TM 11-6625-498-45

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD (FOURTH ECHELON) AND DEPOT MAINTENANCE MANUAL

TEST SET, RADIO FREQUENCY POWER AN/USM-161

HEADQUARTERS, DEPARTMENT OF THE ARMY

11 JUNE 1963

WARNING

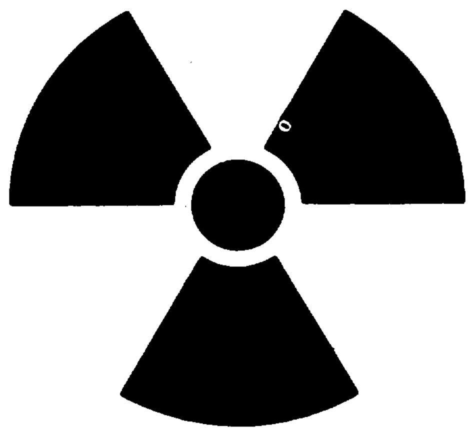
Be careful when working on the 115-volt ac line connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES EXIST IN THE POWER SUPPLY

Before working on this power supply, always short-circuit the high voltage filter capacitors after power has been removed.

RADIATION HAZARD



Ra 226

Co 60

Tube type 5651WA used in this equipment contains radioactive material. This tube is potentially hazardous when broken; see qualified medical personnel and the safety director if you are exposed to or cut by a broken tube containing radioactive material, Use extreme care in replacing this tube (para 16) and follow safe procedures in the handling, storage, and disposal.

Never place radioactive tubes in your pocket.

Use extreme care not to break radioactive tubes while handling them.

Never remove radioactive tubes from cartons until ready to use them.

Technical Manual
No. 11-6625-498-45

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *11* June 1963

TEST SET, RADIO FREQUENCY POWER AN/USM-161

CHAPTER 1

THEORY

1. Scope

a. This manual covers field (fourth echelon) and depot maintenance for Test Set, Radio Frequency Power AN/USM-161 (test set). It includes instructions appropriate to fourth and fifth echelons for troubleshooting, repairing, alignment, and testing the test set. The repair and replacement of specified maintenance parts is also included. In addition, tools, materials, and test equipment for fourth and fifth echelon maintenance are listed. Detailed theory of the test set is covered in this chapter.

b. Throughout this manual Test Set, Radio Frequency Power TS-1776/USM-161 (the major component of the test set) is referred to as power meter.

c. The complete technical manual for this equipment includes TM 11-6625-498-12.

d. Forward all comments on this publication direct to: Commanding Officer, U. S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, New Jersey. (DA Form 1598 (Record of Comments on Publications), DA Form 2496 (Disposition Form), or letter may be used.)

Note: For applicable forms and records, see paragraph 2, TM 11-6625-498-12.

e. Refer to the latest issue of DA PAM 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet No. 310-4 is an index of current Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes to and revisions of each equipment publication.

2. Block Diagram
(fig. 1)

a. General. The test set is designed to measure radiofrequency (rf) power at frequencies between 10 and 10,000 megacycles (mc). Each test set is supplied with a 200-ohm thermistor mount (Bolometer, Radio Frequency DT-255/USM-161 (thermistor mount)). One 7-decibel (db) Attenuator, Fixed CN-844/USM-161 and two 10-db Attenuators, Fixed CN-845/USM-161 are supplied with the test set to extend the maximum power measuring capabilities of the equipment. The frequency range of the attenuators is from 1,000 to 10,000 mc. The rf power (from 2 microwatts (uw) to 5 watts) being measured maybe continuous-wave, modulated, or pulsed power.

b. Rf Cable and Rf Cord. An input cable (rf cable) is permanently attached to the front panel, and connects the thermistor mount to the power meter. When the rf cable is not long enough, the rf cord can be used. This rf cord is 6 feet long and is connected from the rf power source to be measured to the thermistor mount (or attenuators, if required). Standard correction factors for deviations in attenuation introduced by the use of this rf cord are indicated on the calibration plate on the rf cord. It is recommended that the rf cord be used only when absolutely necessary.

c. Attenuators. The test set maybe used without attenuators to measure up to 10 milliwatts (mw) of rf power. With the three attenuators attached, the test set can measure up to 5 watts of rf power. The maximum power that may be applied to the 10-db attenuators is 1 watt, and to the 7-db attenuator, 5 watts. Therefore, when measuring more than 1 watt, the 7-db attenuator should be closest to the rf power source being measured.

d. Thermistor Mount. The 200-ohm thermistor mount supplied with the test set is the element used for measuring the rf power applied. Its resistance changes due to the heating caused by the rf energy applied. This change in resistance is sensed by the rf bridge circuit. Facilities are also contained in the test set for the use of a 100-ohm thermistor mount (not supplied) to measure rf power in waveguides.

e. Test Set, Radio Frequency Power AN/USM-161 Operation.

(1) The power supply (V1, V2, V3, V4, and V7) produces the required operating voltages for the test set. The power meter is operated in conjunction with two external thermistors and a resistor contained with the thermistor mount. A constant direct current (de) from the precision constant current supply (V5, V6, and V7) is applied to the parallel combination of the rf bridge and calibrated rheostat R75 (BIAS-READ switch S2 set to BIAS). The magnitude of the direct current through the rf bridge is determined by the setting of the calibrated rheostat. In addition, an alternating current (at) bias is applied across the parallel combination. This ac bias is produced in the bias oscillator circuit (V8 and V9). The magnitude of the direct current and the ac bias determines the resistance of the thermistor, with the ac bias being used as the fine control for obtaining a null. The output of the rf bridge is amplified in the differential amplifier circuit (V10 and V11), detected in the synchronous detector circuit (CR1 and CR2), and applied to the NULL INDICATOR meter (Ml). When the rf bridge is balanced, the NULL INDICATOR meter indicates a null.

(2) Temperature compensation is obtained by using an rf and a compensating bridge system. The compensating bridge contains a thermistor whose characteristics are the same as the thermistor in the rf bridge, and is contained in the same thermistor mount. Temperature changes of the thermistor mount affect both thermistors equally. The thermistor in the compensating bridge causes the ac output of the bias oscillator to change, thereby changing the resistance of the thermistor in the rf bridge. This change is of such a nature as to maintain the balance of the rf bridge so that meter readings are a function of the rf input only.

(3) When rf power being measured is applied, the resistance of the thermistor that forms one leg of the rf bridge is changed, and the rf bridge becomes unbalanced. This unbalance results in a deflection of the NULL INDICATOR meter needle. Precision rheostat R77 is then switched into the circuit (BIAS-READ switch S2 set to READ) in place of the calibrated rheostat, Synchronous detector diodes CR1 and CR2 are biased by a portion of the bias oscillator output and precision rheostat R77 is adjusted for a null indication. This results in the shunting of an amount of dc power from the thermistor (through the precision rheostat) equal to the amount of rf power applied to the thermistor. The dial attached to the precision rheostat (POWER control) is calibrated to indicate rf power and this rf power is read direct from the dial.

3. Power Supply
(fig. 2)

a. The power meter power supply provides n e g a t i v e polarity dc voltages required by the power meter. These voltages are applied to the cathodes, and the plates are returned to ground. The required filament voltages are obtained from the two secondary windings (pins 6 and 7 and 8 and 9) of power transformer T1. Ballast tube RT1, operating in conjunction with resistor R93, provides voltage regulation for the filaments of amplifier tube V8 and power output tube V9.

b. Line voltage, at 115 volts 50-1,000 cycles per second (cps), is applied through fuse F1 and switch S3 to the primary of transformer T1. Power indicator lamp DS1 is connected across one secondary (pins 6 and 7) of transformer T1, and

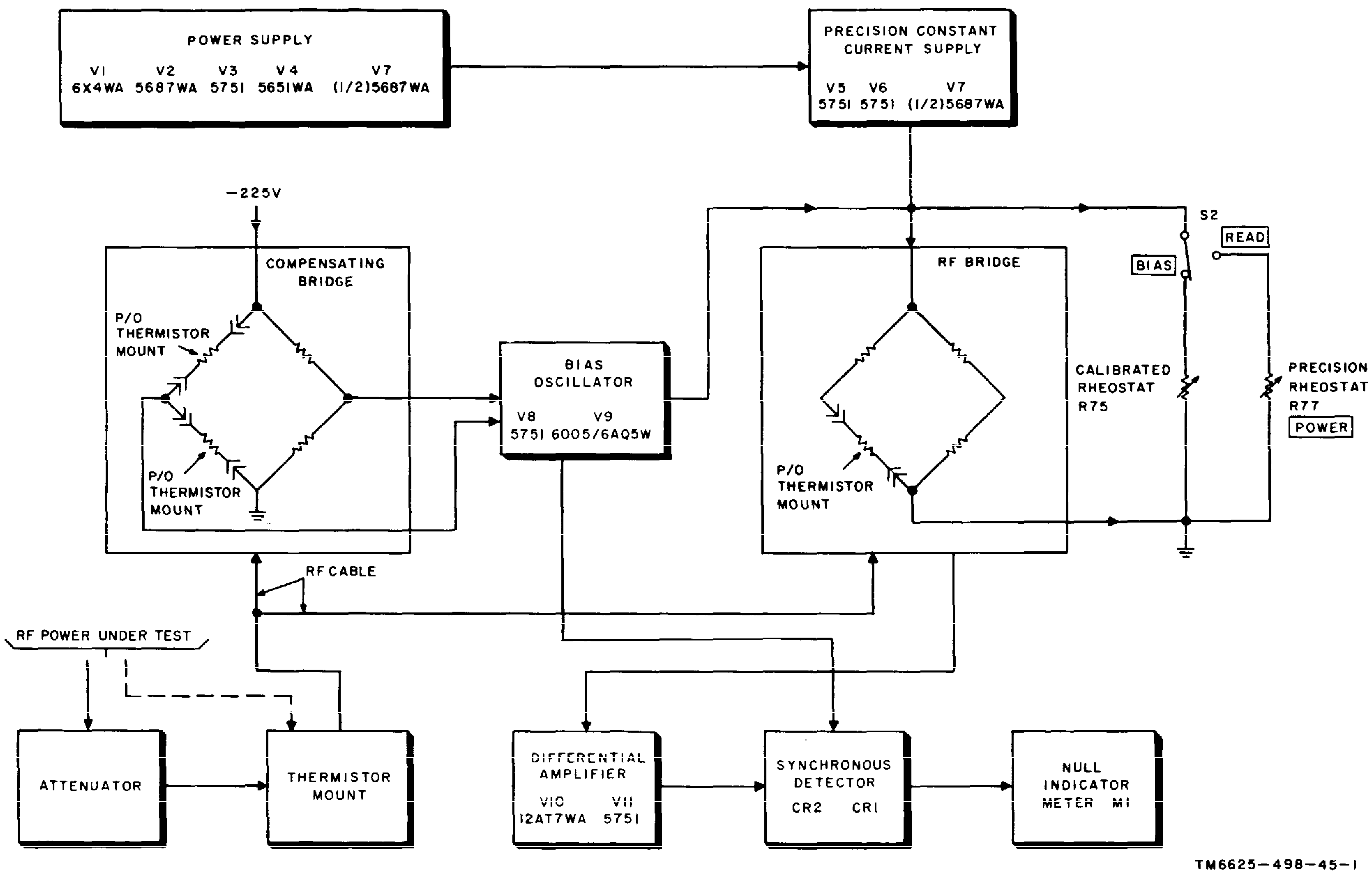


Figure 1. Test Set, Radio Frequency Power AN/USM-161, block diagram.

indicates when ac power is applied. Transformer T1 has three secondary windings. The high-voltage winding (terminals 3, 4, and 5) applies 309 volts ac to the plates of rectifier tube V1. Two filament windings (pins 6 and 7 and 8 and 9) deliver power (6. 3 and 12.6 volts ac) as follows:

(1) The 6.3-volt, 2.6-ampere winding (pins 6 and 7) supplies the filaments of pass tubes V2 and V7 and rectifier tube V1.

(2) The 12.6-volt, 1.8-ampere winding (pins 8 and 9) supplies the filament voltage for the remaining tubes.

c. The 309 volts ac developed across the high-voltage secondary of transformer T1 is applied to the plates of tube V1. The plates of tube V1 conduct alternately on each cycle of the applied voltage, and a pulsating dc voltage appears at the cathode of tube V1. The pulsating dc is applied to a filter network (capacitor C1A and C1B) that reduces the ripple content. Capacitor C1A filters the voltage across tube V1. Capacitor C1B filters the voltage across the bleeder supply. The filtered output is applied to a series regulator.

d. The series regulator consists of pass tubes V2 and V7A, amplifier tube V3 (dual triode connected in cascode), and reference tube V4. If the output voltage tends to decrease (become less negative), the full change is applied to the cathode of tube V3B because the drop across tube V4 (voltage regulator diode) remains constant. A portion of the change is applied to the grids of tubes V3A and V3B due to voltage divider action of resistors R5, R6, and R7. The

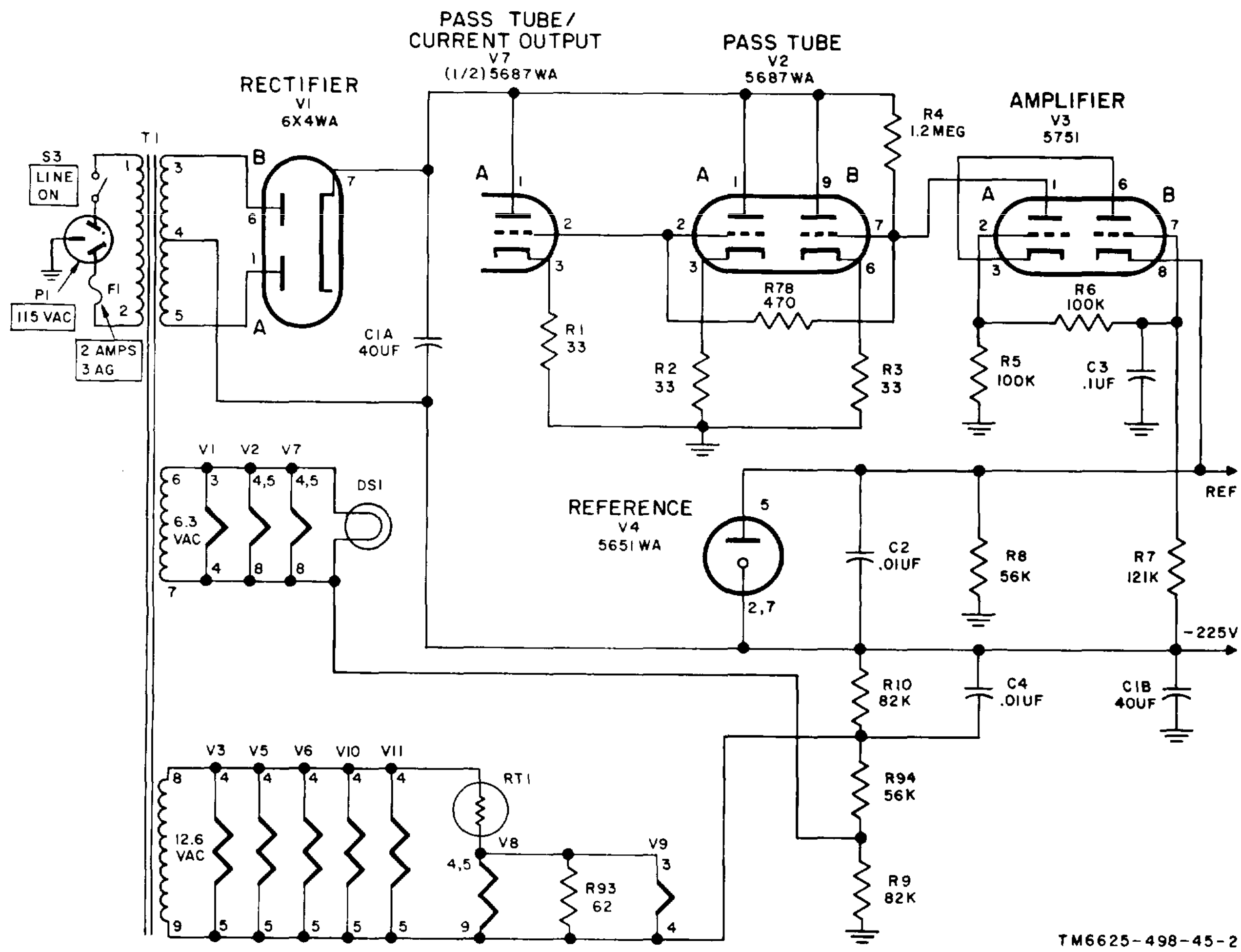


Figure 2. Power supply schematic diagram.

net effect is an increase in bias for V3B and V3A. This cuts down conduction of plate current through plate load resistor R4 and a positive-going voltage is applied to the grids of tubes V2A, V2B, and V7A (parallel connected). This decreases the impedance of the three stages causing less voltage drop across them and more voltage is applied to the load, returning the output voltage to -225 volts. This action also results in a constant output when the ac source voltage varies.

e. If the output voltage tends to increase (become more negative), the net effect is a decrease in bias for V3B and V3A. This increases conduction of plate current through plate load resistor R4 and a negative-going voltage is applied to the grids of V2A, V2B, and V7A. This increases the impedance of the three stages causing more voltage drop across them and less voltage is applied to the load, returning the output voltage to -225 volts.

f. Resistors R1, R2, and R3 in the cathode circuits of the three triode pass tube stages (V2A, V2B, and V7A) serve to balance the current in these stages. Resistors R5, R6, and R7 form a voltage divider network with R5 as the grid resistor for V3A and the junction of R6 and R7 as the reference voltage takeoff point for the grid of V3B. Capacitor C2 is used to bypass rf currents that may appear on the cathode of V3B. Capacitor C3 is used to bypass rf currents that may appear on the grid of V3B. Capacitor C4 is used to bypass rf currents that may appear on the filaments connected across pins 8 and 9 of T1. Voltage divider R9, R94, and R10 sets the dc levels of the filament voltages.

