NAVSHIPS 91435 UNCLASSIFIED

INSTRUCTION BOOK

for

TUBE TESTER

TV-3A/U

Manufactured by

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 Dupont Avenue Cleveland 8, Ohio

for

U. S. NAVY DEPARTMENT BUREAU OF SHIPS

Contract No. NObsr 43282
Contract No. NObsr 49238

Approved by BuShips:
31 March 1951

LIST OF EFFECTIVE PAGES

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DEPARTMENT OF THE NAVY
BUREAU OF SHIPS
WASHINGTON 25, D. C.

IN REPLY REFER TO
Code 993-100
31 March 1951

From: Chief, Bureau of Ships
To: All Activities concerned with the Installation, Operation and Maintenance of the Subject Equipment

Subj: Instruction Book for Tube Tester TV-3A/U, NAVSHIPS 91435

1. NAVSHIPS 91435 is the instruction book for the subject equipment and is in effect upon receipt.

2. When superseded by a later edition, this publication shall be destroyed.

3. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.

4. All requests for NAVSHIPS Electronics publications should be directed to the nearest District Publications and Printing Office. When changes or revised books are distributed, notice will be included in the applicable maintenance bulletin and the BUSHIPS ELECTRON.

H. N. WALLIN
Chief of Bureau

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

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CONTRACTURAL GUARANTEE

The Contractor guarantees that at the time of delivery thereof the articles provided for under this contract will be free from any defects in material or workmanship and will conform to the requirements of this contract. Notice of any such defect or nonconformance shall be given by the Government to the Contractor within one year of the delivery of the defective or nonconforming article, unless a different period of Guaranty is specified in the schedule. If required by the Government within a reasonable time after such notice, the Contractor shall, with all possible speed, correct or replace the defective or nonconforming article or part thereof. When such correction or replacement requires transportation of the article or part thereof, shipping costs, not exceeding the usual charges, from the delivery point to the Contractor's plant and return, shall be borne by the Contractor; the Government shall bear all other shipping costs. This Guaranty shall then continue as to corrected or replacing articles or, if only parts of such articles are corrected or replaced, to such corrected or replacing parts, until one year after the date of redelivery, unless a different period of Guaranty is specified in the schedule. If the Government does not require a correction or replacement of a defective or nonconforming article, the Contractor, if required by the contracting officer, within a reasonable time after the notice of defect or nonconformance, shall repay such portion of the contract price of the article as is equitable in the circumstances.

INSTALLATION RECORD

Contract Number NObsr 49238	Date of Contract 30 June, 1950
Contract Number NObsr 43282	Date of Contract 18 May, 1949

Serial Number of Equipment .....

Date of Acceptance by the Navy .....

Date of Delivery to Contract Destination .....

Date of Completion of Installation .....

Date Placed in Service .....

Blank spaces in this table shall be filled in at time of installation.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made to the Bureau of Ships in accordance with current regulations, using form NAVSHIPS NBS 383 (revised). The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failure see Chapter 67 of the BUREAU OF SHIPS MANUAL or superseding instructions.

ORDERING PARTS

All requests or requisitions for replacement material should include the following data:

1. Standard Navy stock number or, when ordering from a Marine Corps or Signal Corps supply depot, the Signal Corps stock number.
2. Name and short description of part.

If the appropriate stock number is not available the following shall be specified:

1. Equipment model or type designation, circuit symbol, and item number.
2. Name of part and complete description.
3. Manufacturer's designation.
4. Contractor's drawing and part number.
5. JAN or Navy type number.

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the BUREAU OF SHIPS MANUAL or superseding instructions on the subject of radio-safety precautions to be observed.

The use of this equipment involves voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working on equipment employing high voltages.

While every practicable safety precaution has been incorporated in ship and shore electronic equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS.

Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustment inside equipment with high voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors. To avoid casualties always remove power and discharge and ground circuits prior to touching them.

DON'T SERVICE OR ADJUST ALONE.

Under no circumstances should any person reach within or enter the enclosure for the purpose of servicing or adjusting the equipment without the immediate presence of assistance of another person capable of rendering aid.

DON'T TAMPER WITH INTERLOCKS.

Do not depend upon door switches or interlocks for protection, but always shut down motor generators or other power equipment. Under no circumstances should any access gate, door, or safety interlock switch be removed, short-circuited, or tampered with in any way, by other than authorized maintenance personnel, nor should reliance be placed upon the interlock switches for removing voltages from the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR, OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

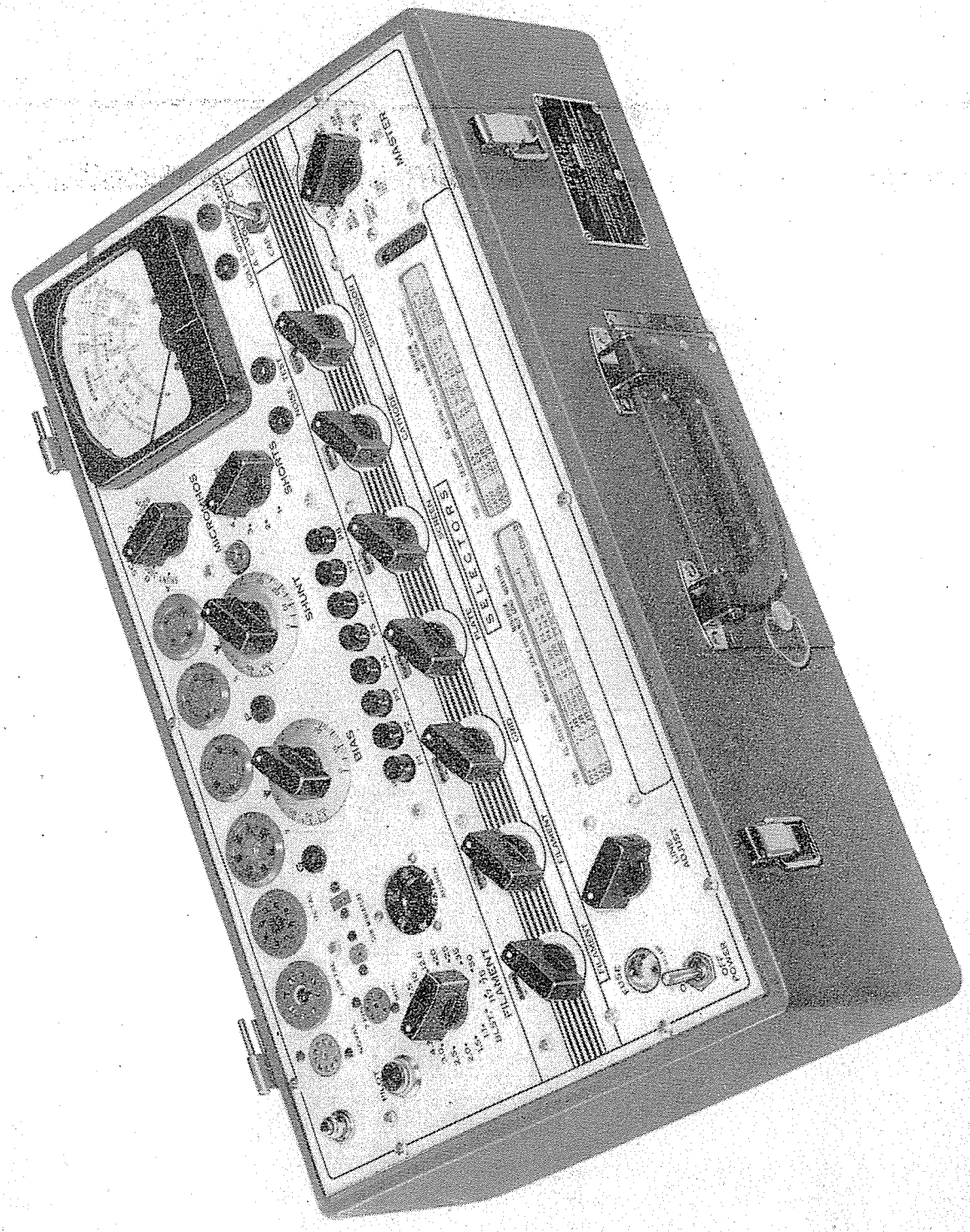


Figure 1-1. Tube Tester TV-3A/U

SECTION 1
GENERAL DESCRIPTION

1. PURPOSE.

This handbook is intended for use with the Tube Tester TV-3A/U (see Figure 1-1) described in the following paragraphs and contains information essential to the operation and maintenance of the equipment.

a. GENERAL.—Tube Tester TV-3A/U is a portable Tube Tester of the dynamic mutual conductance type designed to test and measure the mutual conductance values of electron tubes of the receiving types and many of the smaller transmitting types. A multimeter section, using the same indicator, is also incorporated in the equipment permitting measurements of ac and dc volts, dc mils, resistance and capacity in the ranges listed in paragraph 2j of this section. The entire equipment is enclosed in an aluminum carrying case with a built-in compartment for accessories and operating or running spare parts. The cover of the case is secured by means of two draw bolts. Two slip hinges permit the removal of the cover if desired. An Instruction Sheet for the Tube Tester section and the Multimeter section is mounted on the inside surface of the cover for ready reference. A suitable carrying handle is provided. An interlock switch automatically shuts off the equipment when the lid is closed.

2. REFERENCE DATA.

a. Nomenclature: Tube Tester TV-3A/U.

b. Contract Number: NObsr-43282.

c. Contractor: The Hickok Electrical Instrument Co.

d. Cognizant Naval Inspector: Inspector of Naval Material, Cleveland, Ohio.

e. Number of Packages Involved per Complete Shipment of One Equipment Including Equipment Spare Parts: One.

f. Total Cubical Contents Including Equipment Spares: Crated: 5.3 Cu. Ft.
Uncrated: 1.07 Cu. Ft.

g. Total Weight Including Equipment Spares:
Crated: 90 lbs.
Uncrated: 32 lbs.

h. Characteristics of Power Supply Required for Operation: 105 to 125 Volts ac at 50 to 1600 Cycles, Single Phase, 45 Watts at 60 Cycles.

i. Current Drain: 0.38 Amps.

j. Meter Ranges:

(1) Micromhos: 0 to 3000, 0 to 6000, 0 to 15,000, 0 to 30,000.

(2) AC and DC Volts: 0 to 20, 0 to 200, 0 to 500, 0 to 1000.
Sensitivity on all ranges 1000 ohms per volt.

(3) DC Milliamperes 0 to 20, 0 to 200.

(4) Resistance: 0 to 1 Megohm, 0 to 100 Megohms.

(5) Capacity 0 to 5 Microfarads, 0 to 50 Microfarads.

k. Accuracy:

(1) DC Ranges: Plus or minus 3% of full scale deflection at temperatures between plus 10 deg. and plus 25 deg. C; Plus or minus 5% of full scale deflection at temperatures between 0 and 50 deg. C.

(2) AC Ranges: Plus or minus 5% of full scale deflection between plus 10 deg. and plus plus 25 deg. C; Plus or minus 6% of full scale deflection between 0 and 50 deg. C.

(3) Resistance Ranges: Plus or minus 5% at mid scale values at normal room temperatures, approx. 20 deg. C.

(4) Micromhos: Plus or minus 10% on all ranges.

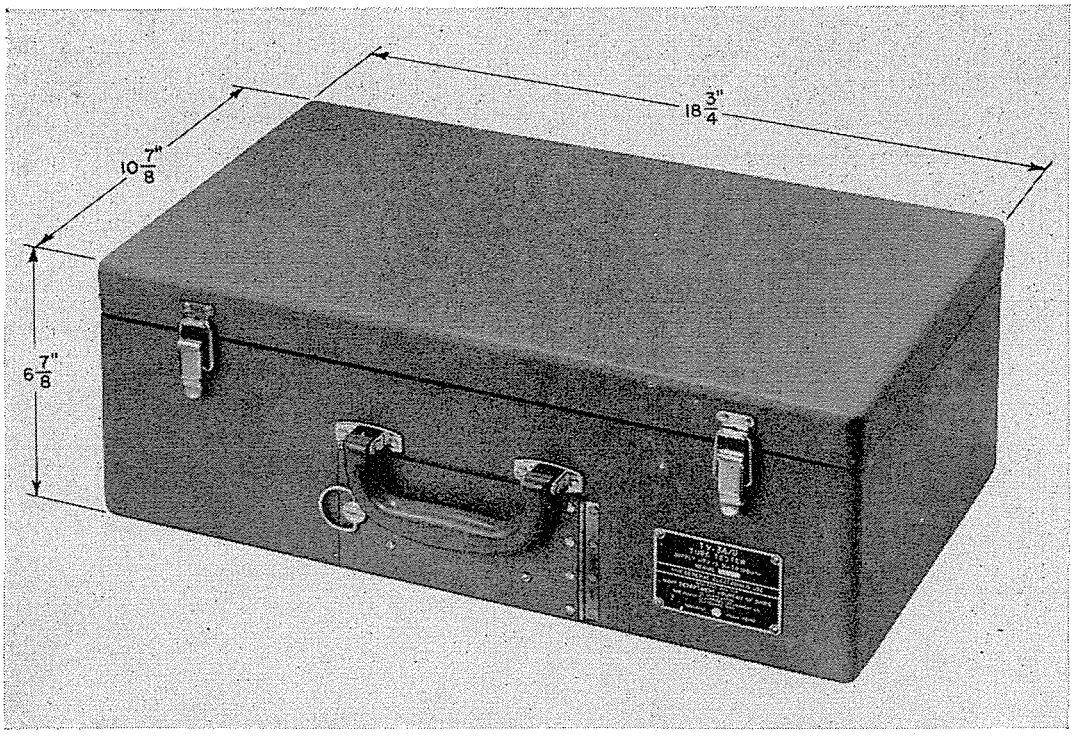


Figure 1-2. Tube Tester TV-3A/U Tester with Cover Closed

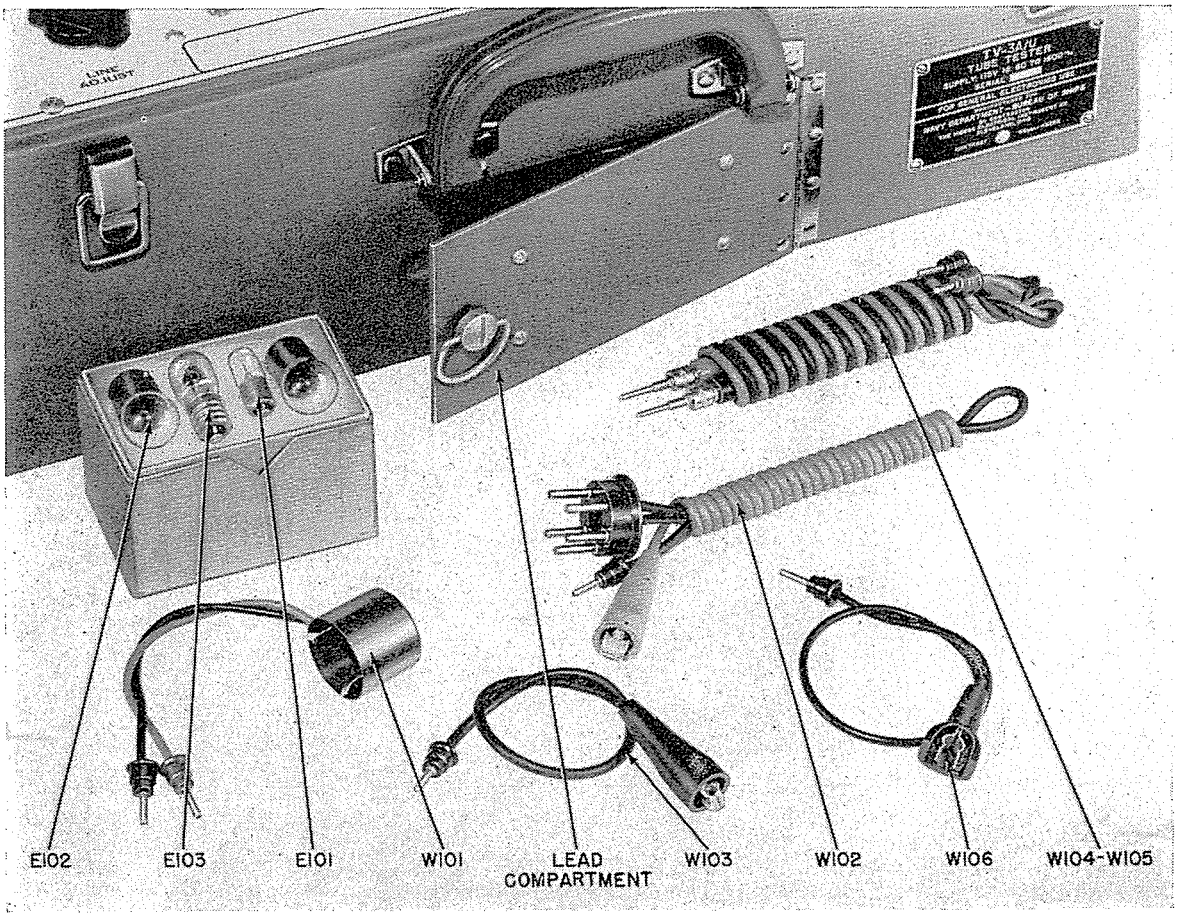


Figure 1-3. Tube Tester TV-3A/U Test Leads and Lead Compartment

3. EQUIPMENT LISTS.

TABLE 1-1. EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	ARMY NAVY TYPE DESIGNATION	OVERALL DIMENSIONS			VOLUME	WEIGHT	
			H	W	D			
1	TUBE TESTER	TV-3A/U	6⅞"	18¾"	10⅞"	.82 Cu. Ft.	20 lbs.	UNCRATED
			13½"	29½"	23"	5.3 Cu. Ft.	90 lbs.	CRATED INCLUDING EQUIPMENT SPARES

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY	NAME OF UNIT	REQUIRED CHARACTERISTICS
1	AC Power Source	Capable of supplying 50 to 1600 cycles, 115 Volts p/m 10% AC, single phase.

4. ELECTRON TUBE COMPLEMENT.

The Tube Tester TV-3A/U requires one each of the following type electron tubes for operation:

ELECTRON TUBE TYPE	QUANTITY
JAN-5Y3GT	1
JAN-83	1

5. ACCESSORIES.

TABLE 1-3. ACCESSORIES AND OPERATING SPARES SUPPLIED

QUANTITY	DESCRIPTION	SYMBOL DESIGNATION
1	LEAD; Grid and Plate, for Lighthouse Tubes	W-101
1	LEAD; Capacity Test	W-102
1	LEAD; Plate Connector	W-103
1	LEAD; Red Test Prod for Multimeter	W-104
1	LEAD; Black Test Prod for Multimeter	W-105
1	LEAD; Grid Connector	W-106
1	PILOT LAMP	E-101
2	FUSE LAMPS	E-102
1	NEON LAMP	E-103
2	INSTRUCTION BOOK, NAVSHIPS 91435	N-101

6. DIFFERENCES AND SIMILARITIES IN EQUIPMENT.

The TV-3A/U differs from the original TV-3/U Tube Tester as outlined below:

DIFFERENCES	TV-3A/U	TV-3/U
Size of Case	18¾" long x 10⅞" wide x 6⅞" deep	16¾" long x 10⅞" wide x 6⅞" deep
Lead Compartment	Located in center of case below carrying handle	Located in end of case
Meter	4½" square	3½" round
Method of Selecting Micromhos Ranges	Has separate micromhos switch S-107 with ranges marked to correspond with meter scales	The SHUNT control dial must be adjusted to one of four red dots imprinted in its surface to select the range in MICROMHOS
Selection of Signal Voltage	Automatically accomplished by setting MICROMHOS switch to the desired range	Selected manually by means of a separate toggle switch
Meter Reversing Switch	Push button type	Toggle type
Interlock Switch	Opens when cover of equipment is closed shutting off equipment	None provided
AC Power Supply Cable	Enters through and is stowed in lead compartment	Enters through equipment panel and is stowed in cover
Sub-Miniature Inline Tube Socket	Mounted on panel	None provided

TABLE 1-4. DIFFERENCES IN EQUIPMENT

Simplified and improved operating procedures due to inclusion of the MICROMHOS range switch in the TV-3A/U require different instruction books and tube data charts for the two models.

In other respects the equipments are similar. They perform the same functions and are equipped with the same tube complement and accessories.

SECTION 2
THEORY OF OPERATION

1. TUBE TESTER REQUIREMENTS.

a. Electron tubes supplied to the Armed Forces are in nearly all cases procured under either JAN Specifications or other military specifications, which impose rigid controls on the processes of manufacturing, handling, and transportation of the tubes to insure delivery of the highest possible quality tubes to the Services.

b. It is necessary however to provide some means of determining the condition of new replacement tubes and also the condition of tubes which have been in service for some time.

c. The TV-3A/U Tester employs the Dynamic Mutual Conductance test method, and the mutual conductance of the tube under test is indicated on the meter scale directly in micromhos.

Note

The terms mutual conductance and transconductance are used interchangeably. Either term may be defined as the ratio of a small change in plate current to the corresponding change in control grid voltage which produced it. Values of mutual conductance are expressed in Micromhos. The symbol G_m is used to represent mutual conductance or transconductance in various mathematical representations of tube characteristics and their relationships.

d. In addition to the mutual conductance test it is essential that the tube tester provide adequate means of testing for shorted elements and excessive gas content.

e. In the case of tubes of the diode type, tubes having no grid, a straight emission test must be employed rather than the mutual conductance test.

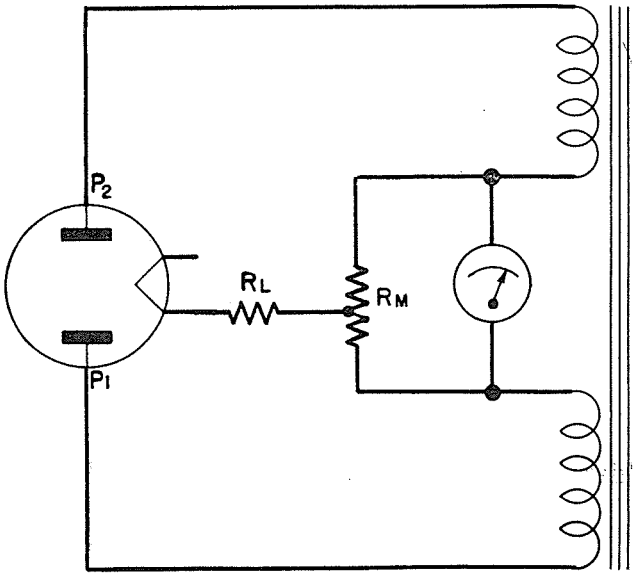


Figure 2-1. Rectifier Diagram Illustrating Theory

f. Some means of adjusting the voltage input to the tube tester must be provided to maintain the proper test potentials at all elements under varying conditions of line voltage.

2. THEORY OF OPERATION OF TUBE TESTER SECTION.

(See Figures 2-1 and 2-2)

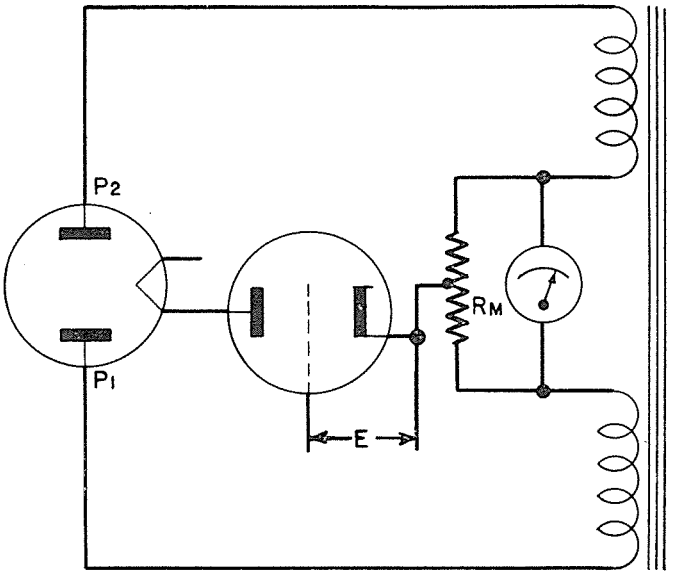


Figure 2-2. Basic Mutual Conductance Circuit Illustrating Theory

a. Examine first the simple full-wave rectifier circuit shown in Figure 2-1. The two power transformer secondary windings have their inner ends connected to a direct-current milliammeter. Across the milliammeter is a center-tapped resistor R_M. The load is shown as a resistance R_L, connected between the center tap and the rectifier filament as in any full-wave rectifier circuit. When rectifier plate P_2 is positive, electron flow is through the upper half of R_M, and the meter tends to deflect in one direction. When P_1 is positive, electron flow is through the lower half of R_M, and the meter tends to deflect in the other direction. With the load resistance fixed and equal forces acting on the meter in both cases, the meter stays at zero because it cannot follow variations at the power line frequency.

b. If the electron tube to be tested is substituted for the fixed load resistance, and a fixed bias E is applied to the tube as in Figure 2-2, the meter will still read zero because an electron tube under steady-state conditions acts like a fixed resistance.

c. If an ac potential is applied to the grid of the tube under test in addition to the dc bias, the circuit becomes equivalent to that employed for quality and mutual conductance tests in Tube Tester TV-3A/U.

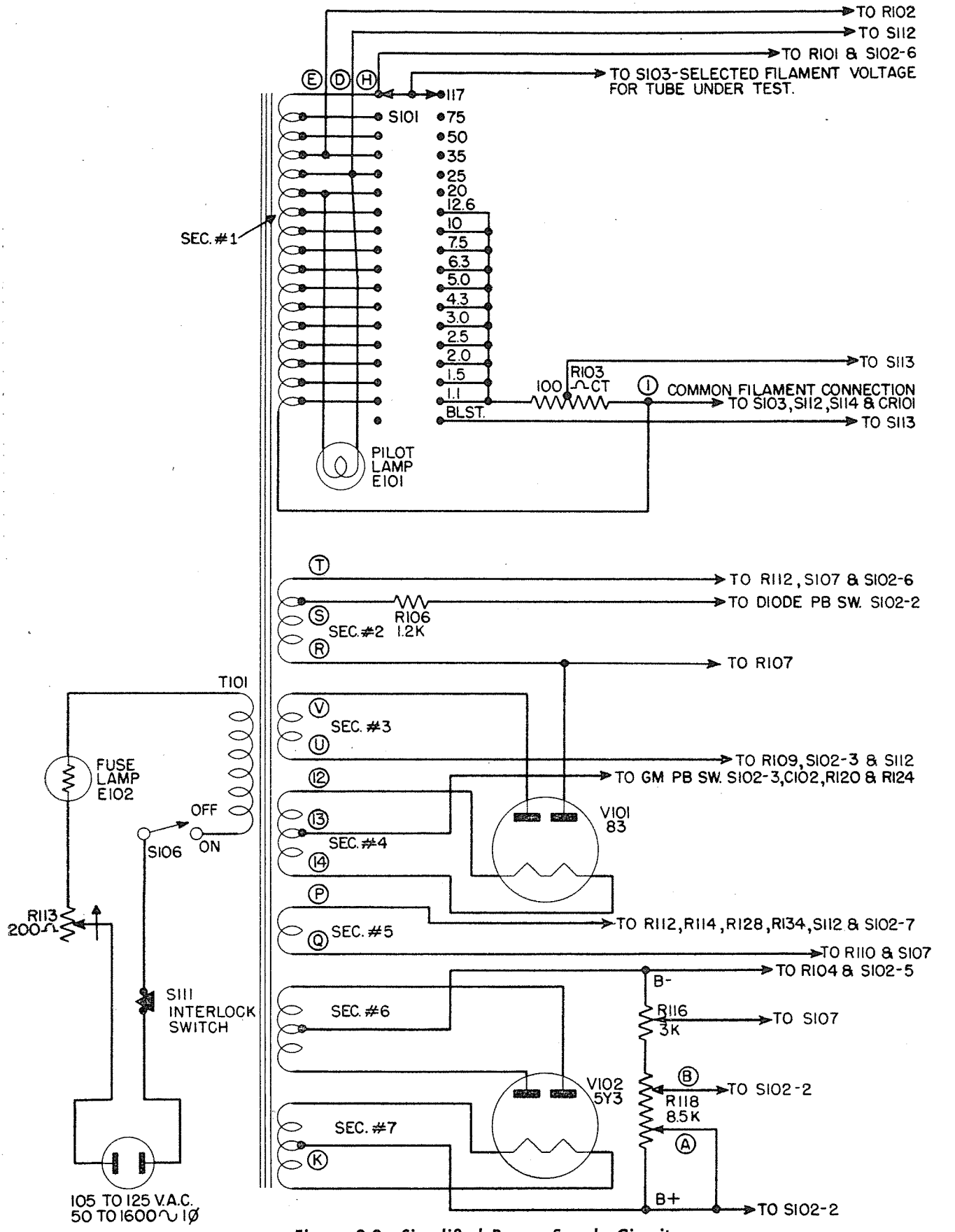


Figure 2-3. Simplified Power Supply Circuit

When this ac potential swings the grid positive, the plate current of the tube is increased, and when the plate-cathode resistance is correspondingly lowered, more current flows through R_M and the deflecting force on the meter is greater than before. When the grid swings negative on the other half-cycle, the resistance of the tube under test is increased and the deflecting force on the meter is less. With unbalanced currents on adjacent half-cycles and consequent unequal forces on the meter, the meter reading becomes proportional to the difference in currents. Since this difference is created by the ac grid potential, the meter indicates the plate-current changes produced by the applied grid voltage change, or in other words, the meter indicates mutual conductance.

3. POWER SUPPLY.
(See Figure 2-3)

a. The power transformer, T101, is supplied with primary voltage from a 105 to 125 volt 50 to 1600 cycle line through power ON-OFF switch S106, INTERLOCK SWITCH S111, LINE ADJUST control R113, and FUSE lamp E102. The LINE ADJUST control, when operated in conjunction with the line test circuit, standardizes the voltage across the primary of T101 at 93 volts. The INTERLOCK SWITCH S111 will open automatically and shut off the equipment when the lid of the case is closed.

b. Secondary #1 of power transformer T101 consists of a multi-tapped winding designed to supply the various filament or heater voltages for the tubes under test. Voltages shown on Figure 2-3 are measured under load. No load voltages will be somewhat higher. For example: no load voltage measured from point (H) to point (I) will be approximately 124 volts with 93 volts on the primary. Secondary #1 also supplies voltages for rectifier emission tests.

c. Secondarys #2 and #3 supply approximately 170 volts ac to the plates of the type 83 tube V101, which supplies plate voltage to the tube under test. Secondary #2 is also tapped at 20 volts to supply voltage for diode emission tests.

d. Secondary #4, a center tapped 5 volt winding, supplies filament voltage for the type 83 rectifier tube V101.

e. Secondary #5 supplies the signal voltage for mutual conductance tests, 5 volts ac. A voltage divider network across this winding also provides a signal voltage of 1 volt and 0.5 volt.

f. Secondary #6, 320 volts center tapped, supplies the plates of the screen voltage rectifier V102, a type 5Y3GT tube, a voltage divider system consisting of BIAS control R116, and adjustable resistor R118 across, the output of V102 provides the bias voltage for mutual conductance tests.

g. Secondary #7, 5 volts center tapped, supplies the filament of the type 5Y3 tube, V102.

4. LINE VOLTAGE TEST.
(See Figure 2-4)

a. Pressing the LINE ADJ. push button P1 connects the METER, M101, through resistor R101 and copper oxide rectifier CR 101 to points (H) and (I) of the power supply (Figure 2-3).

b. The values of R101 in series with the meter and R131 and R133 in shunt are such that 124 volts RMS across (H) and (I) of the power supply will cause the METER M101 to read at LINE TEST.

c. The design of the power transformer T101 is such that 93 volts applied to the primary winding will induce 124 volts across the total secondary #1 winding or across points (H) and (I).

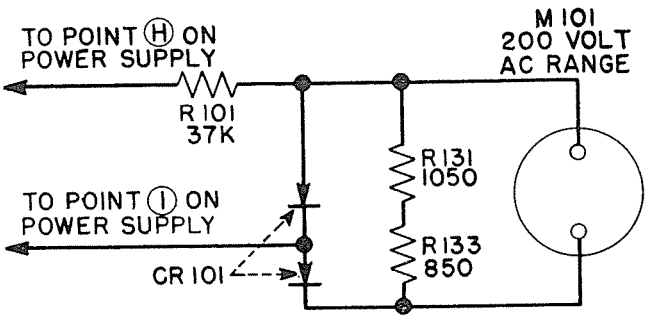


Figure 2-4. Simplified Line Voltage Test Circuit

d. Therefore if, with the LINE ADJ. push button P 1 pressed down, the LINE ADJUST CONTROL R113 is turned until the pointer of the METER, M101, is exactly over the LINE TEST mark a standard voltage of 93 volts RMS will be established across the primary winding of T101.

5. SHORT TEST.
(See Figure 2-5)

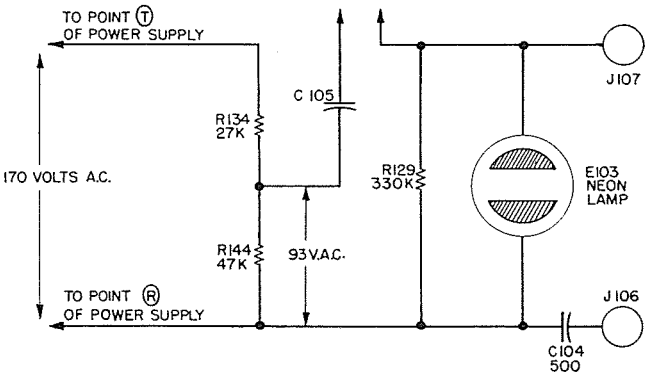


Figure 2-5. Simplified Short Test Circuit

a. An ac potential of approximately 170 volts RMS from secondary #2 of T101 is applied to voltage divider resistors R134 and R144 developing a voltage of approximately 90 volts RMS across R144. This voltage is applied to the elements of the tube under test through the capacitor C105 and the neon short test lamp E103 which is shunted by R129.

b. Turning the SHORTS test switch S113 through position 1, 2, 3, 4, and 5 connects the various elements of the tube under test between the neon lamp E103 and capacitor C105. The SELECTORS must, of course, be set correctly for the particular tube. Any shorts between the elements will complete the circuit from capacitor C105 to the neon lamp E103 causing it to glow.

6. NOISE TEST.

(See Figure 2-5)

a. The short test circuit may also be used for making a noise test of electron tubes.

b. Connect the NOISE TEST jacks, J106 and J107, to the antenna and ground posts of any radio receiver.

c. Turn the SHORTS test switch S113 through positions 1, 2, 3, 4, and 5, meanwhile tapping the tube under test with a finger, or the eraser on a pencil. Intermittent disturbances between the electrodes too brief to register on the neon lamp will cause a momentary short, permitting the alternating voltage from the power supply to be applied to the neon lamp causing a brief oscillation. This oscillation will be reproduced by the loud speaker or headphones as an audible signal similar to static.

7. RECTIFIER TEST.

(See Figure 2-6)

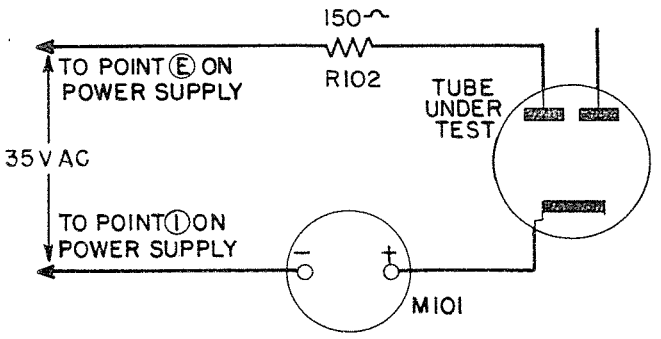


Figure 2-6. Simplified Rectifier Test Circuit

a. Rectifier tubes and diode detector tubes can only be tested for emission. The test circuit is therefore quite simple.

b. Pressing button P 7 applies an ac potential of 35 volts between the cathode and plate of the tube under test through resistor R102, and the METER, M101, causing the tube to rectify. This test is used for power rectifiers such as the 5Y3 or 83 types.

c. The rectifying action of the tube under test will cause a direct current to flow through the meter. Since the current indicated by the meter is proportional to the electron emission of the tube, the meter reading may be taken as a measure of the tube's efficiency.

d. A line on the meter scale marked RECTIFIER OK indicates the point above which rectifier tubes are considered satisfactory. Tubes reading below this line should be rejected.

e. Pressing the button P 6 sets up a circuit similar to Figure 2-6, but a higher voltage is applied, 287 volts ac, for testing rectifiers of the cold cathode type such as the 0Z4 type.

f. Pressing button P 2 also establishes a circuit similar to Figure 2-6, but a lower voltage, 20 volts ac, is used to protect the delicate cathodes of diode detector types such as the 6H6.

8. MUTUAL CONDUCTANCE.

(See Figure 2-7)

a. The mutual conductance (g_m) of an amplifier-type vacuum tube, also called the grid-plate transconductance, is an expression representing the efficiency of performance of a tube as indicated by the *change in plate* current ($\triangle I_p$) divided by the *change in grid voltage* ($\triangle E_g$). The relation is generally written $G_m = i_p/e_g$. The value is expressed in micromhos and is a performance indication because it shows how effective a tube is in converting a small change in grid voltage (grid signal) to a large change in plate current.

b. For the measurement of the mutual conductance value directly, the proper dc grid voltage for the tube under test is supplied by a full-wave rectifier circuit using a 5Y3G, V102 tube. Setting BIAS control potentiometer R116 at the value called for on the test data roll chart adjusts this negative bias voltage to the correct value for the particular tube under test.

c. Alternating voltages of 5 volts RMS from a separate secondary winding on the power transformer, T101, 1 volt RMS or .5 volt RMS supplied from a voltage divider consisting of R110, R111, and R114, act in series with the grid bias as required for this type of test. This voltage alternately swings the grid in positive and negative directions from the dc bias value, thereby producing the grid-voltage ($\triangle E_g$) required for a dynamic test.

d. The plate voltage for the tube under test is supplied by another full-wave rectifier circuit, using a type 83 tube V101. The return lead contains the meter circuit which serves to measure the plate-current change ($\triangle I_p$). The meter circuit consists essentially of a resistance network made up of resistors R115, R140, R141, R142 and R143 shunted across the METER, M101 and controlled by MICROMHO switch S107.

e. The mutual conductance test circuit is actuated by push button P 3.

9. GAS TEST.

(See Figure 2-8)

a. Pressing GAS-1 push button P 4 applies definite values of plate voltage and grid bias voltage to the tube under test, causing a definite value of plate current to flow. This current is indicated on the METER, M101.

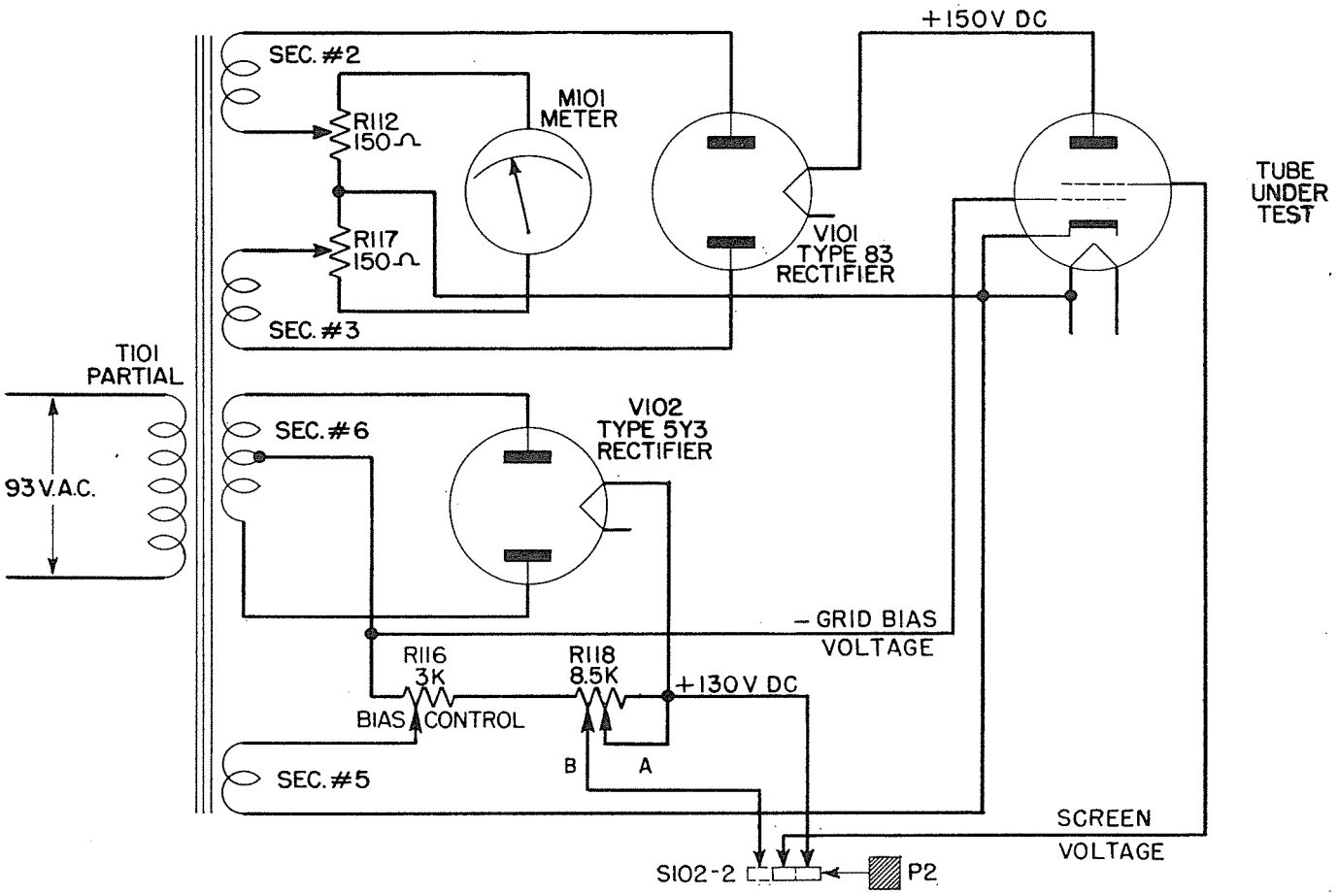


Figure 2-7. Simplified Mutual Conductance Test Circuit

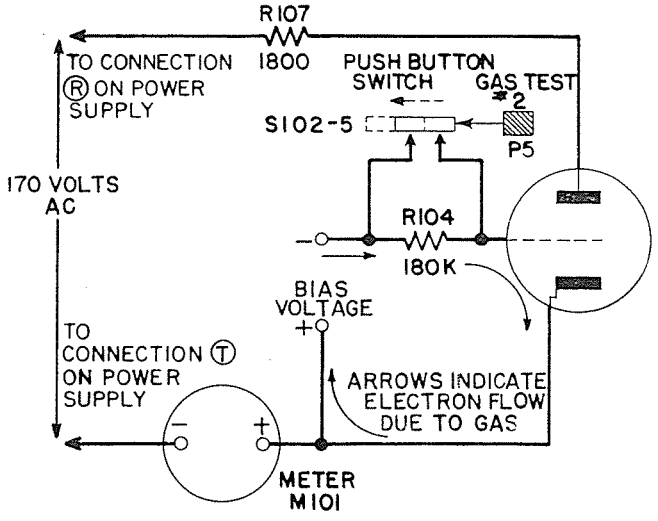


Figure 2-8. Simplified Gas Test Circuit

b. Pressing GAS-2 push button P 5 inserts a 180,000 ohms resistor, R104, in the grid circuit. If grid current is flowing from the bias voltage source through the grid circuit to the cathode due to gas in the tube, this current will develop a voltage drop across resistor R104. This voltage drop will reduce the negative bias on the grid, causing a corresponding increase in the plate current being measured by the METER, M101.

c. If the tube contains gas the pointer of the meter will move up scale. This increase in meter reading should not exceed one scale division.

