# TM 11-2062

TO 16-40 I 142-5

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

# TEST SET I-142
# AND
# TEST SET I-142-A
# (TELEPHONE)

*DEPARTMENT OF THE ARMY • SEPTEMBER 1948*

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*DEPARTMENT OF THE ARMY* *SEPTEMBER 1948*

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## DESTRUCTION NOTICE

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

WHEN—When ordered by your commander.

HOW—1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut—Use axes, handaxes, machetes.
3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. 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—Meter, resistors, lamps, potentiometers, tubes, switches, and fuses.

2. Cut—Wiring behind front panel.
3. Burn—Technical manual.
4. Bend—Contact springs of all keys.
5. Bury or scatter—Any or all of the above pieces after breaking.

### DESTROY EVERYTHING

## SAFETY NOTICE

Severe shock may result from contact with current carrying parts of this equipment. Be sure that the power is off before changing voltage taps and making adjustments within the equipment. Handle the line wires carefully.




**RESCUE.**

In case of electric shock, shut off the high voltage at once and ground the circuits. If the high voltage cannot be turned off without delay, free the victim from contact with the live conductor as promptly as possible. Avoid direct contact with either the live conductor or the victim's body. Use a dry board, dry clothing, or other nonconductor to free the victim. An ax may be used to cut the high-voltage wire. Use extreme caution to avoid the resulting electric flash.

**SYMPTOMS.**

**a.** Breathing stops abruptly in electric shock if the current passes through the breathing center at the base of the brain. If the shock has not been too severe, the breath center recovers after a while and normal breathing is resumed, provided that a sufficient supply of air has been furnished meanwhile by artificial respiration.

**b.** The victim is usually very white or blue. The pulse is very weak or entirely absent and unconsciousness is complete. Burns are usually present. The victim's body may become rigid or stiff in a very few minutes. This condition is due to the action of electricity and is not to be considered rigor mortis. Artificial respiration must still be given, as several such cases are reported to have recovered. The ordinary and general tests for death should never be accepted.

**TREATMENT.**

**a.** Start artificial respiration immediately. At the same time send for a medical officer, if assistance is available. Do not leave the victim unattended. Perform artificial respiration at the scene of the accident, unless the victim's or operator's life is endangered from such action. *In this case only*, remove the victim to another location, but no farther than is necessary for safety. If the new location is more than a few feet away, artificial respiration should be given while the victim is being moved. If the method of transportation prohibits the use of the Shaeffer prone pressure method, other methods of resuscitation may be used. Pressure may be exerted on the front of the victim's diaphragm, or the direct mouth-to-mouth method may be used. Artificial respiration, once started, must be continued, without loss of rhythm.

**b.** Lay the victim in a prone position, one arm extended directly overhead, and the other arm bent at the elbow so that the back of the hand supports the head. The face should be turned away from the bent elbow so that the nose and mouth are free for breathing.

**c.** Open the victim's mouth and remove any foreign bodies, such as false teeth, chewing gum, or tobacco. The mouth should remain open, with the tongue extended. Do not permit the victim to draw his tongue back into his mouth or throat.

**d.** If an assistant is available during resuscitation, he should loosen any tight clothing to permit free circulation of blood and to prevent restriction of breathing. He should see that the victim is kept warm, by applying blankets or other covering, or by applying hot rocks or bricks wrapped in cloth or paper to prevent injury to the victim. The assistant should also be ever watchful to see that the victim does not swallow his tongue. He should continually wipe from the victim's mouth any frothy mucus or saliva that may collect and interfere with respiration.

**e.** The resuscitating operator should straddle the victim's thighs, or one leg, in such manner that:

(*1*) the operator's arms and thighs will be vertical while applying pressure on the small of the victim's back;

(*2*) the operator's fingers are in a natural position on the victim's back with the little finger lying on the last rib;

(*3*) the heels of the hands rest on either side of the spine as far apart as convenient without allowing the hands to slip off the victim;

(*4*) the operator's elbows are straight and locked.

**f.** The resuscitation procedure is as follows:

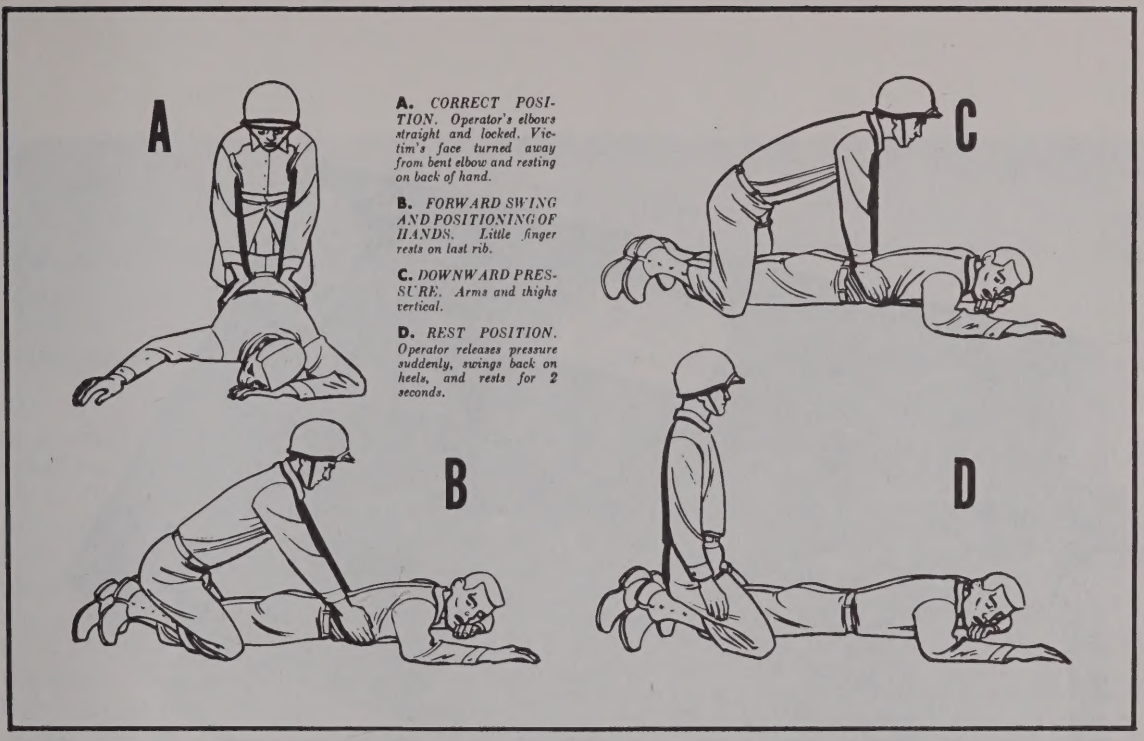
(*1*) Exert downward pressure, not exceeding 60 pounds, for 1 second.

(*2*) Swing back, suddenly releasing pressure, and sit on the heels.

(*3*) After 2 seconds rest, swing forward again, positioning the hands exactly as before, and apply pressure for another second.

**g.** The forward swing, positioning of the hands, and the downward pressure should be accomplished in one continuous motion, which requires 1 second. The release and backward swing require 1 second. The addition of the 2-second rest makes a total of 4

TL15338-D




**A.** *CORRECT POSITION. Operator's elbows straight and locked. Victim's face turned away from bent elbow and resting on back of hand.*

**B.** *FORWARD SWING AND POSITIONING OF HANDS. Little finger rests on last rib.*

**C.** *DOWNWARD PRESSURE. Arms and thighs vertical.*

**D.** *REST POSITION. Operator releases pressure suddenly, swings back on heels, and rests for 2 seconds.*

**seconds for a complete cycle. Until the operator is thoroughly familiar with the correct cadence of the cycle, he should count the seconds aloud, speaking distinctly and counting evenly in thousands. Example: one thousand and one, one thousand and two, etc.**

**h.** Artificial respiration should be continued until the victim regains normal breathing or is pronounced dead by a medical officer. Since it may be necessary to continue resuscitation for several hours, relief operators should be used if available.

**RELIEVING OPERATOR.**

The relief operator kneels beside the operator and follows him through several complete cycles. When the relief operator is sure he has the correct rhythm, he places his hands on the operator's hands without applying pressure. This indicates that he is ready to take over. On the backward swing, the operator moves and the relief operator takes his position. The relieved operator follows through several complete cycles to be sure that the new operator has the correct rhythm. He remains alert to take over instantly if the new operator falters or hesitates on the cycle.

**STIMULANTS.**

**a.** If an inhalant stimulant is used, such as aromatic spirits of ammonia, the individual administering the stimulant should first test it himself to see how close he can hold the inhalant to his own nostril for comfortable breathing. Be sure that the inhalant is not held any closer to the victim's nostrils, and then for only 1 or 2 seconds every minute.

**b.** After the victim has regained consciousness, he may be given hot coffee, hot tea, or a glass of water containing ½ teaspoon of aromatic spirits of ammonia. *Do not give any liquids to an unconscious victim.*

**CAUTIONS.**

**a.** After the victim revives, keep him LYING QUIETLY. Any injury a person may have received may cause a condition of shock. Shock is present if the victim is pale and has a cold sweat, his pulse is weak and rapid, and his breathing is short and gasping.

**b.** Keep the victim lying flat on his back, with his head lower than the rest of his body and his hips elevated. Be sure that there is no tight clothing to restrict the free circulation of blood or hinder natural breathing. Keep him warm and quiet.

**c.** A resuscitated victim must be watched carefully as he may suddenly stop breathing. ***Never leave a resuscitated person alone until it is CERTAIN that he is fully conscious and breathing normally.***

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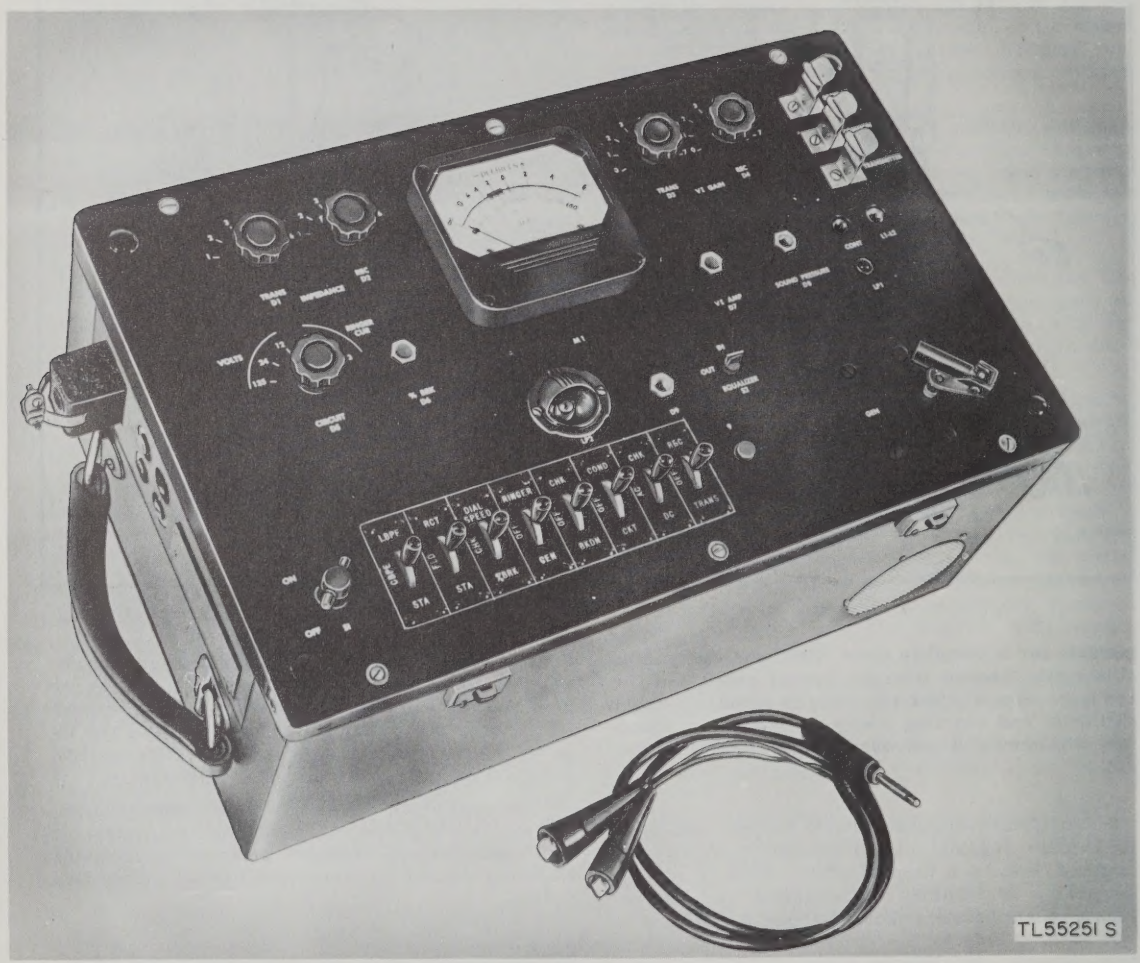



*Figure 1. Test Set I-142-A (Telephone) with cover removed.*

# PART ONE

# INTRODUCTION

## Section I. DESCRIPTION

### 1. General

Test Set I–142–(*) is a composite measuring instrument designed for measuring the electrical characteristics of telephone equipment. All of the circuit elements of the set are contained in a metal case equipped with a carrying handle. The case has a detachable cover held in place by four suitcase-type latches. All controls and indicating elements are mounted on the top panel of the set which is exposed by removal of the cover. The set operates from external battery sources of 3, 12, 24, and 135 volts, connected through a plug and socket in the end panel of the set.

*Note.* Basic nomenclature followed by the symbol (*) is used to indicate all models of an item of equipment covered in this technical manual. Thus, Test Set I–142–(*) indicates both Test Set I–142 and Test Set I–142–A. For the weatherproofed models, the nomenclature used is Test Set I–142–A. For the nonweatherproofed models, the nomenclature used is Test Set I–142.

### 2. Application

Test Set I–142–(*) is intended for use in repair shops requiring facilities for measuring the electrical characteristics of telephone sets, carbon-and-magnetic-type microphones, receivers, capacitors, dials, generators, ringers, and similar telephone equipment. Its use is intended to insure that reissued equipment conforms to definite performance requirements. In addition it expedites the location and correction of defective or deteriorating components in the repair of telephone equipment.

### 3. Equipment Features

*a.* General. Test Set I–142–(*) incorporates a number of relatively independent test circuits which are described in the following subparagraphs. These circuits are selected and controlled by key switches and dials arranged on the top panel of the set (fig. 1).

*b.* Sound Source. The sound source provides a means of developing a known value of acoustic pressure (sound) which, when applied to the diaphragm of a microphone or receiver, generates a measurable electrical potential in the instrument. By applying this potential to the meauring circuit of the test set, a definite standard of performance for the instrument under test can be established. The sound source consists of a vibrator driving a controlled diaphragm receiver unit radiating into the open air. The acoustic output of the sound source, the frequency components of which are approximately equal in level over a range of 500 to 2,500 cycles per second (cps), is 10 dynes per square centimeter at the screen of the sound source. This acoustic pressure is used to drive the microphone or receiver in performance tests.

*c.* Measuring Circuit. A variable range vacuum-tube-type volume indicator is used to measure the electrical output of microphones or receivers in the efficiency test. This circuit has an input impedance of 10,000 ohms and a voltage range of 0.0002 to 3.8 volts. The response of the measuring circuit is essentially uniform from 300 to 5,000 cps.

*d.* Capacitor Test Circuit. To check the leakage resistance of capacitors, a relaxation-type oscillator is used in which the capacitor under test forms the capacitive element. This circuit, designed to test capacitors of 0.05-microfarad (mf) to 4-mf capacitance, indicates open-circuited units and those having a leakage resistance of less than 10 megohms.

*e.* Generator Test Circuit. The generator under test is rated on the voltage it delivers to a 1,000-ohm load measured on the test set meter.

*f.* RINGER TEST CIRCUIT. This circuit consists of a hand-operated generator and resistors arranged to supply minimum operating currents of approximately 16⅔ cps to ringers of three different impedances.

*g.* INSULATION RESISTANCE TEST. The output of the test set generator is applied to the equipment under test with the test set meter connected to measure the leakage current. This circuit indicates resistances of 1 megohm or less. The peak voltage applied to components having an insulation resistance of 200,000 ohms is approximately 200 volts.

*h.* DIAL TEST CIRCUIT. A resistance network associated with the direct-current (d-c) element of the test set meter is used to indicate the percentage of the total pulse period during which the dial pulsing contacts are open. A resistance-capacitance network associated with the meter indicates the rate of operation of the dial pulsing contacts.

*i.* CONTINUITY TEST. A buzzer and lamp are provided to facilitate point-to-point tests for continuity of wiring.

*j.* INSTRUMENT TEST CIRCUITS. Four circuits are provided for testing the efficiency of telephone instruments under simulated line conditions—

(1) A 600-ohm impedance terminated line circuit for local battery (Telephone EE–8–( )) or sound-powered telephones.

(2) A 24-volt, 361-ohm d-c resistance, 320-ohm alternating-current (a-c) impedance terminated line circuit for common battery (Telephone TP–6) telephones.

(3) A 24-volt, 361-ohm d-c resistance of 3-volt, 4-ohm d-c resistance power efficiency circuit adjustable to match impedances of 30, 60, 75, 150, and 300 ohms for testing carbon-type microphones.

(4) A circuit providing resistive loads to match impedances of 128, 256, 512, 1,024, 5,000, and 10,000 ohms for testing receivers and magnetic microphones.

*k.* SOUND CALIBRATOR TS–550/G. Sound Calibrator TS–550/G when provided, is used to test and calibrate the sound source of Test Set I–142–(*).

## 4. List of Components

The following table gives the weights and dimensions of Test Set I–142.

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

*a.* EQUIPMENT SUPPLIED.

| Quantity | Name of component | Dimensions (in.) | | | Unit weight (lb) | Unit volume (cu ft) |
|---|---|---|---|---|---|---|
| | | Length | Width | Height | | |
| 1 | Sound Calibrator TS–550/G for Test Set I–142–A only. | 9¾ | 4¾ | 2⅞ | 5 | 0.07 |
| 1 | Test Set I–142–(*) | 19 | 12 | 9 | 40 | 1.18 |
| 1 | Test cord | 36 | | | | |
| 2 | Technical manuals TM 11–2062 for Test Set I–142. | 10 | 8½ | | | |
| 2 | Tubes JAN–12SG7 (1 installed, 1 spare) | | | | | |
| 2 | Tubes JAN–12SN7GT (1 installed, 1 spare) | | | | | |

*b.* EQUIPMENT REQUIRED BUT NOT SUPPLIED.

| Quantity | Name of component | Dimensions (in.) | | | Unit weight (lb) | Unit volume (cu ft) |
|---|---|---|---|---|---|---|
| | | Length | Width | Height | | |
| 2 | Batteries BA–23 | | | $6^{9}/_{16}$ | 2.6 | |
| 3 | Batteries BA–26 | 8¼ | 4½ | $7^{15}/_{16}$ | 12.75 | 0.17 |
| 4 | Batteries BA–210/U | 2¾ | 2¾ | $4^{1}/_{16}$ | 1.5 | .017 |
| 2 | Batteries BB–49 | $9^{1}/_{8}$ | 7⅛ | 9⅛ | 39.2 | .343 |
| As required | Cordage CO–139 or equal | | | | | |

## 5. Shipping Weight and Dimensions

*a.* PACKING CASE. Test Set I–142–(*) is packed in a triple inclosure consisting of a wooden outer case, a corrugated fiberboard middle carton, and a fiberboard inner carton sealed in a vaporproof and moistureproof covering. Approximately 6 pounds of desiccant are inclosed in the inner carton with the test set, spare tubes, test cord, and technical manuals.

*b.* SIZE AND GROSS WEIGHT.

| | |
|---|---|
| Length | 27 inches |
| Width | 17½ inches |
| Height | 15⅞ inches |
| Weight | 90 pounds |
| Volume | 4.34 cubic feet |

## 6. Difference in Models

*a.* NONTROPICALIZED SET. The early models of Test Set I–142 (serial numbers 1 through 160) were made from standard telephone- and radio-type parts used in test equipment designed for use under temperate climatic conditions. Some of these sets have been treated with moisture- and fungi-resistant varnish.

*b.* TROPICALIZED SET. Test Sets I–142 serial numbered 161 and up and Test Set I–142–A were manufactured of moisture- and fungi-resistant parts. These sets were also treated with moisture- and fungi-resistant varnish after assembly.

*c.* EQUIPMENT FEATURES. All models provide the same testing facilities and have the same circuit arrangement. The wiring plan of the tropicalized set differs from that of the early models to accommodate the use of hermetically sealed capacitors in place of lead-mounting tubular capacitors used in early models. The tropicalized sets have depressed slotted controls in place of knob-type controls for the elements (D6, D7, and D8) adjusted in the daily operations calibration. This change reduces the hazard of the adjustment being moved accidentally during use. Neon tube LP2 is accessible from the front of the panel on the later model sets. Panel arrangement of sets serial numbered 161 and up and Test Set I–142–A is shown in figure 5. Figure 2 shows panel arrangement of the early model. The difference in wiring and arrangement of parts mounted inside the set is described in the repair section.

*Note.* Sound Calibrator TS–550/G is furnished as a component of Test Set I–142–A. In all other respects Test Set I–142 serial numbered 161 and up are the same as Test Set I–142–A. Any specific reference to Test Set I–142–A should be considered as applying to Test Set I–142 serial numbered 161 and up.




*Figure 2. Test Set I–142, control panel.*

## Section II. INSTALLATION AND ASSEMBLY

### 7. Unpacking and Checking

Use care when unpacking or handling the equipment because damage to the electronic tubes, meter, or sound source will make the set inaccurate or inoperative. In unpacking the set, follow the steps outlined below:

*a.* Place the packing case (fig. 3) 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.* Open the exposed side of the fiberboard carton and lift out the foil-wrapped inner carton.

*e.* Remove the foil wrappings, open the inner carton, and lift out the test set and carton of spare tubes.

*f.* Check the contents of the case against the master packing slip and against the list of components in paragraph 4 of this manual.

***Caution:*** If the chassis has received moistureproofing and fungiproofing treatment *do not remove* any of the protective coating.

### 8. Physical Checks

*a.* Check the cords for tightness of connection and for damaged insulation.

*b.* Check the control panel for chips, cracks, and damaged parts.

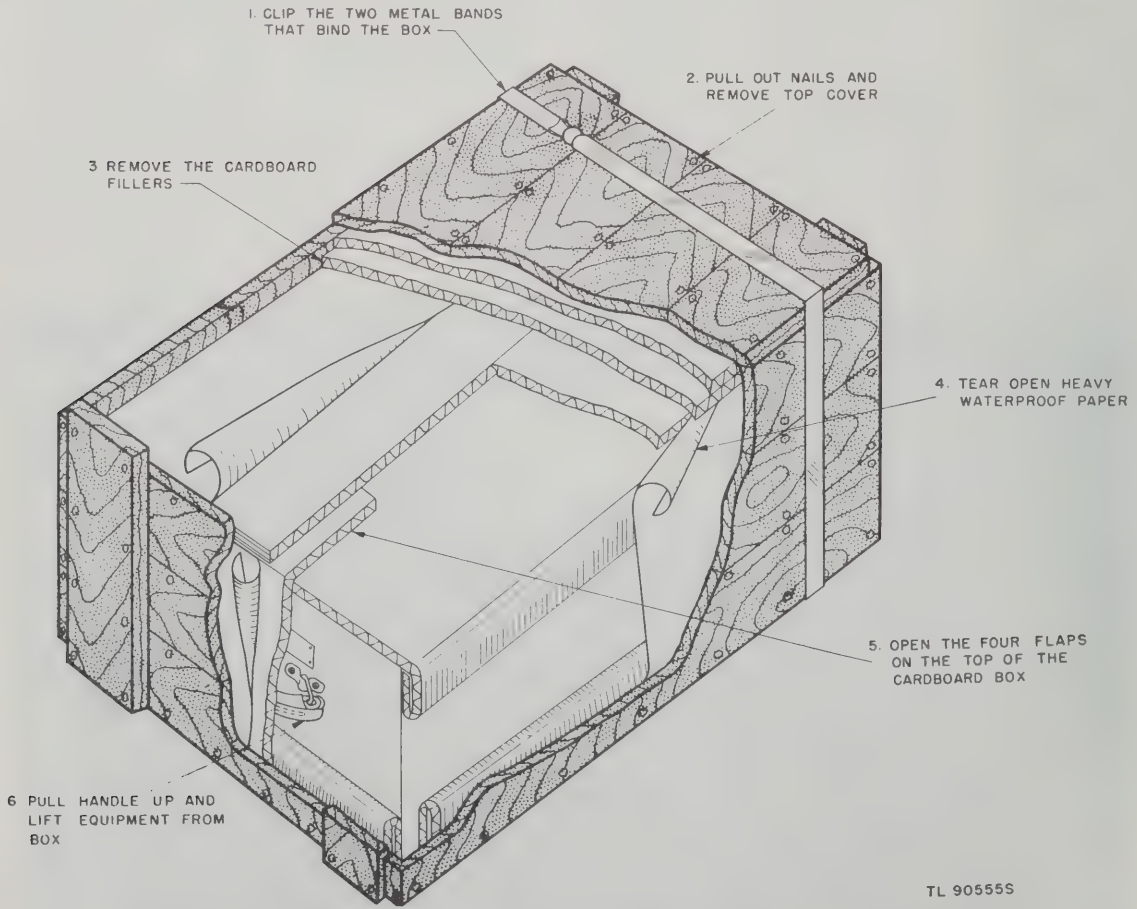



*Figure 3. Packing details.*

*c.* Check the plugs for chips, cracks, and damaged parts.

*d.* Check the switches for ease of movement.

*e.* Check spare parts.

## 9. Repacking

Before reshipping to any distant point, disconnect and remove the equipment from service and repack it in the same manner as it was originally. Reverse the procedure discussed in paragraph 10, for repacking.

## 10. Assembly and Disassembly

*a.* GENERAL. Unfasten the suitcase latches, and remove the top cover and the equipment packed under the cover.

*b.* PANEL AND CHASSIS ASSEMBLY. All of the components are mounted on the panel and chassis assembly: To remove the panel and chassis assembly from the case, turn out the six panel mounting screws (located at the corners and top and bottom center edges of the panel) and lift out the assembly. The sound source receiver is mounted in the lower case and is connected to the chassis assembly through a cord plugged in the socket on the vertical panel. Pull out this plug to separate the panel and chassis assembly from the case.

*c.* TUBES. Install Tubes JAN–12SG7 and JAN–12SN7GT in sockets VT1 and VT2 respectively.

*d.* NEON LAMP. Mount neon lamp LP2 in its bayonet base socket. On Test Set I–142, loosen the holding screws in the lamp mounting bracket, slide the section carrying the socket away from the panel, and insert the lamp. Reposition the lamp centrally under the hole in the panel and tighten the holding screws. On Test Set I–142–A, remove the escutcheon plate and its mounting from the top of the panel; then insert the lamp and remount the plate.

*e.* SOUND SOURCE RECEIVER. Check the receiver holder of the sound source receiver. It should be mounted with the terminals toward the end of the case as shown in figure 4. The receiver and the vibrator of the sound source are calibrated together and should not be replaced without recalibrating the sound source (par. 102). Reconnect the receiver cord plug, replace the chassis and panel assembly in the case, and turn down the panel mounting screws.

*f.* POWER SUPPLY. (1) *Cording.* Cord CO–139 is recommended for connecting the test set to the power supply. Expose the connection lugs of connector SK1 by removing the two fastening screws on the sides and sliding back the cover. Solder the leads at one end of the cord to the lugs of the connector as shown in the table below.

| *Lug No.* | *Supply voltage* | *Lead color* |
|---|---|---|
| 7 | +3 | Orange |
| 8 | +12 | Yellow |
| 9 | +24 | Blue |
| 10 | +135 | Green |
| 11 | −12 | Black |
| 12 | −3, −24 | Brown |
| 12 | −135 | Red |
| | | Natural (spare) |

Reassemble connector SK1. If Cord CO–139 is not available, any stranded copper wire of not less than No. 22 American Wire Gage (AWG) nor larger than No. 14 AWG may be used. Where single conductors are used twist the positive and negative 12-volt leads together and dress the cable for protection.

(2) *Connection.* Connect the +12 (yellow) and —12 (black) battery leads to the positive and negative terminals, respectively, of a 12-volt storage battery. Connect the +24 (blue), +3 (orange) and —3, —24 (brown) leads to the +24, +3, and negative terminals, respectively, of a dry battery designed for A-type service. Connect the +135 (green) and —135 (red) leads to the +135 and negative terminals, respectively, of a dry battery designed for B-type service.

*Note.* Use of the separate (red) lead from the No. 12 lug in the plug to the —135-volt battery terminal keeps the resistance of the amplifier plate circuit to a minimum.

(3) *Battery.* For the 3-volt supply, use two Batteries BA–23 connected in series. For the 12-volt supply, use two Batteries BB–49 connected in series. For the 24-volt supply, use four Batteries BA–210/U or four batteries stock number 3A164–10 connected in series. For the 135-volt supply, use three Batteries BA–26 connected in series. Where trouble from rapid deterioration of dry batteries occurs, it is recommended that three additional batteries be connected in series parallel with the above 135-volt supply.

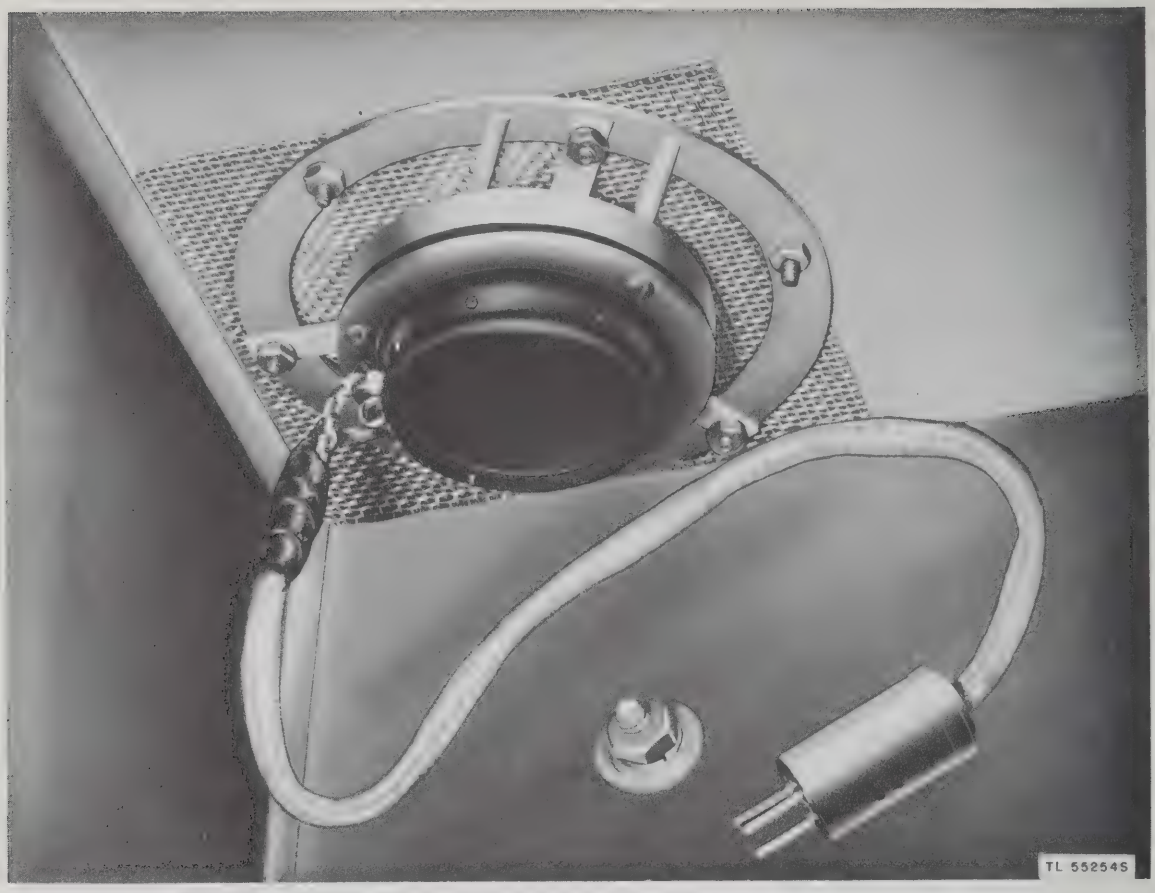



*Figure 4. Sound source assembly.*

## 11. Location

*a.* Place the test set on a flat bench with the side containing the screened opening facing the operator. The bench area in front of the screened opening should be clear of objects which might cause reflections of the sound waves when the sound source is operated. An area to the right of the test set should be allowed for working space.

*b.* Test Set I–142–(*) should be mounted with the sound source screen in a vertical plane to secure the greatest accuracy in measuring the output of carbon-type microphones. The output of these microphones may vary with the angular position, and the specified minimum output requirements are based on testing the instruments with their diaphragms in a vertical plane.

## 12. Adjustment

Test Set I–142–(*) requires that certain circuits be checked before use and occasionally during the day's operation. This information is covered in part two. Some of the circuits are calibrated at the factory. These adjustments do not require rechecking except in the case of failure of a circuit element. The procedure for checking the factory adjustment is outlined in part five.

# PART TWO

# OPERATING INSTRUCTIONS

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

## Section III. CONTROLS AND THEIR USE

### 13. Functions of Controls (fig. 5)

*a.* Control TRANS D1, a six-position control, is used in the efficiency test of carbon-type microphones. It controls the impedance matching circuit and is associated with the transmitter testing circuit.

*b.* Control REC D2, a six-position control, is used in the efficiency test of receivers and magnetic-type microphones. It controls the impedance matching circuit and is associated with the receiver testing circuit.

*c.* Control TRANS D3, an eight-position control, is used in the efficiency tests of both common-battery and local-battery telephone carbon-type microphones. It controls the gain of the measuring circuit amplifier and is associated with the transmitter testing circuit.

*d.* Control REC D4, an eight-position control, is used in the efficiency tests of both magnetic-type microphones and receivers. It controls the gain of the measuring circuit amplifier and is associated with the receiver testing circuit.

*e.* Control CIRCUIT D5, a six-position control, is used in positions 135, 24, and 12 in the power supply circuit. In positions 1, 2, and 3 it is used in the ringer current tests. When control CIRCUIT D5 is in position 1, it is in the OFF position for all circuits of Test Set I–142 other than for the ringer current test.

*f.* Setscrew % BRK D6 adjusts the current flow of the dial % BRK and dial speed test circuits to the correct value.

*g.* Setscrew VI AMP D7 controls the gain of the amplifier in the measuring circuit.

*h.* Setscrew SOUND PRESSURE D8 controls the sound source output in the sound source circuit.

*Note.* Test Set I–142–A contains % BRK D6, VI AMP D7, and SOUND PRESSURE D8 with setscrew adjustments. Test Set I–142 contains % BRK D6, VI AMP D7, and SOUND PRESSURE D8, with dial controls.

*i.* Setscrew D9 functions as a sensitivity control in the capacitor test circuit.

*j.* Meter M1 is used as a measuring guide in testing the various equipments.

*k.* Keys 1 through 8 provide a means of connecting meter M1 and the measuring circuits to the various testing circuits.

*l.* OFF–ON switch S1 functions as a starting or stopping control for the equipment.

*m.* EQUALIZER switch S2 is used in the efficiency test of telephones, handsets, and microphones. It cuts the equalizer in or out of the circuit.

*n.* Jack L1–L2 is used to connect the equipment under test to the test set.

*o.* Jack CONT is used in measuring the continuity of wiring.

*p.* Lamp LP1 functions as a testing signal in connection with the continuity tests.

*q.* Lamp LP2 functions as a testing signal in the capacitor test circuit.

*r.* Generator GEN is used in connection with the ringer tests and the insulation resistance tests.

*s.* Clip terminals, RECEIVER, COMMON, AND TRANSMITTER, are used to connect loose handsets, transmitters, receivers, and microphones to the testing circuits of the test set.

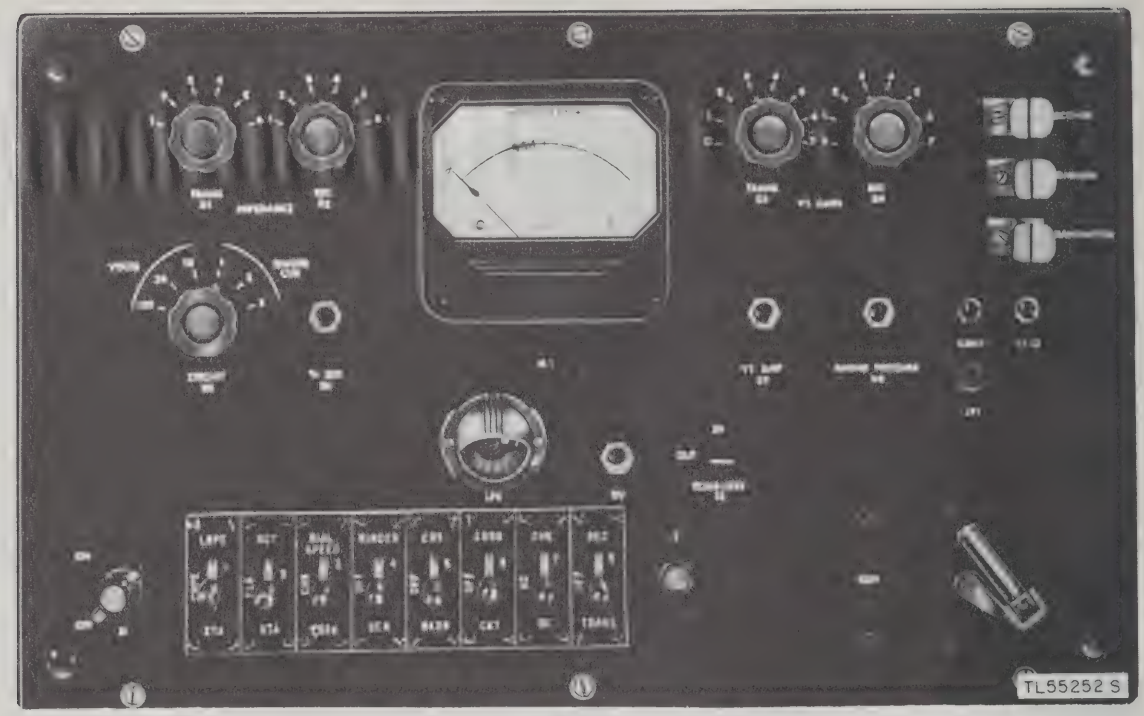



*Figure 5. Test Set I–142–A control panel.*

## Section IV. PREOPERATIONAL TESTS

### 14. General

*a.* Before using Test Set I–142–(*), carefully read the instructions covering its use. *Obey all cautions.*

*b.* Operate switch S1 to ON and allow a warm-up period of at least 5 minutes before adjusting the measuring circuit sensitivity.

*c.* The adjustments outlined in the following paragraphs constitute the adjustments necessary to permit Test Set I–142–(*) to function efficiently. These adjustments are dependent on battery supply conditions and should be repeated as frequently as is necessary, but not less frequently than once every 4 hours of continuous usage. Where these adjustments cannot be met, the circuits involved should be checked in accordance with the information in section XVI.

### 15. Detailed Adjustments of Test Set I–142–(*)

The step-by-step adjustments outlined are—

*a.* Battery check.
*b.* Capacitor test circuit adjustment.
*c.* Dial test circuit adjustment.
*d.* Sound source output adjustment.
*e.* Measuring circuit sensitivity.
*f.* Continuity test check.

### 16. Battery Check

*a.* To perform the battery check, place the control and keys in the following positions:

Key 7 ..... DC
Control D5 ..... 12, 24; then 135

*b.* For each position of control D5, observe the deflection at Meter M1 and, if necessary, adjust the corresponding battery voltage by the addition or the subtraction of cells until the meter deflection is approximately 0 decibel (db), (within the blue-shaded area of the meter scale). Replace dry batteries which test below 1.2 volts per cell (80 percent of the rated voltage) under load.

*c.* At position 12, depress key 9, operating

the sound source, and check the voltage under full load. The reading should be in the blue-shaded area.

*d.* Restore key 7 to normal and turn control D5 to RINGER CUR, position 1.

### 17. Capacitor Test Circuit Adjustment

*a.* To establish the proper sensitivity of the capacitor test circuit, place the control and keys in the following positions:

Control D9.....Maximum counterclockwise position
Key 6.....COND
Key 5.....CHK

*b.* Slowly adjust control D9 in a clockwise direction until lamp LP2 just breaks down as indicated by an orange-colored glow.

*c.* Release and reoperate both keys and check to ascertain positively that the lamp breaks down at the adjusted position of control D9.

*d.* Release keys 5 and 6.

### 18. Dial Test Circuit Adjustment

*a.* To establish the proper calibration of the dial test circuits, place the controls and keys in the following positions:

Control D5.....RINGER CUR, position 1, 2, or 3
Key 7.....DC
Key 6.....CKT
Key 3.....% BRK

*b.* Adjust control D6 for full d-c scale reading (100) at meter M1.

***Caution:*** If the meter does not deflect, check to see that resistor R33 is not shorted before continuing adjustment.

*c.* Operate key 3 to DIAL SPEED. The meter needle should deflect slowly to above or near full scale.

*d.* Release key 3 and restore keys 6 and 7 to normal position.

### 19. Sound Source Output Adjustment

*a.* To establish the correct voltage across the receiver unit to produce the specified acoustic output at the plane of the screen, place the keys in the following positions:

Key 5.....CHK
Key 7.....CHK
Key 9.....DEPRESS

*b.* Adjust control D8 until meter M1 indicates a deflection of 0 db.

### 20. Measuring Circuit Sensitivity

*a.* To establish the correct measuring circuit gain, place the keys in the following positions:

Key 5.....CHK
Key 7.....CHK
Key 9.....DEPRESS

*b.* Observe the reading at meter M1. The deflection should be 0 db, from the adjustment described in paragraph 19.

*c.* Release key 7 and adjust control D7 to obtain a deflection of 0 db at meter M1.

*d.* Release keys 5 and 9.

*Note.* Changing the position of control D7 causes large instantaneous changes in the sensitivity of the amplifier circuit which results in an appreciable change in the deflection of meter M1. A short time should be allowed between changes of D7 to permit the amplifier gain to become stabilized and thus permit a steady meter reading.

### 21. Continuity Test Check

To test for continuity—

*a.* Insert test cord plug in CONT jack.

*b.* Short-circuit clips on end of test cord; buzzer and lamp LP1 should operate.

*c.* Transfer the test cord to jack L1–L2. The test set is now ready for use.

## Section V. OPERATION

### 22. General

For the tests outlined in the following paragraphs, all keys should be in their normal, unoperated positions except as specified for a particular test. Controls D1 to D5, inclusive, and equalizer Switch S2 should be preset to the position specified in repair instructions covering the equipment or as shown in table I (sec. VI). This table is an abstract of the test requirements specified in various repair instructions applicable to Test Set I–142. The repair

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instruction listed in the table and titled, Repair Instructions, Telephone and Telegraph Equipment, may be obtained if authorized from the Maintenance Branch, OCSigO. Controls D3 and D4 control the gain of the measuring circuit amplifier; control D1, the impedance matching circuit for carbon-type microphones; and control D2, the impedance matching circuit for receivers and magnetic microphones. Controls D1 and D3 are associated with the transmitter testing circuit, and controls D2 and D4 with the receiver testing circuit. By presetting the controls for the particular instrument under test, successive tests of transmitters and receivers (as on a handset) can be made without making any adjustments of the controls between tests.

## 23. Operation of Test Set I–142–(*)

Paragraphs 24 through 33 give a detailed step-by-step outline for operating Test Set I–142–(*). The tests outlined are:

*a.* Efficiency tests on field telephone sets.
*b.* Efficiency tests on station (common battery) telephone sets.
*c.* Efficiency tests on carbon-type microphones.
*d.* Efficiency tests on receivers and magnetic-type microphones.
*e.* Capacitor test.
*f.* Generator test.
*g.* Ringer tests.
*h.* Insulation resistance test.
*i.* Dial tests.
*j.* Continuity test.

## 24. Efficiency Tests on Field Telephone Set

*a.* CONNECTIONS. (1) Connect terminals L1 and L2 of the telephone set to jack L1–L2 of Test Set I–142–(*), using the test cord supplied.

(2) Connect the red-covered clip (tip) of the cord to the L1 terminal of the telephone.

(3) Install batteries in the telephone set under test.

*b.* TRANSMITTING EFFICIENCY. Unless otherwise specified in the repair instructions, precondition the transmitter of the handset in the following manner:

(1) With the plane of the transmitter diaphragm vertical, rotate the handset back and forth through approximately 180° about the central axis of the transmitter.

(2) Without jarring, immediately place the transmitter in front of the sound source with the opening of the cap or mouthpiece centrally located with respect to and flush against the sound source screen. To meet these conditions, the handset handle should be horizontal with the receiver extending beyond the end of the test set.

(3) Operate key 8 to TRANS.

(4) Close the handset transmitter switch, if the handset is so equipped.

(5) Depress key 9 and observe the deflection of meter M1.

*Note.* In normal usage, the repair instruction for the particular type of telephone set under test specifies the minimum allowable output in terms of a minimum db scale meter deflection for preset positions of control D3 and switch S2 (table I).

*c.* RECEIVING EFFICIENCY. (1) Hold the receiver in front of the sound source with its cap centrally located with respect to and flush against the screen.

(2) Operate key 8 to REC.

(3) Depress key 9 and observe the deflection of meter M1.

*Note.* In normal usage, the repair instruction for the particular type of telephone set under test specifies the minimum allowable output in terms of a minimum scale meter deflection for a preset position of control D4 (table I).

## 25. Efficiency Tests on Station (Common Battery) Telephone Sets

*a.* CONNECTIONS. (1) Connect the line cord of the telephone set to jack L1–L2 of Test Set I–142–(*), using the test cord supplied. Polarity may be disregarded.

(2) Operate key 1 to STA.

(3) Operate key 2 to STA.

*b.* TRANSMITTING EFFICIENCY AND RESISTANCE. (1) Precondition the microphone (transmitter) by rotation and hold it in front of the sound source screen (par. 24*b*(1) and (2)).

*Note.* In normal usage, the repair instruction for a particular telephone set specifies the minimum allowable output in terms of a minimum db scale reading for prescribed positions of control D3 and switch S2 (see table I). The maximum allowable transmitter resistance is three times the resistance of a new unit.

(2) Operate key 8 to TRANS.

(3) Depress key 9 and observe the output reading on meter M1 (par. 24*b*(5)).

(4) Release key 9 and operate key 7 to DC. Note the DC reading on meter M1. The meter reading is a function of the sum of the transmitter and series induction coil resistances. The relation between the total resistance and the meter deflection is shown in figure 6.

*Note.* The transmitter resistance testing circuit contains a relay to cut out the meter for protection against overload if the transmitter circuit is open-circuited.

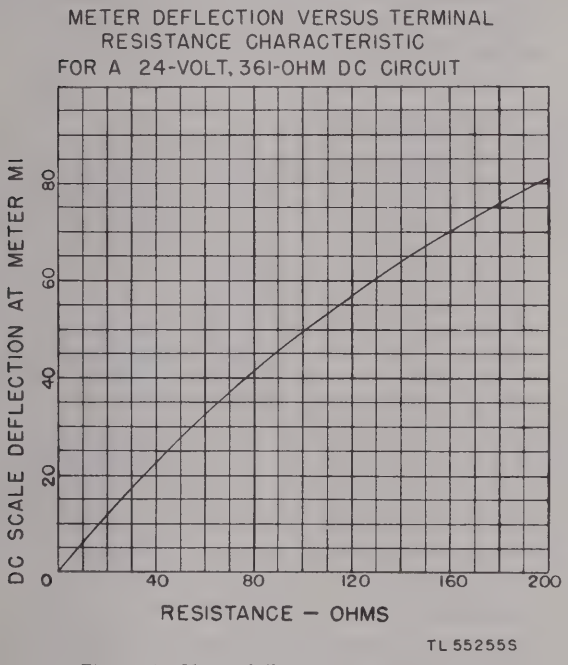



*Figure 6. Meter deflection versus resistance.*

*c.* Receiving Efficiency. See paragraph 24*c*.

## 26. Efficiency Tests on Carbon-type Microphones

*a.* Select the transmitter lead and the common lead and attach them to the TRANSMITTER and COMMON test set clip terminals by means of the instrument cord, if equipped, or by means of a suitable substitute. In transmitters having only two leads, attach one to the transmitter test set clip terminals and the other to the common test set terminal.

*b.* Test microphones used on common battery-type telephones by operating key 1 to CBPE.

*c.* Test microphones used in local battery (3 to 6 volts) circuits by operating key 1 to LBPE.

*d.* Operate key 2 to RCT.

*e.* Set control D1 to the position specified in the repair instruction or to that position which best matches the normal operating impedance of the microphone. The relation between the position of control D1 and the impedance measured at the test set clip terminals is given below.

| *Position of control D1* | *Microphone matching impedance in ohms* |
|---|---|
| 1 | 30 |
| 2 | 60 |
| 3 | 75 |
| 4 | 150 |
| 5 | 300 |
| 6 | Spare |

*f.* Precondition the microphone by rotating it back and forth about its central axis and hold it in front of the sound source screen (par. 24*b*).

*g.* Operate key 8 to TRANS.

*h.* Operate the microphone switch to ON, if the microphone is so equipped.

*i.* Depress key 9 and observe whether the db scale deflection on meter M1 is above or below the minimum value specified in the repair instruction (table I).

*j.* On microphones tested in the 24-volt, 361-ohm d-c resistance circuits, with key 1 in CBPE position, measure the resistance after agitation as outlined in paragraph 25*b*(4). On microphones tested in the 3-volt local battery circuit the microphones' resistance is the controlling factor and no resistance test is provided in this circuit. The current supply loss resulting from high microphone resistance usually causes the microphone output to be below its minimum requirement.

## 27. Efficiency Test on Receivers and Magnetic-type Microphones

*a.* Select the receiver lead and the common lead and attach them to the RECEIVER and COMMON test set clip terminals by means of the instrument cord, if equipped, or a suitable substitute. In receivers having only two leads, attach one to the receiver test clip terminal and the other to the common test clip terminal. For

certain receivers, the repair instruction specifies the method of orienting the unit to position its magnet properly with respect to the magnetic field of the sound source unit.

*b.* Operate key 2 to RCT.

*c.* Set control D2 to the position specified in the repair instruction or to that position which best matches the normal operating impedance of the instrument under test. The relationship between the position of control D2 and the impedance measured at the test set clip terminals is given below.

| *Position of control D2* | *Receiver matching impedance in ohms* |
|---|---|
| 1 | 128 |
| 2 | 256 |
| 3 | 512 |
| 4 | 1,024 |
| 5 | 5,000 |
| 6 | 10,000 |

*d.* Hold the receiver in front of the sound source with its cap centrally located with respect to and flush against the screen.

*e.* Operate key 8 to REC.

*f.* Depress key 9 and observe whether the db scale reading on meter M1 is above or below the minimum value specified in the repair instruction (table I).

## 28. Capacitor Test

*a.* Loose Capacitors. (1) Connect the capacitor under test to jack L1–L2 with the test set cord.

(2) Operate key 6 to COND and observe lamp LP2. A flashing operation of lamp LP2 will occur for capacitors having an acceptable leakage resistance.

(3) The rate of flash varies with the capacitance of the unit under test, being approximately one flash every 3 seconds for a 2-mf capacitor and approximately two flashes per second for a 100,000-mmf capacitor. Failure of the lamp to glow when key 6 is operated indicates that the capacitor has a low leakage resistance. The presence of a steady glow at the lamp, when key 6 is operated, indicates that the capacitor is open-circuited.

*b.* Capacitors in Assembled Apparatus. (1) Remove all the wiring from one terminal of the capacitor to be tested if it is required to open any parallel circuit. Test the capacitor as outlined above.

(2) If removal of the wiring is not feasible, make connections to the capacitor through other circuit elements. Be certain that there is no closed d-c path bridging the capacitor being tested. The repair instruction for the assembled equipment generally describes the method of making connections to the capacitors to insure that the above condition is met.

(3) Capacitors which meet the flashing requirements specified in *a* above, when tested through the associated wiring, are satisfactory. Indication of low leakage resistance or open circuit conditions may be caused by associated wiring. This should be checked before replacing the capacitor.

## 29. Generator Test

*a.* Loose Generators. (1) Connect the output terminals of the generator under test at jack L1–L2 of the test set through the test cord supplied.

(2) Operate key 6 to CKT.

(3) Operate key 4 to GEN.

(4) Turn the crank of the generator under test at normal speed and observe the db scale reading at meter M1. The deflection at meter M1 is a measure of the output voltage of the generator in terms of the voltage developed across a 1,000-ohm load. Circuit constants have been chosen so that 0 db deflection corresponds to a generator output voltage of 45 volts. Repair instructions for the various types of generators prescribe the minimum acceptable output voltage in terms of the minimum allowable meter deflection.

*b.* Generators in Assembled Apparatus. (1) Connect the line terminals in the apparatus under test at jack L1–L2 of the test set.

(2) Operate the apparatus line switch (receiver on hook position) to disconnect the associated telephone set circuit from the line terminals.

(3) Measure the output of the generator as outlined in *a* above.

## 30. Ringer Tests

*a.* Loose Ringers. (1) Connect the ringer under test to the L1–L2 jack of the test set through the test cord supplied. When the ringer is normally associated with a series capacitor,

such as in common battery station telephone sets, the capacitor is considered an integral part of the ringer and a capacitor of equivalent value should be connected in series with the ringer.

(2) Adjust control D5 to the proper RINGER CUR position, depending upon the impedance classification of the ringer. The relationship between the position of control D5 and the impedance classification is given below.

| *Position of control D5* | *Ringer impedance classification* |
|---|---|
| 1 | Low |
| 2 | Medium |
| 3 | High |

(3) Operate key 6 to CKT.

(4) Operate key 4 to RINGER.

(5) Turn the test set generator crank at the speed required to produce a deflection at meter M1 of 0 db and observe the ringer performance. A normal ringer emits a sustained audible ring.

*b.* RINGERS IN ASSEMBLED APPARATUS. (1) Connect the line terminals in the apparatus under test at jack L1–L2 of the test set with the test cord supplied.

(2) Operate the apparatus line switch (receiver on hook position) to disconnect the associated telephone set circuit from the line terminals.

(3) Set dial 5 to proper RINGER CUR position and test as outlined in *a* above.

## 31. Insulation Resistance Test

*a.* In the electrical circuit of the unit or assembly under test, connect the red-covered test cord lead to any accessible point which is not connected to ground.

*b.* Connect the remaining test cord lead to any accessible point of the frame, mounting, or chassis.

*c.* Operate key 6 to CKT.

*d.* Operate key 5 to BKDN and at the same time turn the crank of the test set generator at a speed of approximately 200 revolutions per minute (rpm). Observe the deflection in db at meter M1.

*e.* The deflection observed at meter M1 is a measure of the insulation resistance. The relationship between deflection and resistance is approximately as indicated below, when the generator is operated at a speed to produce a deflection of +6 db with the test cord short-circuited.

| *Deflection at meter M1* | *Insulation resistance in ohms* |
|---|---|
| +6 DB | 0 |
| +3 DB | 30,000 |
| 0 DB | 60,000 |
| −3 DB | 115,000 |
| −6 DB | 200,000 |
| 10 DC Scale | 550,000 |
| 5 DC Scale | 900,000 |

*Note.* In normal usage, the repair instruction for the apparatus under test prescribes the minimum acceptable insulation resistance in terms of a maximum allowable deflection at meter M1.

## 32. Dial Tests

*a.* CONNECTIONS. (1) When loose dials are being tested, connect the pulsing contacts of the dial under test to jack L1–L2 of the test set through the proper dial terminals and the test cord supplied.

(2) When dials assembled in apparatus are being tested, connect the line terminals of the telephone to jack L1–L2 of the test set and short out the circuit elements of the apparatus that are in series with the dial-pulsing contacts.

*b.* PERCENT BREAK MEASUREMENT. (1) Operate key 6 to CKT.

(2) Operate key 7 to DC.

(3) Fully wind the dial under test and hold it in that position.

(4) Operate key 3 to %BRK.

(5) Release the dial and permit it to restore to normal. Note the average d-c scale reading at meter M1 while the dial is in motion.

(6) The reading at meter M1, in terms of the d-c scale calibration, represents the percentage of the total pulse period during which the contacts are open. The green-shaded area of the meter scale represents the allowable range in meter readings to control the percentage break within the acceptable range of 59½ to 67½ percent.

*c.* DIAL SPEED MEASUREMENT. (1) Fully wind the dial under test and hold it in that position. The keys are considered to be positioned as in the percent break measurement test above.

(2) Operate key 3 to DIAL SPEED.

(3) Release the dial and permit it to restore to normal. Read the maximum d-c scale deflection at meter M1 immediately after the dial comes to rest.

(4) Release key 3 to normal before repeating the above test. This discharges the charge from the capacitor of the test circuits. As the dial speed measurement is influenced by the percent break adjustment of the pulsing contacts, it should be made only after the percent break measurement outlined in *b* above.