4. Precision Constant Current Supply (fig. 3)

a. The precision constant current supply produces the precision dc that is required for the rf bridge, and consists of amplifier tubes V5 and V6; current output tube V7B, and associated circuitry. The settings on POWER RANGE switch S1 select the magnitude of the precision constant current applied to the rf bridge by changing the resistance in the cathode and place circuits of V7B. The precision current output to the rf bridge is regulated as follows:

(1) If the output current tends to increase (positive-going with respect to the -225 volt line), the voltage drop across resistor R19B would also tend to increase. This would result in an increased voltage on the grid (pin 7) of V5B, thereby increasing conduction in V5B. Since tube V5A and V5B have the same cathode resistor (R18), an increase in conduction of V5B would result in a decrease in the conduction of V5A. The resultant increase increase in the plate voltage of V5A, which is also the grid voltage of V6A, causes an increase in the conduction of V6A; the lower plate of voltage of V5B, which is also the grid voltage of V6B, causes a decrease in conduction of V6B. The accumulative action between V6A and V6B, when a positive-going voltage is present on the grid (pin 2) of V6A and a negative-going voltage is present on the grid (pin 7) of V6B, results in a lower voltage at the plate (pin 1) of V6A. The lower plate voltage of V6A is also the grid (pin 7) of V7B. This condition causes a decrease in output current.

(2) If the output current tends to decrease, the voltage drop across resistor R19B would also tend to decrease. This would result in a decreased voltage on the grid of V5B, thereby decreasing conduction in V5B. When V5B conduction decreases, V5A conduction increases and the plate voltage of V5A decreases. This decrease in voltage is applied to the grid of V6A and conduction decreases, causing the plate of V6A to increase. This increase in voltage is applied to the grid of V7B, causing an increase in conduction and resulting in an increase in output current.

b. Voltage divider R12, R13, and R14 is used to obtain the proper reference voltage on the grid (pin 2) of tube V5A.

Compensation for the different attenuator operating characteristics is obtained by rheostat R19B. The operating point of tube v7B is determined by rheostat R19A, POWER RANGE switch S1A and S1D, and associated resistors R25, R26, R27, R88, R89, and R90. The operating point of V7B is also controlled by resistors R20, R22, and R87, and rheostat R21 serves as a precision adjustment for the resistance of R19B. Resistors R83 and R81 set the potential on the plate (pin 6) of V6B. Capacitor C5 is used to bypass rf currents that may appear on the grid of V5A. Capacitor C8 is used for frequency compensation. Resistors R16, R17, R80, and R81 are plate load resistors. Resistors R18 and R82 are cathode resistors,

5. Bias Oscillator
(fig. 4)

a. The bias oscillator circuit produces the ac bias voltage that is required for the rf bridge and the synchronous detector diodes CR1 and CR2. The magnitude of the ac bias voltage is used as a fine control of the resistance of the thermistor in the rf bridge. The bias oscillator circuit consists of amplifier tube V8, power output tube V9, and associated circuitry, including the compensating bridge. The compensating bridge consists of resistors R1, R33, R34, and a thermistor (resistor R1 and the thermistor are contained in the thermistor mount).

b. The bias oscillator tank circuit, consisting of capacitors C10 and C12 and coil

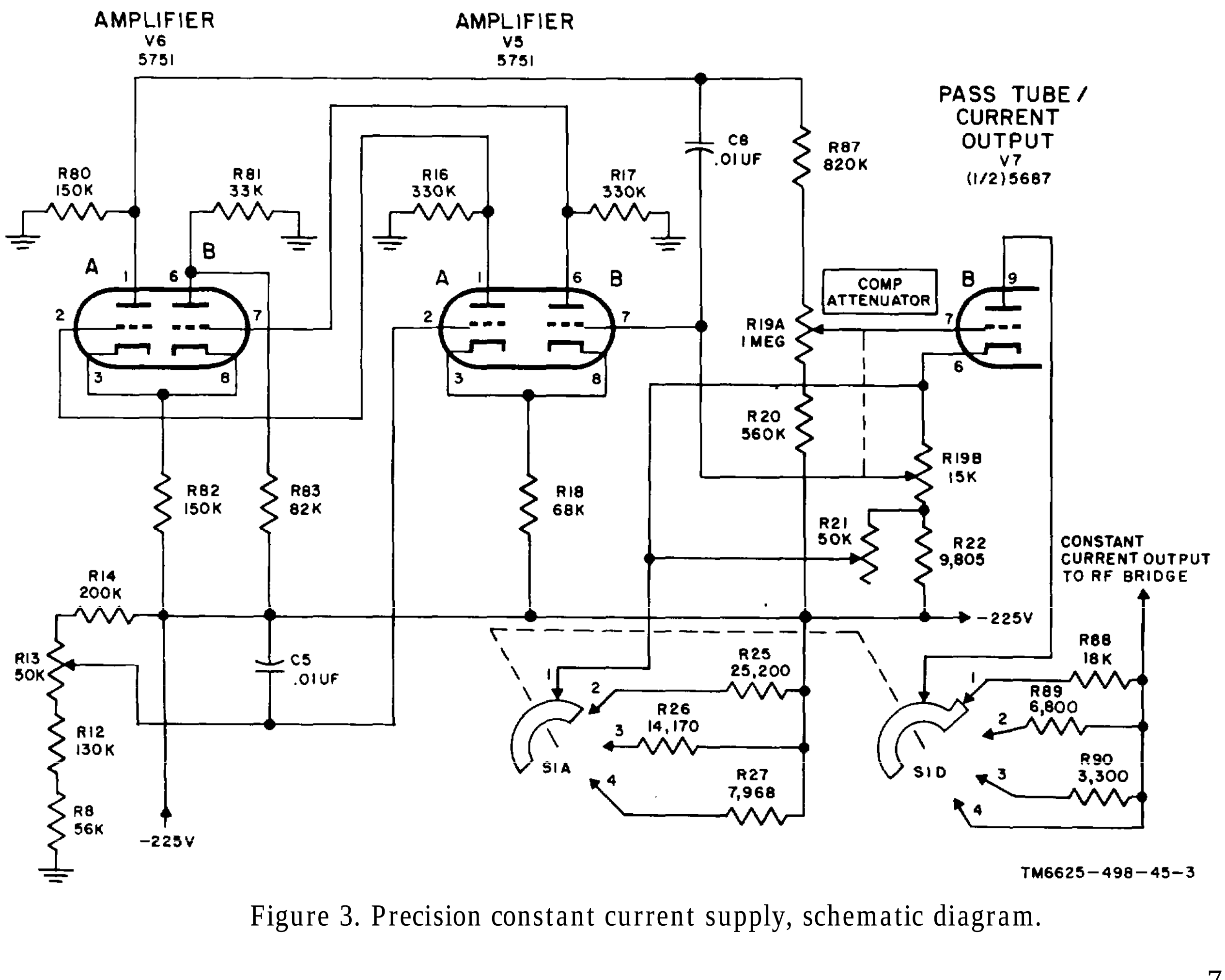


Figure 3. Precision constant current supply, schematic diagram.

L1, operates at approximately 20 kilocycles (kc). The ac signal generated by the bias oscillator is fed back through capacitor C13 and resistor R85 to the compensating bridge. This ac signal appears across the compensating bridge and is coupled to the grids of V8A and V8B through capacitors C6 and C7. Because of the unbalance of the compensating bridge, tube V8 amplifies the ac signal (feedback for the bias oscillator) and couples this ac signal to the grid of V9 through capacitor C7. The thermistor in the compensating bridge is used to control the amplitude of the feedback signal and thus the amplitude of the output signal of the bias oscillator. Wafer B of POWER RANGE switch S1, in conjunction with resistors R38, R39, R40, and R41, biases the thermistor in the compensating bridge so that the direct current that flows through the thermistor in the compensating bridge is approximately equal to the direct current that flows through the thermistor in the rf bridge. The output of tube V9 is coupled through capacitor C21 to the rf bridge and diodes CR1 and CR2 through an attenuating network consisting of rheostat R44 (BIAS COARSE control), resistor R92, part of rheostat R48 (BIAS FINE control), and resistor R47. Biasing for the grids (pins 2 and 7) of V8 is obtained by resistors R29 and R32 and cathode resistors R30 and R31. Resistor R43 and capacitor C24 are used to decouple the cathode circuits of tubes V8 and V9 from the -225 volt line. Resistor R28 is the plate load resistor for V8A. Resistor R37 is the cathode resistor,

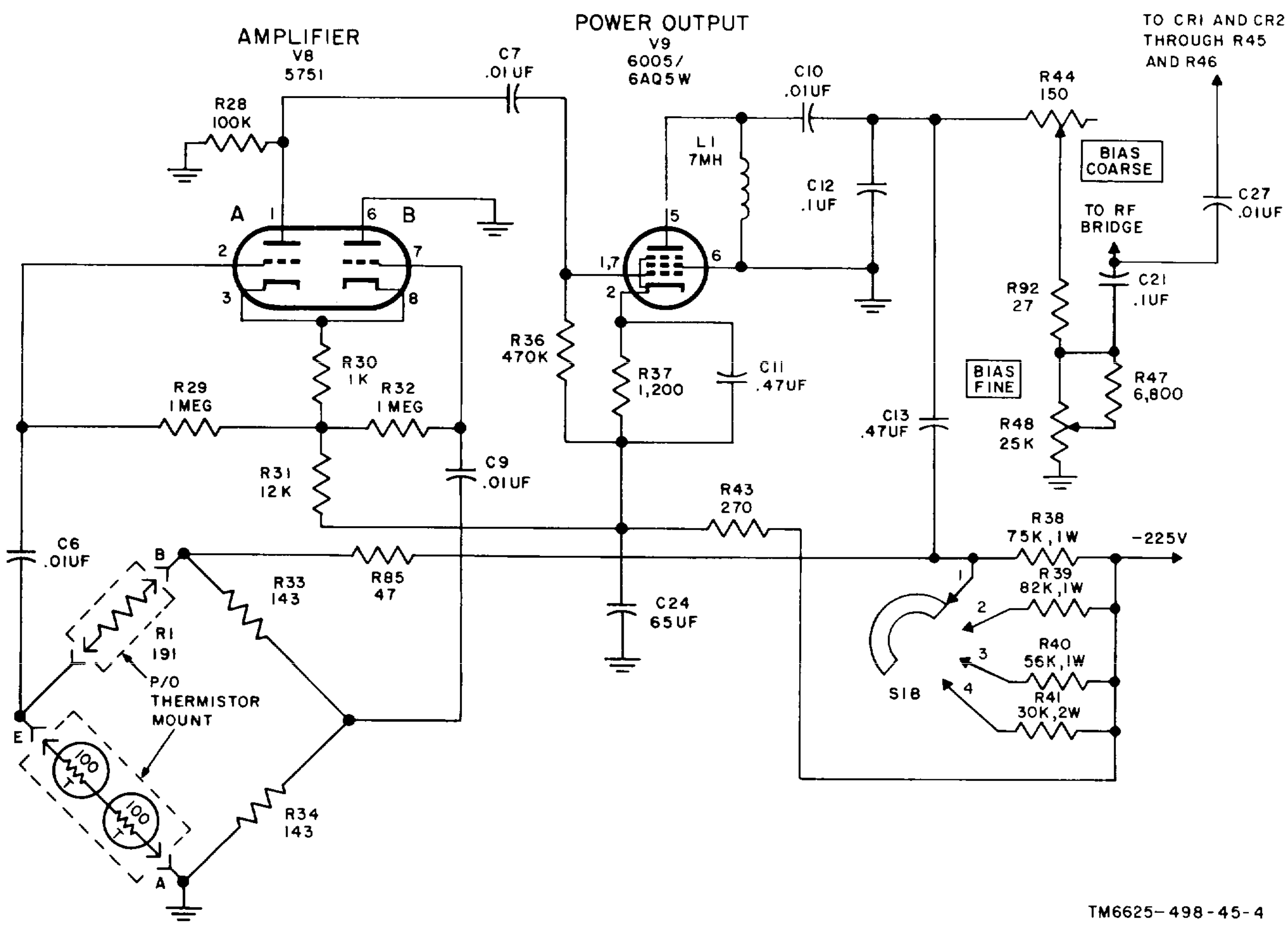


Figure 4. Bias oscillator, schematic diagram.

resistor R36 is the grid resistor, and capacitor C11 is the cathode bypass capacitor for V9.

c. The thermistor in the compensating bridge is located in close proximity to the thermistor in the rf bridge so that it responds as identically as possible to changes in temperature of the thermistor mount, but yet is shielded from rf effects. This thermistor has a negative temperature coefficient; therefore, the resistance of the thermistor decreases as the temperature increases. The compensating bridge thermistor is identical to the rf bridge thermistor (para 6c).

d. Before rf power is applied, the compensating bridge establishes equilibrium with the ultimate thermistor resistance slightly higher than that of resistor R1. After rf power is applied, the compensating bridge thermistor resistance is varied by the ambient temperature changes within the thermistor mount. Thus, a change of ambient temperature within the thermistor mount will produce a change in the feedback and thus the bias oscillator output that is fed to the rf bridge. This counteracts the change in the rf bridge thermistor resistance due to the temperature change within the thermistor mount.

6. Rf Bridge
(fig. 5)

a. The rf bridge circuit is initially adjusted for a null indication on the NULL INDICATOR meter with no rf power applied to the thermistor mount. After initial adjustment, the application of an unknown rf power to the thermistor mount causes an unbalanced condition in the rf bridge circuit. Rheostat R77 (POWER control) is adjusted (S2 in the READ position) until the output of the rf bridge is balanced again. The calibrated dial (POWER control) attached to rheostat R77 then indicates the level of the unknown rf power.

b. Resistors R68, R72, and R73 form three legs of the rf bridge. When the thermistor mount is connected, the thermistor forms the fourth leg. Resistor R67 is placed in the circuit by THERM RES switch S4 when a 100-ohm thermistor mount (not supplied) is used. This matches the resistance of the 100-ohm thermistor. When in 100-ohm thermistor mount operation, resistors R66 and R70 are also placed across the rf bridge to shunt excessive current. Rheostats R69 and R74, in conjunction with resistor R71, are used to trim rheostat R77 during calibration. Rheostat R75 is adjusted to obtain the zero position on the meter. Ml needle (during calibration) when switch S2 is at BIAS. Inductor L2 and capacitor C22 form a filter to keep the ac bias voltage out of the constant current supply source.

c. The rf thermistor (mounted on thermistor disk assembly 407-R, fig. 23) consists of a thin mica disk upon which are deposited two resistive carbon film sections connected in series, having a nominal resistance of 100 ohms each. Capacitor C3 connects the carbon film sections inparal - lel for the input rf signal, and in series for the precision constant current and the bias current. Capacitor C1 provides compensation across resistor R68 for the capacitive reactance introduced by capacitor C3. The disk capacitor in series with the input coaxial line blocks dc from the signal source.

d. With rf applied, capacitors C1 and C3 have negligible reactance and may be considered as short circuits. The effective rf input path, therefore, parallels the two 100-ohm carbon film sections to produce a 50-ohm termination to the rf circuit. For dc, however, the 100-ohm carbon film sections are in series to total 200 ohms and act as one leg of the rf bridge.

e. Capacitor C2 is provided to compensate for any tolerance differences between capacitors C1 and C3. Capacitor C2 is selected at the factory and connected as required. In some cases where capacitors are matched very closely, capacitor C2 is not required.

7. Differential Amplifier and Synchronous Detector
(fig, 6)

a. The output of the rf bridge is amplified and detected by the differential amplifier and synchronous detector circuit, and applied to NULL- INDICATOR meter Ml. This network consists of amplifier tubes V10 and V11, synchronous detector diodes

CR1 and CR2, and associated circuitry. When the output of the rf bridge is zero, the NULL INDICATOR meter M1 needle indicates a null. When the output of the rf bridge is not zero, the meter M1 needle will indicate a deviation proportional to the amplitude and phase of the output of the rf bridge.

b. Tubes V10 and V11 are differential amplifiers. The output from tube V11 is coupled to the grids (pins 2 and 7) of tube V10 through capacitors C18 and C19. The output of tube V10 is detected by diodes CR1 and CR2, which are biased by a portion of the ac bias signal produced in the bias oscillator to provide a signal to the negative side of synchronous detectors CR1 and CR2. This signal, in proper phase with the signal on the positive side of CR1 and CR2, causes the diodes to conduct an equal amount of current with no rf power being measured.

c. The detected signals charge capacitor C14 which is in parallel with NULL INDICATOR meter M1. Any charge on capacitor C14 will result in a deviation of the meter M1 needle. Wafer C of POWER RANGE switch S1, in conjunction with resistors R51, R52, and R53, is used to control the sensitivity of the circuit by changing the resistance across meter M1.

d. The ac bias signal from the bias oscillator is coupled through capacitor C27 and resistors R45 and R46. Capacitor C26 and resistor R91 form a phase shift network. Resistors R54, R55, R60, and R61 are plate load resistors. Resistors R56, R57, R62, and R63 are cathode resistors. Resistors R58, R59, R64, and R65 are grid resistors. Capacitors C16, C17, C20, and C23 are coupling capacitors. Capacitor C25 is a decoupling capacitor. Resistor R79 is a decoupling resistor for the power supply.