10. ANALYZER SECTION.

a. Volts AC and DC. (See Figure 2-9)

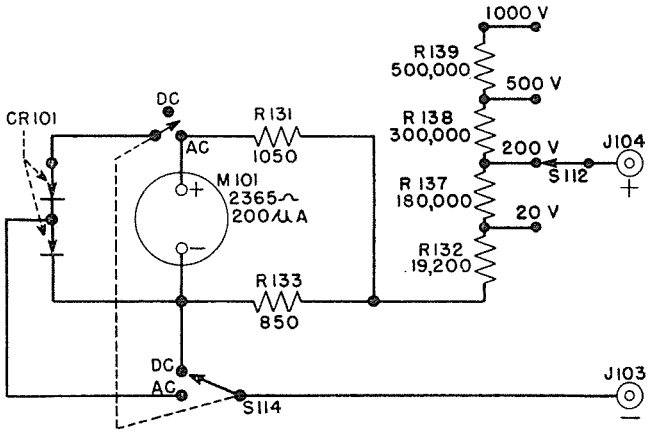


Figure 2-9. Simplified Voltmeter Circuit

(1) The voltmeter circuit consists of the METER, M101, shunted by resistors R131 and R133, with a network of series resistors R132-R137-R138-R139 connected to the point where R131 and R133 are joined.

(2) The MASTER switch S112 connects the jack J104 to the proper tap of the series resistors for the voltmeter range selected.

(3) For AC volts, the copper oxide rectifier CR101 is connected into the voltmeter circuit, by operating the switch S114 to the proper position.

b. OHMS, THOUSANDS and MEGOHMS. (See Figures 2-10 and 2-11)

(1) The ohmmeter section has two ranges, one reading in thousands of ohms and the other reading in megohms. Each has a voltage divider network selected by the MASTER SWITCH S112, which connects the meter across part of the voltage divider, so that it reads INF. or full scale when a standard voltage is applied by setting LINE ADJUST control R113.

(2) The unknown resistance connected between test jacks J103 and J104, parallels part of the divider network, changing the effective resistance of the divider.

(3) The meter scale indicates the value of the unknown resistance directly.

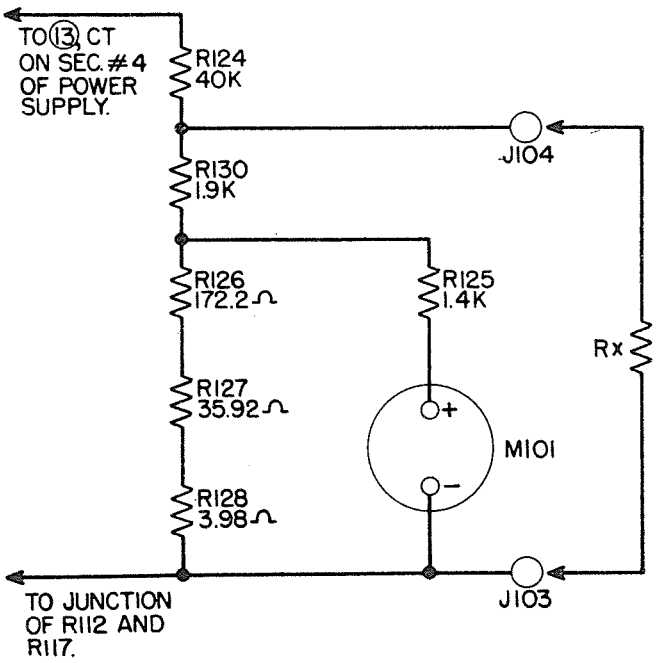


Figure 2-10. Simplified Ohmmeter Circuit for Thousands Range

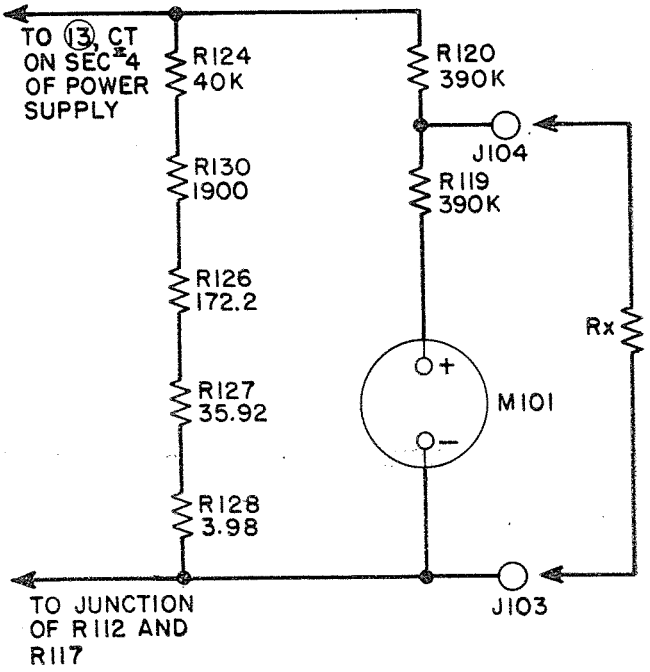


Figure 2-11. Simplified Ohmmeter Circuit for Megohms Range

c. CAPACITY. (See Figure 2-12)

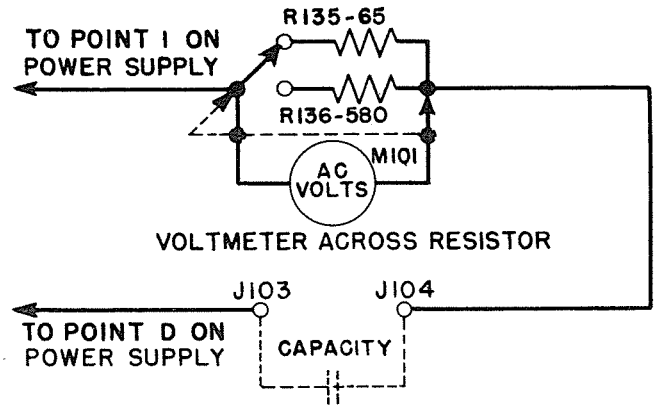


Figure 2-12. Simplified Capacity Test Circuit

(1) A standard ac voltage is applied across the capacitor connected to J103 and J104, through resistor R135 or R136, depending on the range selected by MASTER switch S112.

(2) The voltage drop across the series resistor, either R135 or R136, is proportional to the reactance of the capacitor under test and is measured by the meter, which is calibrated in microfarads based on a line frequency of 60 cycles. Due to the fact that the reactance of any capacitor varies with frequency it is necessary to apply corrections to the basic meter readings for line frequencies other than 60 cycles. Refer to Figure 4-4 Conversion Chart For Capacity Measurements At Frequencies Other Than 60 Cycles.

d. MILLIAMPERES. (See Figure 2-13)

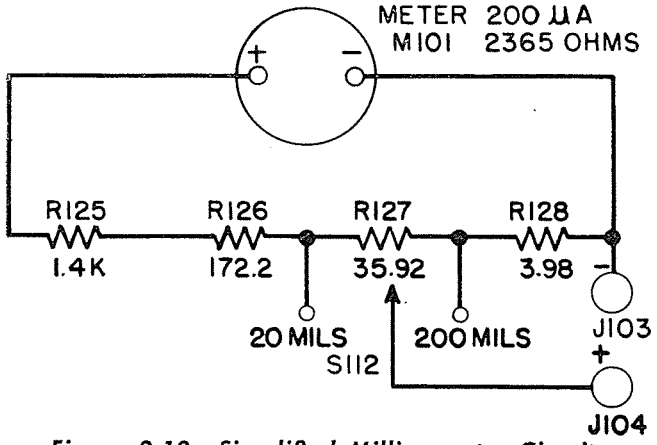


Figure 2-13. Simplified Milliammeter Circuit

(1) The milliammeter, as shown in Figure 2-13 is of the conventional type and will measure up to 200 mils in two ranges, 0-20 and 0-200.

(2) To avoid possible damage to the meter always use the highest range first.

11. FUNCTIONS OF COMPONENT PARTS.

The individual functions of components not specifically referred to in this section as applied to theory of operation will be found in the third column of Table 8-4 Parts and Spare Parts List by Symbol Designation.

12. SPECIAL SWITCHING CIRCUITS.

a. The SELECTOR switches FILAMENT S103 and S104, GRID S105, PLATE S108, SCREEN S109, CATHODE S110 and SUPPRESSOR S115 are so constructed and interconnected as to eliminate the possibility of applying more than one voltage to any tube pin at the same time or shorting out any voltage by accidental mis-adjustment of the switches. The basic principle of this interlocking circuit is illustrated by Figure 2-14.

b. Conductors from the socket contacts 1 through 9 enter the switching circuit from the left and progress toward the right through the FILAMENT SELECTORS and the GRID PLATE, SCREEN, CATHODE and SUPPRESSOR SELECTORS. In order to simplify the illustration only portions of the first four selectors have been shown.

(1) The first FILAMENT SELECTOR is set to apply voltage to pin #1. This switch setting automatically breaks the conductor from pin #1 at point "A" making it impossible for any other voltage to reach pin #1 regardless of where the succeeding selectors are set.

(2) Setting the second FILAMENT SELECTOR to apply voltage to pin #2 breaks the conductor from this pin at point "B" making it impossible for any other voltage to reach pin #2.

(3) With the GRID SELECTOR set to deliver grid voltage to pin #3 the conductor from this pin is broken at point "C" preventing the application of any other voltage to the pin.

(4) Setting the PLATE SELECTOR to deliver plate voltage to pin #4 breaks the conductor from pin #4 at "D".

(5) With the first four SELECTORS set in this manner a condition has been established where filament voltage is applied across pins #1 and #2, grid voltage to pin #3 and plate voltage to pin #4 but the application of any other voltage to these pins is rendered impossible.

c. The operation of the SHORTS switch S113 is illustrated by Figure 2-15 which shows the short test section in the number 1 position. In this position the cathode, filament and suppressor of the tube under test are in contact with segment #1 and the screen, plate and grid are in contact with segment #2. Any short between the element on segment #1 and those on segment #2 will complete the circuit between points X and Y causing the neon lamp E103 to glow. Rotating the switch through position 2, 3, 4 and 5 changes the grouping of the elements on the two segments. Different types of shorts will cause the neon lamp to glow on different positions of the switch, e.g. a screen to suppressor short will cause the lamp to glow in all five switch positions while a grid to plate short will only cause a glow on position #4. By referring to the SHORT TEST CHART, TABLE 4-1, the various types of shorts can be readily identified.

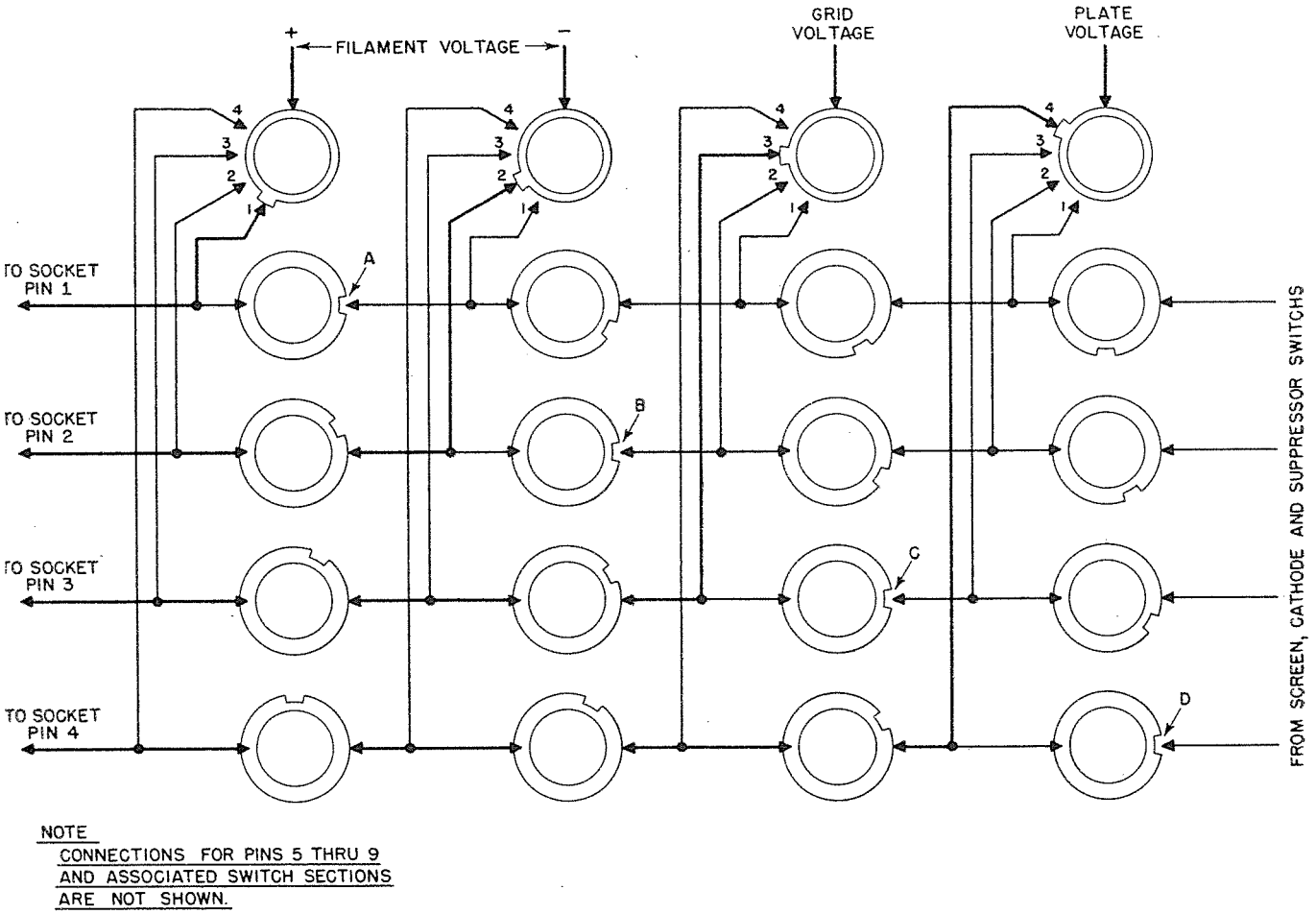


Figure 2-14. Simplified Selector Switch Diagram

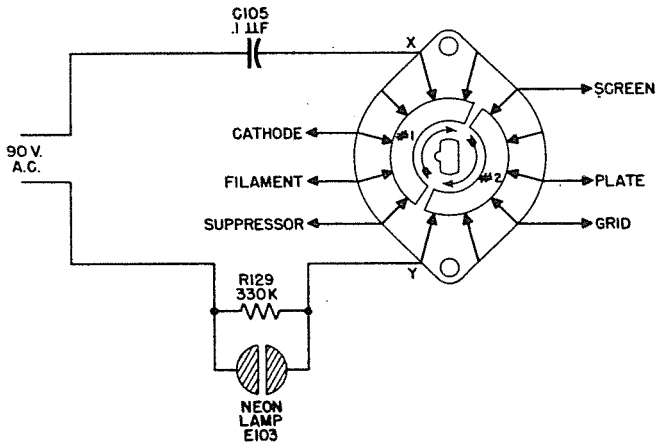


Figure 2-15. Simplified Short Test Switch Diagram

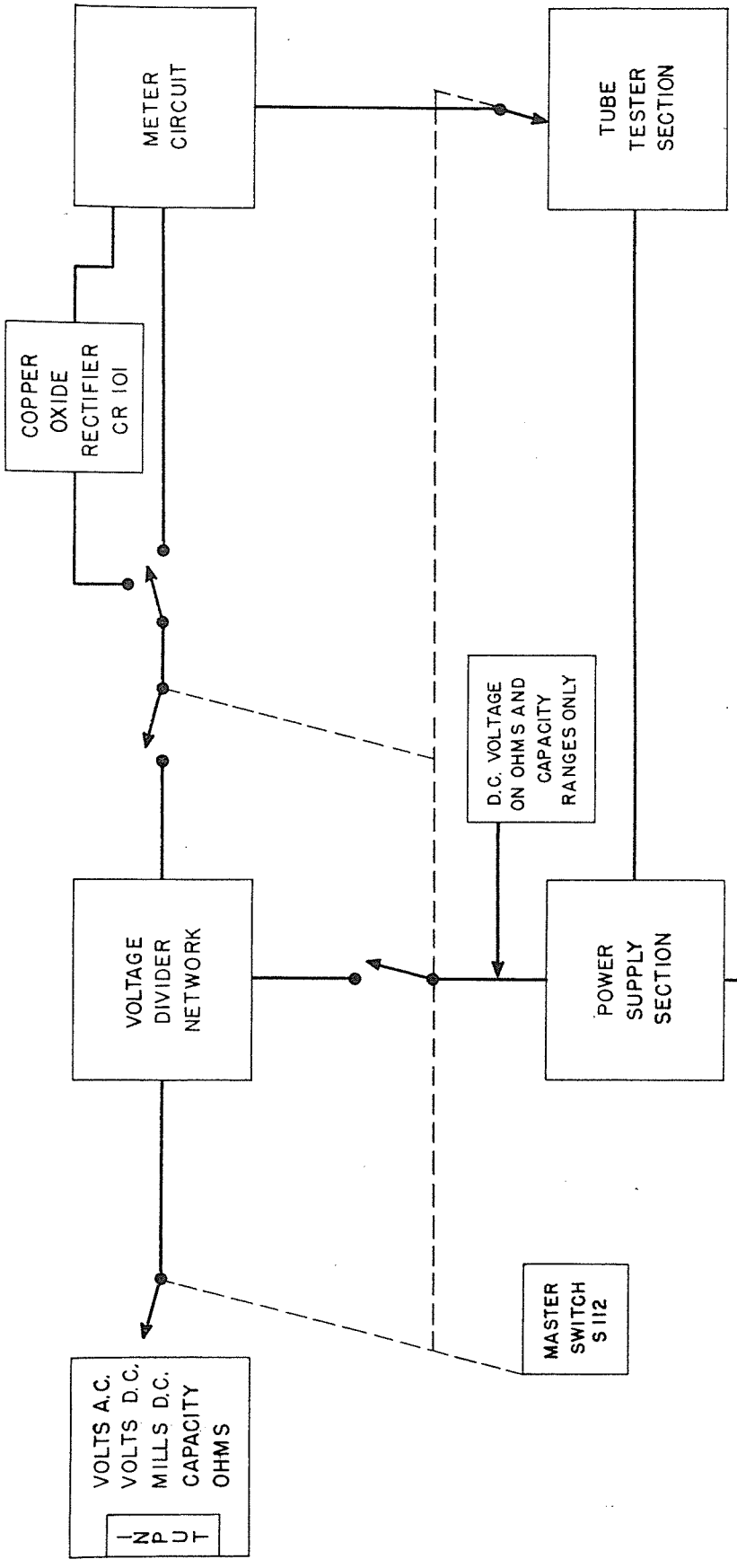


Figure 2-16. Basic Block Diagram of Tube Tester TV-3A/U

SECTION 3
INSTALLATION AND INITIAL ADJUSTMENTS

1. TUBE TESTER SECTION.

a. After carefully removing the TUBE TESTER TV-3A/U from its shipping container, set the Tester up near a 105 to 125 Volt 50-1600 cycle ac outlet.

b. Open the cover and check the FUSE lamp E102 and the neon lamp E103 to make sure they are properly seated in their sockets.

c. Open the lead compartment in front of the case and check the lead compartment using Table 1-3 and Figure 1-3. In addition to the leads and line cord, a set of operating spares consisting of two FUSE lamps, one neon lamp, and one pilot lamp is also stowed in this compartment. Uncoil the line cord.

d. Plug the line cord into a 105 to 125 volt 50-1600 cycle ac outlet, and throw the line switch S106 to the ON position. The red panel indicator I101 should light. If it does not, unscrew the red jewel cover of indicator I101 and make sure that the pilot lamp E102 is properly seated in its socket. Should the indicator still fail to light, check pilot lamp E102 and the FUSE lamp E101 for open filaments; and, if necessary, replace from operating spares which will be found in the lead compartment.

e. Press the LINE ADJ. button P 1 and be sure that the pointer of meter M101 can be set to LINE TEST by turning the LINE ADJUST knob. If this adjustment can be accomplished, the tube tester section is ready for operation. If this adjustment cannot be accomplished refer to section 5 paragraph 1*c*.

2. ANALYZER SECTION.

a. With the line cord connected to a 105 to 125 volt 50 to 1600 cycle ac source and the line switch S106 in the ON position, turn the master switch S112 to the THOUS. OHMS position.

b. The pointer of the meter M101 will move up scale to the right.

c. Turn LINE ADJUST knob of R113 until the pointer rests exactly over the end of the scale marked INF. (infinity).

d. Insert the red and black Test leads W104 and W105 in the VOLTS-OHMS-MILS-CAP. jacks at the right hand side of the panel.

e. Short the ends of the test leads together. This should cause the pointer of the meter to return to zero.

f. Repeat the steps outlined in paragraphs 2a through 2e above for MEGOHMS, CAP. 5 MFD and CAP. 50 MFD settings of master switch S112.

g. If proper meter indications and adjustments are obtained as in steps "a" through "e" above, on these four ranges, the analyzer section is ready for operation.

SECTION 4

OPERATION

IMPORTANT: Read these instructions thoroughly before attempting to operate the Tube Tester TV-3A/U.

1. GENERAL.

a. Refer to the photograph of the Tube Tester TV-3A/U, Figure 4-1, or preferably to the *tester itself.*

(1) The tube sockets are grouped along the top edge and in the upper left hand section of the panel as follows. Along the top edge reading from left to right are standard sockets for noval 9 pin miniature tubes, standard 8 pin loktal and octal tubes, a dual socket for large and small radius 7 pin tubes which also provides a pilot lamp test receptacle, and standard 4, 5, and 6 pin tubes. A 7 pin miniature socket and two subminiature sockets, one round 8 pin and one in line 7 pin are found at the right of the PILOT indicator light. An acorn tube socket designed to accommodate all tubes of this type now in use is located at the right of the FILAMENT voltage switch.

(2) For tubes having top grid connections, top plate connections, or both, use grid and plate leads, W106 and W103, Figure 1-3. For lighthouse type tubes use W101, Figure 1-3.

(3) Leads supplied for use with the analyzer section are also illustrated in Figure 1-3. They are red and black test leads 48″ long, W104 and W105 for VOLTS-MILS-OHMS and capacity measurements, and W102, a special lead for checking small capacitors from .0001 to .05 M.F.

(4) All leads referred to in the preceding paragraphs are kept in the lead compartment in the front of the case.

(5) The FUSE lamp serves both as a protective fuse and an overload indicator. This lamp will flash brightly when on overload is placed on the tube tester or the tube under test. When this occurs turn off the equipment immediately. A continued or excessive overload will, of course, burn out the FUSE lamp, and a replacement will be necessary. The red pilot lamp serves only as an ON-OFF indicator for the equipment.

2. CONTROLS.

a. Power input to the TV-3A/U is controlled by the ON-OFF switch, S106.

b. The LINE ADJUST, R113, controls the input voltage to the power transformer, T101, for proper standardization of the tube tester section, and also the ohms and capacity circuits.

c. The master switch S112, located in the lower right hand section of the panel, sets up the proper internal circuit connections for using the TV-3A/U equipment for TUBE TEST, or for testing OHMS, VOLTS (AC or DC), CAPACITY or MILS in the ranges provided.

d. Roller Index Chart I101, located at the bottom of the panel, is operated by a phenolic gear which protrudes through the panel in the lower right hand corner. Appropriate column headings on the panel just above the index window provide easy reference to tube test data printed on the roll chart.

e. The FILAMENT *voltage* switch, S101, provides a selection of filament or heater voltages from 1.1 through 117 volts ac in seventeen steps. Another position on this switch, marked BLST., also provides for testing ballast tubes.

f. SELECTORS FILAMENT S103, FILAMENT S104, GRID S105, PLATE S108, SCREEN S109, CATHODE S110, and SUPPRESSOR S115 provide proper switching of the internal circuits to apply correct test voltages to the various pins of the tube under test.

g. BIAS control R116 is used to adjust the bias voltage applied to the tube under test to the proper value.

h. SHUNT control, a dual potentiometer R112 and R117, controls the sensitivity of the meter circuit to the proper level for testing rectifier and diode type tubes.

i. MICROMHOS Switch, S107, selects the proper range of mutual conductance in micromhos for the tube under test as indicated on the roll chart. When this switch is set in the "A" or SHUNT position the SHUNT potentiometer R112 is connected into the circuit and must be set as indicated by the chart. This position of the switch is used when testing rectifier and diode type tubes. The letters "A", "B", "C", "D", and "E" above the four positions of the MICROMHOS switch indicate the meter scale on which the reading is to be made. In positions "B", "C", "D", and "E" fixed shunt resistors are connected across the meter as required by the four ranges of micromhos.

j. SHORTS switch S113 has five short test positions which connect the various elements of the tube under test to the short test circuit containing the neon indicator lamp E103. A sixth switch position TUBE TEST connects the tube to the tube test circuits after short test is completed.

k. Push button switches located in the center of the

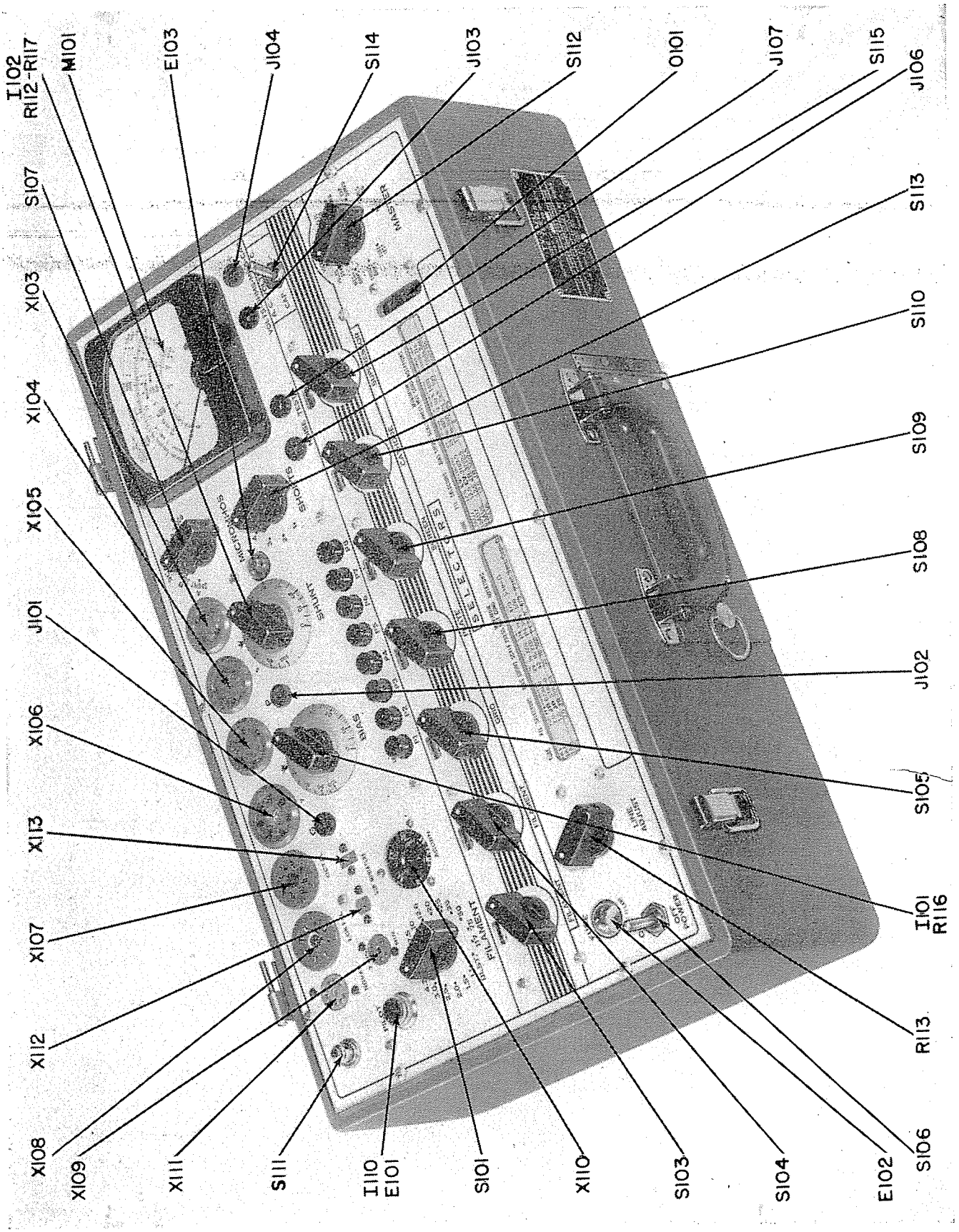


Figure 4-1. Front View of Tube Tester TV-3A/U Showing Controls by Symbol Designation

panel actuate the final circuit selector switches for the type of test to be made as follows:

(1) P1: LINE ADJUST test button.

(2) P2: Test button for low power diodes such as type 6H6.

(3) P3: RED test button for mutual conductance test of amplifier tubes only. NEVER USE THIS BUTTON WHEN TESTING RECTIFIER TUBES.

(4) P4 and P5: Test buttons for gas test.

(5) P6: Test button for cold cathode rectifiers such as type 0Z4.

(6) P7: Test button for rectifiers such as types 5Y3, 6X4, 83, etc.

(7) P8: Test button for reversing polarity of voltage applied to the meter when testing certain types of tubes.

l. A.C.-D.C. VOLTS-CAP. switch S114, a double pole double throw toggle switch, connects the copper oxide rectifier CR101 in the analyzer circuit for AC VOLTS and CAPACITY measurements only.

m. METER M101.

(1) The mutual conductance, MICROMHOS, ranges are printed in purple-blue color and are identified by the small letters "B", "C", "D", and "E" at the right hand end of the scale. These letters correspond with the SCALE letters above the positions of the MICROMHOS switch S107. Scale "B" 0 to 3000 micromhos, scale "C" 0 to 6000 micromhos, scale "D" 0 to 15,000 micromhos, and scale "E" 0 to 30,000 micromhos.

Note

When using the "E" or 30,000 micromhos range it is necessary to multiply the numerical meter reading by 10 to obtain the actual value in micromhos.

(2) The "A" scale is for checking rectifiers and diodes, and is used when the MICROMHOS switch is in the SHUNT or "A" position.

(3) The green resistance scale has two ranges and is read directly in thousands of ohms or megohms depending on the setting of the MASTER switch S112.

(4) The black volts and mils scale covers the four dc and ac voltage ranges 0 to 20, 200, 500, and 1000 as well as the two dc milliampere ranges 0 to 20 and 0 to 200.

Note

When using the 0 to 20 volt or the 0 to 20 mils ranges it is necessary to divide the numerical meter reading on the 0 to 200 scale by 10 to obtain the actual value in volts or mils.

(5) The blue M.F. scale is used in making capacity measurements, and is read directly in microfarads 0 to 5 or 0 to 50.

3. TUBE TEST DATA.

a. All information necessary for properly setting the tube test controls for the various tube types is tabulated on the roll chart in nine columns under the following headings, reading from left to right:

(1) TUBE TYPE: All currently available type numbers which the TV-3A/U is designed to test are listed numerically in this column starting with type 00A and continuing through type 38142. Tubes having type letters only instead of numbers, such as XXB, are listed at the end of the numerical listings.

(2) FILAMENT: Correct filament or heater voltages for the tube types listed are shown in this column. FILAMENT voltage switch S101 must be adjusted accordingly BEFORE inserting a tube in any of the test sockets.

(3) SELECTORS: In this column are listed the correct settings for the two FILAMENT selector switches, S103 and S104, GRID selector switch S105, PLATE selector S108, SCREEN selector S109, CATHODE selector S110, and SUPPRESSOR selector S115.

The settings follow the same order in which the switches appear on the panel reading from left to right.

(4) BIAS: This column lists the proper settings for the BIAS dial I101 of bias control R116.

(5) SHUNT: This column lists the settings for the SHUNT dial I102 of shunt control R112. Setting of this dial is only required when the MICROMHOS switch is set to the SCALE "A" SHUNT position.

(6) SCALE: In this column are listed the proper settings for the MICROMHOS switch S107. The letters "A", "B", "C", "D", and "E" also correspond with the meter scale on which readings are to be taken.

(7) PRESS: Under this heading are listed the correct test PUSH BUTTONS to be used for the various tube types and their individual sections in the case of multipurpose tubes.

(8) MUT. COND.: In this column are the MINIMUM, not average, mutual conductance values for amplifier tubes and amplifier sections of multipurpose tubes. Any tube showing a G_m or mutual conductance reading less than the value indicated in this column should be discarded. Classes of tubes or sections of multipurpose tubes other than amplifiers have no mutual conductance rating and are indicated in this column by the following designations:

Rect.—Rectifier (power type)
Volt. Reg.—Voltage regulator

Diode—Detector type diode rectifier
Thyr.—Thyratron
Eye—Tuning eye

(9) NOTATIONS: Under this heading is listed special information pertaining to particular tube types.

b. The roll chart is divided into left and right hand sections. The left hand section covering the tube type numbers from *00A* through *12BT6* and the right hand section covering type numbers from *12BU6* through *XXL*.

c. All data shown on the roll chart originally accompanying the equipment is also contained in TABLE 4-2 of this section.

4. OPERATIONAL PROCEDURE.

a. When the TV-3A/U is used as a tube tester.

(1) Remove the line cord W107 from the lead compartment, uncoil and plug it into an outlet supplying 105 and 125 volts ac at 50 to 1600 cycles.

Caution

DO NOT INSERT TUBE IN TEST SOCKET UNTIL CORRECT SETTINGS OF ALL CONTROLS HAVE BEEN MADE IN ACCORDANCE WITH THE FOLLOWING STEPS:

(2) Turn the MASTER switch S112 to the TUBE TEST position.

(3) Operate the phenolic gear which turns the roll chart mechanism until the type number of the tube to be tested appears in the window and just above the red index line.

(4) Turn the knob of FILAMENT *voltage* switch S101 to the voltage indicated on the chart under FIL.

(5) Set the SELECTORS: The operation of setting these seven dials is somewhat similar to dialing a telephone number. On the roll chart, below the word SELECTORS, are listed the dialing numbers. These numbers consist of two letters and five figures. It is only necessary to turn the knobs of the seven SELECTOR switches, (FILAMENT, S103; FILAMENT, S104; GRID, S105; PLATE, S108; SCREEN, S109; CATHODE, S110; and SUPPRESSOR, S115) until the letters and numbers appearing in the small windows above the knobs are the same, reading from left to right, as those indicated on the roll chart.

EXAMPLE: The roll chart indicates JR 6-2375 under SELECTORS.

Starting at the left, turn the knob of the first FILAMENT SELECTOR switch S103 until the letter J appears in the window. Turn the second FILAMENT SELECTOR switch until the letter R appears in the window. Turn the GRID SELECTOR until the number 6 appears, the PLATE SELECTOR to number 2, SCREEN to number 3, CATHODE to number 7, and SUPPRESSOR to number 5.

The sequence of letters and numbers appearing in the windows should now be identical with those indicated on the roll chart. (JR 6-2375)

The seven SELECTORS are electrically interconnected in such a way that it is impossible to connect two different voltages to the same tube pin at the same time. Accidental shorts are thus avoided.

(6) Set the BIAS dial I101 to the point indicated on the roll chart under BIAS.

(7) Set the SHUNT dial I102 to the position indicated on the roll chart under SHUNT. If no setting is indicated disregard this operation and proceed with the following adjustments.

(8) Set the MICROMHOS switch S107 to the position indicated by the roll chart under the heading SCALE.

(9) Insert the tube to be tested in the proper test socket and if necessary make top connections to the tube caps by means of test leads W101, W103, or W106 as required.

(10) Throw the POWER toggle switch S106 to the ON position. The PILOT indicator I110 should light.

Note

IF THE TUBE IS OF THE HEATER CATHODE TYPE, ALLOW ENOUGH TIME FOR THE CATHODE TO REACH OPERATING TEMPERATURE BEFORE PROCEEDING.

(11) Press the LINE ADJ. Push Button, P1, which will cause the pointer of the METER, M101, to move up scale to the right.

(12) While still holding down Push Button P1, turn the knob of LINE ADJUST control R113 until the meter pointer rests exactly on the LINE TEST mark at the center of the meter scale. This establishes standard voltages for the tube test circuits.

(13) Turn the SHORTS switch S113 from position number 1 through position number 5, meanwhile tapping the tube lightly with a finger or the eraser on a pencil and watching the neon short indicator lamp E103 on each switch position. Tubes having shorted elements will cause the lamp to glow. Tubes may be tested either hot or cold. A short is indicated by a steady glow on both plates of the neon lamp. A momentary glow when the switch is turned from one position to another should be disregarded, as this flashing is caused by the charging of a condenser in the short test circuit. Intermittent flashing as a result of tapping the tube indicates loose elements which might cause noisy or erratic operation.

Tubes having more than one section such as the 6J6 should be tested for shorts on each section.

A shorted tube should be discarded without further test.

Note

Some tubes will show a shorted condition on certain positions of the switch even though they are good tubes. These positions are noted in the "NOTATIONS" column e.g. "SHORT on 1 and 2" means that a short indication on positions 1 and 2 is normal.

(14) LOCATING SHORTED ELEMENTS. In the following table (X) under any SHORT switch position indicates that the neon lamp glows in that position.

TABLE 4-1. SHORT TEST CHART

KIND OF SHORT	SWITCH POSITION 1	2	3	4	5
SCREEN TO SUPPRESSOR	X	X	X	X	X
GRID TO CATHODE	X	X	X		X
FIL. TO PLATE	X	X		X	X
FIL. TO GRID	X	X			X
FIL. TO SCREEN	X		X	X	X
PLATE TO SUPPRESSOR	X			X	X
GRID TO SUPPRESSOR	X				X
GRID TO SCREEN		X	X	X	
PLATE TO SCREEN		X	X		
FIL. TO SUPPRESSOR		X			
FIL. TO CATHODE			X		
GRID TO PLATE				X	

Note

Multi section tubes must be tested for shorts by individual sections TABLE 4-1 applies to the elements of these sections.

(15) If the tube passes the short test OK, turn the SHORTS switch S113 to the TUBE TEST position.

(16) Press the test push button indicated on the Roll Chart in the column headed PRESS.

P2 for DIODES.
P3 for mutual conductance test of AMPLIFIERS.
P6 for 0Z4 and similar rectifiers.
P7 for standard RECTIFIERS.

Note

When testing Voltage Regulator Tubes, Thyratrons, Tuning Eye tubes and other special types the push button to be used may vary with the individual tube type number involved. Always refer to the data chart for the correct button.

(17) With the proper test push switch depressed, the METER M101 will indicate the condition of the tube.

(18) RECTIFIER TUBE TEST: Rectifier tubes, including diode tubes and diode sections of multi-purpose tubes, are tested for emission only since they have no mutual conductance characteristic.

Caution

NEVER press the RED mutual conductance push button P3 when testing rectifier tubes.

(a) The push button P2 is used when testing detector DIODES. It applies a low voltage which will not injure the delicate cathode. Good diodes will cause the pointer of METER M101 to indicate on scale "A" above the point marked DIODES OK.

(b) The push button P6 is used when checking cold cathode rectifiers such as the 0Z4. This applies a voltage sufficiently high to ionize the tube and start conduction. Good tubes will cause the pointer of METER M101 to indicate to the right of the line on scale "A" marked RECTIFIERS OK.

(c) The push button P7 is used when testing regular power rectifiers such as the 5Y3. Depressing this button applies a medium voltage which is best suited to reveal defects in this type of tube. Good tubes will read above the line on scale "A" marked RECTIFIERS OK.

(d) For multi-section tubes having more than one diode section, or for full wave power rectifiers, each section must be tested separately as indicated on the Roll Chart.

(e) Push button P8 is used to reverse polarity of the meter when testing the rectifier section of certain tube types such as the 117N7. These types will cause the meter to deflect backwards (to the left) when the normal push button P7 is pressed. It is therefore necessary to hold down P8 and then push P7 to obtain a normal reading.

(19) MUTUAL CONDUCTANCE TEST: In the case of amplifier tubes an emission test is not sufficient, and a mutual conductance test must be employed. Be sure that the controls are properly set in accordance with the Roll Chart as outlined in paragraphs 4a(1) through 4a(12) of this section, and also that the tube has been checked for shorts in accordance with paragraphs 4a(13), (14) and (15) of this section. Then turn the SHORTS switch S113 to the TUBE TEST position.

(a) Turn the MICROMHOS switch S107 to the position indicated under the SCALE column heading of the roll chart. This selects the correct range in micromhos 0 to 3000, 0 to 6000, 0 to 15,000 or 0 to 30,000 for the tube under test.

(b) Check the line voltage adjustment as in paragraphs 4a(11) and 4a(12) of this section and reset the LINE ADJUST control R113 if necessary.

(c) Press the amplifier test button P3. The METER, M101, will indicate the mutual conductance, G_m, of the tube directly in micromhos on the scale corresponding to the setting of the MICROMHOS switch.

(d) Compare the mutual conductance in micromhos as indicated on the meter with the value shown on the roll chart. Since the figures shown on the chart are the MINIMUM acceptable values of mutual con-

ductance any tube which reads below this value should be rejected and replaced.

(20) RESERVE LIFE TEST: After making the mutual conductance test in the usual manner, Press P3 again and turn the FILAMENT voltage control switch S101 to the next lower voltage position. If the mutual conductance indicated by the METER M101, with this reduced filament voltage applied to the tube, remains within 20% of the original reading, the tube has a larger reserve life or cathode emission power. A tube which passes this test will in all probability operate satisfactorily under adverse conditions due to low filament voltage, such as described in SECTION 4 paragraph 4a(25).

(21) GAS TEST. The push switches P4 and P5 are used to test an amplifier tube for gas content.

(a) Turn the MICROMHOS switch to the position indicated under "SCALE" on the roll chart.

(b) Push button P4 and hold down while adjusting the BIAS dial until the pointer of the meter indicates 100 micromhos on the 0 to 3000 scale.

(c) Hold down P4 and press P5.

(d) If the tube contains gas the pointer of the meter will move UP the scale. If the pointer movement is not more than one division of the scale, the gas content is satisfactory.

Note

With some tubes, such as the type 45, the micromhos reading cannot be brought down to 100 micromhos by turning the BIAS dial. In such cases turn the BIAS dial to 100 and test for gas by noting whether the pointer moves more than one division up scale when P4 is held down and P5 is pressed.

(f) Some tubes develop gas after being heated for a period of time. If a tube is suspected, allow it to heat for a few minutes.

(22) TOP CAPS. Two jacks in the upper center of the control panel marked G(grid) J101 and P(plate) J102 are used when making connection to the top cap of the tube being tested. On the data chart in the NOTATIONS column, opposite tube types having top caps, is the notation CAP-G or CAP-P. G means that the top cap must be connected to the G jack, and P that it must be connected to the P jack. Test leads W103 and W106 are used in making these connections.

(23) NOISE TEST. The short test circuit is also used in making noise tests on electron tubes. Connections are made from the noise test jacks J105 and J106 to the antenna and ground posts of any radio receiver. The tube under test is tapped with the finger as the SHORTS switch S113 is turned through positions 1-2-3-4-5. Intermittent disturbances, which are too brief to register on the neon lamp, will be reproduced by the loud speaker as static.

(24) PILOT LAMP TEST. The center of the large 7-pin socket is used to check pilot lamps. Set the filament selector switches on JR. Set the filament voltage switch to the proper voltage for the lamp being tested.

(25) SPECIAL TUBE TYPES.

(a) Voltage Regulator tubes are tested by applying a voltage sufficiently high to ionize the gas and cause the tube to conduct. Refer to the roll chart for the proper test button and control settings. The condition of the tube is indicated on the "A" scale of the meter. A good tube will cause the meter to read to the right of the line marked "RECTIFIERS OK."

(b) Thyratrons are tested in the following way: Set the controls as indicated by the roll chart, press the push button indicated and adjust the BIAS control dial until the tube strikes as indicated by a glow between the elements and a sharp rise of the meter pointer. The approximate dial setting at which the tube should strike is noted on the chart. After the tube strikes its condition is read on the "A" scale of the meter as a rectifier.

(c) Tuning Eye tubes are tested by applying suitable standard test voltages to the control elements and noting the resulting effect on the eye. Refer to the roll chart for proper test button and control settings.

(26) TESTING SUB-MINIATURE TUBES.

(a) Sub-miniature tubes of the round type having wire leads instead of pins are tested in the TV-3A/U by means of a special socket X112, (See Figure 4-1). This socket has 8 contacts, numbers fc. which are shown by Figure 4-2.

