

NAVSHIPS 92193

INSTRUCTION BOOK
for
TUBE TESTER
TV-3C/U

Manufactured by
JETRONIC INDUSTRIES, INC.
MAIN AND COTTON STREETS
PHILADELPHIA, PA.

BUREAU OF SHIPS

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From: Chief, Bureau of Ships
To: All Activities Concerned with the
Installation, Operation and Main-
tenance of the Subject Equipment

Subj: Instruction Book for Tube Tester
TV-3C/U NAVSHIPS 92193

1. This 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 When superseded by a later edition, this publication shall be destroyed.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 Navy 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 Bureau of Ships Journal and in the Index of Bureau of Ships General and Electronics Publications, NAVSHIPS 250-020.

W. D. LEGGETT, JR.
Chief of Bureau

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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 of part and complete description.

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. JAIN or Navy type number.



Figure 1-1.—Tube Tester TV-3C/U.

SECTION 1 GENERAL DESCRIPTION

1. PURPOSE.

This handbook is intended for use with the Tube Tester TV-3C/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-3C/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. Instruction sheets for the Tube Tester section and the Multimeter section are mounted on the inside surface of the cover for ready reference. A suitable carrying handle is provided. An inter-lock automatically shuts off the equipment when the lid is closed.

2. REFERENCE DATA.

- a. Nomenclature: Tube Tester TV-3C/U.
- b. Contract Number: NObsr 59586.
- c. Contractor: Jetronic Industries, Inc.
- d. Cognizant Naval Inspector: Inspector of Naval Material, Upper Darby, Pa.
- e. Number of Packages Involved per Complete Shipment of One Equipment Including Equipment Spare Parts: One.
- f. Total Cubical Contents Including Equipment Spares:
 - Crated: 1.06 Cu. Ft.
 - Uncrated: 0.76 Cu. Ft.
- g. Total Weight Including Equipment Spares:
 - Crated: 24 Lbs.
 - Uncrated: 22 Lbs.
- h. Characteristics of Power Supply Required for Operation: 105 to 125 Volts ac at 50 to 1000 cycles, Single Phase, 75 Watts at 60 cycles minimum.

i. Current Drain: 0.5 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 5
	0 to 10
	0 to 50
	0 to 100
	0 to 500
	0 to 1000

Sensitivity on all AC ranges 1000 ohms per volt.

Sensitivity on all DC ranges 20,000 ohms per volt.

(3) DC Milliamperes:	0 to 1
	0 to 5
	0 to 10
	0 to 50
	0 to 100
	0 to 500

(4) Resistance:	
0 to 1000	3. ohms center scale
0 to 10,000	30. ohms center scale
0 to 100,000	300. ohms center scale
0 to 1 Megohm	3000 ohms center scale
0 to 10 Megohms	30,000 ohms center scale
0 to 100 Megohms	300,000 ohms center scale

(5) Capacity:	0 to 0.02 Microfarads
	0 to 0.2 Microfarads
	0 to 2 Microfarads
	0 to 20. Microfarads

k. Accuracy:

- (1) DC Ranges: Plus or minus 3% of full scale deflection at plus 25 deg. C (77 Deg. F).
- (2) AC Ranges: Plus or minus 5% of full scale deflection at plus 25 deg. C (77 Deg. F).
- (3) Resistance Ranges: Plus or minus 3% of full scale arc in degrees at 25 deg. C (77 Deg. F).
- (4) Micromhos: Plus or minus 10% on all ranges.