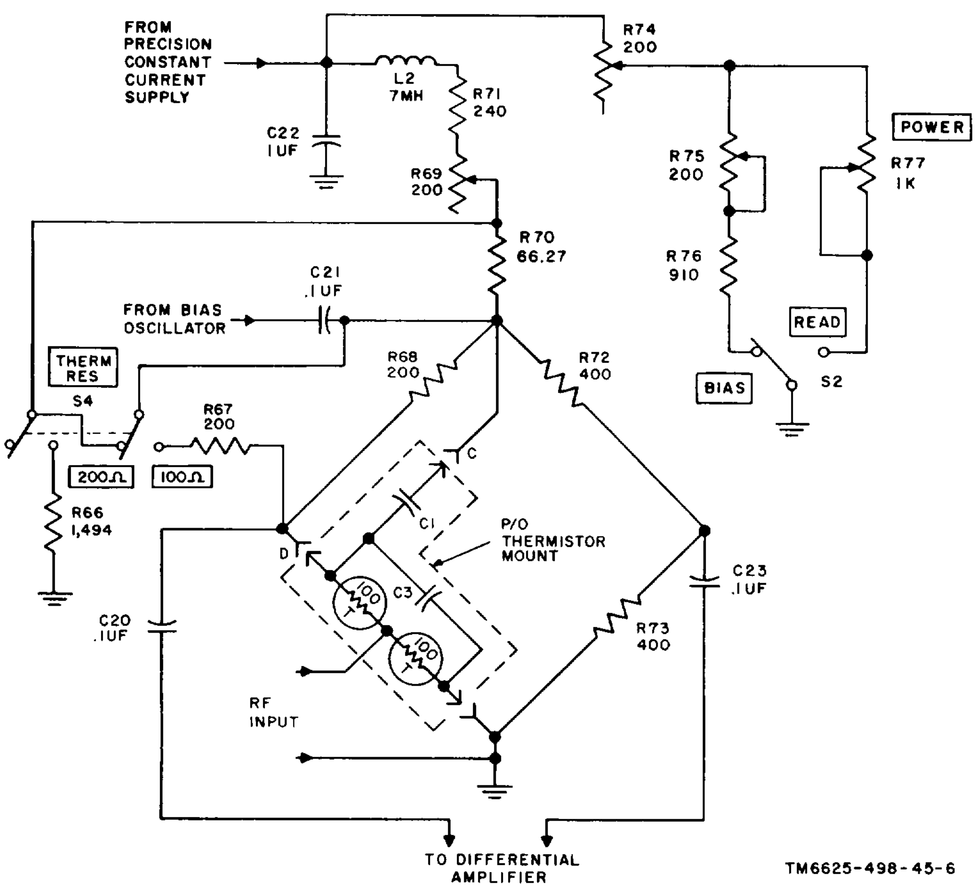


Figure 5. Rf bridge, schematic diagram.

e. Jacks J1 and J2 (fig. 23) are provided for calibrating purposes. Jack J2 is used to interrupt the constant current input to the BIAS-READ switch S2 network when calibrating rheostats R13 and R69. Jack J1 is used to interrupt the constant current input to the rf bridge network when calibrating rheostats R74, R75, and R77.

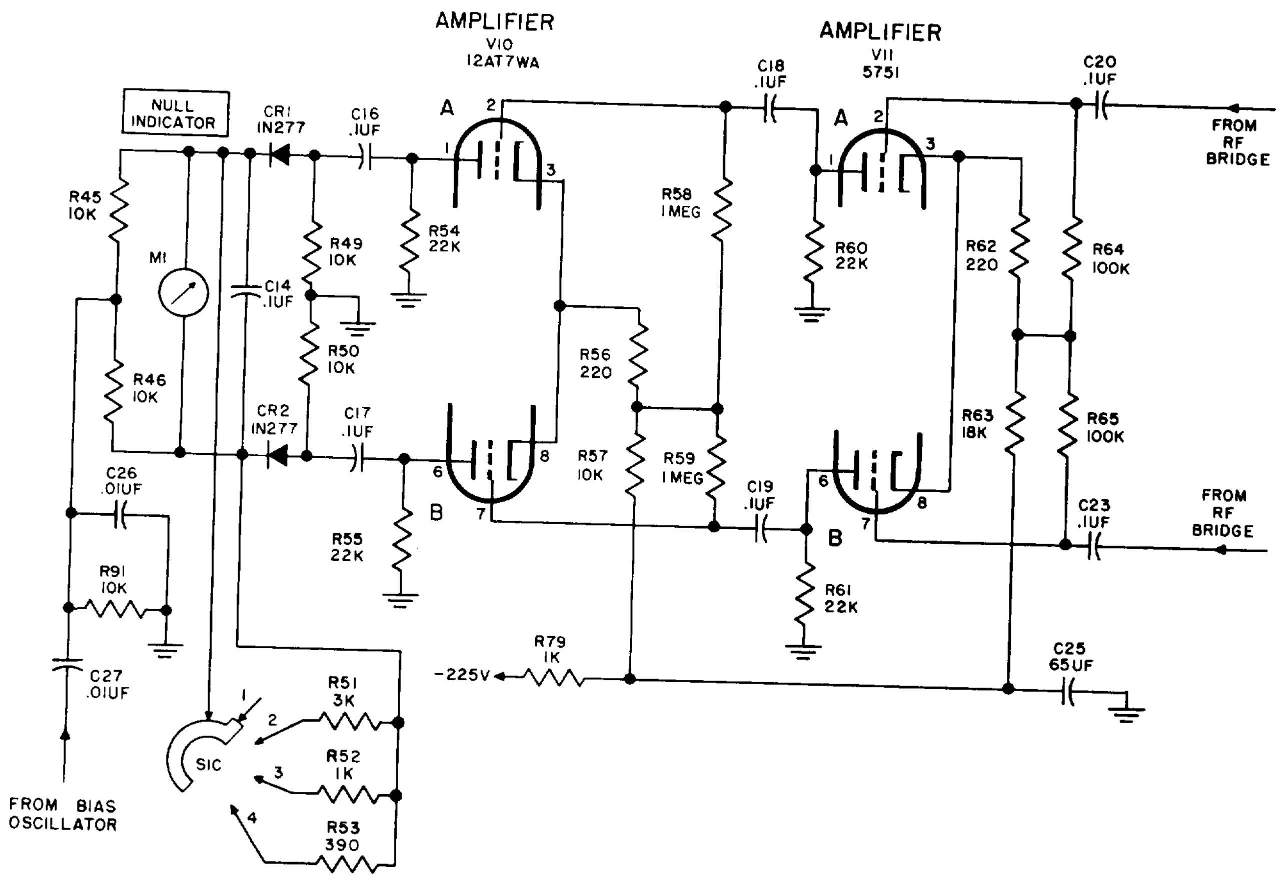


Figure 6. Differential amplifier and synchonous detector TM 6625-498-45-5

CHAPTER 2

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

Warning: When servicing the power meter, be extremely careful of high voltages. Disconnect all power before performing maintenance procedures. After power is disconnected, some capacitors still may retain dangerous voltages. Before touching exposed electrical parts, short-ciruit the parts to ground. When maintenance is completed, replace the equipment in its case, reconnect the power, and check for satisfactory operation.

8. General Instructions

Troubleshooting at fourth and fifth echelon maintenance levels includes all the techniques outlined for organizational maintenance (TM 11-6625-498-12) and any special or additional techniques required to isolate a defective part. The systematic troubleshooting procedures, which begins with the operational checks that can be performed at an organizational level, must be completed by means of additional localizing and isolating techniques.

9. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective power meter is to sectionalize the fault. Sectionalization means tracing the fault to the circuit responsible for abnormal operation or failure. The second step is to localize the fault. Localization means tracing the fault to a defective part responsible for the abnormal condition. Isolating means locating the defective part. Some faults, such as burned-out resistors and arcing and shorted transformers can often be located by sight, smell, and hearing. The majority of faults, however, must be localized by checking voltages and resistances.

b. Sectionalization. The testing methods listed below aid in isolating the source of trouble. The tests are arranged to simplify the process of tracing a trouble to a specific circuit; follow the procedures in the sequence given. The first step in tracing trouble is to locate the circuit or circuits at fault by the following methods:

(1) Visual inspection. The purpose of visual inspection is to locate faults without testing or measuring circuits. Meter readings or other visual signs should be observed and an attempt made to sectionalize the fault to a particular circuit.

(2) Operational tests. Operational tests frequently indicate the general location of trouble. In many instances, the tests will help in determining the exact nature of the fault. The operational and equipment performance check lists (TM 11-6625-498-12) provide a good operational test.

c. Localization. The tests listed below will aid in isolating the trouble. First, localize the trouble to a single stage or circuit and then isolate the trouble within that circuit by voltage, resistance, and continuity measurements.

(1) Troubleshooting chart. The trouble symptoms listed in the chart (para 13d) will aid in localizing trouble to the defective part or component.

(2) Voltage and resistance measurements. These measurements will help locate the individual part at fault. Use resistor and capacitor color codes (fig. 21 and 22) to find the value of components. Use the voltage and resistance diagram (fig. 11) to find normal readings, and compare them with the readings taken.

(3) Intermittent troubles. In all these

tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. It is possible that some external connections may cause the trouble. Check the wiring for loose connections; move the wires and components gently with an insulated tool. This may show where a faulty connection or component is located.

10. Test Equipment Required

The following chart lists test equipment required for troubleshooting Test Set, Radio Frequency Power AN/USM-161. The associated technical manuals and the assigned common names are also listed.

Test equipment	Technical manual	Common name
Test Set, Electron Tube TV-7/U, TV 7A/U, TV-713/U, or TV-7D/U.	TM 11-6625-274-12	Tube tester
Multimeter ME-26B/U.	TM 11-6625-200-12	Multimeter
Oscilloscope AN/USM/81 with Preamplifier AM-3148/USM.	TM 11-6625-219-12	oscilloscope

11. General Precautions

Whenever the power meter is serviced, observe the following precautions carefully.

a. Be careful of high voltages when working on the equipment with the power on. To remove power from the power meter, remove the ac power cable from the ac outlet.

b. Always replace a defective part with a part having the same value. A different value will change the accuracy of the power meter. When replacing a part, be sure to replace the leads and connections exactly as they were in the original wiring. This is very important.

12. Checking Filament and B-Circuits for Shorts

a. When to Check. When any of the following conditions exist, check for short circuits and clear the troubles before applying power.

(1) When abnormal symptoms reported from operational tests (para 27, TM 11-6625-498-12) indicate possible power supply troubles.

(2) When abnormal symptoms reported from organizational tests (para 33, TM 11-6625-498-12) indicate possible power supply troubles.

b. Conditions for Tests. Prepare for the short-circuit tests as follows:

(1) Remove the ac power cable from the power source.

(2) Remove the power meter from its case.

(3) Remove all tubes (including ballast tube RT1) and the indicator lamp.

c. Measurements. Make the resistance tests indicated in the chart below, and replace faulty parts before applying power to the unit.

Short-circuit tests

Point of measurement	Normal indiction	Isolating procedure
Between terminal 8 of transformer T1 (fig. 9) and chassis ground.	Resistance reading of approximately 60,000 Ohms.	If resistance is low, check for leaky capacitor C1B or shorted resistor R5, R6, R7, R9, R10, or R94. If resistance is higher than normal, check the continuity between terminals 8 and 9 of transformer T1 secondary, and cheek resistors R5, R6, R7, R9, R10, and R94 for open circuit or increased values.
Between pins 3 and 4 of the tube socket of V9.	Resistance reading of approximately 62 ohms.	If resistance is zero, check for shorted resistor R93. If the

Short-circuit tests		
Point of measurement	Normal indication	Isolating procedure
		resistance is higher than normal, check resistor R93 for open circuit or increased value.
Between terminals 8 and 5 of transformer T1 (fig. 9).	Resistance reading of approximately 55,000 ohms.	If resistance is low, check for shorted resistor R10 or leaky capacitor C4. If resistance is higher than normal, check the continuity between terminals 4 and 5 of transformer T1 secondary, and check resistor R10 for open circuit or increased value.
Between terminal 6 of transformer T1 (fig. 9) and chassis ground.	Resistance reading of approximately 54,000 ohms.	If resistance is zero, check for shorted resistor R9. If resistance is higher than normal, check the continuity between terminals 6 and 7 of transformer T1 secondary, and check resistor R9 for open circuit or increased value.
Between terminals 5 and 6 of transformer T1 (fig. 9).	Resistance reading of approximately 50,000 ohms.	If resistance is low, check for shorted resistor R10 or R94 or leaky capacitor C1B. If resistance is higher than normal, check the continuity between terminals 4 and 5 and 6 and 7 of transformer T1 secondary, and check resistors R10 and R94 for open circuit or increased values.

Section II. UNIT TROUBLESHOOTING

Caution: Do not attempt removal or replacement of parts before reading the instructions in paragraph 17.

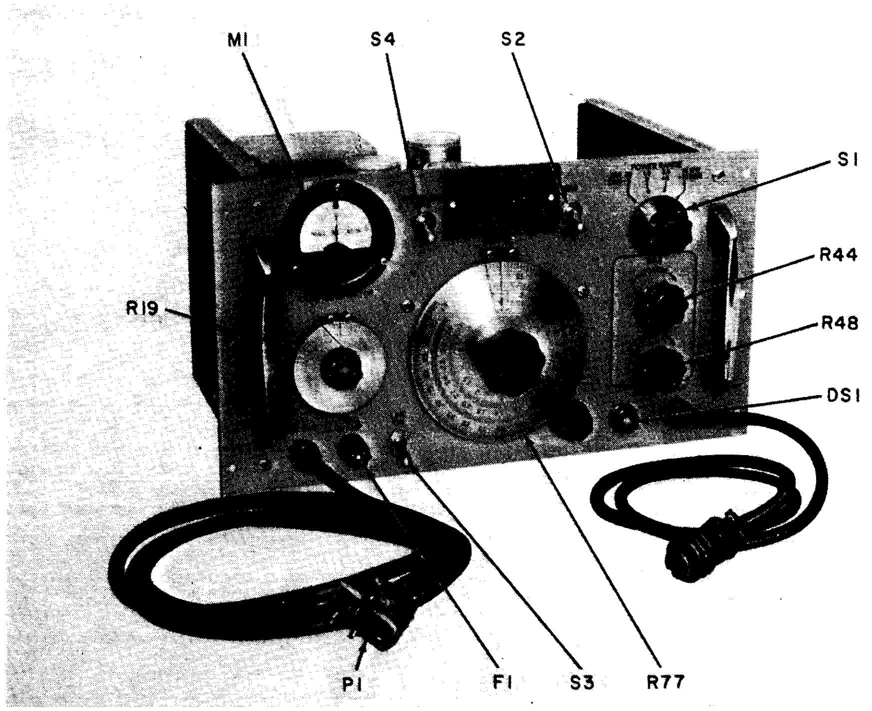
13. Localizing Troubles

a. General. In the troubleshooting chart (d below), procedures are outlined for localizing troubles to a particular state within the power meter. Parts locations are indicated in figures 7 through 10. Voltage and resistance measurements are given in figure 11. A schematic diagram is shown in figure 23. Depending on the nature of the operational symptoms, one or more of the localizing procedures will be necessary. When a trouble has been localized to a particular stage, use voltage and resistance measurements to isolate the trouble to a particular part.

b. Use of Chart. The troubleshooting chart is designed to supplement the checks detailed in TM 11-6625-498-12. If no operational symptoms are known, begin with item 1 of the equipment performance checklist (TM 11-6625-498-12) and proceed until a symptom of trouble appears.

Caution: If operational symptoms are not known, or If they indicate the possibility of short circuits within the power meter, make the short-circuit check described in paragraph 12 before applying power to the power meter.

c. Conditions for Test. All checks outlined in the chart are to be performed with the power meter connected to a source of 115 volts, 50 to 1,000 cps and the thermistor mount connected to the rf cable.



TM6625-498-45-7

Figure 7. Power meter, front view.

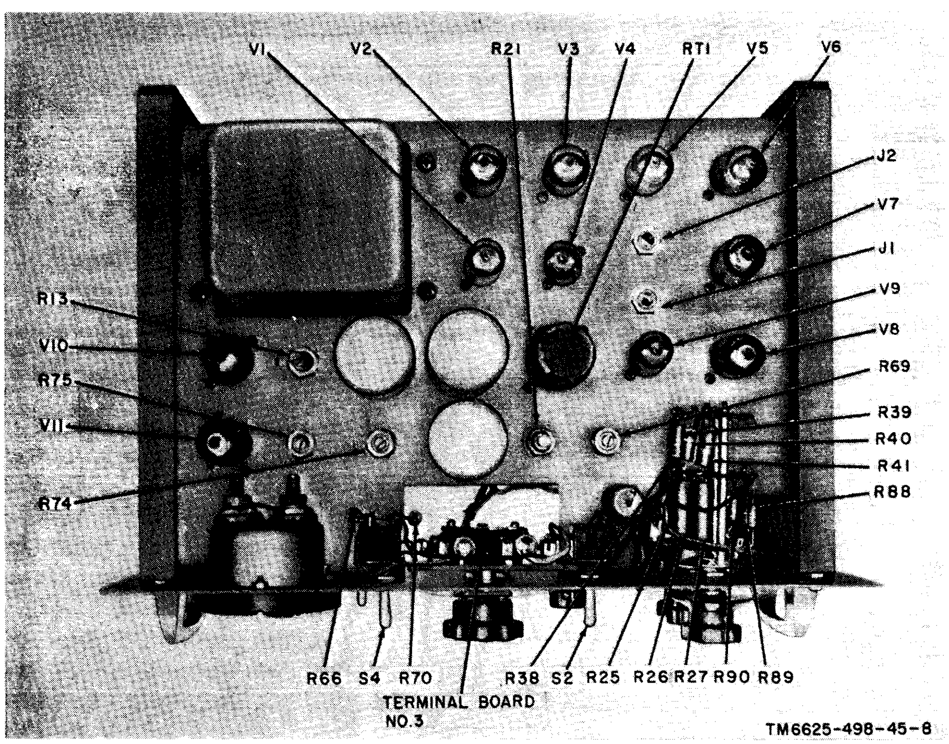
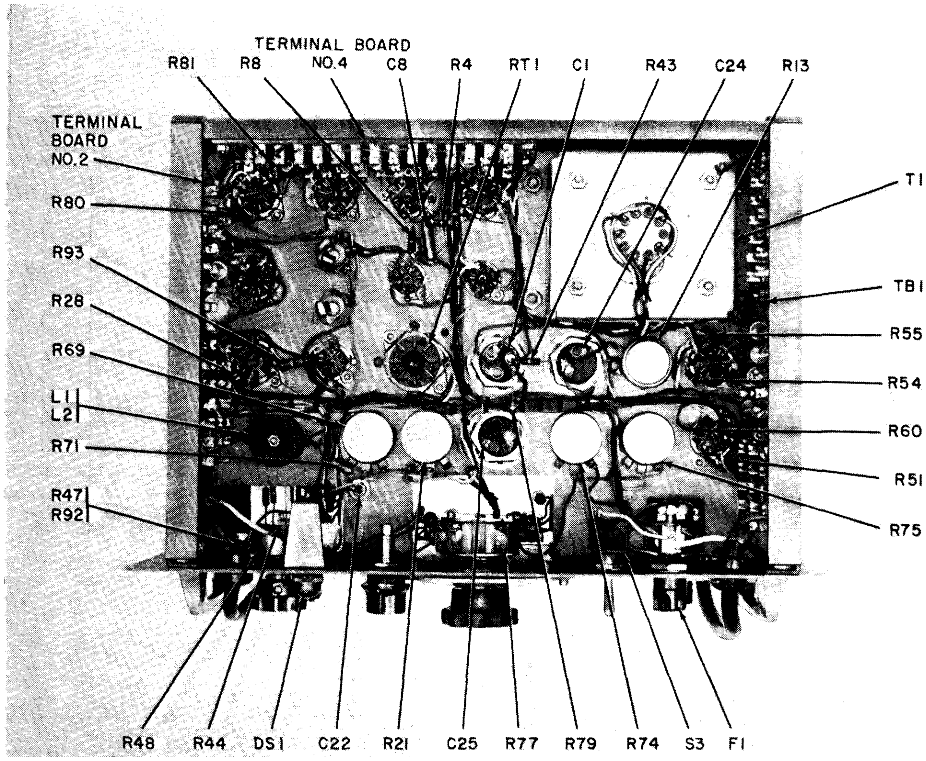


Figure 8. Power meter, top view.