There are several basing arrangements used for these tubes as illustrated by Figure 4-3.

The numbered leads of the tubes are inserted in the corresponding contacts of the socket X112. A good way to handle the leads is to grasp each lead about ⅛" from its end with the tips of a pair of long nose pliers, and insert the leads in their proper socket contact.

Sub-miniature type tubes are identified on the Roll Chart and in Table 4-3 by a star beside the type number. The applicable basing for the various round types is indicated under the column headed NOTATIONS.

(b) Sub-miniature tubes of the flat or inline contact type having either pins or leads are tested in the flat socket (X113 in Figure 4-1) also illustrated by Figure 4-2. The tube pins or leads must be inserted with the dot on the base of the tube directly in line with the small molded dot on the socket.

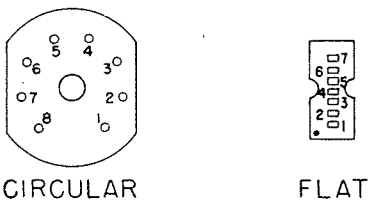


Figure 4-2. Top View of Socket X112

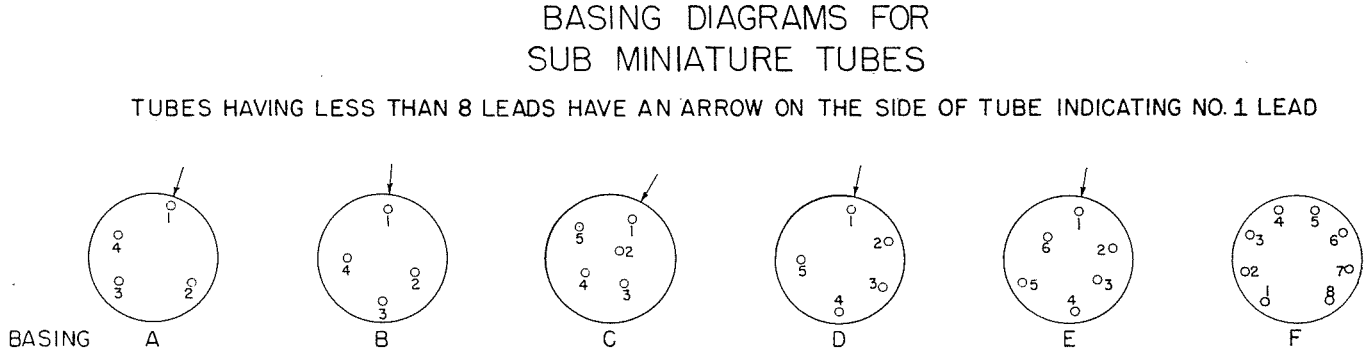


Figure 4-3. Basing Sub-Miniature Tubes

(27) SPECIAL NOTES. Power line voltage varies in different localities and may also vary somewhat aboard ship.

While a national survey indicates that the average voltage for the U.S.A. is about 117 volts, it does not mean that every locality maintains a constant voltage at that level.

Occasionally there is the complaint that a used tube will test GOOD, but will not work in the equipment; but when a NEW tube is substituted, the equipment will operate correctly. In a case of this kind check the line voltage being supplied to the equipment. The used tube that would not perform may not have been receiving its specified filament voltage, due to low line voltage. The new tube performed because of its initial reserve capacity. The used tube may have performed if it had rceived its specified filament voltage.

Tube failure frequently occurs in ac-dc sets where several tubes are connected with their heaters or filaments in series. Sometimes, even though the power line voltage is normal, a series tube with abnormally high filament resistance will rob its companion tube of its normal filament voltage. The robbed tube apparently fails; but when tested under specified conditions, the tube will test GOOD.

TABLE 4-2. TUBE TEST DATA CHART

NOTES: 1. Mutual conductance values are minimum. Discard amplifier tubes which read less than value.
2. A star symbol in the tube type column indicates a subminiature tube. For tube basing diagrams see Figure 4-2.
3. Wherever a cross hatch (#) or a double dagger (‡) appears refer to the notations column for special test procedure.

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
00A	5.0	JR3-2000	33	.....	B	P3	420	
01A	5.0	JR3-2000	48	....	B	P3	460	
0A2	BLST	KR0-3020	0	47	A	P4	Volt. Reg.	Read As Rectifier
0A3	.....	JP0-5010	0	70	A	P4	Volt. Reg.	Read As Rectifier
0A4G	.....	KS0-5810	100	90	A	P4	Volt. Reg.	Read As Rectifier
0B2	.....	JP0-5020	0	47	A	P4	Volt. Reg.	SHORT ON 3 READ AS RECTIFIER
0B3	.....	JP0-5010	0	72	A	P4	Volt. Reg.	Read As Rectifier
0C3	.....	JP0-5010	0	68	A	P4	Volt. Reg.	Read As Rectifier
0D3	.....	JP0-5010	0	50	A	P4	Volt. Reg.	Read As Rectifier
0Y4	BLST	JX3-5020	0	54	A	P6	Rect.	Short on 1-2
0Z4	.....	JR0-5070	0	73	A	P6	Rect.	HOLD BUTTON DOWN FOR 5 SECONDS. PLATE NO. 1
0Z4	.....	JR0-3070	0	73	A	P6	Rect.	HOLD BUTTON DOWN FOR 5 SECONDS. PLATE NO. 2
1A3	1.5	HT0-2010	0	0	A	P2	Diode	
1A4	2.0	JR0-2300	18	....	B	#	470	#CAP=G HOLD DOWN P2 AND PRESS P3
1A5	1.5	JR5-3400	43	....	B	P3	500	
1A6	2.0	JR0-2504	24	....	B	#	315	#PENT. SECT. CAP=G. HOLD DOWN P2 AND PRESS P3
1A6	2.0	JR4-3502	24	....	B	#	190	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1A7	1.5	JR0-3465	0	....	B	#	410	#PENT. SECT. CAP=G. HOLD DOWN P2 AND PRESS P3
1A7	1.5	JR5-6430	28	....	B	#	315	#OSC SECT. HOLD DOWN P2 AND PRESS P3
1AB5	1.1	JR6-2300	0	....	B	P3	900	
1AC5★	1.1	EV2-7800	22	....	B	#	250	#F BASING HOLD DOWN P2 AND PRESS P3
1AD5★	1.1	EV2-7800	0	....	B	#	410	#F BASING HOLD DOWN P2 AND PRESS P3
1AE4	1.1	DX6-2100	22	....	B	P3	600	
1AF4	1.5	DX6-2100	21	....	B	P3	440	
1AF5	1.5	DX6-5800	0	....	B	#	380	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
1AF5	1.5	HT0-1000	0	0	A	P2	Diode	DIODE SECT. OK OVER 250 ON 3000 SCALE
1B3	1.1	JR0-0000	0	65	A	P4	Rect.	Cap=P
1B4	2.0	JR0-2300	18	....	B	#	410	#CAP=G HOLD DOWN P2 AND PRESS P3
1B5	2.0	JR5-2000	23	....	B	P3	360	Triode Sect.
1B5	2.0	BY5-4000	0	0	A	P2	Diode	Diode No. 1
1B5	2.0	JR5-3000	0	0	A	P2	Diode	Diode No. 2
1B7	1.5	JR0-3405	0	....	B	#	570	#PENT. SECT. CAP=G HOLD DOWN P2 AND PRESS P3
1B7	1.5	JR5-6403	20	....	B	#	440	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1C3	1.5	DX8-2000	37	....	B	P3	480	
1C5	1.5	JR5-3400	37	....	B	P3	480	
1C6	2.0	JR0-2534	0	....	B	#	410	#AMPL. SECT. CAP=G HOLD DOWN P2 AND PRESS P3
1C6	2.0	JR4-3520	20	....	B	#	250	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1C7	2.0	JR0-3465	0	....	B	#	410	#PENT. SECT. CAP=G HOLD DOWN P2 AND PRESS P3
1C7	2.0	JR5-6430	20	....	B	#	250	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1C8★	1.1	EV8-6702	45	....	B	P3	250	F Basing
1C21	BLST	JP8-5010	0	88	A	P4	Rect.	
1D5	2.0	JR0-3400	18	....	B	#	470	#CAP=G. HOLD DOWN P2 AND PRESS P3
1D7	2.0	JR0-3465	24	....	B	#	315	#PENT SECT. CAP=G. HOLD DOWN P2 AND PRESS P3
1D7	2.0	JR5-6430	24	....	B	#	190	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1D8	1.5	JR5-3460	50	....	B	P3	580	Pent. Sect.
1D8	1.5	JR5-6430	11	....	B	P3	360	Triode Sect. Cap=G
1D8	1.5	JR5-7430	0	0	A	P2	Diode	Diode Sect.
1E4	1.5	JR5-3000	37	....	B	P3	520	
1E5	2.0	JR0-3400	18	....	B	#	410	#CAP=G HOLD DOWN P2 AND PRESS P3
1E7	2.0	JR5-6734	10	....	D	P3	900	Pent. No. 1
1E7	2.0	JR4-3765	10	....	D	P3	900	Pent. No. 2
1F4	2.0	JR3-2400	23	....	B	P3	880	
1F5	2.0	JR5-3400	23	....	B	P3	880	
1F6	2.0	JR0-2300	8	....	B	#	410	#PENT. SECT. CAP=G. HOLD DOWN P2 AND PRESS P3
1F6	2.0	JR0-5300	0	0	A	P2	Diode	DIODE NO 1 OK ABOVE 500 ON 3000 SCALE
1F6	2.0	JR0-4300	0	0	A	P2	Diode	DIODE NO. 2 OK ABOVE 500 ON 3000 SCALE
1F7	2.0	JR0-3600	8	....	B	#	410	#PENT. SECT. CAP=G. HOLD DOWN P2 AND PRESS P3
1F7	2.0	JR0-4630	0	0	A	P2	Diode	DIODE NO 1. OK ABOVE 500 ON 3000 SCALE
1F7	2.0	JR0-5630	0	0	A	P2	Diode	DIODE NO 2 OK ABOVE 500 ON 3000 SCALE
1G4	1.5	JR5-3000	49	....	B	P3	520	
1G5	2.0	JR5-3400	37	....	B	P3	950	
1G6	1.5	JR5-6000	16	....	B	P3	420	Triode No. 1
1G6	1.5	JR4-3000	16	....	B	P3	420	Triode No. 2
1H4	2.0	JR5-3000	40	....	B	P3	570	
1H5	1.5	JR0-3000	16	....	B	P3	175	Triode Sect. Cap=G
1H5	1.5	JR0-5000	0	0	A	P2	Diode	Diode Sect.
1H6	2.0	JR6-3000	23	....	B	P3	360	Triode Sect.
1H6	2.0	BY6-5000	0	0	A	P2	Diode	Diode No. 1
1H6	2.0	JR6-4000	0	0	A	P2	Diode	Diode No. 2
1J5	2.0	JR5-3400	45	....	B	P3	600	
1J6	2.0	JR5-6000	15	....	B	P3	630	Triode No. 1
1J6	2.0	JR4-3000	15	....	B	P3	630	Triode No. 2
1L4	1.5	HT6-2100	19	....	B	P3	650	

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
1L6	1.5	DX6-2518	0	....	B	#	410	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
1L6	1.5	DX8-1526	28	....	B	#	190	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1LA4	1.5	JR6-2300	43	....	B	P3	500	
1LA6	1.5	JR6-2534	0	....	B	#	380	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
1LA6	1.5	JR4-3526	32	....	B	#	190	#OSC. SECT. HOLD DOWN P2 AND PRESS P3
1LB4	1.5	JR6-2300	51	....	B	P3	580	
1LB6	1.5	JR6-2437	0	....	B	P3	250	Heptode Sect.
1LB6	1.5	JR6-3574	20	....	B	P3	950	Osc. Sect.
1LC5	1.5	JR6-2340	0	....	B	#	470	#HOLD DOWN P2 AND PRESS P3
1LC6	1.5	JR6-2534	30	....	B	P3	440	Pent. Sect.
1LC6	1.5	JR4-3526	30	....	B	P3	240	Osc. Sect.
1LD5	1.5	JR6-2300	0	....	B	#	380	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
1LD5	1.5	JR6-4300	0	0	A	P2	Diode	DIODE SECT. OK OVER 500 ON 3000 SCALE
1LE3	1.5	JR6-2050	0	....	B	P3	820	
1LF3	1.5	JR6-2050	20	....	B	P3	1200	
1LG5	1.5	JR6-2340	25	....	B	P3	660	
1LH4	1.5	JR6-2000	16	....	B	P3	175	Triode Sect.
1LH4	1.5	JR6-4000	0	0	A	P2	Diode	Diode Sect.
1LN5	1.5	JR6-2340	11	....	B	P3	480	
1N5	1.5	JR0-3400	11	....	B	P3	480	Cap=G
1N6	1.5	JR5-3400	43	....	B	P3	500	Pent. Sect.
1N6	1.5	JR0-6000	0	0	A	P2	Diode	DIODE SECT. OK OVER 250 ON 3000 SCALE
1P5	1.5	JR0-3400	11	....	B	P3	500	Cap=G
1Q5	1.5	JR5-3400	37	....	B	P3	1320	
1Q6★	1.1	EV2-7800	0	....	B	#	190	#F BASING. PENT.SECT. HOLD DOWN P2 AND PRESS P3
1Q6★	1.1	EV0-6000	0	0	A	P2	Diode	F BASING DIODE SECT. OK OVER 250 ON 3000 SCALE
1R4	1.5	JR0-4070	0	0	A	P2	Diode	
1R5	1.5	DX8-2160	0	....	B	#	250	#NO. 1 GRID HOLD DOWN P2 AND PRESS P3
1R5	1.5	DX6-2180	0	....	B	#	220	#NO. 3 GRID HOLD DOWN P2 AND PRESS P3
1S4	1.5	DX1-2800	31	....	B	#	950	#HOLD DOWN P2 AND PRESS P3
1S5	1.5	DX6-5800	13	....	B	#	330	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
1S5	1.5	DX0-1800	0	0	A	P2	Diode	Diode Sect.
1S6★	1.1	EV3-1806	0	....	B	#	220	#F BASING PENT. SECT. HOLD DOWN P2 AND PRESS P3
1S6★	1.1	EV0-6000	0	0	A	P2	Diode	F BASING DIODE SECT. OK OVER 250 ON 3000 SCALE
1SA6	1.5	JR4-7630	0	....	B	#	500	#HOLD DOWN P2 AND PRESS P3
1SB6	1.5	JR7-3400	0	....	B	#	410	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
1SB6	1.5	JR7-5000	0	0	A	P2	Diode	DIODE SECT. OK OVER 500 ON 3000 SCALE
1T4	1.5	DX6-2100	0	....	B	#	470	#HOLD DOWN P2 AND PRESS P3
1T5	1.5	JR5-3400	45	....	B	P3	725	
1T6★	1.1	EV3-1860	0	....	B	#	125	#F BASING. PENT. SECT. HOLD DOWN P2 AND PRESS P3
1T6★	1.1	EV0-6000	0	0	A	P2	Diode	F BASING DIODE SECT. OK OVER 250 ON 3000 SCALE
1U4	1.5	DX6-2100	14	....	B	P3	565	
1U5	1.5	DX6-2100	34	....	B	P3	330	Pent. Sect.
1U5	1.5	DX6-8100	0	0	A	P2	Diode	Diode Sect.
1U6	1.5	DX6-2581	23	....	B	P3	470	Heptode Sect.
1U6	1.5	DX8-1562	0	....	B	P3	315	Osc. Sect.
1V	6.3	JR0-2030	0	49	A	P7	Rect.	
1V2	‡1.1	EV0-9000	0	30	A	P4	Rect.	‡ADJUST LINE TEST TO 1000 ON 3000 SCALE.
1V5★	1.1	EV2-7800	24	....	B	#	440	#F BASING HOLD DOWN P2 AND PRESS P3
1W4	1.5	DX6-2100	49	....	B	P3	580	
1W5★	1.1	EV2-7800	27	....	D	P3	410	F Basing
1X2	1.5	JR0-0000	0	73	A	P4	Rect.	Cap=P Shorton 3
1Z2	1.5	DS0-0000	0	75	A	P4	Rect.	Cap=P
2A3	2.5	JR3-2000	67	....	C	P3	1900	
2A4	2.5	JR5-3000	#	63	A	P7	Thyr.	#STRIKES AT ABOUT 72. READ AS RECTIFIER.
2A5	2.5	JR4-2350	29	....	B	P3	1260	
2A6	2.5	JR0-2050	11	....	B	P3	470	**Triode Sect. Cap=G**
2A6	2.5	JR0-4050	0	0	A	P2	Diode	Diode No. 1
2A6	2.5	JR0-3050	0	0	A	P2	Diode	Diode No. 2
2A7	2.5	JR0-2365	22	....	B	P3	630	**Pent. Sect. Cap=G**
2A7	2.5	JR5-4360	30	....	B	P3	250	Osc. Sect.
2B4	2.5	JR3-2040	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 67. READ AS RECTIFIER.
2B6	2.5	JR4-2360	15	....	B	P3	950	
2B7	2.5	JR0-2360	30	....	B	P3	630	**Pent. Sect. Cap=G**
2B7	2.5	JR0-5360	0	0	A	P2	Diode	Diode No. 1
2B7	2.5	JR0-4360	0	0	A	P2	Diode	Diode No. 2
2B22	6.3	JR0-0070	0	50	A	P3	Diode	Cap=P
2C4	2.5	HT1-5080	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 67. READ AS RECTIFIER.
2C21	6.3	JR4-5060	38	....	B	P3	860	Triode No. 1
2C21	6.3	JR0-3020	38	....	B	P3	860	**Triode No. 2 Cap=G**
2C22	6.3	JR0-0070	13	....	C	P3	1900	Upper Cap=G Lower Cap=P
2C26	6.3	JR0-0070	18	....	B	P3	950	Upper Cap =P Lower Cap=G
2C30	6.3	JR6-5070	18	....	E	P3	12600	SEE SECT. 4. PAR. 4a (29)
2C40	6.3	JR0-0070	17	....	C	P3	1760	Cap=P. Ring=G
2C43	6.3	JR0-0070	17	....	C	P3	2800	Cap=P. Ring=G
2C45	7.5	JR3-2000	37	....	B	P3	1380	
2C51	6.3	KR3-4028	17	....	D	P3	3300	Triode No. 1
2C51	6.3	KR7-6082	17	....	D	P3	3300	Triode No. 2
2C52	12.6	JX4-5061	15	....	B	P3	630	Triode No. 1
2C52	12.6	JX2-1035	15	....	B	P3	630	Triode No. 2
2C53	6.3	JR5-0070	0	....	B	P3	250	Cap=P
2D21	6.3	JR3-6025	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 30. READ AS RECTIFIER.
2E5	2.5	JR5-4030	0	100	A	P3	Eye	Eye Open
2E5	2.5	JR5-4230	0	100	A	P3	Eye	Eye Closed
2E22	6.3	JR3-0240	0	....	C	P3	2500	Cap=P
2E24	6.3	JR5-0300	35	....	C	P3	2000	**Cap=P Short on 3**
2E25	6.3	JR5-0470	0	....	C	P3	1900	Cap=P
2E26	6.3	JR5-0327	37	....	C	P3	2200	Cap=P
2E30	6.3	JR3-5602	20	....	C	P3	1900	
2E31	1.1	DV4-1200	0	....	B	#	250	#HOLD DOWN P2 AND PRESS P3
2E32	1.1	DV4-1200	0	....	B	#	250	#HOLD DOWN P2 AND PRESS P3
2E35	1.1	DV4-1200	18	....	B	#	380	#HOLD DOWN P2 AND PRESS P3
2E36	1.1	DV4-1200	18	....	B	#	380	#HOLD DOWN P2 AND PRESS P3

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
2E41	1.1	EW5-1200	20	....	B	#	250	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
2E41	1.1	EW0-3000	0	0	A	P2	Diode	DIODE SECT OK OVER 150 ON 3000 SCALE
2E42	1.1	EW5-1200	20	....	B	#	250	#PENT. SECT. HOLD DOWN P2 AND PRESS P3
2E42	1.1	EW0-3000	0	0	A	P2	Diode	DIODE SECT. OK OVER 150 ON 3000 SCALE
2V3	2.5	JR0-0000	0	73	A	P4	Rect.	Cap=P
2W3	2.5	HR0-4000	0	0	A	P7	Rect.	
2X2A	2.5	JR0-0000	0	83	A	P4	Rect.	Cap=P
2Z2	2.5	JR0-2000	0	0	A	P7	Rect.	
3A4	2.5	DX8-2100	33	....	B	P3	1260	
3A5	3.0	DX5-6000	32	....	B	P3	1260	Triode No. 1
3A5	3.0	HT1-2000	32	....	B	P3	1260	Triode No. 2
3A8	2.5	JR0-3400	12	....	B	P3	470	**Pent. Sect. Cap=G**
3A8	2.5	JR5-6400	12	....	B	P3	315	Triode Sect.
3A8	2.5	JR0-7400	0	0	A	P2	Diode	Diode Sect.
3B4	2.5	JV1-7300	55	....	B	P3	1070	Short on 3
3B7	2.5	BY6-7000	25	....	B	P3	950	Triode No. 1
3B7	2.5	JR3-2000	25	....	B	P3	950	Triode No. 2
3B24	2.5	JR0-0000	0	88	A	P4	Rect.	Cap=P
3B24	2.5	CR0-0000	0	88	A	P4	Rect.	Cap=P
3B29	3.0	JR0-0000	0	92	A	P4	Rect.	Cap=P
3C6	2.5	BY5-6000	10	....	B	P3	700	Triode No. 1
3C6	2.5	JR4-3000	10	....	B	P3	700	Triode No. 2
3D6	2.5	JR6-2300	37	....	B	P3	1320	
3E5	2.5	DX6-2150	29	....	B	#	750	#SHORT ON 3 HOLD DOWN P2 AND PRESS P3
3E6	3.0	JR6-2340	15	....	B	P3	1000	
3LE4	2.5	JR6-2374	55	....	B	P3	700	Short on 3
3LF4	2.5	JR6-2300	30	....	B	P3	1200	
3Q4	3.0	HT1-2800	24	....	B	P3	1340	
3Q5	2.5	JR5-3400	38	....	B	P3	1130	
3S4	2.5	HT1-2800	28	....	B	#	940	#HOLD DOWN P2 AND PRESS P3
3V4	3.0	DX6-2100	31	....	B	P3	1040	
4A6	3.0	JR5-6000	16	....	B	P3	630	Triode No. 1
4A6	3.0	BY4-3000	16	....	B	P3	630	Triode No. 2
5A6	5.0	EV7-1603	46	....	C	P3	1900	
5AX4	5.0	HR0-6000	0	40	A	P7	Rect.	Plate No. 1
5AX4	5.0	HR0-4000	0	32	A	P7	Rect.	Plate No. 2
5AZ4	5.0	JS0-4006	0	0	A	P7	Rect.	Plate No. 1
5AZ4	5.0	JS0-6004	0	0	A	P7	Rect.	Plate No. 2
5R4	5.0	HR0-6000	0	21	A	P7	Rect.	Plate No. 1
5R4	5.0	HR0-4000	0	12	A	P7	Rect.	Plate No. 2
5T4	5.0	HR0-6000	0	48	A	P7	Rect.	Plate No. 1
5T4	5.0	HR0-4000	0	39	A	P7	Rect.	Plate No. 2
5U4	5.0	HR0-6000	0	40	A	P7	Rect.	Plate No. 1
5U4	5.0	HR0-4000	0	32	A	P7	Rect.	Plate No. 2
5V4	5.0	HR0-6000	0	63	A	P7	Rect.	Plate No. 1
5V4	5.0	HR0-4000	0	63	A	P7	Rect.	Plate No. 2
5W4	5.0	HR0-6000	0	0	A	P7	Rect.	Plate No. 1
5W4	5.0	HR0-4000	0	0	A	P7	Rect.	Plate No. 2
5X3	5.0	JR0-3000	0	0	A	P7	Rect.	Plate No. 1
5X3	5.0	JR0-2000	0	0	A	P7	Rect.	Plate No. 2
5X4	5.0	JX0-5000	0	40	A	P7	Rect.	Plate No. 1
5X4	5.0	JX0-3000	0	32	A	P7	Rect.	Plate No. 2
5Y3	5.0	HR0-6000	0	0	A	P7	Rect.	Plate No. 1
5Y3	5.0	HR0-4000	0	0	A	P7	Rect.	Plate No. 2
5Y4	5.0	JX0-5000	0	0	A	P7	Rect.	Plate No. 1
5Y4	5.0	JX0-3000	0	0	A	P7	Rect.	Plate No. 2
5Z3	5.0	JR0-3000	0	40	A	P7	Rect.	Plate No. 1
5Z3	5.0	JR0-2000	0	32	A	P7	Rect.	Plate No. 2
5Z4	5.0	HR0-6000	0	61	A	P7	Rect.	Plate No. 1
5Z4	5.0	HR0-4000	0	61	A	P7	Rect.	Plate No. 2
6A3	6.3	JR3-2000	67	....	C	P3	1900	
6A4	6.3	JR3-2400	28	....	B	P3	1260	
6A5	6.3	JR5-3000	67	....	C	P3	1900	
6A6	6.3	JR5-6040	12	....	B	P3	950	Triode No. 1
6A6	6.3	JR3-2040	12	....	B	P3	950	Triode No. 2
6A7	6.3	JR0-2365	22	....	B	P3	630	**Pent. Sect. Cap=G**
6A7	6.3	JR5-4362	30	....	B	P3	190	Osc. Sect.
6A8	6.3	JR0-3475	22	....	B	P3	630	**Pent. Sect. Cap=G**
6A8	6.3	JR5-6473	30	....	B	P3	190	Osc. Sect.
6AB4	6.3	JR6-3070	14	....	D	P3	2500	
6AB5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6AB5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6AB6	6.3	JR5-3470	0	....	B	P3	920	
6AB7	6.3	JR4-7653	0	....	C	P3	2200	
6AC5	6.3	JR5-3070	0	....	B	P3	530	
6AC6	6.3	JR5-3470	0	....	B	P3	1500	
6AC7	6.3	JR4-7653	10	....	D	P3	3800	
6AD4★	6.3	DU2-1050	15	....	D	P3	1325	C Basing
6AD6	6.3	JR4-3570	0	100	A	P3	Eye	Eye 1 Open Eye 2 Closed
6AD6	6.3	JR3-4570	0	100	A	P3	Eye	Eye 2 Open Eye 1 Closed
6AD7	6.3	JR5-3476	29	....	B	P3	1260	Pent. Sect.
6AD7	6.3	JR2-6073	0	....	B	P3	380	Triode Sect.
6AE5	6.3	JR5-3070	68	....	B	P3	750	
6AE6	6.3	JR5-4073	0	....	B	P3	540	Triode No. 1
6AE6	6.3	JR5-3074	0	....	B	P3	470	Triode No. 2
6AE7	6.3	JR6-3074	33	....	B	P3	950	Triode No. 1
6AE7	6.3	JR4-3056	33	....	B	P3	950	Triode No. 2
6AF5	6.3	JR5-3070	51	....	B	P3	950	
6AF6	6.3	JR4-3570	0	100	A	P3	Eye	Eye 1 Open Eye 2 Closed
6AF6	6.3	JR3-4570	0	100	A	P3	Eye	Eye 2 Open Eye 1 Closed
6AG5	6.3	JR3-5620	10	....	D	P3	2500	
6AG7	6.3	JR4-7652	10	....	D	P3	3800	
6AH5	6.3	JR6-4270	23	....	D	P3	3150	
6AH6	6.3	JR3-5672	10	....	D	P3	3800	
6AH7	6.3	JX5-6040	20	....	D	P3	1510	Triode No. 1
6AH7	6.3	JX2-3010	20	....	D	P3	1510	Triode No. 2

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
6AJ5	6.3	JR3-5620	12	....	D	#	1730	#HOLD DOWN P2 AND PRESS P3
6AJ7	6.3	JR4-7653	10	....	D	P3	3800	
6AK5	6.3	JR3-5620	10	....	D	P3	2780	
6AK6	6.3	JR3-5672	23	....	B	P3	1320	
6AK7	6.3	JR4-7652	10	....	D	P3	3800	
6AL5	6.3	JR0-7030	0	70	A	P2	Diode	Diode No. 1
6AL5	6.3	JR0-2050	0	70	A	P2	Diode	Diode No. 2
6AL6	6.3	JR5-0470	23	....	C	P3	3150	Cap=P
6AL7	6.3	JR6-3570	Vary	100	A	P3	Eye	Bias Controls Left Pattern
6AL7	6.3	JR5-3470	Vary	100	A	P3	Eye	Bias Controls Both Patterns
6AL7	6.3	JR4-3570	Vary	100	A	P3	Eye	Bias Controls Right Pattern
6AN5	6.3	JR3-5670	0	....	D	#	3800	#HOLD DOWN P2 AND PRESS P3
6AQ5	6.3	JR3-5620	21	....	C	P3	2320	
6AQ6	6.3	JR3-7020	6	....	B	P3	725	Triode Sect.
6AQ6	6.3	JR0-6020	0	0	A	P2	Diode	Diode No. 1
6AQ6	6.3	JR0-5020	0	0	A	P2	Diode	Diode No. 2
6AQ7	6.3	JX4-5016	13	....	B	P3	630	Triode Sect.
6AQ7	6.3	JX4-2016	0	40	A	P2	Diode	Diode No. 1
6AQ7	6.3	JX4-3016	0	40	A	P2	Diode	Diode No. 2
6AR5	6.3	JR3-5620	34	....	B	P3	1000	
6AR6	6.3	GX8-3520	34	....	C	P3	3400	
6AS5	6.3	JR2-7630	25	....	D	P3	3530	
6AS6	6.3	JR3-5627	10	....	D	P3	1540	
6AS7	6.3	JX4-5061	100	....	C	P3	1800	Triode No. 1
6AS7	6.3	JX2-1035	100	....	C	P3	1800	Triode No. 2
6AT6	6.3	JR3-7020	18	....	B	P3	750	Triode Sect.
6AT6	6.3	JR0-6020	0	0	A	P2	Diode	Diode No. 1
6AT6	6.3	JR0-5020	0	0	A	P2	Diode	Diode No. 2
6AU5	6.3	JR2-5730	41	....	C	P3	1780	
6AU6	6.3	JR3-5672	10	....	D	P3	2050	
6AV5	6.3	JR2-5730	50	....	C	P3	2450	
6AV6	6.3	JR3-7025	12	....	B	P3	800	Triode Sect.
6AV6	6.3	JR3-6025	0	0	A	P2	Diode	Diode No. 1
6AV6	6.3	JR3-5027	0	0	A	P2	Diode	Diode No. 2
6AW7	6.3	JX1-6020	8	....	B	P3	570	Triode Sect.
6AW7	6.3	JX1-3050	0	68	A	P2	Diode	Diode No. 1
6AW7	6.3	JX1-4020	0	68	A	P2	Diode	Diode No. 2
6AX5	6.3	JR0-5073	0	0	A	P7	Rect.	Plate No. 1
6AX5	6.3	JR0-3075	0	0	A	P7	Rect.	Plate No. 2
6AX6	6.3	JR0-5070	0	65	A	P7	Rect.	Plate No. 1
6AX6	6.3	JR0-3040	0	65	A	P7	Rect.	Plate No. 2
6B4	6.3	JR5-3000	67	....	C	P3	1900	
6B5	6.3	JR4-2350	0	....	B	P3	950	
6B6	6.3	JR0-3070	15	....	B	P3	470	Triode Sect. Cap=G
6B6	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
6B6	6.3	JR0-4070	0	0	A	P2	Diode	Diode No. 2
6B7	6.3	JR0-2360	30	....	B	P3	630	Pent. Sect. Cap=G
6B7	6.3	JR0-5360	0	0	A	P2	Diode	Diode No. 1
6B7	6.3	JR0-4360	0	0	A	P2	Diode	Diode No. 2
6B8	6.3	JR0-3672	24	....	B	P3	720	Pent. Sect. Cap=G
6B8	6.3	JR0-5672	0	0	A	P2	Diode	Diode No. 1
6B8	6.3	JR0-4672	0	0	A	P2	Diode	Diode No. 2
6BA5★	6.3	EW3-1520	15	....	D	P3	2080	E Basing
6BA6	6.3	JR3-5672	9	....	C	P3	2700	
6BA7	6.3	EV7-9132	17	....	B	P3	470	Ampl. Sect.
6BA7	6.3	EV2-9137	25	....	B	P3	470	Osc. Sect.
6BC5	6.3	JR3-5620	0	....	C	P3	2000	
6BC7	6.3	EV0-8090	0	70	A	P2	Diode	Diode No. 1
6BC7	6.3	EV0-6070	0	70	A	P2	Diode	Diode No. 2
6BC7	6.3	EV0-2010	0	70	A	P2	Diode	Diode No. 3
6BD5	6.3	JR2-5730	18	....	D	P3	3150	
6BD6	6.3	JR3-5672	13	....	D	P3	1260	
6BE6	6.3	JR7-5623	11	....	B	P3	900	Ampl. Sect.
6BE6	6.3	JR3-5627	0	....	B	P3	1000	Osc. Sect.
6BE7	6.3	EV7-1639	29	....	B	P3	630	
6BF5	6.3	JR3-5620	49	....	C	P3	2140	
6BF6	6.3	JR3-7020	18	....	B	P3	1200	Triode Sect.
6BF6	6.3	JR3-6020	0	0	A	P2	Diode	Diode No. 1
6BF6	6.3	JR3-5020	0	0	A	P2	Diode	Diode No. 2
6BF7★	6.3	DW7-8050	22	....	C	P3	1575	F BASING TRIODE NO. 1
6BF7★	6.3	DW2-1040	22	....	C	P3	1575	F BASING TRIODE NO. 2
6BG6	6.3	JR5-0730	18	....	D	P3	3800	Cap=P
6BG7★	6.3	DW7-8050	22	....	C	P3	1575	F BASING TRIODE NO. 1
6BG7★	6.3	DW2-1040	22	....	C	P3	1575	F BASING TRIODE NO. 2
6BH6	6.3	JR3-5627	15	....	B	P3	1260	
6BJ6	6.3	JR3-5627	0	....	C	P3	2400	
6BK6	6.3	JR3-7025	6	....	B	P3	790	Triode Sect.
6BK6	6.3	JR0-6025	0	0	A	P2	Diode	Diode No. 1
6BK6	6.3	JR0-5027	0	0	A	P2	Diode	Diode No. 2
6BL7	6.3	JX2-1030	24	....	D	P3	3150	Triode No. 1
6BL7	6.3	JX4-5060	24	....	D	P3	3150	Triode No. 2
6BN6	6.3	JR2-7536	0	....	B	P3	440	Limiter Grid
6BN6	6.3	JR6-7532	0	....	B	P3	570	Quadrature Grid
6BQ6	6.3	JR5-0470	50	....	C	P3	2800	Cap=P
6BQ7	6.3	EV7-6080	17	....	D	P3	3300	Triode No. 1
6BQ7	6.3	EV2-1030	17	....	D	P3	3300	Triode No. 2
6BT6	6.3	JR3-7020	13	....	B	P3	820	Triode Sect.
6BT6	6.3	JR3-6020	0	40	A	P2	Diode	Diode No. 1
6BT6	6.3	JR3-5020	0	40	A	P2	Diode	Diode No. 2
6BU6	6.3	JR3-7020	34	....	B	P3	940	Triode Sect.
6BU6	6.3	JR3-6020	0	30	A	P2	Diode	Diode No. 1
6BU6	6.3	JR3-5020	0	30	A	P2	Diode	Diode No. 2
6BY5	6.3	JR0-5070	0	43	A	P7	Rect.	Plate No. 1
6BY5	6.3	JR0-4020	0	43	A	P7	Rect.	Plate No. 2
6C4	6.3	JR6-3070	24	....	B	P3	1380	
6C5	6.3	JR5-3070	21	....	B	P3	1260	
6C6	6.3	JR0-2354	21	....	B	P3	770	Cap=G

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
6C7	6.3	JR0-2060	29	....	B	P3	780	**Triode Sect. Cap=G**
6C7	6.3	JR0-5060	0	0	A	P2	Diode	Diode No. 1
6C7	6.3	JR0-4060	0	0	A	P2	Diode	Diode No. 2
6C8	6.3	JR5-6070	17	....	B	P3	630	Triode No. 1
6C8	6.3	JR0-3040	17	....	B	P3	630	**Triode No. 2 Cap=G**
6CB6	6.3	JR3-5627	11	....	D	P3	3500	
6CD6	6.3	JR5-0730	42	....	D	P3	4100	Cap=P
6D4	6.3	JR3-7050	#	45	A	P7	Thyr.	#STRIKES AT ABOUT 70. READ AS RECTIFIER.
6D5	6.3	JR5-3070	57	....	B	P3	1260	
6D6	6.3	JR0-2354	21	....	B	P3	1000	Cap=G
6D7	6.3	JR0-2364	24	....	B	P3	770	Cap=G
6D8	6.3	JR0-3475	22	....	B	P3	630	**Pent. Sect. Cap=G**
6D8	6.3	JR5-6473	30	....	B	P3	190	Osc. Sect.
6E5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6E5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6E6	6.3	JR5-6040	54	....	B	P3	880	Triode No. 1
6E6	6.3	JR3-2040	54	....	B	P3	880	Triode No. 2
6E7	6.3	JR0-2364	24	....	B	P3	950	Cap=G
6F4	6.3	JR2-3060	30	....	D	P3	3800	
6F5	6.3	JR0-4072	12	....	B	P3	630	Cap=G
6F6	6.3	JR5-3472	29	....	B	P3	1260	
6F7	6.3	JR0-2365	28	....	B	P3	700	**Pent. Sect. Cap=G**
6F7	6.3	JR5-4362	28	....	B	P3	315	Triode Sect.
6F8	6.3	JR5-6070	23	....	B	P3	1260	Triode No. 1
6F8	6.3	JR0-3040	23	....	B	P3	1260	**Triode No. 2 Cap=G**
6G5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6G5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6G6	6.3	JR5-3470	12	....	D	P3	1450	
6G7S	6.3	JR0-2354	36	....	B	P3	940	**Pent. Sect. Cap=G**
6G7S	6.3	JR0-6030	0	65	A	P2	Diode	Diode No. 1
6G7S	6.3	JR0-4030	0	65	A	P2	Diode	Diode No. 2
6H4	6.3	JR0-4070	0	65	A	P2	Diode	
6H5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6H5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6H6	6.3	JR0-5070	0	65	A	P2	Diode	Diode No. 1
6H6	6.3	JR0-3040	0	65	A	P2	Diode	Diode No. 2
6H7M	6.3	JR5-3476	29	....	B	P3	1260	Pent. Sect.
6H7M	6.3	JR0-6073	0	....	B	P3	100	**Triode Sect. Cap=G**
6J4	6.3	JR3-7020	15	....	D	P3	5700	
6J5	6.3	JR5-3070	22	....	D	P3	1640	
6J6	6.3	JR5-2070	15	....	D	P3	2800	Triode No. 1
6J6	6.3	JR6-3070	15	....	D	P3	2800	Triode No. 2
6J7	6.3	JR0-3475	22	....	B	P3	770	Cap=G
6J8	6.3	JR5-3476	18	....	B	P3	630	**Heptode Sect. Cap=G**
6J8	6.3	JR5-6473	30	....	B	P3	315	Triode Sect.
6K4★	6.3	DU2-1050	31	....	D	P3	2000	C Basing
6K5	6.3	JR0-3070	21	....	B	P3	630	Cap=G
6K6	6.3	JR5-3470	34	....	B	P3	1000	
6K7	6.3	JR0-3475	19	....	B	P3	910	Cap=G
6K8	6.3	JR5-3476	11	....	B	P3	630	**Hexode Sect. Cap=G**
6K8	6.3	JR5-6473	0	....	C	P3	1500	Triode Sect.,
6L4	6.3	JR2-3060	25	....	D	P3	3150	
6L5	6.3	JR5-3070	27	....	B	P3	950	
6L6	6.3	JR5-3472	23	....	D	P3	3150	
6L7	6.3	JR0-3475	23	....	B	P3	410	Cap Grid. Cap=G
6L7	6.3	JR5-3472	27	....	B	P3	410	Pin Grid
6N4	6.3	JR3-5020	18	....	D	P3	3800	
6N5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6N5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6N6	6.3	JR5-3470	0	....	B	P3	950	
6N7	6.3	JR5-6073	12	....	B	P3	950	Triode No. 1
6N7	6.3	JR4-3076	12	....	B	P3	950	Triode No. 2
6N8	6.3	EV2-6139	17	....	B	P3	1380	Pent. Sect.
6N8	6.3	EV2-7139	0	0	A	P2	Diode	Diode No. 1
6N8	6.3	EV2-8139	0	0	A	P2	Diode	Diode No. 2
6P5	6.3	JR5-3070	29	....	B	P3	910	
6P7	6.3	BT0-4576	28	....	B	P3	700	**Pent. Sect. Cap=G**
6P7	6.3	BT8-6074	28	....	B	P3	315	Triode Sect.
6Q4	6.3	EV1-9030	0	....	D	P3	6300	**Short on 1-2-3-5**
6Q5	6.3	JR5-3070	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 54 READ AS RECTIFIER.
6Q6	6.3	JR0-3070	17	....	B	P3	630	**Triode Sect. Cap=G**
6Q6	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
6Q6	6.3	JR0-4070	0	0	A	P2	Diode	Diode No. 2
6Q7	6.3	JR0-3072	17	....	B	P3	500	**Triode Sect. Cap=G**
6Q7	6.3	JR0-5073	0	0	A	P2	Diode	Diode No. 1
6Q7	6.3	JR0-4073	0	0	A	P2	Diode	Diode No. 2
6R4	6.3	EV1-8030	23	....	C	P3	2500	
6R7	6.3	JR0-3072	18	....	B	P3	1200	**Triode Sect. Cap=G**
6R7	6.3	JR0-5073	0	0	A	P2	Diode	Diode No. 1
6R7	6.3	JR0-4073	0	0	A	P2	Diode	Diode No. 2
6R8	6.3	EV8-9072	13	....	B	P3	1200	Triode Sect.
6R8	6.3	EV0-1078	0	70	A	P2	Diode	Diode No. 1
6R8	6.3	EV0-6078	0	70	A	P2	Diode	Diode No. 2
6R8	6.3	EV0-2039	0	70	A	P2	Diode	Diode No. 3
6S4	6.3	EV6-9020	17	....	C	P3	2600	
6S7	6.3	JR0-3475	27	....	B	P3	1100	Cap=G
6S8	6.3	JX0-6010	10	....	B	P3	570	**Triode Sect. Cap=G**
6S8	6.3	JX0-4010	0	0	A	P2	Diode	Diode No. 1
6S8	6.3	JX0-2010	0	0	A	P2	Diode	Diode No. 2
6S8	6.3	JX0-3050	0	0	A	P2	Diode	Diode No. 3
6SA7	6.3	JR7-3465	21	....	B	P3	470	Ampl. Sect.
6SA7	6.3	JR5-3467	21	....	B	P3	470	Osc. Sect.
6SB7	6.3	JR7-3465	16	....	B	P3	470	Ampl. Sect.
6SB7	6.3	JR5-3467	40	....	B	P3	190	Osc. Sect.
6SC7	6.3	JX4-5061	10	....	D	P3	840	Triode No. 1
6SC7	6.3	JX3-1065	10	....	D	P3	840	Triode No. 2
6SD7	6.3	JR4-7653	10	....	D	P3	1900	
6SF5	6.3	JX3-5012	10	....	D	P3	940	
6SF7	6.3	JX1-6432	0	....	B	P3	1260	Pent. Sect.
6SF7	6.3	JX0-5436	0	0	A	P2	Diode	Diode Sect.