(5) The red-shaded area of the meter scale represents the allowable range in maximum meter deflections to control the dial speed within the customary range of 7½ to 13½ pulses per second.

### 33. Continuity Test

This circuit is provided primarily for use in checking the continuity of wiring. It may be used for checking elements having a d-c resistance not exceeding 5 ohms.

*a.* Transfer the test cord from jack L1–L2 to the jack labeled CONT.

*b.* Connect the test cord clips across the end connections of the item being tested. An audible buzzer signal and a light at lamp LP1 indicates continuity.

## Section VI. TESTING PLAN

### 34. General

*a.* When using the various facilities of Test Set I–142–(*), follow the instructions given in section V. When assembled equipment is to be tested, and a number of tests are involved, a testing plan should be followed which will insure that all components are tested. The plan should be arranged as follows:

(1) To cover circuit continuity, sequence of switching, and proper circuit arrangement.

(2) To detect at the start of the tests, the components which require extensive work to replace.

(3) To require a minimum of changes in test set arrangement and connections.

*b.* The electrical requirements of the repair instruction for Telephone EE–8–( ) together with the requirements covering Microphone T–45 and Headset HS–30–( ) are included in the following paragraphs as examples of types of testing plans.

### 35. Testing Plan for Telephone EE–8–( )

Tests of the components of Telephone EE–8–( ) must be made in the sequence listed below if an accurate result is desired. No one test or portion of the whole may be utilized alone. The entire series must be performed.

*Note.* Disconnect Handset TS–9 from Telephone EE–8–( ).

*a.* CONTINUITY AND CIRCUIT CONNECTIONS. Continuity and circuit connections are checked in the over-all tests of the various circuit elements. Where these tests indicate incorrect wiring or discontinuity, make point-to-point tests.

*b.* GENERATOR GN–38–( ). (1) Operate all keys of Test Set I–142–(*) to OFF or normal position.

(2) Connect the L1–L2 clips of the test cord to the L1 and L2 terminals of the telephone under test.

(3) Operate key 4 to GEN.

(4) Operate key 6 to CKT.

(5) Operate key 7 to AC.

(6) Depress the lever switch of the telephone and hold it down.

(7) Turn the generator crank in the telephone at a speed of approximately 200 rpm, and observe the db scale deflection at meter M1. Meter readings to the right of 0 db indicate a satisfactory output.

(8) If no output is obtained—

(*a*) Check the continuity of the wiring from the generator terminals to the line terminals of the telephone being tested.

(*b*) Check the contact points from the generator terminals to the line treminals of the telephone.

(*c*) Check the continuity of the generator winding.

(9) Replace all low output generators or open or grounded generators with new parts.

*c.* RINGER MC–131. With the telephone connected to the test set as in *b* above—

(1) Set control D5 to RINGER CUR, position 1.

(2) Turn screw switch on the telephone under test to LB position.

(3) Operate key 4 to RINGER.

(4) Turn the generator crank of the test set at a speed to cause meter M1 to deflect to 0 db. The ringer in the telephone should ring clearly.

(5) Turn the screw switch on the telephone under test to the CB position; depress the lever switch of the telephone and repeat the above test.

(6) If the ringer fails to operate, check the continuity of the wiring from the ringer through the generator switch to the line terminals.

(7) If the ringer operates unevenly or if it is weak in tone, remove the ringer from the telephone and replace it.

*d.* CAPACITOR (2-mf SECTION). With the telephone connected to the test set as in *c* above:

(1) Return key 4 to OFF.

(2) Depress the lever switch of the telephone and hold it down.

(3) Operate key 6 to COND.

(4) Observe lamp LP2 for flashing. Flashing at approximately 3-second intervals, after an initial lapse of 5 seconds, indicates that the insulation resistance of the capacitor is satisfactory.

(5) A steady light is an indication that the capacitor or the associated wiring under test is open and the circuit through the induction coil is open.

(6) If there is no light at all, it is an indication that the—

(*a*) Insulation of the capacitor is less than 10 megohms.

(*b*) Insulation of the wiring associated with the capacitor is less than 10 megohms.

(*c*) Screw switch of the telephone under test has remained closed to the LB side.

(7) If the lamp does not glow; if there is a steady light; if the lamp flashes at a materially faster or slower flash rate—

(*a*) Disconnect the wiring from one terminal of the capacitor and retest, connecting the test cord directly to the capacitor.

(*b*) Replace the capacitor if open, low in insulation resistance, or of incorrect capacity.

*e.* LEVER SWITCH. With lamp LP2 flashing as described in *d*(4) above—

(1) Release the lever switch of the telephone from its depressed position and observe the lamp. If there is no light, operation of the lever switch contacts and the continuity of the holding coil are satisfactory.

(2) If lamp LP2 flashes continuously, it is an indication either of the failure of the lever switch contacts to close or of an open circuit of wiring through the holding coil.

(3) Repair or replace the defective switch, the wiring, or the holding coil.

*f.* SCREW SWITCH. With lamp LP2 flashing as described in *d*(4) above—

(1) Slowly turn the screw switch to the LB position and observe the flashing of lamp LP2. If there is no light, the operation of the screw switch is satisfactory.

(2) If lamp LP2 continues to flash it is an indication that the screw switch does not close in the LB position.

*Note.* A click is heard when the screw switch short-circuits the 2-mf capacitor.

(3) Repair or replace the defective screw switch.

*g.* CAPACITOR (0.5-mf SECTION). (1) Transfer test set lead L1 to the REC terminal of the telephone.

(2) Operate key 6 to COND. Observe the flash rate of lamp LP2. Flashing at approximately 1-second intervals indicates that the 0.5-mf capacitor section has satisfactory insulation resistance and that the 0.3-mf capacitor section is not short-circuited.

(3) If there is no light, it is an indication that either the—

(*a*) Insulation resistance of the 0.5-mf capacitor section is below 10 megohms.

(*b*) Insulation resistance of the 0.3-mf capacitor section is below 10 megohms.

(*c*) Insulation resistance of the wiring is below 10 meghoms.

(4) To determine whether the 0.5-mf capacitor section or 0.3-mf capacitor section is defective:

(*a*) Slowly turn the screw switch to the CB position.

(*b*) Depress the lever switch and hold it down.

(*c*) Operate key 6 to COND.

(*d*) Observe the flash rate of lamp LP2. Flashing at approximately 1-second intervals indicates that the 0.5-mf capacitor section has satisfactory insulation resistance and that the 0.3-mf capacitor section is short-circuited. Flashing at approximately 3-second intervals indicates that the 0.5-mf capacitor section is open-circuited. If there is no light, it is an indication that either the 0.5-mf capacitor section or the wiring is below 10 megohms.

(5) If lamp LP2 does not light, disconnect the wire from the 0.5-mf capacitor section and retest, connecting the test set leads directly to the 0.5-mf capacitor section terminals.

*h.* CAPACITOR (0.3-mf SECTION). (1) Transfer the test set lead from the L2 terminal of the telephone to the C terminal of the telephone.

(2) With the screw switch in the CB position depress the lever switch and hold it down.

(3) Operate key 6 to COND.

(4) Observe the flash rate of lamp LP2. Flashing at approximately 1-second intervals indicates that the 0.3-mf capacitor section has satisfactory insulation resistance. Flashing at approximately 3-second intervals indicates that the 0.3-mf capacitor section is open-circuited. If there is no light, it is an indication that either the 0.3-mf capacitor section or the wiring is below 10 megohms.

(5) If lamp LP2 does not light, disconnect the wire from the 0.3-mf capacitor section and retest, connecting the test set leads directly to the 0.3-mf capacitor section terminals.

*Note.* Telephones EE–8–A and –B are equipped with one three-section capacitor. If any one section is defective, it is necessary to replace the entire capacitor. (Tests outlined in *g*(4) and (5) above are to be made progressively and only when all sections of the capacitor require a check.)

*i.* INSULATION RESISTANCE BETWEEN CURRENT CARRYING PARTS AND CASE. (1) Connect the leads of the test cord to the L2 terminal of the telephone and the screw-eyed cord fastener of the telephone.

(2) Operate key 6 to CKT.

(3) Turn the generator crank of the test set at a speed of approximately 200 rpm and keep crank in motion.

(4) Operate key 5 to BKDN.

(5) Observe the deflection at meter M1. Meter readings to the left of —6 db indicate a satisfactory insulation resistance. A deflection to the right of —6 db indicates an unsatisfactory condition.

(6) If there is a short circuit, remove the side plates of the telephone and check for wiring crossed to the chassis or to the frame of component assembled parts.

(7) If the insulation resistance is unsatisfactory, check for moisture or dirt.

(8) Repair or replace the grounded component parts.

*j.* RECEIVING PERFORMANCE. (1) Connect the cord leads of Handset TS–9 to the proper terminals of the telephone as shown below.

| *Cord leads TS–9* | *Telephone EE–8–( ) terminals* |
|---|---|
| Black | T and Bat + (plus) |
| Red | Common |
| White | Receiver |

(2) Turn the screw switch to the CB position.

(3) Connect the L1 and L2 terminals of the telephone to jack L1–L2 of the test set.

(4) Operate key 2 to FLD.

(5) Operate key 6 to OFF.

(6) Turn control D4 to position 6.

***Caution:*** Place the telephone at least 10 inches away from the test set to avoid electrical intereference.

(7) With the lever switch depressed (use weight or extra handset), hold the receiver cap of the handset flush against and centrally located with respect to the sound source screen.

(8) Operate key 8 to REC.

(9) Depress key 9 and observe the deflection at meter M1. Meter readings to the right of —10 db indicate a satisfactory output.

(10) Release the lever switch, thus placing Holding Coil C–158 across the line. The meter reading should not decrease more than 1 db. If a loss of more than 1 db results, replace Holding Coil C–158.

(11) If the output is low, test the handset separately.

(*a*) Connect the handset directly to the test terminal clips. (See table I.)

(*b*) Operate key 1 to LBPE.

(*c*) Operate key 2 to RCT.

(*d*) Turn control D2 to 2.

(*e*) Turn control D4 to 6. Hold the handset so that the receiver cap or earpiece is centrally located with respect to and flush against the sound source screen and observe the deflection

at meter M1 while holding key 8 in the REC position and key 9 depressed.

(*f*) Observe the deflection at meter M1. If the meter reading is to the right of —10 db, replace Induction Coil C–105 and retest the telephone as described in *j*(1) through (9) above.

*k.* TRANSMITTING PERFORMANCE. With the telephone connected as described in *j*(1) through (9) above—

(1) Turn control D3 to position 3.

(2) Operate equalizer switch S2 to IN and key 2 to FLD.

(3) Place two Batteries BA–30 in the telephone battery container.

(4) With the face of the transmitter in a vertical plane, rotate the handset back and forth approximately 180° about the central axis of the transmitter. Without jarring the transmitter, immediately place it in front of the test set sound source screen. The opening in the cap or mouthpiece should be flush against and centrally located with respect to the screen.

(5) Operate the handset switch to the maximum ON position.

(6) Operate key 8 to TRANS.

(7) Depress key 9 and observe the deflection at meter M1. Meter readings to the right of —8 db indicate a satisfactory output.

(8) If the output is low, replace the transmitter unit and repeat the test.

(9) If no output is obtained—

(*a*) Transmitter unit is defective or not properly connected in the handset.

(*b*) Handswitch contacts do not close.

(*c*) Wiring to the batteries of the telephone is not continuous.

(10) Repair or replace defective component.

## 36. Testing Plan for Microphone T–45

*a.* INSULATION RESISTANCE. (1) Operate all keys of Test Set I–142–(*) to OFF or normal position.

(2) Connect the test set leads from jack L1–L2 to the terminal ends of the microphone cord with the microphone unit disconnected from one conductor.

***Caution:*** Do not apply break-down voltage with both conductors connected to the microphone unit.

(3) Operate key 6 to CKT.

(4) Operate key 7 to AC.

(5) Turn the generator crank of the test set at a speed of approximately 200 rpm and keep crank in motion.

(6) Operate key 5 to BKDN.

(7) Observe the deflection at meter M1. Meter readings to the left of —6 db indicate a satisfactory insulation resistance.

(8) Replace the right face strap if the insulation resistance is low.

*b.* OUTPUT. (1) Reconnect the microphone cord to the microphone unit and mount it in the face harness.

(2) Remove the breath shield.

(3) Connect the microphone cord to the COMMON and TRANSMITTER terminals of the test set.

(4) Operate key 1 to CBPE.

(5) Operate key 2 to RCT.

(6) Operate key 6 to OFF.

(7) Operate key 7 to AC.

(8) Operate equalizer switch S2 to IN.

(9) Turn control D1 to position 3.

(10) Turn control D3 to position 6.

(11) With the face of the microphone in a vertical plane, rotate the microphone back and forth approximately 180° about the central axis of the microphone. Without jarring the microphone, immediately place its face side in front of the test set sound source screen. The hole in the side of the microphone should be centrally located with respect to the screen and the bottom edge of the microphone and the strap-mounting bracket should touch the screen (fig. 7).

(12) Operate key 8 to TRANS.

(13) Depress key 9 and record the deflection at meter M1 for reference in the next test. Meter readings to the right of —3 db indicate a satisfactory output.

(14) If the meter reading is off scale on the positive side, turn control D3 to position 5 and repeat the test. Meter readings to the right of —11 db indicate a satisfactory output.

(15) If the output is low, replace the microphone element.

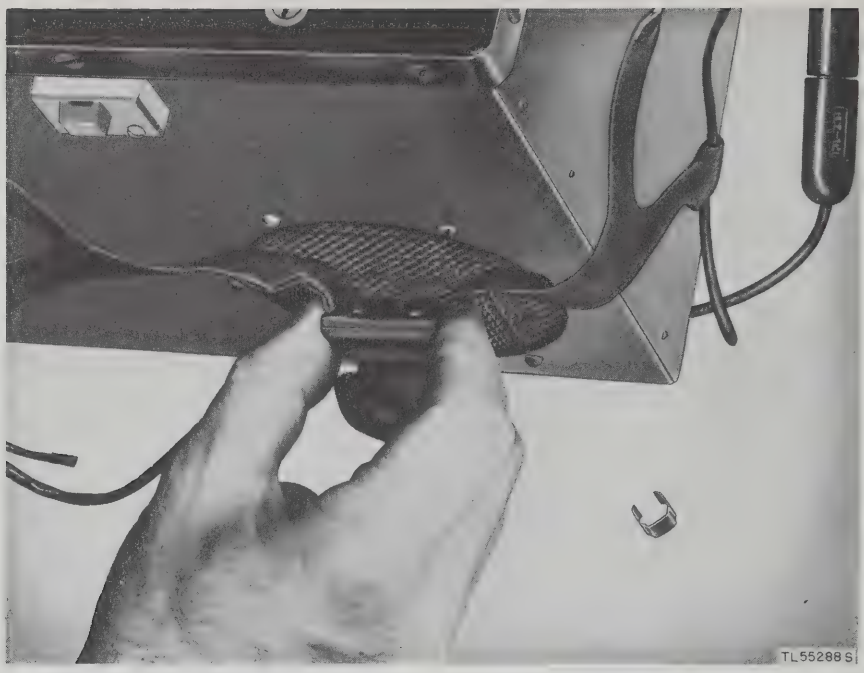



*Figure 7. Microphone T–45, output measurement.*

*c.* NOISE CANCELLATION. (1) Repeat the test outlined in *b* above, except this time place the microphone in front of the sound source screen so that the center of its bottom edge is against the center of the screen and the face side of the microphone is vertical (fig. 8).

(2) Meter readings which are 8 db or more below the meter reading obtained in the output test, *b*(13) and (14) above, indicate a satisfactory noise cancellation in the microphone.

(3) If the output obtained in *c*(2) is not 8 db less than the output as described in *b*(13) and (14), replace the microphone element.

## 37. Testing Plan for Headset HS–30–( )

*a.* INSULATION RESISTANCE. (1) Operate all keys of Test Set I–142–(*) to OFF or normal position.

(2) Disconnect the cords from both terminals of each receiver unit.

(3) Connect the test cord from jack L1–L2 of the test set to the conductors at one end of the cord. Make sure that the terminals at the other two ends are not in contact with each other.

(4) Operate key 6 to CKT.

(5) Operate key 7 to AC.

(6) Turn the generator crank of the test set at a speed of approximately 200 rpm and keep crank in motion.

(7) Operate key 5 to BKDN.

(8) Observe the deflection at meter M1. Meter readings to the left of —6 db indicate a satisfactory insulation resistance.

(9) Repeat the above test on the other pair of wires at the opposite ends of the cord.

(10) Replace all cords which show a low insulation resistance.

*b.* RECEIVER OUTPUT. (1) Reconnect the cord to the receiver terminals.

(2) Assemble the receiver unit in the case.




*Figure 8. Microphone T–45, noise cancellation measurement.*

(3) Remove the rubber earpiece and screw on the cap.

(4) Connect the red conductor terminal of the headset cord to COMMON terminal of the test set. Connect the black conductor terminal of the headset cord to RECEIVER terminal of the test set.

(5) Operate key 1 to CBPE.

(6) Operate key 2 to RCT.

(7) Operate key 6 to OFF.

(8) Operate key 7 to AC.

(9) Turn control D2 to position 6.

(10) Turn control D4 to position 6.

***Caution:*** Place the receiver unit which is in series with the unit under test face down on a bench out of the sound field of the sound source.

(11) Except when testing Receiver R–30–B, hold the receiver under test with its axis through the cord hole positioned vertically, so that its cap is centrally located with respect to and flush against the test set sound source screen.

(12) Operate key 8 to REC.

(13) Depress key 9 and observe the deflection at meter M1. Meter readings to the right of —9 db indicate a satisfactory output.

(14) Repeat the above test on the other receiver of the headset.

(15) If no output is obtained, use an ohmmeter to check for open or shorted receiver units or cord connections.

(16) Replace all units which fail the output test.

| EQUIPMENT | TEST | TEST CORD CONNECTIONS | | DIAL CONTROL SETTINGS | | | | | EQUAL-IZER | KEY OPERATION FOR VARIOUS TESTS KEYS NOT LISTED REMAIN IN UNOPERATED POSITION | | | | | | | | | DB SCALE OF METER L= LEFT R= RIGHT | | FOR DETAILS SEE REPAIR INSTRUCTIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BLACK | RED | D1 | D2 | D3 | D4 | D5 | S2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | READING | | |
| TEST SET I-142 | BATTERY CHECK | | | | | | | 12<br>24<br>130 | | | | | | | | DC<br>DC<br>DC | | | | ODB<br>ODB<br>ODB | |
| | LAMP LP-2 CHECK | | | | | | | 1 | | | | | | CHK | COND | AC | | | LAMP LP2 LIGHTS | | |
| | % BREAK VOLTAGE AJUSTMENT | | | | | | | 1 | | | | % BK | | | CKT | DC | | | 100 | DC | |
| | TRANSMISSION ADJUSTMENTS | | | | | | | 1 | | | | | | CHK | | CHK | | OPR | | 0 DB | |
| | CONTINUITY | | | | | | | 1 | | | | | | | | | | | LAMP LP1 LIGHTS | | |
| TELEPHONE EE-8( ) | GENERATOR | L-1 | L-2 | | | | | 1 | | | | | GEN | | CKT | AC | | | R | 0 DB | T-302.01 |
| | RINGER | L-1 | L-2 | | | | | 1 | | | | | RINGER | | CKT | AC | | | | 0 DB | T-302.01 |
| | 2 MF CAPACITOR | L-1 | L-2 | | | | | 1 | | | | | | | COND | AC | | | 3 SEC FLASH | | T-302.01 |
| | 0.5 MF CAPACITOR | REC TERM | L-2 | | | | | 1 | | | | | | | COND | AC | | | 1 SEC FLASH | | T-302.01 |
| | 0.3 MF CAPACITOR | REC TERM | COM TERM | | | | | 1 | | | | | | | COND | AC | | | 1 SEC FLASH | | T-302.01 |
| | INSULATION RESISTANCE | STAY CORD SCREW EYE | L-2 | | | | | 1 | | | | | | BKDN | CKT | AC | | | L | -6 DB | T-302.01 |
| | RECEIVER (TB-9) ATTACHED TO TELEPHONE EE-8( ) | L-1 | L-2 | | | | 6 | 1 | | | | | | | | AC | REC | OPR | R | -10DB | T-302.01 |
| | TRANSMITTER (TB-9) ATTACHED TO TELEPHONE EE-8( ) | L-1 | L-2 | | | 3 | | 1 | IN | | | | | | | AC | TRANS | OPR | R | -8 DB | T-302.01 |
| TELEPHONE EE-91 | GENERATOR | L-1 | R-TERM | | | | | 1 | | | | | GEN | | CKT | AC | | | R | +3.0DB | T-302.02 |
| | RINGER | L-1 | R-TERM | | | | | 1 | | | | | RINGER | | CKT | AC | | | | 0 | T-302.02 |
| | CAPACITOR | L-2 | C-TERM | | | | | 1 | | | | | | | COND | AC | | | | | |
| | INSULATION RESISTANCE | L-2 | FRAME | | | | | 1 | | | | | | BKDN | CKT | AC | | | L | -6DB | T-302.02 |
| | RECEIVING PERFORMANCE | L-1 | L-2 | 2 | 2 | 3 | 6 | 1 | IN | LBPE | RCT | | | | OFF | AC | REC | OPR | | | T-302.02 |
| | TRANSMITTING PERFORMANCE | L-1 | L-2 | 2 | 2 | 3 | 6 | 1 | IN | LBPE | RCT | | | | OFF | AC | TRANS | OPR | | | T-302.02 |

*Table I. Test Set I–142–(*) key and dial settings.*

| EQUIPMENT | TEST | TEST CLIP CONNECTIONS | | | DIAL CONTROL SETTINGS | | | | | EQUAL-IZER | KEY OPERATION FOR VARIOUS TESTS KEYS NOT LISTED REMAIN IN UNOPERATED POSITION | | | | | | | | | METER READING L = LEFT R = RIGHT | | FOR DETAILS SEE REPAIR INSTRUCTIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | REC | COM | TRANS | D1 | D2 | D3 | D4 | D5 | S2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| HANDSET TS-9A & J (A.E. CO.) | RECEIVING EFFICIENCY | WHITE | RED | | | 2 | | 6 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | -10 DB | |
| | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 6 DB | |
| HANDSET TS-9K (KELLOGG) | RECEIVING EFFICIENCY | WHITE | RED | | | 2 | | 7 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | - 5 DB | |
| | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 1 DB | |
| HANDSET TS-9( ) ALL OTHERS | RECEIVING EFFICIENCY | WHITE | RED | | | 2 | | 6 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | - 4 DB | |
| | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 6 DB | |
| HANDSET TS-10( ) | RECEIVING EFFICIENCY | BLACK | RED | | | 6 | | 4 | 1 | | | RCT | | | | | AC | REC | OPR | R | | T-307.01 |
| | TRANSMITTING EFFICIENCY | BLACK | RED | | | 6 | | 4 | 1 | IN | | RCT | | | | | AC | REC | OPR | R | | |
| HANDSETS TS-11( ) TS-12( ) TS-13( ) TS-15( ) | RECEIVING EFFICIENCY | WHITE | RED | | | 2 | | 6 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | -10 DB | |
| | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 6 DB | |
| MICROPHONES T-24, T-32 T-36, T-38 T-40, T-48 | | | | | | | | | | | | | | | | | | | | | | |
| | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 6 DB | |
| HEADSETS P11, P12, P13 P14, P16, P18 P19, P20, P21 | RECEIVING EFFICIENCY | TIP | SLEEVE | | | 6 | | 5 | 1 | OUT | CBPE | RCT | | | | | AC | REC | OPR | R | - 6 DB | |
| | | | | | | | | | | | | | | | | | | | | | | |
| HEADSET HS-20 RECEIVER R-3 | RECEIVING EFFICIENCY | TIP | SLEEVE | | | 3 | | 6 | 1 | | CBPE | RCT | | | | | AC | REC | OPR | R | - 8 DB | T-303.05 |
| HEADSET HS-30 REC R-30 | RECEIVING EFFICIENCY | BLACK | RED | | | 6 | | 6 | 1 | | CBPE | RCT | | | | | AC | REC | OPR | R | - 9 DB | T-303.02 |
| HEAD & CHEST SET HS-17 REC R-21 TRANS T-26 | RECEIVING EFFICIENCY | R | C | | | 1 | | 6 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | - 10 DB | T-304.01 |
| | TRANSMITTING EFFICIENCY | | C | T | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 6 DB | |
| HEAD & CHEST SET HS-19 REC R-22 | RECEIVING EFFICIENCY | R | C | | | 2 | | 6 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | - 10 DB | T-304.02 |
| | TRANSMITTING EFFICIENCY | | C | T | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | - 6 DB | |
| MICROPHONE T-17 | TRANSMITTING EFFICIENCY | | RING | SLEEVE | 3 | | 4 | | 1 | IN | CBPE | RCT | | | | | AC | TRANS | OPR | R | - 9 DB | T-305.01 |
| | RESISTANCE | | RING | SLEEVE | 3 | | 4 | | 1 | IN | CBPE | RCT | | | | | DC | TRANS | | L | 50 DC | |
| MICROPHONE T-30 | TRANSMITTING EFFICIENCY | | CONNECT THRU JACK CC 346 | | 3 | 2 | 3 | 6 | 1 | OUT | CBPE | RCT | | | | | AC | REC TRANS | OPR | R | - 5 DB | T-305.02 |
| | NOTE: SEE REPAIR INSTRUCTIONS FOR METHOD OF USING HANDSET TS-9( ) TO CONTROL SOUND LEVEL | | | | | | | | | | | | | | | | | | | | | |

*Table I—Continued.*

| EQUIPMENT | TEST | TEST CLIP CONNECTIONS | | | DIAL CONTROL SETTINGS | | | | | EQUAL-IZER | KEY OPERATION FOR VARIOUS TESTS KEYS NOT LISTED REMAIN IN UNOPERATED POSITION | | | | | | | | | METER READING L = LEFT R = RIGHT | | FOR DETAILS SEE REPAIR INSTRUCTIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | REC | COM | TRANS | D1 | D2 | D3 | D4 | D5 | S2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| MICROPHONE T-45 | TRANSMITTING EFFICIENCY | | C | T | 3 | | 6 | | 1 | IN | CBPE | RCT | | | | | AC | TRANS | OPR | R | -3 DB | T-305.05 |
| | NOISE CANCELLATION | | C | T | 3 | | 6 | | 1 | IN | CBPE | RCT | | | | | AC | TRANS | OPR | | -8DB * | |
| | * METER READING AT LEAST 8 DB BELOW TRANSMITTING EFFICIENCY TEST | | | | | | | | | | | | | | | | | | | | | |
| MICROPHONE T-50 | TRANSMITTING EFFICIENCY | *3 | *1 | | | 6 | | 5 | 1 | OUT | CBPE | RCT | | | | | AC | REC | OPR | R | -6 DB | T-305.06 |
| TELEPHONE SET A.E.CO. TYPE-40 (TP-6) | RECEIVING EFFICIENCY | TEST CORD CONN BLACK L1 | | TEST CORD CONN RED L2 | | | | 6 | 1 | | STA | STA | | | | | AC | REC | OPR | R | -12DB | T-302.04 |
| | TRANSMITTING EFFICIENCY | L1 | | L2 | | | 3 | | 1 | OUT | STA | STA | | | | | AC | TRANS | OPR | R | -6DB | |
| TELEPHONE SET KELOGG 925BAX (TP-6) | RECEIVING EFFICIENCY | L1 | | L2 | | | | 6 | 1 | | STA | STA | | | | | AC | REC | OPR | R | -6 DB | |
| | TRANSMITTING EFFICIENCY | L1 | | L2 | | | 3 | | 1 | OUT | STA | STA | | | | | AC | TRANS | OPR | R | -3 DB | |
| TELEPHONE SET ST CARL 1222BW (TP-6) | RECEIVING EFFICIENCY | L1 | | L2 | | | | 6 | 1 | | STA | STA | | | | | AC | REC | OPR | R | -.0DB | |
| | TRANSMITTING EFFICIENCY | L1 | | L2 | | | 3 | | 1 | OUT | STA | STA | | | | | AC | TRANS | OPR | R | -3 DB | |
| TELEPHONE SET W.E.CO 302AW (TP-6) | RECEIVING EFFICIENCY | L1 | | L2 | | | | 6 | 1 | | STA | STA | | | | | AC | REC | OPR | R | -3DB | |
| | TRANSMITTING EFFICIENCY | L1 | | L2 | | | 3 | | 1 | OUT | STA | STA | | | | | AC | TRANS | OPR | R | -9DB | |
| LOOSE DIAL | % BREAK | DIAL PULSE | | CONTACTS | | | | | 1 | | | | % BRK | | | CKT | DC | | | GREEN AREA | | T-302.04 |
| | DIAL SPEED | DIAL PULSE | | CONTACTS | | | | | 1 | | | | DIAL SPEED | | | CKT | DC | | | RED AREA | | |
| SWITCHBOARDS BD-71 & BD-72 | INSULATION RESISTANCE | GENERATOR CASE | | TOP UNIT MTG STRIP | | | | | 1 | | | | | | BKDN | CKT | AC | | | L | -6DB | T-301.01 |
| | GENERATOR | BIND POST A | | BIND POST D | | | | | 1 | | | | | GEN | | CKT | AC | | | R | 0 DB | |
| | HEAD SET HS-19( ) TRANSMITTER | | C | T | 3 | | 3 | | 1 | IN | LBPE | RCT | | | | | AC | TRANS | OPR | R | -6 DB | |
| | HEAD SET HS-19( ) RECEIVER | R | C | | | 2 | | 6 | 1 | | LBPE | RCT | | | | | AC | REC | OPR | R | -10DB | |
| | INDUCTION COIL TRANSMITTING | BIND POST A | | BIND POST B | | | 3 | | 1 | IN | | FLD | | | | | AC | TRANS | OPR | | 3 DB * | |
| | INDUCTION COIL RECEIVING | BIND POST A | | BIND POST B | | | | 6 | 1 | | | FLD | | | | | AC | REC | OPR | | 2 DB * | |
| | REPEATING COIL TRANSMITTING | LINE BIND POST | | LINE BIND POST | | | 3 | | 1 | IN | | FLD | | | | | AC | TRANS | OPR | | 1 DB * | |
| # TRANSFORMATION LOSS NOT MORE THAN THESE VALUES BELOW DB READING FOR HS-19( ) | | | | | | | | | | | | | | | | | | | | | | |

*Table I—Continued.*

## 38. Records

Keep a record for each test set showing the date that it was placed in service, the results of each periodic maintenance check, troubles experienced, and when and how the troubles were cleared. Such records will assist greatly in locating troubles and eliminating potential causes of complete service failure.

## 39. Purpose and Use of Equipment Performance Check List

*a.* GENERAL. (1) The equipment performance check list (par. 40) will aid in determining whether Test Set I–142–(*) is functioning properly. The check list indicates the items which are to be checked, the normal indications and tolerances of correct operation, and the corrective measures to be taken.

(2) Items 1 through 37 represent the checks which are to be made at least twice daily while the set is in operation. It is extremely important that these checks be made in consecutive order since each check depends upon the accuracy of the one preceding it. Start with the first check and follow all the way through.

*b.* ACTION OR CONDITION. For some items, the information given in the action or condition column consists of the setting for various switches and controls under which the item is to be checked. For other items, it represents an action that must be taken in order to check the normal indications given in the normal indications column.

*c.* NORMAL INDICATIONS AND CORRECTIVE MEASURES. The normal indications listed include the visible and audible signs that will be found when the items are checked. If the indications are not normal, an experienced mechanic should apply the recommended corrective measures.

## 40. Equipment Performance Check List for Test Set I–142–(*)

PREPARATORY

| Item No. | Item | Action or condition | Normal indication | Corrective measures |
|---|---|---|---|---|
| 1 | BA–23 (two in use in series). | Connect lug 7 of SK1 to plus terminal of BA–23. | | Check with voltmeter. Replace if less than 1.2 v. per cell under load. |
| | | Connect lug 12 of SK1 to minus terminal of BA–23. | | |
| 2 | BB–49 (two in use in series) or other storage batt. | Connect lug 8 of SK1 to plus terminal of BB–49. | | |
| | | Connect lug 11 of SK1 to minus terminal of BB–49. | | |
| 3 | BA–120/U (four in use in series) or storage batt. | Connect lug 9 of SK1 to plus terminal of BA–210/U. | | |
| | | Connect lug 12 of SK1 to minus terminal of BA–210/U. | | |
| 4 | BA–26 (three in use in series). | Connect lug 10 of SK1 to plus terminal of BA–26. | | |
| | | Connect lug 12 of SK1 to minus terminal of BA–26. | | |
| | | START | | |
| 5 | OFF–ON switch S1 | Operate to ON | Set warms up. (Allow 5 minutes before proceeding to next step.) | |

## 40. Equipment Performance Check List for Test Set I–142–(*) (contd)

EQUIPMENT PERFORMANCE

| Item No. | Item | Action or condition | Normal indication | Corrective measures |
|---|---|---|---|---|
| | | *Battery check* | | |
| 6 | Key 7 | Operate to DC | | |
| 7a | Control D5 | Set to position 12 | Meter M1 deflects to the blue-shaded area. | Check batteries. |
| 7b | Key 9 | Depress. (Checks voltage under full load.) | Meter M1 remains in the blue-shaded area. | Check batteries. |
| 8 | Control D5 | Set to position 24 | Meter M1 deflects to the blue-shaded area. | Replace BA–210/U. |
| 9 | Control D5 | Set to position 135 | Meter M1 deflects to the blue-shaded area. | Replace BA–26. |
| 10 | Key 7 | Operate to AC | Meter returns to 0 on d-c scale. | |
| 11 | Control D5 | Set to RINGER CUR, position 1. | | |
| | | *Capacitor test adjustment* | | |
| 12 | Control D9 | Turn to maximum counterclockwise position. | | |
| 13 | Key 6 | Operate to COND. | | |
| 14 | Key 5 | Operate to CHK. | | |
| 15 | Control D9 | Turn clockwise slowly | Lamp LP2 just glows | Replace lamp if it does not glow. |
| 16 | Key 6 | Operate to OFF | Lamp LP2 ceases to glow. | |
| 17 | Key 5 | Operate to OFF. | | |
| | | *Dial test circuit adjustment* | | |
| 18 | Control D5 | Set to RINGER CUR, position 1. | | |
| 19 | Key 7 | Operate to DC. | | |
| 20 | Key 6 | Operate to CKT. | | |
| 21 | Key 3 | Operate to %BRK | Meter M1 deflects. | |
| 22 | Control D6 | Adjust for reading of meter M1 | Meter M1 reads 100 on d-c scale. | |
| 23 | Key 3 | Operate to DIAL SPEED | Meter M1 deflects slowly to above or near full scale. | |
| 24 | Key 3 | Operate to CHK | Meter M1 returns to 0 on d-c scale. | |
| 25 | Key 6 | Operate to OFF. | | |
| 26 | Key 7 | Operate to AC. | | |
| | | *Sound source output adjustment* | | |
| 27 | Key 5 | Operate to CHK. | | |
| 28 | Key 7 | Operate to CHK. | | |
| 29 | Key 9 | Depress | Meter M1 deflects. | |
| 30 | Control D8 | Adjust for reading of meter M1 | Meter M1 deflects to 0 db. | |

## 40. Equipment Performance Check List for Test Set I–142–(*) (contd)

EQUIPMENT PERFORMANCE

| Item No. | Item | Action or condition | Normal indication | Corrective measures |
|---|---|---|---|---|
| | | *Measuring circuit sensitivity* | | |
| 31 | Key 7 | Operate to AC | Meter M1 deflects. | |
| 32 | Control D7 | Adjust for reading of meter M1 | Meter M1 deflects to 0 db. | |
| 33 | Key 5 | Operate to OFF | Meter M1 deflects to 0 on d-c scale. | |
| 34 | Key 9 | Release. | | |
| | | *Continuity test check* | | |
| 35 | Test cord plug | Insert in CONT jack. Short-circuit clips on end of test cord. | Buzzer BZ1 and lamp LP1 should operate. | |
| 36 | Test cord plug | Transfer to jack L1–L2 | Test Set I–142–(*) is ready for operation. | |
| | | STOP | | |
| 37 | OFF–ON switch S1 | Operate to OFF | Test Set I–142–(*) is not in operation. | |

959852 O—51——3

# PART THREE

# MAINTENANCE INSTRUCTIONS

## Section VIII. PREVENTIVE MAINTENANCE TECHNIQUES

### 41. Meaning and Importance of Preventive Maintenance

*a.* Preventive maintenance (PM) means making systematic checks and adjustments at regular intervals to keep equipment operating at top efficiency.

*b.* The importance of PM cannot be overemphasized. A properly functioning system of communications requires constant operating efficiency of each item of equipment. The readiness and efficiency of these items of equipment depend upon properly operating test equipment. It is vitally important, therefore, that test set operators and repairmen maintain their sets in excellent working order.

*Note.* The operations described in sections VII and VIII are operator maintenance functions.

### 42. Description of Techniques

*a.* GENERAL. (1) Most of the electrical parts used in Test Set I–142–(*) require routine PM of one kind or another. Hit-or-miss methods cannot be used. This section gives definite and specific instructions and serves as a guide for maintenance personnel. The standard lettering system for the six basic operations is as follows:

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

(2) The kind of maintenance necessary is determined by field conditions. For example, dust filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather or excessive dampness, snow, or ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary tightening, cleaning, and adjusting operations, equipment will not be dependable and may break down when it is most needed.

*b.* INSPECT. Inspection is the most important operation in PM. It is necessary to be alert while inspecting the set, as careful observation is required to detect defects in the functioning of certain of the parts. To carry out the inspection operation most effectively, make every effort to become thoroughly familiar with normal operating conditions. This will enable you to recognize and identify abnormal conditions more readily. A careless observer will overlook the evidences of minor trouble. Although these defects may not interfere at the moment with the performance of the equipment, valuable time and effort will be saved if they are corrected *before* they lead to major break-downs. Look carefully at all parts of the equipment, noticing the color, placement, and state of cleanliness. 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; or oxidation of metal contact surfaces.

(2) Improper placement, by seeing that all leads and cabling are properly adjusted and are in their original positions.

(3) Excessive wear, as indicated by loose bearings or fittings.

(4) Lack of cleanliness, by carefully examining all recesses in the units where dust might accumulate, especially between connecting terminals and contacts. Parts, connections, and joints should be free of dust, excessive moisture, corrosion, and other foreign matter. In tropical locations, look for fungus growth, mildew, and moisture accumulations.

* The Feel operation does not apply to Test Set I–142–(*).

(5) Looseness, by testing gently for movement any connection or mounting which appears to be loose.

***Caution:*** Do not tighten parts requiring clearance or tension adjustments. Before tightening any screws, bolts, or nuts, determine whether or not they are a part of any adjustment. Be careful when tightening screws, bolts, and nuts. Fittings tightened beyond the pressure for which they are designed will be damaged or broken. Whenever a loose connection is tightened, apply moistureproofing and fungiproofing varnish again with a small brush. See section X for details of weatherproofing.

*c.* TIGHTEN. Any movement of the equipment caused by transportation, concussion, or vibration may result in loose connections which are likely to impair the proper operation of the equipment. The importance of firm connections cannot be overemphasized; however, never tighten screws, bolts, or nuts unless they are definitely loose. When tightening, always be certain to use the correct tool of proper size. If a screw does not turn easily, remove it and begin again.

*d.* CLEAN. When the schedule calls for a cleaning operation, it does not mean that every item which bears the identifying letter C, must be cleaned every time it is inspected. Items such as vacuum tubes, capacitors, resistors, coils, etc., are cleaned by wiping with a clean lint-free cloth or by brushing. It may be necessary in some cases to use cleaning fluid to remove dirt. Apply the fluid with a cloth or brush and wipe dry with a clean cloth. Remove corrosion by rubbing with a fine sandpaper.

*Note.* Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry Cleaning (SD), is available as a cleaning fluid through established supply channels.

*e.* ADJUST. Adjustments are made only when necessary to restore normal operating conditions. Specific types of adjustments are described in paragraphs pertaining to the particular item.

## 43. Itemized Preventive Maintenance

*a.* In the course of calibrating Test Set I–142–(*) for use and in the course of testing equipment with it, the operator may observe the condition and the function of all control elements not mounted within the carrying case. Under normal shop conditions, any one familiar with the operation of the test set will notice changes in performance indicative of potential faults without making a routine examination. The purpose of the following paragraphs is to cover the examination and the recommended corrective action and to guide the operator while augmenting his cursory observation.

*b.* To insure reliable results with the test set, handle it carefully and maintain it with the degree of attention generally required of precision measuring instruments.

## 44. Preventive Maintenance Tools and Materials

*Note.* Before starting PM, have on hand all tools and materials needed in performing the operations listed in the preventive maintenance check list (par. 60).

*a.* All the materials and tools listed below may be obtained through regular supply channels.

| *Signal Corps stock No.* | *Item* |
|---|---|
| 6G1007 | Oil: lubricating, preservative, special; 4-oz metal can (US Army spec No. 2–120). |
| 6G1516 | Polish: metal, paste. |
| 6G184.1 | Carbon tetrachloride: 8-oz metal can; technical grade. |
| 6G1914 | Solvent (SD) (ed spec No. P–S–661a). |
| 6M751 | Paper: cleaning; Bell Seal bond ¼"x2½". |
| 6N7531 | Solder M–31: resin core. |
| 6N8583 | Tape TL–83: friction; cotton; ¾" wide. |
| 6N8692 | Tape TL–192: rubber; ¾" wide. |
| 6R15371 | Screw driver: 2½" blade. |
| 6R15811 | Screw driver: 5" blade. |
| 6R24617 | Soldering Iron TL–117—110 v, 70–100 w; with cord and plug. |
| 6R1065C | Burnisher: contact. |
| 6R41266A | Bender: spring. |
| 6R4513 | Pliers TL–13: side cutting; 6". |
| 6R4603 | Pliers TL–103: diagonal cutting; 5". |
| 6R4626 | Pliers TL–126: long chain nose. |
| 6R55006 | Wrench TL–111: adjustable; single end; ¾" capacity; 6" long. |
| 6Z1372 | Brush TL–72. |
| 6Z4002 | Flashlight TL–122: includes bulb. |
| 6Z7070–1 | Mirror: mouth. |
| 6Z7360 | Orange stick. |
| 6Z7500–0000 | Paper: sand; flint, #0000, 9"x11" (Fed spec No. P–P–111). |
| 8A805 | Cheesecloth: bleached; 36" wide. |

*Note.* Gasoline will not be used as a cleaning fluid for any purpose.

*b.* All required tools are furnished in Tool Equipment TE–41 with the exception of the spring bender. The acquisition of this tool in addition to those mentioned above will permit the proper preventive maintenance of Test Set I–142–(*).

## 45. Exterior of Test Set

*a.* INSPECT (I). The following PM procedures for the exterior of the test set are elementary operations which should be performed by the operator without detailed instructions.

(1) Examine the case, screen, control panel, jack panel, terminals, and controls for accumulations of dirt or other foreign matter and for corrosion.

(2) Check the controls and the generator crank for easy rotation. Check the keys for free movement.

(3) Inspect key handles, control knobs, generator crank, and fuse holders for cracked or broken parts.

(4) Check the mounting of keys, controls, and terminals for loose screws or nuts.

(5) Observe alinement of pointers on knobs with scale markings.

(6) Check the zero adjustment of the meter on the d-c scale. Inspect the meter case and glass for cracks or breaks.

(7) Check the visor head to find whether it fits correctly or whether it is bent (Test Set I–142–A only).

*b.* TIGHTEN (T). (1) Tighten loose mounting screws and nuts. Replace those which are missing.

(2) Tighten loose jack screws.

(3) Tighten loose key handles.

(4) Tighten loose visor head (Test Set I–142–A only).

*c.* CLEAN (C). (1) With a clean cloth, remove deposits of dirt or excessive moisture from the case panel.

(2) Clean the visor head (Test Set I–142–A only).

(3) Remove all deposits of corrosion with a cloth moistened with solvent (SD). Wipe with a clean dry cloth and retouch the bare spots with the protective finish supplied.

(4) Blow dirt out of recessed parts with compressed air. Do *not* use compressed air to clean the sound source screen without first removing the receiver unit.

(5) Clean the test set terminals with a clean cloth moistened with solvent (SD).

*d.* ADJUST (A). (1) Adjust the meter for 0 d-c scale reading by turning the adjustment screw in the meter. The adjustment screw is located on the front of the panel underneath the viewing glass of the meter.

(2) Aline the pointers of the dials with the correct scale marking and retighten the holding screws.

(3) Reform or replace all bent terminals and generator crank parts.

*Note.* All components inside Test Set I–142–A have been finished with moisture- and fungi-resistant varnish. When this is removed in cleaning, tightening, or adjusting parts, refinish area with similar finish. The contacts of the rotary-type switches and the terminals of the tube sockets are silver-plated. The black discoloration which will develop on these contacts and terminals is not harmful and *must not be* removed.

## 46. Cords, Cables, and Plugs

Cords, cables, and plugs should be regarded as the life lines of the equipment. The condition of the cabling must be closely observed.

*a.* INSPECT (I). (1) Inspect cords and cables for cracked or deteriorated insulation.

(2) Check for frayed or cut insulation at connecting points and for improper connections which strain the wires or connections.

(3) Inspect for cracked or damaged plug shells.

*b.* TIGHTEN (T). (1) Remove the plug shells and tighten the connections.

(2) Tighten loose cable lamps, coupling rings, cable connections, and strain reliefs.

(3) Tighten the case.

*c.* CLEAN (C). Wipe grease, oil, and moisture from the cords, plug, and sockets with a clean dry cloth. Clean any corrosion or stains from the plug with metal polish (Sig C stock No. 6G1516). Do not apply an excessive amount of polish. Be sure to remove all residue of the polish after the cleaning operation in order not to interfere with electrical contact.

## 47. Fuses

Fuses are usually small strips of metal with a low melting point. These are inserted in series

with an electrical current and operate when the amount of current exceeds a prescribed value. Being very rapid in action, fuses protect equipment against overload and damage. Whenever a fuse is blown, an attempt must be made to discover the reason for the failure and corrections must be made, if possible, before a new fuse is inserted. Keep the fuse ends bright and clean. If they are not bright and clean, arcing and burning occur and eventually make replacement of the holder necessary.

*a.* INSPECT (I). (1) Check for burned-out fuses.

(2) Inspect fuse caps for burning, charring, and corrosion.

(3) Inspect fuse ends for dirt and corrosion.

(4) Check fuse holders for cleanliness and foreign matter.

*b.* CLEAN (C). (1) Brush all dirt, dust, and foreign matter out of the fuse holders.

(2) Clean all fuse ends with a clean dry cloth.

## 48. Relays

*a.* GENERAL. Before applying PM techniques to relays, determine whether the relay is *normal* or *abnormal.*

(1) A relay is considered *normal* if—

(*a*) Exterior is free from dirt or dust.

(*b*) Contacts are not burned, pitted, corroded, or do not have build-ups.

(*c*) Contact springs are in good condition.

(*d*) Moving parts travel freely and function satisfactorily.

(*e*) Connections to the relay mountings are tight.

(*f*) Wire insulation is not frayed or torn.

(*g*) Relay assembly is securely mounted.

(*h*) Coil windings show no signs of overheating.

(*i*) Contacts are lined up and correctly spaced.

(2) A relay is considered *abnormal* if it *fails* to meet any of the nine requirements of a normal unit.

*b.* INSPECT (I). (1) Using the check list given in *a* above, inspect the relay to detect abnormalities.

(2) If the contacts are not readily accessible, examine them with the aid of a flashlight and mirror.

(3) Check the mechanical action of the relay to make certain that the moving and the stationary contacts make positive contact and are directly in line with each other when they come together. Do not damage or misaline the relay mechanism.

*c.* TIGHTEN (T). (1) Tighten all loose connections and mounting screws friction tight. Do not apply enough force to damage the screws or break the parts. If a screw does not turn easily, remove it and begin again.

(2) Relay RY1 is insulated from the panel with moulded bushings and washers. Do not overstress these parts.

*d.* CLEAN (C). (1) *Relay exterior.* Brush the exterior of the relay with a soft brush. If it is very dirty, clean it with a clean dry cloth.

(2) *Relay contacts.* Clean corroded, burned, or pitted contacts with a burnishing tool. Do not clean contacts except when required to correct faulty operation. Do not use a file or an abrasive cloth. Insert the blade of the burnishing tool between the contacts, press the contacts together lightly, and draw out the blade. Do not use a back and forth motion, because it may cause unevenness in the contact surfaces and may damage the blade by bending it.

***Caution:*** Keep the blade of the burnishing tool clean. Do not touch the blade with the fingers. Always wipe it with a clean cloth before use and wipe it frequently during use with a clean cloth moistened with carbon tetrachloride.

*d.* ADJUST (A). (1) Carefully adjust the relay contacts so that, if necessary, a definite make or break occurs when the armature is moved by hand. Poor contact in the make position causes arcing and erratic operation. Insufficient travel in the break position causes arcing that may permanently damage the contacts.

(2) Use long-nose pliers to bend contacts. Bend contacts at the point nearest the mounting screws so that they will not be out of parallel after adjustment.

## 49. Vacuum Tubes and Sockets

Perform PM on vacuum tubes and sockets only when the tubes are are removed for a periodic

check. PM for the tube sockets and mountings involves inspection, tightening, and cleaning.

*Note.* Work on tubes carefully. Severe burns may result from contact with the envelopes of hot tubes.

*a.* INSPECT (I). (1) Examine glass and metal tube envelopes, prongs, and base for dirt and corrosion.

(2) Inspect for tube envelopes which have broken away from the tube base. Do not attempt repair. Replace as soon as possible.

(3) Inspect firmness of tubes in their sockets by pressing them down in the sockets and testing them in that position. *Never* test by partially withdrawing the tubes and jiggling them from side to side. Movement of the tube tends to weaken the pins in the base and to spread the contacts in the socket. Trouble may occur where it did not exist before. Always inspect sockets each time tubes are removed.

(4) Be careful when removing a tube from its socket. Never jar a warm tube. The jar may displace the elements. Store tubes carefully after removal. Do not place tubes on flat surfaces until proper precautions have been taken to prevent their rolling to the ground or the floor.

(5) Inspect tube prongs for dirt and corrosion.

*b.* TIGHTEN (T). (1) Socket mountings must be tight at all times. Otherwise, during transit, they will become loosened and the tubes they contain may become damaged beyond repair.

(2) Tighten bolts which hold tube sockets to the panel. Do not apply too much pressure or the insulating material will crack.

*c.* CLEAN (C). (1) Clean tubes only when inspection discloses that cleaning is necessary. Tubes do not need frequent cleaning.

(2) Remove dust and dirt from the envelope with a clean cloth.

(3) Remove dirt and corrosion from the tube prongs with a piece of fine sandpaper. Do not confuse brown or black stains on silver-plated contacts with corrosion.

## 50. Resistors

*a.* INSPECT (I). (1) Inspect the coatings of vitreous resistors for signs of cracks and chipping.

(2) Examine the bodies of all types of resistors for blistering, discoloration, and other evidences of overheating. Look for arc pits or craters.

(3) Check the security of all mountings. *Do not* move resistors with pigtail connections because there is danger of breaking the connections at the point where they enter the body of the resistor. Such defects cannot be repaired.

*b.* TIGHTEN (T). Tighten resistor mountings whenever they are loose. If a resistor mounting is allowed to remain loose, vibration may break the connection or damage the body.

*c.* CLEAN (C). (1) Remove all dirt, dust, and corrosion.

(2) Resistors with discolored bodies cannot be cleaned. Discoloration is indicative of overloading at some time prior to the inspection and is probably due to circuit trouble which requires analysis.

*Note.* When fungiproofed resistors are heated, a harmless brown stain may appear. This will not interfere with the efficiency of the resistor.

## 51. Capacitors

*a.* INSPECT (I). (1) Inspect the terminals of the capacitors for corrosion.

(2) Examine the leads for poor insulation, dry rot, and cracks.

(3) Inspect the mountings for loose mounting screws, studs, or brackets.

(4) Inspect the case of each capacitor for bulges, discoloration, and dirt.

*b.* TIGHTEN (T). Tighten loose connections, terminals, and mountings.

*c.* CLEAN (C). Clean the case of the capacitor, the insulation bushings, and any dirty or corroded connections.

## 52. Meter

A meter is an extremely delicate precision instrument and must be handled carefully. It requires little maintenance.

*a.* INSPECT (I). (1) Inspect the leads and the connections to the meter. Check for loose, dirty, and corroded connections.

(2) Look for cracked or broken cases or cover glass. Because the movement of the meter

is extremely delicate, its accuracy will be seriously affected if the case or the glass is broken and dirt or moisture filters through.

*b.* TIGHTEN (T). (1) Tighten the meter mounting screws securing the meter to the panel. Be especially careful during this operation to avoid damaging the meter case.

(2) Tighten the connections at the back of the meter.

*c.* CLEAN (C). (1) Clean meter case and glass with a clean dry cloth. If dirt deposits are difficult to remove, dampen the cloth with solvent (SD). If solvent is used, wipe the surface clean and dry with a clean dry cloth.

(2) Remove corrosion from connections with No. 0000 sandpaper. Always wipe the surface clean with a clean dry cloth.

*d.* ADJUST (A). Normally, the meter should indicate zero on the d-c scale when the equipment is turned off. Before deciding whether a meter needs readjustment, tap the meter case *lightly* with the tip of the finger. This aids the needle to overcome the slight friction which sometimes exists at the bearings and which prevents an otherwise normal unit from coming to rest at zero. If adjustment is needed, insert the tip of a very thin screwdriver in the slotted screw head located below the meter glass and slowly turn the adjusting screw until the pointer is at zero; then lightly tap the meter case again and view the meter face and the pointer full on, and not from either side. Avoid turning the screw too far, because the needle may be bent or the hairspring damaged.

## 53. Keys, Switches, and Jacks

*a.* INSPECT (I). (1) Inspect the mechanical action of each key, switch, and jack. Look for signs of dirt and corrosion on all exposed elements.

(2) Examine the elements both visually and by observing the action of the keys and switch by flipping them a few times. Note the amount of spring tension and freedom of action. When inspecting the keys or switches, be careful not to remove the wiring.

(3) Observe whether the contacts are free of corrosion and dirt. Do not confuse brown or black stains on silver-plated contacts with corrosion. This stain is silver oxide and is a satisfactory conductor.

(4) Inspect for loose or dirty connections.

*b.* CLEAN (C). (1) Wipe off all moisture with a clean dry cloth.

(2) Clean the exterior surfaces of the keys and switches with a cloth moistened with solvent (SD) and polish the surface with a dry cloth.

(3) Clean the frames and springs of dirt and dust with a soft bristle brush. Do not use solvent (SD).

(4) If the contacts are pitted, corroded, or burned, resurface them with a burnishing tool. Flush the contacts with a clean toothpick and carbon tetrachloride. Dip the toothpick into the carbon tetrachloride to a depth of about one-half inch and deposit the liquid on the contacts without rubbing. Hold the contacts slightly separated during this operation. Dip the flat end of another toothpick into the carbon tetrachloride and deposit it on the contact without rubbing, to flush away the dirt that had been loosened by the first application. Be careful to keep the carbon tetrachloride away from the insulators. When the contacts are thoroughly dry, reburnish them so that no deposit or any foreign matter remains upon them. After burnishing, note whether the contact follow and separation requirements are met, since repeated burnishing tends to increase the contact separation and reduce the follow.

*c.* ADJUST (A). (1) Adjust the contact springs of key-type switches as required.

(2) On keys 1 to 8 inclusive, remove the four mounting screws and lift the key out for cleaning and adjustment. Adjust fixed springs (springs not actuated by a roller or pillar) to have a follow of a minimum of 0.02 inch. Use a spring bending tool. Do not kink the spring.

(3) With a fine-grained burnishing blade, burnish the contacts after adjustment. Check operation and remount the key.

(4) Reposition all connecting wires.

## 54. Battery Supply

*a.* INSPECT (I). (1) Check the level and the specific gravity of the electrolyte in the storage batteries.

(2) Examine the battery cases for evidence of leakage.

(3) Inspect the battery terminals for loose connections, accumulated dirt, and corrosion.

(4) Examine all battery connectors for cut, worn, or otherwise damaged insulation.

(5) Check the voltage of all dry cells on the basis of the number of cells in use to provide a specific voltage. The voltage should be greater than 1.2 volts per cell under load.

*b.* TIGHTEN (T). (1) Tighten loose battery connections.

(2) Replace batteries which have cracked or broken terminals and those showing evidences of leakage.

*c.* CLEAN (C). (1) Clean off dirt or corrosion with a clean cloth or by scratch-brushing.

(2) Clean connectors with a cloth moistened with solvent (SD).

(3) Replace connectors having damaged or corroded conductors.

*d.* ADJUST (A). (1) Adjust the battery voltage by the addition of cells as required.

(2) Replace any dry battery which tests below 1.2 volts per cell (80 percent of rated voltage) under load.

## 55. Acoustic Level of Sound Source

*a.* INSPECT (I). Check the acoustic output level with Sound Calibrator TS–550/G as described in paragraph 102*b*.

*b.* ADJUST (A). If the acoustic output does not meet the requirements of paragraph 102*b*, recalibrate the sound source as outlined in that paragraph.