TM6625-498-45-9

Figure 9. Power meter, bottom view.

d. Troubleshooting Chart (fig. 23).

Note; Perform the procedure given in steps 1,2, and 3 of the equipment performance checklist (para 33, TM 11-6625-498-12) before using this chart, unless trouble has already been localized.

Symptom	Probable trouble	Correction
1. NULL INDICATOR meter Ml cannot be nulled using the BIAS COARSE and BIAS FINE controls.	Defective thermistor mount.	Replace the thermistor mount. Proceed with step 4 and then steps 5 and 6, if necessary.
2. With step 1 above completed, the BIAS-READ switch set to READ, and the POWER control dial to zero, the NULL INDICATOR meter is not nulled.	Defective switch S2 or rheostats R74 or R77.	Check switch S2 and rheostats R74, and R77. Replace defective part.
3. With the POWER control dial moved off-zero, the null indication on NULL INDICATOR meter Ml remains at null.	Defective power supply or constant current supply stages V5, V6, V7B, and associated circuitry.	Proceed with step 7 and then step 8, if necessary.
4. With the oscilloscope connected between the junction of R68 and R72 and chassis ground, the indication is not between 3 and 6 volts rms at approximately 20 kc.	Defective resistor R44, R47, R48, or R92, or defective capacitor C21.	Check resistors R44, R47, R48, and R92, and capacitor C21. Replace defective part.
5. With one vertical input of the oscilloscope connected to the junction of R72 and R73, the other vertical input of the oscilloscope connected to the junction of R67 and R68, and the oscilloscope chassis grounded to the power meter chassis, the following do not occur:	If all displays are as described in a, b, and c, differential amplifier stage V10 or V11, detector CR1 or CR2, or meter Ml is defective.	Check tubes V10 and V11 (fig. 8). Check voltages and resistances at the tube sockets (fig. 11). Check diodes CR1 and CR2 and meter Ml. Replace defective part.

Symptom	Probable trouble	Correction
a. A sine wave at 20 kc appears on the oscilloscope display. b. The amplitude of the sine wave decreases as the BIAS COARSE and BIAS FINE controls are adjusted. c. The amplitude of the sine wave reaches a minimum and begins to increase as the BIAS COARSE and BIAS FINE controls are rotated.	If all displays are not as described in a, b, or c, the thermistor in the rf bridge, the rf cable, or resistor R68, R72, or R73 is defective.	Replace the thermistor mount. Check the rf cable for continuity and shorts. Check resistors R68, R72, and R73. Replace defective parts.
6. The voltage across capacitor C12 is not between 7 to 12 volts rms at approximately 20 kc.	Defective bias oscillator.	Check tube V8 and V9 (fig. 8). Check voltages and resistances (fig. 11) at the tube sockets. Replace defective part.
7. The voltages across capacitor C1B is not between 217 and 239 volts.	Defective power supply.	Check tubes V1, V3, V4, and V7 (fig. 8). Check voltages and resistances at the tube sockets (fig. 11). Check transformer T1 (pars 15). Replace defective part.
8. The voltage between pin 6 of tube V7B end the junction of resistors R25, R26, and R27 is not between 53 and 89 volts.	Defective constant current supply.	Check tubes V5, V6, and V7 (fig. 8). Check voltages and resistances at the sockets (fig. 11). Replace defective part.

14. Isolating Techniques

When trouble has been localized to a stage, use the following techniques to isolate the defective part:

a. Test the tube involved, either in the tube tester or by substituting a similar type of tube which is known to be operating normally (para 16).

b. Take voltage measurements at the tube sockets (fig. 11).

c. If voltage readings are abnormal, take resistance readings (fig. 11) to isolate open and short circuits. Refer also to the dc resistances of transformers and coils in paragraph 15.

d. If all checks fail to indicate a defective part, refer to fifth echelon to check the calibration of Test Set, Radio Frequency Power AN/USM-161 (para 34).

15. Dc Resistances of Transformer and Coils

The dc resistances of the transformer windings and the coils in the power meter are listed below:

Transformer or coil	Terminals	Ohms
T]	3-4	185
	4-5	185
	6-7	Less than 1
	6-9	Less than 1
L1	-----	Less than 1.5
L2	-----	Less than 1

16. Tube-Testing Techniques

Warning: The 5651WA tube contains radioactive material. Handle carefully to avoid breaking.

Tube locations are shown in figure 8. When trouble occurs, check all cabling and connections before removing any tubes. Try to isolate the trouble to a stage. If tube failure is suspected, use the applicable procedure below to check the tubes.

Caution: Do not rock or rotate a tube when removing it from its socket pull it straight out with a tube puller.

a. Use of Tube Tester. Remove and test one tube at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or near its minimum test limit on the tube tester. Put back the original tube, or insert a new one if required, before testing the next one.

Caution: Replacement of reference tube V4 (5651WA) requires recalibration of the test set by fifth echelon (para 34).

b. Tube Substitution Method. Replace a suspected tube with a new tube. If the equipment still does not work, remove the new tube and replace the original tube. Repeat this procedure with each suspected tube until the defective tube is located.

c. Preferred-Type Tubes. All vacuum tubes in the test set are preferred-type electron tubes. Do not replace any preferred-type tubes with nonpreferred tubes.

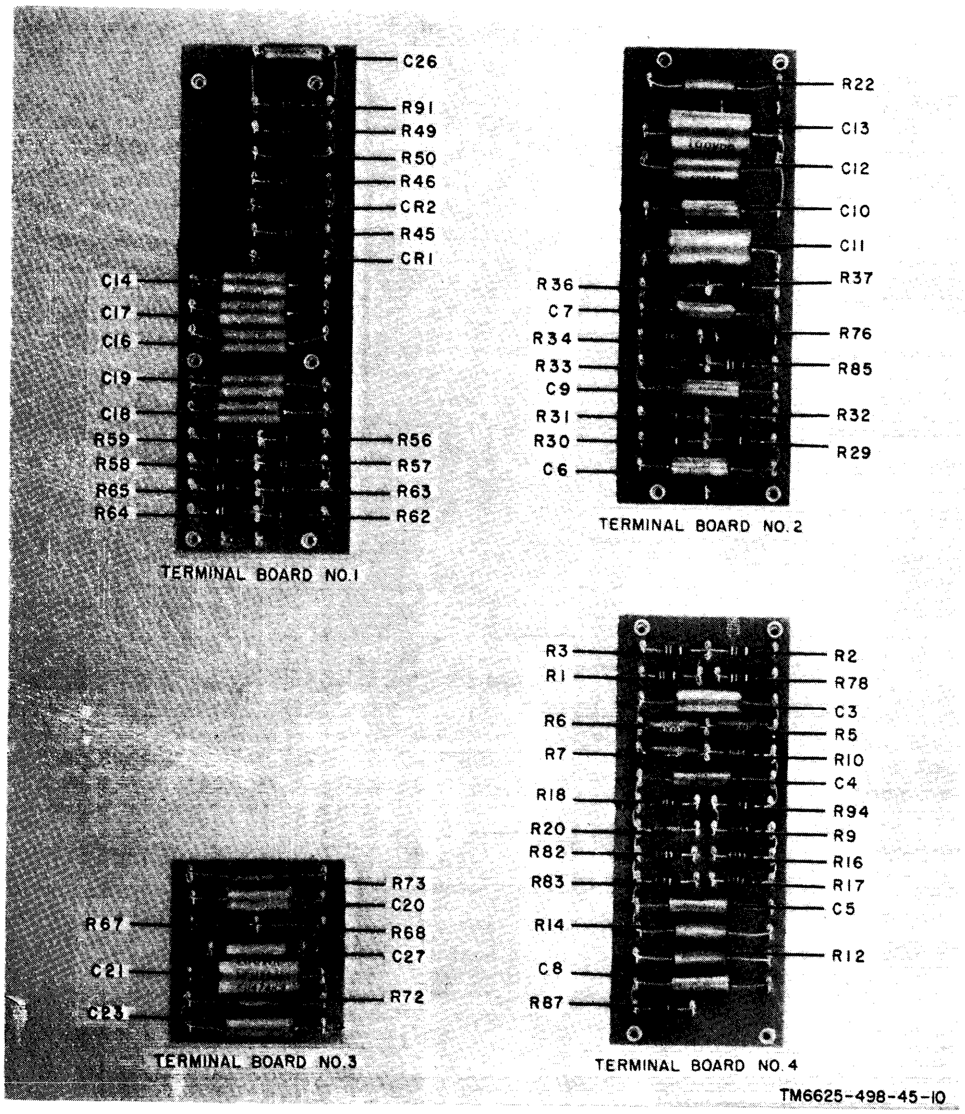
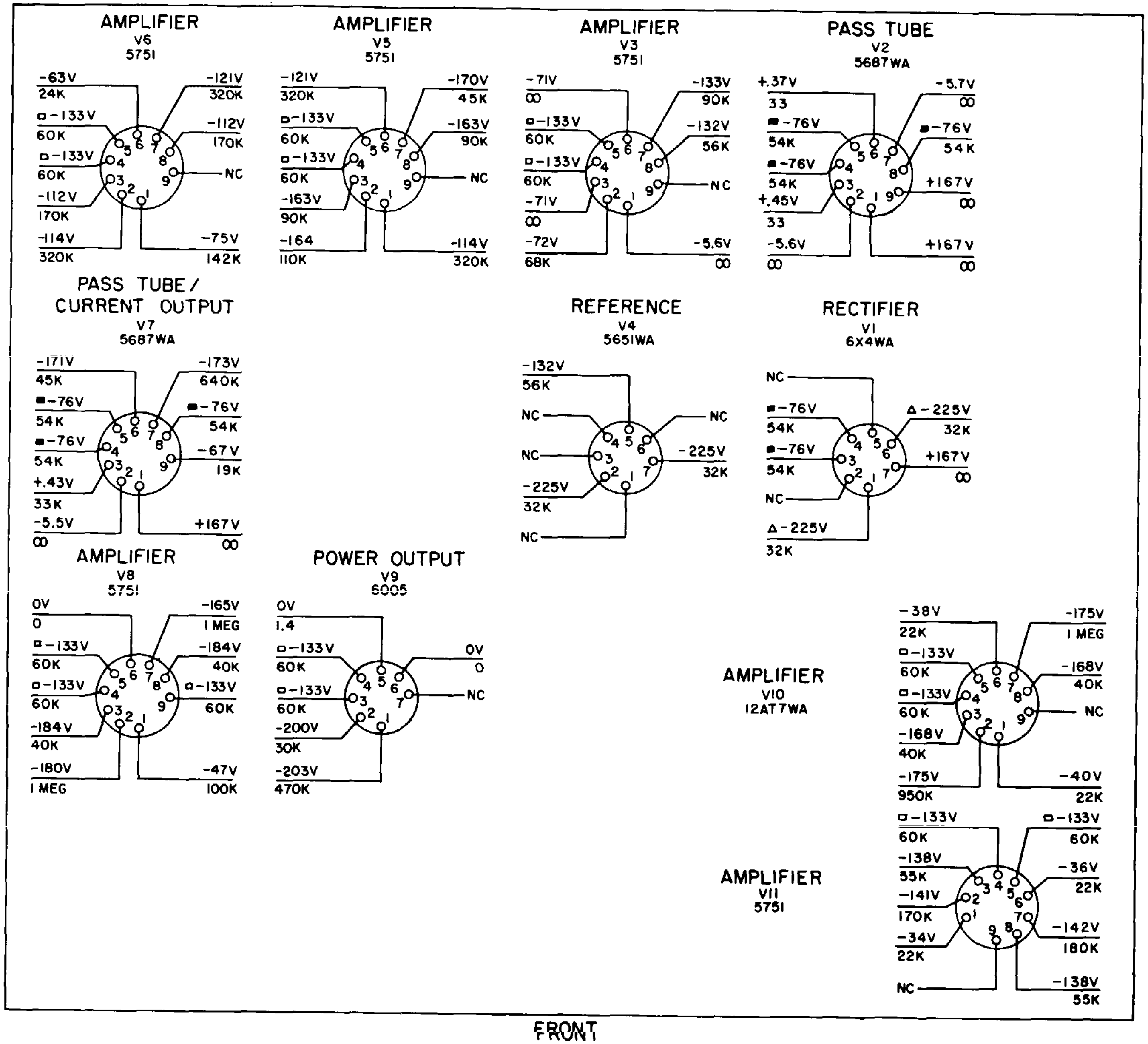


Figure 10, Terminal board assemblies No. 1 through No. 4.



NOTES:

1. VOLTAGE READINGS ABOVE LINE, RESISTANCE READINGS BELOW LINE.
2. UNLESS OTHERWISE SHOWN, ALL VOLTAGES ARE DC AND ALL RESISTANCES ARE IN OHMS.
3. ALL READINGS TAKEN WITH MULTIMETER ME-26/U
4. NC INDICATES NO CONNECTION
5. CONNECT THERMISTOR MOUNT TO POWER METER AND SET [POWER RANGE] SWITCH TO [.30MW-5DBM], [BIAS-READ] SWITCH TO [BIAS] AND [THERM RES] TO [200Ω].
6. DC VOLTAGE AND RESISTANCE MEASURED TO GROUND.
7. ■ INDICATES 6.3 VAC BETWEEN PINS 3 AND 4 OF V1 AND PINS 4, 5, AND 8 OF V2 AND V7.
8. ▫ INDICATES 12.6 VAC BETWEEN PINS 4 AND 5 OF V3, V5, V6, V10, AND V11, PINS 4, 5, AND 9 OF V8, AND PINS 3 AND 4 OF V9.
9. Δ INDICATES 309 VAC BETWEEN PINS 1 AND 6.

TM6625-498-45-11

Figure 11. Tube sockets, voltage and resistance diagram.

CHAPTER 3

REPAIRS

17. General Parts Replacement Techniques

All of the parts of the power meter can be reached and replaced easily without special procedures. The following precautions should be observed during repair or replacement procedures:

a. Always consult the schematic diagram (fig. 23) when replacing parts; be sure to use an exact duplicate of the part removed.

b. Never change the location of parts or wiring leads. Never substitute a longer lead, a lead of different material, or a lead of different gage.

c. When it is necessary to disconnect a number of leads to replace a defective part, tag each lead so that it will be placed on the proper terminal when the equipment is reassembled.

d. Always use the proper handtools when disassembling any part of the equipment.

18. Removal and Replacement of Meter (fig. 7 and 8)

a. NULL INDICATOR meter Ml is located on the front panel of the power meter. Remove NULL INDICATOR meter Ml as follows:

(1) Release the six captive fasteners on the front panel of the power meter and withdraw the power meter from the transit case.

(2) Remove the three nuts and bolts on meter Ml.

(3) Disconnect and tag the wires on meter Ml and remove the meter.

b. Replace NULL INDICATOR meter Ml as follows:

(1) Position meter M1 carefully in its proper position.

(2) Install the three nuts and bolts on the meter.

(3) Connect the wires on the meter.

19. Removing Switches and Controls

The operating switches are located on the front panel of the power meter. Access to all switches is from the front and rear of the front panel. To remove the switches and controls, remove the mounting nuts and bolts and disconnect and tag the wires.

20. Removing Terminal Boards

Most parts on the terminal boards are accessible and removable without removing the terminal boards. When it is necessary to remove the terminal boards, remove the securing screws and carefully pull the terminal board away from the power meter as far as the wiring harness will permit.

CHAPTER 4

FOURTH ECHELON TESTING PROCEDURES

21. General

a. Testing procedures are prepared for use by Signal Field Maintenance Shops and Signal Service Organizations responsible for fourth echelon maintenance of electronics equipment to determine the acceptability of repaired electronics equipment. These procedures set forth specific requirements that repaired electronics equipment must meet before it is returned to the using organization. A summary of the performance standards is given in paragraph 28.

b. Comply with the instructions preceding the body of each chart before proceeding to the chart. Perform each test in sequence. Do not vary the sequence. For each step, perform all the actions required in the Test equipment and Equipment under test columns. Perform each specific test procedure and verify it against its performance standard.

22. Test Equipment, Tools, and Materials

All test equipment, tools, materials and other equipment required to perform the testing procedures given in this section are listed in the following charts and are authorized under TA 11-17, Signal Field Maintenance Shops, and TA 11-100 (11-17), Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shop (Continental United States).

a. Test Equipment.

Nomenclature	Federal stock No.	Technical manual
Transformer, Variable, Power TF-171/USM	5950-503-0632	
Oscilloscope AN/USM-81 With Preamplifier AM-3148/USM	6625-875-1058	TM 11-6625-219-12
Multimeter ME-26 B/U (2)	6625-646-9409	TM 11-6625-200-12
Signal Generator AN/URM-61	6625-519-2056	TM 11-5091

b. Other Equipment.

