3162S

Figure 19. Schematic diagram for Signal Generator I-72-G, H, and J.

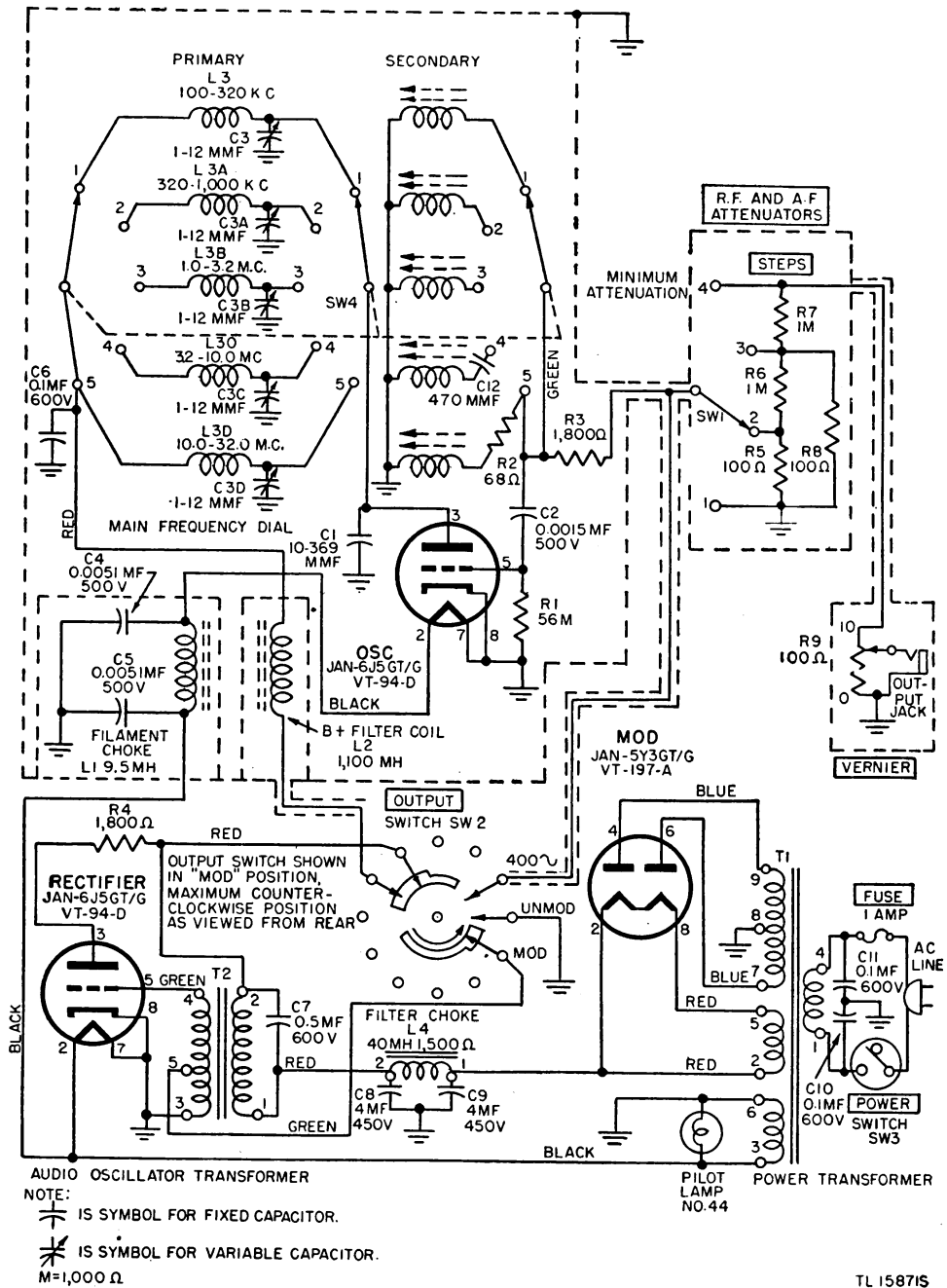


Figure 20. Schematic diagram of Signal Generator I-72-K.

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—692202