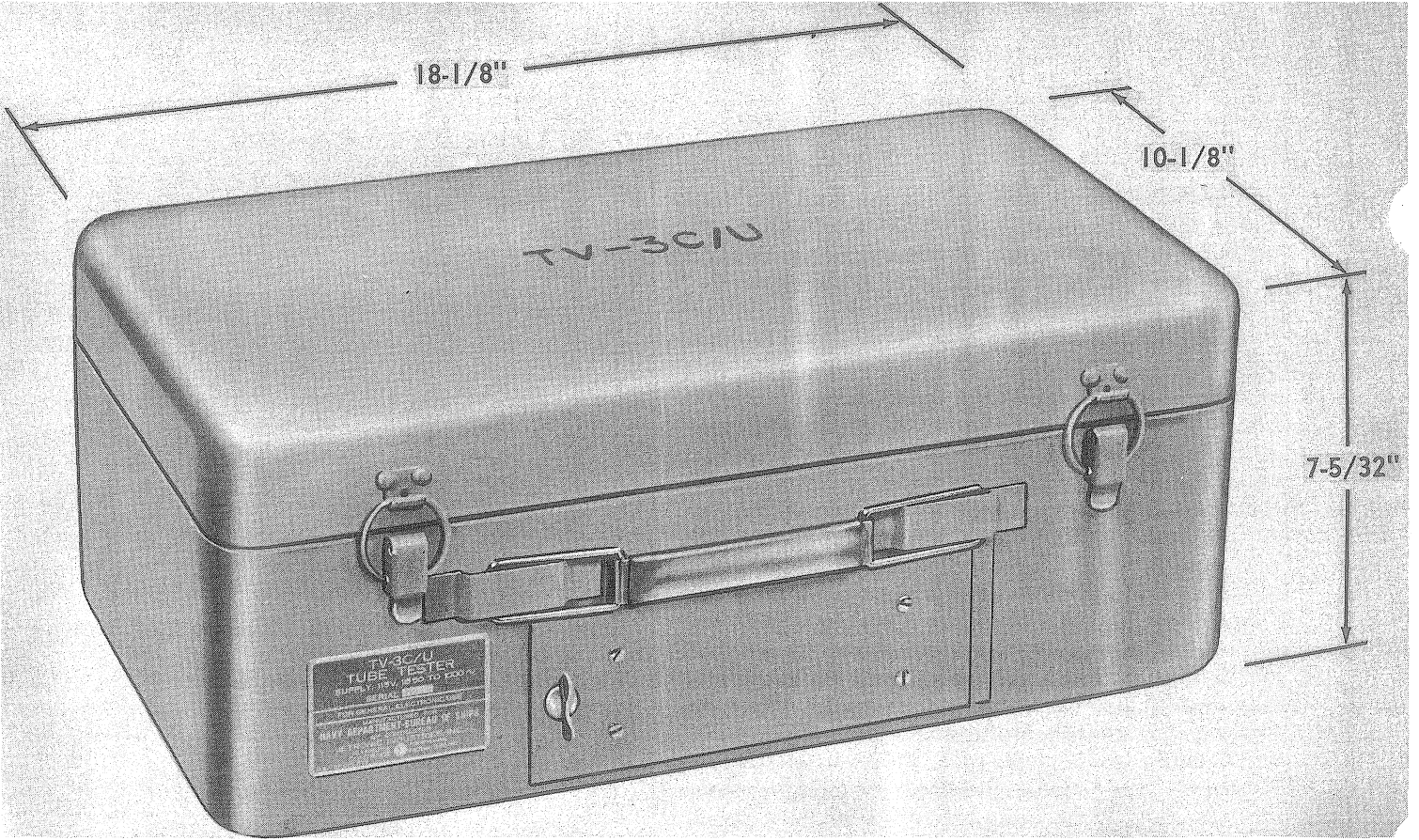


Figure 1-2.—Tube Tester TV-3C/U With Cover Closed.