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
6SG7	6.3	JR4-7652	0	....	C	P3	2100	
6SH7	6.3	JR4-7652	0	....	C	P3	2150	
6SJ7	6.3	JR4-7653	20	....	D	P3	1040	
6SK7	6.3	JR4-7653	10	....	D	P3	1260	
6SL7	6.3	JX4-5061	7	....	D	P3	1000	Triode No. 1
6SL7	6.3	JX2-1035	7	....	D	P3	1000	Triode No. 2
6SN7	6.3	JX4-5061	22	....	D	P3	1650	Triode No. 1
6SN7	6.3	JX2-1035	22	....	D	P3	1650	Triode No. 2
6SQ7	6.3	JX1-6032	11	....	D	P3	700	Triode Sect.
6SQ7	6.3	JX0-5036	0	0	A	P2	Diode	Diode No. 1
6SQ7	6.3	JX0-4036	0	0	A	P2	Diode	Diode No. 2
6SR7	6.3	JX1-6032	18	....	B	P3	1200	Triode Sect.
6SR7	6.3	JX0-5036	0	0	A	P2	Diode	Diode No. 1
6SR7	6.3	JX0-4036	0	0	A	P2	Diode	Diode No. 2
6SS7	6.3	JR4-7653	19	....	B	P3	1160	
6ST7	6.3	JX1-6032	15	....	B	P3	1200	Triode Sect.
6ST7	6.3	JX0-5036	0	0	A	P2	Diode	DIODE NO. 1. OK ABOVE 500 ON 3000 SCALE
6ST7	6.3	JX0-4036	0	0	A	P2	Diode	DIODE NO. 2. OK ABOVE 500 ON 3000 SCALE
6SU7	6.3	JX4-5061	7	....	D	P3	1000	Triode No. 1
6SU7	6.3	JX2-1035	7	....	D	P3	1000	Triode No. 2
6SV7	6.3	JX1-6430	12	....	B	P3	1320	Pent. Sect.
6SV7	6.3	JX1-5430	0	65	A	P2	Diode	Diode Sect.
6SZ7	6.3	JX1-6032	10	....	B	P3	760	Triode Sect.
6SZ7	6.3	JX0-5032	0	0	A	P2	Diode	DIODE NO. 1. OK ABOVE 500 ON 3000 SCALE
6SZ7	6.3	JX0-4032	0	0	A	P2	Diode	DIODE NO. 2. OK ABOVE 500 ON 3000 SCALE
6T5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6T5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6T7	6.3	JR0-3070	17	....	B	P3	630	**Triode Sect. Cap=G**
6T7	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
6T7	6.3	JR0-4070	0	0	A	P2	Diode	Diode No. 2
6T8	6.3	EV8-9076	11	....	B	P3	760	Triode Sect.
6T8	6.3	EV0-6071	0	70	A	P2	Diode	Diode No. 1
6T8	6.3	EV0-2037	0	70	A	P2	Diode	Diode No. 2
6T8	6.3	EV0-1078	0	70	A	P2	Diode	Diode No. 3
6U4	6.3	JX0-5030	0	60	A	P7	Rect.	
6U5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6U5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6U6	6.3	JR5-3470	30	....	D	P3	3900	
6U7	6.3	JR0-3475	21	....	B	P3	1000	Cap=G
6V5	6.3	JX5-3400	31	....	C	P3	2600	
6V6	6.3	JR5-3472	21	....	C	P3	2320	
6V7	6.3	JR0-3070	39	....	B	P3	610	**Triode Sect. Cap=G**
6V7	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
6V7	6.3	JR0-4070	0	0	A	P2	Diode	Diode No. 2
6W4	6.3	JX0-5030	0	60	A	P7	Rect.	
6W5	6.3	JR0-5070	0	28	A	P7	Rect.	Plate No. 1
6W5	6.3	JR0-3070	0	28	A	P7	Rect.	Plate No. 2
6W6	6.3	JR5-3470	56	....	C	P3	1900	
6W7	6.3	JR0-3475	22	....	B	P3	770	Cap=G
6X4	6.3	JR0-6070	0	16	A	P7	Rect.	Plate No. 1
6X4	6.3	JR0-3070	0	16	A	P7	Rect.	Plate No. 2
6X5	6.3	JR0-5072	0	28	A	P7	Rect.	Plate No. 1
6X5	6.3	JR0-3072	0	28	A	P7	Rect.	Plate No. 2
6Y5	6.3	JR0-5040	0	60	A	P7	Rect.	Plate No. 1
6Y5	6.3	JR0-3040	0	60	A	P7	Rect.	Plate No. 2
6Y6	6.3	JR5-3470	33	....	D	P3	3800	
6Y7	6.3	JR5-6073	15	....	B	P3	630	Triode No. 1
6Y7	6.3	JR4-3076	15	....	B	P3	630	Triode No. 2
6Z4	6.3	JR0-3040	0	40	A	P7	Rect.	Plate No. 1
6Z4	6.3	JR0-2040	0	40	A	P7	Rect.	Plate No. 2
6Z5	12.6	JS0-5040	0	25	A	P7	Rect.	Plate No. 1
6Z5	12.6	JS0-3040	0	25	A	P7	Rect.	Plate No. 2
6Z7	6.3	JR5-6070	0	....	B	P3	760	Triode No. 1
6Z7	6.3	JR4-3070	0	....	B	P3	760	Triode No. 2
6ZY5	6.3	JR0-5070	0	10	A	P7	Rect.	Plate No. 1
6ZY5	6.3	JR0-3070	0	10	A	P7	Rect.	Plate No. 2
7A4	6.3	JR6-2070	22	....	D	P3	1640	
7A5	6.3	JR6-2370	25	....	D	P3	3800	
7A6	6.3	JR0-6075	0	65	A	P2	Diode	Diode No. 1
7A6	6.3	JR0-3025	0	65	A	P2	Diode	Diode No. 2
7A7	6.3	JR6-2374	27	....	B	P3	1100	
7A8	6.3	JR6-2574	24	....	B	P3	630	Ampl. Sect.
7A8	6.3	JR4-3576	26	....	B	P3	315	Osc. Sect.
7AB7	6.3	HS5-3140	10	....	B	P3	1140	
7AD7	6.3	JR6-2374	0	....	D	P3	3900	
7AF7	6.3	JR5-6070	21	....	C	P3	1640	Triode No. 1
7AF7	6.3	JR4-3020	21	....	C	P3	1640	Triode No. 2
7AG7	6.3	JR6-2374	0	....	C	P3	1900	
7AH7	6.3	JR6-2374	0	....	C	P3	2100	
7AJ7	6.3	JR6-2374	0	....	D	P3	1430	
7AK7	6.3	JR6-2374	0	....	C	P3	2500	
7B4	6.3	JR6-2070	10	....	D	P3	940	
7B5	6.3	JR6-2370	34	....	B	P3	1000	
7B6	6.3	JR3-2070	11	....	D	P3	700	Triode Sect.
7B6	6.3	JR0-6072	0	0	A	P2	Diode	Diode No. 1
7B6	6.3	JR0-5072	0	0	A	P2	Diode	Diode No. 2
7B7	6.3	JR6-2374	27	....	B	P3	1070	
7B8	6.3	JR6-2574	18	....	B	P3	950	Pent. Sect.
7B8	6.3	JR4-3576	18	....	B	P3	410	Osc. Sect.
7C4	6.3	JR0-4070	0	55	A	P2	Diode	
7C5	6.3	JR6-2370	30	....	C	P3	1900	
7C6	6.3	JR3-2070	10	....	B	P3	380	Triode Sect.
7C6	6.3	JR0-6072	0	0	A	P2	Diode	Diode No. 1
7C6	6.3	JR0-5072	0	0	A	P2	Diode	Diode No. 2
7C7	6.3	JR6-2374	22	....	B	P3	820	
7E5	6.3	JS1-3040	15	....	C	P3	1900	
7E6	6.3	JR3-2070	12	....	B	P3	1380	Triode Sect.
7E6	6.3	JR0-6072	0	0	A	P2	Diode	Diode No. 1
7E6	6.3	JR0-5072	0	0	A	P2	Diode	Diode No. 2
7E7	6.3	JR6-2570	22	....	B	P3	820	Pent. Sect.

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
7E7	6.3	JR0-4072	0	0	A	P2	Diode	Diode No. 1
7E7	6.3	JR0-3072	0	0	A	P2	Diode	Diode No. 2
7F7	6.3	JR5-6073	0	....	B	P3	820	Triode No. 1
7F7	6.3	JR4-3026	0	....	B	P3	820	Triode No. 2
7F8	6.3	HS8-6050	10	....	C	P3	3150	Triode No. 1
7F8	6.3	HS1-3040	10	....	C	P3	3150	Triode No. 2
7G7	6.3	JR6-2374	18	....	B	P3	1260	
7G8	6.3	JR5-7362	10	....	B	P3	1320	Tetrode No. 1
7G8	6.3	JR4-2367	10	....	B	P3	1320	Tetrode No. 2
7H7	6.3	JR6-2374	10	....	D	P3	2400	
7J7	6.3	JR6-2574	18	....	B	P3	500	Heptode Sect.
7J7	6.3	JR4-3576	18	....	B	P3	630	Triode Sect.
7K7	6.3	JR4-3020	10	....	D	P3	1000	Triode Sect.
7K7	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
7K7	6.3	JR0-6070	0	0	A	P2	Diode	Diode No. 2
7L7	6.3	JR6-2374	12	....	B	P3	1260	
7N7	6.3	JR5-6073	29	....	B	P3	1260	Triode No. 1
7N7	6.3	JR4-3026	29	....	B	P3	1260	Triode No. 2
7Q7	6.3	JR6-2374	21	....	B	P3	500	Ampl. Sect.
7Q7	6.3	JR4-2376	21	....	B	P3	500	Osc. Sect.
7R7	6.3	JR6-2570	10	....	C	P3	1900	Pent. Sect.
7R7	6.3	JR0-4072	0	0	A	P2	Diode	Diode No. 1
7R7	6.3	JR0-3072	0	0	A	P2	Diode	Diode No. 2
7S7	6.3	JR6-2574	18	....	B	P3	950	Heptode Sect.
7S7	6.3	JR4-3576	0	....	B	P3	950	Triode Sect.
7T7	6.3	JR6-2374	9	....	C	P3	1900	
7V7	6.3	JR6-2374	6	....	C	P3	2500	
7W7	6.3	JR6-2375	10	....	D	P3	2200	
7X6	6.3	JR0-6075	0	55	A	P7	Rect.	Plate No. 1
7X6	6.3	JR0-3025	0	55	A	P7	Rect.	Plate No. 2
7X7	6.3	JR3-2040	10	....	D	P3	630	Triode Sect.
7X7	6.3	JR0-5040	0	70	A	P2	Diode	Diode No. 1
7X7	6.3	JR0-6070	0	70	A	P2	Diode	Diode No. 2
7Y4	6.3	JR0-6070	0	33	A	P7	Rect.	Plate No. 1
7Y4	6.3	JR0-3070	0	33	A	P7	Rect.	Plate No. 2
7Z4	6.3	JR0-6070	0	0	A	P7	Rect.	Plate No. 1
7Z4	6.3	JR0-3070	0	0	A	P7	Rect.	Plate No. 2
10	7.5	JR3-2000	39	....	B	P3	790	
10Y	7.5	JR3-2000	12	....	B	P3	950	
12A	5.0	JR3-2000	44	....	B	P3	1040	
12A5	12.6	JR4-2350	51	....	B	P3	1130	
12A6	12.6	JR5-3472	12	....	C	P3	1900	
12A7	12.6	JR0-2365	48	....	B	P3	610	Pent. Sect. Cap=G
12A7	12.6	JR0-5042	0	40	A	P7	Rect.	Rect. Sect.
12A8	12.6	JR0-3475	22	....	B	P3	630	Pent. Sect. Cap=G
12A8	12.6	JR5-6473	37	....	B	P3	190	Osc. Sect.
12AH7	12.6	JX5-6043	20	....	B	P3	1260	Triode No. 1
12AH7	12.6	JX2-3016	20	....	B	P3	1260	Triode No. 2
12AL5	12.6	JR0-7030	0	70	A	P2	Diode	Diode No. 1
12AL5	12.6	JR0-2050	0	70	A	P2	Diode	Diode No. 2
12AT6	12.6	JR3-7020	18	....	B	P3	750	Triode Sect.
12AT6	12.6	JR3-6020	0	0	A	P2	Diode	Diode No. 1
12AT6	12.6	JR3-5020	0	0	A	P2	Diode	Diode No. 2
12AT7	12.6	EV7-6080	14	....	D	P3	2500	Triode No. 1
12AT7	12.6	EV2-1030	14	....	D	P3	2500	Triode No. 2
12AU6	12.6	JR3-5672	10	....	D	P3	2050	
12AU7	12.6	EV7-6080	24	....	B	P3	1400	Triode No. 1
12AU7	12.6	EV2-1030	24	....	B	P3	1400	Triode No. 2
12AV6	12.6	JR3-7025	12	....	B	P3	790	Triode Sect.
12AV6	12.6	JR3-6025	0	0	A	P2	Diode	Diode No. 1
12AV6	12.6	JR3-5026	0	0	A	P2	Diode	Diode No. 2
12AV7	12.6	EV7-6082	18	....	D	P3	2580	Triode No. 1
12AV7	12.6	EV2-1037	18	....	D	P3	2580	Triode No. 2
12AW6	12.6	JR3-5627	10	....	D	P3	2500	
12AX7	12.6	EV7-6080	8	....	D	P3	950	Triode No. 1
12AX7	12.6	EV2-1030	8	....	D	P3	950	Triode No. 2
12AY7	12.6	EV7-6080	15	....	D	P3	1100	Triode No. 1
12AY7	12.6	EV2-1030	15	....	D	P3	1100	Triode No. 2
12B7	12.6	JR6-2374	22	....	B	P3	1200	
12B8	12.6	JR0-3420	22	....	B	P3	1140	Pent. Sect. Cap=G
12B8	12.6	JR7-5060	0	....	B	P3	1260	Triode Sect.
12BA6	12.6	JR3-5672	9	....	C	P3	2700	
12BA7	12.6	EV7-9132	17	....	B	P3	470	Ampl. Sect.
12BA7	12.6	EV2-9137	25	....	B	P3	470	Osc. Sect.
12BD6	12.6	JR3-5672	13	....	D	P3	1260	
12BE6	12.6	JR7-5623	11	....	B	P3	900	Ampl. Sect.
12BE6	12.6	JR3-5627	0	....	B	P3	1000	Osc. Sect.
12BF6	12.6	JR3-7020	14	....	B	P3	1200	Triode Sect.
12BF6	12.6	JR3-6020	0	0	A	P2	Diode	Diode No. 1
12BF6	12.6	JR3-5020	0	0	A	P2	Diode	Diode No. 2
12BH7	12.6	EV7-6082	35	....	C	P3	1500	Triode No. 1
12BH7	12.6	EV2-1037	35	....	C	P3	1500	Triode No. 2
12BK6	12.6	JR3-7025	6	....	B	P3	790	Triode Sect.
12BK6	12.6	JR0-6025	0	0	A	P2	Diode	Diode No. 1
12BK6	12.6	JR0-5027	0	0	A	P2	Diode	Diode No. 2
12BN6	12.6	JR2-7536	0	....	B	P3	440	Limiter Grid
12BN6	12.6	JR6-7532	0	....	B	P3	570	Quadrature Grid
12BT6	12.6	JR3-7020	13	....	B	P3	820	Triode Sect.
12BT6	12.6	JR3-6020	0	40	A	P2	Diode	Diode No. 1
12BT6	12.6	JR3-5020	0	40	A	P2	Diode	Diode No. 2
12BU6	12.6	JR3-7020	34	....	B	P3	940	Triode Sect.
12BU6	12.6	JR3-6020	0	30	A	P2	Diode	Diode No. 1
12BU6	12.6	JR3-5020	0	30	A	P2	Diode	Diode No. 2
12C8	12.6	JR0-3672	24	....	B	P3	725	Pent. Sect. Cap=G
12C8	12.6	JR0-5073	0	0	A	P2	Diode	Diode No. 1
12C8	12.6	JR0-4073	0	0	A	P2	Diode	Diode No. 2
12F5	12.6	JR0-4070	10	....	D	P3	950	Cap=G
12H6	12.6	JR0-5072	0	65	A	P2	Diode	Diode No. 1
12H6	12.6	JR0-3042	0	65	A	P2	Diode	Diode No. 2
12J5	12.6	JR5-3072	22	....	D	P3	1640	

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
12J7	12.6	JR0-3475	22	....	B	P3	770	Cap=G
12K7	12.6	JR0-3475	19	....	B	P3	920	Cap=G
12K8	12.6	JR5-3476	11	....	B	P3	630	Heptode Sect. Cap=G
12K8	12.6	JR5-6473	0	....	C	P3	1500	Triode Sect.
12L8	12.6	JW2-7513	10	....	B	P3	1340	Pent. No. 1
12L8	12.6	JW3-4512	10	....	B	P3	1340	Pent. No. 2
12Q7	12.6	JR0-3070	17	....	B	P3	500	Triode Sect. Cap=G
12Q7	12.6	JR0-5070	0	0	A	P2	Diode	Diode No. 1
12Q7	12.6	JR0-4070	0	0	A	P2	Diode	Diode No. 2
12S8	12.6	JX0-6010	10	....	B	P3	570	Triode Sect. Cap=G
12S8	12.6	JX0-3050	0	0	A	P2	Diode	Diode No. 1
12S8	12.6	JX0-4010	0	0	A	P2	Diode	Diode No. 2
12S8	12.6	JX0-2010	0	0	A	P2	Diode	Diode No. 3
12SA7	12.6	JR7-3465	21	....	B	P3	470	Ampl. Sect.
12SA7	12.6	JR5-3467	21	....	B	P3	470	Osc. Sect.
12SC7	12.6	JX4-5061	10	....	D	P3	840	Triode No. 1
12SC7	12.6	JX3-1065	10	....	D	P3	840	Triode No. 2
12SF5	12.6	JX3-5010	10	....	D	P3	950	
12SF7	12.6	JX1-6432	0	....	B	P3	1260	Pent. Sect.
12SF7	12.6	JX0-5036	0	0	A	P2	Diode	Diode Sect.
12SG7	12.6	JR4-7652	0	....	B	P3	2100	
12SH7	12.6	JR4-7652	0	....	B	P3	2150	
12SJ7	12.6	JR4-7653	20	....	D	P3	1050	
12SK7	12.6	JR4-7653	10	....	D	P3	1260	
12SL7	12.6	JX4-5061	7	....	D	P3	1000	Triode No. 1
12SL7	12.6	JX2-1035	7	....	D	P3	1000	Triode No. 2
12SN7	12.6	JX4-5061	22	....	D	P3	1650	Triode No. 1
12SN7	12.6	JX2-1035	22	....	D	P3	1650	Triode No. 2
12SQ7	12.6	JX1-6032	11	....	D	P3	700	Triode Sect.
12SQ7	12.6	JX0-5036	0	0	A	P2	Diode	Diode No. 1
12SQ7	12.6	JX0-4036	0	0	A	P2	Diode	Diode No. 2
12SR7	12.6	JX1-6032	18	....	B	P3	1200	Triode Sect.
12SR7	12.6	JX0-5036	0	0	A	P2	Diode	Diode No. 1
12SR7	12.6	JX0-4036	0	0	A	P2	Diode	Diode No. 2
12SW7	12.6	JX1-6032	14	....	B	P3	1200	Triode Sect.
12SW7	12.6	JX0-5036	0	0	A	P2	Diode	Diode No. 1
12SW7	12.6	JX0-4036	0	0	A	P2	Diode	Diode No. 2
12SX7	12.6	JX4-5061	21	....	D	P3	1640	Triode No. 1
12SX7	12.6	JX2-1035	21	....	D	P3	1640	Triode No. 2
12SY7	12.6	JX7-3465	21	....	B	P3	470	Ampl. Sect.
12SY7	12.6	JX5-3467	21	....	B	P3	470	Osc. Sect.
12Z3	12.6	JR0-2030	0	50	A	P7	Rect.	
12Z5	12.6	JR0-6050	0	30	A	P7	Rect.	Plate No. 1
12Z5	12.6	JR0-2030	0	30	A	P7	Rect.	Plate No. 2
14A4	12.6	JR6-2070	17	....	C	P3	1650	
14A5	12.6	JR6-2370	12	....	C	P3	1900	
14A7	12.6	JR6-2374	22	....	B	P3	1200	
14AF7	12.6	JR5-6070	0	....	C	P3	1570	Triode No. 1
14AF7	12.6	JR4-3020	0	....	C	P3	1570	Triode No. 2
14B6	12.6	JR3-2070	11	....	D	P3	700	Triode Sect.
14B6	12.6	JR0-6072	0	0	A	P2	Diode	Diode No. 1
14B6	12.6	JR0-5072	0	0	A	P2	Diode	Diode No. 2
14B8	12.6	JR6-2574	27	....	B	P3	630	Pent. Sect.
14B8	12.6	JR4-3576	18	....	B	P3	315	Osc. Sect.
14C5	12.6	JR6-2370	23	....	C	P3	2330	
14C7	12.6	JR6-2374	20	....	D	P3	990	
14E6	12.6	JR3-2070	12	....	B	P3	1380	Triode Sect.
14E6	12.6	JR0-6072	0	0	A	P2	Diode	Diode No. 1
14E6	12.6	JR0-5072	0	0	A	P2	Diode	Diode No. 2
14E7	12.6	JR6-2570	24	....	B	P3	820	Pent. Sect.
14E7	12.6	JR0-4072	0	0	A	P2	Diode	Diode No. 1
14E7	12.6	JR0-3072	0	0	A	P2	Diode	Diode No. 2
14F7	12.6	JR5-6073	0	....	B	P3	1000	Triode No. 1
14F7	12.6	JR4-3026	0	....	B	P3	1000	Triode No. 2
14F8	12.6	HS8-6050	10	....	D	P3	3150	Triode No. 1
14F8	12.6	HS1-3040	10	....	D	P3	3150	Triode No. 2
14H7	12.6	JR6-2374	10	....	D	P3	2400	
14J7	12.6	JR6-2574	18	....	B	P3	500	Heptode Sect.
14J7	12.6	JR4-3576	18	....	B	P3	630	Triode Sect.
14N7	12.6	JR5-6073	20	....	D	P3	1640	Triode No. 1
14N7	12.6	JR4-3026	20	....	D	P3	1640	Triode No. 2
14Q7	12.6	JR6-2374	21	....	B	P3	500	Pent. Sect.
14Q7	12.6	JR4-2376	21	....	B	P3	500	Osc. Sect.
14R7	12.6	JR6-2570	10	....	C	P3	1900	Pent. Sect.
14R7	12.6	JR0-4072	0	0	A	P2	Diode	Diode No. 1
14R7	12.6	JR0-3072	0	0	A	P2	Diode	Diode No. 2
14S7	12.6	JR6-2574	18	....	B	P3	950	Heptode Sect.
14S7	12.6	JR4-3576	0	....	B	P3	950	Triode Sect.
14V7	12.6	JR6-2374	6	....	C	P3	2500	
14W7	12.6	JR6-2375	10	....	D	P3	2200	
14X7	12.6	JR3-2040	10	....	D	P3	630	Triode Sect.
14X7	12.6	JR0-5040	0	70	A	P2	Diode	Diode No. 1
14X7	12.6	JR0-6070	0	70	A	P2	Diode	Diode No. 2
14Y4	12.6	JR0-6070	0	0	A	P7	Rect.	Plate No. 1
14Y4	12.6	JR0-3070	0	0	A	P7	Rect.	Plate No. 2
14Z3	12.6	JR0-2030	0	50	A	P7	Rect.	
15	2.0	JR0-2340	10	....	B	#	390	#CAP=G HOLD DOWN P2 AND PRESS P3
19	2.0	JR4-5000	15	....	B	P3	630	Triode No. 1
19	2.0	JR3-2000	15	....	B	P3	630	Triode No. 2
19BG6	20.0	JR5-0730	18	....	D	P3	3800	Cap=P
19C8	20.0	EV8-9070	12	....	D	P3	790	Triode Sect.
19C8	20.0	EV8-6070	0	70	A	P2	Diode	Diode No. 1
19C8	20.0	EV8-2030	0	70	A	P2	Diode	Diode No. 2
19C8	20.0	EV8-1070	0	70	A	P2	Diode	Diode No. 3
19J6	20.0	JR5-2076	17	....	D	P3	3350	Triode No. 1
19J6	20.0	JR6-3075	17	....	D	P3	3350	Triode No. 2
19T8	20.0	EV8-9076	11	....	B	P3	760	Triode Sect.
19T8	20.0	EV0-6071	0	70	A	P2	Diode	Diode No. 1
19T8	20.0	EV0-2037	0	70	A	P2	Diode	Diode No. 2
19T8	20.0	EV0-1078	0	70	A	P2	Diode	Diode No. 3

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
20	3.0	JR3-2000	77	....	B	P3	330	
RK20A	7.5	JR3-0240	0	....	C	P3	1600	Cap=P
VX21	1.1	CX0-4000	0	0	A	P2	Diode	PINS: F—=2, F+=7, P=4 OK ABOVE 250 ON 3000 SCALE
22	3.0	JR0-2300	20	....	B	#	315	#CAP=G. HOLD DOWN P2 AND PRESS P3
24	2.5	JR0-2340	12	....	B	P3	630	Cap=G
24A	2.5	JR0-2340	12	....	B	P3	630	Cap=G
VT25A	7.5	JR3-2000	30	....	B	P3	1260	
25A6	25.0	JR5-3470	43	....	B	P3	1450	
25A7	25.0	JR5-3476	50	....	B	P3	1130	Pent. Sect.
25A7	25.0	JR0-6023	0	55	A	P7	Rect.	Rect. Sect.
25AC5	25.0	JR5-3070	0	....	B	P3	950	
25AV5	25.0	JR2-5730	50	....	C	P3	2450	
25B5	25.0	JR4-2350	0	....	B	P3	1570	
25B6	25.0	JR5-3470	52	....	C	P3	2500	
25B8	25.0	JR0-3420	22	....	B	P3	1260	**Pent. Sect. Cap=G**
25B8	25.0	JR7-5060	10	....	B	P3	950	Triode Sect.
25BQ6	25.0	JR5-0470	50	....	C	P3	2800	Cap=P
25C6	25.0	JR5-3470	33	....	D	P3	3800	
25D8	25.0	JR0-3420	18	....	B	P3	1200	**Pent. Sect. Cap=G**
25D8	25.0	JR5-6020	0	....	B	P3	700	Triode Sect.
25D8	25.0	JR5-7020	0	30	A	P2	Diode	Diode Sect
25L6	25.0	JR5-3472	10	....	D	#	5650	#HOLD DOWN P2 AND PRESS P3
25N6	25.0	JR5-3470	0	....	B	P3	1570	
25T	6.3	JR3-0000	0	....	B	P3	630	Cap=P
25W4	25.0	JX0-5030	0	60	A	P7	Rect.	
25Y5	25.0	JR0-5040	0	0	A	P7	Rect.	Plate No. 1
25Y5	25.0	JR0-2030	0	0	A	P7	Rect.	Plate No. 2
25Z5	25.0	JR0-5040	0	55	A	P7	Rect.	Plate No. 1
25Z5	25.0	JR0-2030	0	55	A	P7	Rect.	Plate No. 2
25Z5MG	25.0	JR0-5070	0	55	A	P7	Rect.	Plate No. 1
25Z5MG	25.0	JR0-3040	0	55	A	P7	Rect.	Plate No. 2
25Z6	25.0	JR0-5072	0	55	A	P7	Rect.	Plate No. 1
25Z6	25.0	JR0-3042	0	55	A	P7	Rect.	Plate No. 2
26	1.5	JR3-2000	43	....	B	P3	725	
26A6	25.0	JR3-5672	9	....	C	P3	2500	
26A7	25.0	JW2-7513	11	....	D	#	3450	#PENT. NO. 1. HOLD DOWN P2 AND PRESS P3
26A7	25.0	JW3-4512	11	....	D	#	3450	#PENT. NO. 2. HOLD DOWN P2 AND PRESS P3
26BK6	25.0	JR3-7025	6	....	B	P3	790	Triode Sect.
26BK6	25.0	JR0-6025	0	0	A	P2	Diode	Diode No. 1
26BK6	25.0	JR0-5027	0	0	A	P2	Diode	Diode No. 2
26C6	25.0	JR3-7020	18	....	B	P3	1200	Triode Sect.
26C6	25.0	JR3-6020	0	0	A	P2	Diode	Diode No. 1
26C6	25.0	JR3-5020	0	0	A	P2	Diode	Diode No. 2
26D6	25.0	JR7-5623	11	....	B	P3	900	Ampl. Sect.
26D6	25.0	JR3-5627	0	....	B	P3	1000	Osc. Sect.
27	2.5	JR3-2040	41	....	B	P3	630	
28D7	25.0	JR7-5362	20	....	D	#	2140	#PENT. NO. 1. HOLD DOWN P2 AND PRESS P3
28D7	25.0	JR2-4367	20	....	D	#	2140	#PENT. NO. 2. HOLD DOWN P2 AND PRESS P3
30	2.0	JR3-2000	40	....	B	P3	570	
31	2.0	JR3-2000	65	....	B	P3	580	
32	2.0	JR0-2300	19	....	B	#	400	#CAP=G HOLD DOWN P2 AND PRESS P3
32L7	35.0	JR5-3470	34	....	C	P3	3000	Ampl. Sect.
32L7	35.0	JR0-6023	0	55	A	P7	Rect.	Rect. Sect.
33	2.0	JR3-2400	35	....	B	P3	900	
RK33	6.3	JR4-5060	38	....	B	P3	860	Triode No. 1
RK33	6.3	JR0-3020	38	....	B	P3	860	**Triode No. 2 Cap=G**
34	2.0	JR0-2300	17	....	B	#	380	#CAP=G. HOLD DOWN P2 AND PRESS P3
RK34	6.3	JR3-0040	18	....	B	P3	1670	Triode No. 1 Right Cap=P
RK34	6.3	JR5-0040	18	....	B	P3	1670	Triode No. 2 Left Cap=P
35	2.5	JR0-2340	24	....	B	P3	650	Cap=G
35A5	35.0	JR6-2370	33	....	D	P3	3700	
35B5	35.0	JR3-5620	32	....	D	P3	2830	
35C5	35.0	JR2-7630	32	....	D	P3	2830	
35L6	35.0	JR5-3470	33	....	D	P3	3700	
35W4	BLST	JR0-3670	....	....	....	....	.....	**Short on 1-2-3-4-5**
35W4	35.0	JR0-5070	0	60	A	P7	Rect.	Rect. Sect.
35Y4	BLST	JR0-2470	....	....	....	....	.....	**Short on 1-2-3-4-5**
35Y4	35.0	JR0-2070	0	60	A	P7	Rect	Rect. Sect.
35Z3	35.0	JR0-2070	0	60	A	P7	Rect.	
35Z4	35.0	JR0-5070	0	60	A	P7	Rect.	
35Z5	BLST	JR0-5370	....	....	....	....	.....	**Short on 1-2-3-4-5**
35Z5	35.0	JR0-5070	0	60	A	P7	Rect.	Rect. Sect.
35Z6	35.0	JR0-5070	0	60	A	P7	Rect.	Plate No. 1
35Z6	35.0	JR0-3040	0	60	A	P7	Rect.	Plate No. 2
36	6.3	JR0-2340	24	....	B	P3	660	Cap=G
37	6.3	JR3-2040	41	....	B	P3	570	
38	6.3	JR0-2340	39	....	B	P3	660	Cap=G
39/44	6.3	JR0-2340	28	....	B	P3	630	Cap=G
40	5.0	JR3-2000	32	....	B	P3	125	
40Z5	BLST	JR0-5370	....	....	....	....	.....	**Short on 1-2-3-4-5**
40Z5	50.0	JR0-5070	0	60	A	P7	Rect.	
41	6.3	JR4-2350	34	....	B	P3	1000	
42	6.3	JR4-2350	29	....	B	P3	1260	
43	25.0	JR4-2350	43	....	B	P3	1450	
45	2.5	JR3-2000	61	....	B	P3	1170	
45Z3	50.0	HT0-2080	0	55	A	P7	Rect.	
45Z5	BLST	JR0-5370	....	....	....	....	.....	**Short on 1-2-3-4-5**
45Z5	50.0	JR0-5070	0	60	A	P7	Rect.	Rect. Sect.
46	2.5	JR3-2400	30	....	B	P3	1260	
47	2.5	JR3-2400	22	....	B	P3	1260	
48	25.0	JR4-2350	58	....	B	P3	1260	
49	2.0	JR3-2400	49	....	B	P3	710	
50	7.5	JR3-2000	61	....	B	P3	950	
50A5	50.0	JR6-2370	10	....	D	#	5650	#HOLD DOWN P2 AND PRESS P3
50B5	50.0	JR3-5620	10	....	D	#	5650	#HOLD DOWN P2 AND PRESS P3
50C5	50.0	JR2-7630	10	....	D	#	5650	#HOLD DOWN P2 AND PRESS P3

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
50C6	50.0	JR5-3472	33	....	D	P3	3800	
50L6	50.0	JR5-3472	10	....	D	#	5650	#HOLD DOWN P2 AND PRESS P3
50X6	50.0	JR0-6075	0	55	A	P7	Rect.	Plate No. 1
50X6	50.0	JR0-3025	0	55	A	P7	Rect.	Plate No. 2
50Y6	50.0	JR0-5070	0	55	A	P7	Rect.	Plate No. 1
50Y6	50.0	JR0-3040	0	55	A	P7	Rect.	Plate No. 2
50Y7	BLST	JR0-0600	....	....	....	....	.....	**Short on 1-2-3-4-5**
50Y7	50.0	JR0-5070	0	55	A	P7	Rect.	Plate No. 1
50Y7	50.0	JR0-3040	0	55	A	P7	Rect.	Plate No. 2
50Z7	BLST	JR0-0600	....	....	....	....	.....	**Short on 1-2-3-4-5**
50Z7	50.0	JR0-5070	0	55	A	P7	Rect.	Plate No. 1
50Z7	50.0	JR0-3040	0	55	A	P7	Rect.	Plate No. 2
HD51	BLST	KR0-3020	0	47	A	P4	Volt. Reg.	READ AS RECTIFIER
51/51S	2.5	JR0-2340	24	....	B	P3	640	Cap=G
52	6.3	JR3-2400	33	....	C	P3	1500	
53	2.5	JR5-6042	12	....	B	P3	950	Triode No. 1
53	2.5	JR3-2046	12	....	B	P3	950	Triode No. 2
55	2.5	JR0-2050	39	....	B	P3	610	**Triode Sect. Cap=G**
55	2.5	JR0-4050	0	0	A	P2	Diode	Diode No. 1
55	2.5	JR0-3050	0	0	A	P2	Diode	Diode No. 2
56	2.5	JR3-2040	29	....	B	P3	920	
57	2.5	JR0-2354	21	....	B	P3	770	Cap=G
57A	6.3	JR0-2354	21	....	B	P3	770	Cap=G
58	2.5	JR0-2354	24	....	B	P3	900	Cap=G
58A/58AS	6.3	JR0-2354	24	....	B	P3	900	Cap=G
59	2.5	JR4-2365	22	....	B	P3	1260	
HY65	6.3	JR5-0407	0	....	C	P3	1900	Cap=P
VT67	2.0	JR3-2000	40	....	B	P3	570	
HY69	6.3	JR3-0240	0	....	C	P3	1900	Cap=P
70A7	75.0	JR5-3470	50	....	C	P3	1900	Pent. Sect.
70A7	75.0	JR0-2000	0	60	A	#	Rect.	#RECT. SECT. HOLD DOWN P8 AND PRESS P7
70L7	75.0	JR5-3460	41	....	C	P3	3150	Pent. Sect.
70L7	75.0	JR0-7023	0	60	A	P7	Rect.	Rect. Sect.
71A	5.0	JR3-2000	73	....	B	P3	1040	
75	6.3	JR0-2050	11	....	B	P3	470	**Triode Sect. Cap=G**
75	6.3	JR0-4052	0	0	A	P2	Diode	Diode No. 1
75	6.3	JR0-3052	0	0	A	P2	Diode	Diode No. 2
75MG	6.3	JR0-4070	11	....	B	P3	470	**Triode Sect. Cap=G**
75MG	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
75MG	6.3	JR0-6070	0	0	A	P2	Diode	Diode No. 2
76	6.3	JR3-2040	29	....	B	P3	900	
77	6.3	JR0-2354	21	....	D	P3	770	Cap=G
78	6.3	JR0-2354	24	....	B	P3	900	Cap=G
79	6.3	JR0-5040	15	....	B	P3	630	**Triode No. 1 Cap=G**
79	6.3	JR3-2040	15	....	B	P3	630	Triode No. 2
80	5.0	JR0-3000	0	0	A	P7	Rect.	Plate No. 1
80	5.0	JR0-2000	0	0	A	P7	Rect.	Plate No. 2
81	7.5	JR0-2000	0	40	A	P6	Rect.	
82	2.5	JR0-3000	0	50	A	P7	Rect.	Plate No. 1
82	2.5	JR0-2000	0	50	A	P7	Rect.	Plate No. 2
83	5.0	JR0-3000	0	67	A	P7	Rect.	Plate No. 1
83	5.0	JR0-2000	0	55	A	P7	Rect.	Plate No. 2
83V	5.0	JR0-3000	0	63	A	P7	Rect.	Plate No. 1
83V	5.0	JR0-2000	0	63	A	P7	Rect.	Plate No. 2
84	6.3	JR0-3040	0	40	A	P7	Rect.	Plate No. 1
84	6.3	JR0-2040	0	40	A	P7	Rect.	Plate No. 2
85	6.3	JR0-2050	39	....	B	P3	620	**Triode Sect. Cap=G**
85	6.3	JR0-4052	0	0	A	P2	Diode	Diode No. 1
85	6.3	JR0-3052	0	0	A	P2	Diode	Diode No. 2
85AS	6.3	JR0-2050	28	....	B	P3	700	**Triode Sect. Cap=G**
85AS	6.3	JR0-4052	0	0	A	P2	Diode	Diode No. 1
85AS	6.3	JR0-3052	0	0	A	P2	Diode	Diode No. 2
89/89Y	6.3	JR0-2354	37	....	B	P3	980	Cap=G
99	3.0	JR3-2000	55	....	B	P3	270	
101D	4.3	JR3-2000	55	....	B	P3	700	
101F	4.3	JR3-2000	53	....	B	P3	700	
102D	2.0	JR3-2000	25	....	B	P3	315	
102F	2.0	JR3-2000	25	....	B	P3	365	
104D	4.3	JR3-2000	75	....	B	P3	700	
CK108	6.3	JR0-2354	21	....	D	P3	770	Cap=G
112A	5.0	JR3-2000	44	....	B	P3	1040	
CK113	50.0	JR5-3476	48	....	B	P3	1130	
HY114	1.5	JR0-0000	19	....	B	P3	700	Right Cap=P Lower Cap=G
117L7	117.0	JR4-3570	37	....	C	P3	2500	Pent. Sect.
117L7	117.0	JR0-6020	0	60	A	P7	Rect.	Rect. Sect.
117M7	117.0	JR4-3570	37	....	C	P3	2500	Pent. Sect.
117M7	117.0	JR0-6020	0	60	A	P7	Rect.	Rect. Sect.
117N7	117.0	JR4-3560	37	....	D	P3	3150	Pent. Sect.
117N7	117.0	JR0-7000	0	60	A	#	Rect.	#RECT. SECT. HOLD DOWN P8 AND PRESS P7
117P7	117.0	JR4-3560	37	....	C	P3	2500	Pent. Sect.
117P7	117.0	JR0-7000	0	70	A	#	Rect.	#RECT. SECT. HOLD DOWN P8 AND PRESS P7
117Z3	117.0	JR0-5060	0	60	A	P7	Rect.	
117Z4	117.0	JR0-5070	0	60	A	P7	Rect.	
117Z6	117.0	JR0-5070	0	60	A	P7	Rect.	Plate No. 1
117Z6	117.0	JR0-3040	0	60	A	P7	Rect.	Plate No. 2
C182	5.0	JR3-2000	46	....	B	P3	630	
C182A	5.0	JR3-2000	79	....	B	P3	950	
182B	5.0	JR3-2000	58	....	B	P3	950	
183	5.0	JR3-2000	79	....	B	P3	950	
205F	5.0	JR3-2000	34	....	B	P3	920	
231D	3.0	JR3-2000	49	....	B	P3	340	
244A	2.0	JR3-2040	42	....	B	P3	570	
245A	2.0	JR0-2340	55	....	B	P3	460	Cap=G
247A	2.0	JR3-2040	33	....	B	P3	580	
TS251	50.0	JR5-3476	50	....	B	P3	1130	Pent. Sect.
TS251	50.0	JR0-6023	0	55	A	P7	Rect.	Rect. Sect.
257A	3.0	JR0-2000	49	....	B	P3	340	Cap=G
259A	2.0	JR0-2340	33	....	B	P3	1100	Cap=G
262B	10.0	JR0-2030	31	....	B	P3	1000	Cap=G