## 56. Generator

*a.* INSPECT (I). Inspect the generator for dirt, dust, rust, corrosion, and foreign matter. Look for damaged, loose, or missing mounting screws.

*b.* TIGHTEN (T). Tighten all terminal screws and mounting screws.

*c.* CLEAN (C). Using a soft bristle brush, carefully remove all dirt, dust, and foreign matter on the generator. Be careful not to disconnect any wires when performing this operation.

## 57. Vibrator

*a.* INSPECT (I). (1) Check to see that the vibrator mounting is free and resilient.

(2) Do not overtighten screws through the rubber mountings of the vibrator socket and clamp.

*b.* ADJUST (A). Adjust the position of the vibrator socket so that it clears the panel.

## 58. Wiring

*a.* INSPECT (I). (1) Check for loose connections, dirty contacts, and faulty lacing.

(2) Inspect for cracked, frayed, or torn insulation.

(3) Look for any wiring that may be bearing on rotating parts. Watch for kinks or improper supports.

*b.* TIGHTEN (T). (1) Tighten all screw connections which may be loose.

(2) Resolder loose or broken connections.

(3) Place all wiring in the proper place and retie if necessary.

*c.* CLEAN (C). (1) Clean off all moisture, oil, and grease from the wiring with a clean dry cloth.

(2) Clean all connections before reconnecting.

## 59. Preventive Maintenance Check List

The check list which follows is a summary of the preventive maintenance to be performed on Test Set I–142–(*). The suggested time intervals shown on the check list may be varied at any time by the local commander. For best performance of the equipment, the operations should be performed at least as frequently as called for in the check list. Operations are indicated by the letters FITCAL. For example, if the letters ITCA appear in the operations column, the item must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

## 60. Preventive Maintenance Check List for Test Set I–142–(*)

| Item No. | Operations | Item | When performed | | |
|---|---|---|---|---|---|
| | | | Weekly | Monthly | Quarterly |
| 1 | ITCA | Exterior of test set (par. 45) | X | | |
| 2 | ITC | Cords, cables, and plugs (par. 46) | X | | |
| 3 | IC | Fuses (par. 47) | | | X |
| 4 | ITCA | Relays (par. 48) | | | X |
| 5 | ITC | Vacuum tubes and sockets (par. 49) | | | X |
| 6 | ITC | Resistors (par. 50) | | | X |
| 7 | ITC | Capacitors (par. 51) | | | X |
| 8 | ITCA | Meter (par. 52) | | | X |
| 9 | ICA | Keys, switches, and jacks (par. 53) | | | X |
| 10 | ITCA | Battery supply (par. 54) | X | | |
| 11 | IA | Sound source output (par. 55) | X | | |
| 12 | ITC | Generator (par. 56) | | | X |
| 13 | IA | Vibrator (par. 57) | | | X |
| 14 | ITC | Wiring (par. 58) | | | X |

*Note.* X indicates when operations are to be performed.

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

* The Feel operation is not applicable to Test Set I–142–(*).

# Section IX. LUBRICATION

## 61. Generator GN–38–( )

The only parts of Test Set I–142–(*) which require lubrication are the moving parts of Generator GN–38–( ). Normally it will not be necessary to lubricate the generator but when it has been disassembled in a repair shop for other repairs, the moving parts should be lubricated. Use either OIL, lubricating, preservative, special (PL-SPECIAL) or GREASE, lubricating, special (GL) as directed in figure 9. The lubricants recommended can be used at all temperatures. Before lubricating parts with oil (PL-SPECIAL), wipe the dust from the exposed surfaces. Lubricate sparingly to prevent the lubricant from entering the generator or getting on the electrical contacts. Use only solvent (SD) for cleaning the generator.

# Section X. WEATHERPROOFING

## 62. General

Signal Corps equipment, when operated under the severe climatic conditions which prevail in the tropical, arctic, or desert regions, requires special treatment and maintenance.

## 63. Tropicalization

*a.* GENERAL. Because fungus growth, insects, corrosion, salt spray, and excessive moisture affect most materials harmfully, a special moistureproofing, and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. See TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in this treatment. The following problems may be encountered:

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

(2) Electrolytic action, often visible in the form of corrosion, takes place in resistors, coils,

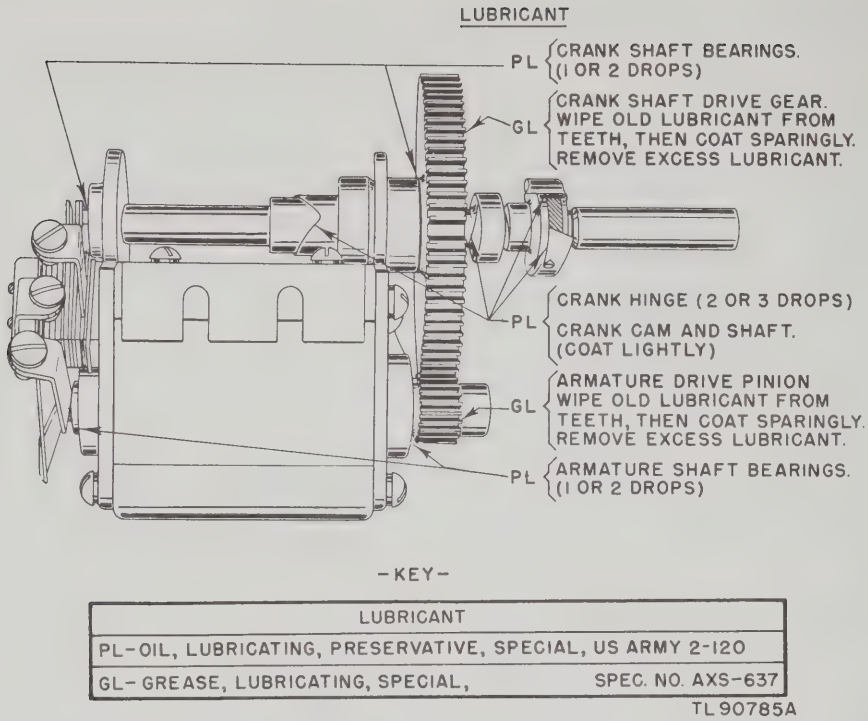



*Figure 9. Lubricants and lubricating points for Generator GN-38-( ).*

chokes, transformer windings, etc., causing eventual break-down.

(3) Hook-up wire insulation and cable insulation break-down. Fungus growth accelerates deterioration.

(4) Moisture forms electrical paths on terminal boards and insulating strips causing flash-overs and crosstalk.

***Caution:*** Varnish spray may have poisonous effects if inhaled. To avoid inhaling spray, use a 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.

*b.* MOISTUREPROOFING AND FUNGIPROOFING AFTER REPAIRS. If the coating of protective varnish has been punctured or broken during repair and if a complete treatment is not needed to reseal the equipment, apply a brush coat to the affected part. Be sure that the break is completely sealed.

## 64. Winterization

Special precautions are necessary to prevent poor performance or total operational failure of equipment in subzero temperatures. Most signal equipment can be used in winter if difficulties common in low temperature are anticipated and precautions taken to prevent them. For operation purposes, place equipment in heated rooms whenever possible. Wrap it in blankets when on the march to protect it from winds and freezing temperatures. See TB SIG 66, Winter Maintenance of Signal Equipment, for complete information. The following problems may be encountered:

*a.* Steel shrinks and becomes brittle in subzero temperatures.

*b.* Glass is especially susceptible to sudden temperature changes. The difference between a low air temperature and the warmth of a man's breath may be sufficient to shatter a lens.

*c.* Prewar rubber resists cold weather well, but certain types of synthetic rubber are unreliable and become brittle.

*d.* Canvas freezes and loses its pliability in cold weather.

*e.* Lubricants become stiff causing drag and also causing moving parts to stick. (See section IX for detailed lubrication instructions.)

## 65. Dustproofing

Signal Corps equipment operated in desert localities is affected by the extremely high temperatures and the amount of dirt, dust, sand, and other foreign matter in the air. Take care to keep such elements from filtering into the lubricated parts. Cover the equipment when it is not in use. Thorough cleanliness is imperative. Instead of merely adding new lubricants at regular intervals, whenever practicable clean and lubricate all moving parts. If possible, clean and inspect the equipment daily. In any case, inspect the air filters and similar protective devices every day and clean them whenever necessary. See TB SIG 75, Desert Maintenance of Ground Signal Equipment. Some of the problems encountered are the following:

*a.* Lubricants become thin and drain rapidly from moving metal and fiber parts. (See section IX for detailed lubrication instructions.)

*b.* Foreign matter, such as dirt, dust, and sand, acts as an abrasive causing excessive wear, clogging air cleaners, and impeding the flow of air.

# PART FOUR

# AUXILIARY EQUIPMENT

## Section XI. TERMINATING APPARATUS

### 66. General

Several types of microphones and headsets are equipped with plug-ended cords. To facilitate connecting these instruments to the test set, connectors having spade-type ends may be fabricated. These connectors consist of a jack wired with a short length of cordage, terminated with spade-type cord tips fitting the clip terminal of the test set. The jacks which may be required to fit the plugs used on various instruments and the method of wiring these jacks are shown in the wiring diagram of the jack box (fig. 11). Where facilities are available for its construction and the quantity of instruments received for test justify its need, the various jacks may be mounted together to form a jack box.

### 67. Jack Box

*a.* CASE. (1) Use plywood, three-eighths inch or one-quarter inch thick to construct the case. The outside measurements are 7 inches wide, 10 inches long, and 5 inches deep.

(2) Finish with two coats of olive drab or black paint. Apply to both inner and outer surfaces.

(3) Drill a clearance hole in the end of the case for Cord CC–309.

*b.* PANEL. (1) Use black bakelite or equal, three-eighths inch or one-quarter inch thick, to construct the top panel. The length is 10 inches and the width 7 inches.

(2) Drill the panel for mounting apparatus and stencil as indicated in figure 10.

*c.* MOUNTING. (1) Mount flush with the panel, Jacks JK–14, JK–37, JK–47, JK–48, and JK–102.

(2) Mount through the panel and clamp to the panel by the locking nut which is provided, Jacks JK–33 and JK–44, socket SP–PC3F, switch S3, and wire-wound control R2.

(3) Mount binding posts and other required apparatus.

*d.* MATERIAL. The material required for assembly of the jack box is listed below.

| *No.* | *Item* | *Signal Corps stock No.* |
|---|---|---|
| 1 | Cord CC–309 | 3E309 |
| 1 | Jack JK–102 | 2Z5575 |
| 1 | Jack JK–14 | 2Z5514 |
| 1 | Jack JK–33 | 2Z5533 |
| 2 | Jack JK–44 | 2Z5544 |
| 1 | Jack JK–47 | 4C4287 |
| 1 | Jack JK–37 | 2Z5537 |
| 1 | Jack JK–48 | 2Z5548 |
| 1 | Socket SP–PC3F (Amphenol) | 2Z8673.80 |
| 1 | Switch, SPST, toggle, S3 | 2Z8105 |
| 1 | Resistor, 2-ohm, variable, R2 | 3Z7002 |
| 1 | Resistor, 1-ohm, R3 | 3Z5991–3 |
| 1 | Meter, d-c, 0-2 amperes, M2 | 3F1002–23 |
| 2 | Terminal, post | 3Z315 |

*e.* WIRING. (1) Connect the apparatus in the jack box as shown in figure 11.

(2) Connect the white, red, and black conductors of Cord CC–309, or equivalent cordage, to R, C, and T terminals of Jack JK–37.

*f.* MOISTUREPROOFING AND FUNGIPROOFING FINISH. (1) After assembly, spray or brush the wiring and inside surfaces of the case with moisture- and fungi-resistant varnish (spec No. 71–2202; stock No. 6G 1005.3).

(2) Mask the contact areas of jacks, switches, and variable resistors to protect them from contamination by the varnish.

(3) The moistureproofing and fungiproofing treatment may be omitted in all areas where protection for tropical use is not required on other test equipment.

*g.* TEST CORD. Use Test Cord CC–347 to connect Switchboards BD–71 and BD–72 to the test set. Test Cord CC–347 is a two-conductor, rubber-covered cord, 6 feet long. It is equipped with Plug PL–11 at one end and two clips (3Z1087–4) at the other end. The stock number of the cord is 3E347.

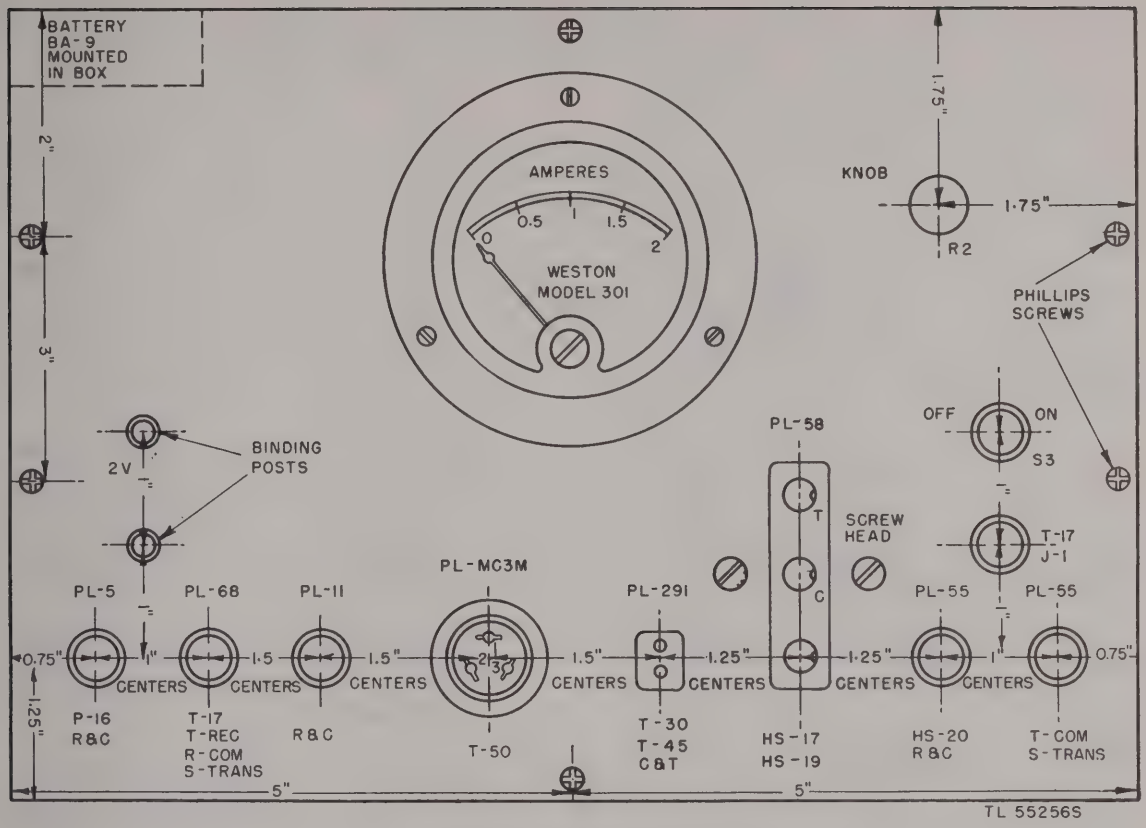



*Figure 10. Jack box panel.*

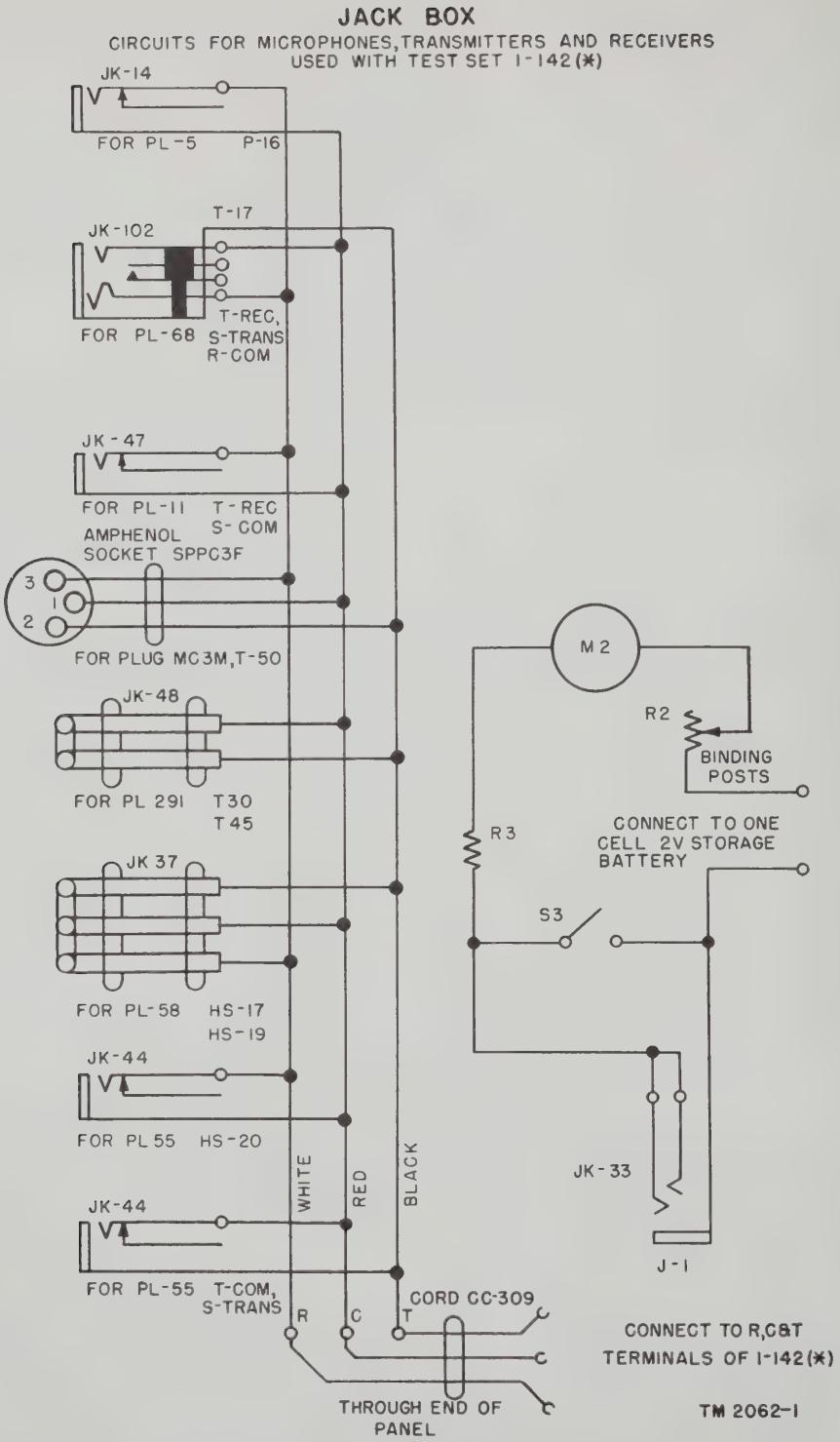



*Figure 11. Jack box, wiring diagram.*

# PART FIVE

# REPAIR INSTRUCTIONS

## Section XII. GENERAL REPAIR PROCEDURE

### 68. Outline of Repair and Adjustment Procedure

Service failures may be held to a minimum by careful handling of the equipment during installation, by completing preventive maintenance as specified in part three, and by thoroughly investigating and correcting all troubles which are encountered. When service faults are discovered, a definite plan of corrective maintenance procedure will reduce both the time the equipment is inoperative and the amount of work required to complete the repairs. For assistance in locating and correcting defects in the various parts and circuits, an outline of the information furnished in part five follows:

*a.* THEORY OF EQUIPMENT. Section XIII includes a complete explanation of the purpose and operation of the various components and circuits. An understanding of how the various mechanisms function will assist greatly in determining when the equipment is operating correctly and when it requires repairs and, when repairs are required, whether it will be more practical to replace the part or to make the repair.

*b.* TESTING APPARATUS. Section XIV describes the testing apparatus normally required to check accurately all of the clearances, spring tensions, and other adjustments to determine whether or not Test Set I–142–(*) is functioning properly.

*c.* TROUBLE SHOOTING PROCEDURES. Section XV describes methods of isolating and locating different troubles and provides step-by-step analysis procedures in the form of trouble analysis charts.

*d.* REPAIR AND REPLACEMENT. All repairs to Test Set I–142–(*) should be made *only* by thoroughly trained repair personnel. For these personnel, the informtaion contained in sections XV and XVI is sufficient to permit effective repair. All operations involved in the dismantling, repairing, and replacement of components of Test Set I–142 are not described. This has been done to preclude any effort at repair by unqualified personnel. Because of the variations in service needs and in repair and supply facilities available, definite rules cannot be laid down specifying exactly which parts, assemblies, or units should be repaired and which should be replaced. The repair personnel should take care in making the decision as to how to proceed.

*e.* CALIBRATION AND ADJUSTMENT. Section XVI provides all the calibration and adjustment values necessary to the proper recalibration of the set.

### 69. Unsatisfactory Equipment Report

WD AGO Form 468 will be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C. when trouble occurs more often than is normal, as determined by qualified repair personnel.

## Section XIII. THEORY OF EQUIPMENT

### 70. Sound Source (fig. 12)

*a.* The vibrator VB1 generates a square-topped voltage wave which is applied across the winding of the controlled diaphragm-type receiver unit. The falling characteristics of energy distribution in successive harmonics of the vibrator frequency, which constitute the square-topped wave, complements the rising radiation characteristic of the receiver work-

ing into the open air. The product is a series of individual frequency sound peaks of approximately equal level over a range of 500 to 2,500 cps. The composite output may be described as a buzzing sound.

*b.* The voltage across the receiver is adjusted by changing the resistance of control D8 to produce an acoustic pressure of 10 dynes per square centimeter when it is measured at the sound source screen. This voltage is then applied through the capacitance-resistance network (C13, R48, and R1) to meter M1 by operating keys 5 and 7 (fig. 29) to the CHK position. After establishing the correct acoustic output, resistor R1 is adjusted to obtain a reading of 0 db on meter M1. In operation, the proper acoustic pressure is reestablished when this voltage is applied to the receiver.

*c.* Sound Calibrator TS–550/G is used to check the voltage across the sound source receiver required to produce an acoustic pressure of 10 dynes per square centimeter at the sound source screen. Each calbirator receiver unit is stamped with the value in db corresponding to the voltage required to produce the 10 dyne pressure at the sound source screen. With the calibrator receiver connected to the test set as described in paragraph 102*a*, the meter reading should correspond to the value stamped on the calibrator receiver.

## 71. Measuring Circuit (fig. 13)

*a.* The measuring circuit consists of a variable attenuator (R2 to R9 inclusive) having a range of 70 db in steps of 10 db, followed by a three-stage, two-tube, resistance-coupled amplifier which terminates in meter M1. By using the voltage applied to the sound source receiver, the gain of the amplifier may be adjusted. This may be done by operating keys 5 and 7 (fig. 29) to the CHK position. Meter M1 and the input to the measuring circuit are thus placed in parallel and are connected through the network to the receiver. The meter indicates the input voltage to the measuring circuit. By operating key 7 to AC, the meter is replaced by R47 which maintains the same load on the input side. The meter is transferred to the output of the amplifier. The input to the amplifier is connected to the 0 point of the attenuator. This introduces a loss of 70 db. By rotating control D7 and thus changing the bias of the first stage, the gain of the amplifier is adjusted until it equals the 70-db loss in the attenuator.

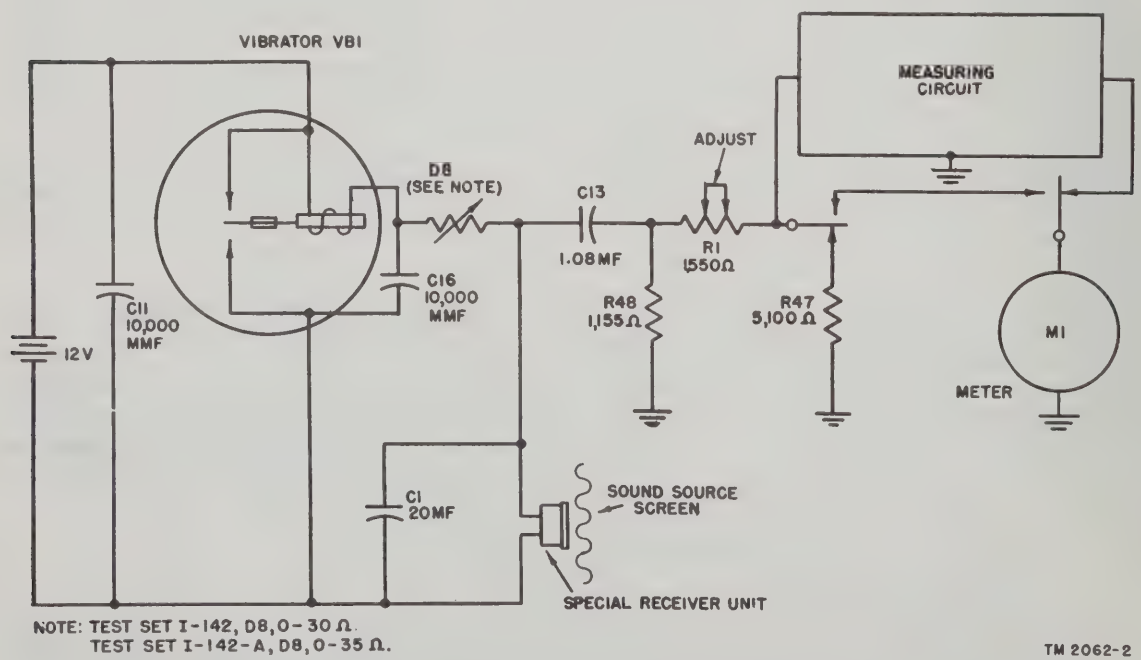
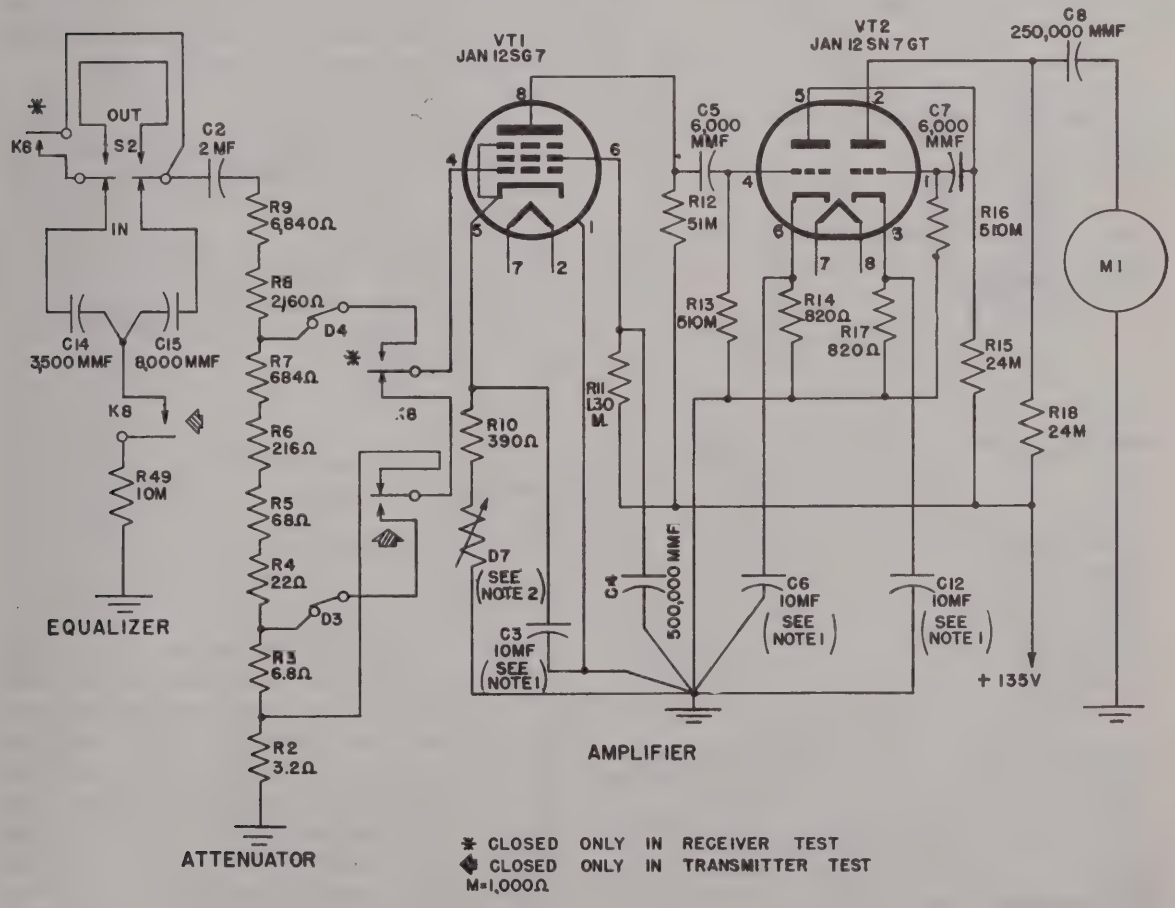



*Figure 12. Sound source, schematic diagram.*

This results in the same voltage reading on meter M1 when it is connected to the output of the amplifier as when it is connected to the input of the attenuator.

*b.* The network circuit (C13, R48, and R1 (fig. 29)) modifies the square-topped wave from the vibrator to a wave form which the amplifier may transmit without appreciable change in form. This provides the same wave form for integration by the meter at the input and the output of the measuring circuit and insures that the gain adjustment is not influenced by differences resulting from the integration of different wave forms.

*c.* The frequency response of the measuring circuit is essentially uniform from 300 cps to 5,000 cps. Where it is desired to obtain a test result indicative of the performance of a transmitter in a circuit having a high loss at the upper range of voice frequencies, a filter (equalizer circuit) may be inserted before the attenuator in the microphone test circuit by means of switch S2. The capacitance-resistance network (C14, C15, and R49 (fig. 13)) which forms the equalizer circuit has a frequency-attenuation characteristic which emphasizes the higher frequency components of the intrument under test.




NOTES:
1. TEST SET I-142, C3, C6, C12, ARE INDIVIDUAL CAPACITORS.
   TEST SET I-142-A, C3, C6, C12, IS A 3-SECTION CAPACITOR.
2. TEST SET I-142, D7, 0-2,000 Ω.
   TEST SET I-142-A, D7, 0-2,500 Ω.

TM 2062-3

*Figure 13. Measuring circuit, schematic diagram.*

## 72. Meter (fig. 14)

The rectifier-type voltmeter, normally terminating the amplifier, is also arranged for use as a d-c meter. The meter is connected through the key system and the external multiplier resistors for checking the various voltages and adjustments required for normal operation.

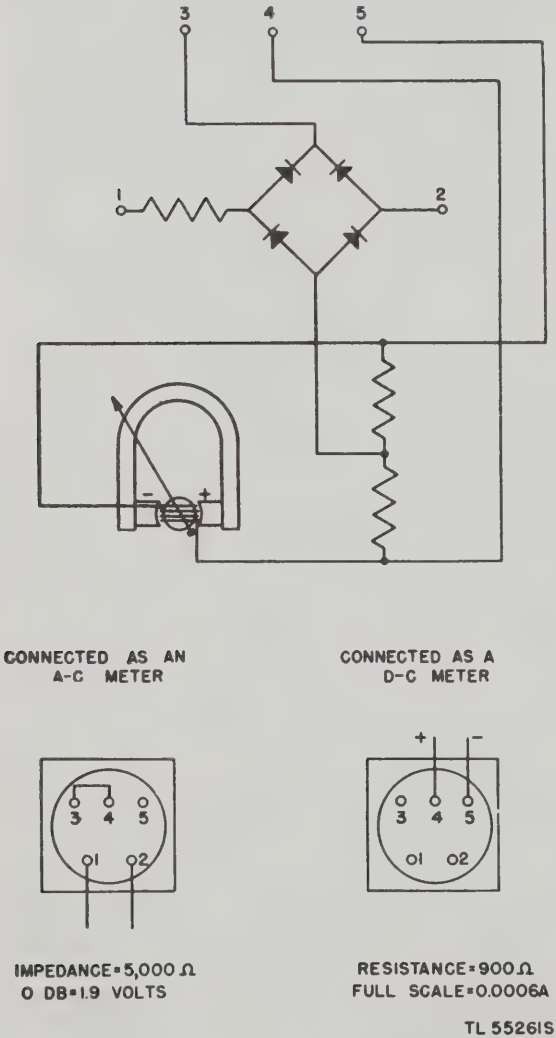



*Figure 14. Meter, schematic diagram.*

## 73. Capacitor Test (fig. 15)

The capacitor under test forms the capacitive element of a relaxation oscillator operating from the 135-volt supply. Neon lamp LP2 is mounted to be visible from the front of the panel. By substituting resistor R28 for the capacitor under test and by connecting it in parallel with lamp LP2 and control D9, a voltage drop across the combination equal to the break-down voltage of the lamp will be obtained when control D9 is adjusted. Breakdown is indicated by a characteristic orange-colored glow. With capacitors having a high leakage resistance, the capacitor charges until the voltage across the lamp reaches the breakdown value. The capacitor discharges through the lamp and with the lamp passing current, the IR drop in resistor R29 reduces the voltage below the sustaining voltage of the lamp. The lamp goes out. This action is repeated at a rate dependent on the capacitance of the unit under test. With a capacitor having a low leakage resistance, the voltage available to the lamp is not sufficient to cause the lamp to glow.

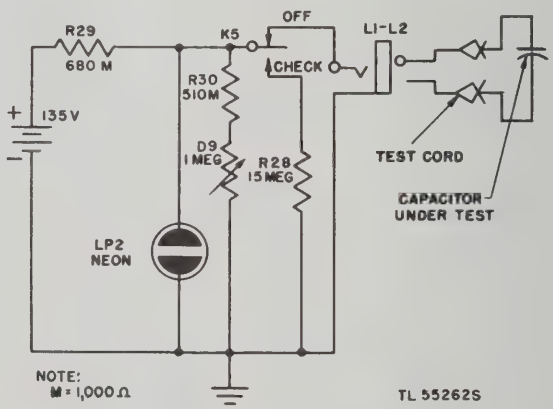



*Figure 15. Capacitor test, schematic diagram.*

## 74. Generator Test (fig. 16)

Meter M1 in series with resistor R38A (and R38B where used) is used to indicate the voltage developed across 1,000-ohm load resistor R39 by a generator under test. This circuit was designed primarily for testing Generator GN–38-( ). Resistor R38 was selected in order to obtain a 0-db reading for a specified output of 45 volts. The peaked wave form produced by this type of generator results in a lower meter reading than is obtainable with a sine wave input of equal peak voltage. In calibration, R38 was selected to produce a reading of +0.8 db for 45 volts, 60 cps, commercial power supply.

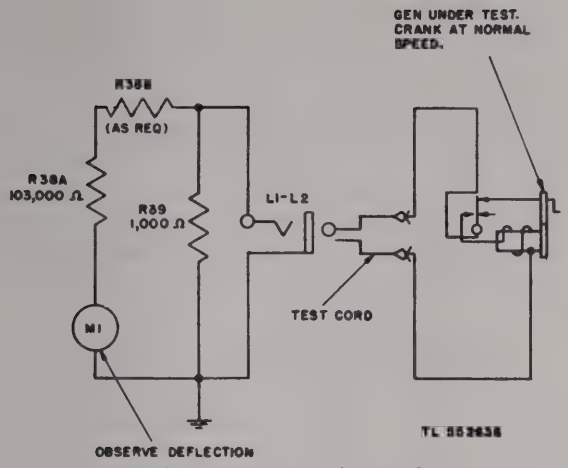



*Figure 16. Generator test, schematic diagram.*

## 75. Ringer Test (fig. 17)

This circuit is arranged to supply ringer currents of 6, 8.5, and 3.5 milliamperes at 16⅔ cps, to ringers of 2,700-, 5,300-, and 12,000-ohm impedance, respectively, when 45 volts is applied from the test set generator. The generator output is 45 volts when the generator is operated at a speed to produce a 0-db reading at meter M1. R40 and R41 are connected to control D5. They serve as devices to match impedances of the particular ringer under test when control D5 is set to RINGER CUR position 1, 2, or 3.

## 76. Insulation Resistance Test (fig. 18)

The generator of the test set is used as a voltage source and the meter is used to measure the leakage current. The chraacteristics of the test set generator are such that resistors R31 and R32 were chosen to give a reading of +6 db at the meter when the generator was operated at a constant speed and when the test set test leads were short-circuited. When a 200,000-ohm insulation resistance load was placed in series and across the test leads and the generator was operated at the same constant speed, a reading of —6 db was obtained at meter M1. When a 1-megohm insulation resistance load was substituted for the 200,000-ohm insulation resistance load, a reading of 5 was indicated on the d-c scale. The peak voltage applied to the equipment under test decreases as the insulation resistance decreases. At 200,000 ohms, the peak

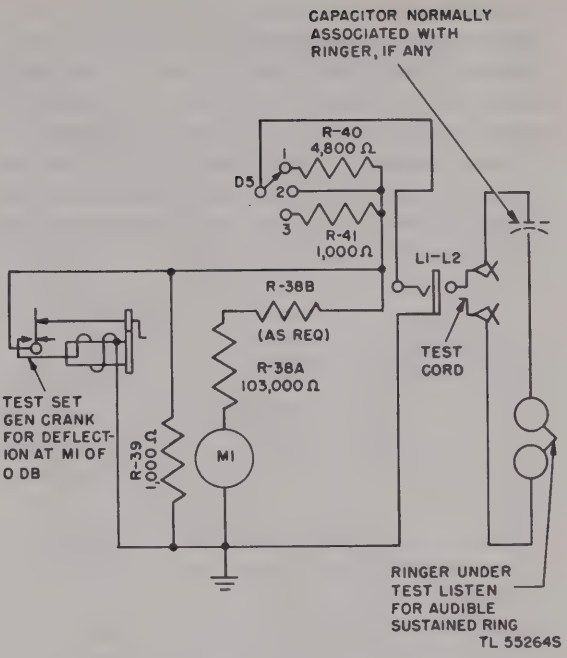



*Figure 17. Ringer test, schematic diagram.*

voltage is approximately 200 volts. At 1 megohm, a peak voltage of 240 volts is obtained.

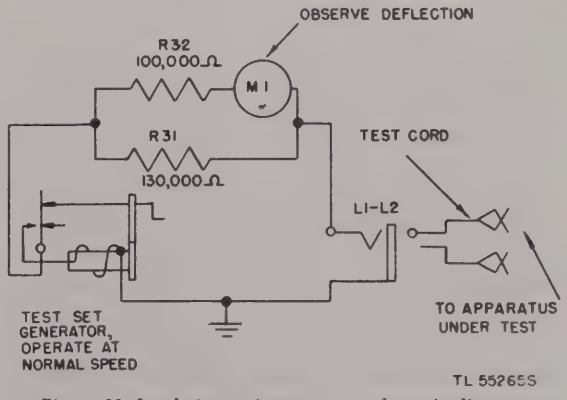



*Figure 18. Insulation resistance test, schematic diagram.*

## 77. Dial Test (figs. 19 and 20)

*a.* GENERAL. Two measurements are made on dials to control the time interval during which the dial pulsing contacts are open and closed. One measurement determines the interval the dial contacts are open relative to the total interval of pulsing, and the other determines the rate of pulsing.

*b.* PERCENT BREAK TEST CIRCUIT. The open interval, relative to the total interval per pulse

(percent break), is measured by using a resistance network (fig. 19) associated with the d-c element of the meter. The ballistic characteristics of the meter and the size of capacitor C10 which damps the meter were selected so that the average reading obtained in the dial test, in terms of percent of full scale, corresponds to the percent of the total pulse period during which the dial pulse contacts are open.

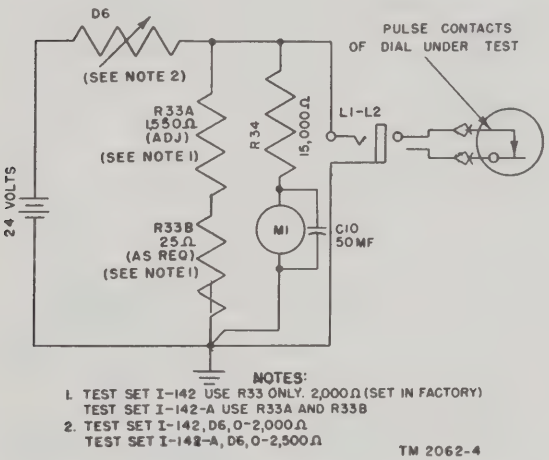



*Figure 19. Dial percent break test, schematic diagram.*

*c.* SPEED TEST CIRCUIT. (1) The rate of operation of the dial pulse contacts (dial speed) is measured in a resistance-capacitance network associated with the meter (fig. 20). The circuit constants and the meter calibration for this circuit are based on the results of experimental tests using ballistic-type and oscillograph testers for comparison. In this circuit, capacitor C9 is alternately partially charged and partially discharged as the dial pulse contacts open and close. The charge on capacitor C9 at the end of 10 pulses, being a function of the voltage impressed and the difference between the open circuit and short circuit intervals, indicates the rate of operation of the dial contacts. With a fast dial, the time the capacitor charges is shorter and the voltage at the end of 10 pulses is lower than for a slow dial, since for the latter the time for charging the capacitor is longer.

(2) At the factory, this circuit is calibrated by adjusting the voltage through control D6 until the desired meter scale reading is obtained for a dial operating at a specified speed. Without changing the position of control D6, and while maintaining the voltage supply at a constant value, resistor R33 (fig. 19) is adjusted to produce a full d-c scale reading in the percent break circuit. Resistor R33 was used in Test Set I–142; resistors R33A and R33B were used in Test Set I–142–A. When in use, control D6 is rotated until full-scale deflection in the percent break circuit is obtained. This establishes the proper voltage for the speed test circuit.

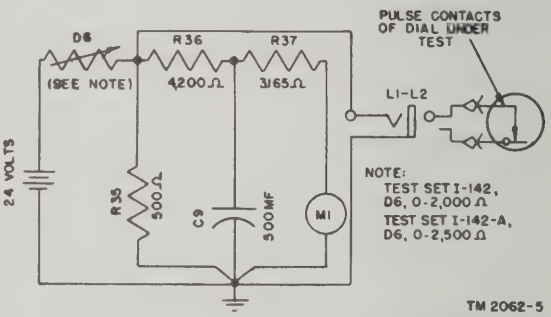



*Figure 20. Dial speed test, schematic diagram.*

## 78. Efficiency Test Circuits

The transmitting efficiency of a microphone or a telephone set is based on the electrical power it delivers for a given acoustical input. To evaluate efficiency measurements properly, it is necessary to define all of the conditions of the test which affect the result. In the case of carbon-type microphones, the output is dependent on the magnitude of direct current supplied for modulation. Where the acoustic input has a composite frequency spectrum, the indicated electrical output is also dependent on the response-frequency characteristic of the measuring circuit. In general practice, the transmitting efficiency is rated relative to the performance of a standard telephone or microphone. The output requirements given for microphones and telephones on Test Set I–142–(*) are based on empirical measurements correlating with output measurements obtained on the standard artificial voice system. The circuits provided in the test set are described below.

*a.* LOCAL BATTERY AND SOUND POWERED TELEPHONES (fig. 21). A 600-ohm resistance load is provided in the test set as an equivalent line load for the telephones under test. This circuit approximately matches the impedance of Telephone EE–8–( ).

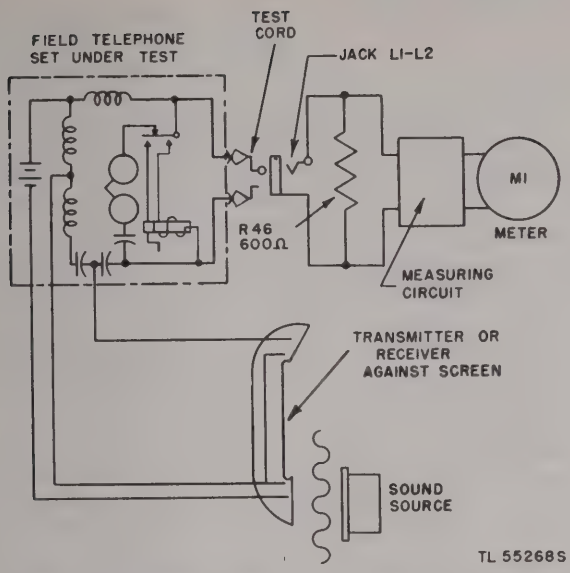



*Figure 21. Schematic diagram of test circuit for local battery telephones.*

*b.* COMMON BATTERY TELEPHONES (fig. 22). Telephone sets similar to Telephone TP–6 are tested while connected to a 320-ohm a-c impedance circuit in the test set. The battery for the telephone transmitter, supplied through the test set, consists of 24 volts with approximately 361-ohms series resistance. These test conditions approximate the battery and impedance conditions obtained with the telephone connected to a common-battery-type switchboard over a 3-mile loop of 19-gage cable.

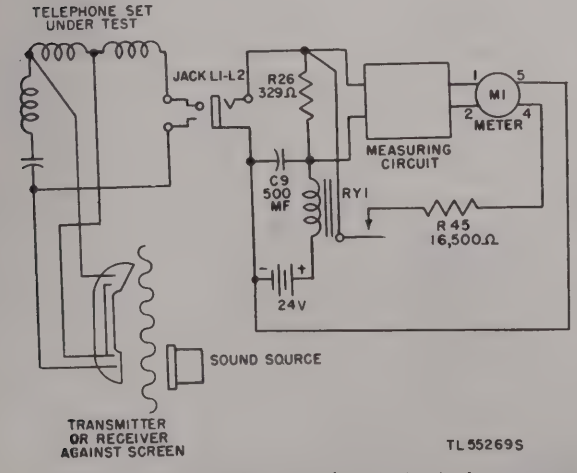



*Figure 22. Schematic diagram of test circuit for common battery telephones.*

*c.* CARBON-TYPE MICROPHONES (fig. 23). Test Set I–142–(*) provides a variable impedance circuit for testing carbon-type microphones arranged to match impedances of 30, 60, 75, 150, and 300 ohms. Two battery supply circuits for microphone tests are provided. The 3-volt, 4-ohm d-c resistance supply is used for microphones normally used on local battery circuits. The 24-volt, 361-ohm d-c resistance circuit is used for microphones on circuits supplied from a 24-volt central supply.

*d.* MICROPHONE RESISTANCE. Resistance requirements are usually applied to microphones used on common battery systems to limit the loss in output resulting from the decrease in microphone current. In addition, their usage prevents troubles caused by nonoperation of the supervisory signals used on these systems. Using either of the two 24-volt supply test circuits of the test set, the d-c element of the meter can be used as a voltmeter to measure the resistance of the microphone. The meter is connected through the contacts of RY1 to protect it against over-voltage loads if the microphone is excessively high in resistance or is open-circuited.

*e.* RECEIVERS AND MAGNETIC-TYPE MICROPHONES (fig. 24). The relative efficiency of receivers is usually determined on the basis of acoustic pressure delivered to an equivalent ear cavity when a specific source of electric power is supplied to a receiver. With Test Set I–142–(*), receivers are tested in the same manner as magnetic microphones. They are rated on the basis of the electrical power delivered for a given acoustic input. Although the response-frequency characteristic of the receiver measured with the diaphragm open to the air differs appreciably from that obtained with the diaphragm operating in a closed cavity coupler, the results obtained in the two tests correlate for a given receiver structure. The output requirements for Test Set I–142–(*) are based on empirical measurements on various types of receivers correlating with the efficiency measured on the standard artificial ear system. Resistive loads are provided in the test set to match impedances of 128, 256, 512, 1,024, 5,000, and 10,000 ohms for testing receivers and magnetic-type microphones.

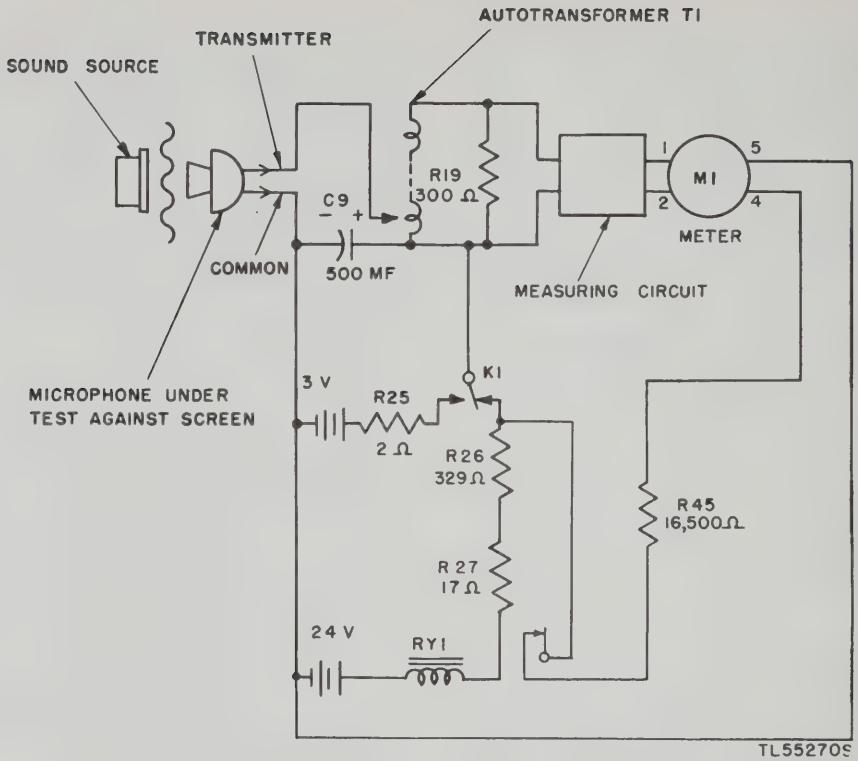



*Figure 23. Schematic diagram of test circuit for carbon-type microphones.*

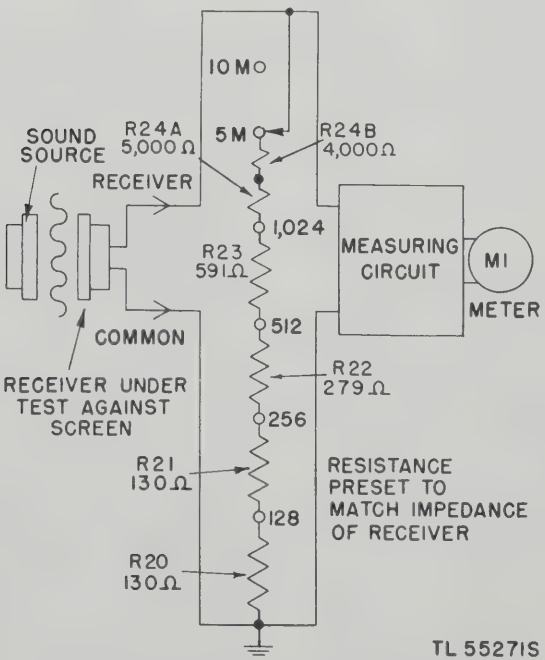



*Figure 24. Schematic diagram of test circuit for receivers and magnetic-type microphones.*

## Section XIV. TESTING APPARATUS

### 79. Measuring Instruments

The following measuring instruments or their equivalents may be required in connection with the repair of Test Set I–142–(*) to check the performance requirements:

*a.* Oscillator I–151, audio-frequency, variable, range 300 to 5,000 cps, accuracy ±2 percent, Signal Corps stock No. 3F3559B.

*b.* Voltohmeter TS–294/U, accuracy ±5 percent, Signal Corps stock No. 3F14050.

*c.* Attenuator TS–402/U, 0- to 80-db range, designed to work into 600-ohm unbalanced load, Signal Corps stock No. 3F1775.

*d.* Test Unit I–176, Signal Corps stock No. 3F4470–176.

*e.* Resistance box, General Radio No. 602–M, Signal Corps stock No. 3F1800–1.

*f.* Electronic Multimeter ME 6/A, Signal Corps stock No. 3F8100–3.

*g.* Sound Calibrator TS–550/G, Signal Corps stock No. 3F4325–550.

### 80. Materials

The following materials or their equivalents may be required in connection with the repair of Test Set I–142–(*) to check the performance requirements:

*a.* Capacitor, 1-mf, Signal Corps stock No. 3DB1.0262.

*b.* Resistor, 10-megohm, ½-watt, Signal Corps stock No. 3RC20BE106J.

*c.* Resistor, 200,000-ohm, 1-watt, Signal Corps stock No. 3RC31AE204J.

*d.* Key, make before break transfer, Signal Corps stock No. 4C5104.79F, Signal Corps stock No. 4C5104.79H, or Auto Elec. Co. DB44 key.

*e.* Dial, station, 8 to 12 pulses per second, Signal Corps stock No. 4B794.6.

## Section XV. TROUBLE SHOOTING

### 81. Introduction

There are many factors to consider in locating trouble and, because of wide variations in the experience of personnel working with the equipment, it is not possible to lay down definite rules as to the exact procedure to be followed in shooting trouble. However, the charts and other information in this section are intended to provide both a step-by-step procedure for the inexperienced trouble shooter and a reference for the experienced trouble shooter. In all cases the origin of the trouble and the characteristics of the trouble reported will determine the procedure to be followed.

*a.* General. It will be found that troubles may be divided into two general classes—

(1) Those which are readily apparent or which, when reported, are definitely identified as being in a particular circuit or part.

(2) Those which are not so readily apparent. In some cases these troubles may be intermittent and may require extensive routine checks of the equipment and facilities before the trouble can be definitely located.

*b.* Trouble Records. It will be found helpful to keep a record of the troubles which are discovered and the method of clearing them. In addition to being a record of equipment performance, trouble records may prove helpful to the trouble shooter as a reference in locating related troubles and in prescribing a method of clearing them.

### 82. Trouble Detected by Inspection

Trouble found during routine check of the equipment or while inspecting the equipment during a major overhaul usually will be definite in nature. In some cases, however, these troubles may require further analysis using the special testing equipment discussed in section XIV.

### 83. Trouble Analysis

*a.* Knowledge of Sequence of Operation. Thorough knowledge of the sequence of operation for each functioning element in the test set is of fundamental importance in analyzing trouble. The trouble shooter must be able to discover where the trouble lies as rapidly as possible. The appearance of a particular oper-

ating failure may indicate immediately the exact location of the faulty adjustment or the damage; if not, it will be immediately necessary to determine with exactness which of the functions are operating properly and which are failing.

*b.* PROCESS OF ELIMINATION. (1) Paragraphs 84 through 88 provide information to assist in the location of faults in a particular test circuit resulting in the failure of the test set to meet the adjustment requirements. In listing the circuit elements which may be the cause of failure in a specific test, elements common to a circuit which is checked prior to the defective circuit are assumed to be in a satisfactory condition. It is also assumed that the adjustment tests are made in the order specified. Any variation from the required method may cause an inaccurate result and prevent speedy location of the trouble.

(2) Paragraphs 89 through 95 outline methods of checking for faults which may be observed in using the test set. All the circuit elements involved in a specific test are listed.

(3) The trouble shooting procedures are based on the use of a combination meter equivalent to the voltohmyst (Signal Corps stock No. 3F14050).

(4) The electrical components, the associated wiring, and the switch contacts of each circuit are illustrated in separate diagrams in order to simplify tracing the various test circuits. In many cases, more than one pair of contacts on the same key is used in a specific test circuit. Some of these contacts are normally closed in their unoperated position; others are normally open when unoperated. Although certain of these contacts may be in a bank not actuated in the selection of the circuit path, yet they may be used in their normally closed position. In the wiring schematic diagrams, the contacts are always shown as representing the key in its normally unoperated position, unless otherwise stated. Normally open contacts close when the key is operated as specified, except when the wiring schematic diagram indicates to the contrary. Each wire which is run in a cable is marked with its distinctive color and only the open form and strap wires on the wiring schematic diagrams are not so marked.

## 84. Power Supply Circuit (fig. 25)

*a.* The meter indicator should deflect when control D5 is operated to position 12, 24, or 135 (par. 16). Failure of the meter indicator to deflect at any one of these positions, while deflecting at the others, indicates that at the position where there is no deflection an open circuit exists. It may be caused by an open-circuited fuse, by meter multiplier resistor R42A, R42B, R43, or R44 being open-circuited, by the associated wiring being open-circuited, or by a disconnected battery lead.

*b.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

*c.* Use the fuses listed below for replacement purposes.

| *Holder marking* | *Fuse size (amp)* | *Signal Corps stock No.* |
|---|---|---|
| 135 (F1) | ¼ | 3Z2587 |
| 24 (F2) | ¼ | 3Z2587 |
| 12 (F3) | 3 | 3Z1950 |
| 4 (F4) | 1 | 3Z1926 |

*d.* When there is no deflection at all three positions of D5 (position 12, 24, or 135) it may be due to the battery plug being disconnected, to switch S1 not being operated to the ON position, to the meter being defective, to key 7 not being in the DC position, or to the associated wiring being open-circuited.

*e.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point. If the meter or the multiplier resistors are replaced, check the accuracy of the circuit by using an external voltmeter. If the voltage of the dry batteries is low, requiring the addition of extra cells, replace the battery when its terminal voltage under load is less than 80 percent of the rated value (less than 1.2 volts per cell).