Equipment	Federal stock No.
Resider, 200-ohm, + or - 0.1, 1/2-watt.	5905-295-4078
Switch, toggle	

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23. Physical Tests and Inspections

a. Test Equipment and Materials: None required.

b. Test Connections and Conditions.

(1) No connections necessary.

(2) Remove the power meter from the transit case.

c. *Procedure.*

step No.	Control settings		Test Procedure	Performance Standard
	Teat equipment	Equipment under test		
1	None - - - - - - - - -	Controls may be in any position.	a. Inspect case and chassis for damage, missing parts, and condition of paint. *Note:* Touchup painting is recommended instead of refinishing whenever practical; screwheads, binding posts, receptacles, and other plated parts will not be painted or polished with abrasives. *b*. Inspect all controls and mechanical assemblies for loose or missing screws, bolts, and nuts, *c*. Inspect all connectors, sockets, and receptacles, fuseholder, and meter for looseness, damage, or missing parts.	a. No damage evident or parts missing. Extend surfaces intended to be painted will not show bare metal. Panel lettering will be legible. *b.* Screws, bolts, and nuts will be tight. None missing. c. No loose puts or damage. No missing parts.
2	None - - - - - - - -	Controls may be in any position.	a. Rotate all panel controls througout their limits of travel. *b.* Operate all switches.	*a.* Controls will rotate freely without binding or excessive looseness. *b.* Switches will operate properly.
3	None - - - - - - - -	POWER control: 1.0 (outermost scale).	Note the indication on the innermost scale - - - - -	Indication on innermost scale must be 0 (no tolerance).

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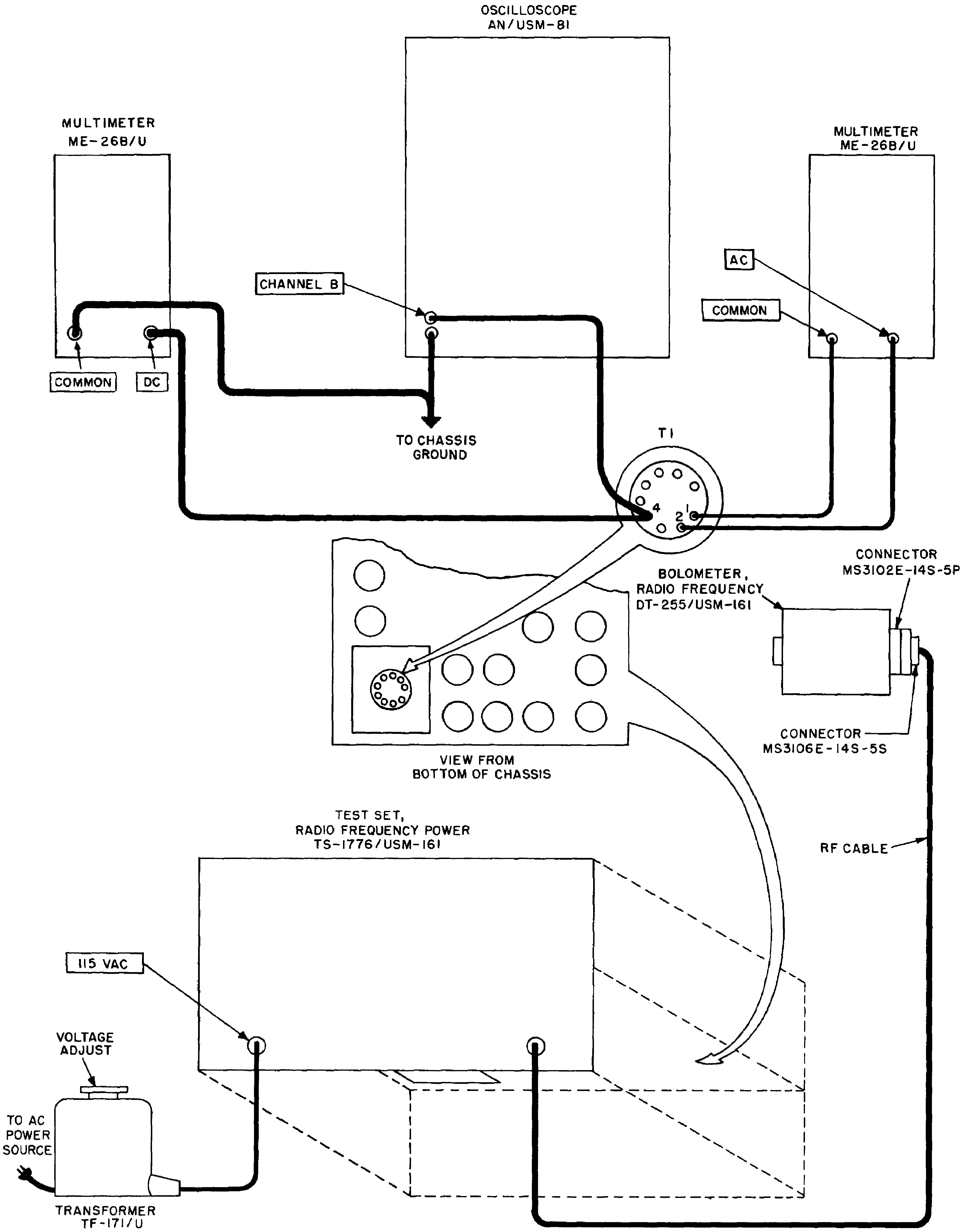

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Figure 12. Power supply test connections.

24. Power Supply Test

a. Test Equipment and Material.
Transformer, Variable, Power TF-171/USM.
Oscilloscope AN/USM-81 with Preamplifier AM-3148/USM.
Multimeter ME-26B/U (2 required).

b. Test Connections and Conditions. Connect the equipment as shown in figure 12.

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	*ME-26B/U* *a.* RANGE: 300V *b.* FUNCTION: AC *ME-26B/U* *a.* RANGE: 300V *b.* FUNCTION: - *TF-171/USM* Adjust control for 117 volts ac on the ME-26B/U. *AN/USM-81* *a.* TRIGGER SLOPE: LINE + *b.* TRIGGERING MODE: AUTOMATIC *c.* HORIZONTAL DISPLAY: MAIN SWEEP NORMAL *AM-3148/USM* *a.* MILLIVOLTS/CM: 10 *b.* Input selector switch: AC A *c.* MV/CM MULTIPLIER: 2 *d.* VARIABLE: CALIBRATED	*a.* POWER RANGE: 10MW + 10 DBM *b.* THERM RES: 200Ω *c.* LINE ON: ON	*a.* Observe performance standard on the ME-26B/U. *b.* Adjust the controls on the AN/USM-81 for a single cycle and observe performance standard.	*a.* From 217 to 239 volts dc. *b.* Ripple must be less than 25 mv peak to peak.
2	*TF-171/USM* Adjust control for 105 volts ac on the ME-26B/U. *ME-26B/U* Same as step 1. *ME-26B/U* Same as step 1.	Same as step 1 ----	Observe performance standard on the ME-26B/U	Not more than ±1 volt deviation from the indication in step 1a.
3	*TF-171/USM* Adjust control for 129 volts ac on the ME-26B/U. *ME-26B/U* Same as step 1. *ME-26B/U* Same as step 1.	Same as step 1 ----	Observe performance standard on the ME-26B/U	Not more than ±1 volt deviation from the indication in step 1a.

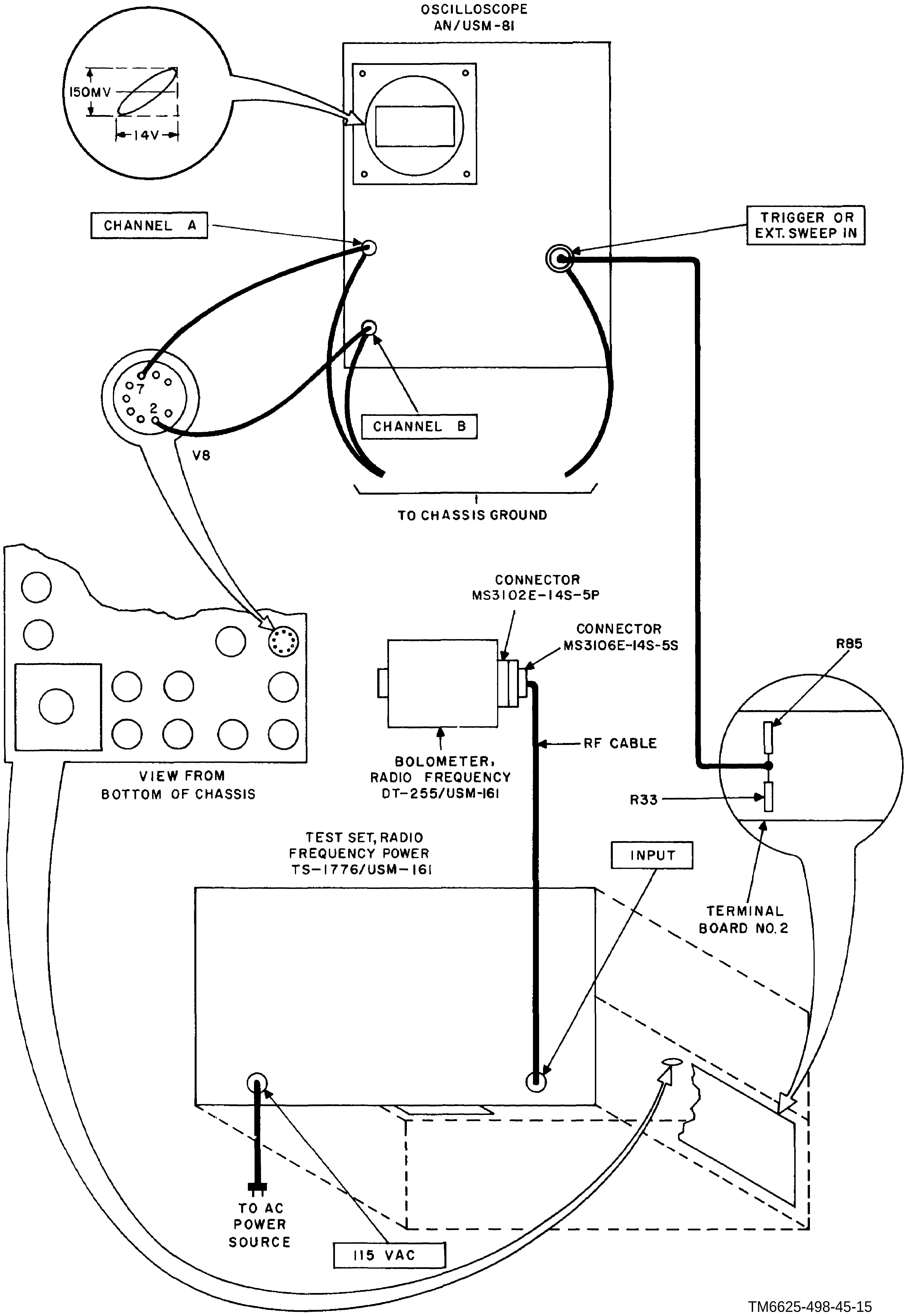

Figure 13. Bias oscillator test connections.

25. Bias Oscillator Test

a. Test Equipment and Material. Oscilloscope AN/USM-81 with Preamplifier AM-3148/USM.

b. Test Connections and Conditions. Connect the equipment as shown in figure 13.

c. *Procedure.*

Step No.	Control settings		Test procedure	Performance Standard
	Test equipment	Equipment under test		
1	AN/USM-81 a. 5X MAGNIFIER: ON	a. LINE ON: ON	a. Connect a jumper from CAL. OUT jack to TRIGGER OR EXT. SWEEP IN jack and adjust ATTEN toggle switch and STABILITY OR EXT. SWEEP ATTEN. control for a 10 centimeter (cm) deflection of the trace displayed on the screen.	a. None.
	b. HORIZONTAL DISPLAY: EXT. SWEEP	*b.* THERM RES: 200Ω	b. Remove the jumpber from the CAL. OUT and the TRIGGER OR EXT. SWEEP IN jacks.	*b.* None.
	c. Calibrator range switch: VOLTS		c. Set the input selector switch on Preamplifier AM-3148/USM to AC A-B, MILLIVOLTS/CM switch to 100, and MV/CM MULTIPLIER to 1.	c. None.
	d. SQUARE WAVE CALIBRATOR: 10		*d.* Adjust the AN/USM-81 VARIABLE VOLTS/CM controls for the indication shown in figure 13. Calibrate the vertical deflection voltage from the oscilloscope gain control settings.	*d.* Approximately 150 mv peak to peak.
			e. Calculate the horizontal deflection from the oscilloscope gain control settings.	e. Approximately 14 volts peak to peak.
			f. Calculate the gain by dividing the vertical deflection voltage (*d* above) into the horizontal deflection voltage (e above).	*f.* Greater than 50.

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26. Operational Test No. 1

a. Test Matetial and Equipment. None is required.

b. Test Connections and Conditions. Connect the thermistor mount to the rf cable,

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	N/A -------------------	*a*. LINE ON: ON *b*. BIAS-READ: READ c. POWER control dial: .10 (outermost scale) *d*. COMP ATTENUATOR control: 0 *e*. THERM RES: 200Ω *f*. POWER *RANGE:* 1.0 MWO DBM *g*. BIAS COARSE: For a null indication on the NULL INDICATOR h. BIAS FINE: *For* a null indication on the NULL INDICATOR	a. Rotate POWER control dial until the needle on NULL INDICATOR meter Ml is at one of the inscribed lines near the null point. Record the indication on POWER control dial. *b.* Rotate POWER control dial until the needle on NULL INDICATOR meter Ml is at the other inscribed line near the null point. Record the indication on POWER control dial. c. Subtract the indication derived in a and b above, divide the result by 2, and determine performance standard. *d.* Remove thermistor mount.	a. Approximately 0.09 mw as read on POWER control did. *b.* Approximately 0.11 mw read on POWER control dial. c. From 0.005 to 0.02 mw.

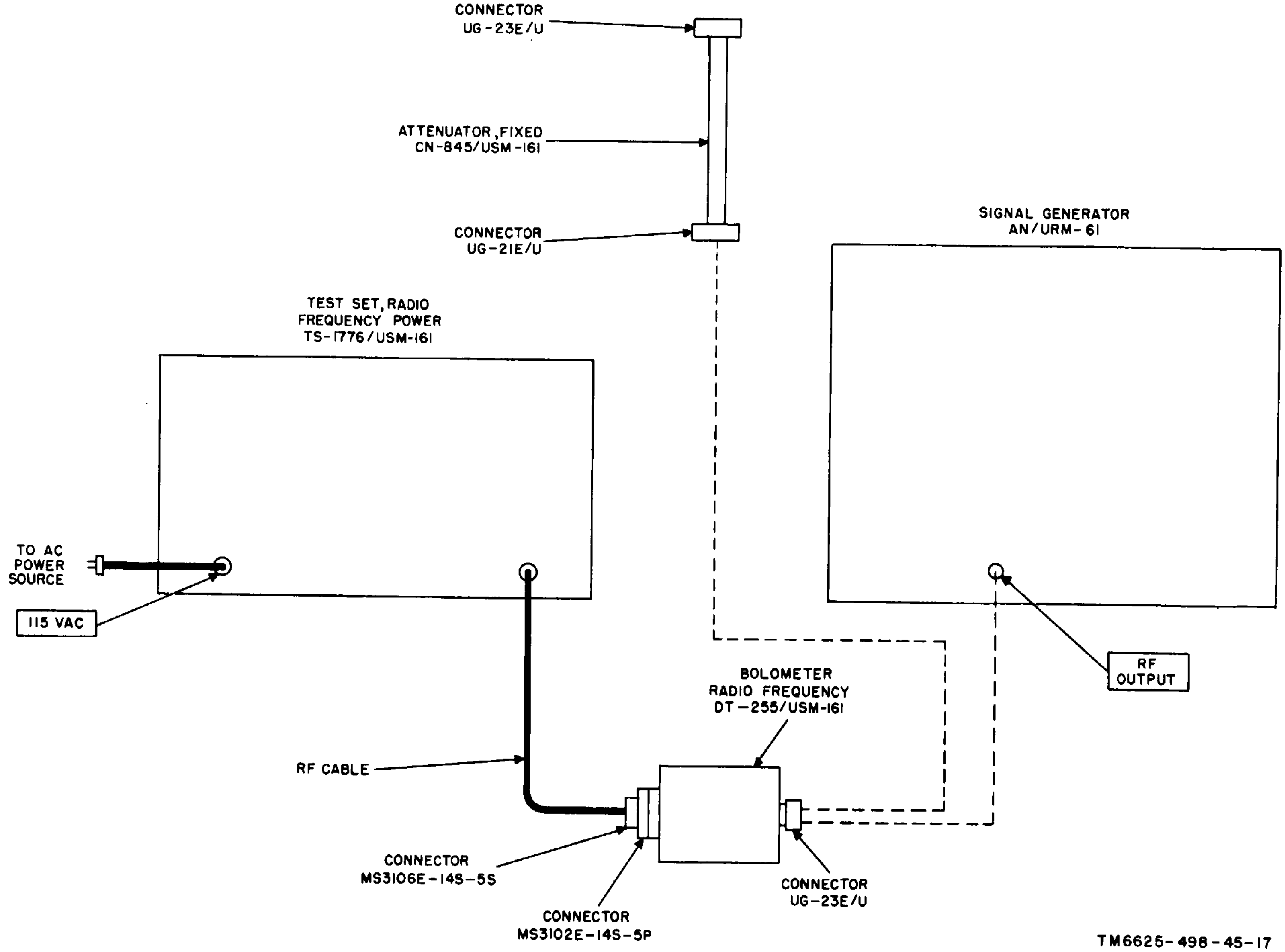


Figure 14. Operational test No. 2 connections.

27. Operational Test No. 2

a. Test Equipment and Material. Signal Generator AN/URM-61.

b. Test Connections and Conditions. Connect the equipment as shown in figure 14.