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
264B	1.5	JR3-2000	49	....	B	P3	365	
264C	1.5	JR3-2000	54	....	B	P3	365	
271A	5.0	JR3-2040	32	....	C	P3	2900	
272A	10.0	JR3-2040	51	....	B	P3	600	
274B	5.0	HR0-6000	0	16	A	P7	Rect.	Plate No. 1
274B	5.0	HR0-4000	0	16	A	P7	Rect.	Plate No. 2
275A	5.0	JR3-2000	68	....	C	P3	1700	
283A	2.0	JR0-2340	28	....	B	P3	630	Cap=G
285A	2.0	JR0-2304	40	....	B	P3	570	Cap=G
300B	5.0	JR3-2000	60	....	C	P3	2900	
307A	5.0	JR3-0204	32	....	B	P3	1600	Cap=P
309A	10.0	JR0-2340	31	....	B	P3	570	Cap=G
310A	10.0	JR0-2354	19	....	D	P3	1130	Cap=G
311A	10.0	JR0-2340	38	....	B	P3	1500	Cap=G
313CA	.....	AP8-2010	0	75	A	P4	Rect.	
328A	7.5	JR0-2354	19	....	D	P3	1130	Cap=G
329A	7.5	JR0-2340	38	....	C	P3	1550	Cap=G
336A	10.0	JR4-2350	10	....	D	P3	1950	
337A	10.0	JR0-2354	21	....	D	P3	1070	Cap=G
339A	5.0	JR3-0240	0	....	C	P3	2000	Cap=P
348A	6.3	JR0-3475	19	....	D	P3	1130	Cap=G
349A	6.3	JR5-3470	10	....	D	P3	2500	
350B	6.3	JR5-3470	25	....	D	P3	3900	
351A	6.3	JR0-5072	0	25	A	P7	Rect.	Plate No. 1
351A	6.3	JR0-3072	0	25	A	P7	Rect.	Plate No. 2
352A	10.0	JR0-2050	36	....	B	P3	410	**Triode Sect. Cap=G**
352A	10.0	JR0-4050	0	30	A	P2	Diode	Diode No. 1
352A	10.0	JR0-3050	0	30	A	P2	Diode	Diode No. 2
367A	6.3	JV6-1470	24	....	D	P3	3800	
373A	2.0	JR4-7603	17	....	D	P3	850	
374A	3.0	JR4-7602	40	....	D	P3	1700	
375A	20.0	JR5-3470	53	....	C	P3	2330	
381A	6.3	HR0-5020	0	70	A	P2	Diode	
383A	6.3	HR4-6020	25	....	D	P3	1770	
385A	6.3	HR5-0328	15	....	D	P3	1480	Cap=P
387A	6.3	HR5-0328	15	....	D	P3	2000	Cap=P
396A	6.3	KR3-4028	17	....	D	P3	3300	Triode No. 1
396A	6.3	KR7-6082	17	....	D	P3	3300	Triode No. 2
398A	6.3	JR4-7603	35	....	D	P3	3350	
400A	1.1	DX6-2185	35	....	B	P3	315	Pent. Sect.
400A	1.1	DX8-2165	35	....	B	P3	315	Osc. Sect.
401A	6.3	JR3-5670	12	....	B	#	1260	#HOLD DOWN P2 AND PRESS P3
403A	6.3	JR3-5620	10	....	D	P3	2750	
420	2.5	JR0-3000	0	60	A	P7	Rect.	Plate No. 1
420	2.5	JR0-2000	0	60	A	P7	Rect.	Plate No. 2
446A	6.3	JR0-0070	0	....	C	P3	1510	Cap=P Ring=G
482A	5.0	JR3-2000	79	....	B	P3	950	
482B	5.0	JR3-2000	57	....	B	P3	950	
483	5.0	JR3-2000	79	....	B	P3	850	
484	3.0	JR3-2040	37	....	B	P3	820	
484A	3.0	JR3-2040	37	....	B	P3	820	
485	3.0	JR3-2040	37	....	B	P3	820	
486	3.0	JR3-2040	43	....	B	P3	280	
GL502	6.3	JR5-3670	#	55	A	P7	Thyr.	#STRIKES AT ABOUT 65 READ AS RECTIFIER.
CK502AX	1.1	DV4-1200	18	....	B	#	380	#HOLD DOWN P2 AND PRESS P3
CK503AX	1.1	DV4-1200	30	....	B	#	150	#HOLD DOWN P2 AND PRESS P3
CK505AX	‡1.1	DV4-1200	0	....	B	‡	100	‡ADJUST LINE TEST TO 1000 ON 3000 SCALE HOLD DOWN P2 AND PRESS P3
CK506AX	1.1	DV4-1200	33	....	B	#	315	#HOLD DOWN P2 AND PRESS P3
CK510AX	‡1.1	EX1-2300	0	0	A	P4	‡	‡ADJUST LINE TEST TO 1000 ON 3000 SCALE. SECTION NO. 1 OK ABOVE 100 ON 3000 SCALE
CK510AX	‡1.1	EX6-5300	0	0	A	P4	‡	‡ADJUST LINE TEST TO 1000 ON 3000 SCALE. SECTION NO. 2 OK ABOVE 100 ON 3000 SCALE
CK512AX	‡1.1	DV4-1200	30	0	A	P4	‡	‡ADJUST LINE TEST TO 1000 ON 3000 SCALE. OK ABOVE 500 ON 3000 SCALE
CK518AX	1.1	DV4-1200	43	0	A	P4	#	#OK over Diodes OK
CK522AX	1.1	DV4-1200	38	0	A	P4	#	#OK over Diodes OK
CK523AX	1.1	DV4-1200	46	0	A	P4	#	#OK over Diodes OK
CK524AX	1.1	DV4-1200	73	0	A	P4	#	#OK over Diodes OK
CK525AX	1.1	DV4-1200	48	0	A	P4	#	#OK over Diodes OK
CK526AX	1.1	DV4-1200	59	0	A	P4	#	#OK over Diodes OK
CK527AX	1.1	DV4-1200	32	0	A	P4	#	#OK OVER 500 ON 3000 SCALE
CK528AX	1.1	DV4-1200	37	0	A	P4	#	#OK over Diodes OK
CK529AX	1.1	DV4-1200	64	0	A	P4	#	#OK over Diodes OK
CK544DX	1.1	DV4-1200	30	0	A	P4	#	#OK OVER 500 ON 3000 SCALE
GL546	6.3	JR3-7520	#	50	A	P7	Thyr.	#STRIKES AT ABOUT 65 READ AS RECTIFIER.
CK556AX	1.1	ES3-1000	31	....	D	P3	1000	
559	6.3	JR0-0070	0	65	A	P2	Diode	Cap=P
CK568AX	1.1	ES3-1000	40	....	B	P3	280	
CK569AX	1.1	DV4-1200	18	....	D	P3	630	
CK571AX	1.1	DU7-1200	92	....	B	P3	100	
CK573AX	1.1	CU3-1000	34	....	B	P3	1260	
CK606BX	6.3	CT0-1040	0	70	A	P2	Diode	
CK608CX	6.3	DU5-1060	21	....	D	P3	3150	
CK619CX	6.3	CT4-1050	8	....	D	P3	2500	
629	2.5	JR3-2040	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 29. READ AS RECTIFIER.
717A	6.3	JR4-7630	0	....	C	P3	2200	
801A	7.5	JR3-2000	0	....	B	P3	950	
802	6.3	JR4-0365	22	....	B	P3	1260	Cap=P
803	10.0	JR7-3020	25	....	B	P3	1260	SEE SECT. 4. PAR. 4a (29)
807	6.3	JR3-0240	33	....	C	P3	2400	Cap=P
809	6.3	JR3-0000	0	....	B	P3	1050	Cap=P
811	6.3	JR3-0000	0	....	B	P3	900	Cap=P
812	6.3	JR3-0000	0	....	B	P3	1400	Cap=P
814	10.0	JR3-0240	0	....	C	P3	1900	Cap=P
815	12.6	HS8-0430	40	....	C	P3	2500	Left Cap=P
815	12.6	HS1-0430	35	....	C	P3	2500	Right Cap=P
816	2.5	JR0-0000	0	65	A	P7	Rect.	Cap=P
SD828A★	6.3	EW3-1520	18	....	D	P3	2080	E Basing

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
829B	6.3	JR5-0674	100	87	A	P4	#	#LEFT CAP=P. READ AS RECTIFIER. SEE SECT. 4. PAR. 4a (29)
829B	6.3	JR4-0674	100	87	A	P4	#	#RIGHT CAP=P. READ AS RECTIFIER. SEE SECT. 4. PAR. 4a (29)
832A	6.3	JR5-0674	100	87	A	P4	#	#LEFT CAP=P. READ AS RECTIFIER. SEE SECT. 4. PAR. 4a (29)
832A	6.3	JR4-0674	100	87	A	P4	#	#RIGHT CAP=P. READ AS RECTIFIER. SEE SECT. 4. PAR. 4a (29)
SN838E★	6.3	EW3-0512	17	....	D	P3	1825	E BASING TOP LEAD=P
834	7.5	JR0-0000	0	....	B	P3	1140	Near Cap=G Far Cap=P
837	12.6	JR4-0365	0	....	C	P3	2500	Cap=P
841	7.5	JR3-2000	0	....	B	P3	630	
842	7.5	JR3-2000	61	....	D	P3	750	
843	2.5	JR3-2040	12	....	B	P3	1050	
864	1.1	JR3-2000	45	....	B	P3	410	
865	7.5	JR3-0200	34	....	B	P3	390	Cap=P
866A	2.5	JR0-0000	0	55	A	P7	Rect.	Cap=P
871	2.5	JR0-0000	0	55	A	P7	Rect.	Cap=P
874	.....	JP0-3000	0	50	A	P4	Volt. Reg.	SHORT ON 3 READ AS RECTIFIER.
879	2.5	JR0-0000	0	83	A	P4	Rect.	Cap=P
884	6.3	JR5-3070	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 67 READ AS RECTIFIER
885	2.5	JR3-2040	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 67 READ AS RECTIFIER
SD917A★	6.3	DU2-1050	17	....	D	P3	950	C Basing
SN944 ★	6.3	EW3-0512	15	....	D	P3	1500	E BASING TOP LEAD=P
SN946 ★	6.3	CT0-1040	0	70	A	P2	Diode	A Basing
SN947D★	6.3	DW1-5782	54	....	C	P3	1900	F Basing
SN949C★	6.3	DW7-1250	#	60	A	P7	Thyr.	#F BASING. STRIKES AT ABOUT 65. READ AS RECTIFIER
950	2.0	JR3-2400	45	....	B	P3	600	
951	2.0	JR0-2300	18	....	B	#	410	#CAP=G. HOLD DOWN P2 AND PRESS P3
SN953D★	6.3	DW1-5720	25	....	D	P3	2650	F Basing
954	6.3	JR7-0364	21	....	B	P3	700	Cap=P
SN954★	6.3	ES0-1030	0	25	A	P7	Rect.	B Basing
955	6.3	JR4-3060	22	....	B	P3	1200	
SN955B★	6.3	DW1-7084	16	....	D	P3	2200	**F Basing Triode No. 1**
SN955B★	6.3	DW2-5084	16	....	D	P3	2200	**F Basing Triode No. 2**
956	6.3	JR7-0364	17	....	B	P3	950	Cap=P
SN956B	1.1	BS0-0000	0	0	A	P7	Rect.	TOP LEAD=P OK OVER 100 ON 3000 SCALE
957	1.5	JR4-3000	28	....	B	P3	400	
SN957A★	6.3	FT4-1020	29	....	D	P3	1380	D Basing
958	1.5	JR4-3000	41	....	B	P3	750	
959	1.5	JR7-0300	25	....	B	#	380	#CAP=P HOLD DOWN P2 AND PRESS P3
SN972D★	6.3	DW1-5740	21	....	B	P3	1260	F Basing
SN973B★	6.3	GT1-5740	21	....	D	P3	1900	F Basing
SN976C★	6.3	DW1-5740	49	....	C	P3	2500	F Basing
SD993C★	6.3	DW1-8050	20	....	D	P3	3660	F Basing
SD995B★	6.3	DW1-5740	21	....	B	P3	1260	F Basing
FM1000	6.3	JR2-4536	12	....	B	P3	950	No. 1 Grid
FM1000	6.3	JR6-4532	12	....	B	P3	950	No. 2 Grid
CK1005	6.3	GX0-3050	0	94	A	P4	Rect.	Plate No. 1
CK1005	6.3	GX0-5030	0	94	A	P4	Rect.	Plate No. 2
SN1006★	6.3	FT4-1020	28	....	B	P3	300	D Basing
E1148	6.3	JR0-0070	14	....	B	P3	1390	Upper Cap=P Lower Cap=G
1201	6.3	JS1-3040	18	....	D	P3	1900	
1203	6.3	JR0-4070	0	55	A	P2	Diode	
1204	6.3	HS5-3140	10	....	D	P3	1150	
1206	6.3	JR5-7362	10	....	B	P3	1320	Tetrode No. 1
1206	6.3	JR4-2367	10	....	B	P3	1320	Tetrode No. 2
1229	2.0	JR0-2300	19	....	B	#	400	#CAP=G HOLD DOWN P2 AND PRESS P3
1231	6.3	JR6-2374	0	....	C	P3	1600	
1232	6.3	JR6-2374	18	....	B	P3	1250	
1237	2.5	JR0-3000	0	76	A	P7	Rect.	PLATE NO. 1 SHORT ON 1-2-4-5
1237	2.5	JR0-6000	0	76	A	P7	Rect.	PLATE NO. 2 SHORT ON 1-2-4-5
HY1269	12.6	JR3-0240	0	....	C	P3	2500	Cap=P
1273	6.3	JR6-2374	11	....	B	P3	1450	
1280	12.6	JR6-2374	11	....	B	P3	1450	
1284	12.6	JR6-2374	28	....	B	P3	1250	
1285	25.0	JR5-3470	36	....	D	P3	3650	
1291	2.5	BY6-7000	25	....	B	P3	950	Triode No. 1
1291	2.5	JR3-2000	25	....	B	P3	950	Triode No. 2
1293	1.5	JR6-2000	30	....	B	P3	820	
1294	1.5	JR0-4070	0	0	A	P2	Diode	
1299	2.5	JR6-2300	37	....	B	P3	1300	
1602	7.5	JR3-2000	39	....	B	P3	790	
1603	6.3	JR0-2354	21	....	B	P3	770	Cap=G
1609	1.1	JR3-2400	0	....	B	#	440	#HOLD DOWN P2 AND PRESS P3
1610	2.5	JR3-2400	22	....	B	P3	1260	
1611	6.3	JR5-3472	29	....	B	P3	1260	
1612	6.3	JR0-3475	23	....	B	P3	410	Cap Grid Cap=G
1612	6.3	JR5-3472	27	....	B	P3	410	Pin Grid
1613	6.3	JR5-3470	0	....	B	P3	1400	
1614	6.3	JR5-3472	23	....	D	P3	3150	
1616	2.5	JR0-0000	0	45	A	P6	Rect.	Cap=P
1619	2.5	JR5-3407	12	....	C	P3	2150	
1620	6.3	JR0-3475	22	....	B	P3	770	Cap=G
1621	6.3	JR5-3470	29	....	B	P3	1250	
1622	6.3	JR5-3470	23	....	D	P3	3150	
1623	6.3	JR3-0000	0	....	B	P3	1400	Cap=P
1624	2.5	JR3-0200	17	....	C	P3	2500	Cap=P
1625	12.6	JR4-0360	33	....	C	P3	2000	Cap=P
1626	12.6	JR5-3070	52	....	B	P3	1325	
1629	12.6	JR5-4070	0	100	A	P3	Eye	Eye Open
1629	12.6	JR5-4370	0	100	A	P3	Eye	Eye Closed
1631	12.6	JR5-3472	23	....	D	P3	3150	
1632	12.6	JR5-3470	10	....	D	#	5650	#HOLD DOWN P2 AND PRESS P3
1633	25.0	JX4-5060	23	....	D	P3	1650	Triode No. 1
1633	25.0	JX2-1030	23	....	D	P3	1650	Triode No. 2
1634	12.6	JX4-5062	0	....	B	P3	650	Triode No. 1

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
1634	12.6	JX3-1062	0	....	B	P3	650	Triode No. 2
1635	6.3	JR4-3070	0	....	B	P3	540	Triode No. 1
1635	6.3	JR5-6070	0	....	B	P3	540	Triode No. 2
1642	6.3	JR4-5060	38	....	B	P3	875	Triode No. 1
1642	6.3	JR0-3020	38	....	B	P3	875	Triode No. 2 Cap=G
1644	12.6	JW2-7513	10	....	B	P3	1350	Pentode No. 1
1644	12.6	JW3-4512	10	....	B	P3	1350	Pentode No. 2
1650	6.3	JR4-3060	22	....	B	P3	1200	
1654	1.5	DX0-0000	0	60	A	P4	Rect.	Cap=P Short on 3
1655	6.3	JX4-5061	10	....	D	P3	840	Triode No. 1
1655	6.3	JX3-1065	10	....	D	P3	840	Triode No. 2
1657	6.3	JR5-3670	#	93	A	P4	Thyr.	#STRIKES AT ABOUT 45 READ AS RECTIFIER.
1658	2.0	JR3-2000	40	....	B	P3	570	
1659	2.5	JR0-2050	11	....	B	P3	470	Triode Sect. Cap=G
1659	2.5	JR0-4050	0	0	A	P2	Diode	Diode No. 1
1659	2.5	JR0-3050	0	0	A	P2	Diode	Diode No. 2
1662	2.5	DX8-2100	33	....	B	P3	1260	
1851	6.3	JR0-3475	10	....	D	P3	3150	Cap=G
1852	6.3	JR4-7653	10	....	D	P3	3800	
1853	6.3	JR4-7653	0	....	C	P3	2200	
2050	6.3	JR5-3670	#	93	A	P4	Thyr.	#STRIKES AT ABOUT 45 READ AS RECTIFIER.
2051	6.3	JR5-3670	#	93	A	P4	Thyr.	#STRIKES AT ABOUT 35 READ AS RECTIFIER.
5516	6.3	JR5-0320	20	....	C	P3	2500	Cap=P Short on 3
5517	BLST	AP0-8070	0	55	A	P6	Volt. Reg.	CAP=P. READ AS RECTIFIER
5556	4.3	JR3-2000	26	....	B	P3	625	
5590	6.3	JR3-5670	12	....	B	#	1260	#HOLD DOWN P2 AND PRESS P3
5591	6.3	JR3-5620	10	....	D	P3	2650	
5603	6.3	JR4-7603	35	....	D	P3	3350	
5608A	2.5	JR5-6042	12	....	B	P3	950	Triode No. 1
5608A	2.5	JR3-2046	12	....	B	P3	950	Triode No. 2
5610	6.3	JR6-3020	27	....	C	P3	2500	
5618	6.3	DX6-2180	24	....	C	P3	1900	
5633★	6.3	EW3-0512	15	....	D	P3	1500	E BASING TOP LEAD=P
5634★	6.3	EW3-0512	17	....	D	P3	1825	E BASING TOP LEAD=P
5635★	6.3	DW1-7084	16	....	D	P3	2200	F BASING TRIODE NO. 1
5635★	6.3	DW2-5084	16	....	D	P3	2200	F BASING TRIODE NO. 2
5637★	6.3	DU2-1050	17	....	D	P3	950	C Basing
5638★	6.3	EW3-1520	18	....	D	P3	2080	E Basing
5639★	6.3	DW1-5720	25	....	D	P3	2650	F Basing
5640★	6.3	DW1-5782	54	....	C	P3	1900	F Basing
5641★	6.3	ES0-1030	0	25	A	P7	Rect.	B Basing
5642	1.1	BS0-0000	0	0	A	P7	Rect.	TOP LEAD=P OK OVER 100 ON 3000 SCALE 4-F BASING.
5643★	6.3	DW7-1250	#	60	A	P7	Thyr.	STRIKES AT ABOUT 65 READ AS RECTIFIER.
5644★	6.3	FT4-1020	16	....	D	P3	950	D Basing
5645★	6.3	FT4-1020	29	....	D	P3	1380	D Basing
5646★	6.3	FT4-1020	28	....	B	P3	300	D Basing
5647★	6.3	CT0-1040	0	70	A	P2	Diode	A Basing
5651	.....	AP0-3070	0	60	A	P4	Volt. Ref.	Read As Rectifier
5654	6.3	JR3-5620	10	....	D	P3	2700	
5659	12.6	JR5-3470	22	....	C	P3	1900	
5660	12.6	JR0-3670	8	....	B	P3	840	Pent. Sect. Cap=G
5660	12.6	JR0-5670	0	0	A	P2	Diode	Diode No. 1
5660	12.6	JR0-4670	0	0	A	P2	Diode	Diode No. 2
5661	12.6	JR4-7653	21	....	B	P3	1250	
5662	6.3	JR3-7050	#	94	A	P4	Thyr.	#STRIKES AT ABOUT 34 READ AS RECTIFIER.
5663	6.3	JR3-7520	#	60	A	P7	Thyr.	#STRIKES AT ABOUT 65 READ AS RECTIFIER.
5670	6.3	KR7-6080	17	....	D	P3	3300	Triode No. 1
5670	6.3	KR3-4020	17	....	D	P3	3300	Triode No. 2
5672	1.1	DV4-1200	55	....	B	P3	350	
5676	1.1	ES3-1000	31	....	D	P3	1000	
5677	1.1	ES3-1000	40	....	B	P3	280	
5678	1.1	DV4-1200	18	....	D	P3	630	
5679	6.3	JR0-6075	0	65	A	P2	Diode	Diode No. 1
5679	6.3	JR0-3025	0	65	A	P2	Diode	Diode No. 2
5686	6.3	JR3-5620	21	....	C	P3	2320	
5687	12.6	EV7-9061	26	....	D	P3	4800	Triode No. 1
5687	12.6	EV2-1039	26	....	D	P3	4800	Triode No. 2
5691	6.3	JX4-5061	7	....	D	P3	1000	Triode No. 1
5691	6.3	JX2-1035	7	....	D	P3	1000	Triode No. 2
5692	6.3	JX4-5061	22	....	D	P3	1650	Triode No. 1
5692	6.3	JX2-1035	22	....	D	P3	1650	Triode No. 2
5693	6.3	JR4-7653	20	....	D	P3	1040	
5694	6.3	JR4-3020	0	....	D	P3	1500	Triode No. 1
5694	6.3	JR5-6070	0	....	D	P3	1500	Triode No. 2
5696	6.3	JR3-6025	#	60	A	P7	Thyr.	#STRIKES AT ABOUT 65 READ AS RECTIFIER.
5703	6.3	DU5-1060	21	....	D	P3	3150	
5704	6.3	CT0-1040	0	70	A	P2	Diode	
5725	6.3	JR3-5627	10	....	D	P3	1540	
5726	6.3	JR0-7030	0	70	A	P2	Diode	Diode No. 1
5726	6.3	JR0-2050	0	70	A	P2	Diode	Diode No. 2
5731	6.3	JR4-3060	20	....	D	P3	1400	
5742	4.3	JR3-2000	10	....	B	P3	530	
5744	6.3	CT4-1050	8	....	D	P3	2500	
5749	6.3	JR3-5672	9	....	C	P3	2700	
5750	6.3	JR7-5623	11	....	B	P3	900	Ampl. Sect.
5750	6.3	JR3-5627	0	....	B	P3	1000	Osc. Sect.
5751	12.6	EV7-6080	8	....	D	P3	950	Triode No. 1
5751	12.6	EV2-1030	8	....	D	P3	950	Triode No. 2
5763	6.3	EV9-1673	8	....	D	P3	4400	
5783	.....	AP0-3050	0	75	A	P4	Volt. Ref.	Read As Rectifier
5784	6.3	DU7-1265	20	....	B	P3	1130	
5785	1.1	GX0-1000	0	0	A	P2	Rect.	OK OVER 500 ON 3000 SCALE
5787	BLST	JP0-3010	0	70	A	P4	Volt. Ref.	Read As Rectifier
5814	12.6	EV7-6080	24	....	B	P3	1400	Triode No. 1
5814	12.6	EV2-1030	24	....	B	P3	1400	Triode No. 2
5823	BLST	AP8-3010	100	90	A	P4	Volt. Reg.	Read As Rectifier
5825	1.5	JR0-0000	0	0	A	P4	Rect.	CAP=P OK ABOVE 250 ON 3000 SCALE

TABLE 4-2 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
CK5829	6.3	**DV**0-6070	0	0	**A**	P2	Diode	Diode No. 1
CK5829	6.3	**DV**0-1020	0	0	**A**	P2	Diode	Diode No. 2
5840★	6.3	**DW**1-5740	22	....	**C**	P3	1575	F Basing
5879	6.3	**EV**1-8739	21	....	**B**	P3	630	
5881	6.3	**JR**5-3472	23	....	**D**	P3	3150	
5897★	6.3	**DW**1-8050	20	....	**D**	P3	3660	F Basing
5899★	6.3	**DW**1-5740	21	....	**B**	P3	1260	F Basing
5900★	6.3	**DW**1-5740	21	....	**B**	P3	1260	F Basing
5915	6.3	**JR**7-5623	20	....	**B**	P3	760	Ampl. Sect.
5915	6.3	**JR**3-5627	10	....	**B**	P3	950	Osc. Sect.
7193	6.3	**JR**0-0070	13	....	**C**	P3	1900	Upper Cap= G Lower Cap=P
8005	10.0	**JR**3-0000	22	....	**B**	P3	1260	Cap=P
8016	1.1	**JR**0-0000	0	65	**A**	P4	Rect.	Cap=P
9001	6.3	**JR**3-5670	21	....	**B**	P3	700	
9002	6.3	**JR**6-3070	22	....	**B**	P3	1200	
9003	6.3	**JR**3-5620	17	....	**B**	P3	950	
9004	6.3	**JR**0-3040	0	70	**A**	P2	Diode	
9005	4.3	**JR**0-4030	0	55	**A**	P2	Diode	
9006	6.3	**JR**0-3070	0	55	**A**	P2	Diode	
38142	7.5	**JR**3-2000	37	....	**B**	P3	1400	
XXB	2.5	**BY**5-6000	10	....	**B**	P3	700	Triode No. 1
XXB	2.5	**JR**4-3000	10	....	**B**	P3	700	Triode No. 2
XXD	12.6	**JR**5-6070	13	....	**D**	P3	1575	Triode No. 1
XXD	12.6	**JR**4-3020	13	....	**D**	P3	1575	Triode No. 2
XXFM	6.3	**JR**3-2040	10	....	**D**	P3	630	Triode Sect.
XXFM	6.3	**JR**0-5040	0	70	**A**	P2	Diode	Diode No. 1
XXFM	6.3	**JR**0-6070	0	70	**A**	P2	Diode	Diode No. 2
XXL	6.3	**JR**6-2070	18	....	**D**	P3	1900	

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations

(28) TESTING BALLAST TUBES.

(a) Turn the tester ON.

(b) Set FILAMENT voltage switch S101 to BLST.

(c) Set SHORTS test switch on position 1.

(d) Refer to TABLE 4-3. Set first SELECTOR switch S103 (lettered A to K) to letter in column headed "First Selector." Set all numbered SELECTORS on zero.

(e) Rotate second SELECTOR switch S104 (lettered P to Z) from P to Z. Neon lamp, E103, should light on positions noted.

TABLE 4-3. BALLAST TUBE CHART

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1L1-1N1-1P1-1Q1-1R1G-1S1G-1T1G-1U1G-1V1-1Y1-1Z1-2	J	R						
2UR224	J			T				X
2LR212	H	R	S		U			
3	J	R						
03G	J			T				
4-5	J	R						
6-133	J			T				
6-6AA	J	R						
7-8-9	J	R						
10A-10AG	J			T				

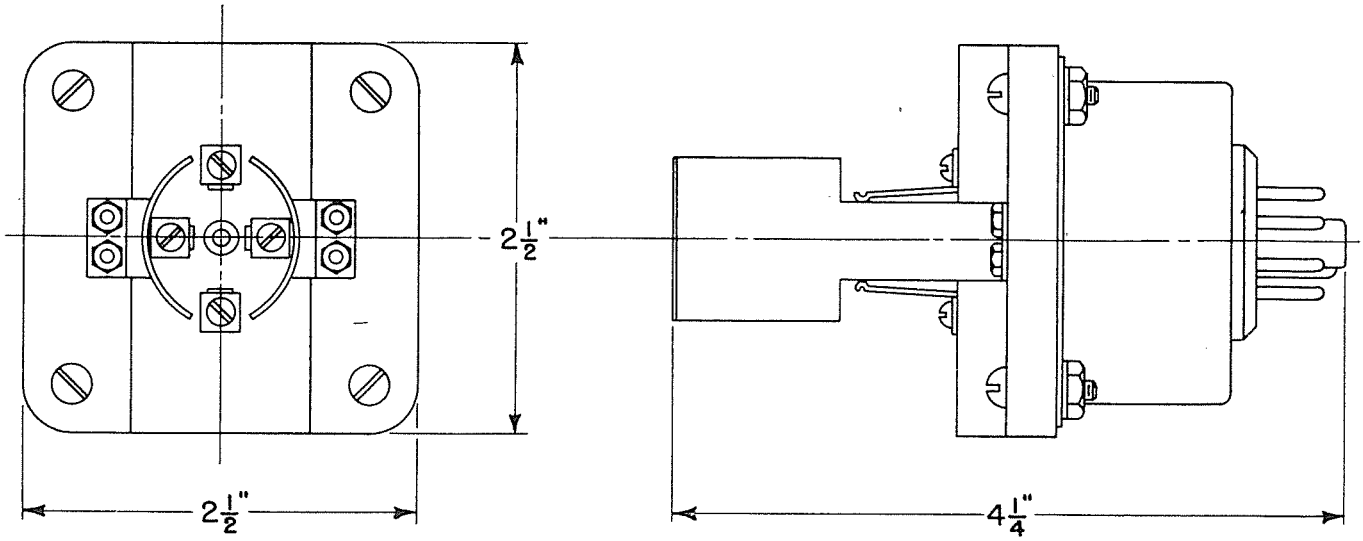
TUBE TYPE	First Selector	Neon lamp should light in these positions.						
10AB	J			T				X
K17B-M17C-BM17C	J			T				X
M17HG-M17H	J		S					X
	D	R						
K23B-K23C-KX23B-KX30C	J			T				X
M30H	J		S					X
	D	R						
30A-K30A	J			T				
K30D	J	R		T				X
33A-33AG	J			T				
K34B	J			T				X
36A	J			T				
K36B-BK36B-L36B-BM-L36C-KX36C	J			T				X
KX36A	J	R						
36D-L36D	J	R		T				X
L36DJ	J	R		T	U			X
K36H-M36H-M36HG	J		S					X
	D	R						
L40S1-L40S2	J	R		T		V		
42A	J			T				
42A1	H				U			
42A2-42B2	H		S		U			
K42B-L42B-M42B-KX42B-LX42B-L42BX-K42C-L42C-M42C	J			T				X
KB42D-K42D-L42D	J	R		T				X
LX42D-L42DX	J	R	S	T				
K42E-L42E	J			T				X
L42F	J							X
	D	R						
42HA-K42HJ-M42H-M42HG	J		S					X
	E	R		T				
KX42C	J			T				X

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
L42S1	J	R		T		V		
49A-49AJ-K49AJ	J			T				
KX49A	J			T				X
49A1	H				U			
49A2-49B2	H		S		U			
K49B-L49B-M49B-BM49B-K49C-M49C-BM49C-BK49C-K49E-L49E	J			T				X
K49D-BK49D-L49D	J			T				X
L49F	J							X
	D	R						
M49H-M49HG	J		S					X
	D	R						
KZ49B-KZ49C	J	R				V		
K49BJ-L49BJ	J			T	U			X
L49S2	J	R		T		V		
49AJ-K49AJ	J			T				
KX49B-LX49B-LX49C	J			T				X
L49DJ	J	R		T	U			X
L49S3	J	R		T		V		
50A2	J	R		T				
50A2MG-50B2	J	R				V		
50X3	J	R						
K52H-M52H	J		S					X
	D	R						
K54B	J			T				X
55A-K55A	J			T				
55A1	H				U			
KX55A	J	R						
55B-K55B-M55B-BM55B-L55BG-LX55B	J			T				X
55A2-55B2	H		S		U			
K55C-L55C-KX55C	J			T				X
K55CP	J			T		V		X

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
K55D-L55D	J	R		T				X
L55E-M55E	J			T				X
L55F-M55F-BL55F	J							X
	D	R						
K55H-M55H-M55HG	J		S					X
	D	R						
L55S1-L55S2	J	R		T		V		X
60R30G	J	R		T				
64.23	J			T				
67A	J			T				
K67B-L67B	J			T				X
L73B-K74B-L74B-CX74C	J			T				X
80A	J			T				
K79B-K80B-M80B-K80C-KX80B-L80B	J			T				X
K80F	J							X
	D	R						
KX87B-LX87B-L90B	J			T				X
K90F-M90F-K92F-M92F	J							X
	D	R						
92A	J			T				
L92B-95K2	J			T				X
L99D	J	R		T				X
100R8	J			T				X
120R	J	R						
120RS-135K1	J			T				X
135K1A	J			T	U			X
140L4-140L8-140R4-140R8	J	R		T				
140R	J	R						
140L44-140R44	J	R	S	T				
165L4-165R4-165R8	J	R		T				
165R	J	R						
165L44-165R44	J	R	S	T				
185L4-185L8-185R4-185R8	J	R		T				
185R	J	R						
185L44-185R44	J	R	S	T				
200R-250R	J	R						
250R8-290L4	J			T				X
300R4-320R4	J			T				X
340	J	R						
808-1	J			T	U			X
E14980-W43357-W4588-3613	J			T				X
3334-3334A	J	R		T				X
8593-8598-8601-8664	J			T				X
3ER248	J	R		T	U			X
3CR241	J	R		T				X

TEST DATA FOR BALLAST TUBES

TUBE TYPE	First Selector	Neon Lamp Should Light in These Positions							
B9M15822	B			T					
	E					V			
	G							X	Y
B9M16067	J	R		T		V	W	X	
B9M16275	B			T	U	V	W	X	Y
B9M16534	J	R		T		V	W	X	
B9M17571	H	R		T					
	J				U	V		X	
B9M18941	B		S	T					
	E					V			
	G							X	Y
17A470303	J	R	S			V			
	D				U				
	G							X	
17A485459	J	R	S				W		
	D				U				
TBR102D	B		S	T	U	V			
	G							X	Y
TBR103D	B		S		U	V			
	G							X	Y
TBR104D	B		S	T	U	V			
	G							X	Y
397021	B		S	T					
397022	E					V	W		
397023	J							X	
397036	C					V			
407100	J	R	S			V			
408100	J	R	S			V			
	D				U				
SW507300	J	R		T		V	W	X	
571606	B		S	T					
	E					V	W		
	J							X	



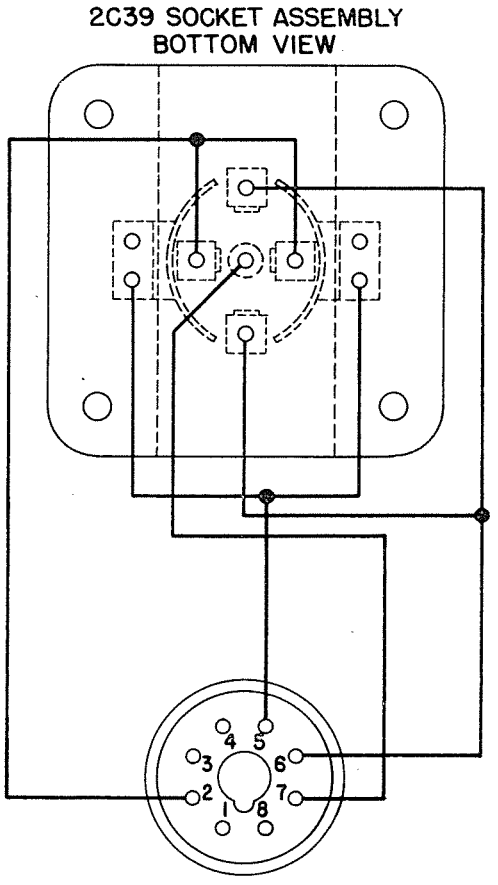
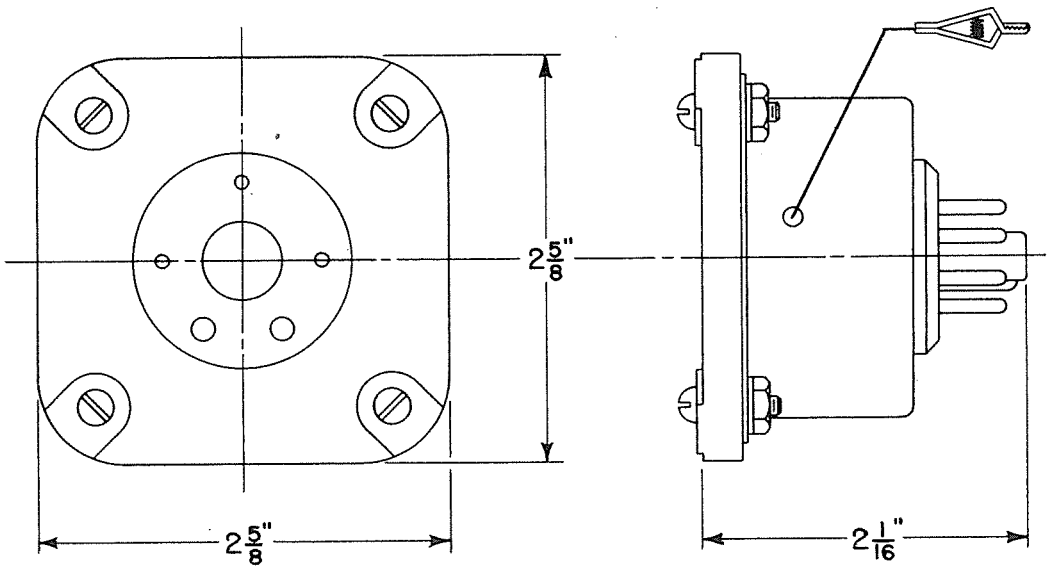


Figure 4-4. Wiring Diagram of Adapter Suitable for Testing Type 2C39 Tubes in the TV-3A/U Equipment



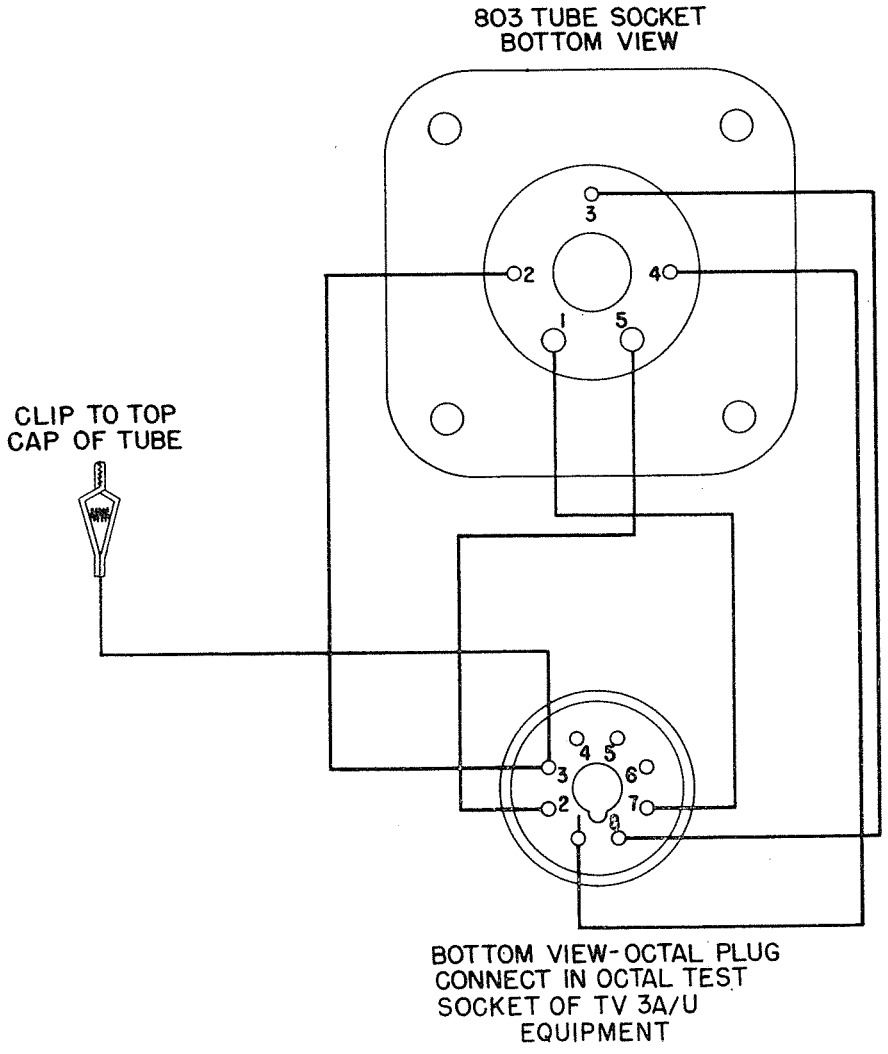
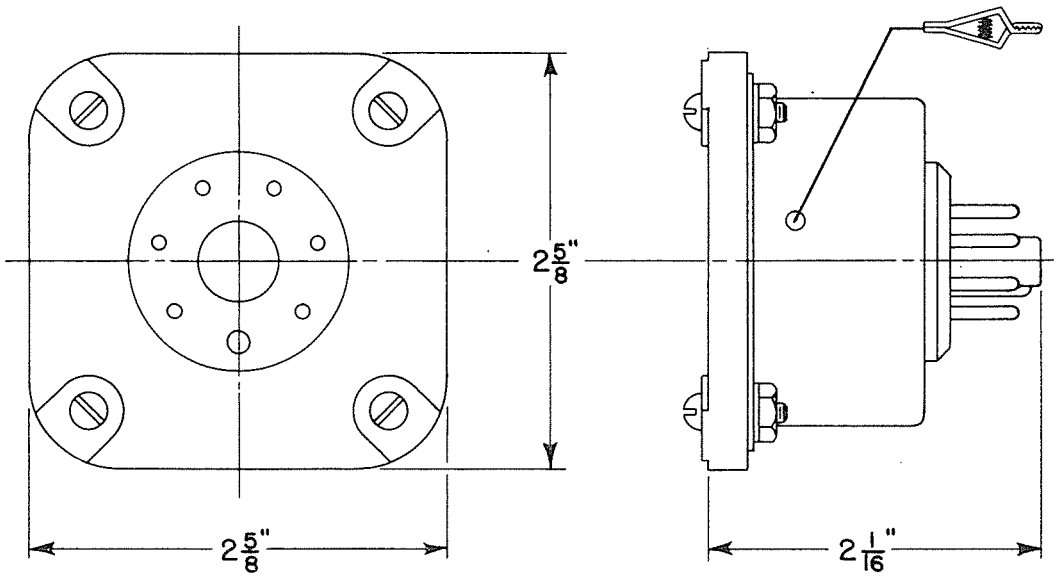


Figure 4-5. Wiring Diagram of an Adapter Suitable for Testing Type 803 Tubes in the TV-3A/U Equipment



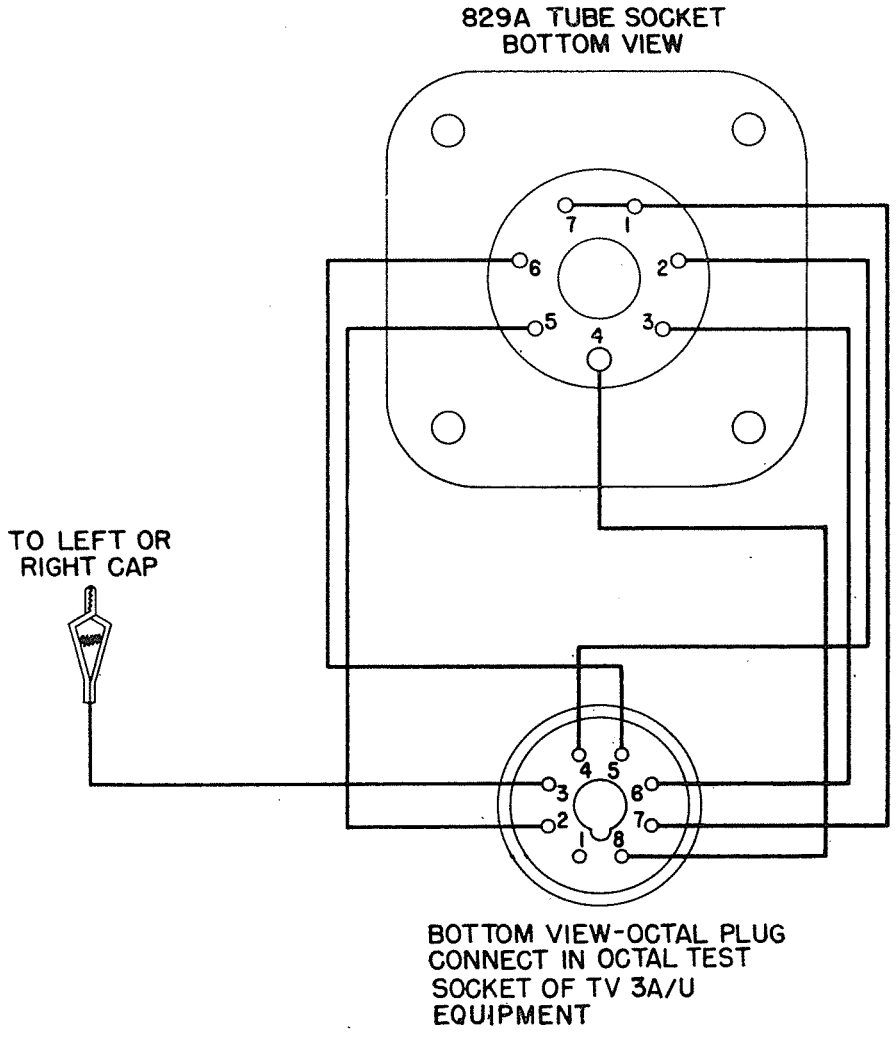


Figure 4-6. Wiring Diagram of an Adapter Suitable for Testing Types 829A and 832A in the TV-3A/U Equipment

(29) Certain tubes which cannot be tested directly in the TV-3A/U equipment can be tested by means of special adapters, the construction and wiring of which is outlined in Figures 4-4, 4-5 and 4-6. Test data for these tubes is included in Table 4-2.

b. When the Tube Tester TV-3A/U is used as a Multimeter.

(1) VOLTS DC may be measured in the ranges 0 to 20, 0 to 200, 0 to 500, and 0 to 1000. The circuit sensitivity is 1000 ohms per volt.

(a) Set the MASTER switch S112 to the appropriate range.

(b) Set the toggle switch S114 below the meter in the position marked VOLTS DC.

(c) Insert the test leads W104 and W105 in the jacks J103 and J104 marked VOLT-OHMS-MILS-CAP, and located below and to the right of the meter. Make contact with the voltage to be measured by means of the insulated test prods. The red jack and red lead are positive.

Note

When making voltage or current measurements always use the high ranges first to avoid possible damage to the equipment due to excessive overload. Then if desired switch to the lower ranges. The lowest multimeter scale that can be used will give the greatest accuracy.

(2) VOLTS AC. The sensitivity of the circuit is 1000 ohms per volt. Ranges are the same as for DC VOLTS.

(a) Set the MASTER SWITCH, S112, to the appropriate range the same as for dc volts.

(b) Set the toggle switch, S114, to AC and CAP.

(c) Insert the test leads W104 and W105 into the jacks J103 and J104, and apply test prods across the voltage to be measured. In measuring ac the polarity does not matter.

(3) OHMS. Ohms are measured in two overlapping ranges, the center scale readings of which are respectively 2000 and 200,000 ohms. No batteries are used as the power is obtained from the built-in power supply. Therefore when measuring ohms the power switch, S106, must be turned on.

When the MASTER SWITCH is set at THOUS. OHMS the top ohms scale reads direct from 0 to 500,000 OHMS.

When the MASTER SWITCH is set at MEGOHMS the bottom scale is read directly in megohms from .5 to 50 and values below .5 megohms are read in megohms by dividing the numerical reading of the top scale by 10. One hundred megohms will read at the mark midway between 50 megohms and infinity INF.