## 85. Capacitor Test Circuit (fig. 26)

*a.* Failure of lamp LP2 to light (par. 17) may be due to the contacts of key 6 being open-circuited, to the low insulation of the associated wiring or to its being open-circuited, to a defective neon lamp, or to resistor R29 being open-circuited.

*b.* If lamp LP2 lights at all positions of

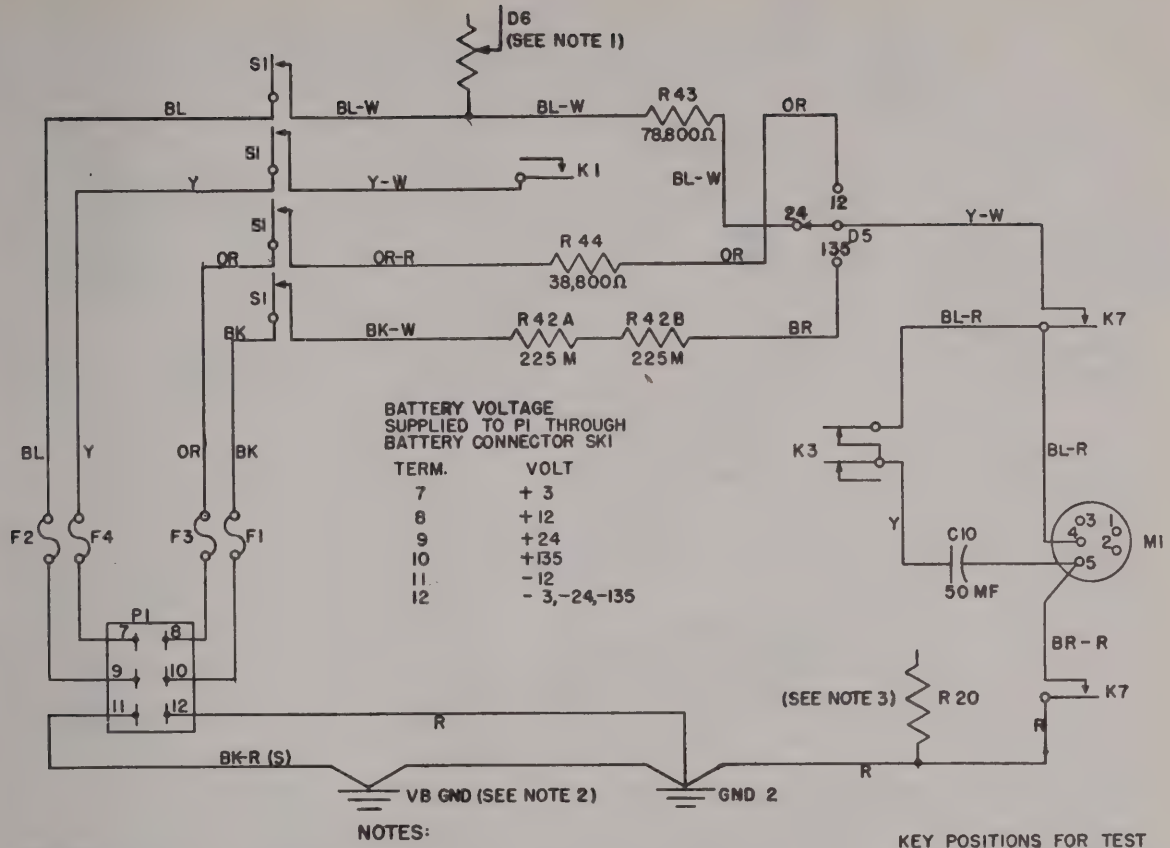



*Figure 25. Power supply circuit, schematic diagram.*

control D9, then either resistor R30 or control D9 may be open-circuited.

*c.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point. Whenever the circuit is adjusted, check it as outlined in paragraph 17.

## 86. Dial Test Circuits (figs. 27, 28, 29, and 30)

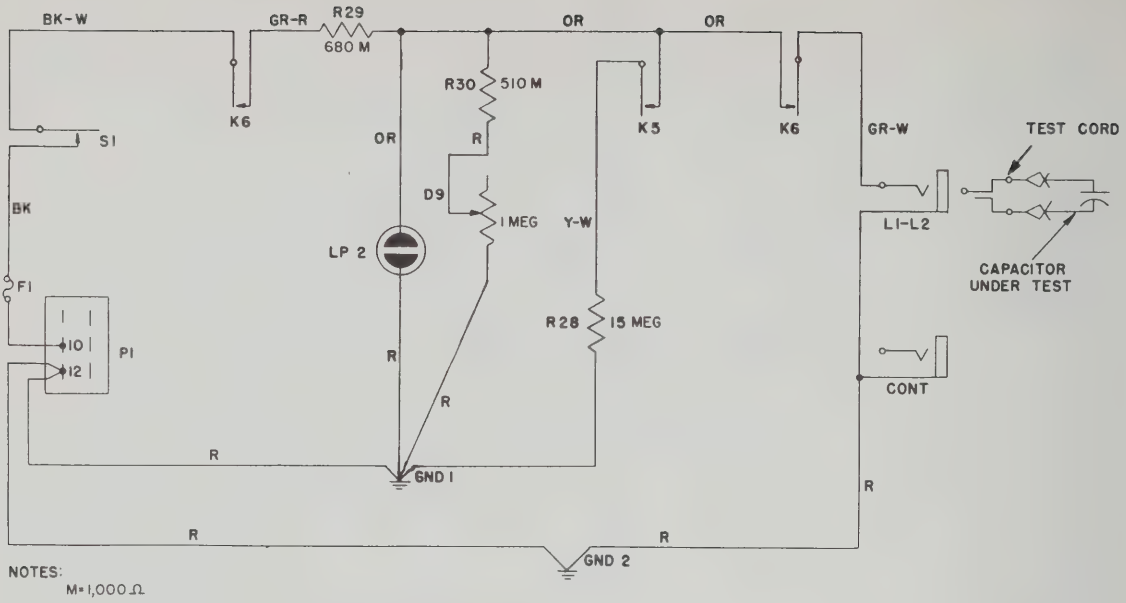
*a.* No output (failure of the meter indicator to deflect) when key 3 is in the %BRK position (par. 18) may be due to resistor R33 being short-circuited, to resistor R34, control D6, the contacts of key 3 or key 6, or the associated wiring being open-circuited, to the wiring to jack L1–L2 being grounded, or to the meter being defective.

*Note.* Check resistor R33 before decreasing the resistance in control D6. Resistor R33 is located on the panel adjacent to the generator in sets numbered 161 and up and on the resistance mounting assembly above the key banks in sets numbered 1 through 160.

*b.* If the meter indicator deflects off scale and cannot be brought on the scale by rotating control D6, either resistor R33 is open-circuited or resistor R34 is short-circuited.

*c.* If the meter indicator is not deflected to different positions on the scale by varying the position of control D6, control D5 may be in a wrong position.

*d.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.



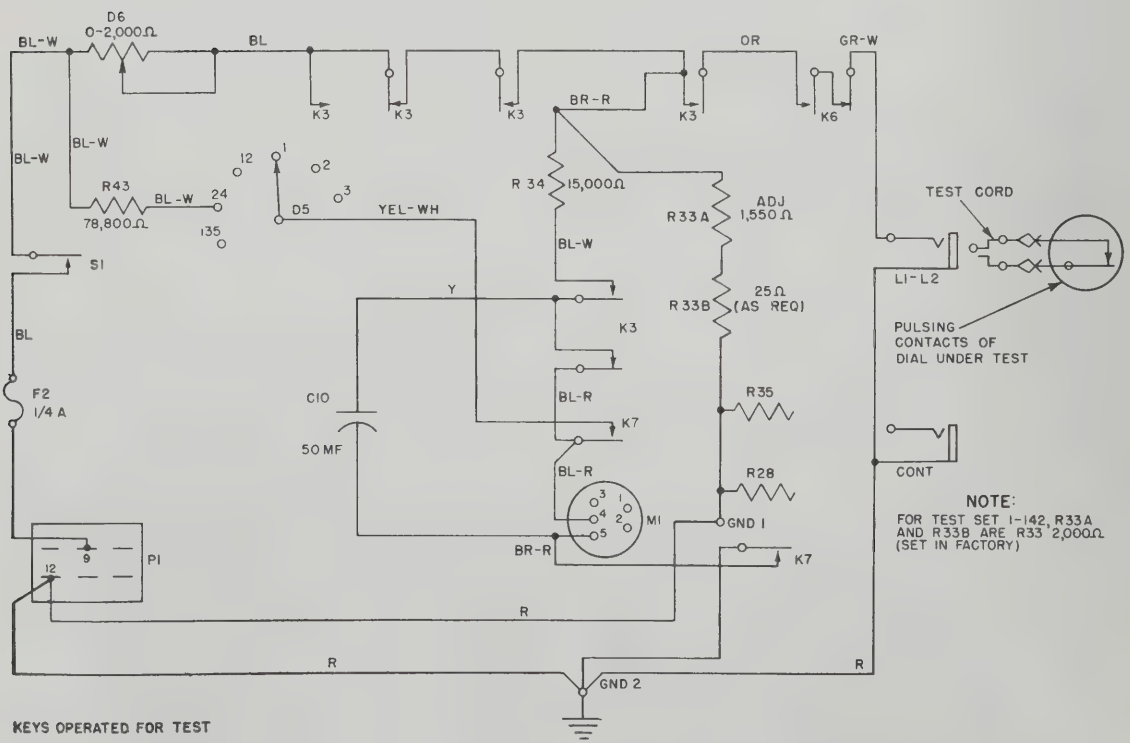

NOTES:
M=1,000 Ω

KEY OPERATIONS

| | FOR | CALIBRATION | FOR | TEST |
|---|---|---|---|---|
| S1 | ON | ADJUST D9 | S1 | ON |
| K5 | CHK | UNTIL LAMP LP2 | K5 | OFF |
| K6 | COND | JUST LIGHTS | K6 | COND |

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*Figure 26. Capacitor test circuit, schematic diagram.*




KEYS OPERATED FOR TEST

| | | | |
|---|---|---|---|
| K3 | % BRK | K7 | DC |
| K6 | CKT | S1 | ON |

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*Figure 27. Test Set I-142, dial percent break test circuit, schematic diagram.*

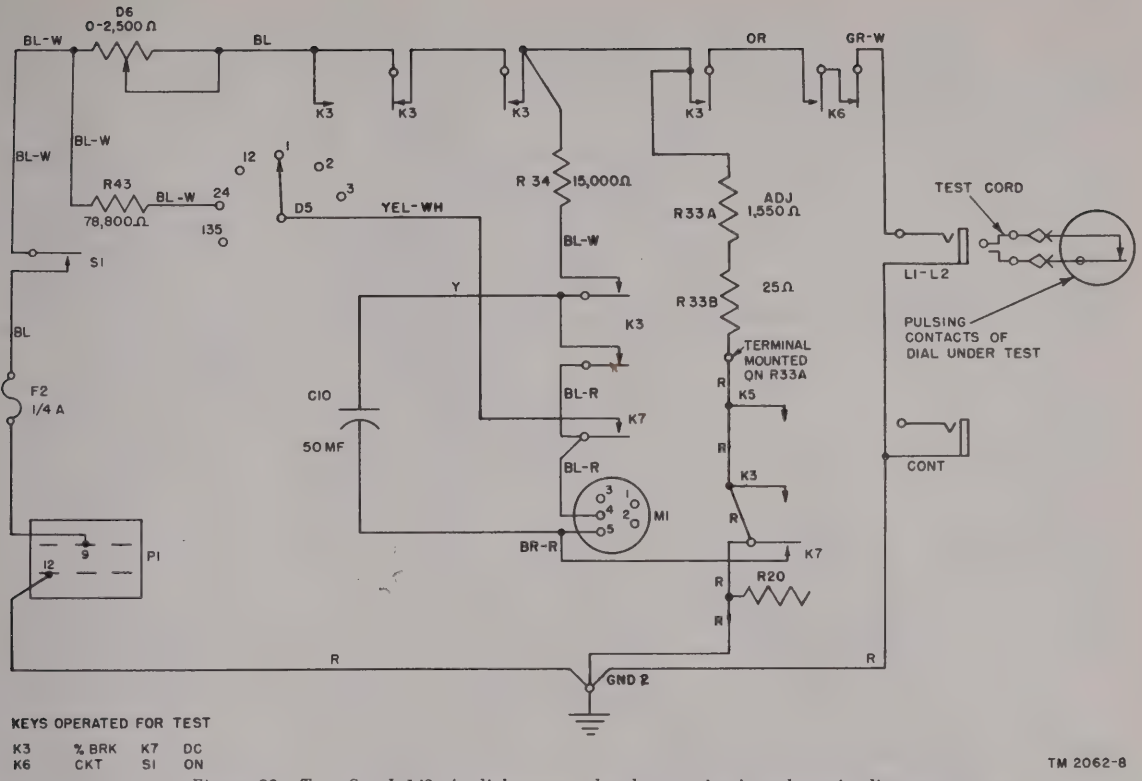



*Figure 28. Test Set I–142–A, dial percent break test circuit, schematic diagram.*

*e.* No output (failure of the meter indicator to deflect) when key 3 is in the DIAL SPEED position (par. 18) may be due to resistor R36 or R37, the contacts of key 3 or key 7, or the associated wiring being open-circuited, to resistor R35 or capacitor C9 being short-circuited, or to the meter being defective.

*f.* If the meter indicator deflects off scale when key 3 is operated to the DIAL SPEED position, either capacitor C9 or the contact of key 6 may be open-circuited or resistors R36 and R37 may be short-circuited.

*g.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point. If capacitor C9 is replaced it will be necessary to check the dial speed circuit (par. 112).

## 87. Sound Source Circuit (figs. 31 and 32)

*a.* Failure of the sound source (no audible output from the receiver) when sound pressure control D8 is adjusted (keys 5 and 7 are operated to CHK and key 9 is depressed as described in paragraph 19) may be due to the receiver, the vibrator winding, or the associated wiring being open-circuited, to capacitors C1, C11, or C16 being short-circuited, or to the internal contacts of the vibrator failing to operate.

*b.* The failure of the vibrator to operate may be detected by placing the fingers lightly on its case and observing whether or not any vibration is felt. If those contacts of the vibrator which are in parellel with the receiver should fail, there would be an appreciable decrease in loudness and tone of the sound source.

*c.* If an audible output is obtained and the indicator of meter M1 does not deflect, the rectifier section of the meter may be defective or capacitor C13, resistor R1, or the associated wiring may be open-circuited, or resistor R48 may be short-circuited.

*d.* If the acoustic output cannot be adjusted to give a 0-db indication on meter M1 after control D8 has been turned to its maximum clockwise position, either control D8 or the receiver unit may be defective, or the internal contacts

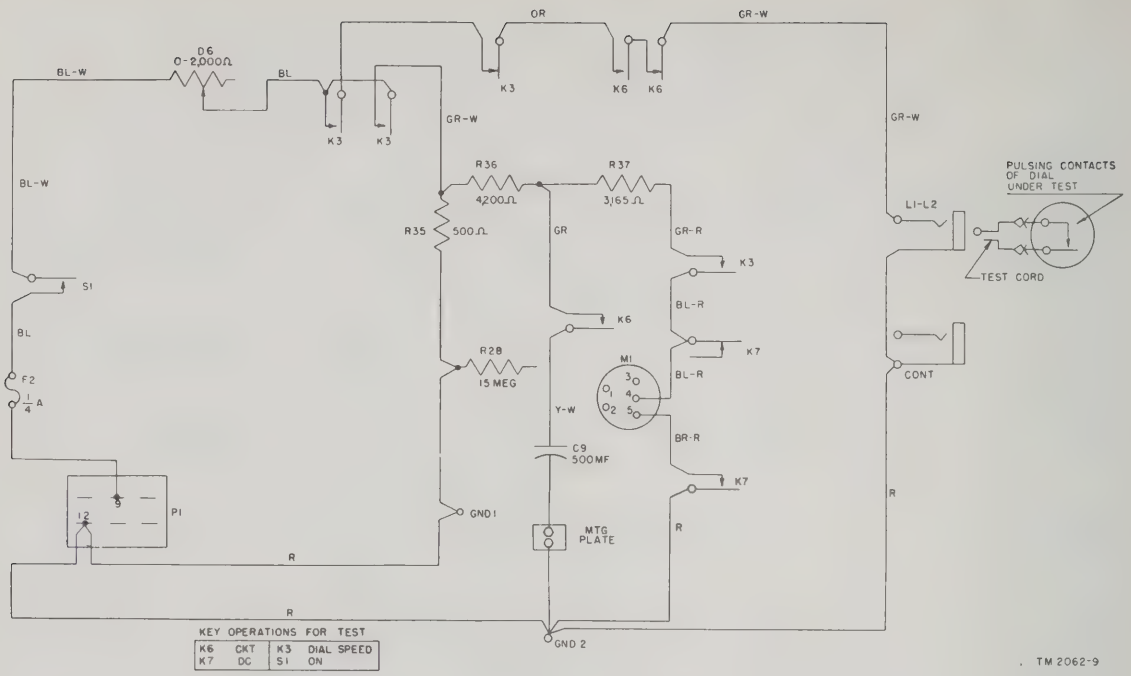



*Figure 29. Test Set I–142, dial speed test circuit, schematic diagram.*

of the vibrator may be worn to a point where they no longer respond to control D8.

*e.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point. In replacing the receiver unit, make sure that the black-white lead from the vibrator which comes through the cord and connectors is connected to the spring which makes contact with the center terminal of the receiver unit. If it is found necessary to replace either the vibrator or the receiver, recheck the level of the sound source (par. 102).

## 88. Measuring Circuit (fig. 33)

*a.* METER DEFLECTION. (1) No output (failure of the meter indicator to deflect) when key 5 is operated to CHK, key 7 to AC, and key 9 is depressed (par. 20) may be due to open-circuited key contacts or associated wiring or to a defective amplifier.

(2) If the meter deflects when key 9 is depressed and keys 5 and 7 are not operated, it is an indication that there is oscillation in the amplifier circuit.

(3) If the meter deflection cannot be brought to 0 db by adjusting control D7, the amplifier may be defective or the 135-volt battery may be high in resistance.

(4) Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

*b.* METER. (1) D-c section. If the meter indicator does not deflect when the procedures set forth in the preparation for use section (par. 20) are being applied or when the efficiency tests are being applied (par. 24), check the d-c section of the meter by operating key 7 to the DC position and then rotating control D5 to positions 135, 24, and 12.

(2) *Rectifier element.* If the meter indicator deflects satisfactorily when testing the d-c section, then check the rectifier element of the meter by operating key 4 to RINGER, key 6 to CKT, control D5 to RINGER CUR, turning the test set generator, and observing the meter deflection.

(3) Failure of the meter indicator to deflect in either or both of these circuits suggests an open or shorted meter. Replace the inoperative meter. Do not attempt to repair it.

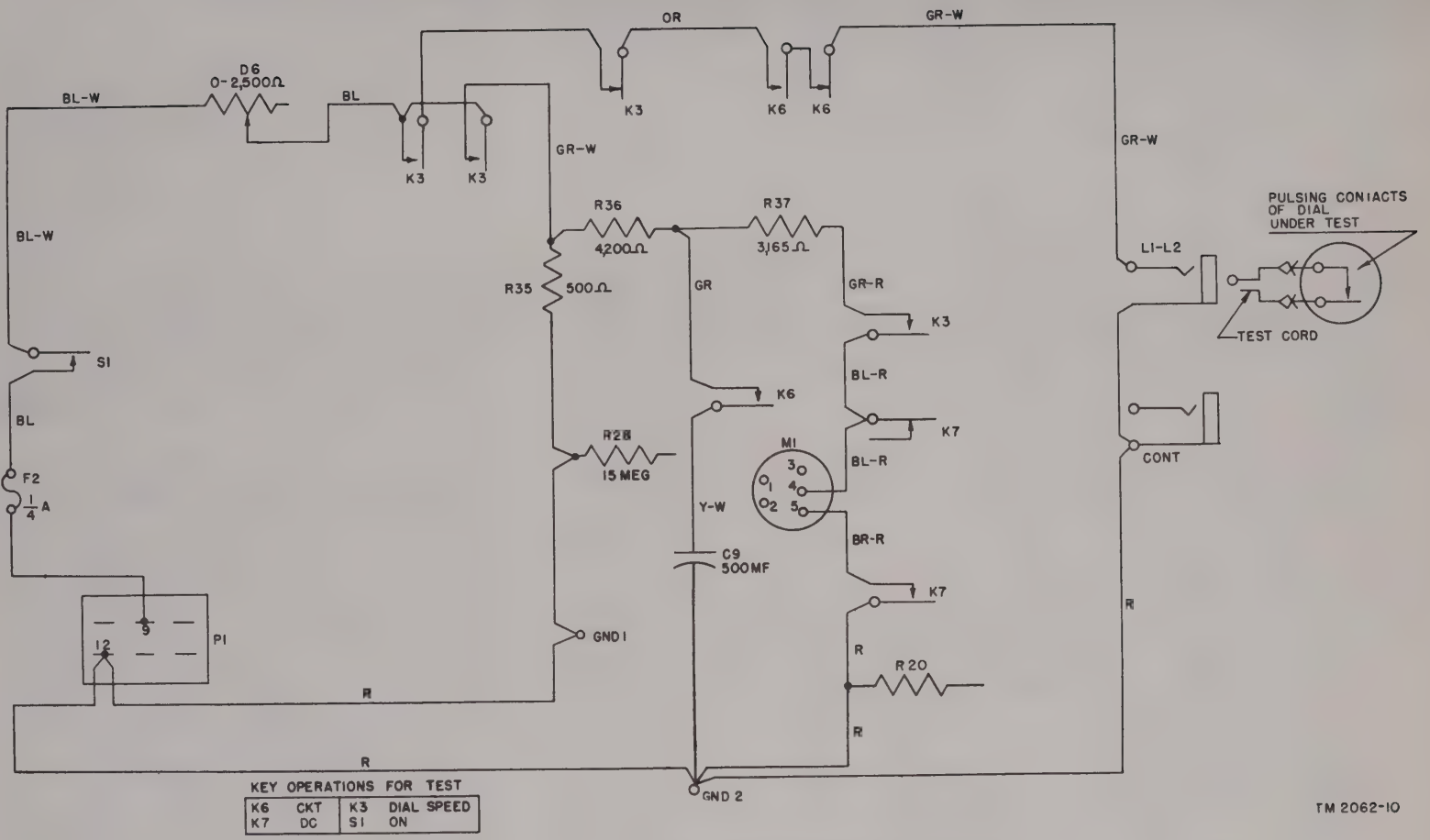
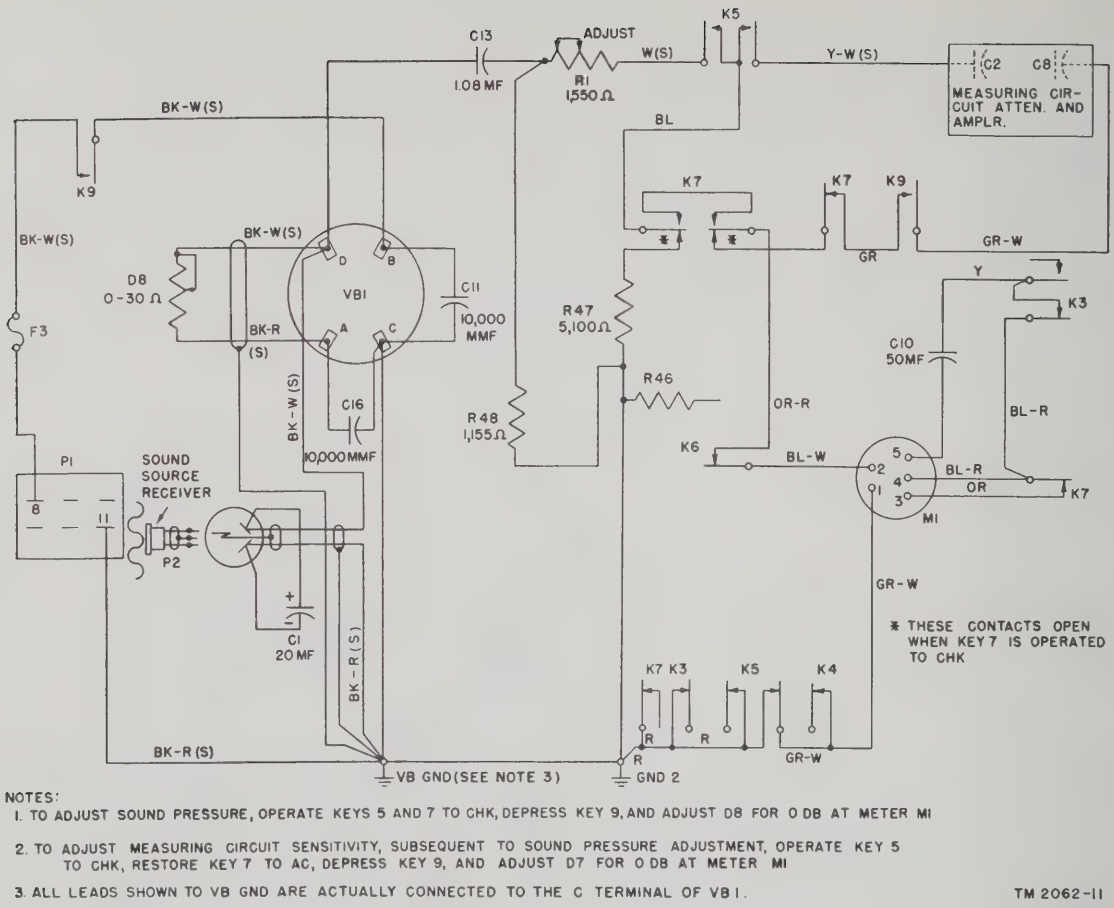



*Figure 30. Test Set I–142–A, dial speed test circuit, schematic diagram.*




NOTES:

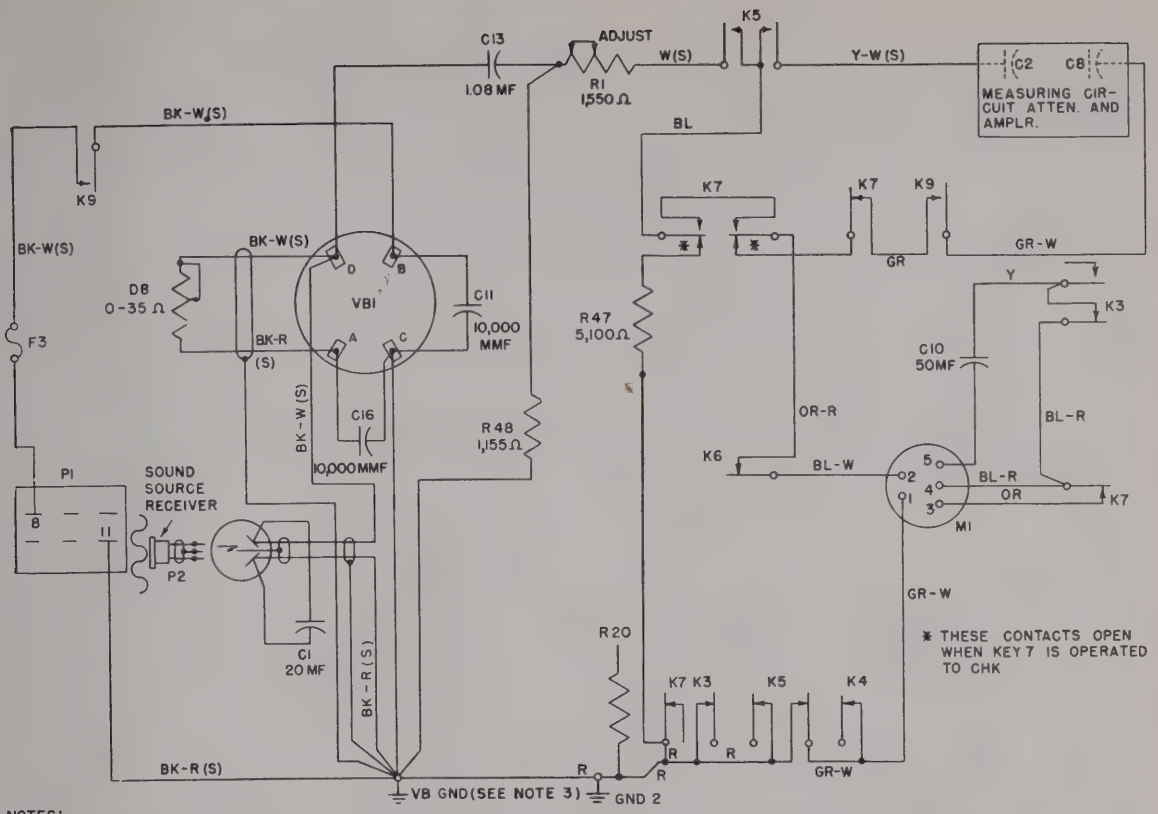
1. TO ADJUST SOUND PRESSURE, OPERATE KEYS 5 AND 7 TO CHK, DEPRESS KEY 9, AND ADJUST D8 FOR 0 DB AT METER M1
2. TO ADJUST MEASURING CIRCUIT SENSITIVITY, SUBSEQUENT TO SOUND PRESSURE ADJUSTMENT, OPERATE KEY 5 TO CHK, RESTORE KEY 7 TO AC, DEPRESS KEY 9, AND ADJUST D7 FOR 0 DB AT METER M1
3. ALL LEADS SHOWN TO VB GND ARE ACTUALLY CONNECTED TO THE C TERMINAL OF VB1.

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*Figure 31. Test Set I–142, sound source circuit, schematic diagram.*

*c.* MEASURING CIRCUIT AMPLIFIER (fig. 34). (1) If the tests made in *b* above indicate that the meter is operative, the associated amplifier may be inoperative. The amplifier may be checked by applying a test signal to the input and observing whether or not the indicator of meter M1 deflects when connected to its output. The test signal may be obtained from an audio oscillator or by talking into a permanent magnet-type receiver connected between the grid of VT1 (terminal 4) and ground, with key 8 operated slightly off normal to the REC position (opening the normally closed contact associated with the transfer spring of key 8 to which the blue–red shielded wire connects) so as to remove the attenuator from the grid circuit. If this test indicates that the amplifier is inoperative, the trouble may be further localized by applying the test signal to the input circuit of the second tube by connecting the oscillator or receiver between terminal 4 of VT2 and ground. If the indicator of meter M1 deflects when the test signal is applied to VT2, but no deflection is obtained when the signal is applied to VT1, the defect lies within the circuit elements of VT1. If no reading is obtained for both input connections, the defect probably is in the circuit elements associated with VT2.

(2) If replacement of the tube which is associated with the section of the amplifier indicated to be defective does not remedy the trouble, check the circuit voltages (fig. 34) for abnormalities which may indicate the defective




NOTES:

1. TO ADJUST SOUND PRESSURE, OPERATE KEYS 5 AND 7 TO CHK, DEPRESS KEY 9, AND ADJUST D8 FOR 0 DB AT METER M1
2. TO ADJUST MEASURING CIRCUIT SENSITIVITY, SUBSEQUENT TO SOUND PRESSURE ADJUSTMENT, OPERATE KEY 5 TO CHK, RESTORE KEY 7 TO AC, DEPRESS KEY 9, AND ADJUST D7 FOR 0 DB AT METER M1
3. ALL LEADS SHOWN TO VB GND ARE ACTUALLY CONNECTED TO THE VB GND TERMINAL ON THE MOUNTING PANEL

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*Figure 32. Test Set I–142–A, sound source circuit, schematic diagram.*

part. The following possibilities should be considered:

(*a*) *No voltage at the plate.* This may occur if voltage supply resistor R12, R15, or R18 is open-circuited or if the plate socket connections are grounded.

(*b*) *No voltage at the screen.* This may occur if voltage supply resistor R11 is open-circuited, if capacitor C4 is short-circuited, or if the screen connection is grounded.

(*c*) *Low voltage at the plate and low voltage at the cathode.* This may occur if cathode resistor D7, R10, R14, or R17 is short-circuited.

(*d*) *Low voltage at the screen and low voltage at the cathode.* This may occur if cathode resistor D7, R14, or R17 is short-circuited.

(*e*) *Low voltage at the plate and no voltage at the cathode.* This may occur if capacitor C3, C6, C8, or C12 is short-circuited.

(*f*) *Low voltage at the screen and no voltage at the cathode.* This may occur if capacitor C3, C6, C8, or C12 is short-circuited.

(*g*) *Low voltage at the plate of VT2 and high positive grid voltage.* This may occur due to leaking blocking capacitor C5 or C7.

(*h*) *Normal circuit voltages but no signal transmission.* This may occur if blocking capacitor C5, C7, or C8 is open-circuited, or if grid resistor R13 or R16 is short-circuited.

(3) Oscillation in the amplifier circuit may be due to a microphonic vacuum tube VT1, to a high resistance in the 135-volt battery circuit, to a defective vibrator in the sound source circuit, or to mechanical vibration being transmitted to VT1 through the vibrator socket and

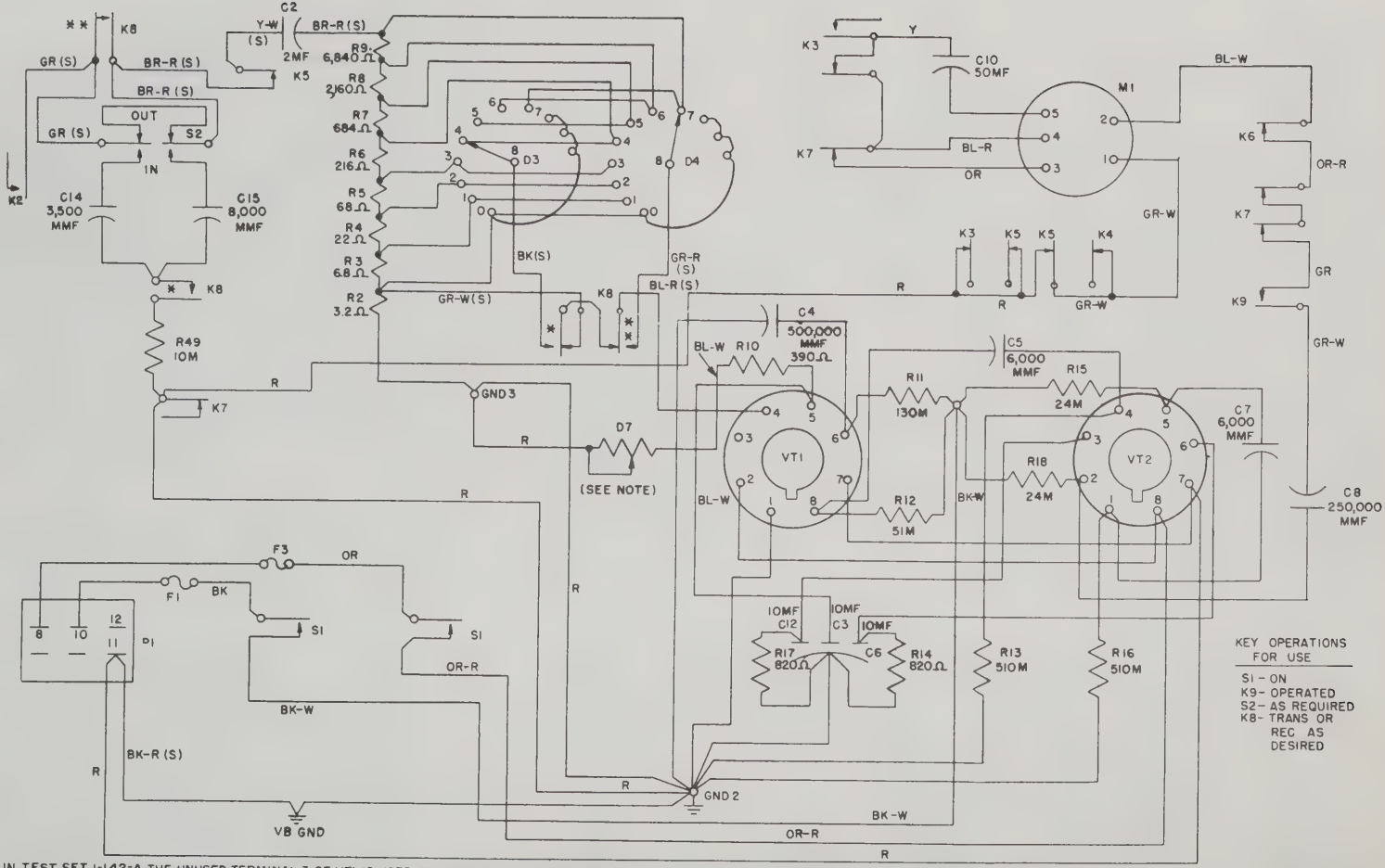



*Figure 33. Measuring circuit, schematic diagram.*

the mounting panel. Check VT1 by the substitution method. Check the voltage of the 135-volt batteries. The batteries should register not less than 1.2 volts per cell under load. Inspect the vibrator socket grommets. The grommets should not be drawn so tightly that the vibrator socket touches the mounting panel.

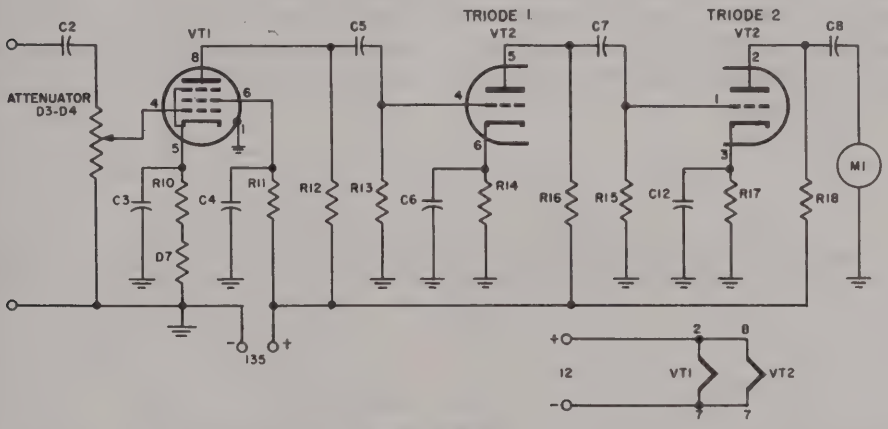
*d.* MEASURING CIRCUIT ATTENUATOR. (1) An abnormal loss in the attenuator indicates that either resistor R2 is low in resistance or that resistors R3 through R9 are abnormally high in resistance.

(2) Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

## 89. Efficiency Tests

*a.* FIELD (LOCAL BATTERY LB) TELEPHONES (figs. 35 and 36). (1) *Transmitting efficiency.* (*a*) No output (failure of the meter indicator to deflect) in the transmitting efficiency test (par. 24) may be due to defects in either the measuring circuit or the equalizer circuit, to the meter being defective, to control D3 being set at the incorrect position, to resistor R46 or jack L1–L2 being short-circuited, or to the key contacts or the associated wiring being open-circuited.

(*b*) If the meter indicator deflects off scale, resistor R46 may be open-circuited, attenuator




SOCKET VOLTAGES

| TUBE NO. VT-1 | | |
|---|---|---|
| PIN NO. (SEE NOTE 1) | PIN DESIGNATION | PIN VOLTAGE (SEE NOTE 2) |
| 1 | SHELL | 0 |
| 2 | HEATER | +12 |
| 3 | NO CONNECTION | - |
| 4 | GRID | 0 |
| 5 | CATHODE | +15 |
| 6 | SCREEN | +60 |
| 7 | HEATER | 0 |
| 8 | PLATE | +62 |

| TUBE NO. VT-2 | | | |
|---|---|---|---|
| | PIN NO. (SEE NOTE 2) | PIN DESIGNATION | PIN VOLTAGE (SEE NOTE 2) |
| TRIODE NO 2 | 1 | GRID | 0 |
| | 2 | PLATE | +80 |
| | 3 | CATHODE | +2.1 |
| TRIODE NO. 1 | 4 | GRID | 0 |
| | 5 | PLATE | +80 |
| | 6 | CATHODE | +2.1 |
| | 7 | HEATER | 0 |
| | 8 | HEATER | +12 |

NOTE PIN NUMBERS ARE IDENTIFIED AS SHOWN BELOW.



BOTTOM VIEW OF SOCKET

NOTE VOLTAGE AS INDICATED BY AN R.C.A. VOLTOHMYST OR THE EQUIVALENT CONNECTED DIRECTLY BETWEEN PIN AND CHASSIS. THE VOLTAGE VALUES GIVEN ARE NOMINAL VALUES FOR AVERAGE SUPPLY VOLTAGES.

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*Figure 34. Voltage diagram for measuring circuit amplifier.*

959852 O—51——5

control D3 or equalizer switch S2 may be set to an incorrect position, or the measuring circuit amplifier gain may be too high.

(*c*) Examine the measuring circuit and determine whether or not it is properly adjusted (pars. 19 and 20). Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

(2) *Receiving efficiency.* (*a*) No output (failure of the meter indicator to deflect) in the receiving efficiency test (par. 24) may be due to defects in the sound source, to the key contacts or the associated wiring being open-circuited or the measuring circuit being defective, to control D4 being set at the incorrect position, or to a defective meter.

(*b*) Examine the measuring circuit amplifier gain and the meter (pars. 19 and 20). Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

*b.* COMMON BATTERY (CB) TELEPHONES (figs. 37 and 38). (1) *Transmitting efficiency.* (*a*) No output (failure of the meter indicator to deflect) in the transmitting efficiency test (par. 25) may be due to defects in either the measuring circuit or the equalizer circuit, to the meter being defective, to control D3 being set at the incorrect position, to resistor R26 being short-circuited, to the key contacts, the associated wiring, or relay RY1 being open-circuited, or to the 24-volt battery being disconnected.

(*b*) If the meter indicator deflects off scale, attenuator control D3 or equalizer switch S2 may be set to an incorrect position or the measuring circuit amplifier gain may be set too high.

(*c*) Examine the measuring circuit and determine whether or not it is properly adjusted (pars. 19 and 20). Check the battery supply (par. 16). Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

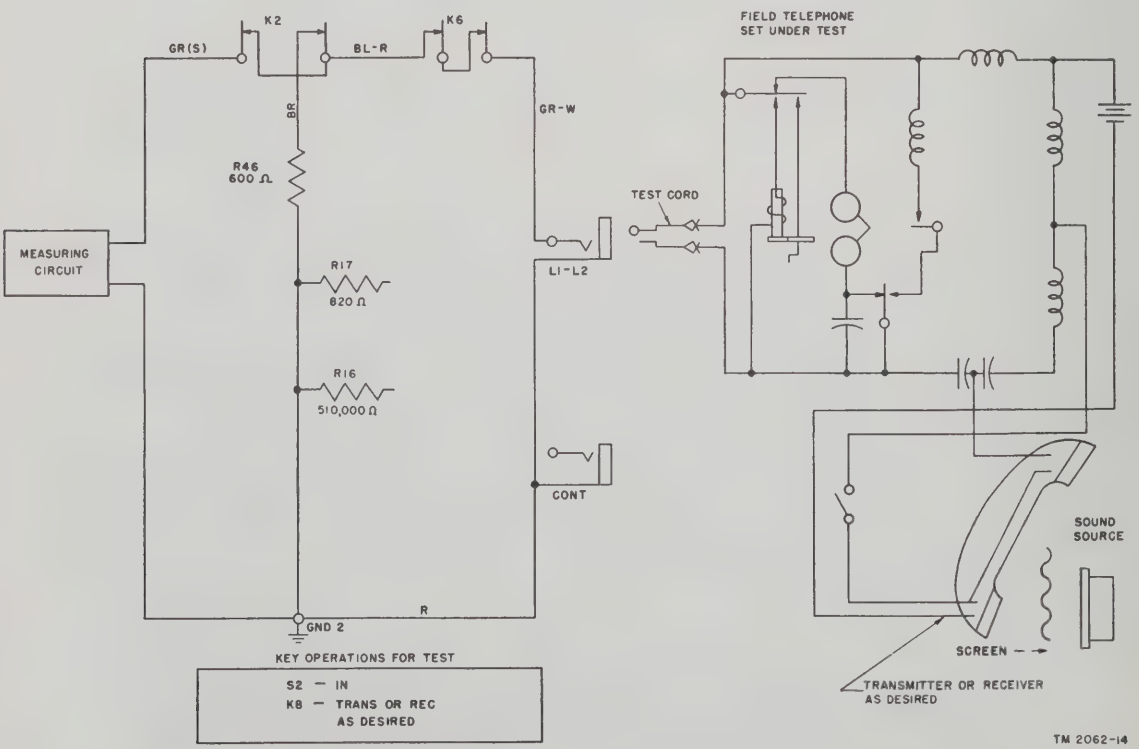



*Figure 35. Test Set I–142, local battery (field) telephone test circuit, schematic diagram.*

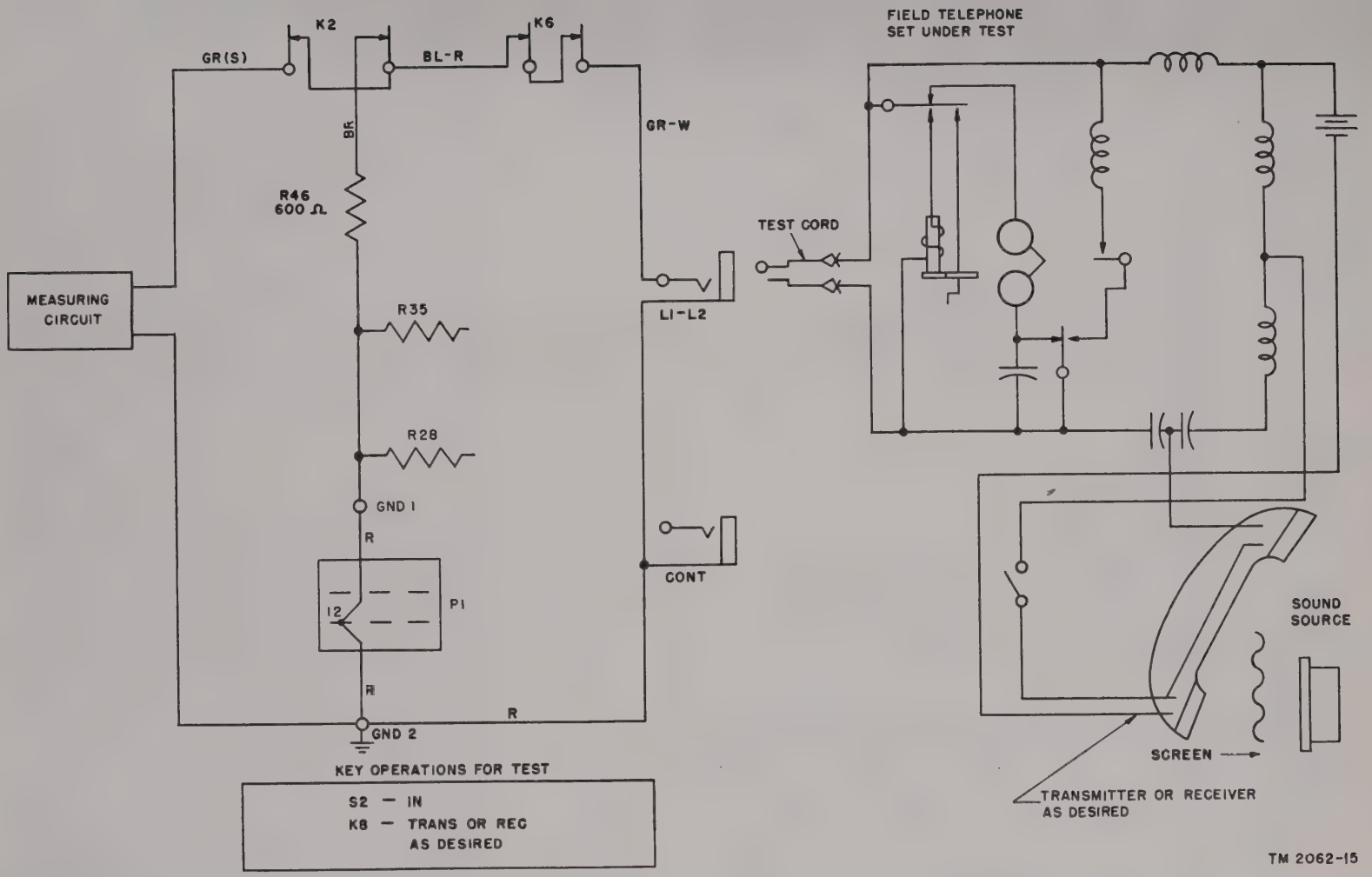



*Figure 36. Test Set I–142–A, local battery (field) telephone test circuit, schematic diagram.*

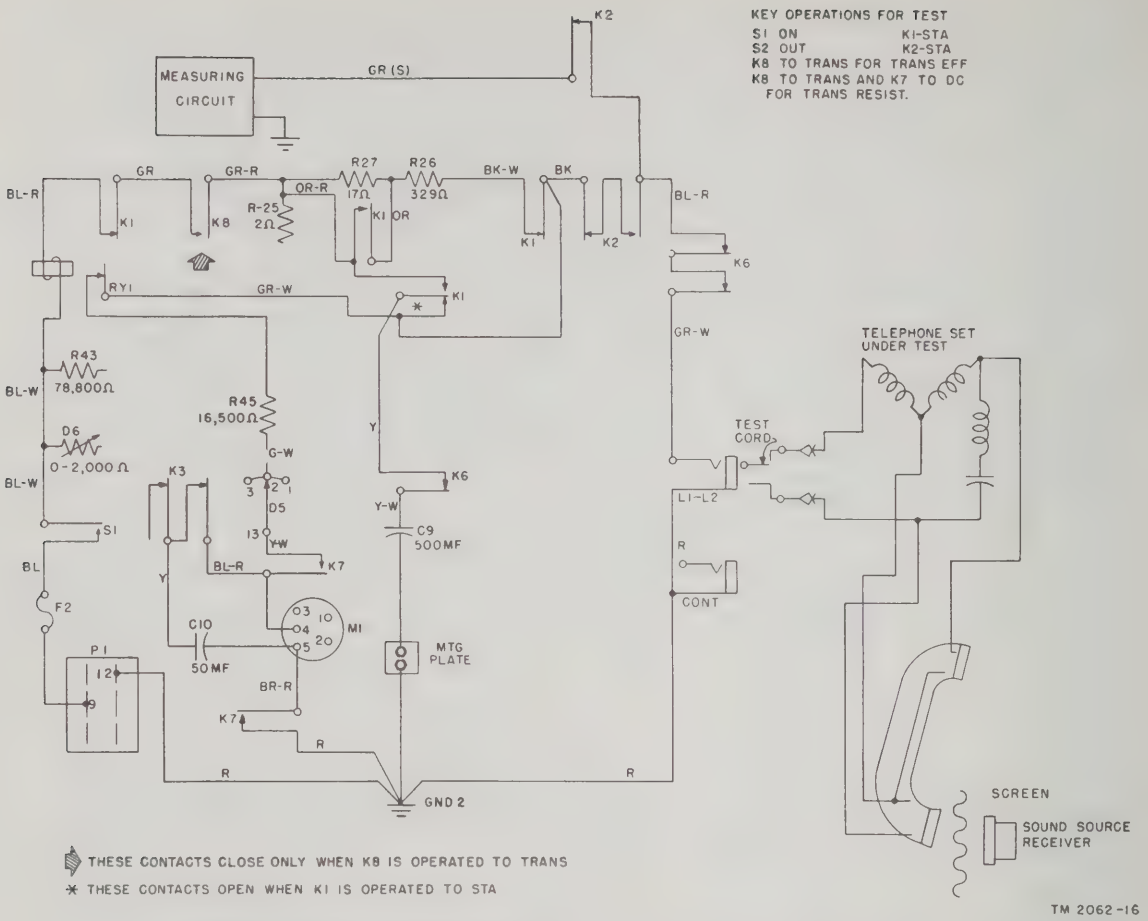



*Figure 37. Test Set I–142, common battery telephone test circuit, schematic diagram.*

(2) *Transmitter resistance.* (*a*) No output (failure of the meter indicator to deflect) when measuring the transmitter resistance (par. 25) may be due to failure of the contacts of relay RY1 to operate, to resistor R45 being open-circuited, to capacitor C9 being short-circuited, to a defective meter, or to the key contacts or the associated wiring being open-circuited.

(*b*) Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

(*c*) If control D5 is not in RINGER CUR position, the meter deflection indicates battery voltage and not resistance.

(3) *Receiving efficiency.* (*a*) No output (failure of the meter indicator to deflect) in the receiving efficiency test (par. 25) may be due to defects in the sound source, to the measuring circuit being defective, to control D4 being set to an incorrect position or the key contacts or the associated wiring being open-circuited, or to a defective meter.

(*b*) Check both the measuring circuit amplifier gain and the meter (pars. 19 and 20). Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

*c.* CARBON-TYPE MICROPHONES. (1) *24-volt, 361-ohm test circuit* (figs. 39 and 40). (*a*) No output (failure of the meter indicator to deflect) in the efficiency test of carbon-type microphones (par. 26) may be due to defect in either the measuring circuit or the equalizer circuit to the key contacts, the associated wiring or relay RY1 being open-circuited, to resistor R19 or transformer T1 being open-or short-circuit-

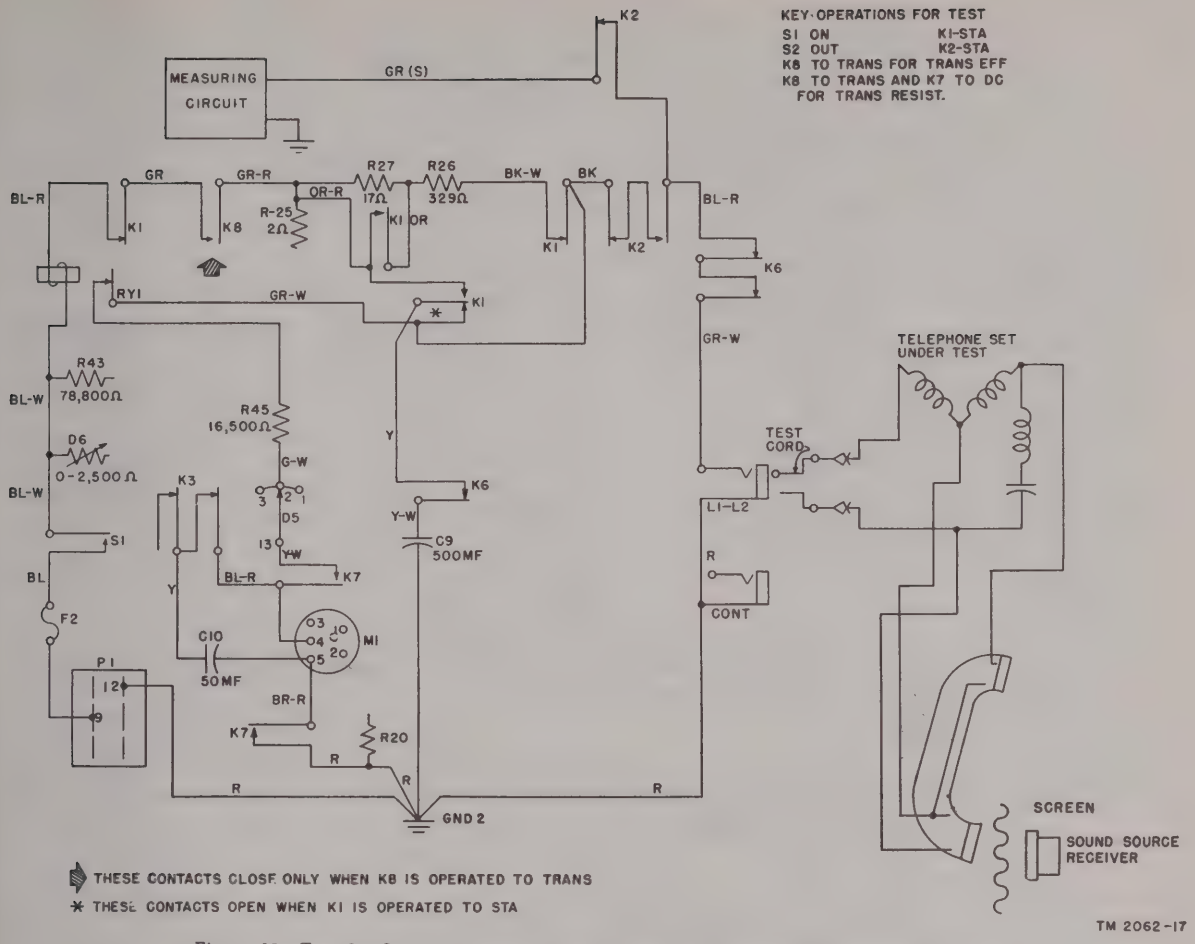



*Figure 38. Test Set I–142–A, common battery telephone test circuit, schematic diagram.*

ed, to resistors R26, R27, or fuse F2 being open-circuited, to capacitor C9 being short-circuited, or to the battery being disconnected.

(*b*) If the meter indicator deflects off scale, attenuator control D3 or equalizer switch S2 may be set to an incorrect position, the measuring circuit amplier gain may be set too high, or control D1 may be set in an incorrect position.