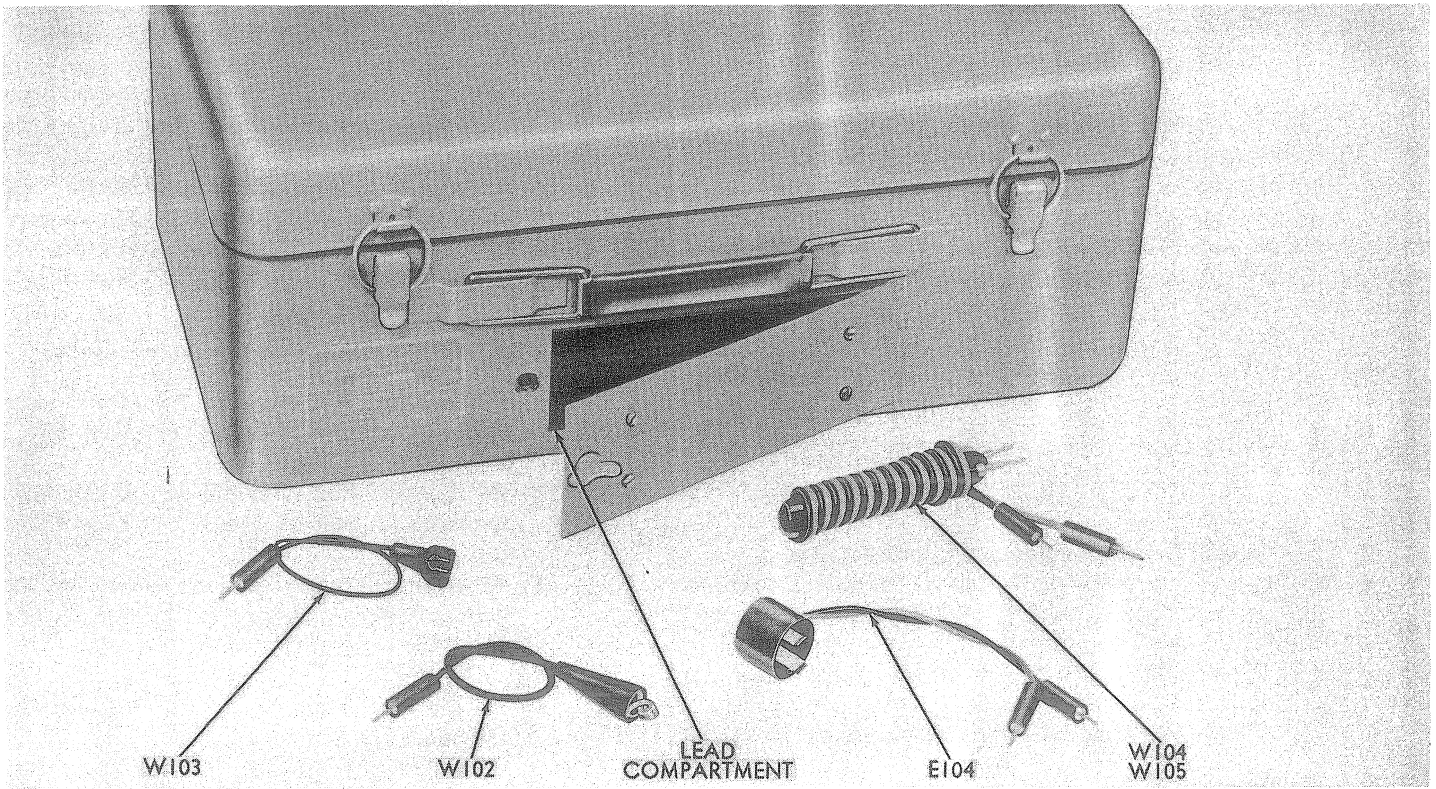


Figure 1-3.—Tube Tester TV-3C/U Lead Compartment and Test Leads.