TO OPERATE:

(a) Set the MASTER SWITCH S112 at the appropriate position (THOUS. OHMS OR MEGOHMS).

(b) Plug the line cord of the tester into a 115 volt ac outlet and turn the power switch, S106, ON.

(c) The pointer of the meter will move to the top of the scale.

(d) Turn the knob of LINE ADJUST R113 until the meter pointer rests exactly over the line at the end of the scale marked INF. (Infinity).

(e) Insert the test leads, W104 and W105, in the two jacks, J103 and J104, below the meter marked VOLTS, OHMS, MILS, CAP.

(f) Touch the prods of the test leads to the terminals of the resistance to be measured. The meter pointer will indicate the resistance in ohms. In measuring resistance elements, care should be taken to see that no parallel current paths are included between the contacts.

(4) CAPACITY—.05 Mfd, or higher. Capacity is measured in two ranges, 0-5 and 0-50 microfarads. It is necessary to apply a standard voltage to the capacitor being measured therefore:

(a) Turn the MASTER SWITCH, S112, to MEGOHMS and turn knob of LINE ADJUST R113 to bring the meter pointer to the INF. mark. This establishes standard voltage across the capacitor.

(b) Turn the MASTER SWITCH, S112, to the appropriate point (5 MFD or 50 MFD).

(c) Set the toggle switch S114 to CAP.-A.C.

(d) Insert the test leads, W104 and W105, in the two jacks, J103 and J104, marked VOLTS, OHMS, MILS, CAP.

(e) Touch the prods of the test leads to the terminals of the capacitor being measured, making sure that no parallel current paths exist between the points of contact. The pointer of the meter will indicate the value of the capacitance in microfarads. The capacitor being measured should not be shunted by other capacitance, resistance, or inductance.

(f) The capacity scale is calibrated for use on 60 cycles. For other power line frequencies consult the conversion chart Figure 4-7.

(5) TO CHECK SMALL CAPACITORS. Capacitors from .0001 to .05 M.F. may be checked as follows:

(a) Make line adjustments the same as for tube testing. See paragraphs 4a(11) and (12) of this section.

(b) Set the master switch S112 on Volts 200. Set toggle switch S114 to A.C.-CAP.

(c) Set SELECTORS to JR 0-2040.

(d) Furnished with the TV-3A/U is a special capacity test cable, W102. One end of this cable is equipped with a 5 pin plug. The black wire terminates

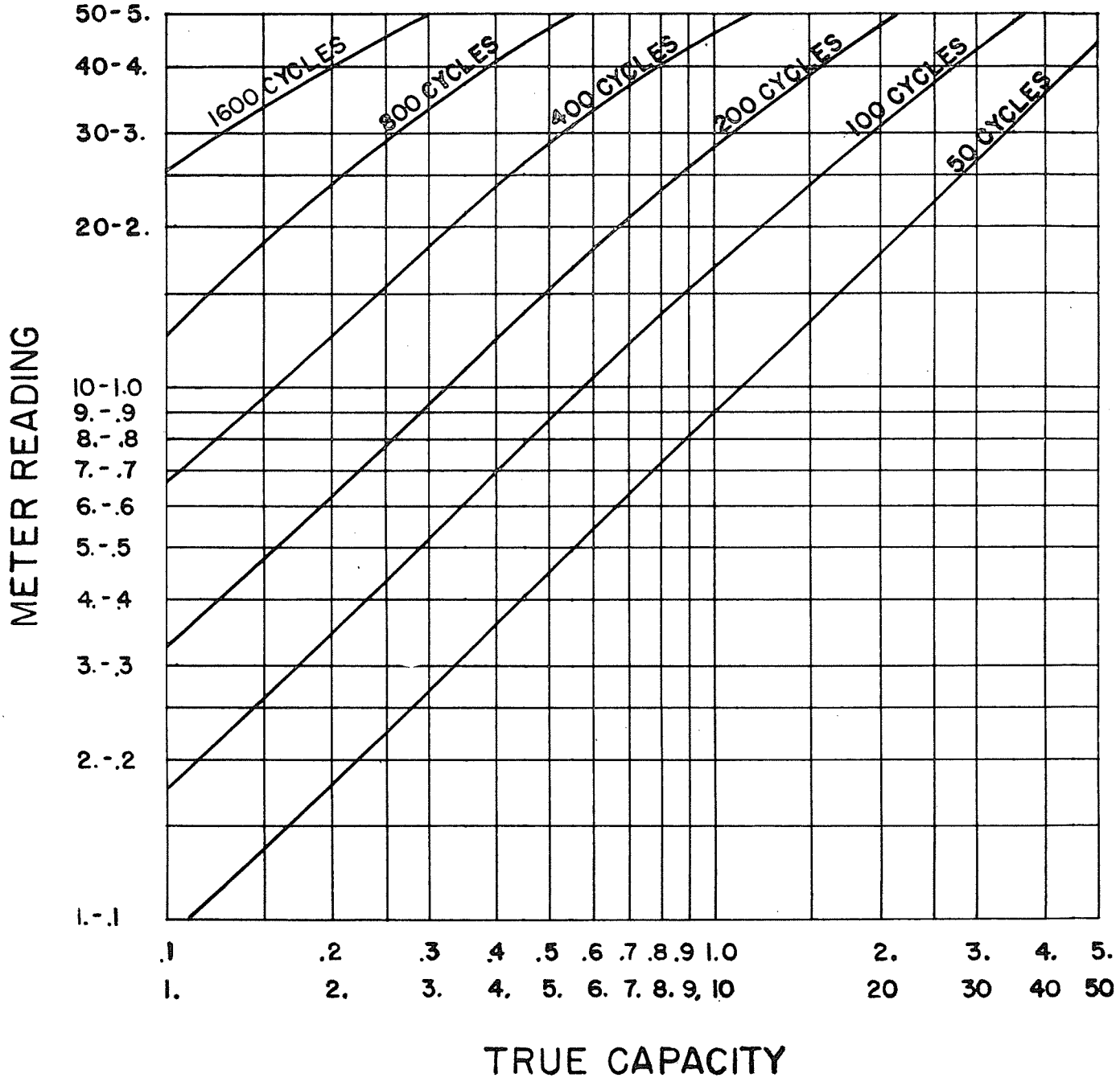


Figure 4-7. Conversion Chart for Capacity Measurements at Frequencies Other Than 60 Cycles

n a pin tip. The red wire terminates in an alligator :lip.

(e) Insert the 5 plug of W102 in the 5 pin tube est socket. Insert the pin tip in the black VOLT-)HMS-MILS-CAP. pin jack J103.

(f) Connect the alligator clip of W102 to one erminal of the capacitor to be measured. Insert the ed test lead W104 in the red VOLT-OHMS-MILS-:AP. jack J104, and hold the prod on the other terminal)f the capacitor.

(g) Press button marked P4 and note the read-ng of the voltmeter. The value of the capacitor is ound in Table 4-4.

TABLE 4-4. CAPACITY TO VOLTAGE CONVERSION TABLE FOR SMALL CAPACITORS AT 60 CYCLES

CAPACITY IN M.F.	VOLTMETER READING ON 200 VOLT SCALE
.0001	1.5 Volts
.0002	3. "
.00025	3.5 "
.0005	7. "
.001	13. "
.002	25. "
.003	37. "
.004	49. "
.005	59. "
.006	70. "
.007	79. "
.008	85. "
.009	92. "
.01	99. "
.015	125. "
.02	139. "
.025	147. "
.03	153. "
.035	156. "
.04	160. "
.05	162. "

(6) MILLIAMPERES, D.C. Milliamperes D.C. are neasured in two ranges, 0-20 and 0-200.

(a) Turn the power switch S106 to OFF position.

(b) Turn the MASTER SWITCH S112 to the ippropriate MILS range.

(c) Connect the current being measured to the iacks, J103 and J104, marked VOLTS, OHMS, MILS, CAP. by means of test leads W104 and W105.

(d) The RED jack is positive.

(7) INDUCTANCE. In measuring inductance of choke coils make switch settings exactly as for measuring capacity. (See paragraph 4b(4) of this section.)

(a) Set the MASTER SWITCH, S112, on CAP. 5 MFD.

(b) Connect the prods to the terminals of the choke being measured and read the microfarad scale of the meter.

(c) Divide the reading in microfarads into 7.04 which will give the results in henries. at 60 cycle power supply frequency.

(d) The following is a conversion table for inductance values:

TABLE 4-5. CONVERSION FROM CAPACITY READING TO INDUCTANCE AT 60 CYCLES

CAPACITY READING M.F.	INDUCTANCE HENRIES
.1	70.4
.2	35.2
.3	23.4
.4	17.6
.5	14.1
.6	11.7
.7	10.1
.8	8.8
.9	7.8
1.0	7.0

(e) For any line frequency the inductance can be found by applying the following formula:

$$\text{Inductance in Henries} = \frac{422}{\text{Meter Reading in Microfarads} \times \text{Frequency}}$$

Example (a): The line frequency is 120 cycles.
The meter reading is 0.5 Mfd.
Applying the formula:

$$\text{Inductance in Henries} = \frac{422}{0.5 \times 120} = 7.04$$

Example (b): The line frequency is 800 cycles.
The meter reading is 0.1 Mfd.
Applying the formula:

$$\text{Inductance in Henries} = \frac{422}{0.1 \times 800} = 5.28$$

NOTES

SECTION 5
OPERATOR'S MAINTENANCE

1. LINE CORD AND PLUG.

a. Inspect cord for cuts or breaks in the insulation. Minor damage to the outer jacket may be repaired with friction tape. If, however, the break or cut is deep enough to expose either of the conductors, the cord should be replaced.

b. If the panel indicator I110 does not light when the Tube Tester TV-3A/U is connected to a live 105-125 volt ac 50-1600 cycle outlet (see paragraph c below), check the FUSE lamp E102 for possible burn out or loose socket connection. If FUSE lamp is OK unscrew the red jewel of indicator I110 and check pilot lamp E101 for loose socket connection, or burn out.

c. Check the ac voltage source using the 200 volt ac range of the Multimeter section. Low line voltage may render it impossible to adjust the meter to LINE TEST and impair the accuracy of the equipment.

2. TEST LEADS.

a. Inspect test leads for worn or broken insulation, also check all leads for continuity using the THOUS. OHM range of the Multimeter section. If leads are badly damaged or open they should be replaced.

3. FUSE LAMP.

E102, a type 81, Mazda lamp is used as a fuse and overload indicator. Two spare lamps are supplied as operating spares, and are stowed in the lead compartment.

4. PILOT LAMP.

a. A number 47 lamp 6.3 volts at .15 amps, E 101, serves as a pilot lamp in panel indicator I 110. A spare lamp is supplied with the operating spares in the lead compartment.

5. NEON LAMP.

a. The neon lamp E 103 used as a short indicator should be checked as follows:

(1) Be sure lamp is firmly screwed into its socket.

(2) With the tester plugged in, and the power switch ON, but with no tube in test sockets, set the MASTER switch S 112 to TUBE TEST.

(3) Set SELECTORS to JR-1-1111.

(4) Turn the SHORTS test switch S 113 through positions 1, 2, 3, 4, and 5. The neon lamp should glow in positions 2 and 3.

b. If the neon lamp is defective replace it from the operating spares in the lead compartment.

Note

Do not deplete the supply of operating spares furnished with the tester without taking the necessary steps to secure replacements.

6. TUBES.

a. Two full wave rectifier tubes are used in the TV-3A/U. One type 83, V 101, used in the mutual conductance test circuit to supply dc plate voltage for the tube under test and dc voltage for the ohmmeter portion of the Multimeter. The type 5Y3, V 102, supplies screen and bias voltages to the tube under test.

b. Failure of the 83 tube V 101 is indicated if, with no tube in the test sockets but the controls set for tube test, the pointer of the METER M 101 moves sharply off scale to the right when the RED push button P 3 is pressed.

c. Failure of the type 5Y3GT tube would result in lack of voltage on the screen, and bias circuits of the tube under test. To check plate and screen voltages refer to Section 7 paragraph 7.

d. To remove rectifier tubes V 101 and V 102 for test or replacement:

(1) Remove the ten mounting screws around the edge of the panel.

(2) Carefully lift the entire unit out of its case and turn face down on the test bench or other flat surface.

(3) Slide the spring clamps holding the tubes in place away from the top of the tube, and to one side.

Note

After tubes are replaced in their sockets, BE SURE THE TUBE CLAMPS ARE IN PLACE BEFORE THE EQUIPMENT IS RETURNED TO ITS CASE.

SECTION 6
PREVENTIVE MAINTENANCE

Note

"THE ATTENTION OF MAINTENANCE PERSONNEL IS INVITED TO THE REQUIREMENTS OF CHAPTER 67 OF THE 'BUREAU OF SHIPS MANUAL' OF THE LATEST ISSUE."

1. PRECAUTIONARY MEASURES.

a. The following precautions should be observed when operating the Tube Tester TV-3A/U:

(1) DON'T connect the TV-3A/U into a dc power supply line. Be sure the power line to be used supplies 105 to 125 volts ac at a frequency between 50 and 1600 cycles.

(2) DON'T insert a tube in any of the test sockets without first properly adjusting the controls.

(3) DON'T attempt to test tubes for emission, or mutual conductance without first checking for shorted elements.

(4) DON'T press the RED mutual conductance push button P 3 when testing rectifier tubes.

(5) DON'T fail to turn off the equipment and return all leads and adapters to the lead compartment when through using it.

FAILURE REPORTS

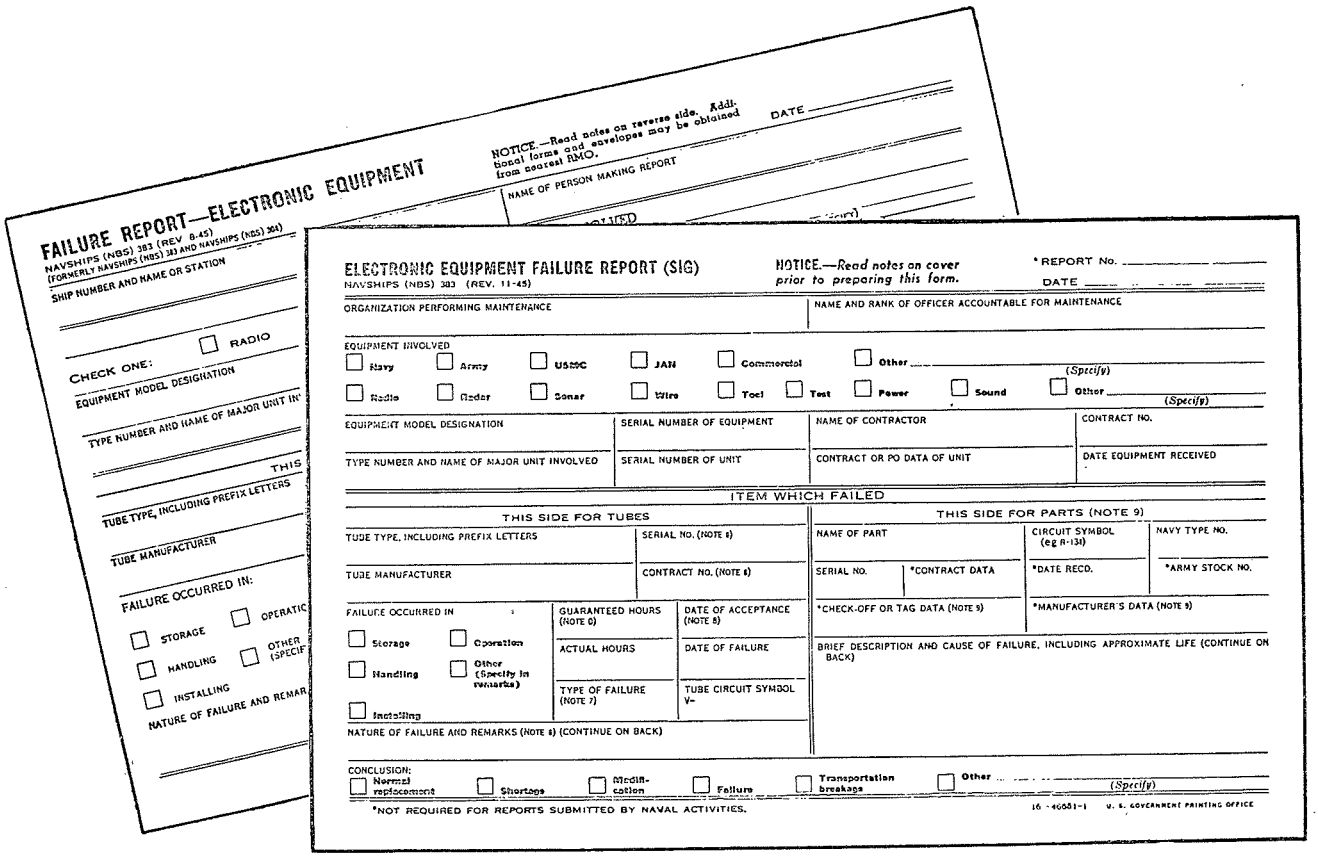
A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards and envelopes on board. They may be obtained from any Electronics Officer.



FAILURE REPORT—ELECTRONIC EQUIPMENT
NAVSHIPS (NBS) 383 (REV. 8-45)
(FORMERLY NAVSHIPS (NBS) 383 AND NAVSHIPS (NBS) 384)
SHIP NUMBER AND NAME OR STATION
CHECK ONE: RADIO
EQUIPMENT MODEL DESIGNATION
TYPE NUMBER AND NAME OF MAJOR UNIT IN
TUBE TYPE, INCLUDING PREFIX LETTERS
TUBE MANUFACTURER
FAILURE OCCURRED IN:
STORAGE
HANDLING
INSTALLING
NATURE OF FAILURE AND REMAR
NOTICE.—Read notes on reverse side. Addi-tional forms and envelopes may be obtained from nearest RMO.
DATE
NAME OF PERSON MAKING REPORT

ELECTRONIC EQUIPMENT FAILURE REPORT (SIG)
NAVSHIPS (NBS) 383 (REV. 11-45)
NOTICE.—Read notes on cover prior to preparing this form.
*REPORT No.
DATE
ORGANIZATION PERFORMING MAINTENANCE
NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE
EQUIPMENT INVOLVED
Navy Army USMC JAN Commercial Other (Specify)
Radio Radar Sonar Wire Tool Test Power Sound Other (Specify)
EQUIPMENT MODEL DESIGNATION
SERIAL NUMBER OF EQUIPMENT
NAME OF CONTRACTOR
CONTRACT NO.
TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED
SERIAL NUMBER OF UNIT
CONTRACT OR PO DATA OF UNIT
DATE EQUIPMENT RECEIVED
ITEM WHICH FAILED
THIS SIDE FOR TUBES
TUBE TYPE, INCLUDING PREFIX LETTERS
SERIAL NO. (NOTE 6)
TUBE MANUFACTURER
CONTRACT NO. (NOTE 6)
FAILURE OCCURRED IN
Storage Operation Handling Other (Specify in remarks) Installing
GUARANTEED HOURS (NOTE 6)
ACTUAL HOURS
DATE OF ACCEPTANCE (NOTE 6)
DATE OF FAILURE
TYPE OF FAILURE (NOTE 7)
TUBE CIRCUIT SYMBOL V-
NATURE OF FAILURE AND REMARKS (NOTE 8) (CONTINUE ON BACK)
THIS SIDE FOR PARTS (NOTE 9)
NAME OF PART
CIRCUIT SYMBOL (eg R-134)
NAVY TYPE NO.
SERIAL NO.
*CONTRACT DATA
*DATE RECD.
*ARMY STOCK NO.
*CHECK-OFF OR TAG DATA (NOTE 9)
*MANUFACTURER'S DATA (NOTE 9)
BRIEF DESCRIPTION AND CAUSE OF FAILURE, INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)
CONCLUSION:
Normal replacement Shortage Modification Failure Transportation breakage Other (Specify)
*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES.
16-40681-1 U. S. GOVERNMENT PRINTING OFFICE

SECTION 7
CORRECTIVE MAINTENANCE

1. FUSE LAMP.

a. The Tube Tester TV-3A/U is protected by a combination FUSE lamp and overload indicator, E102, in the primary circuit of power transformer, T101. If the pilot light I102 does not glow when the tester is connected to a live ac line of proper voltage, remove FUSE lamp E101 from its socket, and check for continuity using a low range ohmmeter. If FUSE is open replace from spares found in the lead compartment.

b. Line voltage of the power source may be checked by using the 200 volt ac range of the TV-3A/U Multimeter section. Low line voltage may make it impossible to adjust the meter to LINE TEST and impair the accuracy to the equipment.

2. PILOT LAMP.

a. The type 47, 6.3 volt bayonet base pilot lamp E101 should glow when the TV-3A/U is plugged into a live 115 volt ac outlet, and the power switch S106 is turned ON. If the lamp does not glow, but FUSE lamp E102 checks OK, unscrew the red jewel cover of the indicator I110 and check the lamp for continuity and looseness in the socket.

b. A burned out pilot lamp should be replaced with one from the operating spares found in the lead compartment.

3. NEON LAMP.

a. The neon lamp E 103 used as a short indicator should be checked as follows:

(1) Be sure lamp is firmly screwed into its socket.

(2) With the tester plugged in and the power switch ON, but with no tube in test sockets, set the MASTER switch S 112 to TUBE TEST.

(3) Set SELECTORS to JR-1-1111.

(4) Turn the SHORTS test switch S 113 through positions 1, 2, 3, 4, and 5. The neon lamp should glow in positions 2 and 3.

b. If the neon lamp is defective replace it from the operating spares in the lead compartment.

Note

Do not deplete the supply of operating spares furnished with the equipment without taking the necessary steps to secure replacements.

4. TUBES.

a. Two full wave rectifier tubes are used in the TV-3A/U. One type 83 V 101 used in the mutual conductance test circuit to supply plate voltage and to supply dc voltage for the ohmmeter circuit of the Multimeter section. The 5Y3GT, V 102 supplies dc screen and bias voltages for the tube under test.

b. Failure of the 83 tube V 101 is indicated if, with no tube in the test sockets but the controls set for tube test, the pointer of the METER M 101 moves sharply off scale to the right when the RED push button P 3 is pressed.

c. Failure of the type 5Y3GT tube would result in lack of voltage on the screen and plate circuits of the tube under test. To check plate and screen voltages refer to paragraph 7 of this section.

d. To remove rectifier tubes V 101 and V 102 for test, or replacement:

(1) Remove the ten mounting screws around the edge of the panel.

(2) Carefully lift the entire unit out of its case, and turn face down on the test bench or other flat surface.

(3) Slide the spring clamps holding the tubes in place, away from the top of the tube and to one side.

Note

After tubes are replaced in their sockets BE SURE THE TUBE CLAMPS ARE IN PLACE BEFORE THE EQUIPMENT IS RETURNED TO ITS CASE.

5. TEST LEADS.

a. Inspect all test leads for defective insulation and test for continuity. Make any minor repairs necessary, but if leads are in poor conditions, or beyond repair, requisition replacements immediately.

6. SCHEMATIC WIRING DIAGRAM.

a. Refer to schematic diagram Figure 7-6 and internal views Figures 7-2, 7-3, 7-4, and 7-5 for correct wiring and placement of parts in the TV-3A/U.

7. VOLTAGE AND CALIBRATION CHECK.

a. The tube tester section of the TV-3A/U may be checked for proper voltages and for correct calibration of the SHUNT and BIAS control dials as outlined in the following steps:

(1) Set the MASTER switch, S112, and the SHORTS switch, S113, to TUBE TEST. Set the SELECTORS, S103, S104, S105, S108, S109, S110 and S115 to JR 5-3460. Turn power switch, S106, ON. PRESS

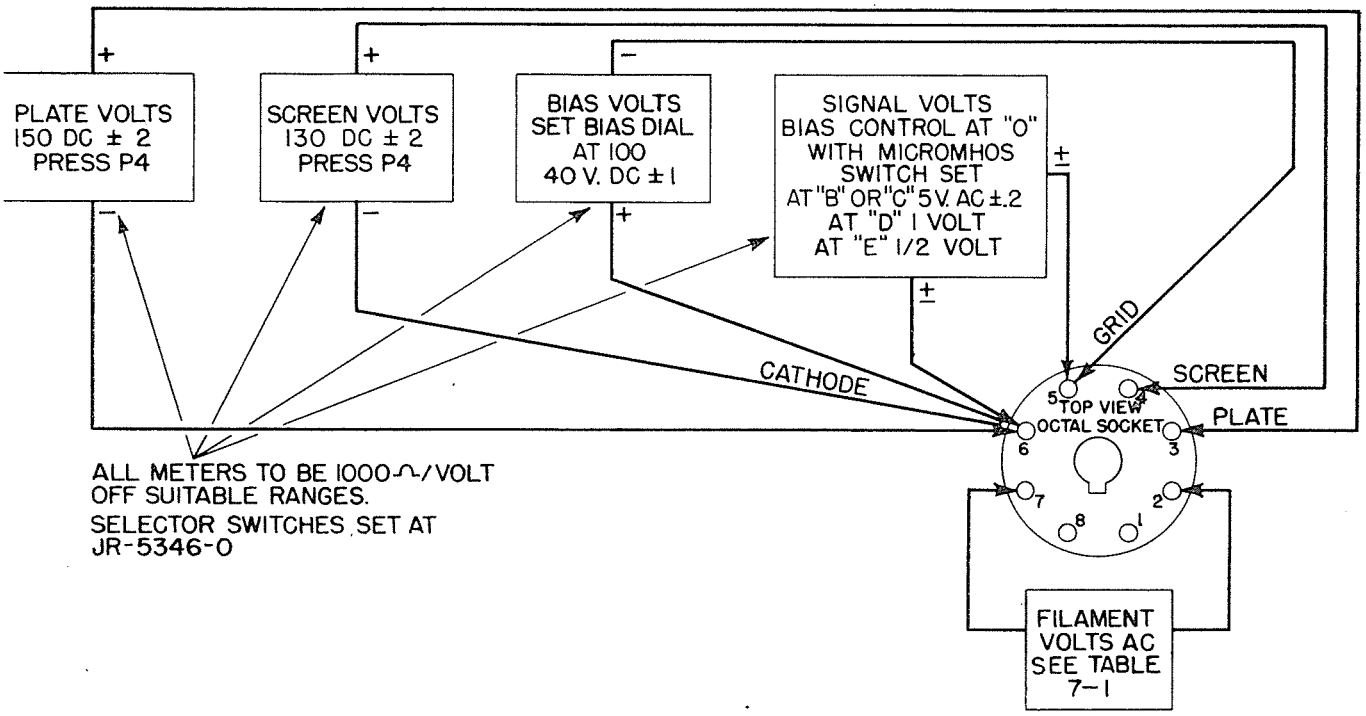


Figure 7-1. Voltage Calibration Check Diagram

LINE ADJ. push button P1 and turn LINE ADJUST control R113 until the METER pointer is set at LINE TEST.

Note

Voltage tests must be made with an external multimeter, or individual meters of 1000 ohms per volt sensitivity having suitable ranges of ac and dc connected as illustrated by Figure 7-1. The Multimeter section of the TV-3A/U cannot be used for these tests. If the voltages are not in accordance with the following paragraphs, 7a(2) through 7a(6), refer to paragraph 8 and Table 7-2 of this section for probable causes.

(2) PLATE VOLTAGE CHECK (150 vdc).

(a) Connect the positive (+) terminal of the voltmeter to contact No. 3 of the octal test socket, X107, and the negative (—) terminal to contact No. 6 of the same socket. (See Figure 7-1)

(b) Press RED push button P3. The voltmeter should read approximately 150 volts dc plus or minus 2 volts.

(3) SCREEN VOLTAGE CHECK (130 vdc).

(a) Connect the positive (+) terminal of the voltmeter to contact No. 4 of the octal test socket X107, and the negative (—) terminal to contact No. 6. Set BIAS control to zero. (See Figure 7-1)

(b) Press RED push button P3. The voltmeter should read approximately 130 volts dc plus or minus 2 volts.

(4) BIAS VOLTAGE CHECK (40 vdc).

(a) Set the BIAS dial, I101 of bias control R116, at 100.

(b) Connect the positive (+) terminal of the voltmeter to contact No. 6 of the octal test socket X107 and the negative (—) terminal to the No. 5 contact. (See Figure 7-1)

(c) The voltmeter should read 40 volts dc plus or minus 1 volt.

(5) SIGNAL VOLTAGE CHECK (0.5, 1 and 5 vac).

(a) Set BIAS dial I101 of bias control R116 at zero.

(b) Connect the terminals of the ac voltmeter to contacts 5 and 6 of the octal test socket X107. (See Figure 7-1)

(c) With the MICROMHOS switch S107 set at "B" or "C" the meter should read 5 volts ac plus or minus 0.2 volt.

(d) With the MICROMHOS switch S107 set at "D" the meter should read approximately 1 volt ac.

(e) With the MICROMHOS switch S107 set at "E" the meter should read approximately 0.5 volt.

(6) FILAMENT VOLTAGE CHECK (1.1 to 117 vac).

(a) Set FILAMENT voltage switch S101 to the desired voltage.

(b) Connect the terminals of an ac voltmeter or a multimeter of suitable range between contacts 2 and 7 of octal test socket X107.

(c) The meter should read within the limits indicated in Table 7-1 for the various nominal settings of the FILAMENT voltage switch S101.

(7) BIAS dial I101 and SHUNT dial I102 should indicate zero when they are in full counter clockwise positions. If they do not loosen the set screws and re-set the dials on the shafts.

TABLE 7-1. FILAMENT VOLTAGE CHART FOR TUBE TESTER TV-3A/U

NOMINAL	MIN.	MAX.
1.1	1.1	1.2
1.5	1.5	1.7
2.0	2.0	2.2
2.5	2.7	2.9
3.0	3.3	3.5
4.3	4.4	4.7
5.0	5.4	5.6
6.3	6.4	6.7
7.5	7.6	8.0
10.0	10.1	11.0
12.6	12.5	13.2
20.0	19.0	21.0
25.0	26.0	28.0
35.0	34.0	39.0
50.0	50.0	56.0
75.0	73.0	83.0
117.0	118.0	128.0

8. SUGGESTIONS FOR LOCATING TROUBLE.

If proper voltages are not present in the tube tester section the following suggestions are offered for locating and correcting the trouble.

a. If all voltages are found to be either high or low it is possible that the trouble is in the line test circuit. Check resistor R101 for correct value. An excessively high or low resistance at this point would result in improper adjustment of the line voltage causing high or low test voltages at the points covered in paragraph 7 of this section. Also check rectifier CR101 as outlined in paragraph 10 of this section, a faulty rectifier would cause an erroneous meter reading which would result in high secondary voltages from the transformer T101.

b. Incorrect Plate Voltage.

(1) High plate voltage can only result from the application of incorrect voltage to the primary of T101, see paragraph (a) above.

(2) Low plate voltage will result from a defective 83 tube V101.

c. Probable causes of incorrect voltages in the tube tester section are listed in Table 7-2.

d. Replacement of Resistor R118.

After replacement of this resistor it will be necessary to adjust the two sliding contacts "A" and "B" to establish proper voltage distribution.

(1) Turn on the equipment and set all controls in accordance with paragraph 7a(1) of this section.

(2) Connect a voltmeter between pins 5 and 6 of octal socket X107 as illustrated by Figure 7-1.

(3) Set BIAS control R116 at 100.

(4) Adjust slider "A" of R118 until the meter reads 40 volts dc.

(5) Connect a voltmeter between pins 4 and 6 of octal socket X107 as in Figure 7-1.

(6) Press buttons P3 and P2 and adjust slider "B" of R118 until the meter reads 56 volts dc.

(7) Tighten the slider screws and recheck the voltages.

TABLE 7-2. VOLTAGE TROUBLE CHART FOR TUBE TEST CIRCUIT

CONDITION	PROBABLE CAUSE	REMEDY
High Plate Voltage	See Paragraph 8a and 8b section 7	
Low Plate Voltage	Defective 83 tube V101	Replace
	Shorted capacitor C102	Replace
	Open winding secondary 2 or 3	Replace T101
Zero Plate Voltage	Defective 83 tube V101	Replace
	Open winding secondarys 2 and 3 or 4 of T101	Replace T101
High Screen Voltage	BIAS control R116 open at positive end	Replace
	Resistor R118 open	Replace
Low Screen Voltage	5Y3 tube V102 weak	Replace
	Open winding secondary 5 or 6	Replace T101
Zero Screen Voltage	Defective 5Y3 tube V102	Replace
	BIAS control R116 open at negative end	Replace
	Open winding secondarys 5 and 6 or 7 of T101	Replace T101
High Bias Voltage	BIAS control R116 open at negative end	Replace
Low Bias Voltage	Weak 5Y3 tube V102	Replace
	Open winding secondary 5 or 6	Replace T101
Zero Bias Voltage	BIAS control R116 open at positive end	Replace
	Resistor R118 open	Replace
	Defective 5Y3 tube V102	Replace
	Open winding secondarys 5 and 6 or 7 of T101	Replace T101
High Signal Voltage	BIAS control R116 not set at zero	Readjust
	Defective resistor R110, R111 or R114	Replace
Low Signal Voltage	Defective resistor R110, R111 or R114	Replace
Zero Signal Voltage	Defective resistor R110, R111 or R114	Replace
	Open winding secondary #5 of T101	Replace T101

9. RESISTANCE CHECK FOR MULTIMETER SECTION.

a. TABLE 7-2 is intended as an aid in localizing trouble in the Multimeter section of the TV-3A/U.

b. An ohmmeter or multimeter having suitable ranges should be connected to the VOLTS, MILS, OHMS, CAPACITY jacks J103 and J104.

TABLE 7-3. POINT TO POINT RESISTANCE CHECK FOR MULTIMETER SECTION

POSITION OF MASTER SWITCH	RESISTANCE ACROSS PIN JACKS J103 AND J104	COMPONENT PARTS BY SYMBOL DESIGNATION WHICH SHOULD BE CHECKED FOR POSSIBLE FAILURE IF PROPER RESISTANCE READING ACROSS PIN JACKS IS NOT OBTAINED
THOUS. OHMS	1900 OHMS	R124, R125, R126, R127, R128, R130
MEG. OHMS	200,000 OHMS	R119, R120, R124, R126, R127, R128, R130
VOLTS 20	20,000 OHMS	R131, R132, R133
VOLTS 200	200,000 OHMS	R131, R132, R133, R137
VOLTS 500	500,000 OHMS	R131, R132, R133, R137, R138
VOLTS 1000	1 MEGOHM	R131, R132, R133, R137, R138, R139 NOTE: FOR AC VOLTAGE RANGES CR101 SHOULD ALSO BE CHECKED. SEE PARAGRAPH 10 THIS SECTION
CAPACITY 5	Approx 580 OHMS	R136
CAPACITY 50	Approx 65 OHMS	R135
MILS 20	Approx 38 OHMS	R125, R126, R127, R128
MILS 200	Approx 3 OHMS	R125, R126, R127, R128

Caution

DISCONNECT POWER CORD BEFORE STARTING RESISTANCE MEASUREMENTS.

10. COPPER OXIDE RECTIFIER.

a. Failure of meter rectifiers of the type used in the TV-3A/U seldom occurs in normal use.

b. A defective rectifier CR101 will cause a considerable drop in sensitivity on the ac ranges only. If the dc voltage circuits check out properly, but an appreciable error is found when measuring ac voltages, it is a definite indication that the rectifier CR101 is defective and should be replaced.

Caution

DURING FUNGUS PROOFING OPERATIONS BE SURE THAT NONE OF THE COATING COMPOUND IS USED ON OR PERMITTED TO COME IN CONTACT WITH THE COPPER OXIDE RECTIFIER. CHEMICALS USED IN THESE COATING COMPOUNDS MAY CAUSE DAMAGE TO METALLIC RECTIFIER ELEMENTS.

c. The rectifier CR101, may be tested with an ohmmeter in the following way.

(1) Disconnect the rectifier leads at the ends farthest from the rectifier, taking care to note the original position of the lead connections.

(2) Measure the resistance between the red and yellow rectifier leads with the positive ohmmeter lead in contact with the red rectifier lead. A high resistance reading in excess of 20,000 ohms should be obtained.

(3) Reverse the polarity of the ohmmeter leads and again measure the resistance between the red and yellow rectifier leads. A low resistance reading from approximately 75 ohms to 500 ohms should be obtained.

(4) If when the polarity of the ohmmeter leads is reversed, both readings are low resistance or zero resistance, the rectifier is defective and should be replaced.

(5) Measure the resistance between the yellow and black leads in the same way as in paragraphs (2), (3) and (4) above. Similar readings should be obtained.

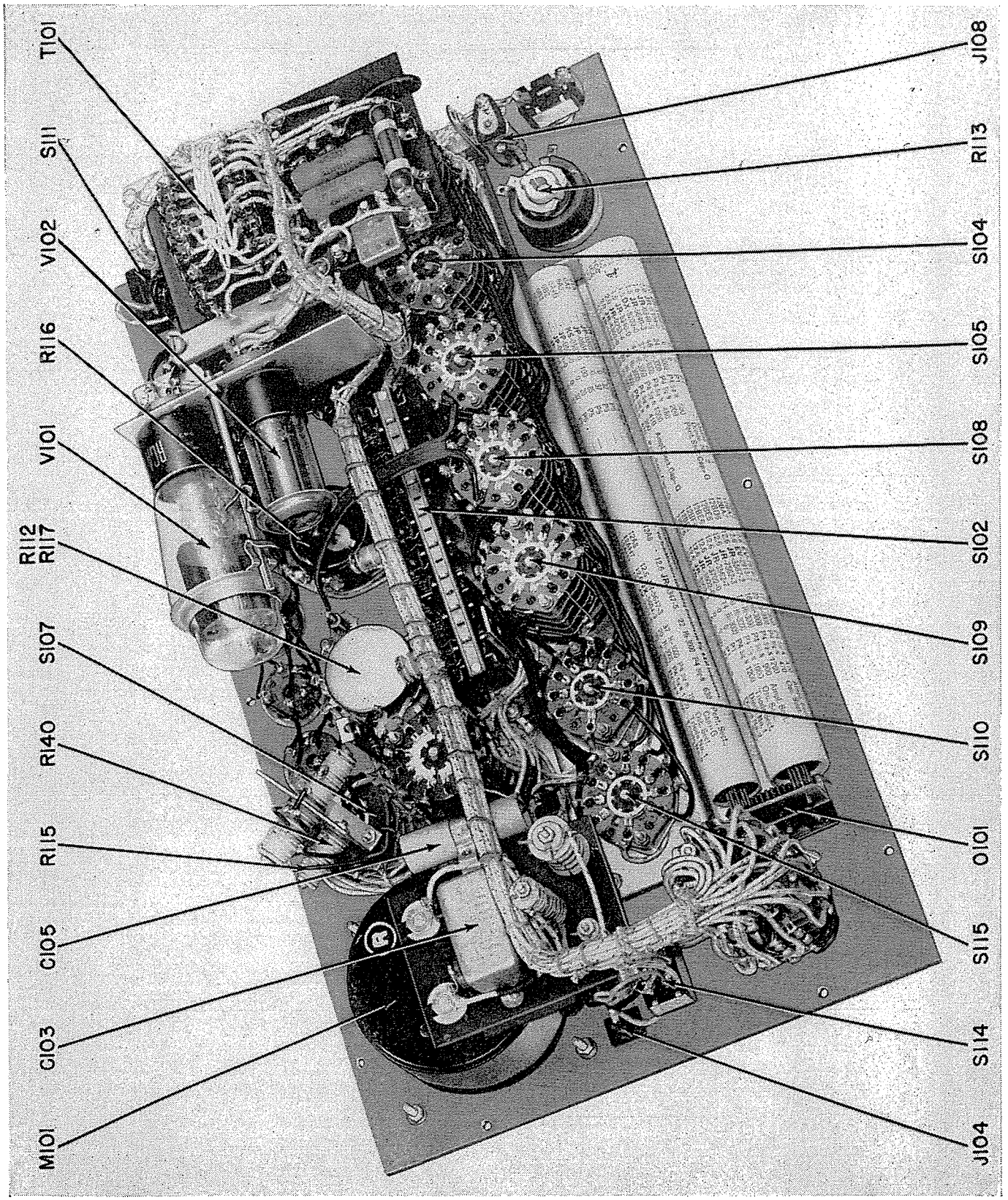


Figure 7-2. Internal View of Tube Tester TV-3A/U (Front Left Oblique)

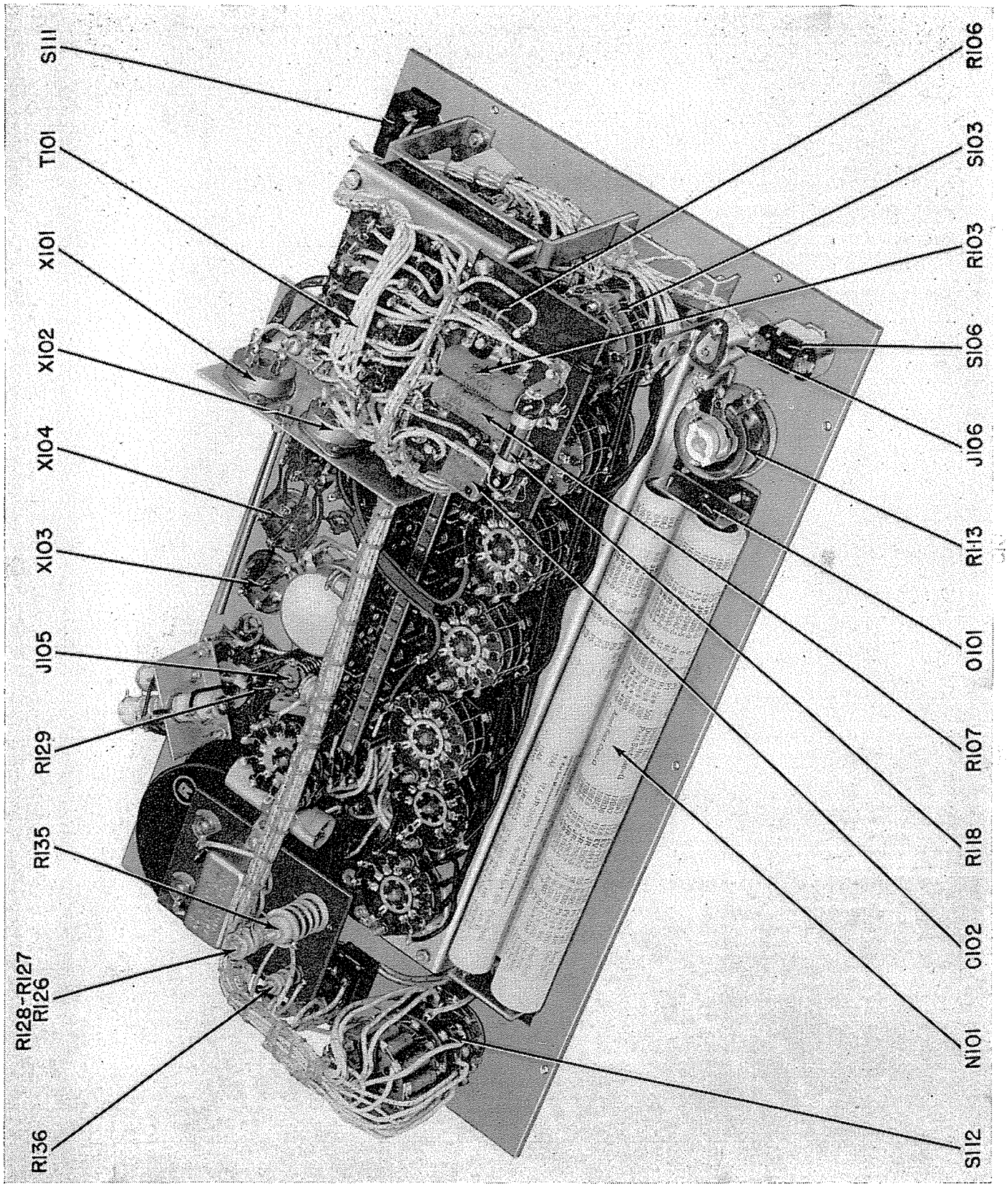


Figure 7-3. Internal View of Tube Tester TV-3A/U (Front Right Oblique)