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	*AN/URM-61* a. SIGNAL FREQUENCY control: 3,000 megacycles. b. FM, CW, OFF, INT, EXT NEG, EXT POS: CW. c. OUTPUT ATTEN control: For a reading of 0.3 mw on POWER SET meter.	a. LINE ON: ON b. BIAS-READ: BIAS. c. BIAS COARSE: For a null indication on the NULL INDICATOR. d. BIAS FINE: For a null indication on the NULL INDICATOR. e. BIAS-READ: READ. f. THERM RES: 200Ω g. POWER RANGE: .30 MW -5 DBM h. COMP ATTENUATOR control: 0	a. Adjust the AN/URM-61 for exactly 0.3 mw at 3,000 megacycles direct output to thermistor mount and adjust POWER control dial to determine the performance standard on the power meter. b. Set the POWER RANGE switch to 1.0 MW 0 DBM and determine the performance standard on the power meter. c. Set the POWER RANGE switch to 3.0 MW +5 DBM and determine the performance standard on the power meter. d. Remove thermistor mount from AN/URM-61	a. 0.3 mw ±0.006. b. 0.3 mw ±0.02. c. 0.3 mw ±0.06.
2	None ----------------	a. LINE ON: ON b. BIAS-READ: READ. c. THERM RES: 200Ω d. POWER RANGE: .30 MW -5 DBM. e. COMP ATTENUATOR: 0. f. POWER: .10 (outermost scale). g. BIAS COARSE: Adjusted for a null indication on NULL INDICATOR. h. BIAS FINE: Adjusted for a null indication on NULL INDICATOR.	Connect the thermistor mount to the 10-db attenuator, and note the indication on the POWER control dial when the null is obtained again on the NULL INDICATOR by adjusting the POWER control dial (this indication is the *zero shift*.)	0.003 mw maximum.

28. Test Data Summary

Personnel may find it convenient to arrange the checklist in a manner similar to that shown below:

1. POWER SUPPLY TEST	
a. Average input voltage check.	217 to 239 volts dc.
b. Power supply ripple check.	25 mv peak to peak (max).
c. Power supply regulation, low input voltage check.	±1 volt of a above.
d. Power supply regulation, high input voltage check.	±1 volt of a above.
2. BIAS OSCILLATOR TEST	
a. Bridge input voltage	150 mv ±100 (peak to peak).
b. Bridge output voltage	14 volts ±4 (peak to peak).
c. Oscillator gain	Greater than 50.
3. OPERATIONAL TEST NO. 1	
NULL INDICATOR sensitivity	0.005 to 0.02 mw.
4. OPERATIONAL TEST NO. 2	
a. Power measurement (POWER RANGE switch set to .30 MW -5 DBM).	0.3 mw ±0.006
b. Power measurement (POWER RANGE switch set to 1.0 MW 0 DBM).	0.3 mw ±0.02
c. Power measurement (POWER RANGE switch set to 3.0 MW +5 DBM).	0.3 mw ±0.06
d. Zero shift	0.003 mw (max)

CHAPTER 5

FIFTH ECHELON MAINTENANCE

29. General Parts Replacement Techniques

a. Before removing a part in the thermistor mount, note the position of the part and its lead. Be sure to install replacement parts in the same position as the original parts.

b. The procedure to disassemble and reassemble the thermistor mount is contained in paragraphs 31 and 32.

c. An exploded view of the thermistor mount is shown in figure 15.

30. Tools, Test Equipment, and Materials

a. The following chart lists the tools and test equipment required for fifth echelon maintenance of Test Set, Radio Frequency Power AN/USM-161. Also listed are the associated manual and the assigned common names.

Test equipment	Technical manual	Common name
Voltmeter, Electronic AN/USM-98.	TM 11-6625-438-10	Vtvm
Tool Kit, Radar and Radio Repairman TK-87/U.	-----------------	Tool kit
Tool Kit, Supplementary, Radar and Radio Repair TK-88/U.	-----------------	Toolkit
Temperature chamber.		

b. The following chart lists the items required for fifth echelon maintenance of the power meter and their Federal stock numbers.

	Federal stock No.
Resistor, 100-ohm, 10.1-percent, l/2-watt (2).	5905-500-5565
Resistor, 200-ohm, l0.1-percent, l/2-watt (2).	5905-295-4078
Potentiometer, 50-ohm ----------	5905-665-6933
Potentiometer, 2-ohm -----------	5905-275-9861
Switch, 2-position toggle ---------	
Battery, 6-volt -----------------	6135-050-0916
Plug PJ-051----------------------	5935-192-4771
Plug PJ-047 ------------— ------	5935-192-4758

31. Disassembly of Thermistor Mount (fig. 15)

Caution: The procedures given in paragraph 33 must be performed when the thermistor disk assemblies have been replaced.

Disassemble the thermistor mount for thermistor disk assemblies replacement as follows:

a. Remove the four connector screws and the three housing screws and remove the housing.

b. Remove the three section screws.

c. Remove the rear and center sections from the front body.

d. Remove both thermistor disk assemblies. (Do not break down the thermistor mount beyond this procedure.)

32. Reassembly of Thermistor Mount (fig. 15)

Caution: The procedures given in paragraph 33 must be performed when the thermistor disk assemblies have been replaced.

Proceed as follows if the thermistor mount has been disassembled (para 31).

a. Place the thermistor disk marked 407-R between the front body and the center section.

b. Place the thermistor disk marked 407- C between the center section and the rear section.

c. Replace the three section screws.

d. Replace the housing and the three housing screws.

e. Replace the four connector screws.

33. Thermistor Mount Thermal Compensation (fig. 16 and 17)

Perform the following procedure only when the thermistor disk assemblies have been replaced.

a. Fabricate the test setup shown in figure 16. Wire the test jig to a temperature chamber so that the thermistor mount

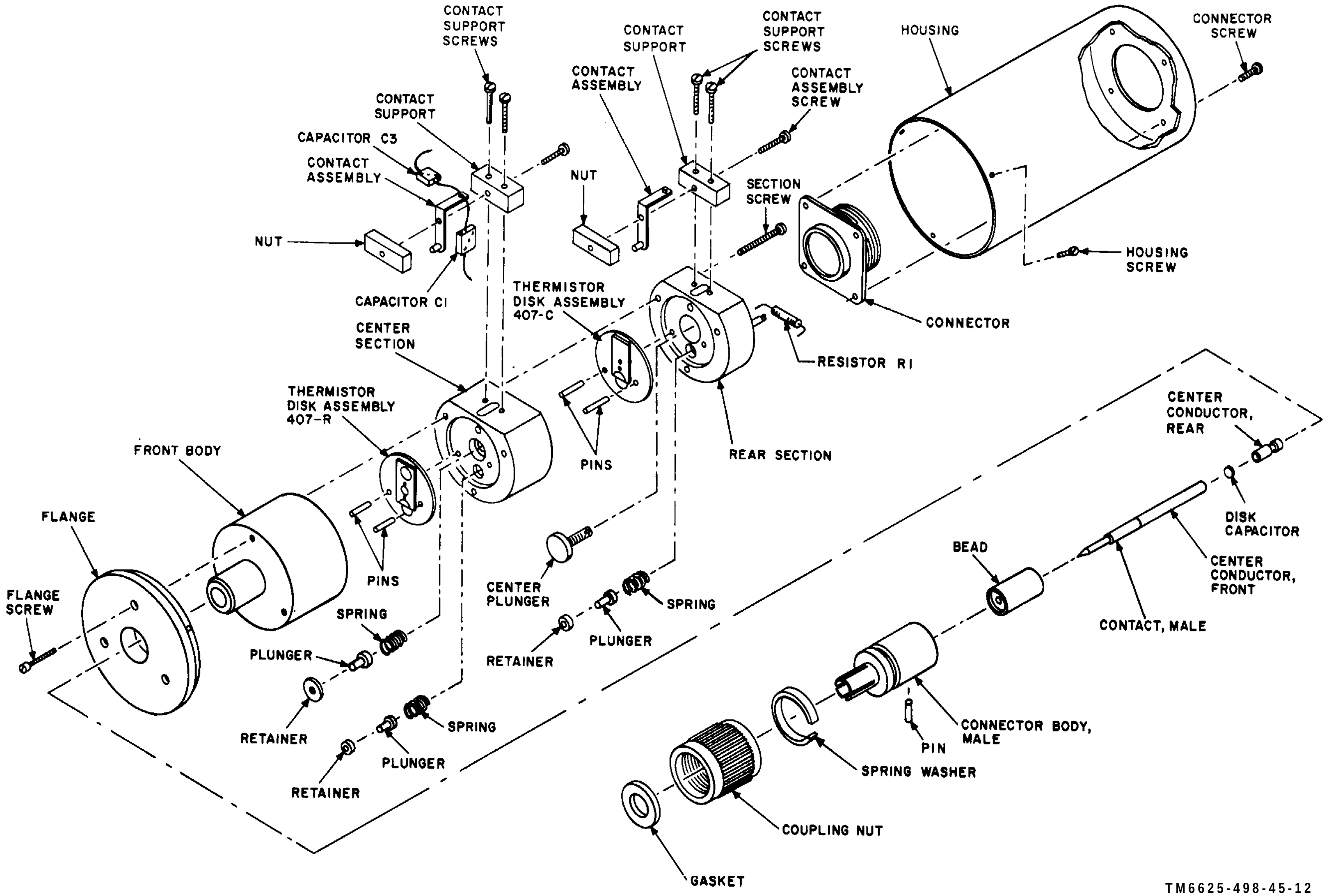


Figure 15. Thermistor mount, exploded view.

need not be removed from the temperature chamber to be placed in its relative position with the test jig. The symbols A, D, and E shown in figure 16 correspond to the symbols shown in figures 17 and 23.

b. With the thermistor mount out of the temperature chamber, carefully rotate the center plunger (fig. 17) fully counterclockwise and perform the procedure given in c below.

c. With toggle switch S1 set to position 1 (fig. 16), adjust potentiometers R1 and R2 for a null indication on the vacuum tube voltmeter (vtvm) and perform the procedure given in d below.

d. With toggle switch S1 set to position 2, slowly rotate the center plunger (fig. 17) clockwise until the vtvm indicates less than 2 millivolts (rev). Note the indication. (If an indication less than 2 mv cannot be accomplished, replace the thermistor disk assemblies.)

e. Place the thermistor mount into the temperature chamber and set the temperature chamber to +65° C (+149° F). Allow enough time for the thermistor mount to achieve thermal equilibrium.

f. With toggle switch S1 set to position 1, adjust potentiometers R1 and R2 for a null indication on the vtvm.

g. Set toggle switch S1 to position 2 and note the indication on the vtvm.

h. Repeat the procedure given in c through g above as necessary until the difference between the indications noted in d and g above is less than 7 mv. (If the difference is greater than 7 mv, repeat the procedure given in c through g above. If less than 7 mw is not achieved after five attempts, replace the thermistor disk assemblies.)

i. Return the temperature chamber to approximately room temperature and allow enough time for the thermistor mount to achieve thermal equilibrium. Set toggle switch S1 to position 1 and adjust potentiometers R1 and R2 for a null indication on the vtvm.

j. Set toggle switch S1 to position 2 and note the indication on the vtvm. Note the temperature of the thermistor mount (in degrees centigrade).

k. Set the temperature chamber to +55° C (+121° F) and allow enough time for the thermistor mount to achieve thermal equilibrium.

1. With toggle switch S1 set to position 1, adjust potentiometers R1 and R2 for a null indication on the vtvm.

m. Set toggle switch S1 to position 2 and note the indication on the vtvm and the exact temperature (in degrees centigrade) of the thermistor mount.

n. Determine the numerical difference between the voltages and between the temperatures (in degrees centigrade) noted in j and m above. If the voltage difference is not less than 75 percent of the temperature difference, repeat the procedure given in a through h above. An example, using practical values, follows: The voltage in j above is 1.5 mv and the temperature is 23° C; the voltage in m above is 17 mv, and the temperature is 55° C; therefore, 55 -23 = 32 and 17 -1.5 = 15.5. This is satisfactory, since 15.5 is less than 75 percent of 32.

34. Calibrating Test Set, Radio Frequency Power AN/USM-161

Perform the following calibration procedures when the performance of the applicable testing procedures in chapter 4 indicate deviations from the indicated limits, or when replacement of reference tube V4 is necessary. Thermistor mount is not used when performing the calibration procedures.

a. Precision Constant Current Supply Calibration. Proceed as follows:

(1) Set the LINE ON switch to ON and allow a 15-minute warmup period.

(2) Set the POWER RANGE switch to 1.0 MW 0 DBM.

(3) Rotate the COMP ATTENUATOR control fully counterclockwise.

(4) Connect the positive lead of the vtvm to pin 7 of tube V5.

(5) Connect the negative lead of the vtvm to the negative side of capacitor C1B (junction of capacitor C1B and resistor R14).

(6) Adjust potentiometer R13 (fig. 8) for an indication of 50 volts on the Vtvm.

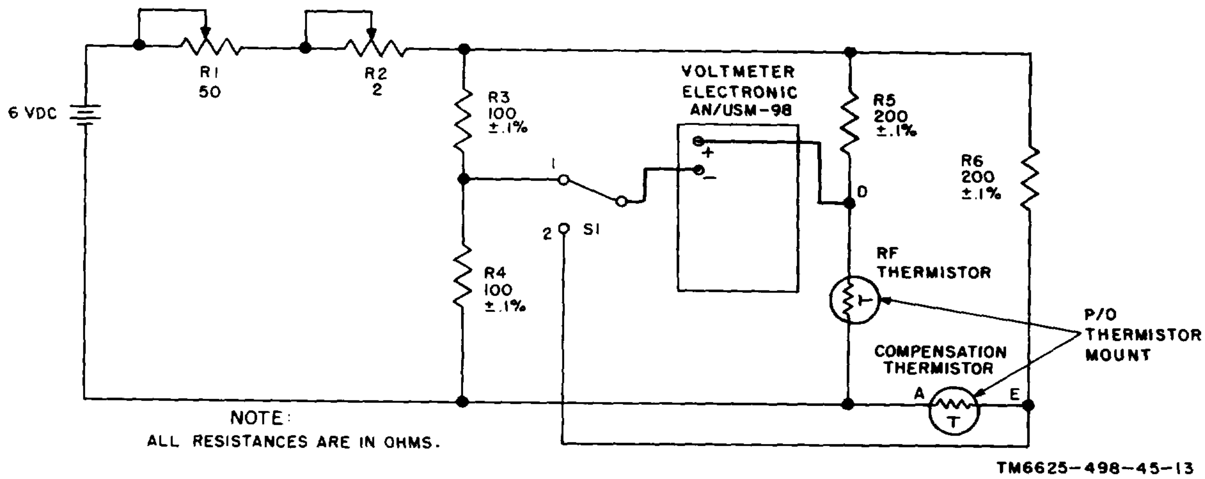


Figure 16. Thermistor mount thermal compensation, test setup.

(7) Remove the positive lead of the vtvm and reconnect it to pin 6 of tube V7. Adjust potentiometer R21 (fig. 8) for an indication of 100 volts on the vtvm.

(8) Repeat the procedure given in (4), (5), and (6) above.

(9) Remove the positive lead of the vtvm and reconnect it to pin 6 of tube V7.

(10) Adjust the COMP ATTENUATOR control for an indication of 69.003 volts on the vtvm.

(11) Loosen the two setscrews on the COMP ATTENUATOR control, and rotate the dial (without rotating the shaft) until the zero line on the dial is under the hairline.

(12) Tighten the two setscrews.

(13) If the indication of the vtvm is not 69.003 volts, repeat the procedure given in (10), (11), and (12) above.

(14) Insert Plug PJ-047 into jack J2 (fig. 8). Remove the vtvm test leads.

(15) Set the THERM RES switch to 100 Ω.

(16) Connect the positive lead of the vtvm to chassis ground.

(17) Connect the negative lead of the vtvm to the junction of R72 and R73.

(18) Adjust potentiometer R13 (fig. 8) for an indication of 2.5028 volts on the vtvm.

(19) Disconnect equipment. Remove Plug PJ-047 from jack J2.

b. Automatic Zero Adjustment. Proceed as follows:

(1) Perform the procedures described in a above.

(2) Insert Plug PJ-051 into jack J1 (fig. 8).

(3) Set the POWER control dial to 0.

(4) Set the BIAS-READ switch to READ.

(5) Connect the vtvm across capacitor C22 (positive test lead to chassis ground) (fig. 9) and note the indication. This is E_1.

(6) Set the BIAS-READ switch to BIAS and adjust potentiometer R75 (fig. 8) until the indication on the vtvm is equal to E_1 ((4) and (5) above).

c. Maximum Power Calibration. Proceed as follows:

(1) Perform the procedures described in b above.

(2) Set the BIAS-READ switch to READ.

(3) Set the POWER control dial to 1.0 (on the outermost scale).

(4) Note the indication on the vtvm. This is E2.

(5) Using the following formula, solve for E_3:

$E_3 = 0.15645 (E_1 - E_2)$

(6) Adjust potentiometer R74 (fig. 8) until the indication on the vtvm is equal to E_3.

d. Minimum Power Calibration. Proceed as follows:

(1) Perform the procedures described in c above.

(2) Connect a 200-ohm, +0.1-percent, 1/2-watt resistor from the junction of resistors R67 and R68 to chassis ground.

(3) Set the THERM RES switch to 200 Ω.

(4) Remove Plug PJ-051 from jack J1. Insert Plug PJ-047 into jack J2.

(5) Set the BIAS-READ switch to READ.

(6) Using the following formula, solve for E_4:

$$E_4 = 0.57822 (E_1-E_2)$$

(7) Adjust potentiometer R69 (fig. 8) until the indication on the vtvm is equal to E_4.

(8) Remove Plug PJ-047 from jack J2 .

(9) Disconnect the 200-ohm resistor and the vtvm.