(*c*) Examine the measuring circuit and determine whether or not it is properly adjusted (pars. 19 and 20). Check the battery supply (par. 16). Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

(2) *3-volt, 4-ohm test circuit* (figs. 41 and 42). (*a*) No output (failure of the meter indicator to deflect) in the efficiency test of carbon-type microphones (par. 26) may be due to defects in either the measuring circuit or the equalizer circuit, to the key contacts or the associated wiring being open-circuited, to resistor R19 or transformer T1 being open-or short-circuited, to resistor R25 or fuse F4 being open-circuited, to capacitor C9 being short-circuited, or to the battery being disconnected.

(*b*) If the meter indicator deflects off scale, attenuator control D3 or equalizer switch S2 may be set to an incorrect position, the measuring circuit amplifier gain may be set too high, or control D1 may be set in an incorrect position.

(*c*) Examine the measuring circuit and determine whether or not it is properly adjusted (pars. 19 and 20). Check the battery supply (par. 16). Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

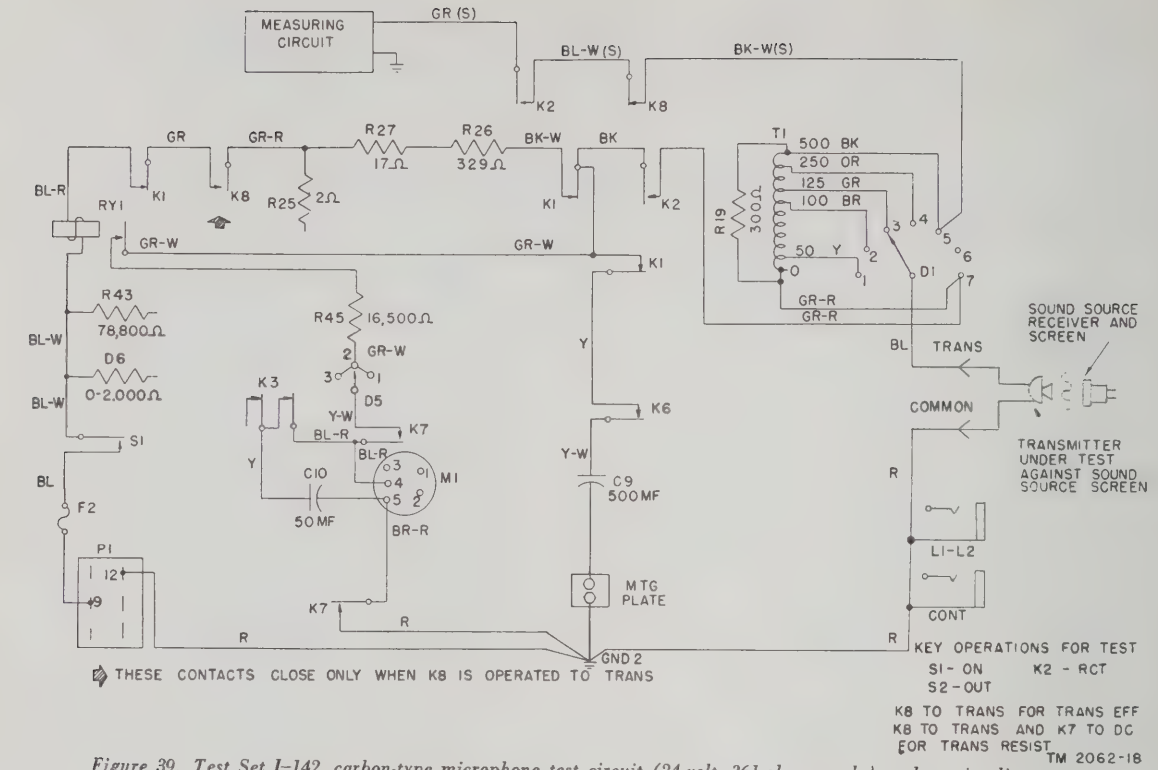



*Figure 39. Test Set I–142, carbon-type microphone test circuit (24-volt, 361-ohm supply), schematic diagram.*

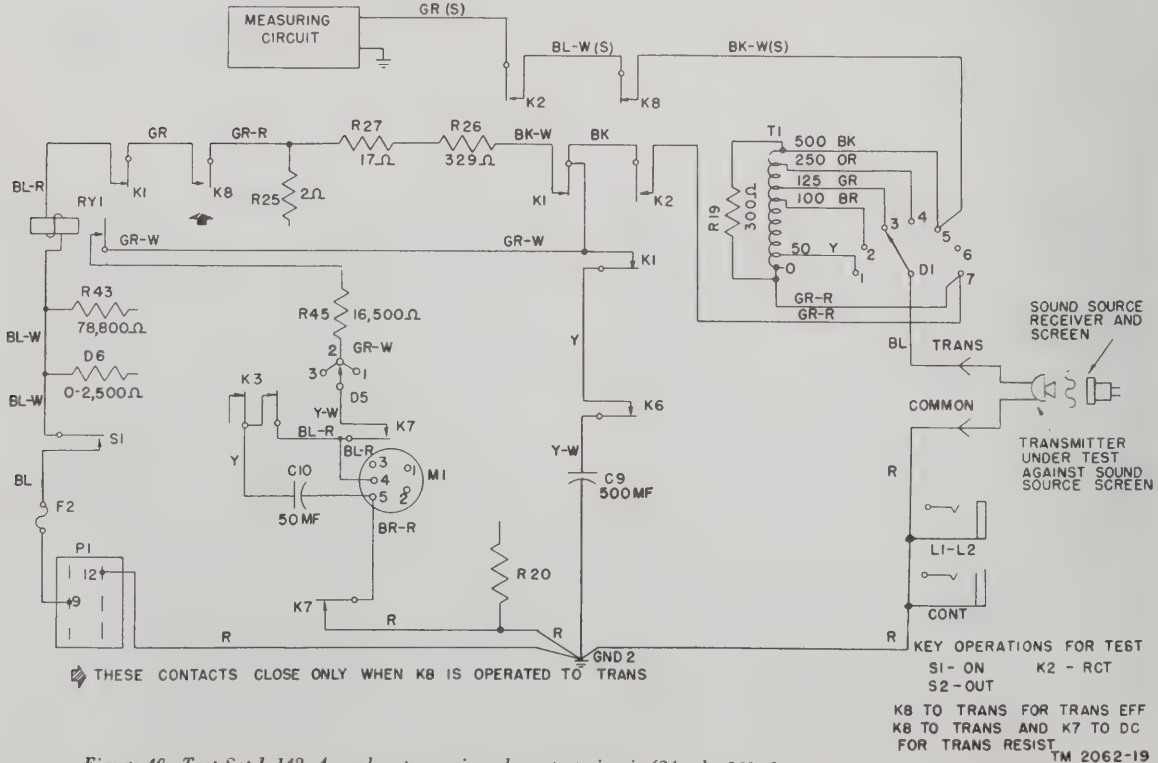



*Figure 40. Test Set I–142–A, carbon-type microphone test circuit (24-volt, 361-ohm supply), schematic diagram.*

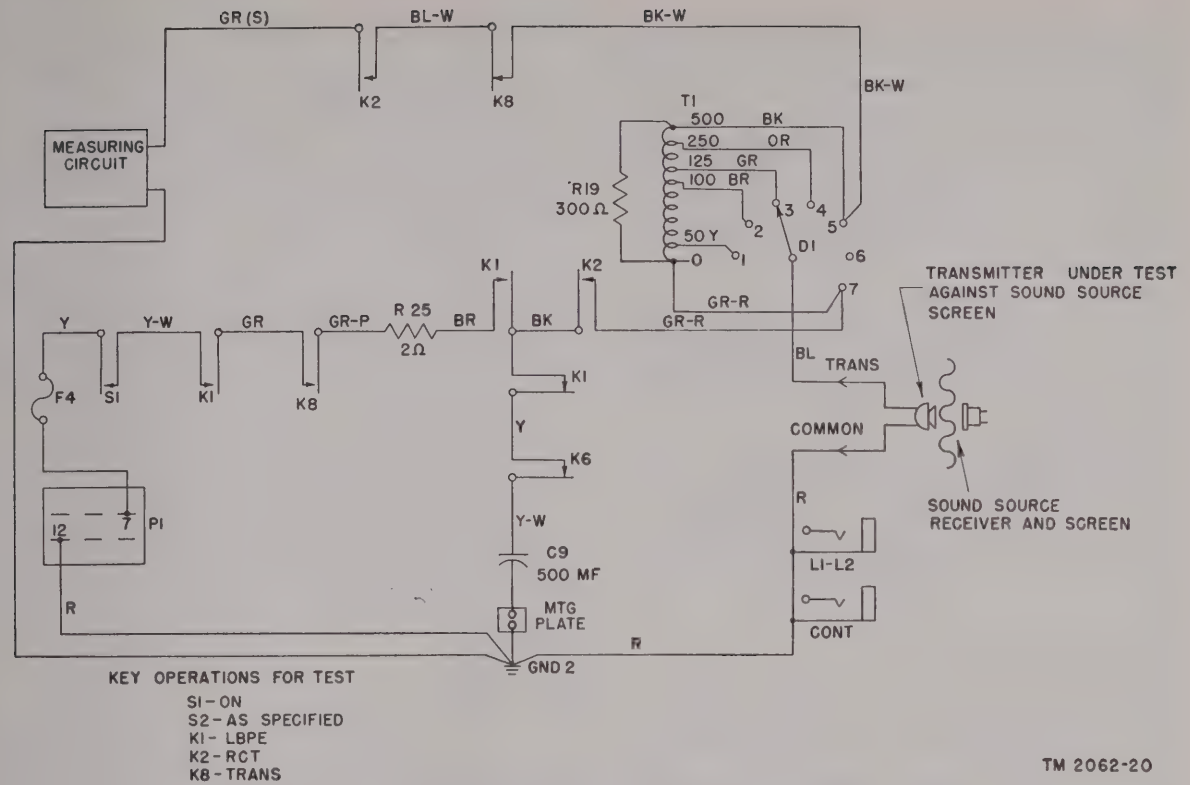



*Figure 41. Test Set I–142, carbon-type microphone test circuit (3-volt, 4-ohm supply), circuit diagram.*

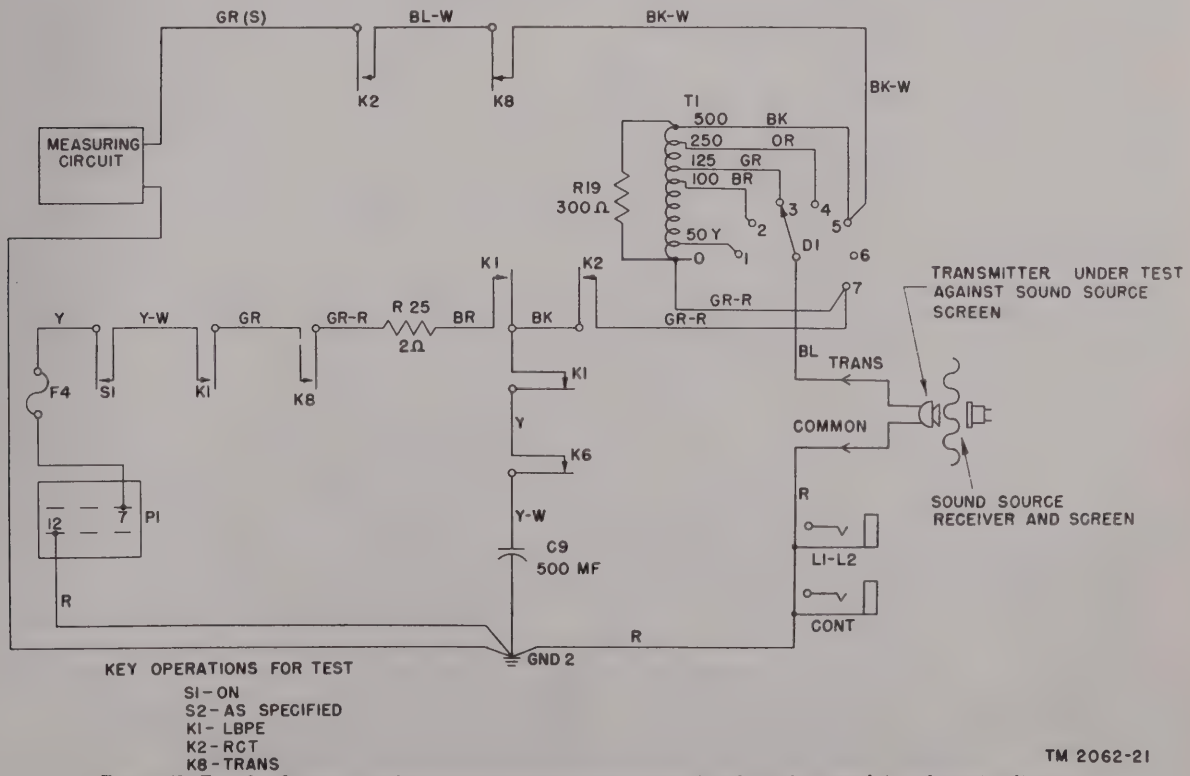



*Figure 42. Test Set I–142–A, carbon-type microphone test circuit (3-volt, 4-ohm supply), schematic diagram.*

*d.* RECEIVERS AND MAGNETIC-TYPE MICROPHONES (fig. 43). (1) No output (failure of the meter indicator to deflect) in the efficiency test of receivers or magnetic-type microphones (par. 27) may be due to defects in the measuring circuit or the test receiver, to the key contacts or the associated wiring being open-circuited, or to load resistors R20 to R24 being short-circuited.

(2) If the meter indicator deflects off scale, control D2 or D4 may be set in incorrect positions, load resistors R20 to R24 inclusive may be open-circuited, or control D2 may be open-circuited.

(3) Examine the measuring circuit and determine whether or not it is properly adjusted. Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

## 90. Capacitor Test

For troubles observed in testing capacitors (par. 28) check the circuit as outlined in paragraph 85.

## 91. Generator Test (fig. 44)

*a.* No output (failure of the meter indicator to deflect) in testing generators (par. 29) may be due to the key contacts or the associated wiring being open-circuited, to resistor R39 or capacitor C10 being short-circuited, meter multiplier resistor R38 being open-circuited, or to the meter being defective.

*b.* If the meter indicator deflects off scale when voltage is applied from the generator under test, resistor R39, or the associated wiring may be open-circuited or resistor R38 may be short-circuited.

*c.* Check the meter by operating key 4 to the RINGER position, key 6 to the CKT position, and turning the test set generator. The meter should deflect to midscale. Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

## 92. Ringer Test (fig. 45)

*a.* If no voltage is delivered to the ringer under test and the meter indicator is at 0 db

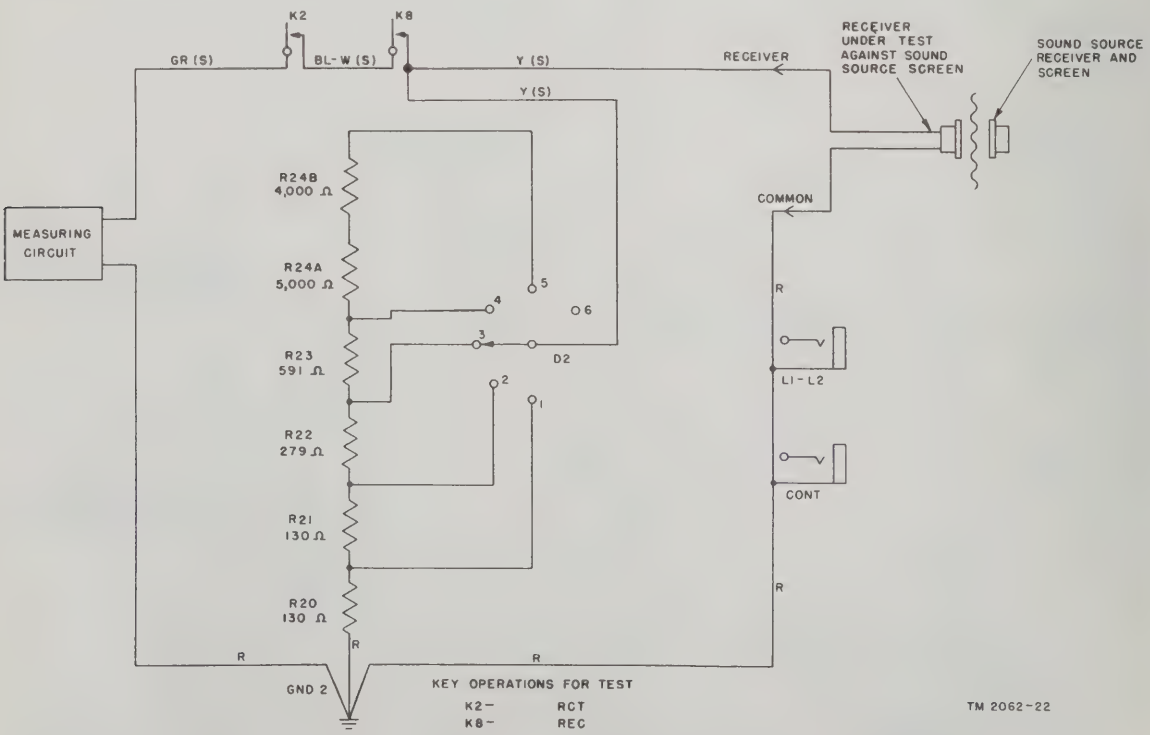



*Figure 43. Receiver and magnetic-type microphone test circuit, schematic diagram.*

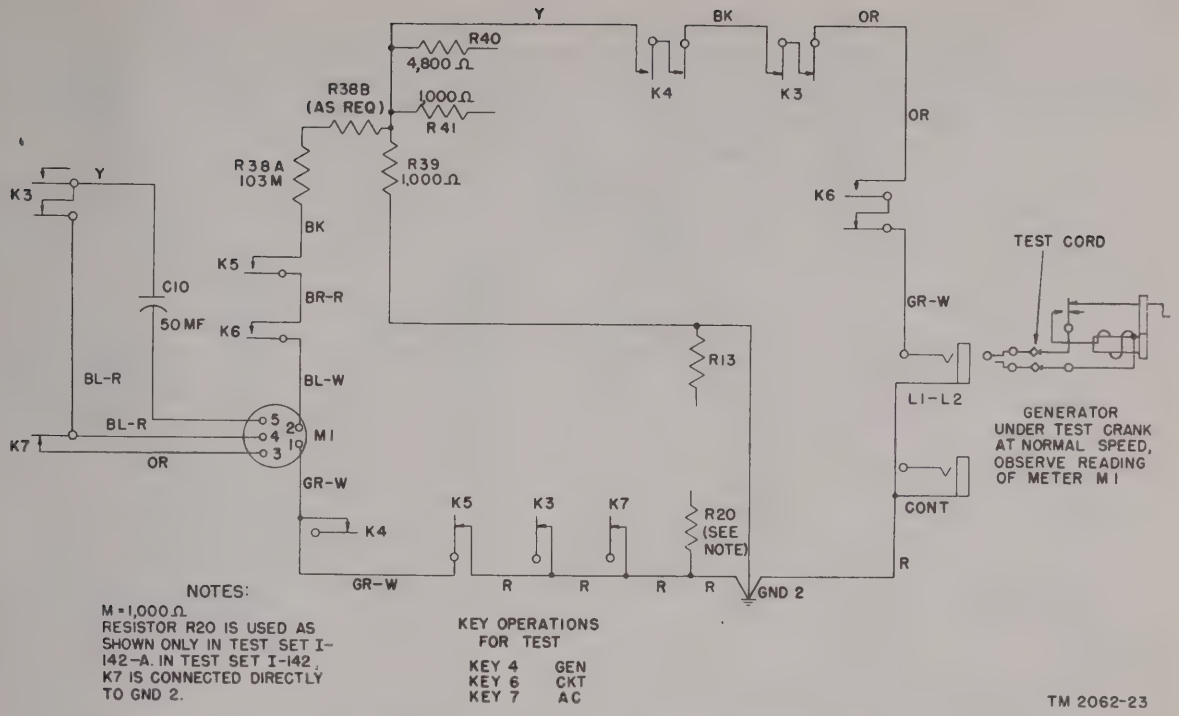



*Figure 44. Generator test circuit, schematic diagram.*

(par. 30), control D5 may be set at an incorrect position, or resistor R40 or R41, the key contacts involved, or the associated wiring may be open-circuited.

*b.* If the meter indicator does not deflect and voltage is obtained at the ringer under test, resistor R38, the key contacts affecting the meter, or the associated wiring may be open-circuited, or meter M1 or capacitor C10 may be short-circuited.

*c.* If the meter indicator deflects off scale, resistor R39 or the associated wiring may be open-circuited or resistor R38 may be short-circuited.

*d.* Meter readings appreciably less than 0 db, with the generator turning at normal speed, may be caused by a defective generator. Replace the test set generator if the output is less than that specified in paragraph 108*c*.

*e.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

## 93. Insulation Resistance Test (fig. 46)

*a.* No output (failure of the meter indicator to deflect) when measuring the insulation resistance (par. 31) may be due to resistor R31 being short-circuited, or resistor R32, the associated wiring, or the key contacts being open-circuited.

*b.* When the insulation resistance of the part being tested is appreciably beyond the 1-megohm range of the circuit, the meter deflection will be hardly noticeable.

*c.* Notice whether or not the meter indicator deflects when the test cord clips are short-circuited while the generator is being operated at normal speed. Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

## 94. Dial Tests

For troubles observed in testing dials (par. 32) check the dial circuit in accordance with paragraph 86. Figures 27 to 30 illustrate the schematic diagrams for the dial test circuits.

## 95. Continuity Test (fig. 47)

*a.* No output (failure of lamp LP1 to light or buzzer BZ1 to operate) when the ends of the

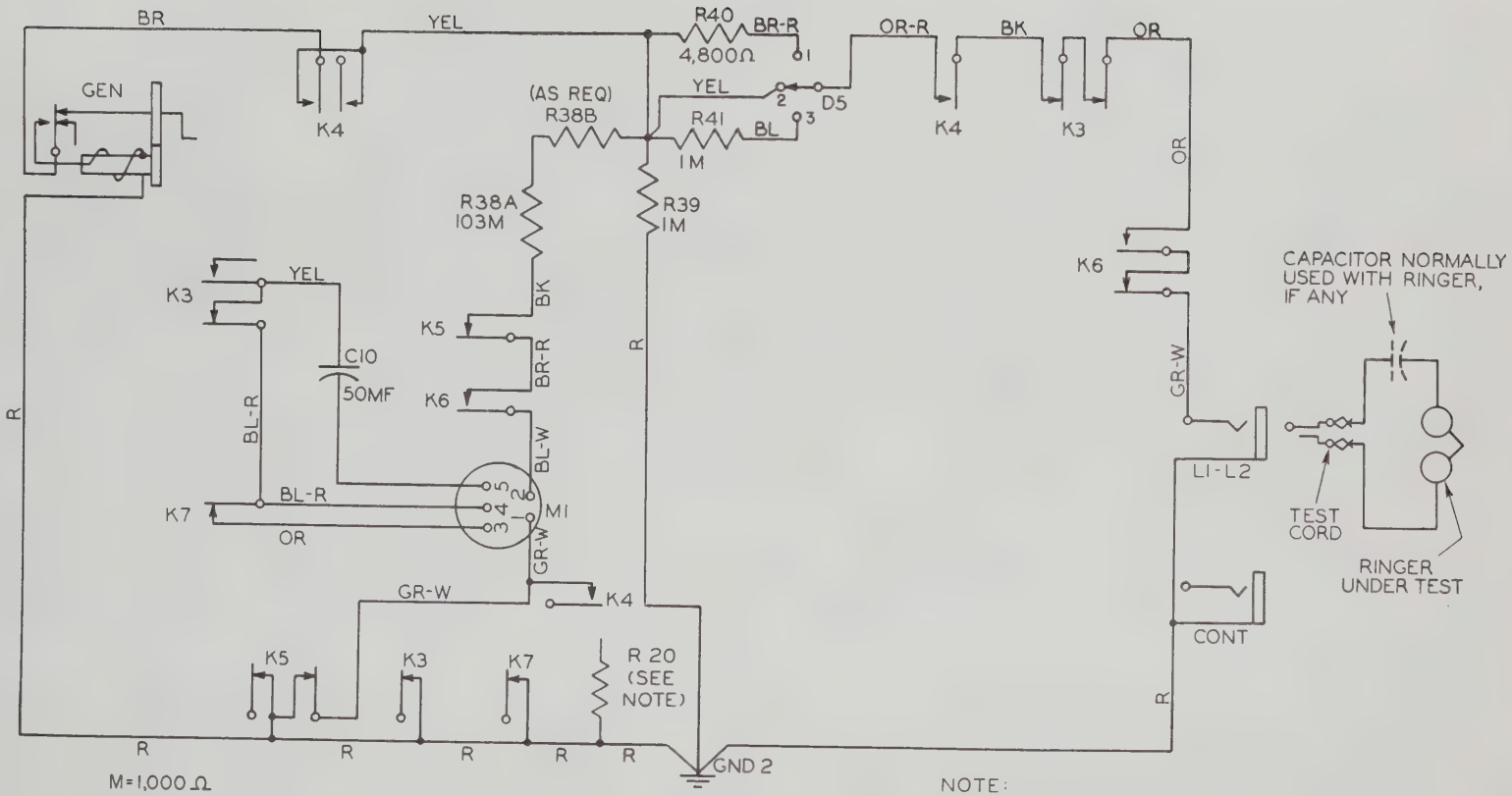



*Figure 45. Ringer test circuit, schematic diagram.*

test cord which are connected to jack CONT are touched together in checking continuity may be due to fuse F3 or the associated wiring being open-circuited or to lamp LP1 or buzzer BZ1 being defective.

*b.* Operate switch S1 to OFF and, using an ohmmeter, check the components and the continuity of the circuit from point to point.

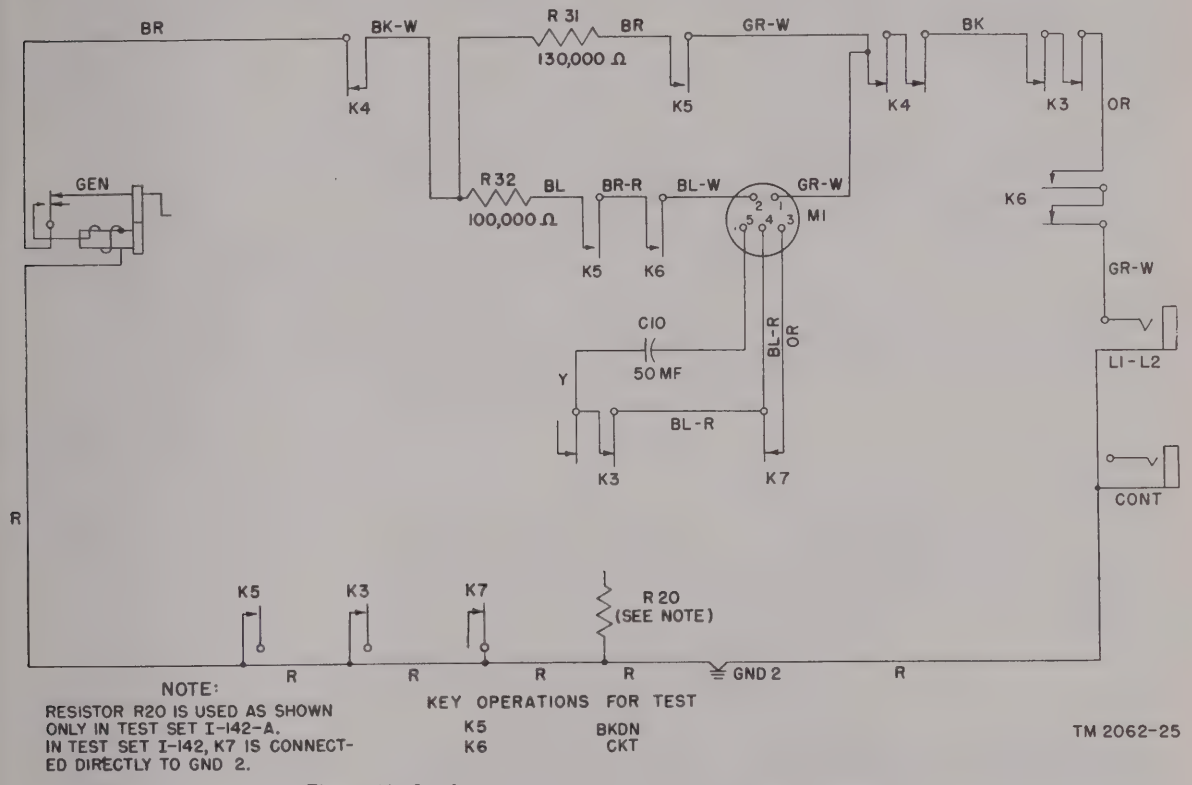



*Figure 46. Insulation resistance test circuit, schematic diagram.*

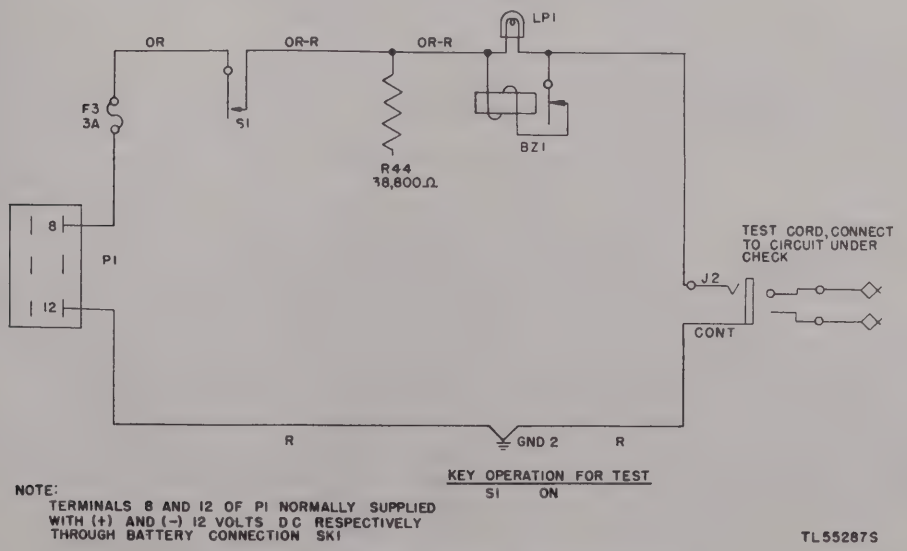



*Figure 47. Continuity test circuit, schematic diagram.*

## 96. Trouble Shooting Chart

The following trouble shooting chart, if properly used, will simplify fault location. This chart lists the various symptoms which may be easily recognized by the operator, and gives the possible location of the trouble as well as the recommended corrective action.

*a.* Power Supply Circuit.

| Condition | Possible trouble | Corrective action | Paragraph reference |
|---|---|---|---|
| 1. Meter indicator deflects when control D5 is at position 12, 24, or 135, but does not deflect at all three positions. | 1. Battery lead disconnected | 1. Reconnect battery lead | |
| | Open-circuited fuse | Replace fuse | |
| | Open-circuited resistor R42A, R42B, R43, or R44. | Replace resistor | |
| | Open circuit in associated wiring | Repair open circuit | 84*a*, 84*b*, and 84*c*. |
| 2. Meter indicator does not deflect at all three positions of control D5. | 2. Battery plug disconnected | 2. Reconnect battery plug | |
| | Switch S1 in OFF position | Operate to ON position | |
| | Key 7 not in DC position | Operate to DC position | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Meter M1 defective | Replace meter | 84*d* and 84*c*. |

*b.* Capacitor Test Circuit.

| | | | |
|---|---|---|---|
| 1. Lamp LP2 does not light when capacitor test circuit is being made. | 1. Contacts of key 6 dirty or not making. | 1. Clean, repair, or replace key | |
| | Defective neon lamp | Replace lamp | |
| | Resistor R29 open-circuited | Replace resistor | |
| | Low insulation resistance or open circuit of associated wiring. | Replace wiring or repair open circuit. | 85. |
| 2. Lamp LP2 lights at all positions of control D9. | 2. Open connection to control D9 | 2. Repair open connection or replace control D9. | |
| | Resistor R30 open-circuited | Replace resistor | 85. |

*c.* Dial Test Circuits.

| | | | |
|---|---|---|---|
| 1. Meter indicator does not deflect with key 3 in %BRK position. | 1. Control D6 open-circuited | 1. Repair open connection or replace control D6. | |
| | Contacts of key 3 or key 7 dirty or not making. | Clean, repair, or replace keys | |
| | Open circuit in associated wiring. | Repair open circuit | 86*a*. |
| | Wiring to jack L1–L2 grounded. | Remove ground | |
| | Resistor R33 short-circuited. | Replace resistor | 86*a*. |
| | Resistor R34 open-circuited | Replace resistor | |
| | Open- or short-circuited meter | Replace meter | |
| 2. Meter indicator can not be brought on scale with control D6. | 2. Resistor R33 open-circuited | 2. Replace resistor | 86*b*. |
| | Resistor R34 short-circuited | Replace resistor | |
| 3. Meter indicator deflection cannot be changed by varying control D6. | 3. Control D5 in wrong position | 3. Move to correct position | 86*c*. |

*c.* DIAL TEST CIRCUITS—(*contd*).

| Condition | Possible trouble | Corrective action | Paragraph reference |
|---|---|---|---|
| 4. Meter indicator does not deflect with key 3 in DIAL SPEED position. | 4. Contacts of key 3 or key 7 dirty or not making. | 4. Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | 86*e*. |
| | Resistors R36 or R37 open-circuited. | Replace resistors | 86*e*. |
| | Control D6 open-circuited | Replace control | |
| | Resistor R35 short-circuited | Replace resistor | |
| | Capacitor C9 short-circuited | Replace capacitor | |
| | Open or shorted meter | Replace meter | |
| 5. Meter indicator deflects off scale rapidly when key 3 is operated to DIAL SPEED. | 5. Contacts of key 6 dirty or not making. | 5. Clean, repair, or replace key | |
| | Capacitor C9 open-circuited | Replace capacitor | 86*f*. |
| | Resistor R36 or R37 short-circuited. | Replace resistors | |

*d.* SOUND SOURCE CIRCUIT.

| | | | |
|---|---|---|---|
| 1. No audible output from receiver when adjusting control D8. Key 9 depressed. | 1. Defective control D8 | 1. Replace control | 87*d*. |
| | Defective vibrator | Replace vibrator | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Capacitor C1, C11, or C16 short-circuited. | Replace capacitor | |
| | Defective receiver | Replace receiver | 87*a* and 87*d*. |
| | Defective key 9 | Adjust or replace key 9 | |
| 2. Audible output received but meter indicator does not deflect when adjusting control D8. | 2. Capacitor C13 open-circuited. | 2. Replace capacitor | |
| | Resistor R48 short-circuited. | Replace resistor | |
| | Resistor R1 open-circuited. | Replace resistor | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Defective rectifier section of meter. | Replace meter | 87*c*. |
| 3. Meter indicator deflection cannot be brought to 0 db by adjusting control D8. | 3. Defective control D8 | 3. Replace control | 87*d*. |
| | Defective vibrator | Replace vibrator | |

*e.* MEASURING CIRCUIT.

| | | | |
|---|---|---|---|
| 1. Meter indicator does not deflect when key 5 is operated to CHK, key 7 to AC, and key 9 is depressed. | 1. Contacts of keys dirty or not making. | 1. Clean, repair, or replace key | 88*a*. |
| | Open circuit in associated wiring | Repair open circuit | |
| | Defective amplifier | Repair amplifier | |
| 2. Meter indicator deflects when key 9 is depressed and all other keys are unoperated. | 2. Microphonic tube VT1 | 2. Replace tube | 88*b*. |
| | High resistance in 135-volt battery circuit (depleted batteries). | Check batteries; replace if necessary. | |
| | Vibrator socket touching mounting panel. | Adjusting socket grommet mounting. | |

*e.* MEASURING CIRCUIT—(*contd*).

| Condition | Possible trouble | Corrective action | Paragraph reference |
|---|---|---|---|
| 3. Meter indicator deflection cannot be brought to 0 db by adjusting control D7. | 3. High resistance in 135-volt battery circuit (depleted batteries). | 3. Check batteries; replace if necessary. | 88*c*. |
| | Defective amplifier. | Repair amplifier | |
| 4. Meter indicator does not deflect in adjustment test (par. 19) or efficiency tests (par. 24). | 4. Open or short circuited meter | 4. Replace meter | 88*b* and 88*c*. |
| | Defective amplifier | Repair amplifier | |
| 5. Abnormal loss in measuring circuit attenuator. | 5. Resistance of R2 low | 5. Replace resistor | 88*d*. |
| | Resistors R3 to R9 inclusive abnormally high in resistance. | Replace resistor | |

*f.* EFFICIENCY TESTS ON LOCAL BATTERY TELEPHONES.

| | | | |
|---|---|---|---|
| 1. Meter indicator does not deflect in transmitting efficiency test. | 1. Control D3 set in incorrect position. | 1. Move to correct position | |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | 89*a*(1). |
| | Open circuit in associated wiring. | Repair open circuit | |
| | Defective measuring circuit | Repair measuring circuit | 89*a*(1). |
| | Resistor R46 short-circuited | Replace resistor | |
| | Jack L1–L2 short-circuited | Repair or replace jack | |
| | Defective meter | Replace meter | |
| 2. Meter indicator deflects off scale in transmitting efficiency test. | 2. Control D3 or switch S2 set in incorrect position. | 2. Remove to correct position | |
| | Resistor R46 open-circuited | Replace resistor | 89*a*(1). |
| 3. Meter indicator does not deflect in receiving efficiency test. | 3. Control D4 set in incorrect position. | 3. Move to correct position | |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | 89*a*(2). |
| | Defective sound source | Check sound source | 87. |
| | Defective measuring circuit | Repair measuring circuit | |
| | Defective meter | Replace meter | |

*g.* EFFICIENCY TESTS ON COMMON BATTERY TELEPHONES.

| | | | |
|---|---|---|---|
| 1. Meter indicator does not deflect in transmitting efficiency test. | 1. Control D3 set in incorrect position. | 1. Move to correct position | |
| | Battery (24-volt) disconnected | Connect battery | |
| | Capacitor C9 short-circuited | Replace capacitor | |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Defective relay RY1 | Replace relay | |
| | Defective measuring circuit | Repair measuring circuit | 89*b*(1). |
| | Resistor R26 short-circuited | Replace resistor | |
| | Defective meter | Replace meter | |

*g.* EFFICIENCY TESTS ON COMMON BATTERY TELEPHONES—(*contd*).

| Condition | Possible trouble | Corrective action | Paragraph reference |
|---|---|---|---|
| 2. Meter indicator deflects off scale in transmitting efficiency test. | 2. Control D3 or switch S2 set in incorrect position. | 2. Move to correct position | 89*b*(1). |
| 3. Meter indicator does not deflect when measuring transmitter resistance. | 3. Contacts of keys dirty or not making. | 3. Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Defective relay RY1 | Replace relay | 89*b*(2). |
| | Resistor R45 open-circuited | Replace resistor | |
| | Capacitor C9 short-circuited | Replace capacitor | |
| | Defective meter | Replace meter | |
| 4. Meter indicator does not deflect in receiving efficiency test. | 4. Control D4 set in incorrect position. | 4. Move to correct position | 89*b*(3) |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Defective measuring circuit | Repair measuring circuit | |
| | Defective sound source | Check sound source | 87. |
| | Defective meter | Replace meter | |

*h.* EFFICIENCY TESTS ON CARBON-TYPE MICROPHONES.

| | | | |
|---|---|---|---|
| 1. Meter indicator does not deflect in 24-volt, 361-ohm test circuit. | 1. Battery (24-volt) disconnected | 1. Connect battery | |
| | Fuse F2 open-circuited | Replace fuse | |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | 89*c*(1). |
| | Defective relay RY1 | Replace relay | |
| | Resistor R27 or R26 open-circuited. | Replace resistor | |
| | Transformer T1 open- or short-circuited. | Replace transformer | |
| | Capacitor C9 short-circuited | Replace capacitor | |
| | Resistor R19 short-circuited | Replace resistor | |
| | Defective measuring circuit | Repair measuring circuit | |
| 2. Meter indicator deflects off scale in 24-volt, 361-ohm test circuit. | 2. Control D1 or D3, or switch S2 set in incorrect position. | 2. Move to correct position | 89*c*(1). |
| 3. Meter indicator does not deflect in 3-volt, 4-ohm test circuit. | 3. Battery (3-volt) disconnected | 3. Connect battery | |
| | Fuse F4 open-circuited | Replace fuse | |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | 89*c*(2). |
| | Resistor R19 short-circuited | Replace resistor | |
| | Transformer T1 open- or short-circuited. | Replace transformer | |
| | Resistor R25 open-circuited | Replace resistor | |
| | Capacitor C9 short-circuited | Replace capacitor | |
| | Defective measuring circuit | Repair measuring circuit | |
| 4. Meter indicator deflects off scale in 3-volt, 4-ohm test circuit. | 4. Control D1 or D3, or switch S2 set in incorrect position. | 4. Move to correct position | 89*c*(2). |

*i.* EFFICIENCY TEST OF RECEIVERS AND MAGNETIC-TYPE MICROPHONES.

| Condition | Possible trouble | Corrective action | Paragraph reference |
|---|---|---|---|
| 1. Meter indicator does not deflect in efficiency test. | 1. Contacts of keys dirty or not making. | 1. Clean, repair, or replace key | 89*d*. |
| | Open circuit in associated wiring | Repair open circuit | |
| | Load resistors R20 to R24 inclusive short-circuited. | Replace defective resistor | |
| | Defective measuring circuit | Repair measuring circuit | |
| 2. Meter indicator deflects off scale in efficiency test. | 2. Control D2 or D4 set in incorrect position. | 2. Move to correct position | 89*d*. |
| | Control D2 open-circuited | Repair open circuit or replace control D2 | |
| | Load resistors R20 to R24 inclusive open-circuited. | Replace defective resistor | |

*j.* GENERATOR TEST.

| | | | |
|---|---|---|---|
| 1. Meter indicator does not deflect in test. | 1. Contacts of keys dirty or not making. | 1. Clean, repair, or replace key | 91*a*. |
| | Open circuit in associated wiring | Repair open circuit | |
| | Resistor R39 short-circuited | Replace resistor | 91*a*. |
| | Capacitor C10 short-circuited | Replace capacitor | |
| | Resistor R38 open-circuited | Replace resistor | |
| | Defective meter | Replace meter | |
| 2. Meter indicator deflects off scale in test. | 2. Resistor R38 short-circuited | 2. Clean, repair, or replace key | 91*b*. |
| | Open circuit in associated wiring | Replace resistor | |
| | | Repair open circuit | |
| | Resistor R39 open-circuited | Replace resistor | |

*k.* RINGER TEST.

| | | | |
|---|---|---|---|
| 1. Meter indicator deflects but no voltage delivered to ringer. | 1. Control D5 set in incorrect position. | 1. Move to correct position | 92*a*. |
| | Contacts of keys dirty or not making. | Clean, repair, or replace key | 92*a*. |
| | Open circuit in associated wiring | Repair open circuit | |
| | Resistor R40 or R41 open-circuited. | Replace resistor | |
| 2. Meter indicator does not deflect but voltage is delivered to ringer. | 2. Contacts of keys dirty or not making. | 2. Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Capacitor C10 short-circuited | Replace capacitor | |
| | Resistor R38 open-circuited | Replace resistor | 92*b*. |
| | Defective meter | Replace meter | |
| 3. Meter indicator deflects off scale in test. | 3. Open circuit in associated wiring | 3. Repair open circuit | |
| | Resistor R39 open-circuited | Replace resistor | 92*c*. |

*l.* INSULATION RESISTANCE TEST.

| Condition | Possible trouble | Corrective action | Paragraph reference |
|---|---|---|---|
| Meter indicator does not deflect in test. | Contacts of keys dirty or not making. | Clean, repair, or replace key | |
| | Open circuit in associated wiring | Repair open circuit | |
| | Resistor R31 short-circuited | Replace resistor | 93. |
| | Resistor R32 open-circuited | Replace resistor | |

*m.* CONTINUITY TEST.

| | | | |
|---|---|---|---|
| Lamp LP1 does not light and buzzer BZ1 does not sound. | Fuse F3 open-circuited | Replace fuse | |
| | Open circuit in associated wiring | Repair open circuit | 95. |
| | Defective lamp LP1 | Replace lamp | |
| | Defective buzzer BZ1 | Replace buzzer | |

## Section XVI. CALIBRATION AND ADJUSTMENT

### 97. General

This section outlines the calibration and adjustment procedures for Test Set I–142–(*). Where possible, alternate methods are included to illustrate the use of substitute test apparatus, if the desired test apparatus is not available. The connections set up in any numbered paragraph remain the same for that paragraph only and are to be considered disconnected at the end of that paragraph. The amplifier of Test Set I–142–(*) should be operating for at least 5 minutes before any test or adjustment is made.

### 98. Measuring Circuit (fig. 33)

*a.* Strap together those terminals of key 9 to which the green and green-white leads are connected.

*b.* Connect a variable audio-frequency oscillator in parallel with an a-c voltmeter which has an accuracy of 2 percent over a frequency range of 300–5,000 cps. Make the connection between ground No. 2 and that side of resistor R1 (fig. 31) which is not strapped to resistor R48.

*c.* With switch S1 in the ON position and the oscillator frequency set to 1,000 cps, operate keys 5 and 7 to the CHK position.

*d.* Adjust the oscillator output level to produce a deflection of 0 db at meter M1. The corresponding voltage reading at the external voltmeter should be 1.9 $\pm$0.11 volts.

*e.* Where a less accurate a-c voltmeter, such as a voltohmyst, is used in making the adjustment described in *d* above, the tolerance of $\pm$0.11 volt must be increased to $\pm$(0.07 + 0.02P) volt, where P is the meter accuracy in percent.

*f.* Release key 7 and adjust control D7 to its maximum clockwise position. The output of the amplifier as indicated on meter M1 should be to the right of +3 db.

*g.* Adjust control D7 to its maximum counterclockwise position. The indicator of meter M1 should be to the left of —3 db.

*h.* Adjust control D7 to produce a deflection at meter M1 of 0 db.

*i.* Release key 5 and disconnect the external voltmeter.

*j.* In checking the response-frequency characteristic of the amplifier—

(1) Adjust the frequency of the oscillator to each of the frequencies listed below.

(2) At each frequency, operate keys 5 and 7 to the CHK position and adjust the oscillator output level to produce a deflection at meter M1 of 0 db.

(3) Release key 7 to the AC position and observe the deflection at meter M1. If the circuit elements of the amplifier are in a satisfac-

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tory condition, the output voltage should be as follows:

| Oscillator frequency (cps) | Deflection at meter M1 (db) |
|---|---|
| 300 | 0 ± 0.5 |
| 500 | 0 ± 0.3 |
| 1,000 | [1]0 |
| 2,000 | 0 ± 0.3 |
| 3,000 | 0 ± 0.5 |

[1]By adjustment of control D7 in h above.

(4) Release key 5 and disconnect the oscillator.

*k.* To make a noise check, operate key 9 and observe the deflection at meter M1 when the various key and control combinations listed below are in the positions stated. The deflection at the meter must not exceed 5 divisions on the d-c scale. All keys not listed in the table are in the normal unoperated position.

| Combination | K1 | K2 | K8 | D1 | D2 | D3 | D4 |
|---|---|---|---|---|---|---|---|
| 1. | STA | STA | TRANS | — | — | 0–6 | — |
| 2. | STA | STA | REC | — | — | — | 0–7 |
| 3. | — | FIELD | TRANS | — | — | 0–6 | — |
| 4. | — | FIELD | REC | — | — | — | 0–7 |
| 5. | CBPE | RCT | TRANS | 1–5 | — | 0–6 | — |
| 6. | CBPE | RCT | REC | — | 1–6 | — | 0–7 |
| 7. | LBPE | RCT | TRANS | 1–5 | — | 0–6 | — |
| 8. | LBPE | RCT | REC | — | 1–6 | — | 0–7 |
| 9. | CBPE | FIELD | OFF | — | — | — | — |

## 99. Measuring Circuit Meter

*a.* To check the db scale of the meter—

(1) Connect a variable audio-frequency oscillator in series with an external attenuator which has a range of 0 to 20 db and which is designed to work into an unbalanced load of 600 ohms. Make the connection to jack L1–L2 with the ground side of the attenuator connected to the sleeve of the jack and the high side of the attenuator connected to the tip of the jack.

(2) Strap together those terminals of key 9 to which the green and green–white leads are connected.

(3) With switch S2 in the OUT position and the oscillator frequency set to 1,000 cps, set the external attenuator at 10 db.

(4) Adjust the oscillator output level to produce a deflection at meter M1 of 0 db.

(5) Adjust the external attenuator to each of the positions given below and observe the deflection at meter M1. The relationship between attenuator settings and meter deflections is as follows:

| Attenuator setting (db) | Meter deflection (db) |
|---|---|
| 4 | + 6 ± 0.4 |
| 6 | + 4 ± 0.3 |
| 8 | + 2 ± 0.3 |
| 10 | 0 |
| 12 | − 2 ± 0.3 |
| 14 | − 4 ± 0.5 |
| 16 | − 6 ± 0.6 |
| 20 | −10 ± 0.7 |

*b.* Where a suitable attenuator is not available, this test may be made using an external a-c voltmeter as follows:

(1) Connect a variable audio-frequency oscillator in parallel with an a-c voltmeter. Connect them to jack L1–L2.

(2) Strap together those terminals of key 9 to which the green and green–white leads are connected.

(3) With switch S2 in the OUT position, set the oscillator frequency to 1,000 cps.

(4) Adjust the oscillator output level to produce a deflection at meter M1 of 0 db. Observe the deflection at the external voltmeter. This deflection is labeled A in the table.

(5) Change the output level of the oscillator so as to produce at meter M1 the deflections listed in the table. Observe the deflection at the external voltmeter each time. The relationship between the deflection at meter M1 (in db) and the voltages (A), as indicated on the external voltmeter, should be as follows:

| Meter M1 deflection (db) | External voltmeter (v) |
|---|---|
| + 6 ± 0.4 | A × 2 |
| + 4 ± 0.3 | A × 1.58 |
| − 2 ± 0.3 | A × 0.79 |
| − 4 ± 0.5 | A × 0.63 |
| − 6 ± 0.6 | A × 0.50 |
| −10 ± 0.7 | A × 0.32 |

## 100. Measuring Circuit Attenuator (fig. 33)

*a.* The attenuator loss of Test Set I–142–(*) is regulated by the adjustment of controls D3 and D4. To check the attenuator—

(1) Connect a variable audio-frequency oscillator in series with an external attenuator which has a range of 0 to 80 db and which is

designed to work into an unbalanced load of 600 ohms. Make the connection to jack L1–L2 with the ground side of the attenuator connected to the sleeve of the jack and the high side of the attenuator connected to the tip of the jack.

(2) Strap together those terminals of key 9 to which the green and green–white leads are connected.

(3) With switch S2 in the OUT position and the oscillator frequency set to 1,000 cps, adjust control D3 to position 4.

(4) Set the external attenuator to 50 db and operate key 8 to the TRANS position.

(5) Adjust the oscillator output level to produce a deflection at meter M1 of 0 db.

(6) Release key 8.

(7) For each of the external attenuator settings listed in the table, adjust control D3 to the corresponding position. Operate key 8 to the TRANS position and observe the deflection at meter M1. Release key 8 after every setting. The relationship between the external attenuator (in db) settings and control D3 positions and the deflection at meter M1 (in db) should be as follows:

| *Attenuator setting (db)* | *Position of control D3* | *Meter deflection (db)* |
|---|---|---|
| 80 | 7 | 0 ± 0.5 |
| 70 | 6 | 0 ± 0.3 |
| 60 | 5 | 0 ± 0.2 |
| 50 | 4 | 0 |
| 40 | 3 | 0 ± 0.2 |
| 30 | 2 | 0 ± 0.3 |
| 20 | 1 | 0 ± 0.5 |
| 10 | 0 | 0 ± 0.7 |

*b.* Where a suitable attenuator is not available, this test may be made using meter M1 of the test set as follows:

(1) Connect a variable audio-frequency oscillator in parallel with jack L1–L2.

(2) Strap together those terminals of key 9 to which the green and green–white leads are connected.

(3) With switch S2 in the OUT position and the oscillator frequency set to 1,000 cps, adjust controls D3 and D4 to position 7.

(4) Operate key 8 to the TRANS position.

(5) Adjust the oscillator output level to produce a deflection at meter M1 of +4 on the db scale. Since the corresponding numbered points of controls D3 and D4 are strapped together, the same meter reading should be obtained when key 8 is operated to the REC position.

(6) Adjust controls D3 and D4 to position 6. Observe the deflection at meter M1 when key 8 is operated first to the TRANS position then to the REC position. The meter indicator should deflect to —6 ±1.0 on the db scale. The difference between the meter deflections obtained at positions 7 and 6 of the controls is the attenuation between the first two positions of the measuring circuit attenuator plus or minus the error in the meter scale calibration (par. 99).

(7) In order to eliminate the meter error, the difference in deflections obtained should be used in checking the subsequent positions of controls D3 and D4 as follows:

(*a*) With controls D3 and D4 at position 6 with key 8 in the TRANS position, readjust the output level of the oscillator to produce a deflection at meter M1 of +4 on the db scale.

(*b*) Operate key 8 to the REC position and check the meter deflection. It should be the same as in (*a*) above.

(*c*) Adjust controls D3 and D4 to position 5. Observe the deflection at meter M1 when key 8 is operated first to the TRANS position then to the REC position. The attenuation difference between positions 6 and 5 of the controls should be within ±0.2 db of the attenuation obtained between positions 7 and 6.

(*d*) Repeat the procedures detailed above substituting the remaining positions of controls D3 and D4. The attenuation between positions should remain ±0.2 db.

## 101. Equalizer (fig. 33)

*a.* Connect a variable audio-frequency oscillator in series with an external attenuator. Make the connection to jack L1–L2 with the ground side of the attenuator connected to the sleeve of the jack and the high side of the attenuator connected to the tip of the jack.

*b.* Strap together those terminals of key 9 to which the green and green–white leads are connected.

*c.* With switch S2 in the IN position, operate key 8 to the TRANS position.

*d.* Adjust the oscillator to each of the fre-

quencies listed in the table below; then adjust the oscillator output level to produce a deflection at meter M1 of 0 db in each case.

*e.* With switch S2 in the OUT position, adjust the attenuator in each case to the value listed in the table below and observe the deflection obtained at meter M1.

*f.* The relationship between the oscillator frequency, the attenuation added when the equalizer is switched out of the circuit, and the meter deflection at meter M1 is as follows:

| *Oscillator frequency* | *Attenuation (in db) added with S2 switch OUT* | *Meter reading (db)* |
|---|---|---|
| 3,000 | 12 | 0 ± 1.0 |
| 1,000 | 23 | 0 ± 2.0 |
| 500 | 32 | 0 ± 3.0 |

*g.* The attenuation-frequency characteristic of the equalizer circuit may be checked by using an external oscillator with the measuring circuit of the test set as follows:

(1) Connect a variable audio-frequency oscillator in parallel with jack L1–L2.

(2) Strap together those terminals of key 9 to which the green and green–white leads are connected.

(3) With switch S2 in the OUT position, adjust control D3 to position 1 and operate key 8 to the TRANS position.

(4) Adjust the oscillator to each of the frequencies listed in the table below; then adjust the oscillator output level to produce a deflection at meter M1 of 0 db in each case.

(5) With switch S2 in the IN position, adjust the position of control D3 to the position indicated in the table below and observe the deflection obtained at meter M1.

(6) The relationship between the oscillator frequency, the position of control D3, and the meter deflection at meter M1 is as follows:

| *Oscillator frequency* | *Position of control D3 with switch S2 IN* | *Meter reading (db)* |
|---|---|---|
| 3,000 | 2 | − 2 ± 1 |
| 1,000 | 3 | − 3 ± 2 |
| 500 | 4 | − 2 ± 3 |

## 102. Sound Source (fig. 31)

*Note.* The receiver element of Sound Calibrator TS–550/G is stabilized and calibrated at the factory. When one of the three receiver elements is damaged it should not be repaired or replaced. The entire calibrator should be replaced.

*a.* The acoustic output of the sound source may be measured by using Sound Calibrator TS–550/G (fig. 48) and the measuring circuit of Test Set I–142–(*). The measurements should be made as follows:

(1) Adjust control D2 to position 2 and control D4 to position 6.

(2) Operate key 2 to the RCT position.

(3) Operate keys 5 and 7 to the CHK position.

(4) Operate key 9 and adjust control D8 to produce a deflection at meter M1 of 0 db. Release key 7 to the AC position.

(5) With key 5 in the CHK position and key 9 depressed, adjust control D7 to produce a deflection at meter M1 of 0 db.

(6) Connect one of the receiver units of Sound Calibrator TS–550/G to the RECEIVER and COMMON terminals of the test set.

(7) Locate the receiver unit of the sound calibrator in the center of and flush against the sound source screen with the cord towards the right-hand end of the test set.

(8) Operate key 8 to the REC position, depress key 9, and record the db scale deflection at meter M1. Test the three standard units in turn. The average of the meter readings should agree with the average of the values stamped on the three units of the sound calibrator to within ±0.5 db.

(9) If the average difference between the measured value and the calibrated value is greater than ±0.5 db, recalibrate the sound source as follows:

(*a*) Connect and position one of the receiver units of the sound calibrator as explained in steps 1 to 7 above.