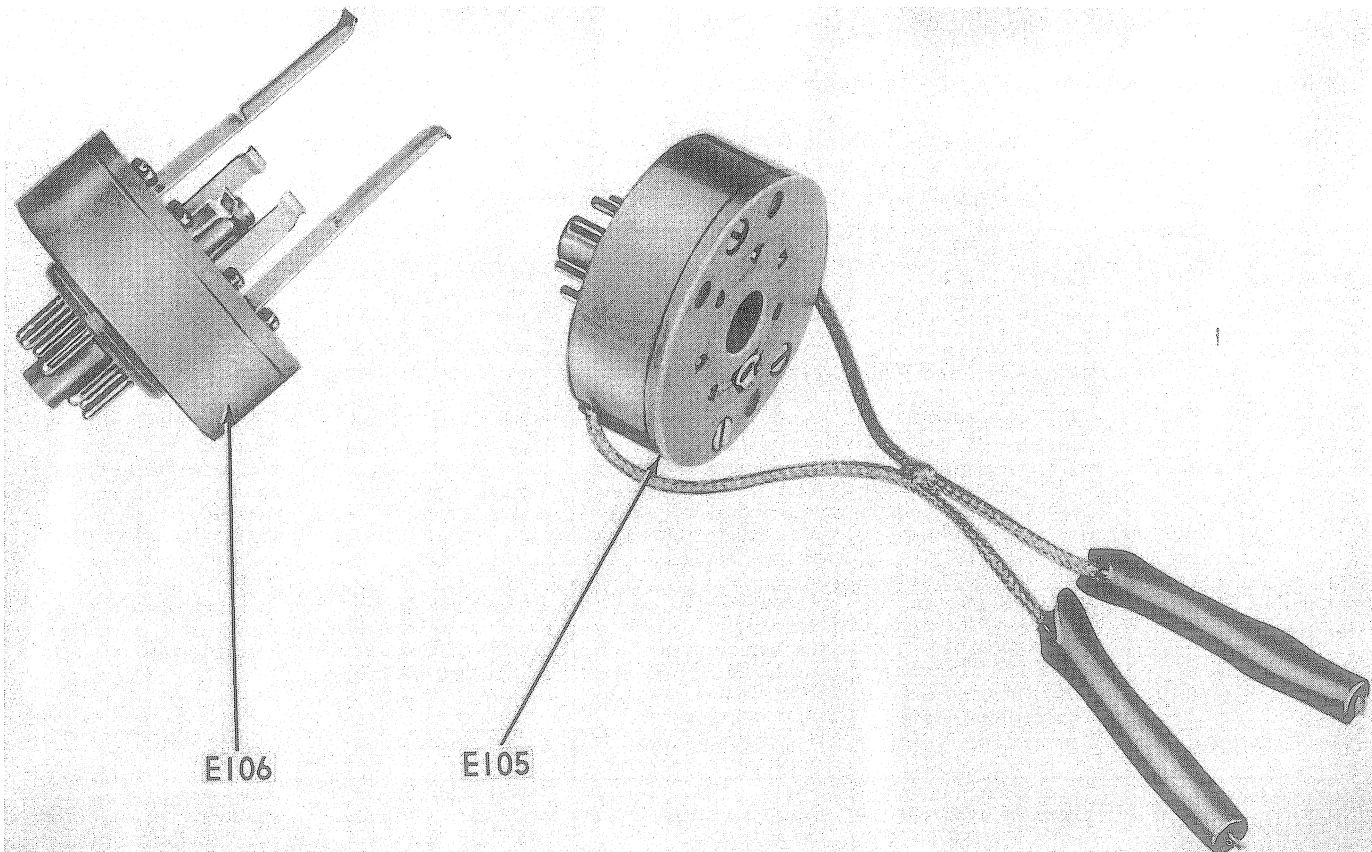


Figure 1-4.—Tube Socket Adapters Used With Tube Tester TV-3C/U.

3. EQUIPMENT LISTS.

TABLE 1-1. EQUIPMENT SUPPLIED

Quan.	DESCRIPTION	SYMBOL DESIGNATION	OVERALL DIMENSIONS			VOLUME	WEIGHT
			L	W	D		
1	TUBE TESTER TV-3C/U including:		18-1/8"	10-1/8"	7-5/32"	.76 Cu. Ft.	22 lbs.
2	INSTRUCTION BOOK, NAVSHIPS 92193						
1	LEAD; Grid & Plate, for Lighthouse Tubes	E-104					
1	LEAD; Plate Connector	W-102					
1	LEAD; Red Test Prod for Multimeter	W-104					
1	LEAD; Black Test Prod for Multimeter	W-105					
1	LEAD; Grid Connector	W-103					
1	ADAPTER FOR 829B TUBES	E-105					
1	ADAPTER FOR 2C39 TUBES	E-106					
1	*PILOT LAMP	I-101					
1	*FUSE LAMP	I-102					
1	*NEON LAMP	I-103					
1	*FUSE	F-101					
1	*FUSE	F-102					

*EQUIPMENT SPARES

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY	NAME OF UNIT	REQUIRED CHARACTERISTICS
	AC Power Source	Capable of supplying 50 to 1000 cycles, 115 volts p/m 10% AC, single phase, sine wave.