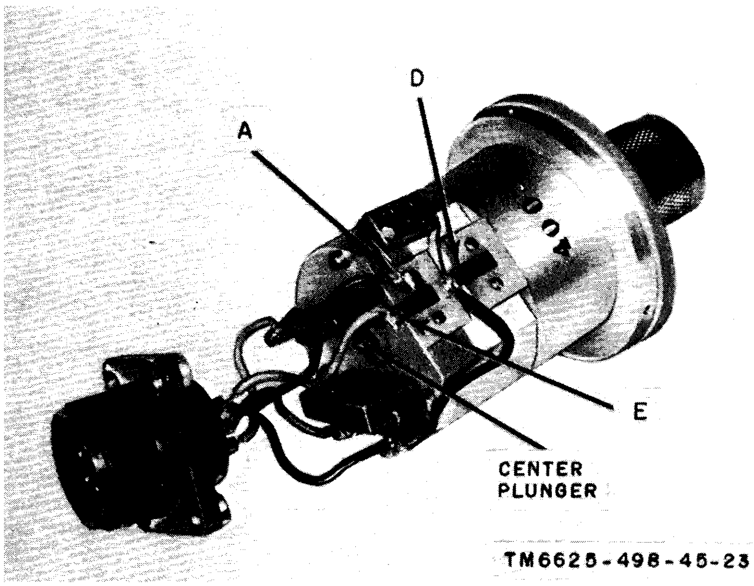


Figure 17. Thermistor mount, housing removed.

CHAPTER 6

DEPOT INSPECTION STANDARDS

35. Applicability of Depot Inspection Standards

The tests outlined in this chapter are designed to measure the performace capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

36. Applicable References

a. Repair Standards. Applicable procedures of the Signal Corps depot performing these tests and the general standards for repaired electronics equipment, form a part of the requirements for testing this equipment.

b. Technical Publications. The technical publication applicable to this equipment is TM 11-6625-498-12.

c. Modification Work Orders. Perform all applicable modification work orders pertaining to this equipment before making the tests specified. DA PAM 310-4 lists all available MWO's.

37. Test Facilities Required

The following equipments, or suitable equivalents, will be employed in determining compliance with the requirements of this specific standard.

a. Test Equipment.

Equipment	Stock No.	Qty reqd	Applicable literature
Audio Level Indicator Weinchel Model INI.		1	
Attenuator, Weinchel Model C F- 1.		1	
Bolometer, Weinchel Model BA- 1B.		1	
Bolometer, GMC 408 with mount GMC 401.		1	
coaxial slotted Line IM-92/U.	6625-692-6558	1	TM 11-5109
Double Stub Tuner Narda Model 903N.		1	
Indicator, Standing Wave IM-97/USM-37.	6625-814-8357	1	
Signal Generator SG-104/MRQ-7.		1	TM 9-9504-38
Signal Generator AN/URM-61	6625-591-2056	1	TM 11-5091
Signal Generator AN/URM-52	6625-546-6663	1	TM 11-6625-214-10
Voltmeter, Electronic AN/USM-98.		1	TM 11-6625-438-10
Slotted Section Carriage, HP-809B (MX-1545/USM-37).		1	
Slotted Section Body, HP-806B (IM-100/USM-37).		1	
Probe, HP-44A (MX-1546/USM-37) .		1	

b. Additional Equipment.

Equipment	Stock No.	Qty/ reqd
Resistor, 200-ohm ±O.1-percent 1/2-watt.	5905-295-4078	1
Test jig with one battery (6-volt), two potentiometers (50-ohm and 2-ohm), four resistors (2 each, 100-ohm and 2 each 200-ohm ±0.1-percent), and one switch (2-position toggle). (See figure 16.)		1
Adapter, Connector UG 57B/U.	5935-170-8147	1
Adapter, Connector UG-29B/U.	5935-643-9875	1
Cable Assembly, Radio Frequency RG-58C/U (4 ft. 3 in. long).	5995-823-3068	4

38. Tests

a. Power Meter Check. The following check will verify the proper operation of the power meter if all indications are as specified.

(1) Connect one side of the 200-ohm resistor to the junction of resistors R67 and R68 as shown in figure 18.

(2) Connect the other side of the 200-ohm resistor to the side of resistor R73 as shown in figure 18.

(3) Connect the vtvm across the 200-ohm resistor as shown in figure 18.

(4) Turn on the vtvm.

(5) Set the controls on the power meter as follows:

(a) LINE ON switch to ON.

(b) BIAS-READ switch to READ.

(c) THERM RES switch to 200 Ω.

(d) POWER RANGE switch to 1.0 MW 0 DBM.

(e) POWER control dial to 0 (on the outermost scale).

(f) COMP ATTENUATOR control to 0.

(6) Measure the voltage across the resistor with the vtvm and note the indication.

(7) Set the POWER control dial to 1.0 on the outermost scale and note the new indication on the vtvm.

(8) Divide the difference of the squares of the indications noted in (6) and (7) above by 200. The result should be 1.0 mw ±1 percent.

(9) Set the POWER control dial to 0 on the outermost scale and the COMP ATTENUATOR control to -2.2. The indication on the vtvm should be within 1 percent of 1.288 times the indication noted in (6) above.

(10) Set the COMP ATTENUATOR control to +2.2. The indication on the vtvm should be within 1 percent of 0.7763 times the indication noted in (6) above.

(11) Remove the test equipment and proceed with the attenuator checks.

b. Attenuator Checks. The following checks will determine the usability of the attenuators supplied with the power meter.

(1) Use Signal Generator SG-104/MRQ-7 and Coaxial Slotted Line IM-92/U to connect the equipment as shown in A, figure 19.

(2) Determine the attenuation and (standing wave ratio (voltage)) (vswr) at the male end of the 7-db attenuator at 1,000 mc. The vswr should not be more than 1.35, and the attenuation should be as indicated on the calibration plate attached to the 7-db attenuator.

(3) Repeat the procedure given in 1 and 2 above for each of the 10-db attenuators. The vswr should be not more than 1.4, and the attenuation should be as indicated on the calibration plates attached to the 10-db attenuators.

(4) Connect the equipment as shown in B, figure 19, and determine the vswr at the female end of each of the attenuators tested ((2) and (3) above). The vswr of the 7-db attenuator should be not more than 1.35. The vswr of the 10-db attenuators should be not more than 1.4.

(5) Connect the equipment as shown in A, figure 19, and determine the attenuation at the male end of each of the attenuators at 1,200 mc. The attenuation should be as indicated on the calibration plates attached to each of the attenuators.

(6) Replace Signal Generator SG-104/MRQ-7 with Signal Generator AN/URM-61. Tune the signal generator to 1,800 mc and determine the attenuation at the male end of each of the attenuators (A, fig. 19). The attenuation should be as indicated on the calibration plates attached to each of the attenuators.

(7) Tune Signal Generator AN/URM-61 to 2,000 mc and determine the attenuation at the male end of each of the attenuators (A, fig. 19). The attenuation should be as indicated on the calibration plates attached to each of the attenuators.

(8) Tune Signal Generator AN/URM-61 to 4,000 mc and determine the attenuation at the male end of each of the attenuators (A, fig. 19). The attenuation should be as indicated on the calibration plate attached to each of the attenuators.

(9) Replace Signal Generator AN/URM-61 with Signal Generator AN/URM-52. Replace Coaxial Slotted Line IM-92/U with Slotted Section Carriage HP-809B (MX-1545/USM-37), Slotted Section Body HP-806B (IM-100/USM-37), and Probe HP-44A (MX-1546/USM-37).

(10) Determine the attenuation at the

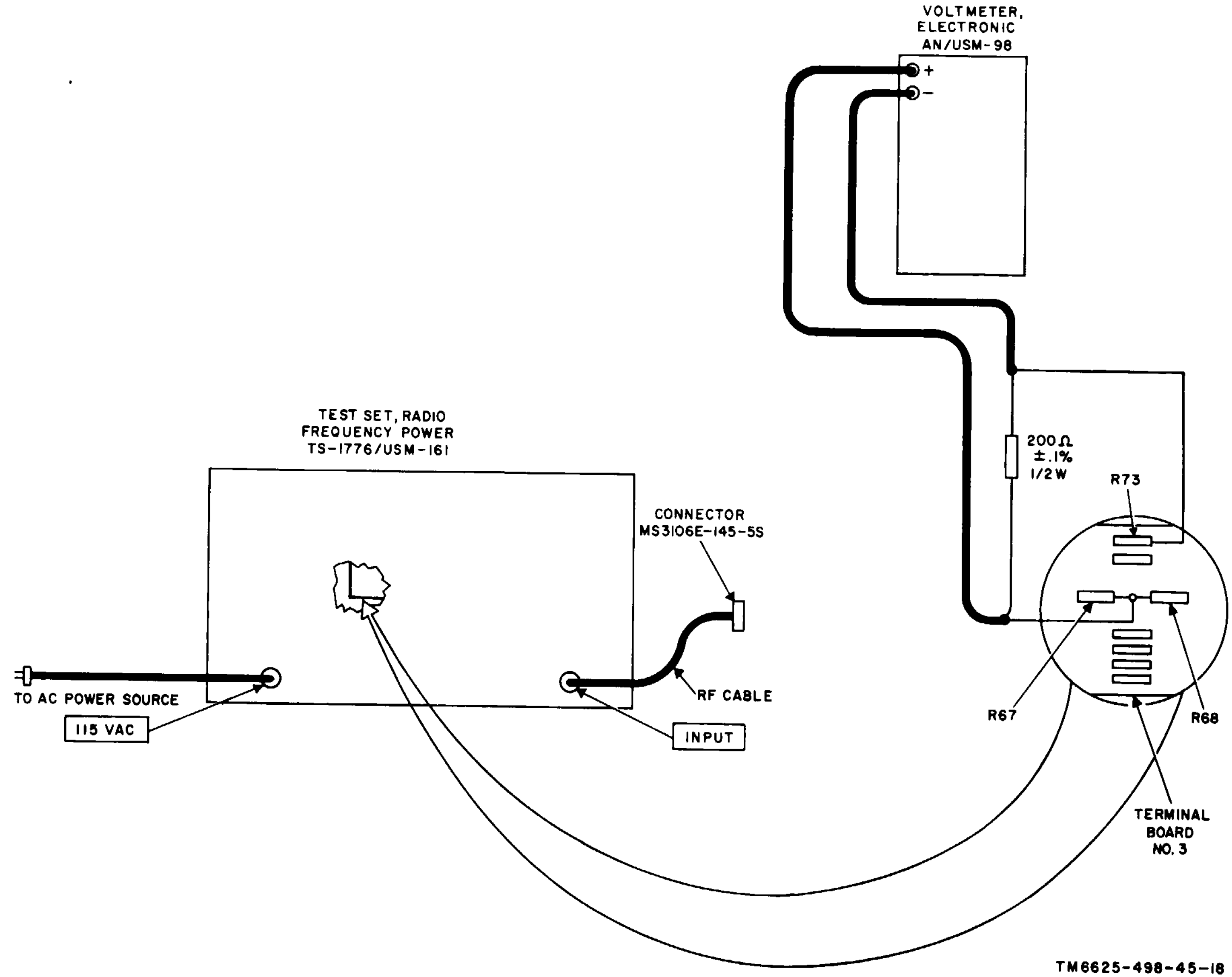
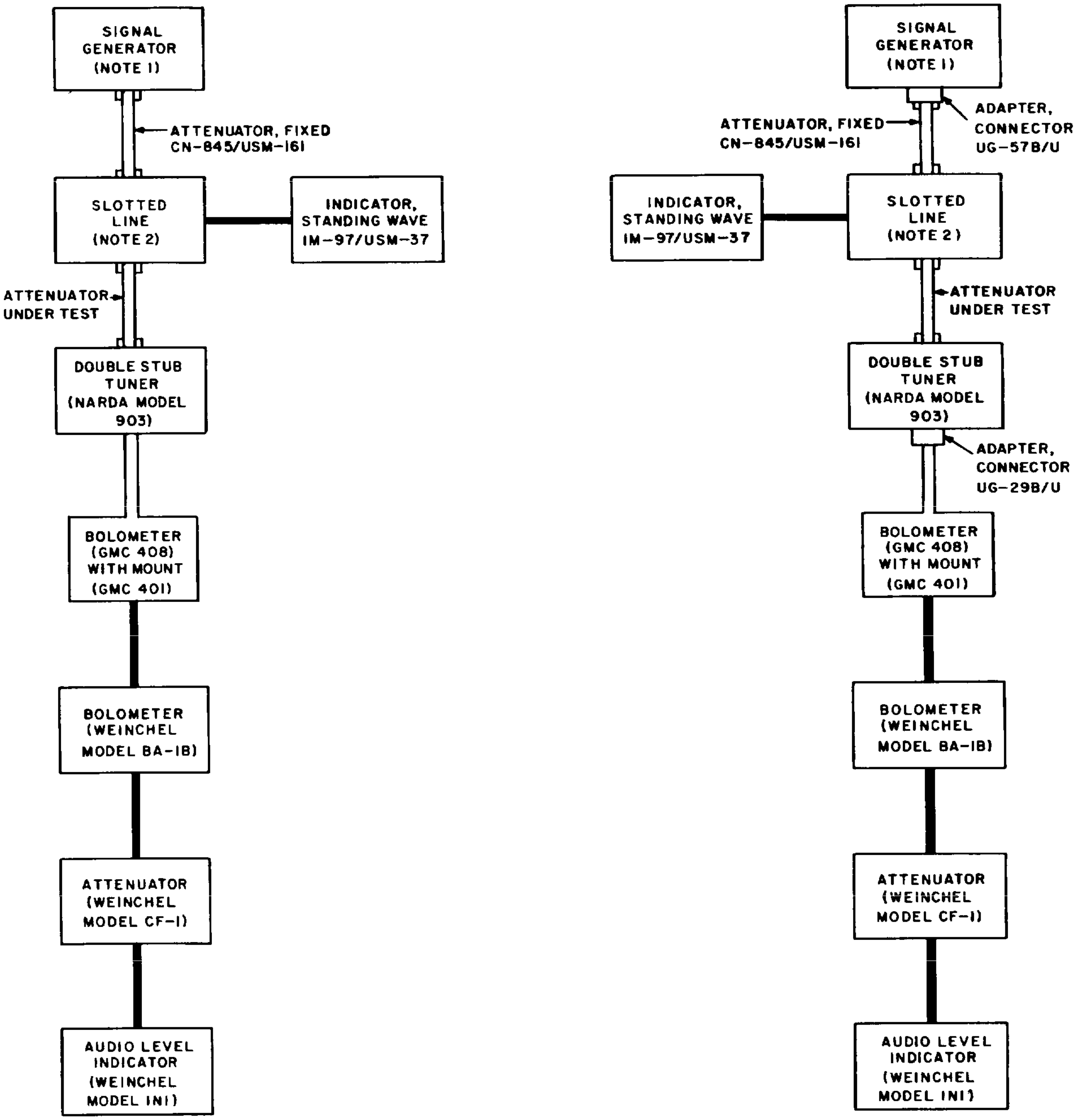


Figure 18. Test Set, Radio Frequency Power AN/USM-161, test setup.



8. FEMALE END TEST SETUP

NOTES:

1. USE SG-104/MRQ-7 FOR FREQUENCIES UP TO 1,200 MC, AN/URM-61 FOR FREQUENCIES FROM 1,800 TO 4,000 MC,OR AN/URM-52 FOR FREQUENCIES FROM 4,000 TO 7,500 MC.
2. USE COAXIAL SLOTTED LINE, IM-92/U FOR FREQUENCIES UP T0 4,000 MC. USE SLOTTED SECTION CARRIAGE HP-809B(MX-1545/USM-37). SLOTTED SECTION BODY HP-806B(IM-100/USM-37), AND PROBE HP-44A (MX-1546/USM-37) FOR FREQUENCIES ABOVE 4,000 MC.

LEGEND:

CABLE ASSEMBLY, RADIO FREQUENCY RG-58C/U.

TM6625-498-45-19

Figure 19. Test setup for testing attenuators,

male end of each of the attenuators at 5,000 mc (A, fig. 19). The attenuation should be as indicated on the calibration plates attached to each of the attenuators.

(11) Tune Signal Generator AN/URM-52 to 7,000 mc and determine the attenuation at the male end of each of the attenuators (A, fig. 19). The attenuation should be as indicated on the calibration plate attached to each of the attenuators.

(12) Tune Signal Generator AN/URM-52 to 7,500 mc and determine the attenuation at the male end of each of the attenuators (A, fig. 19). The attenuation should be as indicated on the calibration plate attached to each of the attenuators.

(13) Remove the test equipment and proceed with the thermistor mount checks.

c. Thermistor Mount Checks. The following checks will determine the usability of the thermistor mount supplied with the power meter.

(1) Connect the test equipment as shown in figure 20.

(2) Set the controls on the power meter as follows:

(a) LINE ON switch to ON.

(b) BIAS-READ switch to BIAS.

(c) THERM RES switch to 200 Ω.

(d) POWER control dial to 0.

(e) COMP ATTENUATOR control to 0.

(f) Adjust the BIAS COARSE control for an approximate null indication on the NULL INDICATOR meter.

(g) Adjust the BIAS FINE control for and exact null indication on the NULL INDICATOR meter.

(3) Determine the vswr of the thermistor mount at 7,500 mc. The vswr should be not greater than 1.5.

(4) Remove the test equipment and fabricate the test jig shown in figure 16.

(5) Wire the test jig to a temperature chamber so that the thermistor mount need not be removed from the temperature chamber to be placed in its relative position within the test jig.

(6) Use Voltmeter, Electronic AN/USM-98 (vtvm) as the null indicator.

(7) With the temperature chamber at room temperature and toggle switch S1 set to position 1 (fig. 16), adjust potentiometers R1 and R2 for a null indication on the vtvm.

(8) Set toggle switch S1 to position 2 and note the indication on the vtvm. Note the temperature of the thermistor mount (in degrees centigrade).