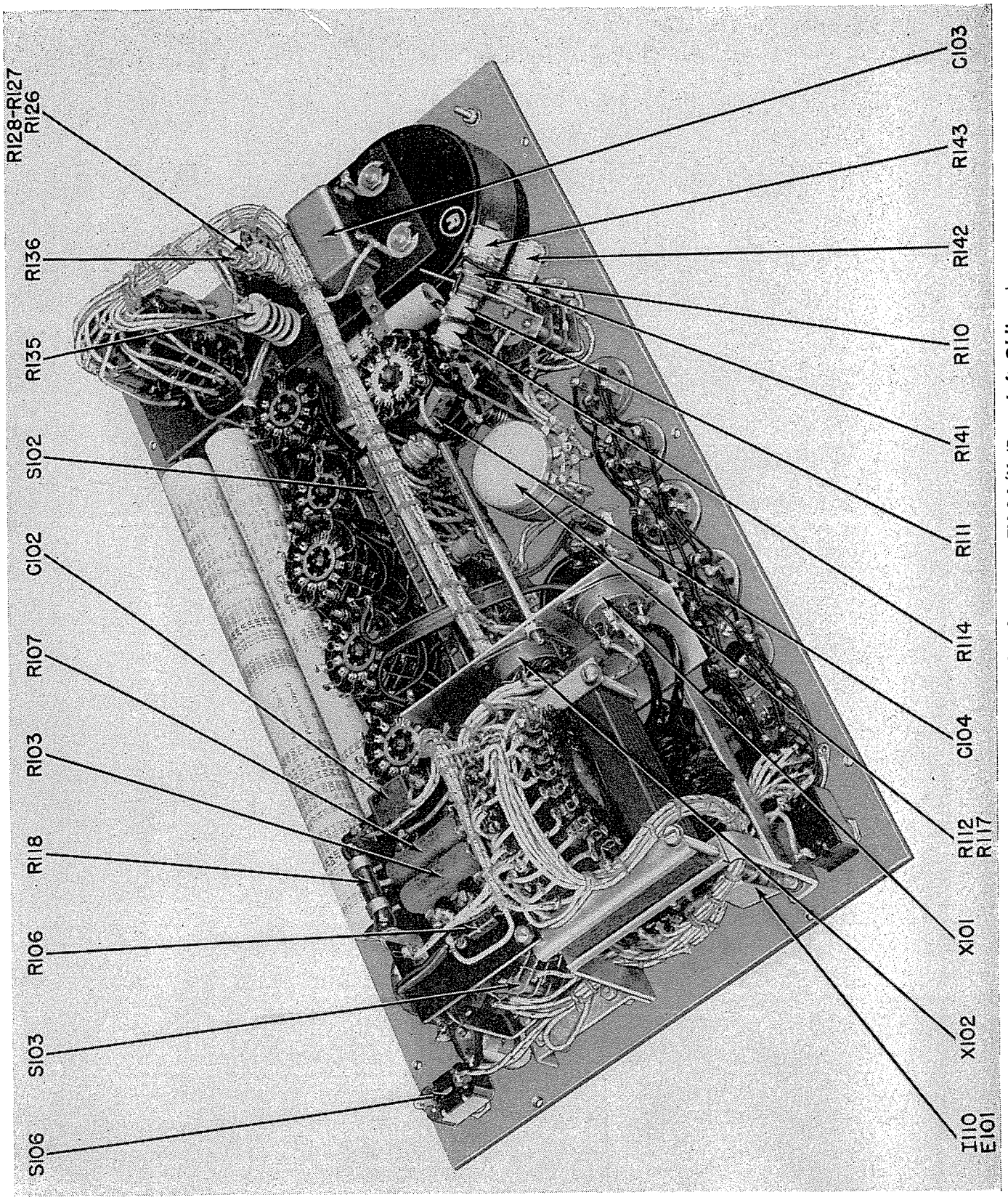


Figure 7-4. Internal View of Tube Tester TV-3A/U (Rear Left Oblique)

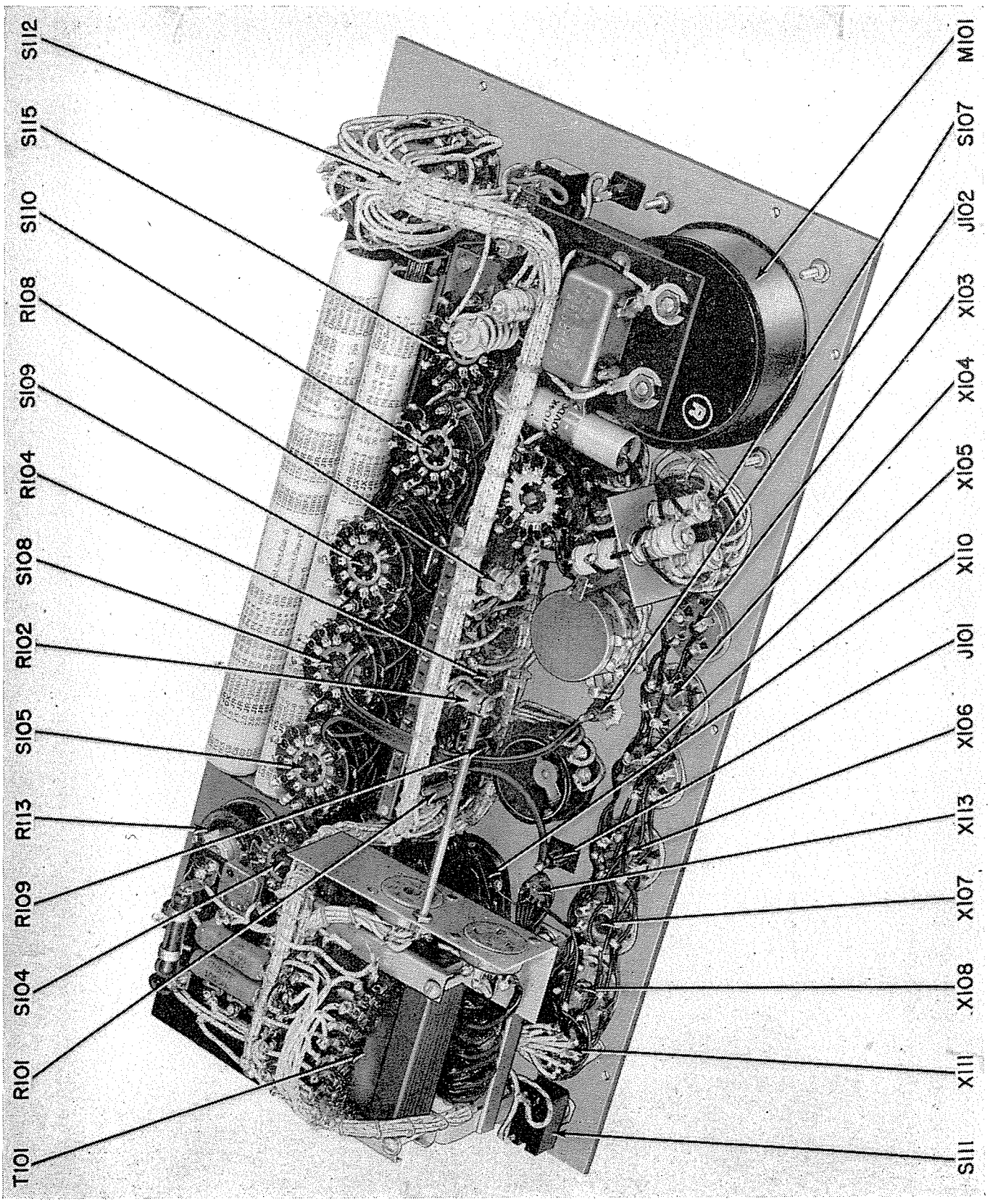


Figure 7-5. Internal View of Tube Tester TV-3A/U (Rear Right Oblique)

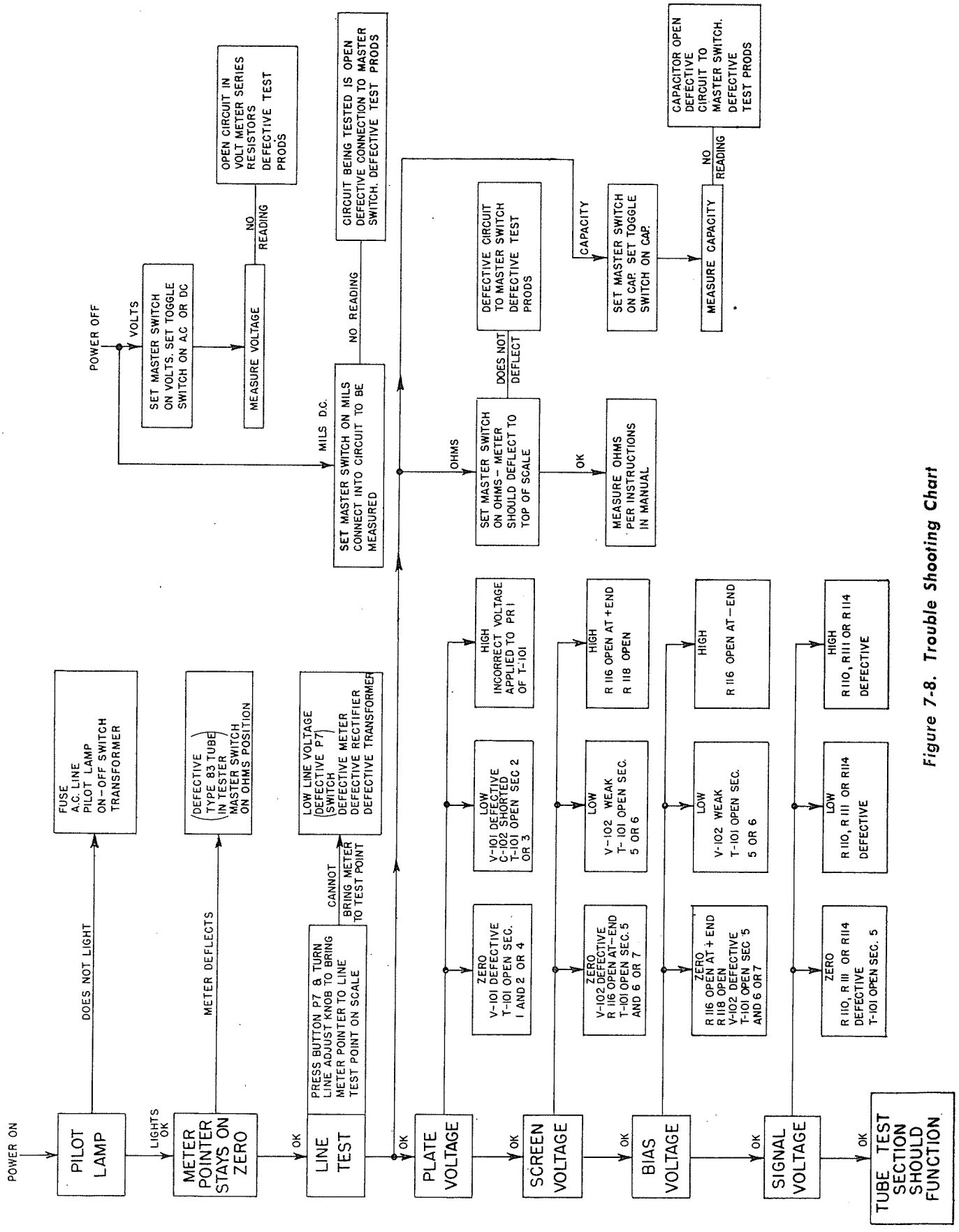


Figure 7-8. Trouble Shooting Chart

NOTES

TABLE 8-1. WEIGHT AND DIMENSIONS OF SPARE PARTS BOX

Spare Parts Box	EQUIPMENT SPARES				
	Overal Dimensions			Volume	Weight
	Height	Width	Depth		
1	6″	12″	6″	.25 cu. ft.	12 lbs.

Note

EQUIPMENT SPARES ARE PACKED IN THE SAME SHIPPING CONTAINER AS THE EQUIPMENT.

TABLE 8-2. LIST OF MAJOR UNITS

Symbol Group	Quantity	Name of Major Unit	Navy Type	Designation
100	1	Tube Tester	TV-3A/U	

TABLE 8-3. COMBINED PARTS AND SPARE PARTS LIST

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
C-101	Not Assigned.								
C-102	CAPACITOR, fixed: mica; 2700 mmf p/m 10%; Spec JAN-C-5.	Neutralizing capacitor. Prevents oscillation in tube under test	CM30B272K	N16-C-32145-5164	3K3027221	Cornell Dubilier	X3095-41	C-102	1
C-103	CAPACITOR, fixed: electrolytic; 100 mfd minus 10% plus 25%; 15 vdcw; Spec JAN-C-62.	Filter capacitor across meter	CE63C101E	N16-C-20179-5441	3DB100-45	Cornell Dubilier	3085-35	C-103	1
C-104	CAPACITOR, fixed: mica; 470 mmf p/m 10%; Spec JAN-C-5.	Isolating capacitor noise test. Prevents shorting when making noise test	CM20B-471K	N16-C-30114-4276	3K2047121	Cornell Dubilier	X3095-8	C-104	1
C-105	CAPACITOR, fixed: paper; 100,000 mmf p/m 10%; 600 vdcw; Spec JAN-C-25.	Isolating capacitor short test. Blocks flow of direct current	CP26A1EF-104K	N16-C-45777-4137	3DA100-730		3105-114	C-105	1
CR-101	RECTIFIER, metallic: copper oxide; input 4.5 V.A.C.; output 3 V.D.C. @ 5 ma; 7/16" lg x 3/8" wd x 1/4" h o/a excluding term; 3/32" mtg holes on 5/32" mtg/c; 3 wire leads 1 red; 1 yellow and 1 black 3" lg; p/o Navy Tube Tester Model TV-3A/U.	Meter rectifier to permit measurement of ac voltages		N17-R-50882-2338	3H4838-15.3	Bradley Type #CX2E2D	Part/dwg #18150-14	CR-101	1
E-101	LAMP, incandescent: 6 to 8 volts @ .15 amps; bulb T-3 1/4" clear; 1 1/8" lg overall; miniature bayonet base; C-2 filament; burn any position.	Pilot lamp		G17-L-6297	2Z5952	Sylvania Prod. Type #47	#12270-12	E-101	1
E-102	LAMP, incandescent: 6 to 8 v; 6 cp; type G6 clear; 1 7/16"; miniature bayonet base; C-2R filament; burn any position.	Fuse and overload indicator in primary circuit of transformer T101		G17-L-6686	6Z6806.14	Tungsol #81	#X12270-2	E-102	1
E-103	LAMP, glow; 115 v 1/4; w striking voltage 65 v AC, 90 v DC; T-4 1/2 clear; 1 5/8" o/a length; candelabra screw base; P-3 electrode; burn any position; neon gas.	Short test indicator		N17-L-6807	3F4056A/L2	G.E. Catalog #NE45	#X12270-1	E-103	1

E-104	CLIP, tube contact: grid and plate connector for lighthouse tubes; used with Tube Tester TV-3A/U; 1¼″ diam plate clip and one silver plated phos bronze grid clip mounted in and insulated from a cylindrical metal shell; blued steel shell; phenolic insulation; cylindrical shape; 1⅛″ diam x 1″ lg excluding contact clips; friction fit mtg over plate and grid connections of tube; replacement part, supplied less leads.	Replacement-tube cap portion of W-101		N17-C-800730-881	2Z2737-4	Ucinite #J-1348-1-2	Part/dwg #3075-13	E-104	1
E-105	COVER, clip: conical shape; black polyvinyl acetate; 1 45/64″ lg x 19/32″ OD x 29/64″ ID max.	Replacement-test clip cover, part of W-103		N17-C-945001-299	3GK1087-3	Mueller #87 Black	Part #9720-12 Dwg #9720-11	E-105	1
E-106	COVER, clip; conical shape red polyvinyl acetate; 1 45/64″ lg; 19/32″ OD x 29/64″ ID max.	Replacement-test clip cover, part of W-102		N17-C-945001-490	3G1790-28	Mueller #87 Red	Part/dwg #9720-11	E-106	1
E-107	PROD, test: nickel plated brass tip with black plastic handle; wire secured in tip by knurled sleeve nut; will accommodate #18 AWG wire, handle 1/16″ ID; 5″ lg x 3/8″ diam approx. o/a.	Replacement-prod, part of W-105		N17-P-84923-8791	3Z4220-5	American Radio Hdwe Part #145 Black	Part #16975-13 Dwg #16975-1	E-107	1
E-108	PROD, test: nickel pl brass tip with red plastic insulating handle; wire secured in tip by knurled sleeve nut; will accommodate #18 AWG wire; handle 1/16″ ID; 5″ lg x 3/8″ diam approx o/a.	Replacement-prod, part of W-104		N17-P-84923-8801	3Z4220-5.1	American Radio Hdwe Part #145 Red	Part/dwg #16975-1	E-108	1
H-101	PLATE, index guide marker: cellulose acetate clear; 11 5/8″ lg x 1½″ wd x .020 thk; four 3/16″ diam mtg holes on 11¼″ x 1″ mtg/c; single red indicator line 1/32″ wd printed lengthwise on center line; 5/16″ x 1¼″ cut out at one end to clear roller index knob.	Protective cover and index line for roll chart		N16-P-403561-112	2Z7091-225		Part/dwg #23800-19	H-101	1
H-102	BUTTON, push: p/o Navy Tube tester Model TV-3A/U; phenolic black; 15/32″ lg x 7/16″ dia, push on type to fit .052″ x 3/16″ flat shaft, with spring.	Operating button for S-102 Section #1		N17-B-840101-117	2Z1480.47	Friedman Co. #S-330-30	Part/dwg #X2920-7	H-102, H-103, H-104, H-105, H-106, H-107, H-108	7
H-103	BUTTON, push: Same as H-102.	Operating button for S-102 Section #2							

TABLE 8-3 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
H-104	BUTTON, push: Same as H-102.	Operating button for S-102 Section #4							
H-105	BUTTON, push: Same as H-102.	Operating button for S-102 Section #5							
H-106	BUTTON, push: Same as H-102.	Operating button for S-102 Section #6							
H-107	BUTTON, push: Same as H-102.	Operating button for S-102 Section #7							
H-108	BUTTON, push: Same as H-102.	Operating button for S-102 Section #8							
H-109	BUTTON, push: p/o Navy Tube Tester Model TV-3A/U; phenolic, red; 15/32″ long x 7/16″ dia, push on type to fit .052″ x 3/16″ flat shaft, with spring	Operating button for S-102 Section #3		N17-B-840101-118	2Z1480.48	Friedman Co. #S-330-30	Part #X2920-8 Dwg #2920-7	H-109	1
I-101	DIAL: bias control; etched aluminum dial filled in black attached to black phenolic bar knob; approx dimen 1 5/16 diam. x 7/8″ high o/a; mounts on 1/4″ diam shaft by means of one #8-32 set screw; filled black numerals 0, 10, 20, through 100, 100 scale divisions on 300° arc, non uniform spacing.	Adjustment dial of bias_voltage control		N16-D-46346-6726	2Z3718.142		Part #4160-57 Dwg #4160-57	I-101	1
I-102	DIAL: Shunt control; etched aluminum dial filled in black attached to black phenolic bar knob; approx dimen 1 5/16″ diam x 7/8″ high o/a; mounts on 1/4″ diam shaft by means of one #8-32 set screw; filled black numerals 0, 10, 20 etc through 100, 100 scale divisions.	Adjustment dial of shunt control		N16-D-46346-6686	2Z3718.138		Part #4160-66 Dwg #4160-66	I-102	1
I-103	SCALE: brass, temper 1/2 H with etched letters enameled black, satin chrome background; alphabetical range: BCDEFGHJK; 1 5/16″ diam, center hole .253″ dia with .190″ flat; mounts on 1/4″ dia flatted shaft behind panel.	Indicates setting of selector switch S-103		N16-S-117101-262	2Z3718.137		Part #4150-65 Dwg #4150-16	I-103	1

I-104	SCALE: brass, temper ½ H with etched letters enameled black, satin chrome background; alphabetical range: RSTUVWXYZ; 1 15/16″ diam, center hole .253″ diam with .190″ flat side; mounts on ¼″ diam flatted shaft behind panel.	Indicates setting of selector switch S-104		N16-S-117101-260	2Z3718.136		Part #X4150-66 Dwg #4150-16	I-104	1
I-105	SCALE: brass, temper ½ H with etched numbers enameled black, satin chrome background; numerical range 0 to 9 inclusive; 1 15/16″ diam, center hole .253″ dia with .190″ flat; mounts on ¼″ diam flatted shaft behind panel.	Indicates setting of selector switch S-105		N16-S-117101-261	2Z3718.135		Part #X4150-64 Dwg #4150-16	I-105, I-106, I-107, I-108, I-109	5
I-106	SCALE: Same as I-105.	Indicates setting of selector switch S-108							
I-107	SCALE: Same as I-105.	Indicates setting of selector switch S-109							
I-108	SCALE: Same as I-105.	Indicates setting of selector switch S-110							
I-109	SCALE: Same as I-105.	Indicates setting of selector switch S-115							
I-110	LIGHT, Indicator: with lens; ½″ frosted red jewel lens; for miniature bayonet base T-3¼ lamp; open frame; brass nickel pl; 1 11/16″ x ⅞″ x 1 1/16″ h o/a, behind mtg sur jewel extends approx ½″ in front of mtg sur; mounts in 1 1/16″ mtg hole, ¼″ max panel thickness; lamp mounted horiz, removable from front; threaded jewel; two solder lug terminals.	ON-OFF indicator, and socket for E-101		N17-L-76850-3998	2Z5991-3	Drake type #40	#19350-112	I-110	1
J-101	CONNECTOR, receptacle, female contact: single contact; phos bronze; straight; ½″ diam x ¾″ lg o/a excluding term; cylindrical black phenolic body; opening for .080″ to 3/32″ diam pin plug; mounts in 11/32″ diam panel hole; supplied with speed nut for mtg.	Panel connection for insertion of grid cap lead		N17-C-73108-1999	2Z5581-5	Eby type #52 black	#10300-2	J-101, J-103, J-106, J-107	4

TABLE 8-3 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
J-102	CONNECTOR, receptacle, female contact: single contact; phos bronze; straight; ½″ diam x ¾″ lg o/a excluding term; cylindrical red phenolic body; opening for .080″ to 3/32″ diam pin plug; mounts in 11/32″ diam panel hole, supplied with speed nut for mtg.	Panel connection for insertion of plate cap lead		N17-C-73108-2000	2Z5581-4	Eby type #52 red	#10300-1	J-102, J-104	2
J-103	CONNECTOR, receptacle; female contact: Same as J-101.	Panel connection for insertion of black test lead							
J-104	CONNECTOR, receptacle, female contact: Same as J-102.	Panel connection for insertion of red test lead							
J-105	LAMPHOLDER: candelabra screw; brass shell body; 115 v, 75w; 1¾″ lg x 1″ wd x ⅝″ h excluding terminals and mtg bracket; one elongated mtg hole 3/16″ x ⅞″ in bracket; mtg. bracket extends 1¼″ behind base of socket; two solder lug term on opposite sides.	Socket for neon short indicator lamp E-103		N17-L-50844-4672	2Z5956.16	Drake Type #414L-CH-LT	#X19350-2	J-105	1
J-106	CONNECTOR, receptacle, female contact: Same as J-101.	Panel connection for insertion of noise test lead							
J-107	CONNECTOR, receptacle, female contact: Same as J-101	Panel connection for insertion of noise test lead							
J-108	LAMPHOLDER: candelabra bayonet; steel shell body; 115 v, 75 w; 2″ lg x 1″ wd x 1 1/16″ h, excluding terminals and mtg bracket; one elongated mtg hole 3/16″ x ⅞″ in bracket; mtg bracket extends 1¼″ behind base of socket; two solder lug term on opposite sides.	Socket for fuse lamp E-102		N17-L-51678-3452	6Z8332	Drake #614L-CH-LT	#X19350-1	J-108	1

M-101	METER, multi-scale: DC; scale ranges 0/3000/6000/15000 micromhos, 0/100,000 ohms /100 megohms, 0/200/500/1000 volts and mils, 0/5/50 microfarads; square, phenolic, flush mtg case; barrel diam 3½", depth behind flange 1½" rectangular flange 4" x 3¾" x ⅝", excluding terminals; accuracy 2%; D'Arsonval movement; 200 UA basic movement sensitivity, resistance 2365 ohms p/m 50 ohms; calibrated for non-magnetic panel; micromho scale 60 divisions black on purple blue, ohms and megohms 72 divisions black on green, volts and mils 40 divisions black on white, capacity ranges 30 divisions black on blue; meter designed only for use in Navy Model TV-3A/U Tube Tester which contains all associated circuit components; four 6-32 mtg studs ⅝" lg on 3⅜" mtg/c; two stud terminals 1¼"-28 thread ⅞" lg spaced 1½" c to c; check points for diodes, rectifier, and line test.	Indicator for Line Test Micromhos Volts A. C. Volts D. C. Milliamperes And Capacity Measurements			Part 480-855 Dwg A-530	M-101	1
N-101	SHEET INSTRUCTION: tube test data; white paper; 10.25" wide x approx 90" long; black print on white background; p/o Navy Tube Tester Model TV-3A/U.	Tube test settings and instructions	N16-S-290001-104	6D8647	#3200-37	N-101	1
N-102	SHEET, instruction: operating data; Navy Tube Tester Model TV-3A/U; cardboard, white stock, black print; rectangular; 5" wd x 18" lg.	Condensed operating data	N16-S-290001-105	6D8647-1	#3122-8	N-102	1
O-101	DRIVE, chart: p/o Navy Tube Tester Model TV-3A/U, dual fibre rollers, ¾" diam mounted and geared on cad pl welded panel assembly; rectangular; 1½" wide x 11⅝" long x 1½" deep; 4 mounting holes ⅜" d on 1" x 11¼" mtg/c.	Mechanism for mounting and rotation of roll chart	N16-D-900201-101	223876.108	Part/dwg #X9600-7	O-101	1
O-102	CLIP: electron tube contact; connector for grid or plate caps ¼" to ⅜" diam; spring brass, cad pl; 1¼" lg x $^{23}/_{32}$" wd x $^{29}/_{64}$" h over-all; black phenolic insulation; one solder connection.	Replacement-tube cap portion of W-106	N17-C-800828-601	222712.120	Amphenol #63-1 black	Part/dwg #3075-12	O-102	1

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
O-103	CLIP: test; steel cad plate; 1½″ lg x 5/16″ wd x ½″ h overall; one pierced hole for solder connection; (see note) ⅜″ maximum jaw opening; supplied less terminal screw, solder connection required (see note). NOTE: Clips used on original equipment are not tapped for terminal screw. Standard Mueller #45 clip with terminal screw is suitable replacement part.	Replacement-Test clip, part of W-102 and W-103		N17-C-801899-101	3ZK1087-4	Mueller #45 Pee Wee	#3300-3	O-103	2
O-104	KNOB: bar; black phenolic; for ¼″ diam shaft; single 8-32 set screw; filled white dot; 1 13/32″ lg x ⅞″ wd x 13/16″ h o/a; shaft hole ¾″ deep; small metal pointer on lower front edge.	Adjustment knob for MICROMHOS switch		N17-K-700073-551	2Z5821-142		Part/dwg #11500-11	O-104, O-105, O-106, O-107	4
O-105	KNOB: Same as O-104.	Adjustment knob for FILAMENT voltage switch S-101							
O-106	KNOB: Same as O-104.	Adjustment knob for SHORTS switch S-113							
O-107	KNOB: Same as O-104.	Adjustment knob for MASTER switch S-112							
O-108	KNOB: bar, black phenolic; for ¼″ diam shaft; single 8-32 set screw; filled white dot; 1 9/32″ lg x ⅞″ wd x 13/16″ h o/a; shaft hole ¾″ deep.	Adjustment knob for FILAMENT selector switch		N17-K-700068-701	2Z5821-141		Part/dwg #11505-46	O-108, O-109, O-110, O-111, O-112, O-113 O-114, O-115	8
O-109	KNOB: Same as O-104.	Adjustment knob for FILAMENT selector switch S-104							
O-110	KNOB: Same as O-104.	Adjustment knob for GRID selector switch S-105							

O-111	KNOB: Same as O-104.	Adjustment knob for PLATE selector switch S-108						
O-112	KNOB: Same as O-104.	Adjustment knob for SCREEN selector switch S-109						
O-113	KNOB: Same as O-104.	Adjustment knob for CATHODE selector switch S-110						
O-114	KNOB: Same as O-104.	Adjustment knob for SUPPRESSOR selector switch S-115						
O-115	KNOB: Same as O-104.	Adjustment knob for LINE ADJUST rheostat R-113						
P-101	CONNECTOR, plug: one round male contact, nickel plated brass 5/32″ diam x 7/16″ lg; straight; red phenolic head 25/64″ diam x 3/8″ lg; over-all dimen 25/64″ diam x 13/16″ lg; will accommodate #18 AWG wire; solder connection to wire.	Replacement-plug, part of W-101, W-102, W-103, W-105 and W-106		N17-C-71408-3050	2Z7111.23	Amphenol part #71-1S Red	Part/dwg #16525-29	P-101	5
P-102	CONNECTOR, plug: one round male contact, nickel plated brass, 5/32″ diam x 7/16″ lg; straight; black phenolic head 25/64″ diam x 3/8″ lg; over-all dimen 25/64″ diam x 13/16″ lg; will accommodate #18 AWG wire; solder connection to wire.	Replacement-plug, part of W-101 and W-104		N17-C-71410-3324	2Z7111.23.1	Amphenol part #71-1S Black	Part #16525-40 Dwg #16525-29	P-102	2
P-103	CONNECTOR, plug: 5 round male contacts, nickel plated brass, .125″ diam x 9/16″ lg, to fit standard 5 pin tube socket; straight; over-all dimensions 1 1/8″ diam x 3/8″ lg excluding contacts; round phenolic body.	Replacement-plug, part of W-102		N17-C-71498-4296	2Z3025-44	Amphenol part #71-5	Part/dwg #16525-1	P-103	1
P-104	CONNECTOR, plug: two flat parallel blades; straight; 1 3/8″ diam x 1 5/16″ lg over-all excluding terminals; 15 amps 125 volts 10 amps 250 volts; round rubber body; molded rubber insert; cable opening .260″ to .312″. NOTE: P-104 is listed as a replacement part only and is not used on original equipment.	Replacement-plug for W-107		N17-C-71425-4054	2Z7560-5	Bryant type HRB	#16525-58	P-104	1

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
R-101	RESISTOR, fixed: composition; 37,000 ohms p/m 1%; ½ watt; F characteristic; 5/8" long x 17/64" diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Dropping resistor line test circuit		N16-R-73135-6901	3Z6637	Wilkor Prod Carbofilm #CP-½	Part #X18525-378 Dwg #A592	R-101	1
R-102	RESISTOR, fixed: wire wound; 150 ohms p/m 1%; ½ watt; body dimen ¾" lg x ⅜" diam excluding term; resistant to humidity; two radial wire stub terminals; ceramic body; p/o Navy Model TV-3A/U Tube Tester.	Load resistor rectifier test		N16-R-81199-9849	3Z6015-102		Part #18673-218 (150) Dwg #19430-32	R-102	1
R-103	RESISTOR, fixed: wire wound; 100 ohms p/m 5% C/T; 10 watts; Spec #JAN-R-26A.	Provides center tap for filament in filament type tubes. Prevents injection of filament voltage into grid signal	RW31F101T	N16-R-67393-2596	3RW18326		Part #X18575-19	R-103	1
R-104	RESISTOR, fixed: composition; 180,000 ohms p/m 10%; ½ watt; Spec. JAN R-11.	Series grid resistor gas test circuit	RC20BF-184K	N16-R-50696-811	3RC20BF-184K		#X18414-182	R-104	1
R-105	Not Assigned.								
R-106	RESISTOR, fixed: composition; 1200 ohms p/m 10%; 1 watt; Spec JAN-R-11.	Limiting resistor diode test circuit	RC30BF-122K	N16-R-49941-231	3RC30BF-122K		#X18422-122	R-106	1
R-107	RESISTOR, fixed: wire wound; 1800 ohms p/m 5%; 10 watt; Spec JAN-R-26A.	Limiting resistor OZ4 test circuit	RW31F182	N16-R-66094-5706	3RW25819		#X18575-12	R-107	1
R-108	RESISTOR, fixed: wire wound; 45 ohms p/m 1%; ½ watt; body dimen 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub terminals ⅛" lg; ceramic body; p/o Navy Model TV-3A/U Tube Tester.	Meter shunt rectifier test circuit		N16-R-81081-6369	3Z6004E5-12		Part #18673-312 (45) Dwg #19430-33	R-108	1

R-109	RESISTOR, fixed: composition; 15,000 ohms p/m 5%; 1 watt; Spec JAN-R-11.	Limiting resistor tube test, plate circuit	RC30BF-153J	N16-R-50335-751	3RC30BF153J	#X18423-151	R-109	1
R-110	RESISTOR, fixed: ww; 800 ohms p/m 1%; ½ w; 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub term ⅛" lg, #20 AWG twisted; ceramic body; p/o Army Navy Tube Tester TV-3A/U.	Part of voltage divider for signal volts		N16-R-81311-2465	3Z6080-72	Part #18673-326 (800) Dwg #19430-33	R-110	1
R-111	RESISTOR, fixed: ww; 111 ohms p/m 1%; ½ w; 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub term ⅛" lg, #20 AWG twisted; ceramic body; p/o Army-Navy Tube Tester TV-3A/U.	Part of voltage divider for signal volts		N16-R-81169-7296	3Z6011A1-5	Part #18673-317 (111) Dwg #19430-33	R-111	1
R-112	RESISTOR, variable: wire wound; dual section 150 ohms each section; p/m 5%; 4 watts max; 3 solder lug term each section; metal case 1¾" diam x 1 1/16" deep including both sections; enclosed; round metal shaft ¼" diam x ⅞" lg from mtg surface; linear; contact arms insulated from case; normal torque; ⅜-32 mtg bushing ¼" lg from mtg surface; both sections must be within 5% of 150 ohms but each section must also be within 1% of the total resistance of the other section; adjusted at contractor's factory; p/o Navy Tube Tester model TV-3A/U.	Shunt potentiometer controls meter sensitivity for rectifier and diode tests		N16-R-92231-4291	3Z7150-9	Part #16926-4 Dwg #16925-90	R-112, R-117	1
R-113	RESISTOR, variable: wire wound; 200 ohms p/m 10%; Spec JAN-R-22.	Line adjust rheostat	RP101FD-201KK	N16-R-90301-2675	3RP6007	#X18750-13	R-113	1
R-114	RESISTOR, fixed: ww; 89 ohms p/m 1%; ½ w; 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub term ⅛" lg, #20 AWG twisted; ceramic body; p/o Army-Navy Tube Tester TV-3A/U.	Part of voltage divider for signal volts		N16-R-81152-6029	3Z6008J9.2	Part #18673-316 (89) Dwg #19430-33	R-114	1

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
R-115	RESISTOR, fixed: ww; 109 ohms p/m 1%; ½ w; 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub term ⅛" lg, #20 AWG twisted; ceramic body; p/o Army-Navy Tube Tester TV-3A/U.	Part of shunt network for micromho measurements		N16-R-81167-8529	3Z6010J9		Part #18673-317 (109) Dwg #19430-33	R-115, R-142	2
R-116	RESISTOR, variable: wire wound; 3000 ohms p/m 10%; 1 watt; 3 terminal nuts with solder lugs; phenolic case 1 21/32" diam x ⅞" deep; open; round shaft ¼" diam x 1" lg from mtg surface; special taper, 35% rotation 466 ohms, 50% rotation 882.2 ohms, 65% rotation 1583 ohms; contact arm grounded to mtg bushing; normal torque; ⅜-32 bushing ⅜" lg from mtg surface, p/o Navy Tube Tester Model TV-3A/U.	Bias potentiometer controls bias voltage		N16-R-90901-1305	3Z7330-23		Part/dwg #16927-3	R-116	1
R-117	RESISTOR, variable: Part of R-112.	Shunt control potentiometer on same shaft as R-112							
R-118	RESISTOR, adjustable: wire wound; 8500 ohms p/m 10%; 10 watts; one adjustable sliding contact; 5/16" diam x 1¾" lg; two mtg brackets supplied; vitreous enamel; two radial tab terminals, one sliding tab terminal.	Part of voltage divider used for calibrating bias voltage		N16-R-43688-3689	3Z6585-10	Mallory-Part #1AV8500	#18575-89	R-118	1
R-119	RESISTOR, fixed: composition; 400,000 ohms p/m 1%; ½ watt; F characteristic; ⅝" lg x 17/64" diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of ohmmeter voltage divider		N16-R-73261-1191	3Z6740-28	Wilkor Prod Carbofilm #CP-½	Part #X18525-364 Dwg #A-592	R-119, R-120	2
R-120	RESISTOR, fixed: Same as R-119.	Part of ohmmeter voltage divider							

R-121	RESISTOR, fixed: composition; 47 ohms p/m 10%; ½ watt; Spec JAN-R-11.	Neutralizing resistor. Oscillation suppressor	RC20BF-470K	N16-R-49427-811	3RC20BF-470K		#X18410-472	R-121, R-122, R-123	3
R-122	RESISTOR, fixed: Same as R-121.	Neutralizing resistor. Oscillation suppressor							
R-123	RESISTOR, fixed: Same as R-121.	Neutralizing resistor							
R-124	RESISTOR, fixed: composition; 40,000 ohms p/m 1%; ½ watt; F characteristic; 5/8" lg x 17/64" diam, insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of ohmmeter voltage divider		N16-R-73139-7657	3Z6640-93	Wilkor Prod Carbofilm #CP-½	Part #X18525-373 Dwg #A-592	R-124	1
R-125	RESISTOR, fixed: composition; 1400 ohms p/m 1%; ½ watt; F characteristic; 5/8" lg x 17/64" diam; insulated moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of meter shunt for mils ranges		N16-R-73000-9867	3Z6140-12	Wilkor Prod Carbofilm #CP-½	Part #X18525-370 Dwg #A592	R-125	1
R-126	RESISTOR, fixed: wire wound; 172.2 ohms p/m 1%; ½ watt; body dimen 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub terminals ⅛" lg; ceramic body; p/o Navy Model TV-3A/V Tube Tester.	Part of meter shunt for mils ranges		N16-R-81205-5279	3Z6017B2-2		Part #18673-319 (172.2) Dwg #19430-33	R-126	1
R-127	RESISTOR, fixed: wire wound; 35.92 ohms p/m 1%; ½ watt; body dimen 15/32" lg x ½" diam excluding term; re sistant to humidity; two radial wire stub terminals ⅛" lg; ceramic body; p/o Navy Model TV-3A/U Tube Tester.	Part of meter shunt for mils ranges		N16-R-81073-5099	3Z6003E5-24		Part #18673-311 (35.92) Dwg #19430-33	R-127	1
R-128	RESISTOR, fixed: wire wound 3.98 ohms p/m 1%; ½ watt; body dimen 15/32" lg x ½" diam excluding term; resistant to humidity; two radial wire stub terminals; ceramic body; p/o Navy Model TV-3A/U Tube Tester.	Part of meter shunt for mils ranges		N16-R-80907-8699	3Z5993J9-1		Part #18673-303 (3.98) Dwg #19430-33	R-128	1
R-129	RESISTOR, fixed: composition; 330,000 ohms p/m 10%; ½ watt; Spec JAN-R-11.	Shunt for neon lamp	RC20BF-334K	N16-R-50759-811	3RC20BF-334K		#X18414-332	R-129	1

TABLE 8-3 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
R-130	RESISTOR, fixed: composition; 1900 ohms p/m 1%; ½ watt; F characteristic; 5/8" lg x 17/64" diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of ohmmeter voltage divider		N16-R-73009-4101	3Z6190-15	Wilkor Prod Carbofilm #CP-½	Part #X18525-377 Dwg #A-592	R-130	1
R-131	RESISTOR, fixed: composition; 1050 ohms p/m 1%; ½ watt; F characteristic; 5/8" lg x 17/64" diam; insulated moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of meter shunt in voltmeter circuit		N16-R-72994-4551	3Z6105-2	Wilkor Prod Carbofilm #CP-½	Part #X18525-375 Dwg #A-592	R-131	1
R-132	RESISTOR, fixed: composition; 19,200 ohms p/m 1%; ½ watt; F characteristic; 5/8" lg x 17/64" diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of voltmeter multiplier network		N16-R-73110-9701	3Z6619B2-2	Wilkor Prod Carbofilm #CP-½	Part #X18525-374 Dwg #A-592	R-132	1
R-133	RESISTOR, fixed: composition; 850 ohms p/m 1%; ½ watt; F characteristic; 5/8" lg x 17/64" diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of meter shunt in voltmeter circuit		N16-R-72983-6757	3Z6085-6	Wilkor Prod Carbofilm #CP-½	Part #X18525-376 Dwg #A-592	R-133	1
R-134	RESISTOR, fixed: composition; 27,000 ohms p/m 5%; ½ w; Spec JAN-R-11.	Limiting resistor short test circuit	RC20BF-273J	N16-R-50398-431	3RC20BF273J		#X18413-271	R-134	1
R-135	RESISTOR, fixed: wire wound; 65 ohms p/m 1%; 1 watt; body dimen 1¼" lg x ¾" diam excluding term; resistant to humidity; two radial wire stub terminals ⅛" lg; ceramic body; p/o Navy Model TV-3A/U Tube Tester.	Capacity calibration resistor for 0-50 MF range		N16-R-81115-1049	3Z6006E5-8		Part #18673-414 (65) Dwg #19430-34	R-135	1

R-136	RESISTOR, fixed: wire wound; 580 ohms p/m 1%; ½ watt; body dimen ¾″ lg x ⅜″ diam excluding term; resistant to humidity; two radial wire stub terminals ⅛″ lg; ceramic body; p/o Navy Model TV-3A/U Tube Tester.	Capacity calibration resistor for 0-5 MF range		N16-R-81283-8699	3Z6058-3		Part #18673-224 (580) Dwg #19430-32	R-136	1
R-137	RESISTOR, fixed: composition; 180,000 ohms p/m 1%; ½ watt; F characteristic; ⅝″ lg x 17/64″ diam, insulated moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of voltmeter multiplier network		N16-R-73216-5957	3Z6718-27	Wilkor Prod Carbofilm #CP-½	Part #X18525-345 Dwg #A-592	R-137	1
R-138	RESISTOR, fixed: composition; 300,000 ohms p/m 1%; ½ watt; F characteristic; ⅝″ long x 17/64″ diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of voltmeter multiplier network		N16-R-73243-8257	3Z6730-48	Wilkor Prod Carbofilm #CP-½	Part #X18525-393 Dwg #A-592	R-138	1
R-139	RESISTOR, fixed: composition; 500,000 ohms p/m 1%; ½ w; F characteristic; ⅝″ lg x 17/64″ diam; insulated, moisture resistant; 2 axial wire leads; polyvinyl chloride insulating sleeve.	Part of voltmeter multiplier network		N16-R-73271-1558	3Z6750-107	Wilkor Prod Carbofilm #CP-½	Part #X18525-392 Dwg #A-592	R-139	1
R-140	RESISTOR, fixed: ww; 41 ohms p/m 1%; ½ w; 15/32″ lg x ½″ diam excluding term; resistant to humidity; two radial wire stub term ⅛″ lg, #20 AWG twisted; ceramic body; p/o Army-Navy Tube Tester TV-3A/U.	Part of shunt network for micromho measurements		N16-R-81079-9824	3Z6004A1-3		Part #18673-312 (41) Dwg #19430-33	R-140, R-141	2
R-141	RESISTOR, fixed: Same as R-140.	Part of shunt network for micromho measurements							
R-142	RESISTOR, fixed: Same as R-115.	Part of shunt network for micromho measurements							
R-143	RESISTOR, fixed: ww; 257 ohms p/m 1%; ½ w; 15/32″ lg x ½″ diam excluding term; resistant to humidity; 2 radial wire stub term, #20 AWG twisted; ceramic body; p/o Army-Navy Tube Tester TV-3A/U.	Meter shunt for 6000 micromho range		N16-R-81230-1149	3Z6025G7		Part #18673-321 (257) Dwg 19430-33	R-143	1
R-144	RESISTOR, fixed; composition; 47,000 ohms p/m 5%; ½ w; Spec. JAN-R-11.	Limiting resistor short test circuit	RC20BF-473J	N16-R-50479-431	3RC20BF-473J		#X18413-471	R-144	1