(*b*) Operate key 8 to the REC position, depress key 9, and increase or decrease the acoustic output (loudness) of the sound source by adjusting control D8 to obtain a reading on meter M1 equal to that stamped on the calibration receiver.

(*c*) Operate keys 5 and 7 to the CHK position.

(*d*) Without changing the position of control D8, depress key 9 and observe the deflection at meter M1. The meter reading will be found to be either to the right or left of 0 db. With this setting of control D8, test the other two standards in turn. If the average of

the three meter readings differs from the average of the values stamped on the three standard units by more than ±0.2 db, readjust D8 as required until this requirement is met.

(*e*) Disconnect the white shielded lead from resistor R1 and connect a variable resistance box in place of resistor R1. Adjust the resistor box to approximately 1,500 ohms. Operate keys 5 and 7 to the CHK position, depress key 9 and adjust the resistance box to give a meter reading of 0 db.

(*f*) Strap resistor R1 so that it equals the resistance used in the box to the nearest 50 ohms. Remove the resistance box and reconnect the white shielded lead to resistor R1.

(*g*) Operate keys 5 and 7 to the CHK position. Depress key 9. The meter should read 0 ± 0.2 db. Remove the test receiver unit of the sound calibrator.

(*h*) In Test Set I–142–A, the resistance of R1 is adjusted by changing the strapping. The chart below illustrates the resistance between the terminals of resistor R1 in these sets.

| *Terminals* | *Resistance (ohms)* |
|---|---|
| 1–2 | 50 |
| 2–3 | 100 |
| 3–4 | 200 |
| 4–5 | 400 |
| 5–6 | 800 |

In Test Set I–142, resistor R1 (WECo D166860CW) is wound to the required resistance as determined in the factory calibration. Replace this resistor with stock No. 3Z6155 (WECo D162025CK). In order to provide sufficient clearance for the latter resistor, insert a fiber spacer one-fourth inch in height between the mounting panel and the resistor.

*b.* The 640-type transmitter and amplifier which are part of the Western Electric Telephone Instruments Testing Machine (per WE D–156516) may be used where currently available. The acoustic output of the sound source may be measured by using the 640-type condenser transmitter and a suitable associated amplifier, properly loaded and terminated by Electronic Multimeter ME–6/A (vacuum-tube voltmeter) or the equivalent. The measurement should be made as follows:

(1) Locate the 640-type Western Electric condenser transmitter at the center of the sound source screen with its polar axis perpendicular to the plane of the screen.

(2) Hold the diaphragm end of the 640-type transmitter flush against the sound source screen. Consider the efficiency of the 640-type transmitter to be the 1,000 cps free field reciprocity calibration value.

(3) Operate key 9 and adjust control D8 for a sound pressure of 21.5 db above 1 dyne per square centimeter. Release key 9.

(4) Operate keys 5 and 7 to the CHK position.

(5) Operate key 9 and adjust the resistance of resistor R1 to produce a deflection at meter M1 of 0 db.

## 103. Field (Local Battery (LB)) Telephone Test Circuit (figs. 35 and 36)

With all the keys in their normal positions, the d-c resistance measured across the tip and sleeve of jack L1–L2 should be 600 ± 20 ohms.

## 104. Common Battery (CB) Telephones Test Circuit (figs. 37 and 38)

*a.* Connect Weston Milliammeter model No. 322, 0–200 scale, or the equivalent, to jack L1–L2. The positive terminal of the milliammeter should be connected to the tip contact of the jack.

(1) Operate keys 1 and 2 to the STA position.

(2) Operate key 8 to the TRANS position and observe the deflection at the milliammeter. The current should be 69.8 ± 1.7 milliamperes.

(3) Release key 8.

*b.* Replace the milliammeter with a variable calibrated resistor covering a minimum range of 0–350 ohms in 1–ohm steps.

(1) Operate key 8 to the TRANS position and key 7 to the DC position.

(2) Adjust the variable resistor for a mid-scale deflection at meter M1. The adjusted value of the variable resistance should be 95 ± 7 ohms.

(3) Remove the external circuit and restore keys 7 and 8 to normal.

*c.* Connect the ungrounded side of a variable audio-frequency oscillator set at 1,000 cps through approximately 500 ohms to the normally open contact spring of a make-before-break transfer key and to the high side of elec-




*Figure 48. Sound Calibrator TS–550/G.*

tronic multimeter ME–6/A or the equivalent.

(1) Connect the normally made contact spring to the tip of jack L1–L2.

(2) Connect the plunger spring to one side of a calibrated variable resistor.

(3) Connect the other terminal of the oscillator, electronic multimeter, and resistor to the sleeve of jack L1–L2.

(4) Operate keys 1 and 2 to the STA position.

(5) With the transfer key in its normal position, adjust the oscillator output level for a convenient deflection at the electronic multimeter.

(6) Operate the transfer key and adjust the calibrated resistor to provide the same deflection at the electronic multimeter. The adjusted setting of the calibrated resistor should be 302 $\pm$ 5 ohms.

(7) Restore keys 1 and 2 to normal.

## 105. Carbon-type Microphones Test Circuit (figs. 39 through 42)

*a.* Connect Weston Milliammeter model No. 322, 0–200 scale, or the equivalent, to the terminal clips COMMON and TRANSMITTER. The positive terminal of the milliammeter should be connected to the TRANSMITTER terminal clip.

(1) Operate key 1 to the CBPE position and key 2 to the RCT position.

(2) Adjust control D1 to position 3.

(3) Operate key 8 to the TRANS position and observe the deflection at the milliammeter.

The current should be 66 ± 1.6 milliamperes.

(4) Release key 8.

*b.* Replace the milliammeter with a variable calibrated resistor covering a minimum range of 0–350 ohms in 1-ohm steps.

(1) Operate key 8 to the TRANS position and key 7 to the DC position.

(2) Adjust the variable resistor for a mid-scale deflection at meter M1. The adjusted value of the variable resistance should be 101 ± 6 ohms.

(3) Remove the external circuit and restore all keys and controls to normal.

*c.* Disconnect power connector SK–1 of Test Set I–142 and short circuit terminals 7 and 12 of connector P1.

(1) Operate key 1 to the LBPE position.

(2) Adjust control D1 to position 1.

(3) Operate key 8 to the TRANS position and measure the d-c resistance at the TRANSMITTER and COMMON clip terminals with an ohmmeter. The d-c resistance should be 4.0 ± 1.0 ohms. Restore the keys and controls to normal.

*d.* Connect the ungrounded side of a variable audio-frequency oscillator set at 1,000 cps through approximately 500 ohms to the armature or common spring of a make-before-break transfer key and to the high side of Electronic Multimeter ME–6/A or the equivalent.

(1) Connect the normally made contact spring to the TRANSMITTER clip terminal of the test set.

(2) Connect the normally open contact spring to one side of a calibrated variable resistor.

(3) Connect the other terminal of the oscillator, electronic multimeter, and resistor to the COMMON clip terminal of the test set.

(4) Operate key 2 to the RCT position.

(5) Adjust control D3 to the 0 position.

(6) Adjust control D1 to position 1.

(7) With the transfer key in its normal position, adjust the oscillator output level for a convenient deflection at the electronic multimeter.

(8) Operate the transfer key and adjust the calibrated variable resistor to provide the same deflection at the electronic multimeter. Observe the value of the adjusted resistor.

(9) Repeat the procedure outlined in (6), (7), and (8) above, with control D1 at positions 2, 3, 4, and 5.

(10) The relationship between the settings of control D1 and the corresponding adjusted values for the calibrated variable resistor should be as follows:

| *Setting of control D1* | *adjusted value of calibrated variable resistor* |
|---|---|
| 1 | 30 ± 2 |
| 2 | 60 ± 4 |
| 3 | 75 ± 5 |
| 4 | 150 ±10 |
| 5 | 300 +15 |

(11) Remove the external circuit and restore the keys and controls to normal.

## 106. Receivers and Magnetic Microphones Test Circuit (fig. 43)

*a.* Operate key 2 to the RCT position.

*b.* Operate key 8 to the REC position and measure the d-c resistance at the RECEIVER and COMMON clip terminals with an ohmmeter. The relationship between the settings of control D2 and the d-c resistance as measured at the RECEIVER and COMMON clip terminals is as follows:

| *Setting of control D2* | *D-c resistance (ohms) measured on COMMON AND RECEIVER* |
|---|---|
| 1 | 130 ± 3 |
| 2 | 260 ± 6 |
| 3 | 539 ± 12 |
| 4 | 1130 ± 23 |
| 5 | 10130 ± 250 |

*c.* Return keys and controls to normal.

## 107. Generator Test Circuit (fig. 44)

*a.* Operate key 6 to the CKT position.

*b.* Operate key 4 to the GEN position and measure the d-c resistance across jack L1–L2 with an ohmmeter. The d-c resistance should be 1,000 ± 50 ohms. Restore the keys to normal.

*c.* Operate key 6 to the CKT position. Connect at jack L1–L2 to a sinusoidal source adjusted to 45 volts, 60 cps as measured by an a-c voltmeter having an accuracy of ± 2 percent.

(1) Operate key 4 to the GEN position and observe the db scale of deflection of meter M1. The meter deflection should be ± 0.8 ± 0.2 db. Resistance of the meter multiplier may be

changed to meet this requirement by replacing resistor R38B with a resistor of like type and of required resistance.

(2) Restore the keys to normal.

### 108. Ringer Test Circuit (fig. 45)

*a.* Operate key 4 to the RINGER position.

*b.* Operate key 6 to the CKT position and measure the d-c resistance across jack L1–L2 with an ohmmeter. The relationship between the settings of control D5 and the d-c resistance as measured at L1–L2 is as follows:

| *Setting of control D5* | *D-c resistance (ohms) measured at L1–L2* |
|---|---|
| 1 RINGER | 5800 ± 10% |
| 2 CUR | 1000 ± 10% |
| 3 | 2000 ± 10% |

*c.* With key 4 at the RINGER position, control D5 at RINGER CUR (position 1, 2, or 3), and key 6 at the CKT position, turn the test set generator at normal speed. Meter M1 should deflect to a minimum of 0 db.

### 109. Capacitor Test Circuit (fig. 26)

*a.* Adjust control D9 to the maximum counterclockwise position.

*b.* Operate key 6 to the COND position and key 5 to the CHK position.

*c.* Slowly rotate control D9 in a clockwise direction until lamp LP2 lights (orange-colored glow).

*d.* Release keys 5 and 6.

*e.* Connect a 1-mf capacitor at jack L1–L2. Operate key 6 to the COND position. Lamp LP2 should flash intermittently at a rate of approximately one flash per second.

*f.* Connect a 10-megohm ± 10 percent resistor across the terminals of the capacitor. Lamp LP2 should cease flashing.

*g.* Release key 6 and disconnect the capacitor and resistor.

### 110. Insulation Resistance Test Circuit (fig. 46)

*a.* Connect a 200,000-ohm ± 5 percent, ½-watt resistor at jack L1–L2.

*b.* Operate key 6 to the CKT position and key 5 to the BKDN position.

*c.* Operate the test set generator at a crank speed of approximately 200 rpm. The deflection at meter M1 should be — 6 ± 0.5 db.

*Note.* Resistor R32 and/or resistor R31 may be adjusted to meet this requirement.

*d.* Return the keys to normal.

### 111. Dial Contact Percent Break Test Circuit (figs. 27 and 28)

At jack L1–L2, connect the pulse contacts of a station-type dial which has been adjusted for operation at a speed of 12 pulses per second and which has its pulse contacts open 63 percent of the total make-and-break interval.

*a.* Operate key 6 to the CKT position and key 7 to the DC position.

*b.* Operate key 3 to the %BRK position.

*c.* Adjust control D6 for the full (100) d-c scale deflection at meter M1.

*d.* Fully wind the dial. Operate key 3 to the %BRK position and release the dial. The mean deflection of the meter should reach and maintain its ultimate value before the dial comes to rest. The range of the meter indicator oscillation about the mean should not exceed 2 percent.

### 112. Dial Speed Test Circuit (figs. 29 and 30)

*a.* Adjust the circuit as specified in paragraph 111.

(1) Fully wind the dial. Operate key 3 to the DIAL SPEED position and release the dial.

(2) Observe the maximum d-c scale deflection at meter M1 at the moment when the dial comes to rest. The meter deflection should be 33 ± 1 on the d-c scale.

*Note.* In order to reduce the variation in speed on successive operations, the dial should be operated several times before test without forcing the rate of return.

*b.* When calibrated dials are not available, the dial speed test circuit of a test set I–142 may be checked on a comparison basis by using a second test set I–142 which is known to be in working condition.

(1) Adjust the dial test circuit of both sets to obtain a full d-c scale deflection in the %BRK position (par. 111).

(2) Select a dial which when tested on the

working I–142, produces a deflection at its meter of between 30 to 40 divisions on the d-c scale in the dial speed test (par. 32).

(3) Operate the dial several times to reduce the variation in speed on successive operations.

(4) Carefully determine the average deflection obtained from three observations of the dial speed circuit of the working set and from the set in question. The average of the meter deflections obtained on the two test sets should agree to within ± 2 divisions on the d-c scale.

*c.* Where the dial speed measurement indicates (by the methods discussed in *a* and *b* above) that the circuit requires adjustment, the procedure is as follows:

(1) Using the 12-pulse-per-second dial, adjust the position of control D6 to obtain a deflection at meter M1 which will be exactly at the F line on the d-c scale.

(2) If calibrated dials are not available and a comparison basis is being used, adjust the position of control D6 to obtain a deflection at meter M1 which will be the same for the working set as for the comparison set.

(3) Then, being careful not to change the position of control D6, disconnect the dial from jack L1–L2.

(4) Operate key 3 to the % BRK position.

(5) Adjust the resistance of resistor R33 to produce a full d-c scale deflection on meter M1.

# APPENDIX I

# REFERENCES AND GLOSSARY

## 1. References

For availability of items listed below, see FM 21–6 and Army Supply Catalog SIG 1 & 2. In addition, see the latest issue of FM 21–6 for applicable technical bulletins, supply bulletins, modification work orders, and changes thereto.

*a.* ARMY REGULATIONS.

AR 380–5, Safeguarding Military Information.

*b.* SUPPLY PUBLICATIONS.

SIG 1 and 2, Introduction and Index.
SIG 3, List of Items for Troop Issue.
SIG 4–1, Allowances of Expendable Supplies.
SIG 4-2, Allowances of Expendable Supplies for Tactical Organizations, Training Centers, Boards and Fixed Installations.
SB 11–6, Dry Battery Supply Data.
SB 11–76, Signal Corps Kit and Materials for Moisture- and Fungi-resistant Treatment.

*c.* TECHNICAL MANUALS ON AUXILIARY EQUIPMENT AND TEST EQUIPMENT.

TM 11–472, Repair and Calibration of Electrical Measuring Instruments.
TM 11–2524, Oscillator I–151–A.
TM–11–2626, Test Unit I–176.

*d.* PACKAGING AND PACKING INSTRUCTIONS.

(1) *Joint Army–Navy packaging specifications.*

JAN–D–169, Desiccants, Activated.
JAN–P–100, General Specifications.
JAN–P–106, Boxes, Wood, Nailed.
JAN–P–116, Preservation, Methods of.
JAN–P–125, Barrier Material, Waterproof.
JAN–P–131, Barrier Material, Moisture-Vaporproof, Flexible.

(2) *U. S. Army Specification.*

100–2E, Marking Shipments by Contractors (and Signal Corps Supplement thereto).

(3) *Signal Corps Instructions.*

720–7, Standard Pack.
726–15, Interior Marking.

*e.* PAINTING, PRESERVING, AND LUBRICATION.

SB 11–30, Shipment and Shelf Life Information Testing, and Disposition of Dry Batteries.

*f.* DECONTAMINATION.

TM 3–220, Decontamination.

*g.* DEMOLITION.

FM 5–25, Explosives and Demolition.

*h.* OTHER PUBLICATIONS.

TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 66, Winter Maintenance of Signal Equipment.
TB SIG 72, Tropical Maintenance of Ground Signal Equipment.
TB SIG 75, Desert Maintenance of Ground Signal Equipment.
TM 1–455, Electrical Fundamentals.
TM 11–453, Shop Work.
TM 11–455, Radio Fundamentals.
TM 11–462, Signal Corps Reference Data.
TM 11–486, Electrical Communication Systems Engineering.
TM 11–487, Electrical Communication Systems Equipment.
TM 38–650, Basic Maintenance Manual.

*i.* FORMS.

WD AGO Form 468 (Unsatisfactory Equipment Report).

## 2. Abbreviations

| | |
|---|---|
| CB | common battery |
| cm | centimeter (s) |
| cps | cycles per second |
| db | decibel (s) |
| GL | Grease, lubricating, special |
| hex. | hexagon |
| IR drop | voltage drop; fall of potential |
| LB | local battery |
| mf | microfarad (s) |

| | |
|---|---|
| mmf | micromicrofarad (s) |
| pps | pulse per second |
| PL | Oil, lubricating, preservative, special |
| PM | preventive maintenance |
| rpm | revolutions per minute |
| SD | Solvent, dry cleaning |
| spec | specification (s) |
| SPST | single pole, single throw |

## 3. Glossary

*Amplifier*—A device used to increase signal voltage, current, or power. It generally consists of a vacuum tube and an associated circuit called a stage. It may contain several stages in order to obtain a desired result.

*Amplitude*—The maximum instantaneous value of an alternating current or voltage measured in either the positive or negative direction.

*Attenuation*—The reduction in strength of a signal. It may be deliberate as when an attenuator is used. It may be involuntary and due to inherent circuit resistance or impedance.

*Audio frequency*—A frequency audible to the human ear. The range extends from approximately 20 to 20,000 cycles per second.

*Battery*—The term battery is normally used when referring to one or more dry cells or storage cells. In Test Set I–142 this term is used when a d-c source is referred to.

*Bias*—The d-c voltage maintained between the control grid and the cathode of a vacuum tube.

*Bleeder*—A resistance connected in parallel with a power-supply output to protect the equipment from excessive voltages when the load is removed, or substantially removed, and to drain the charge remaining in the filter capacitors when the unit is turned off.

*Blocking capacitor*—A capacitor used to block the flow of dc while permitting ac to pass; also called coupling capacitor.

*Bypass capacitor*—A capacitor used to provide an a-c path of comparatively low impedance around a circuit element.

*Capacitor*—Two electrodes, in the form of plates, separated from each other by an insulating material called the dielectric.

*Cathode bias*—The method of biasing a tube by placing the biasing resistor in the common cathode-return making the cathode more positive, rather than the grid more negative, with respect to ground.

*Choke*—A coil used to impede the flow of pulsating dc or ac and to permit the flow of dc.

*Decibel*—The standard unit of comparison between two quantities of electrical or acoustical power. The number of decibels denoting the ratio of the two amounts of power is ten times the logarithm to the base 10 of this ratio.

*Ground*—The contact of a conductor with the earth; also the earth when used as a return conductor.

*Jack*—A receptacle which, in combination with a plug, provides a device by means of which connections may be readily made in electrical circuits.

*Key*—A hand operated device for the rapid opening and closing of a circuit or circuits.

*Rectifier*—A device for changing ac to dc.

*Trimmer capacitor*—A small variable capacitor used to adjust tuning capacitors.

# APPENDIX II

## IDENTIFICATION TABLE OF REPLACEABLE PARTS FOR TEST SET I–142–(*)

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| | | | | Note. Column 1 refers to Test Set I–142, serial numbers 1 to 160; column 2 refers to Test Set I–142, serial numbers 161 and up; column 3 refers to Test Set I–142–A. | | |
| | | | | TEST SET I–142—telephone; metal case; 19″ lg x 12″ wd x 9″ h over-all. Includes test cord. | For measuring quantitatively the electrical characteristics of field and station telephones, head sets, head and chest sets, microphones, telephone receivers, generators, ringers, capacitors, and dials. | 3F4142 |
| | | | | TEST SET I–142–A: telephone, metal case; 19″ lg x 12″ wd x 9″ h over-all. Includes Sound Calibrator TS–550/G and test cord. Moisture and fungus proof; operates from external source. | For measuring quantitatively the electrical characteristics of field and station telephones, head sets, head and chest sets, microphones, telephone receivers, generators, ringers, capacitors, and dials. | 3F4142A |
| 14B | * | * | * | BOARD, terminal: 16 Zierick No. 150 tinned solder lug term.; phenol fiber; 4⅜″ lg x 1¼″ wd x 1/16″ thk; WECo No. ES670692–1. | Resistor mounting board | 2Z9416.70 |
| 15B | * | * | * | BOARD, terminal; 19 Zierick No. 150 tinned solder lug term.; phenol fiber; 5½″ lg x 1¼″ wd x 1/16 thk; WECo No. ES670692–2. | Resistor mounting board | 2Z9419–15 |
| 8B | * | * | * | BOARD, terminal: 36 Zierick No. 150 tinned solder lug term.; phenol fiber; 10⅜″ lg x 1¼″ wd x 1/16″ thk; WECo No. ES670731–1 | Resistor mounting board | 2Z9436–13 |
| BZ1 | * | * | * | BUZZER, test: vibrating; adjustable; 2⅛″ x 1 5/16″ over-all; Edwards No. 15, Lunger size No. 1. | Audible signal, continuity test | 4Z3120.1 |
| | * | * | * | CABLE ASSEMBLY, power: jacket of plasticized cellulose acetate over 21 ply 3 thd cotton braid over vinylite tape; 14″ lg; two #22 AWG stranded copper cond ea comprising 7 #30 tinned copper strands; woven copper shield; WECo type AY. | Test cord, connects equipment under TEST to TEST SET. | 3E4036–14–1 |
| | | | | CALIBRATOR, audio level: Sig C Sound Calibrator TS–550/G; u/w Sig C Test Set I–142–(*); c/o 3 WECo D141915 Receivers, 3 Sig C Cords CC–305–B and 3 WECo No. 11A Receiver Cases, contained in a plywood case; 99¾″ lg x 4¾″ wd x 2⅞″ h over-all. | Used to calibrate generated sound pressure. | 3F4325–550 |
| C3, C6, C12 | * | | | CAPACITOR, fixed: electrolytic; 10 mf; 50 vdcw; 1⅞″ lg x 11/16″ diam; Mallory No. BB13. | Amplifier tube VT1–VT2 cathode bypass capacitor. | 3DB10–131 |
| C3, C6, C12 | | * | * | CAPACITOR, fixed: electrolytic; 3 sec.; 10–10–10 mf; 50 vdcw; 1⅜″ diam x 2¾″ lg; Aerovox No. LEEP. | Amplifier tube VT1–VT2 cathode bypass capacitor. | 3DB10–132 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| C1 | | * | * | CAPACITOR, fixed: electrolytic; 20 mf; 50 vdcw; 1¾" lg x 1¾" wd x 1" h over-all; Aerovox No. LBTEP (bathtub type). | Sound source wave shaping capacitor. | 3DB20–81 |
| C1 | * | | | CAPACITOR, fixed: electrolytic; 20 mf; 150 vdcw; ⅝" diam x 1 11/16" lg; Dubilier No. BR–2015. | Sound source wave shaping capacitor. | 3DB20–13 |
| C10 | | * | * | CAPACITOR, fixed: electrolytic; 50 mf; 25 vdcw; 2½" lg x 1" wd x 15/16" h; JAN type No. CE64C500F. | METER RECTIFIER capacitor. | 3DB50–80 |
| C10 | * | | | CAPACITOR, fixed: electrolytic; 50 mf; 25 vdcw; 1⅞" lg x 11/16" diam; Mallory No. WB29. | METER RECTIFIER capacitor. | 3DB50–51 |
| C14 | * | * | * | CAPACITOR, fixed: mica; 3,500 mmf ±1%; 500 vdcw; 1¼" x 27/32" x 9/32"; WECo type No. 401C. | EQUALIZER NETWORK capacitor. | 3DA3.500–12 |
| C15 | * | * | * | CAPACITOR, fixed: mica; 8,000 mmf ±1%; 500 vdcw; 1⅞" x 1⅛" x 8/32"; WECo type No. 402C. | EQUALIZER NETWORK capacitor. | 3DA8–19 |
| C11, C16 | * | * | * | CAPACITOR, fixed: mica; 10,000 mmf ±10%; 300 vdcw; max dimen 1 1/32" lg x 41/64" wd x 11/32" thk; No. CM40B103K. | SOUND SOURCE VIBRATOR contact spark suppressor. | 3K4010321 |
| C5, C7 | * | * | * | CAPACITOR, fixed: paper: 6,000 mmf ±20%; 800 vdcw; 13/16" x 13/16" x 19/64"; WECo No. 404A. | C5—Amplifier tube VT1 plate coupling capacitor. C7—Amplifier tube VT2 (triode 2) coupling capacitor. | 3DA6–49 |
| C8 | * | * | * | CAPACITOR, fixed: paper; 250,000 mmf ±20% —0%, HS metal case; 4½" lg x 1½" wd x 19/32" thk. JAN type No. CP79A1HC254W. | Amplifier tube VT2 (triode 1) coupling capacitor. | 3DA250–344 |
| C4 | | * | * | CAPACITOR, fixed: paper; 500,000 mmf ±20% —10%; 600 vdcw; 2½" lg x 1" wd x 1⅝" h over-all; 2 solder lug term on top; JAN type No. CP54B1FF504V. | Amplifier tube VT1 screen grid bypass capacitor. | 3DA500–492 |
| C4 | * | | | CAPACITOR, fixed: paper; 500,000 mmf ±20%; 600 vdcw; 1 1/16" diam x 2 13/16" lg; 2 axial wire leads 1½" lg; JAN type No. CP26A1DF504M. | Amplifier tube VT1 screen grid bypass capacitor. | 3DA500–533 |
| C13 | * | * | * | CAPACITOR, fixed: paper; 1.08 mf ±0.01%; 200 vdcw; 3 7/16" lg x 1½" wd x 15/32" thk; WECo No. D166043. | CAPACITOR COUPLING sound source to measuring circuit. | 3DB1.141QA |
| C2 | * | * | * | CAPACITOR, fixed: paper; 2 mf ±25%; 200 vdcw; 3½" lg x 1½" wd x 31/32" thk; WECo No. D–164957. | Capacitor, coupling instrument test circuits to measuring circuit. | 3DB2.39A–1 |
| C9 | * | * | * | CAPACITOR, fixed: electrolytic; 500 mf; 50 vdcw; 1⅜" diam x 3" lg; WECo No. KS8671. | Dial test impulse capacitor | 3DB500–22 |
| | * | * | * | CLIP, battery: steel, cadmium pl; 2" lg; Mueller Elec No. 48–B. | Test clip test cord connector | 3Z1087–5 |
| Receiver, Common, Transmitter P2 | * | * | * | CLIP—jack type; spring steel; nickel-silver plated; ⅝" wd x 1" lg x 1⅛" h over-all; WECo jack No. D–BL159259. | Connects receivers, microphones, and hand sets to test set. | 2Z8877.121 |
| | * | * | * | CONNECTOR, female contact: 3 round polarized cont; straight; 1¼" lg x ⅞" wd x ⅞" thk; Amphenol No. PCG3F. | Connects vibrator output to sound source receiver. | 2ZK8673.18 |
| SK1 | * | * | * | CONNECTOR, female contact: 6 rectangular polarized phosphor-bronze cont; straight; 1 7/16" x 1¼" x 1 3/16" over-all; Jones HB No. S–406–CCT. | Power cord connector | 2ZK8639.10A |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| | * | * | * | CONNECTOR, male contact: 3 round polarized cont; straight; 1 3/16″ lg x 11/16″ OD less cont; Amphenol No. MPM3L. | Connects sound source receiver to vibrator output. | 2Z7234–8 |
| P1 | * | * | * | CONNECTOR, male contact: 6 rectangular polarized phosphor-bronze cont; straight; 1 7/16″ lg x 1″ wd x 13/16″ d less cont; Jones HB No. P–406–AB. | Connects test set to power cord. | 2Z7228.29 |
| | * | * | * | CRANK GC–9: generator; folding type; brass arm w/phenolic handle; 2″ x 5/8″ x 1″ over-all folded; Sig C dwg No. SC–D–1797–E. | Crank for Generator GN–38. | 4B454 |
| F1, F2 | * | * | * | FUSE, cartridge: ¼ amp, 250 v; glass; ferrule; ¼″ diam x ¼″ lg; ¼″ diam x 1¼″ lg over-all; Littelfuse type 3AG No. 1045. | F1—Fuse for 24 V power supply. F2—Fuse for 135V power supply. | 3Z2587 |
| F4 | * | * | * | FUSE FU–26: cartridge; 1 amp, 250 v; glass; ferrule; ¼″ diam x ¼″ lg; ¼″ diam x 1¼″ lg over-all. Littelfuse type 3AG No. 1040. | Fuse for 3V power supply | 3Z1926 |
| F3 | * | * | * | FUSE FU–50: cartridge; 3 amp, 250 v; glass; ferrule; ¼″ diam x ¼″ lg; ¼″ diam x 1¼″ lg over-all. Littelfuse No. 312003. | Fuse for 12V power supply | 3Z1950 |
| GEN | * | * | * | GENERATOR GN–38: hand; telephone; 3 magnets; 4″ x 3⅛″ x 2¾″ over-all; Sig C dwg No. SC–D–816. | A–c voltage generator; insulation resistance and ringer test circuits. | 4B838 |
| | | | | ARMATURE, generator: ringing; max dimen 3.391″ lg x 1.469″ diam over-all. | To generate current | 4B838/A5 |
| | | | | CAM, generator: bronze; max dimen 0.466″ diam x 0.599″ lg. | Closes contacts of switch | 4B794 |
| | | | | CONTACT SET, generator: ringing; 3 flat springs; cont arrangement 1B1A; w/mtg bracket, approx 2″ h x 1⅝″ wd x ⅝″ d over-all. | Acts as circuit control | 4B838/S2 |
| | | | | GEAR, pinion: generator; brass; 0.479″ OD x ⅜″ wd, w/shoulder 5/32″ lg x ⅜″ diam, 21 teeth. | Small gear driving armature | 4B838/G2 |
| | | | | GEAR, spur: generator drive; brass; 2.104″ OD x 5/16″ wd, w/0.468″ diam, hub ⅝″ lg, 99 teeth. | Large gear driving armature | 4B821 |
| | | | | PIN, dowel: steel; 0.0064″ diam x ⅜″ lg. | For pinion gear | 4B838/P1 |
| | | | | SCREW, machine: FH; brass; dull white nickled No. 8–32, ⅜″ lg. | Mounts generator assembly | 6L6832–6.7A |
| | | | | SCREW, set: headless; steel; cup point No. 8–32, ⅛″ lg. | For locking shaft collar | 6L7958–2.31S |
| | | | | SHAFT, generator: steel shaft; 0.277″ diam shaft, 3 37/64″ lg x 0.465″ diam over-all; includes bronze cam and phenolic buffer pin. | Mounts gears | 4B33832 |
| | | | | SPRING, helical: 0.030″ diam; steel music wire; 4 turns, LH; 19/64″ diam x 11/16″ lg. | Operates cam | 4B838/83 |
| | * | * | * | GLIDE, furniture: "Insulated Domes of Silence" type; steel and rubber; 1½″ diam x 1″ h over-all; WECo No. P–382976. | Test set mounting | 6Z4701 |
| | * | * | * | HANDLE, lever switch: black bakelite, knurled; ⅜″ diam x 13/16″ lg; WECo No. P–132717. | Handle for lever switches | 4C5104.79/6 |
| | * | * | * | HOLDER, fuse: extractor post type; for single 3AG fuse; moulded black bakelite body; 10 amp max; ⅝″ OD x 2⅛″ lg over-all; Littelfuse No. 341001. | Holder for power fuses | 3Z3275 |
| | * | * | * | INSULATOR, clip: black rubber; approx 2¾″ lg x ⅝″ OD; Mueller Elec No. 49 black. | Insulator test cord clip | 3G1350–63 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| | * | * | * | INSULATOR, clip: red rubber; approx 2¾″ lg x ⅝″ OD; Mueller Elec No. 49 red. | Insulator test cord clip | 3G1790–44.1 |
| | * | * | * | INSULATOR, washer: soft rubber; ⅛″ ID, ¼″ OD x 1/16″ thk; Canfield Rub No. 1983. | Vibrator mounting shock absorbing washer. | 3G1790–4.1 |
| J1, J2 | * | * | * | JACK, telephone: for 2 cond ¼″ diam plug; 3 15/32″ lg x 9/16″ wd x 13/16″ h over-all; WECo No. D161891–223A. | J1—L1–L2 jack, test cord connector.<br>J2—CONT jack, test cord connector. | 4C4823A.1 |
| | | | | KEY (see SWITCH, lever). | | |
| | * | * | * | KNOB, round: black bakelite; for ¼″ diam shaft; single No. 8–32 setscrew; 1⅛″ diam x ⅝″ h; Kurz-Kasch No. S–308–64–BB. | Knob for controls D1 through D8. | 2ZK5822–32 |
| LP2 | * | * | * | LAMP, glow: 1 w; striking volt 85v d-c-60V A-c; bulb G–10 clear; 1″ diam x 1⅝″ lg; double cont bayonet base; WECo No. CD–4006–CL. | Visual signal capacitor test circuit. | 2Z5889–8 |
| LP1 | * | * | * | LAMP, incandescent: 16 v, 0.270–0.310 amp; bulb T–2 clear; 1 11/16″ lg x 5/16″ diam; slide base; WECo No. H1. | Visual signal continuity test circuit. | 4C5491–H1 |
| | * | * | * | LAMPHOLDER: slide base; brass body; 3⅛″ lg x 1½″ diam over-all; WECo No. D–161946. | Lampholder for lamp LP2 | 2Z5886–17 |
| | * | * | * | LAMPHOLDER: two cont bayonet base; bakelite base, steel body; 1⅜″ diam x 1″ h; Rad Wire Telev No. K13332. | Lampholder for lamp LP1 | 2Z5883–255 |
| | * | * | * | LENS, indicator light: brass w/red glass lens; 13/32″ diam; WECo No. 2H. | Visual signal, continuity test | 4C2502H |
| | * | * | * | LEAD, test: rubber-jacketed; round, 0.275″ diam; 36″ lg; two #18 AWG stranded copper cond; WECo No. KS–7133 cordage, WECo No. ES670923–1 (w/plug PL–48 on one end and two Mueller Elec No. 48B test clips on other end; color-coded). | Test cord connecting test set to equipment to be tested. | 3E4036–36–9 |
| M1 | * | * | * | METER, multiscale: d-c; upper scale —10 to 0 to ±6db, lower scale 0–100 divisions; semi-flush, through panel mtg, round case body, sq flange; flange 4¼″ wd x 4″ h x 11/16″ thk, body 3¼″ diam x 1⅛″ d; WECo No. KS9050. | Measures current values in milliamperes and decibels. | 3F3299–1 |
| | * | * | * | MOUNTING, capacitor: ring type; steel cadmium plate; 1 15/32″ ID, ½″ wd x 1/32″ thk x 2 5/16″ OD over-all; Dubilier No. 15591 (for 1½″ diam can). | Holds vibrator on socket | 2Z2655–264 |
| | * | * | * | NUT, anchor: special; brass, nickel pl; ⅜″–32 thd; 27/64″ OD x 15/32″ lg excluding shoulder, shoulder 7/64″ thk x ½″ across flats; Mallory No. A–11260–2. | Nut for mounting controls through panel. | 6L3866–32.1 |
| | * | * | * | PLATE, mounting: socket; steel, cadmium pl; 2⅛″ x 1⅜″ x 1/16″; Amphenol No. 12–3S NP saddle. | For mounting octal socket 2Z8654.7 in models serial Nos. 1 through 160. | 3F4142–1 |
| | * | * | * | PLUG PL–48: telephone; 2-way; single shank; tubular, red fiber shell; shank 0.250″ diam x 1.199″ lg, shell 9/16″ diam x 1 13/16″ lg, over-all lg 3.295″; Sig C dwg No. SC–D–592. | Plug for test cord | 4C6248 |
| | | | | RECEIVER, head set (see RECEIVER ELEMENT). | | |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| REC | * | * | * | RECEIVER ELEMENT, telephone: capsule type; 135 ohms at 1,000 cps; 1 13/16″ diam x ¾″ thk over-all; WECo No. D–173175 (use sound calibrator TS–550/G when replacing this item). | Converts vibrator output to acoustic pressure. | 4B3040–1 |
| RY1 | * | * | * | RELAY, armature: cont arrangement 1A; 3 35/64″ lg x 1 3/16″ wd x 1 11/16″ h over-all; WECo No. D–161973–1. | Meter overload cut-out, CB telephone test. | 2Z7586–121 |
| R10 | * | * | * | RESISTOR, fixed: composition; 390 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF391K. | Amplifier VT1 tube cathode resistor. | 3RC218F391J |
| R14, R17 | * | * | * | RESISTOR, fixed: composition; 820 ohms ±10%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF821K. | R14—Amplifier VT2 (triode cathode resistor).<br>R17—Amplifier VT2 (triode cathode resistor). | 3RC21BF821K |
| R39 | * | * | * | RESISTOR, fixed: composition; 1,000 ohms ±5%; 5 w; 3.16″ lg x 0.780″ diam max; JAN type No. RC75CF102J. | Generator test load resistor | 3RC75CF102J |
| R47 | * | * | * | RESISTOR, fixed: composition; 5,100 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF512J. | Sound source load resistor for calibrating amplifier. | 3RC21BF512J |
| R49 | * | * | * | RESISTOR, fixed: composition; 10,000 ohms ±5%; ½w; max dimen 0.655″ lg x 0.249″ diam; RC21BF103J. | Equalizer network resistor | 3RC21BF103J |
| R34 | * | * | * | RESISTOR, fixed: composition; 15,000 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF153J. | Dial test meter multiplier | 3RC21BF153J |
| R15, R18 | * | * | * | RESISTOR, fixed: composition; 24,000 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF243J. | R15—Amplifier VT2 (triode grid resistor).<br>R18—Amplifier VT2 (triode plate resistor). | 3RC21BF243J |
| R12 | * | * | * | RESISTOR, fixed: composition; 51,000 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF513J. | Amplifier VT1 tube plate resistor. | 3RC21BF513J |
| R32 | * | * | * | RESISTOR, fixed: composition; 100,000 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF104J. | Insulation resistance test meter multiplier. | 3RC21BF104J |
| R11, R31 | * | * | * | RESISTOR, fixed: composition; 130,000 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF134J. | R11—Amplifier VT1 tube screen grid resistor.<br>R31—Insulation resistance test load resistor. | 3RC21BF134J |
| R13, R16, R30 | * | * | * | RESISTOR, fixed: composition; 510,000 ohms ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF514J. | R13—Amplifier VT2 (triode 2) grid resistor.<br>R16—Amplifier VT2 (triode 2) plate resistor.<br>R30—Capacitor test calibration resistor. | 3RC21BF514J |
| R29 | * | * | * | RESISTOR, fixed: composition; 680,000 ohms ±10%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF684K. | Capacitor test load resistor | 3RC21BF684K |
| R28 | * | * | * | RESISTOR, fixed: composition; 15 meg ±5%; ½ w; max dimen 0.655″ lg x 0.249″ diam; RC21BF156J. | Capacitor test check load resistor. | 3RC21BF156J |
| R25 | * | * | * | RESISTOR, fixed: wire-wound; 2 ohms ±1%; 15/32″ diam x 1 1/16″ lg; 2 axial wire leads 2″ lg; JAN type No. RC51B2R000F. | Microphone test 3V battery supply resistor. | 3RB2-2000 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| R2 | * | * | * | RESISTOR, fixed: wire-wound; 3.2 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg; JAN type No. RC51B3R200C. | Measuring circuit attenuator resistor. | 3RB2–3200.1 |
| R3 | * | * | * | RESISTOR, fixed: wire-wound; 6.8 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg; JAN type No. RC51B6R800C. | Measuring circuit attenuator resistor. | 3RB2–6800 |
| R27 | * | * | * | RESISTOR, fixed: wire-wound; 17 ohms ±½%; 1¼" lg x ½" diam; WECo No. D–171865. | CB telephone test 24V battery supply. | 3Z6001G7–13 |
| R4 | * | * | * | RESISTOR, fixed: wire-wound; 22 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg; JAN type No. RC51B22R00C. | Measuring circuit attenuator resistor. | 3RB3-2200 |
| R33B | * | * | * | RESISTOR, fixed: wirewound; 24 ohms ±5%; ½ w; 15/64" diam x 31/32" lg; JAN type No. RU3B240J. | Dial test calibration resistor | 3RU19601 |
| R33A, R1 | * | * | * | RESISTOR, fixed: wire-wound; 5 windings on core; winding (1–2) 50 ohms, (2–3) 100 ohms, (3–4) 200 ohms, (4–5) 400 ohms, (5–6) 800 ohms; provides 50-ohm steps from 0–1550 ohms; ⅞" h x 1⅛" excluding solder lug term; WECo No. D–162025CK (replaces WECo No. D–166880–CW in Test Set I–142). | Dial test calibration resistor | 3Z6155 |
| R5 | * | * | * | RESISTOR, fixed: wire-wound; 68 ohms ±0.25%; ¼ w, 15/32" diam x 1 1/16" lg max; JAN type No. RB51B68R00C. | Measuring circuit attenuator resistor. | 3RB3–6800 |
| R20, R21 | * | * | * | RESISTOR, fixed: wire-wound; 130 ohms ±1%; 1¼" lg x ½" diam; WECo No. D–171861. | R20—Receiving impedance-matching resistor.<br>R21—Receiving impedance-matching resistor. | 3Z6013–14 |
| R6 | * | * | * | RESISTOR, fixed: wire-wound; 216 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type RB51B216R0C. | Measuring circuit attenuator resistor. | 3RB4–2160 |
| R22 | * | * | * | RESISTOR, fixed: wire-wound; 279 ohms ±1%; 1¼" lg x ½" diam; WECo No. D–171862. | Receiver impedance-matching resistor. | 3Z6027J9 |
| R19 | * | * | * | RESISTOR, fixed: wire-wound; 300 ohms ±1%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type No. RB51B300R0F. | Transmitter and microphone impedance-matching resistor. | 3RB4–3000 |
| R26 | * | * | * | RESISTOR, fixed: wire-wound; 329 ohms ±½%; 1¼" lg x ½" diam; WECo No. D–171864. | Transmitter 24V battery supply resistor. | 3Z6032J9 |
| R23 | * | * | * | RESISTOR, fixed: wire-wound; 591 ohms ±1%; 1¼" lg x ½" diam; WECo No. D–171863. | Receiver impedance-matching resistor. | 3Z6059A1 |
| R46 | * | * | * | RESISTOR, fixed: wire-wound; 600 ohms ±½%; 1 w; 1¼" lg x ½" diam; WECo No. D–75832. | LB telephone test battery supply resistor. | 3Z6060–80 |
| R35 | * | * | * | RESISTOR, fixed: wire-wound; 500 ohms ±½%; 1 w; 1¼" lg x ½" diam; WECo No. D–166860C. | Dial speed test loading resistor. | 3Z6050–178 |
| R7 | * | * | * | RESISTOR, fixed: wire-wound; 684 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type No. RB51B6840C. | Measuring circuit attenuator resistor. | 3RB4–6840 |
| R41 | * | * | * | RESISTOR, fixed: wire-wound; 1,000 ohms ±½%; 1¼" lg x ½" diam; WECo No. D–166860AG. | Sound source load resistor, amplifier calibration. | 3Z6100–227 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| R48 | * | * | * | RESISTOR, fixed: wire-wound; 1,155 ohms ±½%; 1¼" lg x ½" diam; WECo No. D–166860FL. | Sound source load resistor | 3Z6115E5–4 |
| R8 | * | * | * | RESISTOR, fixed: wire-wound; 2,160 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type No. RB51B2160C. | Measuring circuit attenuation resistor. | 3RB5–2160 |
| R37 | * | * | * | RESISTOR, fixed: wire-wound; 3,160 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type No. RB51B31650C. | Dial speed test meter multiplier. | 3RB5–3165 |
| R24B | * | * | * | RESISTOR, fixed: wire-wound; 4,000 ohms ±5%; 1¼" lg x ½" diam; WECo No. D–166860DR. | Receiver impedance-matching resistor. | 3Z6400–101 |
| R36 | * | * | * | RESISTOR, fixed: wire-wound; 4,200 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type No. RB51B42000C. | Dial speed load resistor | 3RB5–4200 |
| R40 | * | * | * | RESISTOR, fixed: wire-wound; 4,800 ohms ±2%; 1¼" lg x ½" diam; WECo No. D–170383. | Ringer test impedance-matching resistor. | 3Z6480–7 |
| R24A | * | * | * | RESISTOR, fixed: wire-wound; 5,000 ohms ±1%; 1¼" lg x 1½" diam; WECo No. D–166860DB. | Receiver impedance-matching resistor. | 3Z6500–224 |
| R9 | * | * | * | RESISTOR, fixed: wire-wound; 6,840 ohms ±0.25%; ¼ w; 15/32" diam x 1 1/16" lg max; JAN type No. RB51B68400C. | Measuring circuit attenuation resistor. | 3RB5–6840 |
| R45 | * | * | * | RESISTOR, fixed: wire-wound; 16,500 ohms ±1%; ½" lg x ½" diam; WECo No. D–165759A. | CB telephone test meter multiplier. | 3Z6616E5–4 |
| R44 | * | * | * | RESISTOR, fixed: wire-wound; 38,800 ohms ±1%; 1½" lg x ½" diam; WECo No. D–165759A. | Battery test 12V meter multiplier. | 3Z6638H8 |
| R43 | * | * | * | RESISTOR, fixed: wire-wound; 78,800 ohms ±1%; 1½" lg x ½" diam; WECo No. D–165759A. | Battery test 24V meter multiplier. | 3Z6678H8 |
| R38A | * | * | * | RESISTOR, fixed: wire-wound; 103,000 ohms ±1%; 1½" lg x ½" diam; WECo No. D–164887A. | Ringer test meter multiplier | 3Z6703 |
| R42A, R42B | * | * | * | RESISTOR, fixed: wire-wound; 225,000 ohms ±1%; 2" lg x 1½" diam; WECo No. D–164887A. | R42A—battery test 135V meter multiplier.<br>R42B—battery test 135V meter multiplier. | 3Z6722E5 |
| D6, D7 | * | | | RESISTOR, variable (potentiometer): wire-wound; 2,000 ohms; 4 w; 3 term.; body 1⅝" diam x 9/16" d; shaft ¼" diam x 1 5/16" lg; Mallory type No. A2MP; WECo dwg No. ES670689 (bushing ⅜"–32 x 13/16" lg). | D6—dial test circuit calibrating resistor.<br>D7—amplifier gain control. | 3Z7320–13 |
| D6, D7 | | * | * | RESISTOR, variable (potentiometer): wire-wound; 2,500 ohms ±10%; 3w; 3 term.; body max dimen 1.64" diam x 0.84" d, shaft ¼" diam x ½" lg; RA25A1SA252AK (bushilng ⅜"–32 x ⅜" lg). | D6—dial test circuit calibrating resistor.<br>D7—amplifier gain control. | 3RA6313 |
| D8 | * | | | RESISTOR, variable (potentiometer): wire wound; 30 ohms; 4 w; 3 term.; body 1⅝" diam x 9/16" d, shaft ¼" diam x 1 5/16" lg; Mallory type U; WECo dwg No. ES670689 (bushing ⅜"–32 x 13/16" lg). | Sound service acoustic output control. | 3Z7030–3 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| D8 | | * | * | RESISTOR, variable (potentiometer): wirewound; 35 ohms ±10%; 3 w; 3 term.; body max dimen 1.64″ x 0.84″ d, shaft ¼″ diam x ½″ lg; RA25A1SA350AK (bushing ⅜″–32 x ⅜″ lg). | Sound service acoustic output control. | 3RA2705 |
| D9 | * | | | RESISTOR, variable (potentiometer): carbon; 1 meg; 3 term.; 1½″ diam x 9/16″ d, shaft ¼″ diam x 1 5/16″ lg; Mallory No. Y1000MP; WECo dwg No. ES670689. | Capacitor test control resistor. | 3Z7499–1.22 |
| D9 | | * | * | RESISTOR, variable (potentiometer): carbon; 1 meg; 3 solder lug term; 1 1/16″ diam x 13/32″ d, ¼″ diam metal shaft ½″ lg;slotted; A-B type J; WECo dwg No. BA–10034–384. | Capacitor test control resistor. | 3Z7499–1.75 |
| | * | * | * | RING, clamping: tube; steel, cadmium pl; 0.023″ thk x 0.085″ wd, split ring 1 1/32″ ID; Cinch No. 1018. | For octal tube sockets | 2Z2642.6 |
| | * | * | * | SCREW, captive: Fil H; brass, nickel pl; No. 10–32 thd, ⅜″ lg; lg over-all; shank 0.140″; WECo No. P420820 lockscrew assembly. | Fastens top panel to case | 6L4770–16.4 |
| | * | * | * | SCREW, machine: RH; brass, nickel pl head; No. 6—32 x ⅞″ lg. | Mounts spring clips for TRANSMITTER, COMMON, RECEIVER on top panel. | 6L6632–14.5 |
| | * | * | * | SCREW, machine: RH; steel, zinc chromate; No. 4—40 x ½″ lg. | Mounts neon lamp LP2 socket | 6L6440–8.49S |
| | * | * | * | SCREW, machine: RH; steel, zinc chromate; No. 4—40 x ¼″ lg. | Mounts spool type resistors | 6L6440–20.87 |
| | * | * | * | SCREW, machine: RH; steel, zinc pl; No. 6—32 x 1⅞″ lg. | Mounts resistor terminal board. | 6L6632–30.1Z |
| | * | * | * | SCREW, wood: slot drive; OH; brass, black enamel on head only; No. 4; ⅜″ lg. | Mounts lever switches | 6L8204–3F |
| | * | * | * | SCREW, wood: OH; brass, black enamel head only; No. 6—1⅛″ lg. | Mounts meter | 6L8206–9F |
| | * | * | * | SCREW, wood: RH; brass; No. 4—1 7/16″ lg. | Mounts spool type resistors on panel. | 6L8104–11–1 |
| | * | * | * | SCREW, wood: RH; brass; No. 6—11/16″ lg | Mounts switch 9 | 6L8106–5–1 |
| | * | * | * | SCREW, wood: RH; steel zinc pl; chromate finish; No. 6—2″ lg. | Mounts resistor terminal boards on under side of panel. | 6L9106–16C |
| | * | * | * | SOCKET, tube: std octal; ring mtg type molded phenolic; 1¼″ diam x ½″ thk; Cinch No. 9862. Includes retainer ring. | Mounts vacuum tubes VT1 and VT2. | 2Z8654.7 |
| | * | * | * | SOCKET, tube: 4 contact medium; plastic body 1¼″ diam x ⅜″ thk; phosphor bronz cadmium plated cont; Amphenol No. RS–4 | Mounts sound source vibrator VB1. | 2Z8659–3 |
| K1 | * | * | * | SWITCH, lever: two position, locking; cont arrangement position No. 1—1C and 1A, position No. 2—1C and 1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168ET engraved LBPE, CBPE, 1, STA, per WECo dwg No. ES670693–1. | Connects CB and LB telephone test circuits to measuring circuit. | 3Z9580–11.26 |
| K2 | * | * | * | SWITCH, lever: two position, locking; cont arrangement position No. 1—1C and 1A, position No. 2—1C and 1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168ET engraved RCT, FLD, 2, STA, per WECo dwg No. ES670693–1. | Connects telephone, receiver, and microphone test circuits to measuring circuit. | 3Z9580–11.30 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| K3 | * | * | * | SWITCH, lever: two position, nonlocking; cont arrangement position No. 1—1A1C and 1C, position No. 2—1A1B1C and 2C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D-172168HP engraved DIAL SPEED, CHK, 3, ℄BRK, per WECo dwg No. ES670693–1. | Connects dial test circuits to meter. | 3Z9580–11.28 |
| K4 | * | * | * | SWITCH, lever: two position, locking; cont arrangement position No. 1—1C and 1A, position No. 2—1C and 1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168ET engraved RINGER, OFF, 4, GEN, per WECo dwg No. ES670693–1. | Connects generator and ringer test circuits to meter. | 3Z9580–11.29 |
| K5 | * | * | * | SWITCH, lever: two position, nonlocking; cont arrangement position No. 1—1C and 1A1C, position No. 2—1C and 1A1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168GG engraved CHK, OFF, 5, BKDN, per WECo dwg No. 670693–1. | Connects insulation resistance test circuit to meter. | 3Z9580–11.31 |
| K6 | * | * | * | SWITCH, lever: two position, No. 1 locking, No. 2 nonlocking; cont arrangement position No. 1—2C and 1C1F, position No. 2—1C and 1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168DY engraved COND, OFF, 6, CKT, per WECo dwg No. 670693–1. | Controls capacitor test circuit. | 3Z9580–11.27 |
| K7 | * | * | * | SWITCH, lever: two position, No. 1 locking, No. 2 nonlocking; cont arrangement position No. 1—1C and 1B1C, position No. 2—1C and 1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168AG engraved CHK, AC, 7, DC, per WECo dwg No. ES670693–1. | Connects test circuits to meter. | 3Z9580–11.25 |
| K8 | * | * | * | SWITCH, lever: two position, nonlocking; cont arrangement position No. 1—1C and 1A1C, position No. 2—1C and 1A1C; 4 9/64″ lg x 2¼″ h x 15/16″ wd; WECo No. D–172168EE engraved REC, OFF, 8, TRANS, per WECo dwg No. ES670693–1. | Connects output of receiver microphone transmitter and telephone sets to measuring circuit. | 3Z9580–11.24 |
| 9 | * | * | * | SWITCH, push (key): nonlocking; cont arrangement 1C and 1C; 3 11/16″ lg x ¾″ x ⅞″ over-all; WECo No. D–163173A. | Operates sound source circuit. | 3Z9824–34.5 |
| D1, D2, D3, D4. | * | * | * | SWITCH, rotary: single pole, 12 position; single sec.; 1¼″ diam x 1 3/16″ lg excluding shaft, shaft ¼″ diam x 1 5/16″ lg; Mallory No. 31112J; WECo dwg No. ES670689 (bushing ⅜″–32 x 13/16″ lg). | D1 and D2—Control microphone and receiver impedance-matching circuit. D3 and D4–Control measuring circuit attenuator. | 3Z9825–33.21 |
| D5 | * | * | * | SWITCH, rotary: 2 pole, 6 position; single sec.; 1¼″ diam x 1 3/16″ lg excluding shaft, shaft ¼″ diam x 1 5/16″ lg; Mallory No. 3126J; WECo dwg No. ES670689 (bushing ⅜″–32 x 13/16″ lg). | Controls battery and ringer test circuits. | 3Z9825–33.29 |
| S1 | * | * | * | SWITCH, turnbutton: locking; cont arrangement 2A and 2A; 3 13/16″ x ⅝″ x ⅝″ over-all; WECo No. D–162130H Key. | Power supply control | 3Z9880–11.23 |
| S2 | * | * | * | SWITCH, rotary: locking; cont arrangement 1C and 1C; 3⅞& lg x 9/16″ x 13/16″ over-all; WECo No. D–161892A Key. | Equalizer control switch | 4C5105.52A.1 |

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| | * | * | * | TERMINAL, lug: ring type; brass L-shaped, one leg ⅜″ lg x 11/64″ wd over-all w/0.072″ hole, other leg 7/16″ lg x 9/16″ wd over-all w/0.151″ hole; WECo No. P–37010. | Ground terminal | 3Z12075–8.1 |
| | * | * | * | TERMINAL, lug: ring type; copper; ½″ x ⅞″ x 0.064″ thk; WECo No. P–68952. | Ground terminal | 4E6399 |
| | * | * | * | TERMINAL, lug: side spade type; for #18 AWG wire; tinned copper; 7/16″ lg x 3/16″ wd x 0.222″ thk; opening for No. 4 screw; WECo No. P–211251 cord tip. | Neon lamp LP2 terminals | 3Z12027–6 |
| | * | * | * | TERMINAL, lug: spade type; brass; 27/64″ lg x ⅛″ wd over-all; WECo No. 38 cord tip. | Test cord lug connecting cord to Plug PL–48. | 3Z12075–8.22 |
| | * | * | * | TERMINAL TM–107: lug; ring type; brass lead alloy coated; 9/16″ lg x ⅜″ wd x 0.0403″ thk; No. 8 stud hole. | Terminals for TRANSMITTER, COMMON, and RECEIVER clips. | 3Z10107 |
| T1 | * | * | * | TRANSFORMER, AF: auto; impedance-matching; impedance 500 ohms, tapped at 250, 167, 125, 100, 83, 71, 62, and 50 ohms; steel shell; 4½″ x 3 1/16″ x 4½″ over-all; UTC No. LVM11. | Transmitter and microphone impedance-matching circuit. | 2Z9621–116 |
| VT1 | * | * | * | TUBE, electron: JAN–12SG7 | Measuring circuit amplifier 1st stage. | 2J12SG7Y |
| VT2 | * | * | * | TUBE, electron: JAN–12SN7GT | Measuring circuit amplifier 2d stage. | 2J12SN7GT |
| VB1 | * | * | * | VIBRATOR, nonsynchronous: input 6.3 v, 4.5 amp; single reed, 115 cps ±7%; 1½″ diam x 3¼″ lg excluding prongs; Mallory No. 294SW (use Sound Calibrator TS–550/G when replacing this item). | Sound source, converts direct current to alternating current. | 3H6691–38 |
| | * | * | * | WASHER, lock: nontangling; steel, zinc pl; for No. 4 screw, 1/32″ x 1/32″ thk. | For mounting spool type resistors and other equipment. | 6L70004–2C |