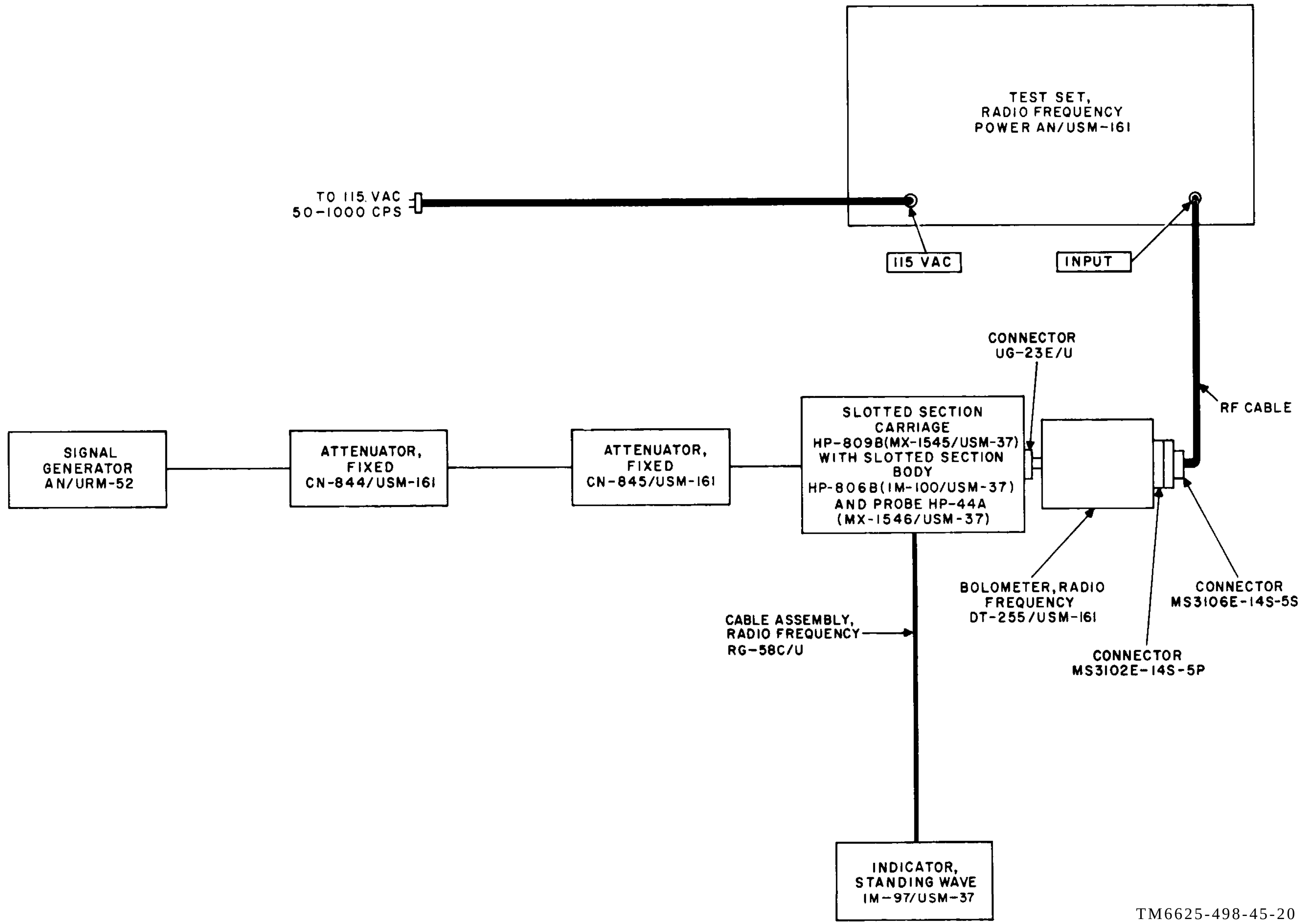
(9) Set the temperature chamber to +55° C (+121° F) and allow enough time for the thermistor mount to achieve thermal equilibrium.

(10) Set toggle switch S1 to position 1 and adjust potentiometers R1 and R2 for a null indication on the vtvm.

(11) Set toggle switch S1 to position 2 and note the indication on the vtvm and the exact temperature of the thermistor mount (in degrees centigrade).

(12) Determine the numerical difference between the voltages and between the temperatures noted in (8) and (11) above. The number corresponding to voltage difference should be less than 75 percent of the number corresponding to the temperature difference.

(13) This completes the test procedures for the power meter.



TM6625-498-45-20

Figure 20. Test setup for testing thermistor mount.

APPENDIX

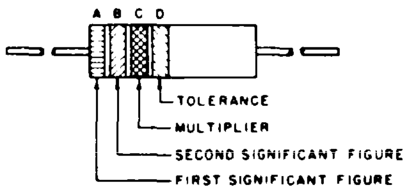
REFERENCES

Following is a list of applicable references available to the field and depot maintenance repairmen of Test Set, Radio Frequency Power AN/USM-161.

DA Pamphlet 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Orders.
TA 11-17	Signal Field Maintenance Shops.
TA 11-100 (11-17)	Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shops.
TM 9-9504-38	Operation, Organizational Maintenance, and Field and Depot Maintenance: Signal Generator SG-104/MRQ-7 (CORPORAL Type II Guided Missile System).
TM 11-5091	Maintenance Instructions: Signal Generators AN/URM-61, AN/URM-61A, Signal Generators TS-403/U, TS-403A/U, and TS-403B/U.
TM 11-5109	Coaxial Slotted Line IM-92/U.
TM 11-6625-200-12	Operation and Organizational Maintenance Manual: Multimeters ME-26A/U and ME-26B/U.
TM 11-6625-214-10	Operator's Manual: Signal Generator AN/URM-52 and AN/URM-52A.
TM 11-6625-219-12	Operator's and Organizational Maintenance Manual: Oscilloscope AN/USM-81.
TM 11-6625-274-12	Operator's and Organizational Maintenance Manual: Test Sets, Electron Tube TV-7/U, TV-7A/U, TV-7B/U, and TV-7D/U.
TM 11-6625-438-10	Operator's Manual: Voltmeter, Electronic AN/USM-98.
TM 1l-6625-498-12	Operator and Organizational Maintenance Manual: Test Set, Radio Frequency Power AN/USM-161.

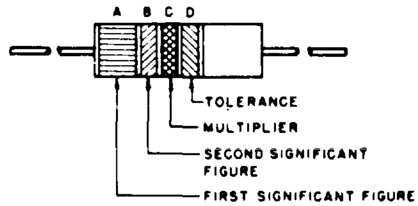
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIREWOUND-TYPE RESISTORS



BAND A— Double Width Signifies Wire-wound Resistor

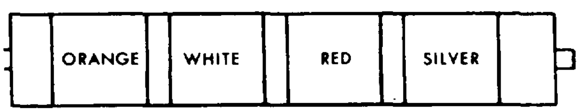
COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING

BAND

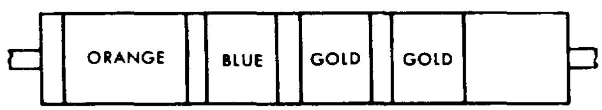
A B C D*



3 9 X100 ± 10%

BAND

A B C D*



3 6 X0.1 ± 5%

NOMINAL RESISTANCE	3,900 Ohms	3.6 Ohms
RESISTANCE TOLERANCE	± 10 percent	± 5 percent

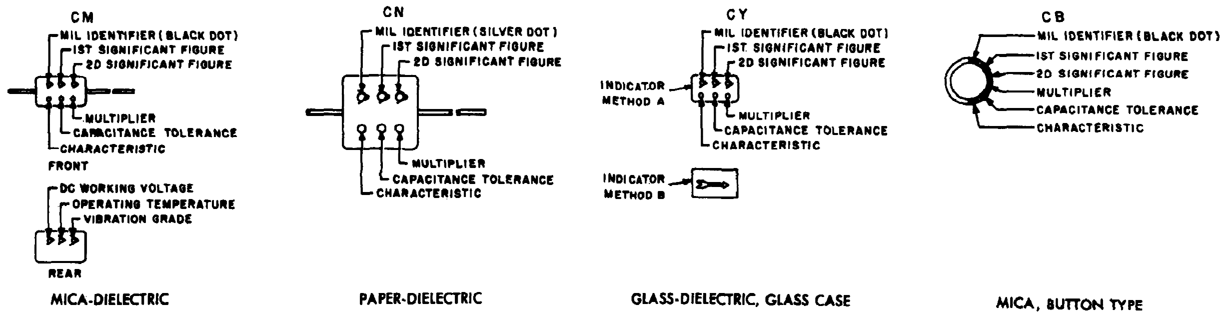
STD-R2

*If Band D is omitted, the resistor tolerance is ± 20%, and the resistor is not Mil-Std.

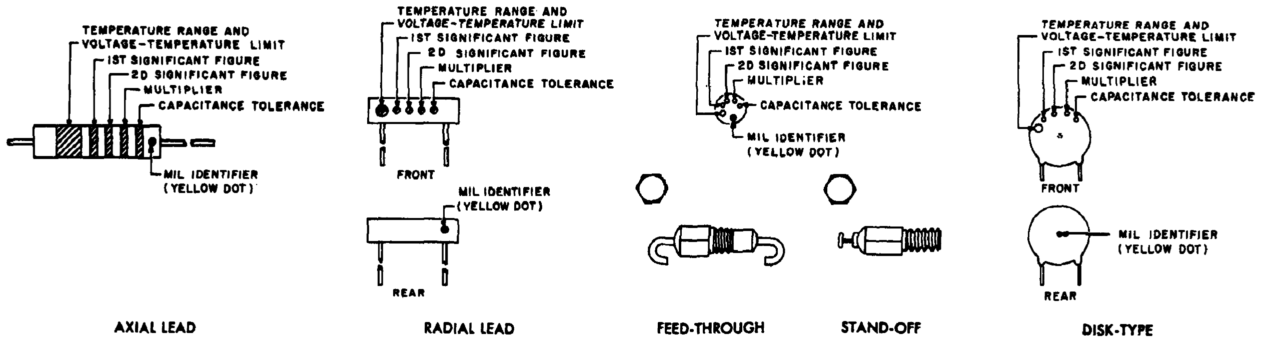
Figure 21. Color code marking for MIL-STD resistors.

COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

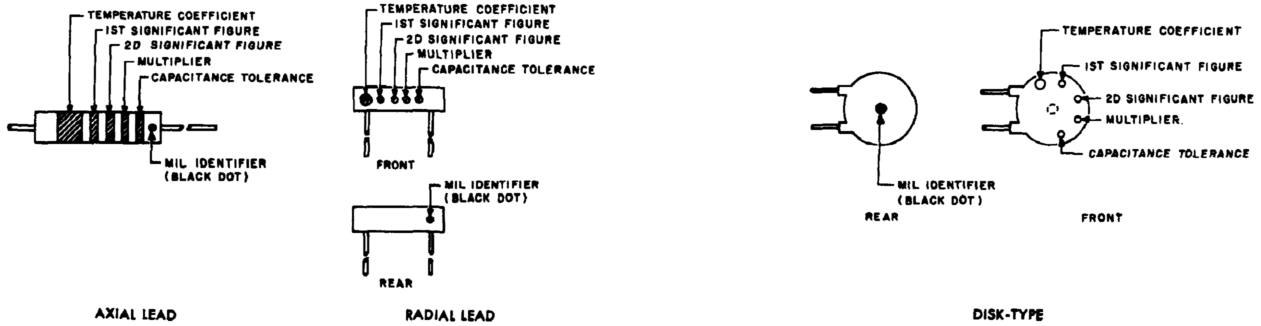
GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC



COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

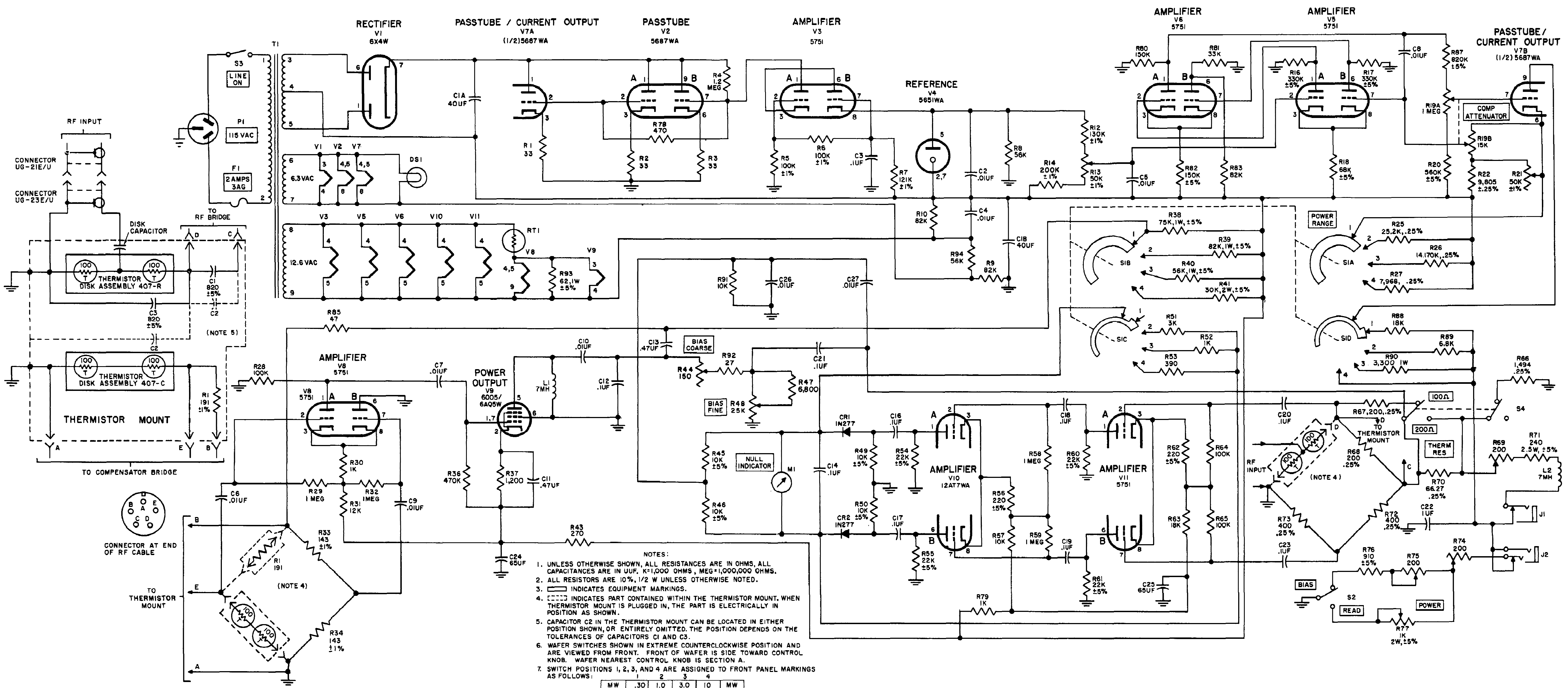
TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL–C–11015.
4. Temperature coefficient in parts per million per degree centigrade.

STD–C2

Figure 23. Test Set, Radio Frequency Power AN/USM-161, schematic diagram.



NOTES:

1. UNLESS OTHERWISE SHOWN, ALL RESISTANCES ARE IN OHMS, ALL CAPACITANCES ARE IN UUF. K=1,000 OHMS, MEG=1,000,000 OHMS.
2. ALL RESISTORS ARE 10%, 1/2 W UNLESS OTHERWISE NOTED.
3. ▭ INDICATES EQUIPMENT MARKINGS.
4. ⬚ INDICATES PART CONTAINED WITHIN THE THERMISTOR MOUNT. WHEN THERMISTOR MOUNT IS PLUGGED IN, THE PART IS ELECTRICALLY IN POSITION AS SHOWN.
5. CAPACITOR C2 IN THE THERMISTOR MOUNT CAN BE LOCATED IN EITHER POSITION SHOWN, OR ENTIRELY OMITTED. THE POSITION DEPENDS ON THE TOLERANCES OF CAPACITORS C1 AND C3.
6. WAFER SWITCHES SHOWN IN EXTREME COUNTERCLOCKWISE POSITION AND ARE VIEWED FROM FRONT. FRONT OF WAFER IS SIDE TOWARD CONTROL KNOB. WAFER NEAREST CONTROL KNOB IS SECTION A.
7. SWITCH POSITIONS 1, 2, 3, AND 4 ARE ASSIGNED TO FRONT PANEL MARKINGS AS FOLLOWS:

	1	2	3	4	
MW	.30	1.0	3.0	10	MW
DBM	-5	0	+5	+10	DBM

8. RF UNDER TEST IS APPLIED TO THE THERMISTOR MOUNT BETWEEN THE GROUND AND D TERMINALS OF THE THERMISTOR MOUNT.

TM6625-498-45-22

Figure 22. Color code marking for MIL-STD capacitors.

By Order of Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
CofEngrs (1)
TSG (I)
CSigO (5)
CofT (1)
USA CD Agcy (1)
USCONARC (5)
USAMC (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Cored (3)
OS Base Cored (2)
LOGCOMD (2)
USAECOM (5)
USAMICOM (3)
USASCC (4)
MDW (1)
Armies (2)
Corps (2)
USA Corps (3)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC Armor (2)
Instls (2) except
Ft Monmouth (63)
Svc College (2)
Br Svc Sch (2)
GENDEP (OS) (2)
Sig Dep (OS) (12)
Sig See, GENDEP (5)
Army Dep (2) except
Ft Worth (8)
Lexington (12)
Sacramento (28)
Tobyhanna (12)
USA Elct RD Actv,
White Sands (13)
USA Elct RD Actv,
Ft Huachuca (2)
USA Trans Tml Cored (1)
Army Tml (1)
POE (1)
USAOSA (1)
AMS (t)
WRAMC (1)
AFIP (1)
Army Pic Cen (2)
USA Mbl Spt Cen (1)
USA Elct Mat Agcy (12)
Chicago Proc Dist (1)
USARCARIB Sig Agcy (1)
Sig Fld Maint Shop (3)
C/Spt Svcs (1)
Units org under fol TOE:
Two copies each UNOINDC:
11-7
11-16
11-57
11-97
11-98
11-117
11-155
11-157
11-500 (AA-AC)(4)
11-557
11-587
11-592
11-597

NG: State AG (3).
USAR: None.
For explanation of abbreviations used, see AR 320-50.

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