TABLE 8-3 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
R-145	RESISTOR, fixed: composition; 1 megohm p/m 10%; ½ w; Spec JAN-R-11.	Grid resistor for converter tubes	RC20BF-105K	N16-R-50975-811	3RC20BF-105K		#X-18415-102	R-145	1
S-101	SWITCH, rotary: 18 position; 2 section; silver brass cont phenolic insulation; body dimen 2 5/16" x 1 5/16" d behind mtg surface; non shorting; solder lug term; single hole mtg bushing 3/8-32" x 1/4" lg from mtg surface; 1/4" diam shaft 3/4" lg from mtg surface; flatted shaft; p/o Navy Model TV-3A/U Tube Tester.	Filament voltage selector		N17-S-63709-5349	3Z9825-62.379	Oak #39641-L2	Part/dwg #X19912-160	S-101	1
S-102	SWITCH, push: (for contact arrangement refer to Hickok dwg 19910-66); 8 sections each of which is operated by a separate push button independently of the other sections; metal frame with phenolic insulation; body dimensions 6 9/32" lg x 15/16" high x 1 15/16" deep behind mtg surface excluding push rods and terminals; shorting type contacts on sections 6 and 7 only as indicated on Hickok dwg #19910-66; momentary action; solder lug term; two .140" diam mtg holes on 6" mtg/c; seven push rods .052" thk x 3/16" wd, extend 7/8" from mtg surface; p/o Army-Navy Tube Tester TV-3A/U.	Selects proper test voltages for various tube types		N17-S-58847-7001	3Z9824-6	Oak Mfg. Co. #45535-130	Part/dwg #19910-66	S-102	1
S-103	SWITCH, rotary: 10 position; 5 section; silver brass cont; bakelite insulation; body dimen 1 7/8" h x 1 5/8" wd x 2 1/8" lg o/a behind mtg surface; non-shorting solder lug term; single hole mtg; bushing 3/8"—32 x 3/8" lg from mtg surface; 1/4" diam shaft 1 3/16" lg from mtg surface; flatted shaft; p/o Navy Model TV-3A/U Tube Tester.	Connects one side of filament voltage to selected socket contact		N17-S-66623-4964	3Z9825-62.378	Oak Mfg. Co. #39646-H5	Part/dwg #X19912-159	S-103, S-104, S-105, S-108, S-109	5

S-104	SWITCH, rotary: Same as S-103.	Connects one side of filament voltage to selected socket contact							
S-105	SWITCH, rotary: Same as S-103.	Connects grid voltage to selected socket contact							
S-106	SWITCH, toggle: SPST; Spec JAN-S-23.	Power, ON—OFF, switch	ST42A	N17-S-70412-4406	3Z9863-42A		#X19911-31	S-106	1
S-107	SWITCH, rotary: 5 pole, 5 positions; two sections; silver pl brass contacts; phenolic insulation; body dimensions 1 7/8" x 1 11/16" d o/a behind mtg surface; non shorting contacts; solder lug term; single hole mtg, 3/8-32 bushing 1/4" lg from mtg surface, 1/4" diam shaft 7/8" lg from mtg surface; flatted shaft; p/o Army-Navy Tube Tester TV-3A/U.	Selects proper ranges in micromhos for tube under test and sets up corresponding signal voltage circuits		N17-S-63690-1051	3Z9825-62.545	Oak Mfg. Co. #45534-H2	Part/dwg #19912-209	S-107	1
S-108	SWITCH, rotary: Same as S-103.	Connects plate voltage to selected socket contact							
S-109	SWITCH, rotary: Same as S-103.	Connects screen voltage to selected socket contact							
S-110	SWITCH, rotary: 10 positions; 1 section; silver brass cont; bakelite insulation; body dimen 1 7/8" h x 1 5/8" w x 1 13/16" lg overall d behind mtg surface; non-shorting; solder lug term; single hole mtg bushing 3/8-32 x 3/8" lg from mtg surface; 1/4" diam shaft 1 3/16 lg from mtg sur; flatted shaft; p/o Navy Model TV-3A/U Tube Tester.	Connects cathode voltage to selected socket contact		N17-S-60522-7969	3Z9825-62.377	Oak Mfg. Co. #39642-H1	Part/dwg #X19912-158	S-110, S-115	2
S-111	SWITCH, interlock: SPST; 6 amp @ 125 v; phenolic body; 1 3/4" lg x 1 1/16" wd x 1 1/16" d behind mtg surface; push button type normally closed; solder lug term; 15/32-32 threaded bushing x 1/2" lg from mtg surface; metal button with overtravel device to prevent damage to contacts.	Turns off equipment when cover is closed		N17-S-56830-7741	3Z9824-31.63	Arrow, Hart & Hageman Type No. 81075	#19910-70	S-111	1

PARTS

SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
S-112	SWITCH, rotary: 11 positions; 5 sections; silver brass cont; bakelite insulation; body dimen 1⅞″ x 1 1/16″ oval, 3 1/16″ d; non-shorting solder lug term; single hole, mtg bushing ⅜″-32 x ¼″ lg from mtg surface; ¼″ diam shaft ⅝″ lg from mtg surface; flatted shaft; p/o Navy Model TV-3A/U Tube Tester.	Master switch selects functions and ranges for multimeter circuit		N17-S-66623-6814	3Z9825-62.376	Oak Mfg. Co. #39645-H5	Part/dwg #X19912-161	S-112	1
S-113	SWITCH, rotary: 6 position 5 section; silver brass cont; bakelite insulation; body dimen 1⅞″ x 1 1/16″ oval, 2 5/16″ d; non-shorting; solder lug term; single hole mounting, ⅜″-32 bushing ¼″ lg from mtg surface, ¼″ diam shaft ⅝″ lg from mtg surface; flatted shaft; p/o Navy Model TV-3A/U Tube Tester.	Short test switch		N17-S-66623-5044	3Z9825-62.375	Oak Mfg. Co. #39643-H5	Part/dwg #X19912-157	S-113	1
S-114	SWITCH, toggle: DPDT; Spec. JAN-S-23.	Connects rectifier CR-101 into meter circuit for ac and capacity measurements	ST52N	N17-S-73959-1025	3Z9863-52N		#X19911-29	S-114	1
S-115	SWITCH, rotary: Same as S-110.	Connects suppressor voltage to selected socket contact							
T-101	TRANSFORMER, power: filament and plate type; pri 93 VAC, .35 amps, 50 to 1600 cycles, single phase; seven secondary windings; secd #1, 117 v @ .3A tapped at 75 v @ .3 A, 50 v @ .3 A, 35 v @ .3 A, 25 v @ .3 A, 20 v @ .3 A, 12.6 v @ .3 A; 10 v @ 3 A, 7.5 v @ 3 A, 6.3 v @ 3 A, 5 v @ 3 A, 4.3 v @ 3 A, 3.0 v @ 3 A, 2.5 v @ 3 A, 2 v @ 3 A, 1.5 v @ 3 A, and 1.1 v @ 3 A; secd #2, 5 v @ 3 A C/T; secd #3, 5 v @ 2 A C/T; secd #4, 320 v @ 20 ma C/T; secd #5, 5 v @ 30 ma; secd #6, 170 v @ 70 ma, tap-	Power transformer		N17-T-73489-5451	2Z9619-220		Part/dwg #X20800-85	T-101	1

	ped at 20 v; secd #7, 170 v @ 70 ma; secd #1, 750 turns total, 80½ turns #19 wire, 669 ½ turns #31 wire; secd #2, 34 turns #19 wire C/T; secd #3, 34 turns #24 wire C/T; secd #4, 2020 turns #34 wire C/T; secd #5, 31 turns #31 wire C/T; secd #6, 1050 turns #33 wire tapped @ 930 turns; secd #7, 1050 turns #33 wire; open frame construction; o/a dimen excluding terminals 3 11/16" x 2¾" x 3⅜"; 22 solder lug terminals on top, 14 wire lead terminals on bottom; clamp mtg; see Hickok dwg #X20800-85; acetate insulation; moisture and fungus proofed per JAN-T-152; p/o Navy Tube Tester Model TV-3A/U.								
V-101	TUBE, electron: full wave mercury vapor rectifier.	Rectifier, plates voltage supply	#83	N16-T-60830	2J83		#X20875-28	V-101	1
V-102	TUBE, electron: full wave rectifier.	Rectifier, screen voltage and bias supply	5Y3GT/G	N16-T-55735	2J5Y3GT		#X20875-6	V-102	1
W-101	LEAD, grid and plate for lighthouse tubes: two #18 AWG stranded copper conductors; 16 #30 AWG strands; neoprene insulation, one red & one black; 5¼" lg excluding term; both leads terminated one end in special grid and plate connector for lighthouse tubes Ucinite #J-1348-1 & 2, other end of red lead terminated in Amphenol #71-1S red tip plug, other end of black lead terminated in Amphenol #71-1S black tip plug; u/w Navy Tube Tester Model TV-3A/U.	Adapter for making contact to grid and plate of lighthouse tubes		N17-L-64608-5801	3E8000-5	Ucinite #J-1348	#1050-7	W-101	1
W-102	LEAD, test: one each of #18 AWG standard copper conductor 41 #34 AWG strands 1/32" rubber jacket color coded black and red respectively; red lead 44" long excluding term; black lead 14" long excluding term; one American Phenolic #71-5 speaker plug connects one end of each lead; opposite end black lead connected to American Phenolic #71-1S black midget plug, opposite end red lead connected to Mueller Electric numbers #45 battery clip and #87 red insulator; p/o Navy Tube Tester Model TV-3A/U.	Adapter for checking low value capacitors		N17-L-64604-3492	3E8000-44		Part/dwg #X12450-203	W-102	1

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
W-103	LEAD, test: one #18 AWG stranded copper conductor, 41 #34 AWG strands 1/32" black rubber; 7 1/4" long excluding term; American Phenolic #71-1S black midget tip plug on one end and Mueller Electric numbers 87 insulator and 45 battery clip on other end; p/o Navy Tube Tester Model TV-3A/U.	Connects top cap of tubes to plate jack		N17-L-63201-4677	3E8000-7		Part/dwg #X12450-145	W-103	1
W-104	LEAD, test: #18 AWG stranded copper conductor, 41 #34 AWG strands, paper wrap, 1/32" red rubber insulation; 4 ft long including terminations; American Radio Hdwe #145 red test prod on one end and Amphenol #71-1S red tip plug on other end; p/o Navy Tube Tester TV-3A/U.	Positive test lead for multimeter section		N17-L-63205-4185	3E8000-48.1		Part/dwg #X12450-152	W-104	1
W-105	LEAD, test: #18 AWG stranded copper conductor, 41 #34 AWG strands, paper wrap, 1/32" black rubber insulation; 4 ft long including termination; American Radio Hdwe #145 black test prod on one end and Amphenol #71-1S black tip plug on other end; p/o Navy Tube Tester TV-3A/U.	Negative test lead for multimeter section		N17-L-63205-4190	3E8000-48		Part #X12450-153 Dwg #X12450-152	W-105	1
W-106	LEAD, test: one #18 AWG stranded tinned copper conductor, 7 #28 AWG strands 1/32" neoprene black; 10" lg excluding term; one American Phenolic #71-1S black midget tip plug at one end and one Amphenol #63-1 grid cap at other end; p/o Navy Tube Tester Model TV-3A/U.	Connects top caps of tubes to grid jack		N17-L-63201-7851	3E8000-10.5	Amphenol #63-1W	Part/dwg #X12450-180	W-106	1

W-107	CABLE ASSEMBLY, power: underwriters type SJ, two #18 AWG stranded conductors, 300 volts working; 7 ft long excluding terminations Cornish Wire #52 R two contact male appliance plug on one end, other end stripped ¾″ and tinned; u/w Navy Tube Tester Model TV-3A/U.	Connects equipment to ac supply line outlet		N17-C-48234-4017	3E7350-1-84.6 	Cornish Wire #S-108	#3675-11	W-107	1
W-108	CABLE, power: type SV; two #18 AWG stranded conductors; rated 300 V working. NOTE: W-108 is listed as a replacement part only. A molded cable and plug assembly W-107 is used on original equipment.	Replacement-wire for W-107		N15-C-99567-1200	1B3018-2.18	Belden Mfg. Co. Code TINY	#23900-292	W-108	7 ft.
W-109	WIRE, electrical: insulated .140″ OD overall; one #18 AWG conductor; tinned copper; stranded, 65 strands #36 AWG; cotton wrap, rubber insulation .043″ thk; rated 5000 volts; red.	Replacement-test lead wire, part of W-101, W-102, and W-104		N15-W-2195-5200	1B818.151	Belden Mfg. Co. Code TESTER Red	#23900-289	W-109	9 ft.
W-110	WIRE, electrical: insulated, .140″ OD overall; one #18 AWG conductor; tinned copper; stranded, 65 strands #36 AWG cotton wrap, rubber insulation .043″ thk; rated 5000 volts; black.	Replacement-test lead wire, part of W-101, W-102, W-103, W-105, and W-106		N15-W-2195-5100	1A818.18	Belden Mfg. Co. Code TESTER Black	#23900-288	W-110	8 ft.
X-101	SOCKET, tube: 4 contact; molded in saddle mtg; two 5/32″ mtg holes on 1½″ mtg/c; round mica filled brown bakelite 1.172″ dia x 15/32″ h, excluding term; brass, cad plated.	83 rectifier tube socket		N16-S-60852-2111	2Z8674.159	Amphenol Part #77MIP4T	#X19350-80	X-101	1
X-102	SOCKET, tube: 8 contact octal; molded in saddle mtg; two 5/32″ mtg holes on 1½″ mtg/c; round mica filled brown bakelite 1.172″ dia x 15/32″ h, excluding term; brass cad plated.	5Y3 rectifier tube socket		N16-S-63516-6564	2Z8678.319	Amphenol Part #77MIP8T	#X19350-79	X-102	1
X-103	SOCKET, tube: 4 contact; retainer ring mounting; one 111/64″ keyed mtg hole; round mica filled brown bakelite 1.172″ dia x 7/16″ h excluding term; cad plated brass.	4 pin tube test socket		N16-S-60841-4271	2Z8674.158	Amphenol 78S4T	#X19350-68	X-103	1

TABLE 8-3 (Cont.) COMBINED PARTS AND SPARE PARTS LIST

PARTS									
SYMBOL DESIG.	NAME OF PART AND DESCRIPTION	FUNCTION	AWS, JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR AND MFR'S DESIG.	CONTRACTOR'S DWG. AND PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL NO. PER EQUIP.
X-104	SOCKET, tube: 5 contact; retainer ring mounting; one $1\frac{11}{64}$" keyed mtg hole; round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$" h excluding term; brass cad plated.	5 pin tube test socket		N16-S-61703-9581	2Z8675.92	Amphenol 78S5T	#X19350-69	X-104	1
X-105	SOCKET, tube: 6 contact retainer ring mounting; one $1\frac{11}{64}$" keyed mtg hole; round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$" h excluding term; phos bronze cad plated.	6 pin tube test socket		N16-S-62152-2626	2Z8676.96	Amphenol 78S6T	#X19350-70	X-105	1
X-106	SOCKET, tube: 7 contact; large and small; retainer ring mounting; one $1\frac{11}{64}$" keyed mtg hole; round mica filled brown bakelite 1.172" dia x $\frac{7}{64}$" h excluding term; brass cad pl; pilot light test socket in center.	7 pin tube test socket		N16-S-62762-2635	2Z8677.140	Amphenol 78-7CDT	#X19350-71	X-106	1
X-107	SOCKET, tube: 8 contact, octal retainer ring mounting; one $1\frac{11}{64}$" keyed mtg hole; round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$" h, excluding term; brass cad plated.	8 pin (octal) tube test socket		N16-S-63462-8245	2Z8678.318	Amphenol 78-S8T	#X19350-73	X-107	1
X-108	SOCKET, tube: 8 contact loktal retainer ring mounting; one $1\frac{11}{64}$" keyed mtg hole; round mica filled brown bakelite 1.172" dia x $\frac{7}{16}$" h, excluding term; brass cad plated.	8 pin (loktal) tube test socket		N16-S-63579-2635	2Z8678.35	Amphenol 78-8LT	#X19350-72	X-108	1
X-109	SOCKET, tube: 7 contact miniature; saddle mtg; two .140" mtg holes on $\frac{7}{8}$" mtg/c; round mica filled brown bakelite $1\frac{1}{8}$" lg x $\frac{47}{64}$" wd x $\frac{19}{64}$" h, excluding term; brass cad plated.	7 pin miniature tube test socket		N16-S-62603-6198	2Z8677.142	Amphenol #140-170-24	#X19350-76	X-109	1

X-110	SOCKET, tube: 7 contact acorn type, special, for testing acorn tubes with either 5 or 7 radial pins; mounts under panel; five 1/8" diameter mtg holes in flange of shell, 1 3/16" diam cut out in panel; round mica filled phenolic body 1 7/8" diam x 1 1/2" deep; phospher bronze silver plated contacts; spring loaded round silver plated brass plunger contact in base for end pin connection; p/o Navy Tube Tester Model TV-3A/U.	Acorn type tube test socket		N16-S-62646-8291	2Z8677.139	Alden #457V-1	Part/dwg #19350-74	X-110	1
X-111	SOCKET, tube: 9 contact miniature; saddle mounting; two .095" mtg holes on 1 1/8" mtg/c; round mica filled brown bakelite 7/8" x 11/32" h excluding term; brass cadmium plated.	9 pin (miniature) tube test socket		N16-S-64063-6220	2Z8679.25	Cinch #53F12884	#X19350-58	X-111	1
X-112	SOCKET, tube: 8 contact, sub-miniature; one piece saddle mtg; two 1/8" diam mtg holes on 5/8" mtg/c; round mica filled phenolic body 3/8" diam x 19/64" h excluding terminals; flatted sides for locking in mtg saddle; phospher bronze silver plated contacts; center shield 3/32" ID.	Test socket for sub-miniature tubes		N16-S-63656-24C0	2Z8678.331	Cinch Mfg Corp #8694	Part/dwg #19350-101	X-112	1

TABLE 8-5 CROSS REFERENCE PARTS LIST

JAN TYPE DESIGNATION	KEY SYMBOL
CE63C101E	C103
CM20B471K	C104
CM30B272K	C102
CP26AIEF104K	C105
RC20BF105K	R105
RC20BF184K	R104
RC20BF273J	R134
RC20BF334K	R129
RC20BF470K	R121
RC20BF473J	R144
RC30BF122K	R106
RC30BF153J	R109
RP101FD201KK	R113
RW31F101T	R103
RW31F182	R107
ST42A	S106
ST52N	S114
5Y3GT/G	V102
83	V101

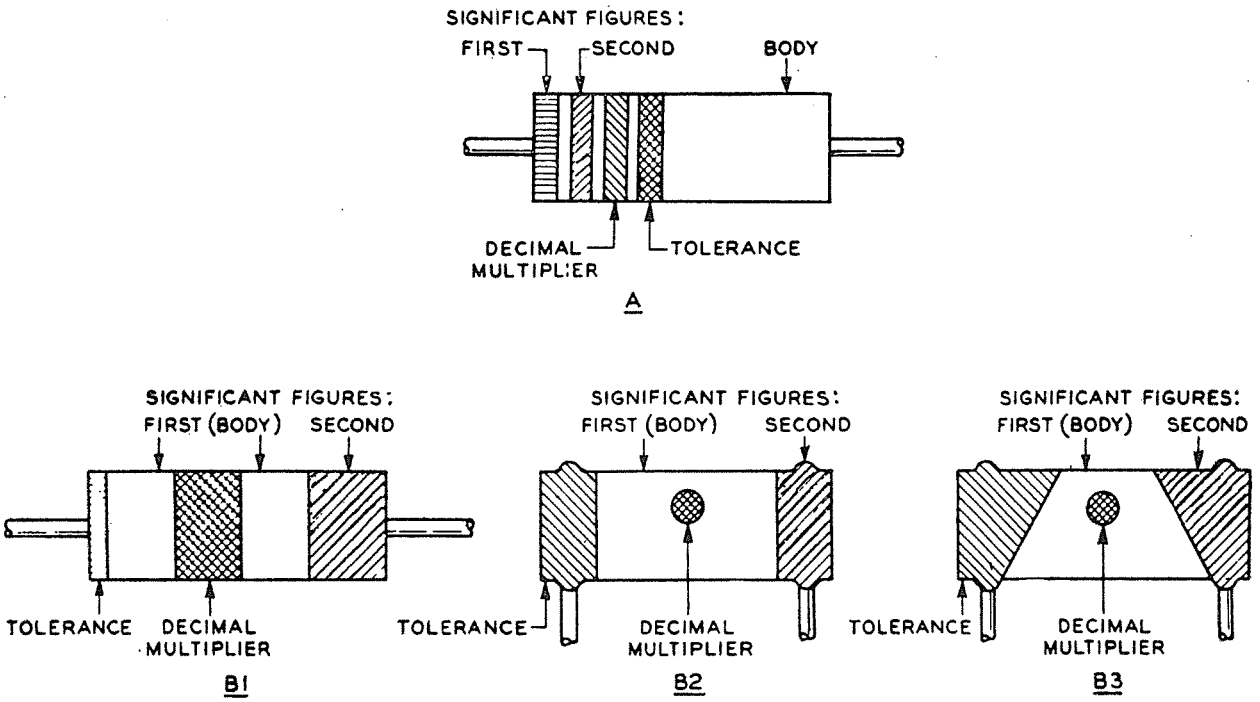
STD. NAVY STOCK NO.	KEY SYMBOL
15-C-99567-1200	W108
15-W-2195-5100	W110
15-W-2195-5200	W109
16-C-20179-5441	C103
16-C-30114-4276	C104
16-C-32145-5164	C102
16-C-45777-4137	C105
16-D-46346-6726	I101
16-D-46346-6686	I102
16-D-900201-101	O101
16-P-403561-112	H101
16-R-43688-3689	R118
16-R-49427-811	R121
16-R-49941-231	R106
16-R-50335-751	R109
16-R-50398-431	R134
16-R-50479-431	R144
16-R-50696-811	R104
16-R-50759-811	R129
16-R-50975-811	R145
16-R-66094-5706	R107
16-R-67393-2596	R103

STD. NAVY STOCK NO.	KEY SYMBOL
16-R-72983-6757	R133
16-R-72994-4551	R131
16-R-73000-9867	R125
16-R-73009-4101	R130
16-R-73110-9701	R132
16-R-73135-6901	R101
16-R-73139-7657	R124
16-R-73216-5957	R137
16-R-73243-8257	R138
16-R-73261-1191	R119
16-R-73271-1558	R139
16-R-80907-8699	R128
16-R-81073-5099	R127
16-R-81079-9824	R140
16-R-81081-6369	R108
16-R-81152-6029	R114
16-R-81167-8529	R115
16-R-81169-7296	R111
16-R-81195-1049	R135
16-R-81199-9849	R102
16-R-81205-5279	R126
16-R-81283-8699	R136
16-R-81311-2465	R110
16-R-90301-2675	R113
16-R-90901-1305	R116
16-R-92231-4291	R112
16-S-117101-260	I104
16-S-117101-261	I105
16-S-117101-262	I103
16-S-290001-104	N101
16-S-290001-105	N102
16-S-60841-4271	X103
16-S-60852-2111	X101
16-S-61703-9581	X104
16-S-62152-2626	X105
16-S-62603-6198	X109
16-S-62646-8291	X110
16-S-62762-2635	X106
16-S-63462-8245	X107
16-S-63516-6564	X102
16-S-63579-2635	X108
16-S-63656-2460	X112
16-S-64063-6220	X111
16-T-55735	V102

STD. NAVY STOCK NO.	KEY SYMBOL
16-T-60830	V101
17-B-840101-117	H102
17-B-840101-118	H109
17-C-48234-4017	W107
17-C-71408-3050	P101
17-C-71410-3324	P102
17-C-71425-4054	P104
17-C-71498-4296	P103
17-C-73108-1999	J101
17-C-73108-2000	J102
17-C-800730-881	E104
17-C-800828-601	O102
17-C-801899-101	O103
17-C-945001-299	E105
17-C-945001-490	E106
17-K-700068-701	O108
17-K-700073-551	O104
17-L-6297	E101
17-L-6686	E102
17-L-6793	E103
17-L-50844-4672	J105
17-L-51678-3452	J108
17-L-63201-4677	W103
17-L-63201-7851	W106
17-L-63205-4185	W104
17-L-63205-4190	W105
17-L-64604-3492	W102
17-L-64608-5801	W101
17-L-76850-3998	I110
17-M-29380-5606	M101
17-P-84923-8791	E107
17-P-84923-8801	E108
17-R-50882-2338	CR101
17-S-56830-7741	S111
17-S-58847-7001	S102
17-S-60522-7969	S110
17-S-63690-1051	S107
17-S-63709-5349	S101
17-S-66623-4964	S103
17-S-66623-5044	S113
17-S-66623-6814	S112
17-S-70412-4406	S106
17-S-73959-1025	S114
17-T-73489-5451	T101

TABLE 8-5 (Cont.) CROSS REFERENCE PARTS LIST

SIGNAL CORPS STOCK NO.	KEY SYMBOL	SIGNAL CORPS STOCK NO.	KEY SYMBOL	SIGNAL CORPS STOCK NO.	KEY SYMBOL
1A818.18	W110	2Z8678.319	X102	3Z6008J9.2	R114
1B3018-218	W108	2Z8678.331	X112	3Z6010J9	R115
1B818.151	W105	2Z8679.25	X111	3Z6011A1-5	R111
2J83	V101	2Z9619-220	T101	3Z6015-102	R102
2J5Y3GT	V102	3DA100-730	C105	3Z6017B2-2	R126
2Z1480.47	H102	3DB100-45	C103	3Z6058-3	R136
2Z1480.48	H109	3E7350.1-84.6	W107	3Z6080-72	R110
2Z2712.120	O102	3E8000-5	W101	3Z6085-6	R133
2Z2737-4	E104	3E8000-7	W103	3Z6105-2	R131
2Z3025-44	P103	3E8000-10.5	W106	3Z6140-12	R125
2Z3718.135	I105	3E8000-44	W102	3Z6190-15	R130
2Z3718.136	I104	3E8000-48	W105	3Z6585-10	R118
2Z3718.137	I103	3E8000-48.1	W104	3Z6619B2-2	R132
2Z3718.138	I102	3F3299-9.4	M101	3Z6637	R101
2Z3718.142	I101	3G1790-28	E106	3Z6640-93	R124
2Z3876.108	O101	3GK1087-3	E105	3Z6718-27	R137
2Z5581-4	J102	3H4838-15.3	CR101	3Z6730-48	R138
2Z5581-5	J101	3K2047121	C104	3Z6740-28	R119
2Z5821-141	O108	3K3027221	C102	3Z6750-107	R139
2Z5821-142	O104	3RC20BF105K	R145	3Z7150-9	R112
2Z5889-16	E103	3RC20BF184K	R104	3Z7330-23	R116
2Z5952	E101	3RC20BF273J	R134	3Z9824-31.63	S111
2Z5956.16	J105	3RC20BF334K	R129	3Z9824-6	S102
2Z5991-3	I110	3RC20BF470K	R121	3Z9825-62.375	S113
2Z7091-225	H101	3RC20BF473J	R144	3Z9825-62.376	S112
2Z7111.23	P101	3RC30BF122K	R106	3Z9825-62.377	S110
2Z7111.23.1	P102	3RC30BF153J	R109	3Z9825-62.378	S103
2Z7560-5	P104	3RP6007	R113	3Z9825-62.379	S101
2Z8674.158	X103	3RW18326	R103	3Z9825-62.545	S107
2Z8674.159	X101	3RW25819	R107	3Z9863-42A	S106
2Z8675.92	X104	3Z4220-5	E107	3Z9863-52N	S114
2Z8676.96	X105	3Z4220-5.1	E108	3ZK1087-4	O-103
2Z8677.139	X110	3Z5993J9-1	R128	6D8647	N101
2Z8677.140	X106	3Z6003E5-24	R127	6D8647-1	N102
2Z8677.142	X109	3Z6004A1-3	R140	6Z6806.14	E102
2Z8678.35	X108	3Z6004E5-12	R108	6Z8332	J108
2Z8678.318	X107	3Z6006E5-8	R135		

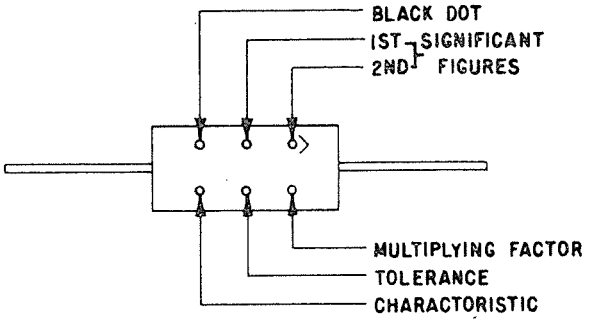


Color	*First Significant Figure*	*Second Significant Figure*	*Decimal Multiplier*	*Tolerance*
Black	0	0	1	—
Brown	1	1	10	± 1%
Red	2	2	100	± 2%
Orange	3	3	1,000	± 3%
Yellow	4	4	10,000	± 4%
Green	5	5	100,000	± 5%
Blue	6	6	1,000,000	± 6%
Violet	7	7	10,000,000	± 7%
Gray	8	8	100,000,000	± 8%
White	9	9	1,000,000,000	± 9%
Gold	—	—	0.1	± 5%
Silver	—	—	0.01	±10%
No color	—	—	—	±20%

—Fixed Resistors: RMA and AWS Standard Color Codes

TABLE 8-5 APPLICABLE COLOR CODES — RESISTORS

JAN COLOR CODE FOR MOLDED MICA CAPACITORS



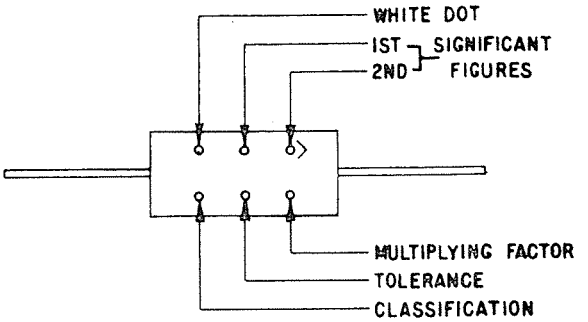
COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE (MMF)	% TOL.	CHARA. *
BLACK	0	1	±20	A
BROWN	1	10		B
RED	2	100	±2	C
ORANGE	3	1,000		D
YELLOW	4	10,000		E
GREEN	5			F
BLUE	6			G
VIOLET	7			
GRAY	8			
WHITE	9			
GOLD		0.1	±5	
SILVER		0.01	±10	

* THESE LETTERS INDICATE COMBINATIONS OF VARIOUS ELECTRICAL CHARACTERISTICS. FOR DETAILS SEE SPECFICICATION JAN-C-5.

NOTE: VOLTAGE RATINGS VARY WITH CAPACITANCE.

NOTE: IF BOTH ROWS OF DOTS ARE NOT ON ONE FACE; ROTATE CAPACITOR ABOUT AXIS OF LEADS TO READ SECOND ROW ON SIDE OR REAR.

1946 RMA COLOR CODE FOR MOLDED MICA CAPACITORS



COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE (MMF)	% TOL.	CLASS. *
BLACK	0	1	±20	A
BROWN	1	10		B
RED	2	100	±2	C
ORANGE	3	1,000	±3	D
YELLOW	4	10,000		
GREEN	5		±5	
BLUE	6			
VIOLET	7			
GRAY	8			I
WHITE	9			J
GOLD		0.1		
SILVER		0.01	±10	

* THESE LETTERS INDICATE COMBINATIONS OF VARIOUS ELECTRICAL CHARACTERISTICS PER RMA STANDARDS.

NOTE: VOLTAGE RATINGS VARY WITH CAPACITANCE.

NOTE: IF BOTH ROWS OF DOTS ARE NOT ON ONE FACE; ROTATE CAPACITOR ABOUT AXIS OF LEADS TO READ SECOND ROW ON SIDE OR REAR.

TABLE 8-6. APPLICABLE COLOR CODES — CAPACITORS

TABLE 8-7. LIST OF MANUFACTURERS

ABBREVIATIONS	MFR'S PREFIX	NAME	ADDRESS
Alden	CYA	Alden Products Co	117 N. Main St., Brockton 64, Mass.
American Radio	CMH	American Radio Hardware Co., Inc	476 Broadway Ave., New York, N. Y.
Amphenol	CPH	American Phenolic Corp	1830 S. 54th Ave., Chicago 50, Ill.
A. H. & H	CHH	Arrow-Hart & Hegeman Elect. Co	102 Hawthorne St., Hartford, Conn.
Belden	CQG	Belden Mfg. Co	P. O. Box 5070A, Chicago, Ill.
Bradley		Bradley Laboratories, Inc	80 Meadow St., New Haven 10, Conn.
Bryant	CYD	Bryant Electric Co	14121 State St., Bridgeport 2, Conn.
Cinch	CMG	Cinch Mfg. Corp	2335 W. Van Buren, Chicago 12, Ill.
Continental Carbon	CCC	Continental Carbon Co	13900 Lorain Ave., Cleveland, Ohio
Cornell Dubilier	CD	Cornell Dubilier Elec. Corp	333 Hamilton Blvd., S. Plainfield, N. J.
Cornish		Cornish Wire Co	Room 1010, 15 Park Row, New York, N. Y.
Drake	CAYS	Drake Mfg. Co	1713 W. Hubbard St., Chicago 22, Ill.
Eby	CEB	Hugh H. Eby, Inc	18 W. Chelten Ave., Phila. 44, Penna.
Friedman		Friedman Co	220 West 23rd St., New York, N. Y.
G. E.	CG	General Electric Co	1 River Road, Schenectady, N. Y.
Mallory	CMA	P. R. Mallory & Co	3029 E. Washington St., Indianapolis, Ind.
Mueller	CBIT	Mueller Electric Co	1597 E. 31st St., Cleveland, Ohio
Oak Mfg. Co	COC	Oak Mfg. Co	1260 Clybourne Ave., Chicago 10, Ill.
Sylvania	CHS	Sylvania Elec. Prod., Inc	500 Fifth Ave., New York 18, N. Y.
Tung-Sol	CTL	Tung-Sol Lamp Works, Inc	100 8th Ave., Newark 4, N. J.
Ucinite	CUF	The Ucinite Co	1 Nevada St., Newtonville, Mass.
Wilkor	CBIQ	Wilkor Products Co	3835 W. 150th St., Cleveland, Ohio

CORRECTIVE MAINTENANCE NAVSHIPS 91435 TV-3A/U Section 7

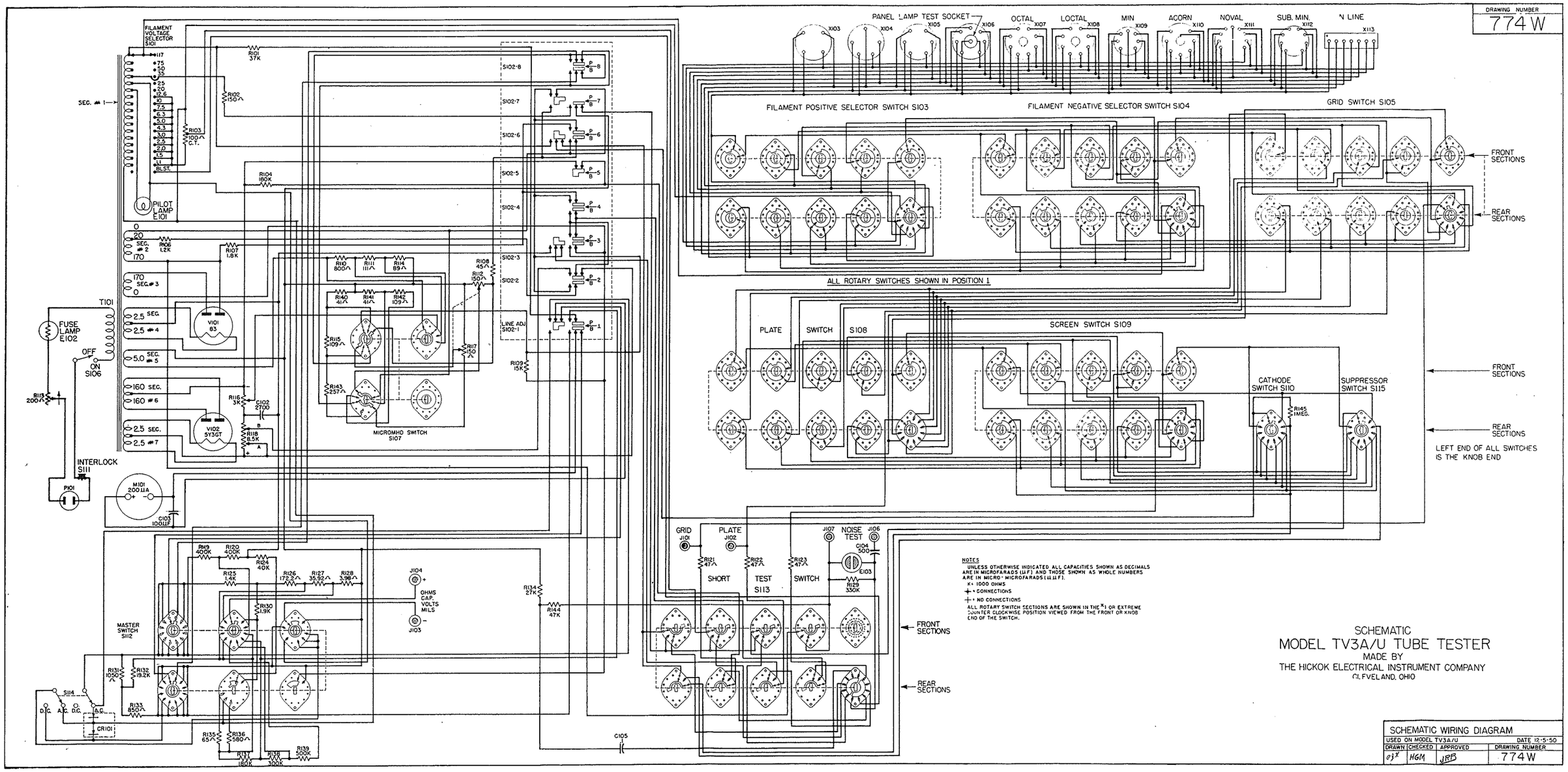
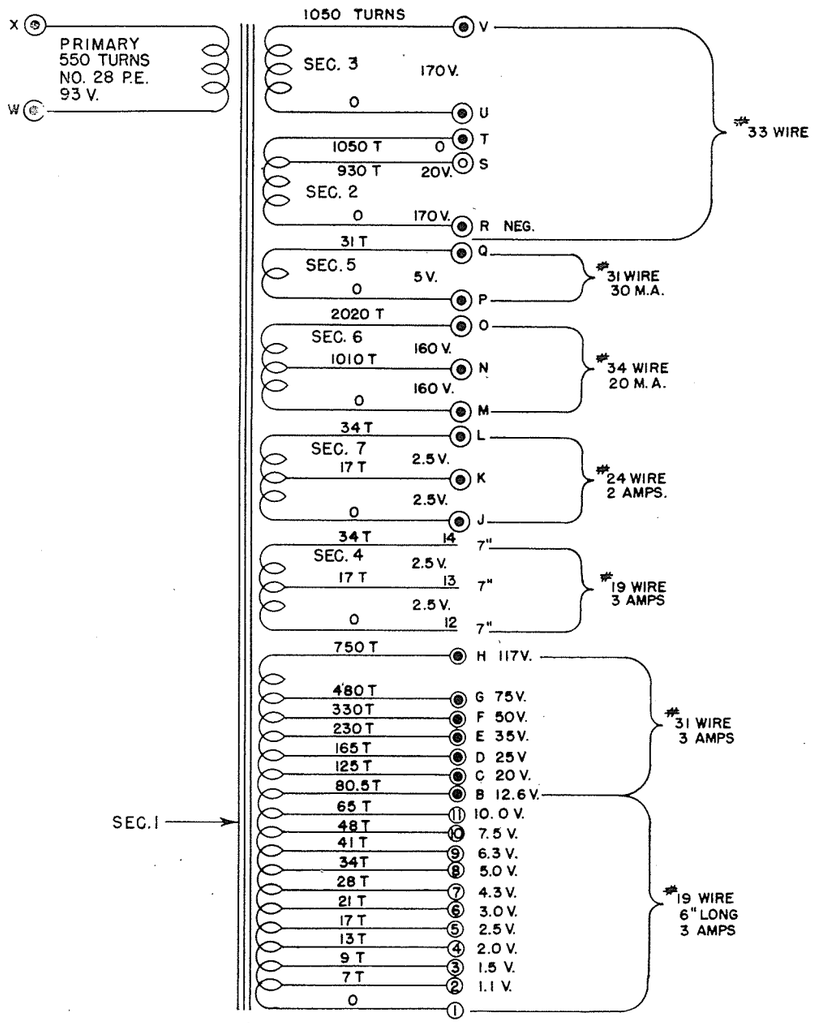


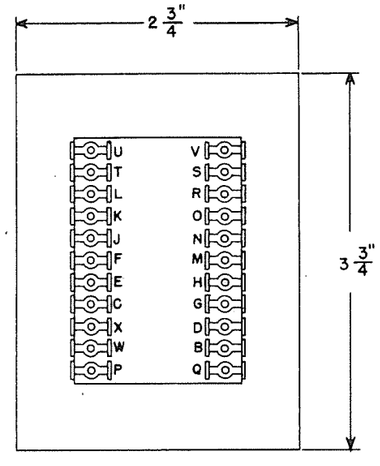
Figure 7-6. Schematic Diagram for Tube Tester TV-3A/U

CORRECTIVE MAINTENANCE NAVSHIPS 91435 TV-3A/U Section 7



= SOLDERING CLIPS, INDENTIFIED BY LETTERS AS INDICATED.

(1) = WIRE LEADS WITH BLACK POLYVINYL CHLORIDE INSULATING SLEEVES, LENGTH AND INDENTIFICATION NUMBERS AS INDICATED.



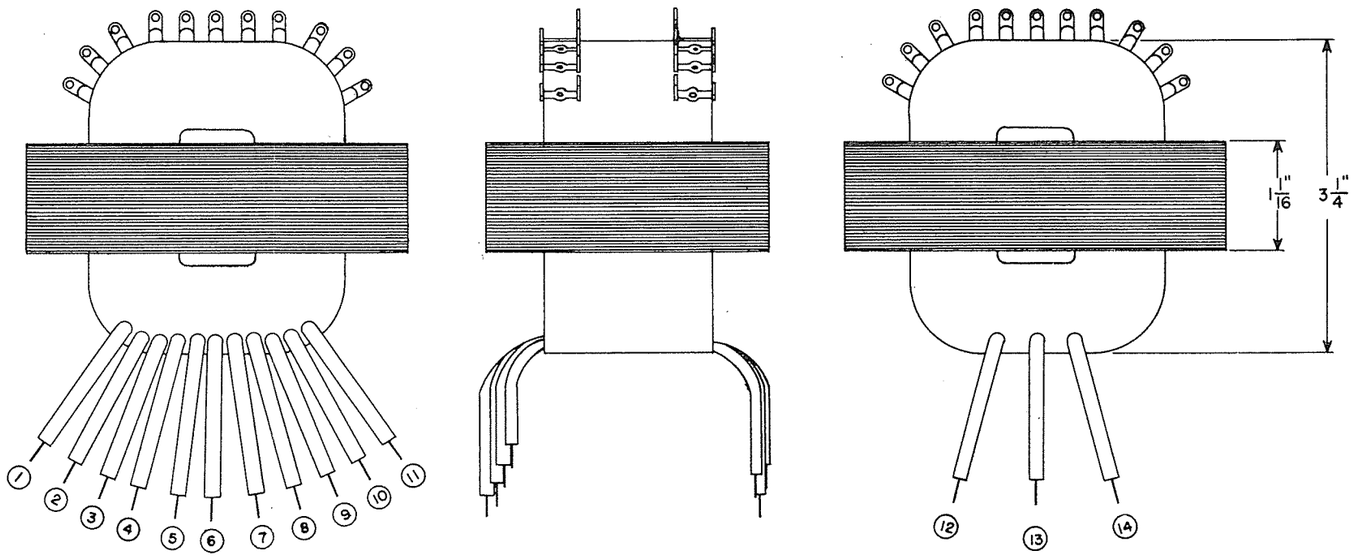


Figure 7-7. Transformer Diagram