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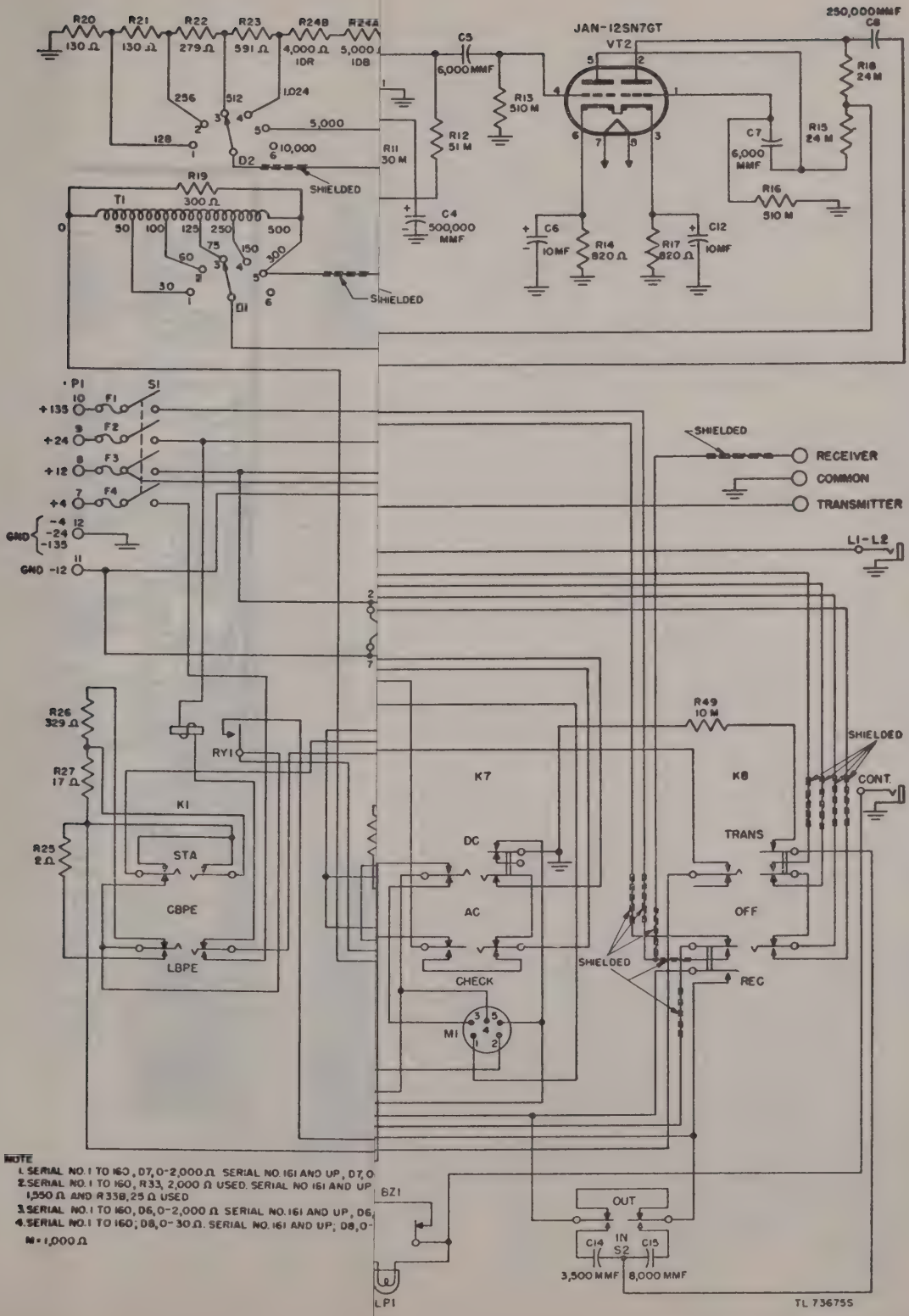
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| Description of techniques | 42 | 26-27 |
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| Trouble shooting | 89*a*, 96*f* | 27-58, 70 |
| Station (CB) telephones: | | |
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| Trouble shooting | 89*b*, 96*g* | 58-69, 70 |
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| Field telephones (LB): | | |
| Test | 24*b* | 10 |
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| Test | 25*b* | 10-11 |
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| Receiving efficiency | 89*b* | 58-60 |
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| Weight, gross, of test set | 5*b* | 3 |
| Wiring, jack box | 67*e* | 36 |




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NOTE

1. SERIAL NO. 1 TO 160, D7, 0-2,000 Ω. SERIAL NO. 161 AND UP, D7, 0-
2. SERIAL NO. 1 TO 160, R33, 2,000 Ω USED. SERIAL NO. 161 AND UP, 1,550 Ω AND R33B, 25 Ω USED
3. SERIAL NO. 1 TO 160, D6, 0-2,000 Ω. SERIAL NO. 161 AND UP, D6,
4. SERIAL NO. 1 TO 160, D8, 0-30 Ω. SERIAL NO. 161 AND UP, D8, 0-

M = 1,000 Ω

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| Insulation resistance between current carrying parts and case | 35*i* | 16 |
| Lever switch | 35*e* | 15 |
| Receiving performance | 35*j* | 16 |
| Ringer MC–131 | 35*c* | 14-15 |
| Transmitting performance | 35*k* | 17 |
| Terminating apparatus: | | |
| General | 66 | 36 |
| Jack box | 67 | 36 |
| Test. (See particular test desired.) | | |
| Testing apparatus: | | |
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| Measuring instruments | 79 | 47 |
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| Dial test: | | |
| General | 77*a* | 43 |
| Percent break test circuit | 77*b* | 43-44 |
| Speed test circuit | 77*c* | 44 |
| Efficiency test circuits: | | |
| Carbon-type microphones | 78*c* | 45 |
| Common battery telephones | 78*b* | 45 |
| Local battery and sound-powered microphones | 78*a* | 44 |
| Microphone resistance | 78*d* | 45 |
| Receivers and magnetic-type microphones | 78*e* | 45 |
| Generator test | 74 | 44 |
| Insulation resistance test | 76 | 43 |
| Measuring circuit | 71 | 40-41 |
| Meter | 72 | 42 |
| Ringer test | 75 | 43 |
| Sound source | 70 | 39-40 |
| Transmitting efficiency: | | |
| Field telephones (LB): | | |
| Test | 24*b* | 10 |
| Trouble shooting | 89*a*, 96*f* | 57-58, 70 |
| Station telephones (CB): | | |
| Test | 25*b* | 10-11 |
| Trouble shooting | 89*b*, 96*f* | 58-69, 70 |
| Tropicalization | 6*b*, 63 | 33-34 |
| Trouble: | | |
| Analysis | 83 | 47-48 |
| Chart | 96 | 68-73 |
| Records | 81*b* | 47 |
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| Capacitor | | |
| Test | 90 | 64 |
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| Test circuit | 86 | 49-51 |
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| Receiving efficiency | 89*b* | 58-60 |
| Transmitter resistance | 89*b* | 58-60 |
| Transmitter efficiency | 89*b* | 58-60 |
| Generator test | 91 | 64 |
| Insulation resistance test | 93 | 65 |
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| Measuring circuit: | | |
| Amplifier | 88*c* | 54-57 |
| Attenuator | 88*d* | 57 |
| Meter | 88*b* | 52 |
| Meter deflection | 88*a* | 52 |
| Power supply circuit | 84 | 48 |
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| Vacuum tubes and sockets, preventive maintenance | 49 | 29-30 |
| Vibrator: | | |
| Preventive maintenance | 57 | 32 |
| Theory | 70*a* | 39-40 |
| Trouble shooting | 87*b* | 51 |
| Weatherproofing: | | |
| Dustproofing | 65 | 35 |
| General | 62 | 33 |
| Tropicalization | 63 | 33-34 |
| Winterization | 64 | 34-35 |
| Weight, gross, of test set | 5*b* | 3 |
| Wiring, jack box | 67*e* | 36 |




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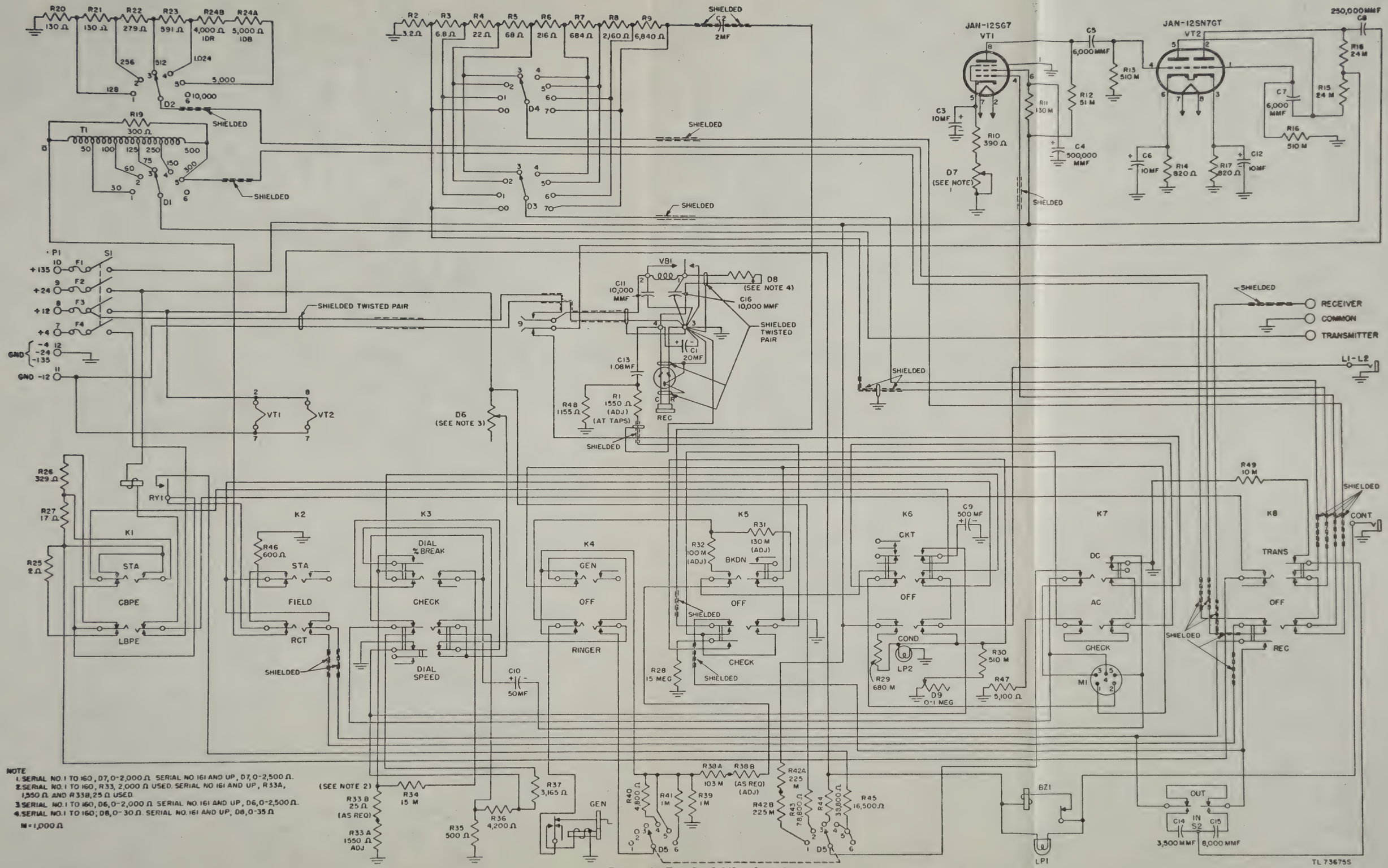
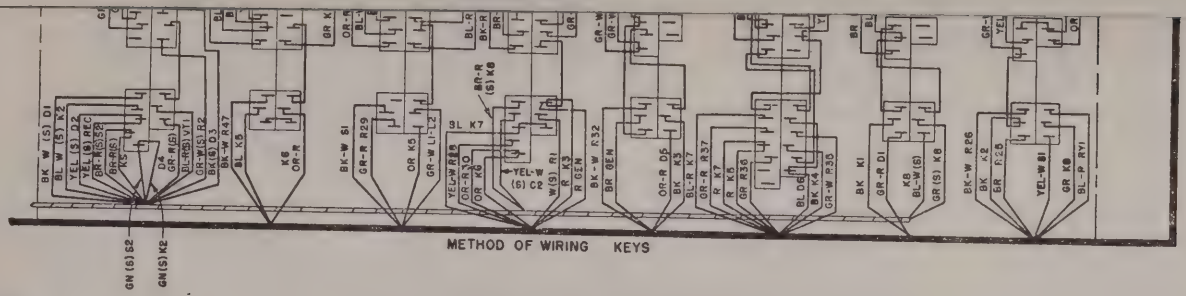



*Figure 49. Test Set I–142, schematic.*




NOTES:

A. ALL STRAPPING TO BE DONE WITH 22 GA TINNED COPPER WIRE, INSULATED WITH VARNISHED TUBING.

B WHEN CONNECTING SHIELDED LEADS, THE LENGTH OF THE UNSHIELDED PORTION FROM THE CONNECTION TO THE END OF THE SHIELD SHALL NOT EXCEED 1/4 IN.

C. CABLES SHALL BE TIED TO KEY FRAME AT POINTS INDICATED WITH LOCKSTITCH.

D. ALPHABET DESIGNATIONS, A-A, B-B, ETC., INDICATE POINTS OF BREAKAGE BETWEEN DRAWINGS

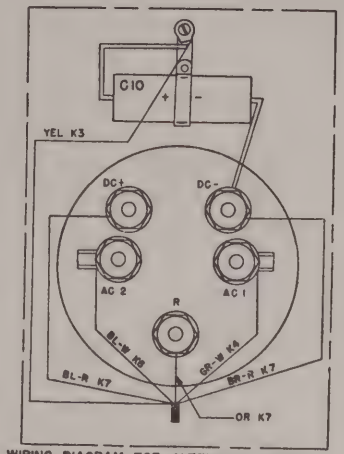
E NUMERICAL DESIGNATIONS, CABLE NO 1, NO 2 ETC., INDICATE CABLES.

F CAPACITORS C3 AND C4 SHALL BE TIED TOGETHER AT THEIR CENTERS TO SUPPORT CAPACITORS DURING SHIPMENT. TERMINAL LEADS OF CAPACITORS C1, C11, C16 SHALL BE KEPT AS SHORT AS POSSIBLE.

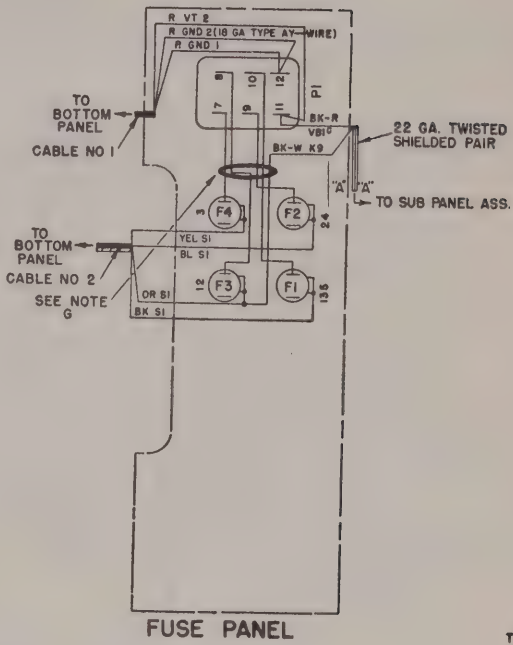
G WHERE THIS NOTE IS REFERRED TO, THE WIRE SHALL BE RUN DIRECTLY FROM TERMINAL TO TERMINAL INDEPENDENTLY OF POSITION OF OTHER WIRING. 22 GA SOLID CONDUCTOR, BLACK WIRE SHALL BE USED

H ASSEMBLE TUBULAR CAPACITORS C3, C4, C6 AND C12 ABOVE RESISTOR STRIP AS SHOWN LENGTH OF LEADS SHALL BE AS SHORT AS POSSIBLE ASSEMBLE CAPACITORS C5, C7 DIRECTLY BELOW THE TERMINALS TO WHICH THEY CONNECT WHEN REQUIRED MOUNT RESISTOR R38B IN THE SAME MANNER

J WHEN CONDUCTOR FROM VIBRATOR TERMINAL C, TO GROUND, GND 2, IS 18 GAUGE WIRE, THE PORTION OF THE LEAD NEAREST THE VIBRATOR MAY BE BARED FOR 3/8" IN. AND GROUND LEADS IN EXCESS OF 3 MAY BE CONNECTED TO THE BARE PORTION OF THE GROUND WIRE.

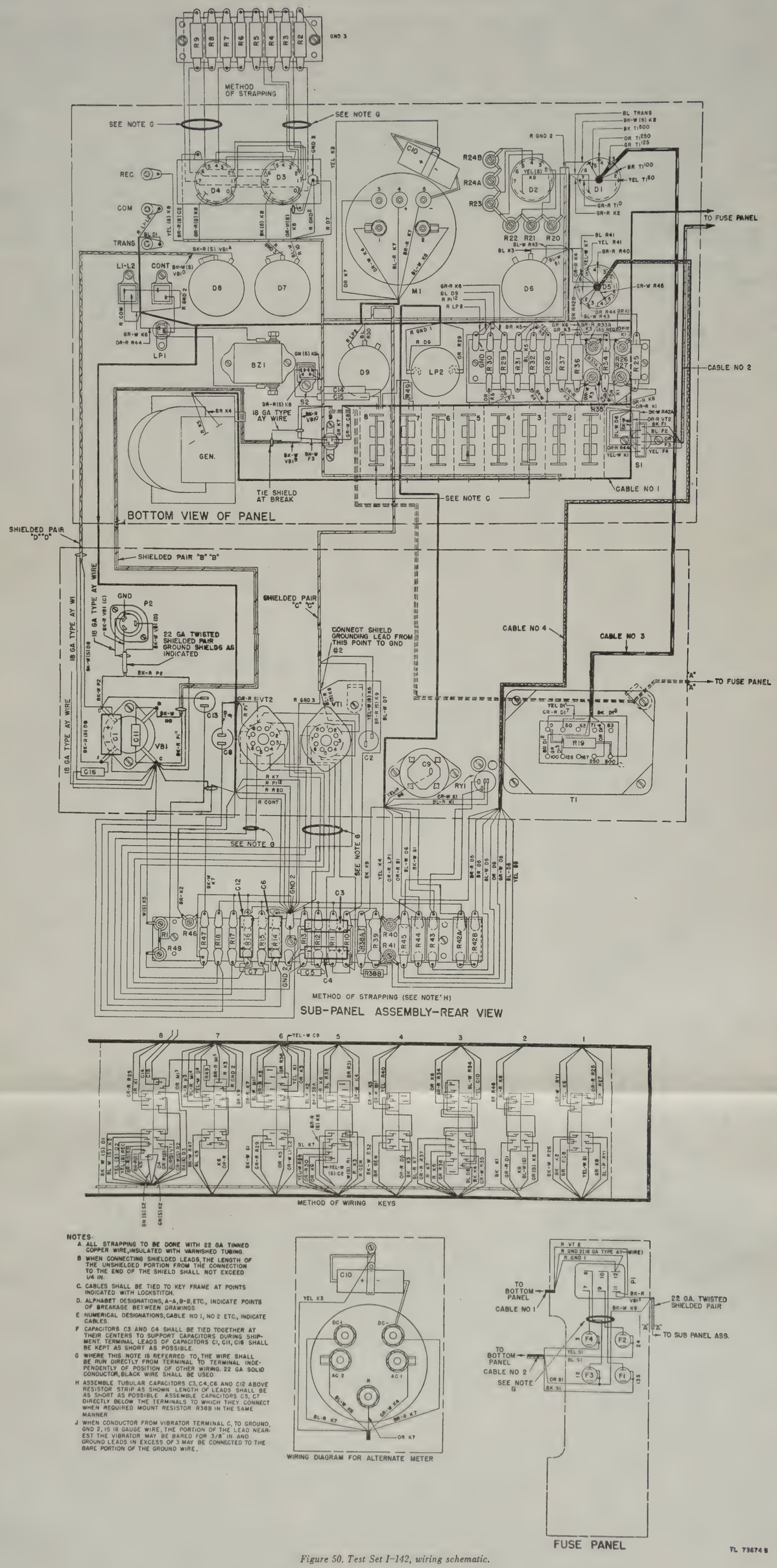



WIRING DIAGRAM FOR ALTERNATE METER




TL 73674 S

*Figure 50. Test Set I-142, wiring schematic.*




NOTES:

A. ALL STRAPPING TO BE DONE WITH 22 GA TINNED COPPER WIRE, INSULATED WITH VARNISHED TUBING.

B. WHEN CONNECTING SHIELDED LEADS, THE LENGTH OF THE UNSHIELDED PORTION FROM THE CONNECTION TO THE END OF THE SHIELD SHALL NOT EXCEED 1/4 IN.

C. CABLES SHALL BE TIED TO KEY FRAME AT POINTS INDICATED WITH LOCKSTITCH.

D. ALPHABET DESIGNATIONS, A-A, B-B, ETC., INDICATE POINTS OF BREAKAGE BETWEEN DRAWINGS.

E. NUMERICAL DESIGNATIONS, CABLE NO 1, NO 2 ETC., INDICATE CABLES.

F. CAPACITORS C3 AND C4 SHALL BE TIED TOGETHER AT THEIR CENTERS TO SUPPORT CAPACITORS DURING SHIPMENT. TERMINAL LEADS OF CAPACITORS C1, C11, C16 SHALL BE KEPT AS SHORT AS POSSIBLE.

G. WHERE THIS NOTE IS REFERRED TO, THE WIRE SHALL BE RUN DIRECTLY FROM TERMINAL TO TERMINAL INDEPENDENTLY OF POSITION OF OTHER WIRING. 22 GA SOLID CONDUCTOR, BLACK WIRE SHALL BE USED.

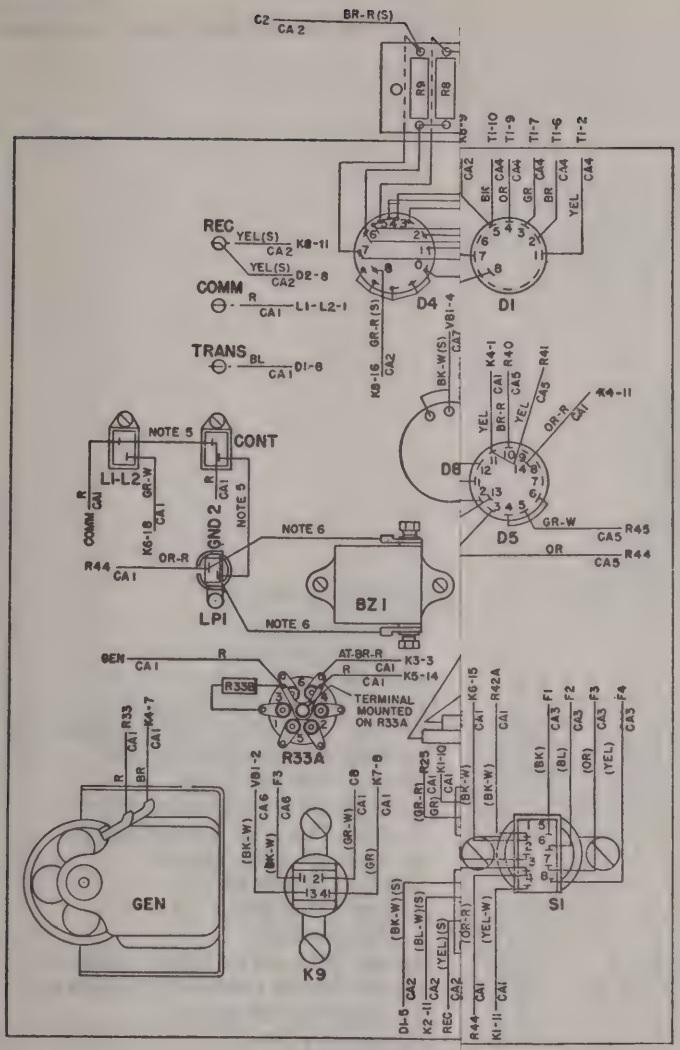
H. ASSEMBLE TUBULAR CAPACITORS C3, C4, C6 AND C12 ABOVE RESISTOR STRIP AS SHOWN. LENGTH OF LEADS SHALL BE AS SHORT AS POSSIBLE. ASSEMBLE CAPACITORS C5, C7 DIRECTLY BELOW THE TERMINALS TO WHICH THEY CONNECT WHEN REQUIRED MOUNT RESISTOR R388 IN THE SAME MANNER.

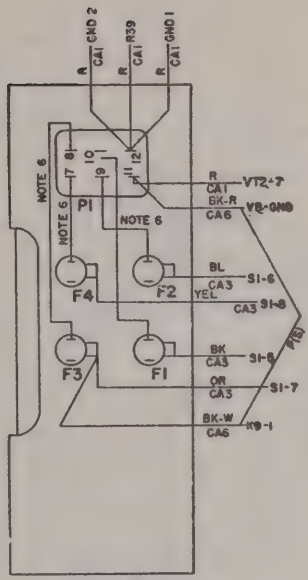
J. WHEN CONDUCTOR FROM VIBRATOR TERMINAL C, TO GROUND, GND 2, IS 18 GAUGE WIRE, THE PORTION OF THE LEAD NEAREST THE VIBRATOR MAY BE BARED FOR 3/8" IN. AND GROUND LEADS IN EXCESS OF 3 MAY BE CONNECTED TO THE BARE PORTION OF THE GROUND WIRE.

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*Figure 50. Test Set I–142, wiring schematic.*



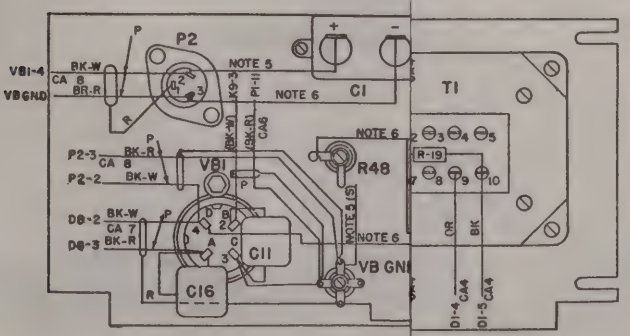


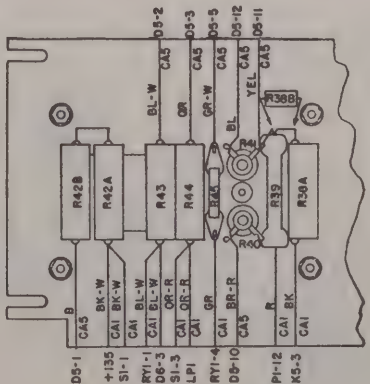




## FUSE PANEL

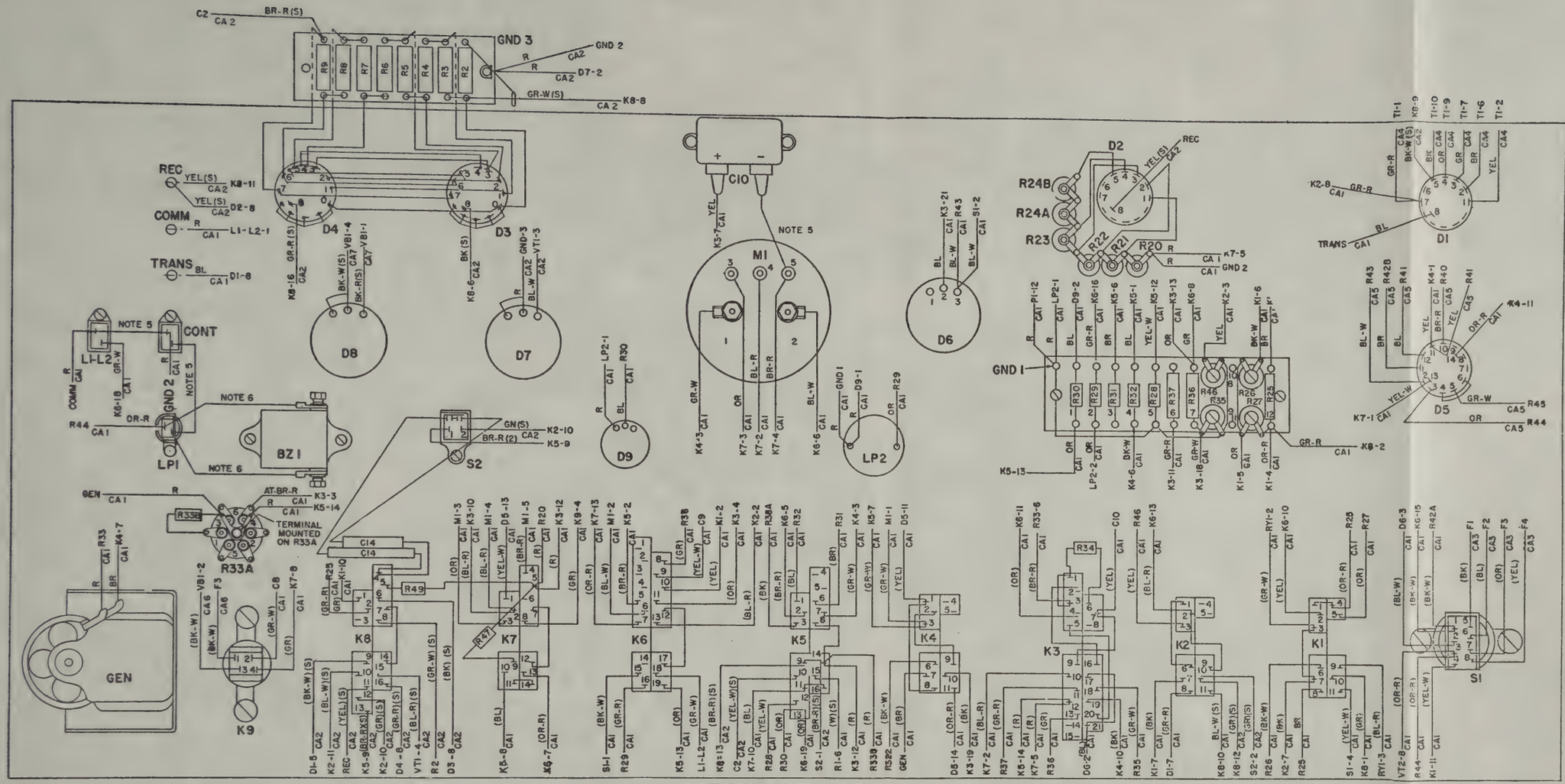
NOTES:

1. ALL OPEN CASE WIRING AND STRAPPING ON KEYS TO BE DONE WITH 22 GA SOLID WIRE.
2. THE CABLE DESIGNATIONS ARE AS FOLLOWS:
   - CA-1 MAIN CABLE
   - CA-2 SHIELDED CABLE
   - CA-3 CABLE
   - CA-4 CABLE
   - CA-5 CABLE
   - CA-6 VIBRATOR POWER CORD
   - CA-7 VIBRATOR CONTROL CORD
   - CA-8 VIBRATOR CONNECTOR CORD
3. 22 GA SOLID TINNED COPPER WIRE SHALL BE USED FOR STRAPPING ADJACENT TERMINALS ON SWITCH UNITS AND CONTROLS AS REQUIRED.
4. LEADS OF CAPACITORS AND RESISTORS WHICH ARE MOUNTED IN PLACE SHALL BE INSULATED WITH VARNISHED TUBING.
5. WHERE THIS NOTE IS REFERRED TO, THE WIRE SHALL BE RUN DIRECTLY FROM TERMINAL TO TERMINAL INDEPENDENTLY OF THE POSITION OF OTHER WIRING. 22 GA SOLID CONDUCTOR BLACK WIRE SHALL BE USED.
6. WHERE THIS NOTE IS REFERRED TO, THE WIRE SHALL BE DRESSED AGAINST THE PANEL IN THE MOST CONVENIENT MANNER AND SHALL PARALLEL THE POSITION OF THE OTHER WIRING. 22 GA SOLID CONDUCTOR BLACK WIRE SHALL BE USED.
7. P = PAIRED WIRES
   AT = ADJUSTED AT TEST.

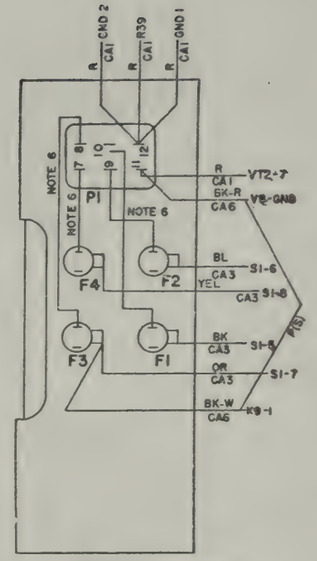






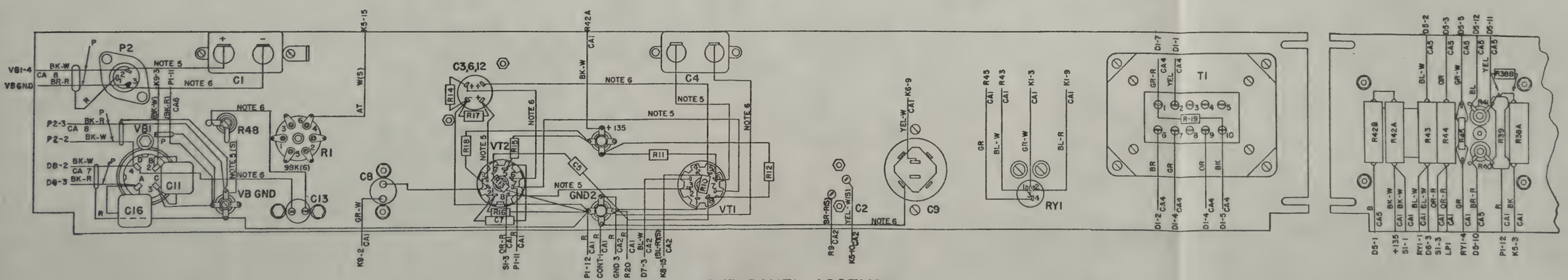

BOTTOM VIEW OF PANEL




FUSE PANEL

NOTES:

1. ALL OPEN CASE WIRING AND STRAPPING ON KEYS TO BE DONE WITH 22 GA SOLID WIRE.
2. THE CABLE DESIGNATIONS ARE AS FOLLOWS:
   - CA-1 MAIN CABLE
   - CA-2 SHIELDED CABLE
   - CA-3 CABLE
   - CA-4 CABLE
   - CA-5 CABLE
   - CA-6 VIBRATOR POWER CORD
   - CA-7 VIBRATOR CONTROL CORD
   - CA-8 VIBRATOR CONNECTOR CORD
3. 22 GA SOLID TINNED COPPER WIRE SHALL BE USED FOR STRAPPING ADJACENT TERMINALS ON SWITCH UNITS AND CONTROLS AS REQUIRED.
4. LEADS OF CAPACITORS AND RESISTORS WHICH ARE MOUNTED IN PLACE SHALL BE INSULATED WITH VARNISHED TUBING.
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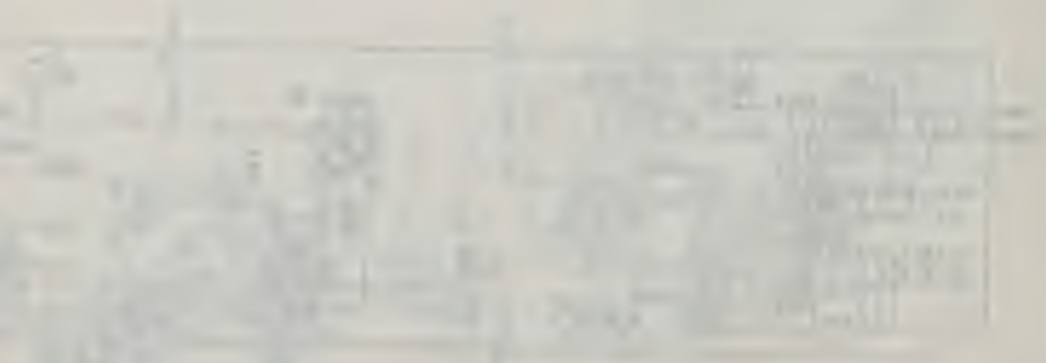



SUB-PANEL ASSEMBLY
REAR VIEW

*Figure 51. Test Set I–142, wiring schematic.*

TM2062-29





TECHNICAL MANUAL

# TEST SETS I–142, I–142A, AND I–142B

CHANGES No. 1

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *29 December 1951*

TM 11–2062, 1 September 1948, is changed as follows:

The title of the manual is changed to read: TEST SETS I–142, I–142–A, ***AND I–142–B***

# PART ONE

# INTRODUCTION

*Note* (Added). Throughout the manual, change all references to clip terminals to read *binding posts or clip terminals*. For the correct values of circuit elements in all schematic diagrams, see appendix II.

## 1. General

Test Set I–142–(*) * * * of the set.

*Note.* Basic nomenclature followed * * * this technical manual. Thus, Test Set I–142–(*) indicates Test Set I–142, Test Set I–142–A, and Test Set I–142–B. For the weatherproofed models, the nomenclatures used are Test Set I–142–A and I–142–B. For the nonweatherproofed * * * Test Set I–142. **See paragraph 6 for differences between models.**

## 3. Equipment Features

* * * * *

*b.* SOUND SOURCE. The sound source * * * in the instrument. By applying this potential to the **measuring** circuit of the test set, a definite standard of performance for the instrument under test can be established. The sound source * * * in performance tests.

* * * * *

*j.* INSTRUMENT TEST CIRCUITS. Four circuits are * * * simulated line conditions—

* * * * *

(3) A 24-volt, 361-ohm d-c resistance **or a** 3-volt, 4-ohm d-c resistance power efficiency circuit adjustable to match impedances of 30, 60, 75, 150, and 300 ohms for testing carbon-type microphones.

* * * * *

## 6. Differences in Models

* * * * *

*b.* TROPICALIZED SET. Test Sets I–142 serial numbered 161 and up, Test Set I–142–A, **and Test Set I–142–B** were manufactured of moisture- and fungi-resistant parts. These sets were * * * varnish after assembly.

*c.* EQUIPMENT FEATURES. All models provide * * * accidentally during use. Neon tube LP–2 is accessible from the front of the panel **of Test Set I–142–A only; on Test Sets I–142 and I–142–B, it is accessible only from the rear of the panel.** Panel arrangements of * * * in figure 5. **Test Set I–142–B is similar to the I–142 and I–142–A except for the following features: the fuseholders and handles are mounted on the front panel, binding posts are used in place of clip terminals, and the meter unit is hermetically sealed.** Figure 2 shows * * * the repair section.

* * * * *

## 10. Assembly and Disassembly

* * * * *

*d.* NEON LAMP. Mount neon lamp * * * bayonet base socket. On Test **Sets** I–142 **and I–142–B,** loosen the holding screws in the lamp mounting bracket, slide the section carrying the socket away from the panel, and insert the lamp. Reposition the lamp * * * remount the plate.

* * * * *

Add the following at the end of table I:

*Table I*—(Continued)

| EQUIPMENT | TEST | TEST CLIP CONNECTIONS | | | DIAL CONTROL SETTINGS | | | | | EQUALIZER |
|---|---|---|---|---|---|---|---|---|---|---|
| | | REC | COM | TRANS | D1 | D2 | D3 | D4 | D5 | S2 |
| RECEIVER H-33/U | RECEIVING EFFICIENCY— | WHITE | RED | | | 2 | | 6 | 1 | |
| | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN |
| TRANSMITTERS H-66/U AND H-74/U | TRANSMITTING EFFICIENCY | | RED | BLACK | 3 | | 3 | | 1 | IN |
| MICROPHONE UNITS H-62/U, H-63/U, AND M-29/U | TRANSMITTING EFFICIENCY | | C | BLACK | 3 | | 6 | | | IN |

| EQUIPMENT | TEST | KEY OPERATION FOR VARIOUS TESTS KEYS NOT LISTED REMAIN IN UNOPERATED POSITION | | | | | | | | | METER READING L=LEFT R=RIGHT | | FOR DETAILS SEE REPAIR INSTRUCTIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| RECEIVER H-33/U | RECEIVING EFFICIENCY— | LBPE | RCT | | | | | AC | REC | OPR | R | −4DB | |
| | TRANSMITTING EFFICIENCY | LBPE | RCT | | | | | AC | TRANS | OPR | R | −8DB | |
| TRANSMITTERS H-66/U AND H-74/U | TRANSMITTING EFFICIENCY | LBPE | RCT | | | | | AC | TRANS | OPR | R | −6DB | |
| MICROPHONE UNITS H-62/U, H-63/U, AND M-29/U | TRANSMITTING EFFICIENCY | CBPE | RCT | | | | | AC | TRANS | OPR | R | +1DB | |

## 52. Meter

A meter is * * * requires little maintenance.

* * * * *

*d.* ADJUST (A). Normally, the meter * * * the hairspring damaged.

*Note* (Added). The meter in Test Set I–142–B is a hermetically sealed unit and cannot be zero-set. Replace the meter if it does not indicate zero on the d-c scale when the equipment is turned off.

## 57. Vibrator

*Note* (Added). The vibrator socket in Test Set I–142–B is not rubber-mounted; it is clamped in place.

* * * * *

## 66. General

Several types of * * * may be fabricated. These connectors consist of a jack wired with a short length of cordage, terminated with spade-type **or pin-type** cord tips fitting the clip terminal **or binding post** of the test set. The jacks which * * * a jack box.

In figure 12, the 12-volt battery is changed to show the positive terminal grounded.

## 72. Meter Circuit, Test Sets I–142 and I–142–A

(fig. 14)

* * * * *

*Figure 14. Meter* **circuit,** *schematic diagram,* **Test Sets I–142 and I–142–A.**

## 72.1 Meter Circuit, Test Set I–142–B

(fig. 14.1) (Added)

In Test Set I–142–B, the meter circuit components which are shown in figure 14.1 are mounted on the long resistor mounting board on the panel. Figure 14.1 shows the connections which are made to terminals 1 through 5 on the back of the meter case.

## 77. Dial Test

(figs. 19 and 20)

* * * * *

*c.* SPEED TEST CIRCUIT.

* * * * *

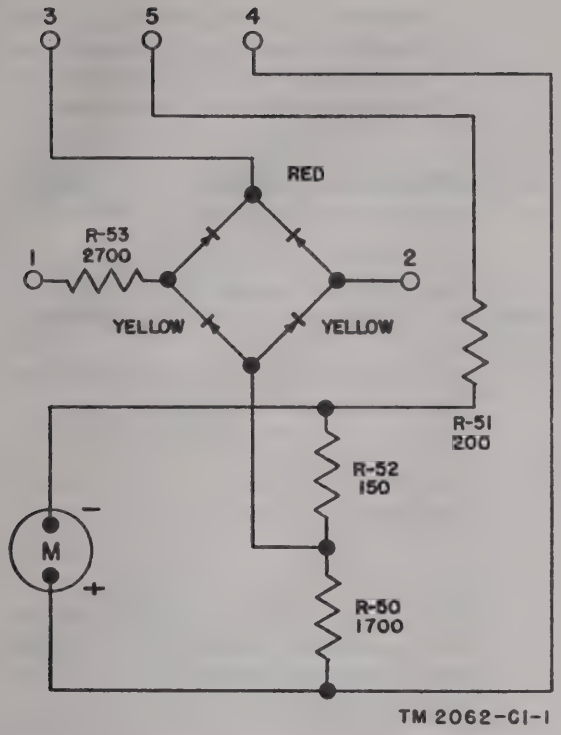



*Figure 14.1* (Added). *Meter circuit, schematic diagram, Test Set I–142–B.*

(2) At the factory * * * percent break circuit. Resistor R33, **with a value of 2,000 ohms is** used in Test Set I–142; resistors R33A and R33B **are** used in Test Set I–142–A; **variable resistor R33, with a maximum value of 1,500 ohms is used in Test Set I–142–B.** When in use * * * speed test circuit.

## 86. Dial Test Circuits

(figs. 27, 28, 29, and 30)

*a.* No output (failure * * * meter being defective.

*Note.* Check resistor R33 * * * 1 through 160. **In Test Set I–142–B, variable resistor R33 is mounted on the resistor mounting board on the chassis of the equipment.**

* * * * *

## 88. Measuring Circuit

(fig. 33)

* * * * *

*b.* Meter.

(1) *D-c section.* If the meter indicator does not deflect when the **measuring circuit sensitivity checks** (par. 20) are being **made,** or when the efficiency tests **of field telephones** are being **made** (par. 24), check the d-c section of the meter by operating key 7 to the DC position and then rotating control D5 to positions 135, 24, and 12. **Failure of the meter to deflect indicates an open or shorted meter circuit or meter. In Test Sets I–142 and I–142–A, replace the meter. In Test Set I–142–B, check resistors R50, R51, and R52 for continuity. In addition, be certain that the black lead from the junction of resistors R50 and R52 (fig. 14.1) to the rectifier is not shorted to ground; if these components are in satisfactory condition, replace the meter.**

(2) *Rectifier element.* If the meter * * * the meter deflection. **In Test Sets I–142 and I–142–A, replace the meter if it fails to deflect. In Test Set I–142–B, check resistor R53 for continuity. If resistor R53 is satisfactory, replace the rectifier. (See figure 52 for the color coding of the wiring.) If replacement of the rectifier fails to remedy the trouble, replace the meter.**

Add the following to the first footnote in figure 33: **In Test Set I–142–B, pin No. 3 is connected internally to pin No. 5.**

In figure 34, make the following changes in the table of socket voltages for tube No. VT–1:

| Pin No. (See note 1) | Tube No. VT-1 Pin designation | Pin voltage (See note 2) |
|---|---|---|
| * * | * | * * |
| 2 | Heater | +12 |
| **3 (I–142 and I–142–A only)** | No connection | |
| **3 (I–142–B only)** | **Cathode** | **+1.5** |
| * * | * | * * |
| 5 | Cathode | **+1.5** |
| * * | * | * * |

## 96. Trouble Shooting Chart

*Note* (Added). In Test Set I–142–B, the rectifier and meter circuit resistors are mounted externally and should be checked before the meter is replaced.

* * * * *

## 102. Sound Source

(fig. 31)

* * * * *

*a*. The acoustic output * * * made as follows:

* * * * *

(9) If the average difference * * * source as follows:

(*e*) Disconnect (**Test Sets I–142 and I–142–A**) the white shielded lead from resistor R1 and connect a variable resistance box in place of resistor R1. Adjust the resistor * * * of 0 db.

* * * * *

(*h*) In Test Set * * * and the resistor. **In Test Set I–142–B, resistor R1 is a 1,500-ohm variable resistor which is set at the factory and sealed. If it is necessary to readjust resistor R1, reseal the control with glyptal or any other sealing material which will not run down inside the shaft bushing.**

* * * * *

## 105. Carbon-Type Microphones Test Circuit

(figs 39 through 42)

* * * * *

*c*. Disconnect power connector SK–1 of Test Set **I–142–(*)** and short circuit terminals 7 and 12 of connector P1.

(1) Operate key 1 to the LBPE position **and key 2 to the RCT position.**

* * * * *

## 107. Generator Test Circuit

(fig. 44)

* * * * *

*c*. Operate key 6 * * * of ±2 percent.

(1) Operate key 4 * * * of meter M1. The meter deflection should be **+8±0.2 db.** Resistance of the * * * of required resistance.

* * * * *

## APPENDIX II

## IDENTIFICATION TABLE OF PARTS FOR TEST SETS I–142–(*)

*Note* (Added). The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as T/O & E, T/A, SIG 7 & 8, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalog applicable to the equipments covered in this manual is SIG–7 & 8–I–142. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of Sig 1.

### 1. Test Sets I–142 and I–142–A

| Ref symbol | 1 | 2 | 3 | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|---|---|---|
| * | * | * | * | * | * | * |

### 2. Test Set I–142–B

(Added)

| Ref symbol | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|
| | TEST SET I–142–B | | 3F4142 |
| | BLOCK, spacing | Generator handle spacer | 2Z736–75 |
| | BLOCK, spacing | Spacer for switch S1 | 2Z736–76 |
| | BOARD, terminal: 2 solder lug term | Resistor mounting board | 3Z770–2.87 |
| | BOARD, terminal: 3 solder lug term | Resistor mounting board | 3Z770–3.51 |
| | BOARD, terminal: 12 solder lug term | Resistor mounting board | 3Z770–12.86 |
| BZ1 | BUZZER, test: vibrating; 6–8 v, dc; 8–10 v, ac. | Provides audible signal for continuity testing. | 4Z3120.1 |
| | CABLE, power: 2 #18 AWG stranded tinned cond. | Connects test set to power supply | 1B818.23–1 |
| | CABLE, special purpose, electrical: Cable WD–28/U; 2 #20 AWG stranded cond. | Test cord | 1B3020–2.7 |
| | CAM | Part of driving and switching mechanism. | 4B794 |
| C1 | CAPACITOR, fixed: electrolytic; 20 μf; 150 vdcw; JAN type CE64C200J. | Sound-source waveshaping capacitor | 3DB20–148 |
| C2 | CAPACITOR, fixed: paper; 2 μf ±10%; 600 vdcw; JAN type CP70E1FF205K. | Couples instrument test circuits to measuring circuit. | 3DB2–130 |
| C3, C6, C12 | CAPACITOR, fixed: electrolytic; 3 sec., 10—10—10 μf; 50 vdcw; JAN type CE33C100J. | C3—Cathode bypass capacitor for tube VT1.<br>C6, C12—Cathode bypass capacitor for tube VT2. | 3DB10–132 |
| C4 | CAPACITOR, fixed: paper; 500,000 μμf +20% −10%; 600 vdcw; JAN type CP54B1EF504V. | Screen grid bypass capacitor for tube VT1. | 3DA500–664 |
| C5, C7 | CAPACITOR, fixed: paper; 6000 μμf ±20%; 600 vdcw; JAN type CN35A602M. | C5—Tube VT1 plate coupling capacitor.<br>C7—Tube VT2 (triode 2) coupling capacitor. | 3DA6–49 |
| C8 | CAPACITOR, fixed: paper; 250,000 μμf ±10%; 400 vdcw; JAN type CP61B1EE254K. | Tube VT2 (triode 1) coupling capacitor. | 3DA250–529 |
| C9 | CAPACITOR, fixed: electrolytic; 450 μf; 50 vdcw; JAN type CE31C451G. | Dial test pulse capacitor | 3DB450–2 |
| C10 | CAPACITOR, fixed: electrolytic; 50 μf; 25 vdcw. | Meter rectifier capacitor | 3DB50–98 |
| C11, C16 | CAPACITOR, fixed: mica; 10,000 μμf ±10%; 300 vdcw; JAN type CM40B103K. | Prevents sparking at vibrator contacts. | 3K4010321 |

| Ref symbol | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|
| C13 | CAPACITOR, fixed: paper; 1 μf ±10%; 400 vdcw; JAN type CP61B1EE105K. | Couples sound source to measuring circuit. | 3DB1-320 |
| C14 | CAPACITOR, fixed: mica; 3600 μμf ±2%; 500 vdcw; JAN type CM35C362G. | Part of equalizer network | 3K3536233 |
| C15 | CAPACITOR, fixed: mica; 8200 μμf ±2%; 300 vdcw; JAN type CM35C822G. | Part of equalizer network | 3K3582233 |
| | CLAMP | Mounting clamp for 1⅜-inch diameter capacitors. | 2Z2626.2 |
| | CLAMP | Mounting clamp for vibrator | 2Z2643.140 |
| | CLIP: ½" jaw opening | Test cord clip | 3Z1087–5 |
| | CONNECTOR, plug: 3 rd male cont; straight | Connects vibrator output to sound source receiver. | 2Z7234–8 |
| SK1 | CONNECTOR, plug: 6 flat parallel female cont; polarized; straight. | Connects test set to power cord | 2ZK8639.10A |
| P2 | CONNECTOR, receptacle: 3 rd polarized female cont; straight. | Connects vibrator output to sound source receiver. | 2ZK8673.18 |
| P1 | CONNECTOR, receptacle: 6 rect polarized male cont; straight. | Connects test set to power cord | 2Z7228.29 |
| | CONTACT SET, ringing generator: cont arrangement 1B1A. | Ringing generator contact set | 4B838/S2 |
| | CRANK GC–9 | Hand generator crank | 4B454 |
| | ESCUTCHEON: electron tube | Escutcheon for tube LP2 | 2Z4100–20 |
| F4 | FUSE FU–26: 1 amp | Fuse for 3-volt power supply | 3Z1926 |
| F3 | FUSE FU–50: 3 amp | Fuse for 12-volt power supply | 3Z1950 |
| F1, F2 | FUSE, cartridge: .25 amp | F1—Fuse for 24-volt power supply<br>F2—Fuse for 135-volt power supply | 3Z2587 |
| | FUSEHOLDER: extractor post type; for single cartridge type fuse. | Fuseholder for fuses F1, F2, F3, and F4. | 3Z3285–6.7 |
| | GEAR: spur gear; 21 teeth | Small gear driving generator armature. | 4B838/G2 |
| | GEAR: spur gear; 99 teeth | Large gear driving generator armature. | 4B821 |
| GEN | GENERATOR GN–38 | A-c voltage generator for insulation resistance and ringer test circuits. | 4B838 |
| | GLIDE, furniture | Test set mounting | 6Z4701 |
| | HANDLE: lever switch handle | Handle for lever switch | 4C5104.79/6 |
| | INSULATOR, clip: conical shape; red rubber | Insulator for test cord clip | 3G1350–63 |
| | INSULATOR, clip: conical shape; black rubber. | Insulator for test cord clip | 3G1790–44.1 |
| J1, J2 | JACK JJ–086: for 2-cond plug | J1—L1–L2 jack<br>J2—CONT jack. | 2Z5598A–86 |
| | KNOB: rd; black bakelite | Knob for controls D1 through D8 | 2ZK5822–32 |
| LP2 | LAMP, glow: 1 w; double cont bayonet base | Visual signal for capacitor test circuit. | 2Z5889–8 |
| LP1 | LAMP, incandescent: 12–16 v, .25 amp; miniature double cont bayonet base. | Visual signal for continuity test circuit. | 2Z5933.1 |
| | LAMPHOLDER: double cont, candelabra bayonet base. | Lampholder for lamp LP1 | 6Z8335–3 |
| | LIGHT, indicator: w/lens | Visual signal for continuity test circuit. | 2Z5991–3 |
| M1 | METER, multiscale: upper scale −10 to +6 db, lower scale 0–360 ua at calibration mark. | Power level indicator | 3F3299–1 |
| | NUT, hexagon: 6–32 NC–2 thd | | 6L3606–32–3N |
| | PIN, dowel | Generator shaft fastening pin | 4B838/P2 |
| | PIN, dowel | Spur gear fastening pin | 4B838/P1 |
| K1 | PLATE, switch: marked LBPE, CPBE, STA, and 1. | Plate for switch K1 | 3Z4150–11.7 |

| Ref symbol | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|
| K2 | PLATE, switch: marked RCT, FLD, STA, and 2. | Plate for switch K2 | 3Z4150–11.6 |
| K3 | PLATE, switch: marked DIAL SPEED, CHK, % BRK, and 3. | Plate for switch K3 | 3Z4150–11.5 |
| K4 | PLATE, switch: marked RINGER, OFF, GEN, and 4. | Plate for switch K4 | 3Z4150–11.4 |
| K5 | PLATE, switch: marked CHK, OFF, BKDN, and 5. | Plate for switch K5 | 3Z4150–11.3 |
| K6 | PLATE, switch: marked COND, OFF, CKT, and 6. | Plate for switch K6 | 3Z4150–11.2 |
| K7 | PLATE, switch: marked CHK, AC, DC, and 7. | Plate for switch K7 | 3Z4150–11.1 |
| K8 | PLATE, switch: marked REC, OFF, TRANS, and 8. | Plate for switch K8 | 3Z4150–11 |
| | PLUG PJ–047R | Test cord plug | 2Z7228A–47R |
| | POST, binding: screw type | To connect elements undergoing testing to the test circuits. | 3Z737–19 |
| REC | RECEIVER ELEMENT, telephone | Converts vibrator output to acoustic pressure. | 4B3040–1 |
| RECT 1 | RECTIFIER, metallic: copper oxide; input 12 v, 1,000 cps; output 10 v, 5 ma, dc. | Meter rectifier | 3H4800M–1 |
| R2 | RESISTOR, fixed: WW; 3.2 ohms ±.25%; JAN type RB11B3R200C. | Measuring-circuit attenuator resistor. | 3RB2–3200.3 |
| R3 | RESISTOR, fixed: WW; 6.8 ohms ±.25%; JAN type RB11B6R800C. | Measuring-circuit attenuator resistor. | 3RB2–6800.1 |
| R4 | RESISTOR, fixed: WW; 22 ohms ±.25%; JAN type RB11B22R00C. | Measuring-circuit attenuator resistor. | 3RB3–2000.3 |
| R5 | RESISTOR, fixed: WW; 68 ohms ±.25%; JAN type RB12B130R0F. | Measuring-circuit attenuator resistor. | 3RB3–6800.2 |
| R6 | RESISTOR, fixed: WW; 216 ohms ±.25%; JAN type RB11B216R0C. | Measuring-circuit attenuator resistor. | 3RB4–2160.1 |
| R7 | RESISTOR, fixed: WW; 684 ohms ±.25%; JAN type RB11B684R0C. | Measuring-circuit attenuator resistor. | 3RB4–6840.1 |
| R8 | RESISTOR, fixed: WW; 2160 ohms ±.25%; JAN type RB11B21600C. | Measuring-circuit attenuator resistor. | 3RB5–2160.1 |
| R9 | RESISTOR, fixed: WW; 6840 ohms ±.25%; JAN type RB51B68400C. | Measuring-circuit attenuator resistor. | 3RB5–6840 |
| R10 | RESISTOR, fixed: composition; 390 ohms ±5%; JAN type RC20BF391J. | Cathode resistor for tube VT1 | 3RC20BF391J |
| R11, R31 | RESISTOR, fixed: composition; 130,000 ohms ±5%; JAN type RC20BF134J. | R11—Screen grid resistor for tube VT1.<br>R31—Insulation resistance test load resistor. | 3RC20BF134J |
| R12 | RESISTOR, fixed: composition; 51,000 ohms ±5%; JAN type 3RC20BF513J. | Plate load resistor for tube VT1 | 3RC20BF513J |
| R13, R16, R30. | RESISTOR, fixed: composition; 510,000 ohms ±5%; JAN type RC20BF514J. | R13—Grid resistor for tube VT2 (triode 2).<br>R16—Grid resistor for tube VT2 (triode 1).<br>R30—Capacitor test calibration resistor. | 3RC20BF514J |
| R14, R17 | RESISTOR, fixed: composition; 820 ohms ±10%; JAN type RC20BF821K. | Cathode resistor for tube VT2 | 3RC20BF821K |
| R15, R18 | RESISTOR, fixed: composition; 24,000 ohms ±5%; JAN type RC20BF243J. | Plate load resistor for tube VT2 | 3RC20BF243J |
| R19 | RESISTOR, fixed: WW; 300 ohms ±1%; JAN type RB11B300R0F. | Transmitter and microphone impedance-matching resistor. | 3RB4–3000.3 |
| R20, R21 | RESISTOR, fixed: WW; 130 ohms ±1%; JAN type RB12B130R0F. | Receiver impedance-matching resistor. | 3RB4–1300.2 |

| Ref symbol | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|
| R22 | RESISTOR, fixed: WW; 279 ohms ±1%; JAN type RB12B279R0F. | Receiver impedance-matching resistor. | 3RB4–2790 |
| R23 | RESISTOR, fixed: WW; 591 ohms ±1%; JAN type RB12B591R0E. | Receiver impedance-matching resistor. | 3RB4–5910.1 |
| R24A | RESISTOR, fixed: WW; 5000 ohms ±1%; JAN type RB12B50000F. | Receiver impedance-matching resistor. | 3RB5–5000.4 |
| R24B | RESISTOR, fixed: WW; 4000 ohms ±1%; JAN type RB12B40000F. | Receiver impedance-matching resistor. | 3RB5–4200.1 |
| R25 | RESISTOR, fixed: WW; 2 ohms ±1%; JAN type RB11B2R000F. | 3-volt battery supply resistor for microphone test circuit. | 3RB2–2000.3 |
| R26 | RESISTOR, fixed: WW; 329 ohms ±.5%; JAN type RB12B329R0D. | 24-volt battery supply resistor for transmitter. | 3RB4–3290 |
| R27 | RESISTOR, fixed: WW; 17 ohms±.5%; JAN type RB12B17R00D. | 24-volt battery supply resistor for common battery test circuit. | 3RB3–1700.1 |
| R28 | RESISTOR, fixed: composition; 15 meg ±5%; JAN type RC20BF156J. | Capacitor test check load resistor | 3RC20BF156J |
| R29 | RESISTOR, fixed: composition; 680,000 ohms ±5%; JAN type RC20BF684J. | Load resistor for capacitor testing | 3RC20BF684J |
| R32 | RESISTOR, fixed: composition; 100,000 ohms ±5%; JAN type RC20BF104J. | Meter multiplier for insulation test circuit. | 3RC20BF104J |
| R34 | RESISTOR, fixed: composition; 15,000 ohms ±5%; JAN type RC20BF153J. | Meter multiplier for dial test circuit | 3RC20BF153J |
| R35 | RESISTOR, fixed: WW; 500 ohms ±.5%; JAN type RB12B500R0D. | Loading resistor for dial speed test circuit. | 3RB4–5000.5 |
| R36 | RESISTOR, fixed: WW; 4200 ohms ±.25%; JAN type RB11B4200C. | Dial speed test load resistor | 3RB5–4200.1 |
| R37 | RESISTOR, fixed: WW; 3165 ohms ±.25%; JAN type RB51B31650C. | Meter multiplier for dial speed test circuit. | 3RB5–3165.1 |
| R38A | RESISTOR, fixed: WW; 103,000 ohms ±1%; JAN type RB12B10302F. | Meter multiplier for ringer test circuit. | 3RB7–1030 |
| R39 | RESISTOR, fixed: WW; 1000 ohms ±5%; JAN type RW55G102. | Load resistor for generator test circuit. | 3RW24355 |
| R40 | RESISTOR, fixed: WW; 4800 ohms ±1%; JAN type RB12B48000F. | Impedance-matching resistor for ringer testing. | 3RB5–3800.1 |
| R41 | RESISTOR, fixed: WW; 1000 ohms ±5%; JAN type RB12B10000D. | Sound source load resistor | 3RB5–1000.10 |
| R42A, R42B | RESISTOR, fixed: WW; 225,000 ohms ±1%; JAN type RB12B22502F. | Meter multiplier for battery testing, 135-volt circuit. | 3RB7–2250 |
| R43 | RESISTOR, fixed: WW; 78,800 ohms ±1%; JAN type RB12B78801F. | Meter multiplier for battery testing, 24-volt circuit. | 3RB6–7880 |
| R44 | RESISTOR, fixed: WW; 38,800 ohms ±1%; JAN type RB12B38801F. | Meter multiplier for battery testing, 12-volt circuit. | 3RB6–3880.1 |
| R45 | RESISTOR, fixed: WW; 16,500 ohms ±1%; JAN type RB11B16501F. | Meter multiplier for common battery telephone test circuit. | 3RB6–1650.1 |
| R46 | RESISTOR, fixed: WW; 600 ohms ±1%; JAN type RB41B600R0D. | Test battery supply resistor for local-battery telephone test circuit. | 3RB4–6000.4 |
| R47 | RESISTOR, fixed: composition; 5100 ohms ±5%; JAN type RC20BF512J. | Load resistor for sound source | 3RC20BF512J |
| R48 | RESISTOR, fixed: WW; 1155 ohms ±.5%; JAN type RB12B11550D. | Load resistor for sound source | 3RB5–1155.2 |
| R49 | RESISTOR, fixed: composition; 10,000 ohms ±5%; JAN type RC20BF103J. | Equalizer network resistor | 3RC20BF103J |
| R50 | RESISTOR, fixed: WW; 1700 ohms ±1%; JAN type RB11B17000F. | Voltage divider resistor | 3RB5–1700.1 |
| R53 | RESISTOR, fixed: WW; 2700 ohms ±1%; JAN type RB11B27000F. | Multiplier for meter circuit | 3RB5–2700.1 |
| R1, R33 | RESISTOR, variable: WW; 1500 ohms ±10% max; JAN type RA20A1SA152AK. | Calibration resistor for dial test circuit. | 3RA6004 |

| Ref symbol | Name of part and description | Function of part | Signal Corps stock No. |
|---|---|---|---|
| D6, D7 | RESISTOR, variable: WW; 2500 ohms ±10% max; JAN type RA25A1SA252AK. | D6—Calibration resistor for dial test circuit.<br>D7—Amplifier gain control | 3RA6313 |
| D8 | RESISTOR, variable: WW; 35 ohms ±10% max; JAN type RA20A1SA350AK. | Output control for sound source | 3RA2709 |
| D9 | RESISTOR, variable: composition; 1 meg ±20% max; JAN type RV3AUSA105B. | Control resistor for capacitor test circuit. | 3RV61010 |
| | SCREW, captive: knurled thumb head; 10–32 thd. | | 6L4770–20.8KN |
| | SCREW, machine: slotted drive; RH; 8–32 thd. | | 6L6836–6.5 |
| | SHAFT | Generator shaft | 4B3832 |
| VT1, VT2 | SOCKET, tube: 8 cont medium | Socket for tubes VT1 and VT2 | 2Z8659–3 |
| VB1 | SOCKET, tube: 4 cont octal | Socket for vibrator VB1 | 2Z8678.326 |
| | SPRING: helical compression type | Generator shaft tension spring | 4B838/S3 |
| | STRAP, carrying: cotton webbing | Carrying strap | 6Z8448–24 |
| K1, K2, K4 | SWITCH, lever: 2 positions, locking; cont arrangement: position 1, 1C1A; position 2, 1C1C. | K1—Connects CB and LB test circuits to measuring circuit.<br>K2—Connects telephone, receiver, and microphone test circuits to measuring circuit.<br>K4—Connects generator and ringer test circuits to meter. | 3Z9580–30.27 |
| K3 | SWITCH, lever: 2 positions, nonlocking; cont arrangement: position 1, 1A1C and 1C; position 2, 1A1B1C and 2C. | Connects dial test circuits to meter | 3Z9580–30.30 |
| K5, K8 | SWITCH, lever: two positions, nonlocking; cont arrangement: position 1, 1C and 1A1C; position 2, 1C and 1A1C. | K5—Connects insulation resistance test circuit to meter.<br>K8—Connects output of receiver, microphone, transmitter, and telephone sets to measuring circuit. | 3Z9580–30.26 |
| K6 | SWITCH, lever: 2 positions, No. 1 locking, No. 2 nonlocking; cont arrangement: position 1, 2C and 1B1C; position 2, 1C1C. | Controls capacitor test circuit | 3Z9580–30.29 |
| K7 | SWITCH, lever: 2 positions, No. 1 locking, No. 2 nonlocking; cont arrangement: position 1, 1C and 1B1C; position 2, 1C1C. | Connects test circuits to meter | 3Z9580–30.28 |
| 9 | SWITCH, push: cont arrangement 1A and 1A | Operates sound source circuit | 3Z9815–10.1 |
| D1, D2, D3, D4 | SWITCH, rotary: single pole, 12 position | D1, D2—Control microphone and receiver impedance-matching circuit.<br>D3, D4—Control measuring circuit attenuator. | 3Z9825–33. 21 |
| D5 | SWITCH, rotary: 2 poles, 6 positions | Controls battery and ringer test circuits. | 3Z9825–33. 22 |
| S1 | SWITCH, rotary: 2 positions locking; cont arrangement 2A and 2A. | Power supply control | 3Z9580–11. 23 |
| S2 | SWITCH, rotary: contact arrangement 1C1C | Equalizer control switch | 3Z9825–35. 2 |
| T1 | TRANSFORMER, AF: auto line type; 500 ohms impedance, tapped at 250, 167, 125, 100, 83, 71, 62, and 50 ohms. | Transmitter and microphone impedance-matching transformer. | 2Z9637. 124 |
| VT1 | TUBE, electron: type 12SG7Y | Measuring circuit amplifier, first stage. | 2J12SG7Y |
| VT2 | TUBE, electron: type 12SN7GT | Measuring circuit amplifier, second stage. | 2J12SN7GT |
| VB1 | VIBRATOR, nonsynchronous: 6.3 volts nominal, 4.5 amp max. | Sound source | 3H6690–4 |

By order of the Secretary of the Army:

Official:

WM. E. BERGIN
*Major General, USA*
*The Adjutant General*

J. LAWTON COLLINS
*Chief of Staff, United States Army*

DISTRIBUTION:

For explanation of distribution formula see SR 310–90–1.



U. S. GOVERNMENT PRINTING OFFICE : 1956 O - 398609

D4
D3
D2
D1
D8
D5
K9
K1
GEN.
COMM. TRANS.
REC.
L1,L2 CONT.
LP 1
BZ
R25
GND 2
W (S)
BK-W (S)
BK-R (S)
YEL (S)
GR (S)
GR-W
GR-R
OR-R
BR
BL
YEL
BK
OR
GR
BL-R
BK-W
YEL-W
TRANS.
K8-16
K8-11
K8-6
K4-11
K9-1
K1-8
K1-5
K8-2
K1-4
R44
R45
K4-7
R33
F3
C8
S2-2
K8-12
K8-10
R26
K2-7
R25
S1-4
K8-1
RY1-3
RY1-2
K6-10
R27
K2-8
T1-1
K8-9
T1-10
T1-9
VB1-1
VB1-4
R42B
R41
K4-1
R40
CA-1
CA-2
CA-5
CA-7
D1-8

ram.



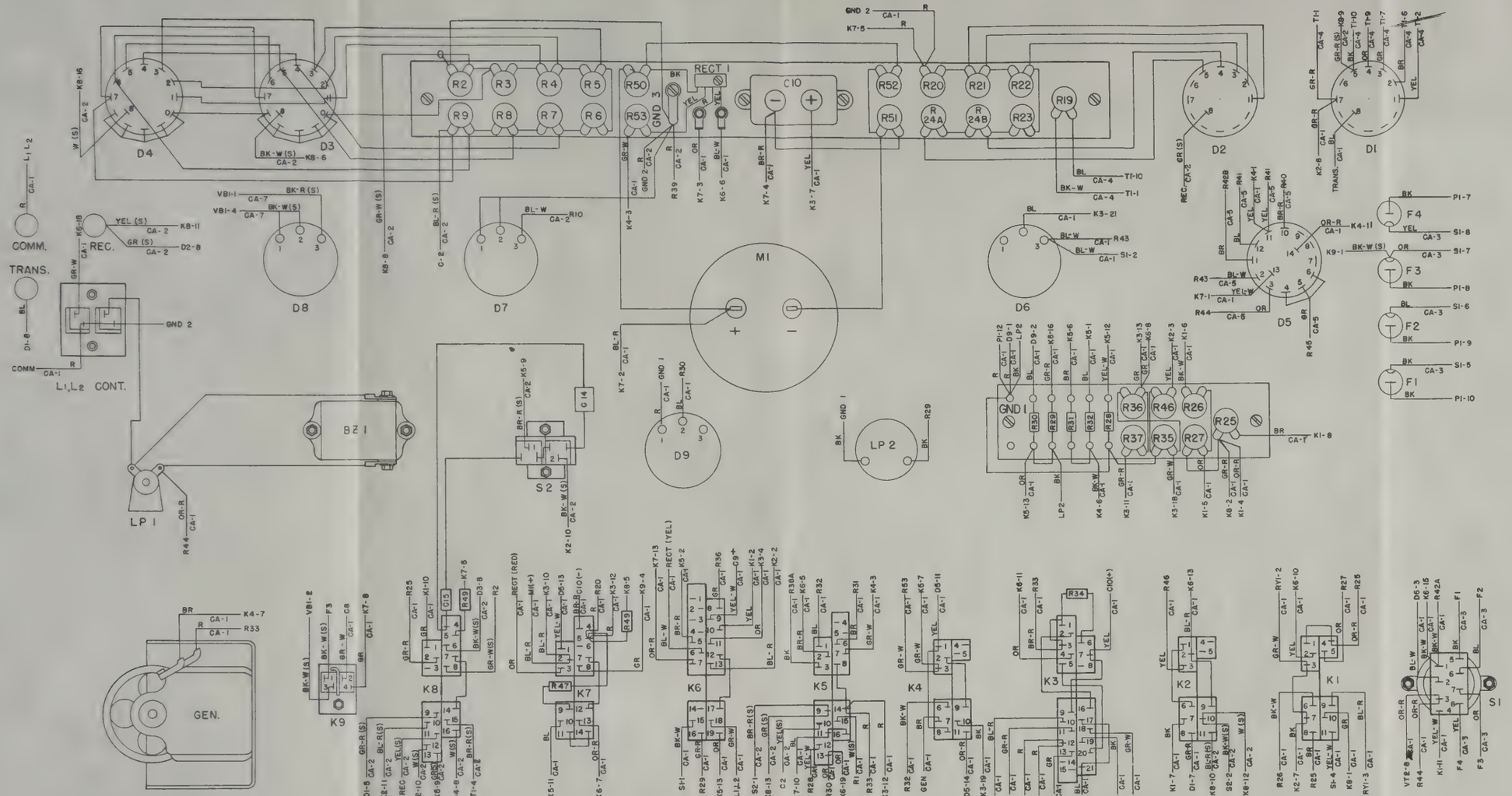
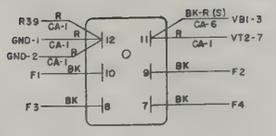



*Figure 52* (Added). *Test Set I-142-B, rear view of subpanel assembly, wiring diagram.*



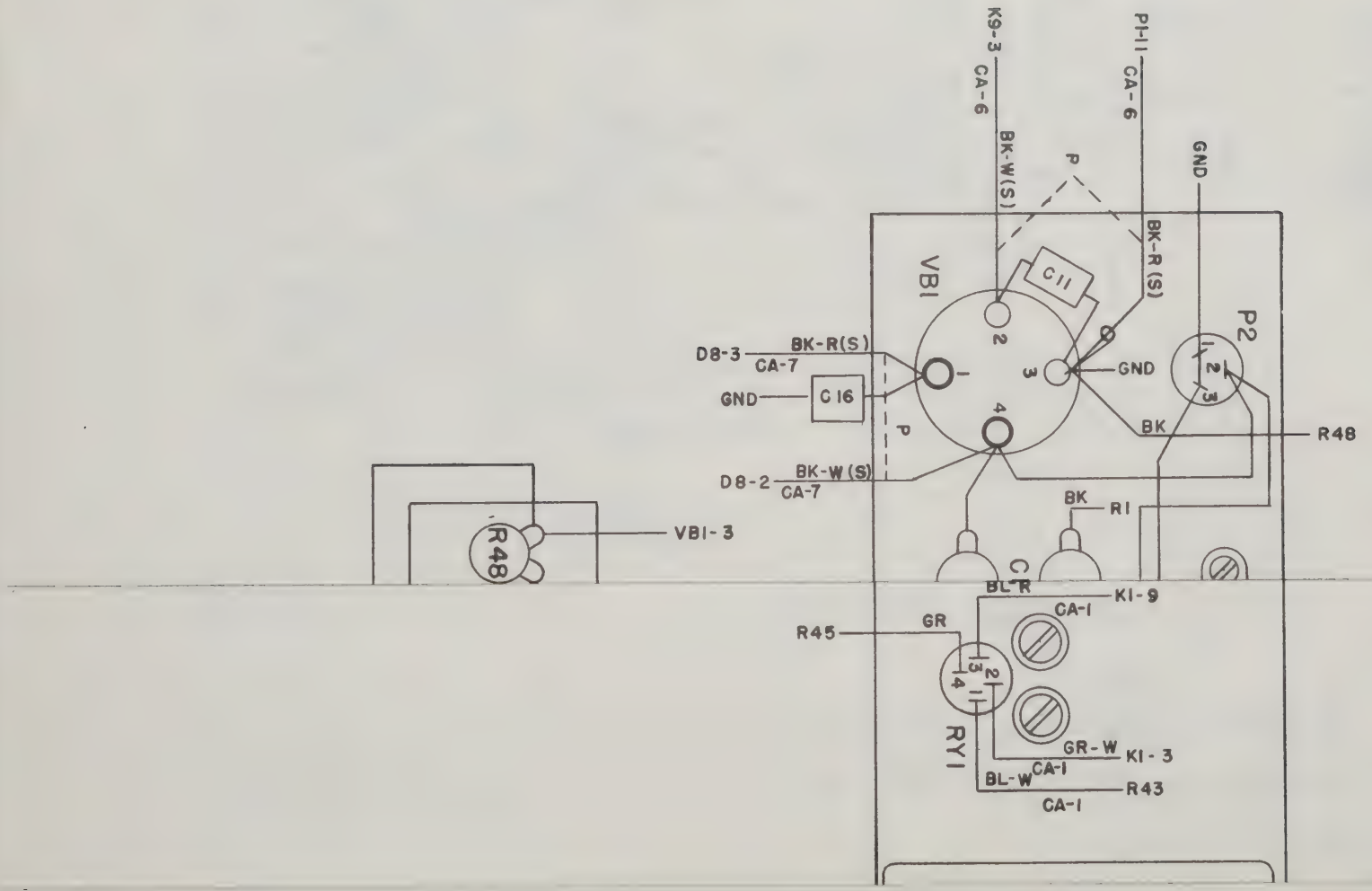

## NOTES

1. ALL OPEN CASE WIRING AND STRAPPING ON SWITCHES TO BE DONE WITH 22 GA. SOLID WIRE INSULATED WITH GLASS BASE TUBING.
2. THE CABLE DESIGNATIONS ARE AS FOLLOWS:
   - CA-1 MAIN CABLE
   - CA-2 SHIELDED CABLE
   - CA-3 CABLE
   - CA-4 CABLE
   - CA-5 CABLE
   - CA-6 VIBRATOR POWER CORD
   - CA-7 VIBRATOR CONTROL CORD
3. 22 GA. SOLID TINNED COPPER WIRE INSULATED WITH GLASS BASE TUBING SHALL BE USED FOR STRAPPING ADJACENT TERMINALS ON SWITCH UNITS AND CONTROLS AS REQUIRED.
4. LEADS OF CAPACITORS AND RESISTORS WHICH ARE MOUNTED IN PLACE SHALL BE INSULATED WITH GLASS BASE TUBING.
5. P = PAIRED WIRES.
6. + 135 V. LUG MOUNTED UNDER R38A.
7. + 135 V. LUG MOUNTED UNDER R40.
8. TIE LUG MOUNTED UNDER R45.



398609 O - 56 (Face p. 11) No. 1




K9-3
CA-6
BK-W(S)
P1-1
CA-6
GND
P
VB1
C11
BK-R(S)
P2
D8-3
BK-R(S)
CA-7
GND
C16
GND
BK
R48
P
D8-2
BK-W(S)
CA-7
BK
R1
R48
VB1-3
C
BL-R
KI-9
CA-1
R45
GR
RY1
GR-W
KI-3
CA-1
BL-W
R43
CA-1

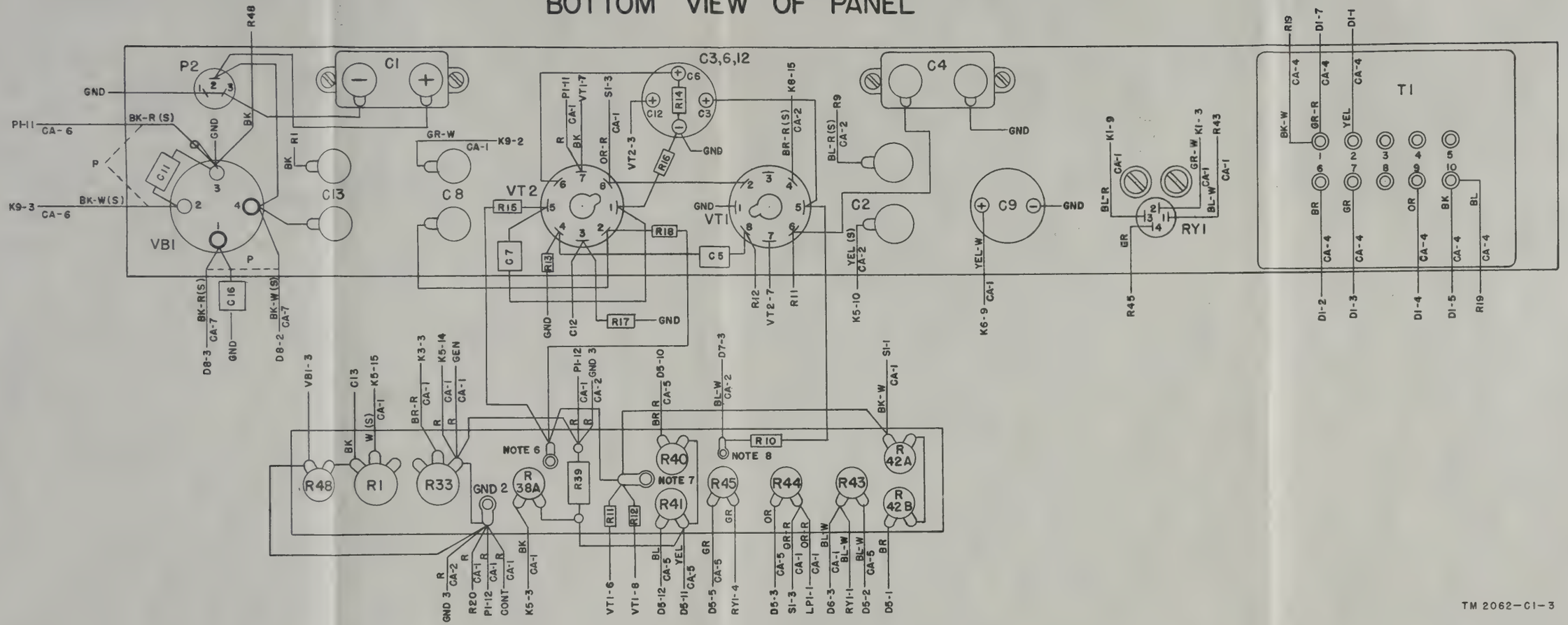



*Figure 53* (Added). *Test Set I-142-B, bottom view of panel, wiring diagram.*



398609 O -56 (Face p. 11) No. 2

TECHNICAL MANUAL

# TEST SETS I–142, I–142–A, I–142–B, AND TELEPHONE TEST SET AN/PTM–6

TM 11–2062
CHANGES No. 2

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *9 January 1956*

TM 11–2062, 1 September 1948 is changed as follows:

The title of the manual is changed to read: **TEST SETS I–142, I–142–A, I–142–B, AND TELEPHONE TEST SET AN/PTM–6.**

The following information changes TM 11–2062 so that the manual also applies to the following equipment:

| *Nomenclature* | *Order No.* | *Serial No.* |
|---|---|---|
| Telephone Test Set AN/PTM–6 | 25694–Phila–53 | 1 through 453 |

*Page 1.* Part One. (C1), Number the existing note: 1. Add the following note.

*2.* Telephone Test Set AN/PTM–6 procured on Order No. 25694–Phila–53, consists of Telephone Test Set TS–903/G, Sound Calibrator TS–550/G, and Test Lead CX–3303/G, and is similar to Test Set I–142–B. All information in this manual applies equally to Telephone Test Set AN/PTM–6 furnished on Order No. 25694–Phila–53 unless otherwise specified in this change.

*Page 2.*

## 4.1 Table of Components for Telephone Test Set AN/PTM–6 (Added)

| Quantity | Component | Dimensions (in.) | | | Unit weight (lb) | Unit volume (cu ft) |
|---|---|---|---|---|---|---|
| | | Length | Width | Height | | |
| 1 | Telephone Test Set TS–903/G | 20½ | 12⅞ | 9¾ | 50 | 1.5 |
| 1 | Sound Calibrator TS–550/G | 9¾ | 4¾ | 2⅞ | 5 | .07 |
| 1 | Test Lead CX–3303/G | 36 | | | | |
| 1 | Set of spare parts including: | | | | | |
| | 1 tube 12SG7. | | | | | |
| | 1 tube 12SN7GT. | | | | | |
| | 2 fuses (¼ amp). | | | | | |
| | 1 fuse (1 amp). | | | | | |
| | 1 fuse (3 amp). | | | | | |

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

*Page 3,* paragraph 6. Add the following after *c*:

*d. Telephone Test Set AN/PTM–6.* Telephone Test Set AN/PTM–6 is similar to Test Set I–142–B with the following exceptions.

(1) Four spare fuses are mounted on the inside of the cover.

(2) The test set chassis is shock-mounted in the carrying case.

(3) Hexagonal head captive screws are used to secure the front panel in the carrying case.

*Page 3.*

*Page 20,* table 1, change the first item in the "Equipment" column to read: **Test Set I–142 or Telephone Test Set AN/PTM–6.**

*Page 41,* paragraph 71, add the following at the end of *c*: Capacitors C17 and C18 are used in Telephone Test Set AN/PTM–6 only. Capaci-

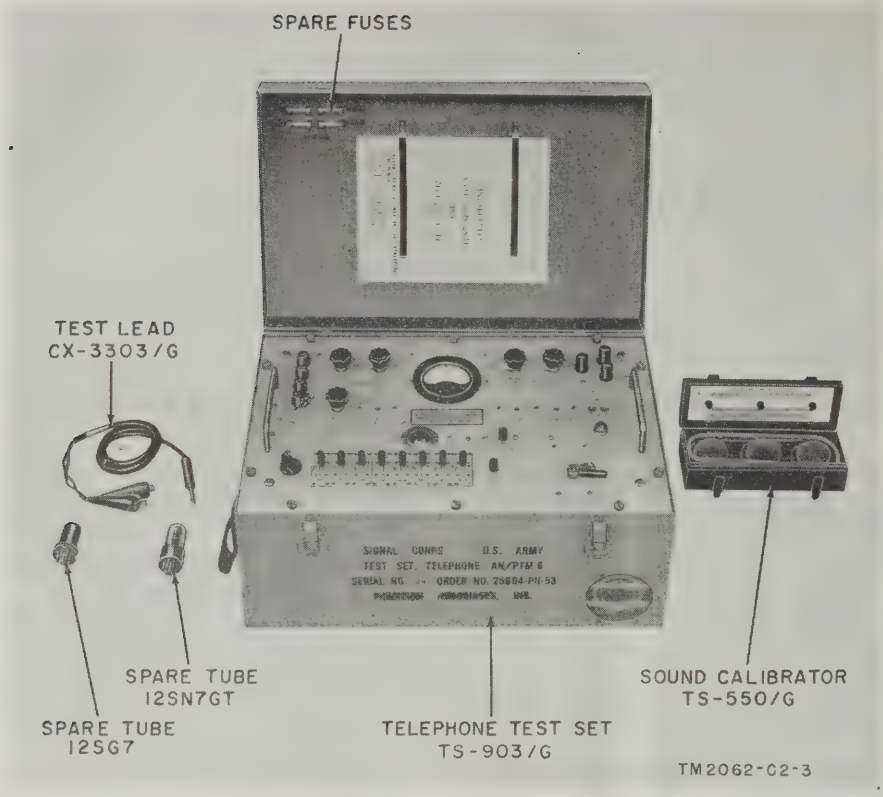



*Figure 2.1* (Added) *Telephone Test Set AN/PTM–6, components.*

tor C17 increases the stability of the amplifier and capacitor C18 prevents noise and audio signals from entering the +135V supply.

*Page 41,* figure 13, make the following changes to figure 13:

Add "C17" between pins 4 and 6 of tube VT1.

Add "C18" between +135V lead and ground.

Add reference "(see note 3)" adjacent to added capacitors.

Add the following note:

3. CAPACITORS C17 AND C18 ARE USED IN TELEPHONE TEST SET AN/PTM–6 ONLY.

*Page 42,* paragraph 72.1, (C1), change the last sentence of paragraph 72.1 to read: **Figure 14.1 shows the connections that are made to the meter.**

*Page 42,* figure 14.1, (C1). Add reference "(see note)" adjacent to resistor R53. Add the following note to figure 14.1:

NOTE: IN TELEPHONE TEST SET AN/PTM–6, RESISTOR R53 IS 3,100 OHMS.

*Page 44,* paragraph 77, in *c*(2), add the following at the end of the third sentence: variable resistor R33, with a maximum value of 2,500 ohms, is used in Telephone Test Set AN/PTM–6.

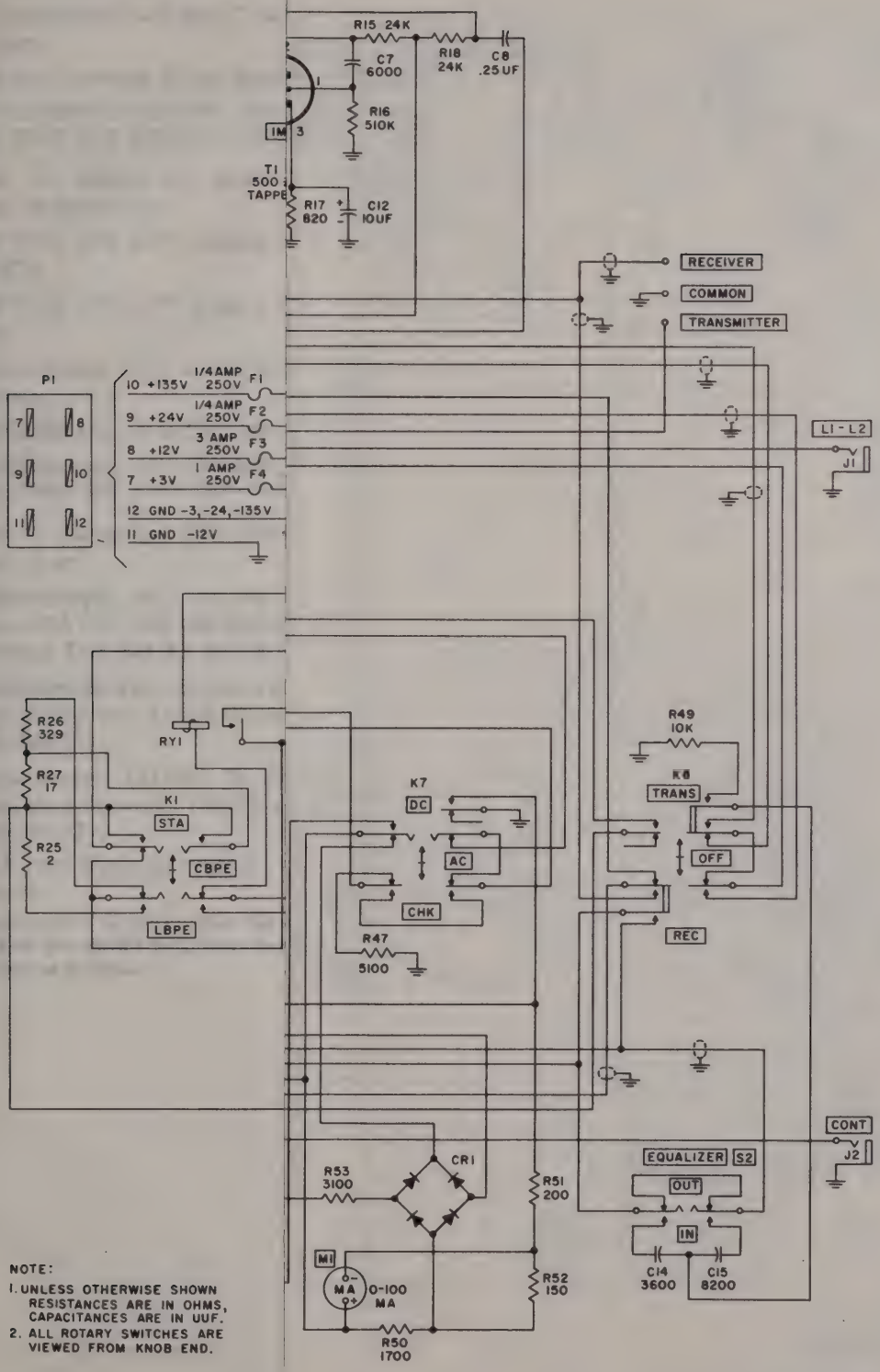
*Page 55,* paragraph 88, make the following changes in *c*(2): Subparagraph (*a*). In line 3, add the following after "open-circuited:" decoupling capacitor C18 is shorted (AN/PTM–6 only).

Subparagraph (*b*). In line 3, after "C4," add the following: or C17 (AN/PTM–6 only).

Subparagraph (*g*). At the end of (*g*), add the following: or leaking capacitor C17 (AN/PTM–6 only).

*Page* 56, figure 33, make the following changes in figure 33:

Add "C17, .002 UF" between pins 4 and 6 of tube VT1.




NOTE:

1. UNLESS OTHERWISE SHOWN RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ALL ROTARY SWITCHES ARE VIEWED FROM KNOB END.

TM 2062-C2-2

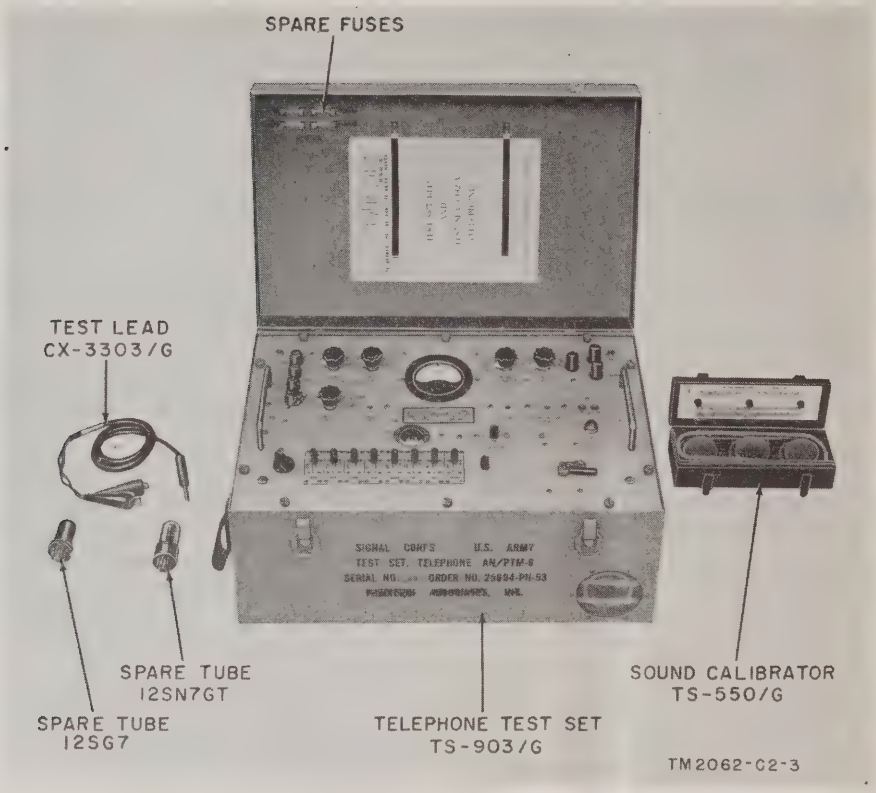



*Figure 2.1* (Added) *Telephone Test Set AN/PTM–6, components.*

tor C17 increases the stability of the amplifier and capacitor C18 prevents noise and audio signals from entering the +135V supply.

*Page 41,* figure 13, make the following changes to figure 13:

Add "C17" between pins 4 and 6 of tube VT1.

Add "C18" between +135V lead and ground.

Add reference "(see note 3)" adjacent to added capacitors.

Add the following note:

3. CAPACITORS C17 AND C18 ARE USED IN TELEPHONE TEST SET AN/PTM–6 ONLY.

*Page 42,* paragraph 72.1, (C1), change the last sentence of paragraph 72.1 to read: **Figure 14.1 shows the connections that are made to the meter.**

*Page 42,* figure 14.1, (C1). Add reference "(see note)" adjacent to resistor R53. Add the following note to figure 14.1:

NOTE: IN TELEPHONE TEST SET AN/PTM–6, RESISTOR R53 IS 3,100 OHMS.

*Page 44,* paragraph 77, in *c*(2), add the following at the end of the third sentence: variable resistor R33, with a maximum value of 2,500 ohms, is used in Telephone Test Set AN/PTM–6.

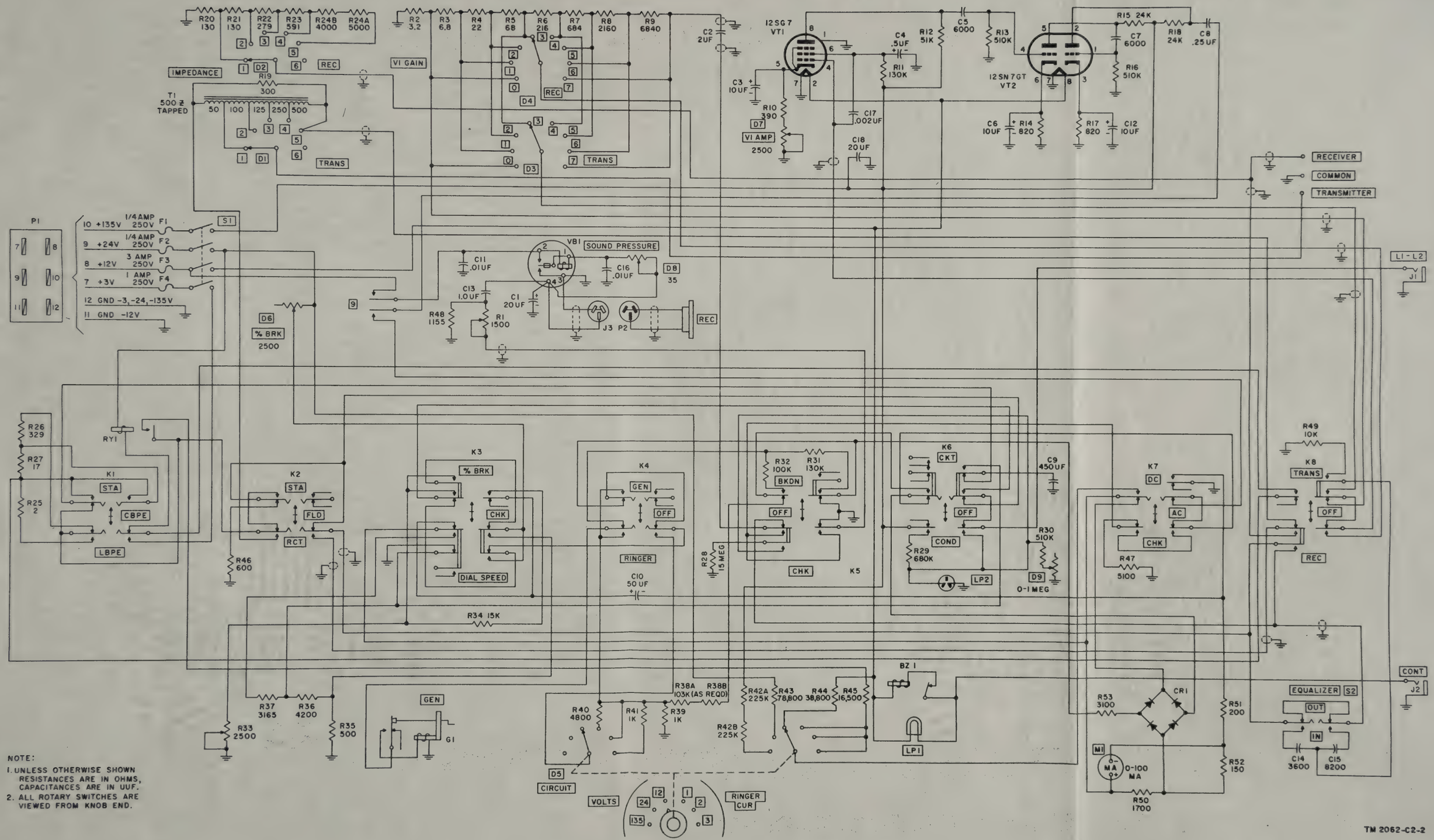
*Page 55,* paragraph 88, make the following changes in *c*(2): Subparagraph (*a*). In line 3, add the following after "open-circuited:" decoupling capacitor C18 is shorted (AN/PTM–6 only).

Subparagraph (*b*). In line 3, after "C4," add the following: or C17 (AN/PTM–6 only).

Subparagraph (*g*). At the end of (*g*), add the following: or leaking capacitor C17 (AN/PTM–6 only).

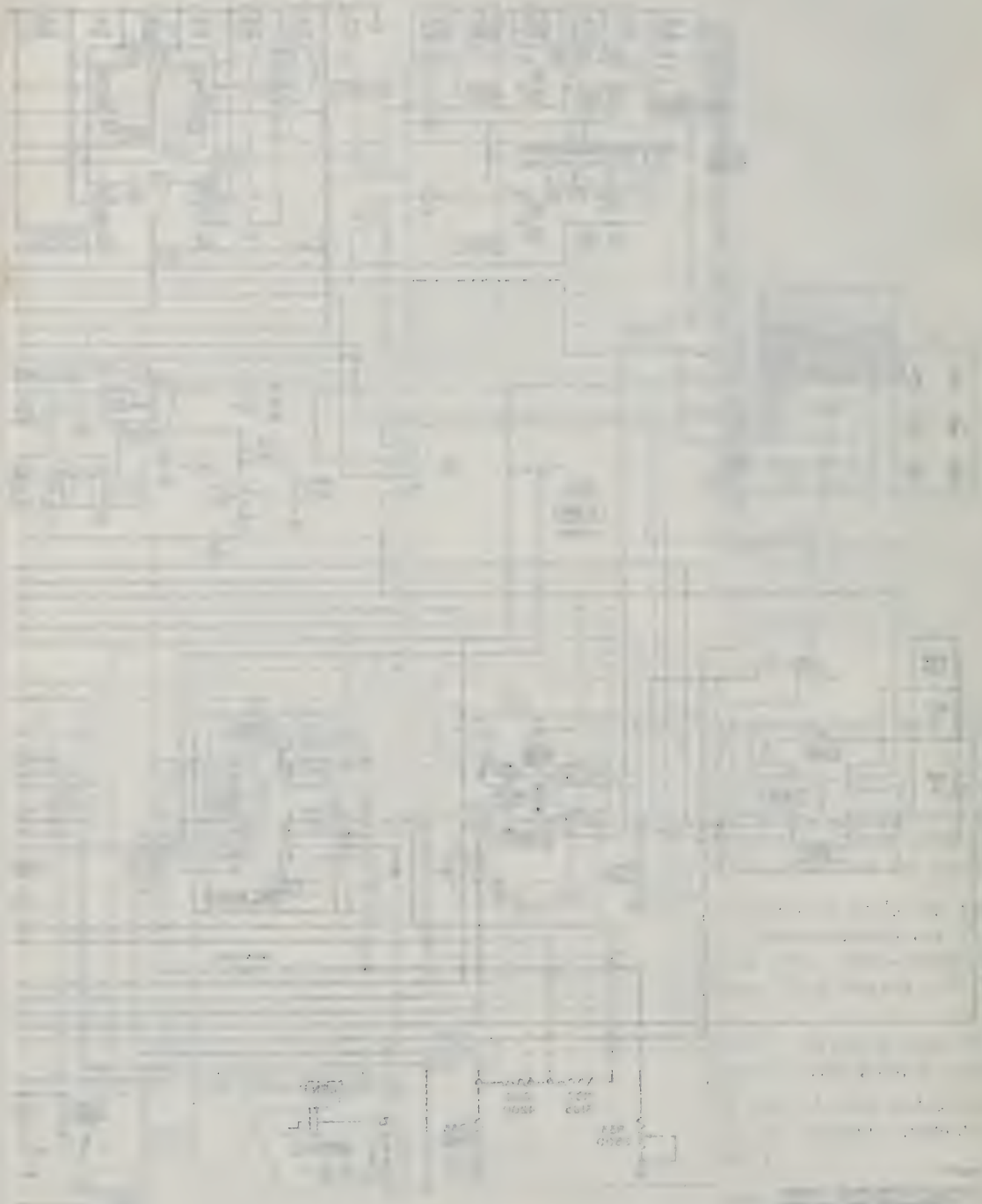
*Page* 56, figure 33, make the following changes in figure 33:

Add "C17, .002 UF" between pins 4 and 6 of tube VT1.




NOTE:
1. UNLESS OTHERWISE SHOWN RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UUF.
2. ALL ROTARY SWITCHES ARE VIEWED FROM KNOB END.

*Figure 49.1* (Added) *Telephone Test Set TS–903/G, schematic diagram.*



Add "C18, .002 UF" from F1 to ground.

Add reference "(see note)" adjacent to added capacitors.

Add the following to the notes:

CAPACITORS C17 AND C18 ARE USED IN TELEPHONE TEST SET AN/PTM–6 ONLY.

*Page 57,* figure 34, make the following changes in figure 34:

Add "C17, .002 UF" between pins 4 and 6 of Tube VT1.

Add "C18, .002 UF" from +135-volt lead to ground.

Add reference "(see note)" adjacent to added capacitors.

Add the following to the note:

CAPACITORS C17 AND C18 ARE USED IN TELEPHONE TEST SET AN/PTM–6 ONLY.

*Page 76,* paragraph 102, make the following changes in *a*:

Subparagraph (8). In the last line after "within ±0.5 db," add the following: (±0.8 db when using Test Set TS–903/G).

Subparagraph (9). In line 3 after "±0.5 db," add the following: (±0.8 db when using Test Set TS–903/G).

Subparagraph (9) (*d*). In line 9 after "0.2 db," add the following: (0.5 db when using Test Set TS–903/G).

Fig. 52, (C1). (fold-out). Make the following changes to figure 52:

Change caption to read: ***Test Set I–142–B* or Telephone Test Set AN/PTM–6, *rear view of subpanel assembly, wiring diagram.***

Add "C18" from F1 to GND 1.

Add reference "(NOTE 6)" to added capacitor.

Change note 6 to read: **CAPACITOR C18 IS USED IN AN AN/PTM–6 ONLY.**

Change note 7 to read: **IN AN AN/PTM–6, WIRE FROM F3 to K9–1 IS BLACK, WIRE FROM P1–11 TO VB1–3 IS WHITE, AND WIRE FROM K9–3 TO VB1–2 IS BLACK.**

Delete note 8.

Figure 53, (C1). (fold-out). Make the following changes to figure 53.

Change caption to read: ***Test Set I–142–B* or Telephone Test Set AN/PTM–6, *bottom view of panel, wiring diagram.***

Change reference "(NOTE 6)," located adjacent to R38A, to read: "(NOTE 1)."

Change reference "(NOTE 7)," located adjacent to R40, to read: "(NOTE 2)."

Change reference "(NOTE 8)," located adjacent to R45, to read: "(NOTE 3)."

Add "C17" between pins 4 and 6 of tube VT–1.

Add reference "(NOTE 4)" adjacent to added capacitor.

Add the following notes:

1. +135 V. LUG MOUNTED UNDER R38A.

2. +135 V. LUG MOUNTED UNDER R40.

3. TIE LUG MOUNTED UNDER R45.

4. CAPACITOR C17 IS USED IN AN/PTM–6 ONLY.

5. IN AN AN/PTM–6, WIRE FROM VB1–3 TO P1–11 IS WHITE, WIRE FROM VB1–2 TO K9–3 IS BLACK, WIRE FROM VB1–1 TO D8–3 IS BLACK, AND WIRE WIRE FROM VB1–4 TO D8–2 IS WHITE.

*Page 84,* appendix II. (Rescinded)

[AG 413.44 (7 Dec 55)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
*General, United States Army,*
*Chief of Staff.*

Official:

JOHN A. KLEIN,
*Major General, United States Army,*
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Mil Dist (1)
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11–7R, Sig Co, Inf Div (2)
11–15R, Sig Bn, Corps or Abn Corps (2)
11–16R, Hq & Hq Co, Sig Bn, Corps or
Abn Corps (2).
11–57R, Armd Sig Co (2)
11–127R, Sig Rep Co (2)
11–128R, Sig Depot Co (2)
11–500R, (AA–AE), Sig Svc Org (2)
11–537R, Sig Co, Amph Spt Brig (2)
11–557C, Abn Sig Co (2)
11–587R, Sig Base Maint Co (2)
11–592R, Hq & Hq Co, Sig Base Depot (2)
11–597R, Sig Base Depot Co (2)
17R, Armd Div (2)
20–300R, Amph Spt Brig (2)
57R, Abn Div (2)

*NG:* State AG (6); units—same as Active Army except allowance is one copy to each unit.

*USAR:* None.

For explanation of abbreviations used, see SR 320–50–1.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1956—360507

TECHNICAL MANUAL

# TEST SETS I-142, I-142-A, I-142-B AND TELEPHONE TEST SET AN/PTM-6

TM 11-2062
CHANGES No. 3

DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *8 January 1957*

TM 11-2062, 1 September 1948 is changed as follows:

The following information changes TM 11-2062 so that the manual also applies to the following equipment:

| *Nomenclature* | *Order No.* | *Serial No.* |
|---|---|---|
| Telephone Test Set AN/PTM-6 | 32387-PHILA-56 | 1 through 311 |

*Page 1*, paragraph 1 (C 2). Add the following after note 2:

*3.* Telephone Test Set AN/PTM-6, procured on Order No 32387-Phila-56 is similar to Telephone Test Set AN/PTM-6 procured on previous orders and Test Set I-142, I-142-A and I-142-B. All information applies equally to Telephone Test Set AN/PTM-6 furnished on Order No. 32387-Phila-56 unless otherwise specified.

*Page 3*, paragraph 6*d* (C 2). Add the following after (3):

(4) Later models are equipped with two chest handles instead of the carrying strap (fig. 2 1).

(5) On Telephone Test Set AN/PTM-6, Order No. 32387-Phila-56, switches K1 to K8 are mounted directly on the panel.

*Page 5*, paragraph 10*b*. Change the second sentence to read: **To remove the panel and chassis assembly from the case, turn out the panel mounting screws (nearest the outer edges of the panel) and lift out the assembly.**

*Page 7*, paragraph 13*s*. Add the following:

*Note.* Test Set I-142-B and Telephone Test Set AN/PTM-6 are equipped with binding posts instead of clip terminals. The binding posts on the Telephone Test Set AN/PTM-6 will accommodate test cord plugs.

*Page 40*, figure 12. Designate the existing note 1 and add note 2.

2. ON AN/PTM-6, ORDER NO. 25964-PHILA-53, RESISTOR R1 IS 1,500 OHMS; ON AN/PTM-6, ORDER NO. 32387-PHILA-56, RESISTOR R1 IS 2,500 OHMS.

[AG 413.44 (3 Jan 57)]

*Page 54*, figure 31. Add the following after note 3:

4. ON AN/PTM-6, ORDER NO. 25964-PHILA-53, RESISTOR R1 IS 1,500 OHMS; ON AN/PTM-6, ORDER NO. 32387-PHILA-56, RESISTOR R1 IS 2,500 OHMS.

*Page 77*, paragraph 102*a*. Add the following after (9)(*h*):

*Note* In Telephone Test Set AN/PTM-6 (Order No. 26694-Phila-53) and Test Set I-142-B, resistor R1 (1,500 ohms) is set and sealed. In Telephone Test Set AN/PTM-6, Order No. 32387-Phila-56, the shaft of resistor R1 (2,500 ohms) is equipped with a high torque device which prevents accidental changes in setting.

*Page 81*, paragraph 112*c*. Add the following after (5):

*Note.* In some models of Telephone Test Set AN/PTM-6, resistor R33 is a 2,500-ohm variable resistor which is set at the factory and sealed. If it is necessary to readjust resistor R33, reseal the control with glyptal or other material which will not run down the shaft bushing. In the later models of Telephone Test Set AN/PTM-6, the shaft of resistor R33 is equipped with a high torque device which prevents accidental changes in setting.

*Page 98*, figure 49.1 (C 2) (fold-out). Add the following to the notes:

3. IN AN/PTM-6, ORDER NO. 32387-PHILA-56, RESISTOR R1 IS 2,500 OHMS.

*Page 98*, figure 52 (fold-out). Make the following changes to figure 52:

Delete the lead between capacitor C18 and GND 1.

Add a lead from capacitor C18 to contact 5 on switch S5.

*Page 98*, figure 53 (C 2) (fold-out). Add the following note.

6. CAPACITOR C18 MOUNTED BELOW T1 ON AN/PTM-6 ONLY.

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
*General, United States Army,*
*Chief of Staff.*

Official:
HERBERT M. JONES,
*Major General, United States Army,*
*The Adjutant General.*

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Armies (5)
Corps (2)
Div (2)
Ft & Cp (2)
Sp Wpn Comd (2)
Army Cml Cen (4)
Gen & Br Svc Sch (5) except Sig Sch (25)
Gen Depots (2) except Atlanta Gen Depot (None)
Sig Sec, Gen Depots (10)
Sig Depots (17)
US Army Tng Cen (2)
POE (OS) (2)
Trans Terminal Comd (2)
Army Terminals (2)
OS Sup Agencies (2)
Army Elct PG (1)
Sig Fld Maint Shops (3)
Sig Lab (5)
ACS (3)
Mil Dist (1)
Units organized under following TOE's:
9-7R, Ord DS Co (2)
9-500R (AA-AE), Ord Svc Org (2)
11-7C, Sig Co, Inf Div (2)
11-15C, Sig Bn, Corps or Abn Corps (2)
11-16C, Hq & Hq Co, Sig Bn, Corps or Abn Corps (2)
11-57C, Armd Sig Co (2)
11-127R, Sig Rep Co (2)
11-128C, Sig Depot Co (2)
11-500R, Sig Svc Org (2)
11-537R, Sig Co, Amph Spt Brig (2)
11-557C, Abn Sig Co (2)
11-587R, Sig Base Maint Co (2)
11-592R, Hq & Hq Co, Sig Base Depot (2)
11-597R, Sig Base Depot Co (2)
20-300R, Amph Spt Brig (2)

*NG:* State AG (6); units—same as Active Army except allowance is one copy to each unit.
*USAR:* None.
For explanation of abbreviations used, see SR 320 50-1.



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