4. ELECTRON TUBE COMPLEMENT.

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

Electron Tube Type	Quantity
JAN-5Y3WGTA	1
JAN-83	1

5. DIFFERENCES AND SIMILARITIES IN EQUIPMENT.

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

TABLE 1-3. DIFFERENCES IN EQUIPMENT

DIFFERENCES	TV-3C/U	TV-3B/U	TV-3A/U	TV-3/U
Size of Case.	18-1/8" long x 10-1/8" wide x 7-5/32" deep.	18-9/16" long x 10-9/16" wide x 6-3/4" deep.	18-3/4" long x 10-7/8" wide x 6-7/8" deep.	16-3/4" long x 10-7/8" wide x 6-7/8" deep.
Lead Compartment.	Located in center of case below carrying handle	Located in center of case below carrying handle	Located in center of case below carrying handle.	Located in end of case.
Meter.	4-1/2" rectangular.	4-1/2" rectangular.	4-1/2" rectangular.	3-1/2" round.
Method of Selecting Micromhos Ranges.	Selection of Micromhos Ranges and Short Test position are accomplished by means of a single rotary switch S-108.	Selection of Micromhos Ranges and Short Test position are accomplished by means of a single rotary switch S-109.	Has separate micromhos switch with ranges marked to 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 the combination SHORTS-MICROMHOS Switch S-108 to the desired range.	Automatically accomplished by setting the combination SHORTS-MICROMHOS Switch S-109 to the desired range.	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.	Push-button type.	Push-button type.	Toggle type.
Interlock Switch	Power Switch is automatically deflected to the OFF position when the cover is closed.	Opens when cover is closed shutting off to the equipment.	Opens when cover of equipment is closed shutting off power.	None provided or needed.
AC Power Supply Cable.	Enters through and is stowed in lead compartment.	Enters through and is stowed in lead compartment.	Enters through and is stowed in lead compartment.	Enters through equipment panel and is stowed in cover.
Sub-Miniature In-line Tube Socket.	Mounted on Panel.	Mounted on Panel.	Mounted on panel.	None provided.
Selection of Multi-meter Ranges and Functions.	Functional circuits are selected by a separate switch S-111 and Ranges are selected by S-112.	Functional circuits are selected by a separate Switch S-114. and Ranges are selected by S-113.	Accomplished by means of a single MASTER switch.	Same as TV-3A/U.
Multimeter Ranges AC and DC Volts.	0 to 1000 volts in 6 steps.	0 to 1000 volts in 6 steps.	0 to 1000 volts in 4 steps.	0 to 1000 volts in 4 steps.
DC Milliamperes.	0 to 500 MA in 6 steps.	0 to 500 MA in 6 steps.	0 to 200 MA in 2 steps.	0 to 200 MA in 2 steps.
Resistance.	0 to 100 Megs. in 6 steps.	0 to 100 Megs. in 6 steps.	0 to 100 Megs. in 2 steps.	0 to 100 Megs. in 2 steps.
Capacity.	0 to 20 Mfd in 4 steps.	0 to 20 Mfd in 4 steps.	0 to 50 Mfd in 2 steps.	0 to 50 Mfd in 2 steps.
Micromhos Ranges.	0 to 30,000 in 4 steps.	0 to 30,000 in 4 steps.	0 to 30,000 in 4 steps.	0 to 15,000 in 3 steps.
Sensitivity of Multimeter section.	1000 ohms per volt on AC ranges. 20,000 ohms per volt on DC ranges.	1000 ohms per volt on AC ranges. 20,000 ohms per volt on DC ranges.	1000 ohms per volt on both AC and DC ranges.	1000 ohms per volt on both AC and DC ranges.
Pilot Indicator Light.	Red Jewel.	Green Jewel.	Red Jewel.	Red Jewel.
Adapter for 832A, 829B and 2C39 Tubes.	Provided as accessories.	Provided as accessories.	None supplied but construction drawings and circuit diagrams were included in instruction book.	None supplied.
Fuses.	Both sides of line fused; Bias Control fused.	One side of line fused; Bias fuse not provided.	One side of line fused; Bias fuse not provided.	One side of line fused; Bias fuse not provided.
AC Power Supply Cable.	Has shielded cable with grounding lug at plug end.	Has unshielded two conductor cable.	Has unshielded two conductor cable.	Has unshielded two conductor cable.

In other respects the equipments are similar. They perform the same functions and are equipped with the same 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-3C/U Tester employs the Dynamic Mutual Conductance test method. 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.

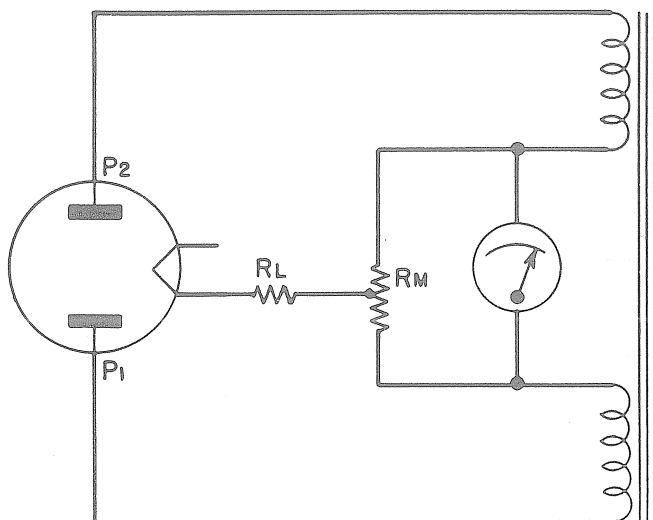


Figure 2-1. Rectifier Diagram
Illustrating Theory

d. In addition to the mutual conductance test, it is essential that the tube tester provides 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.

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)

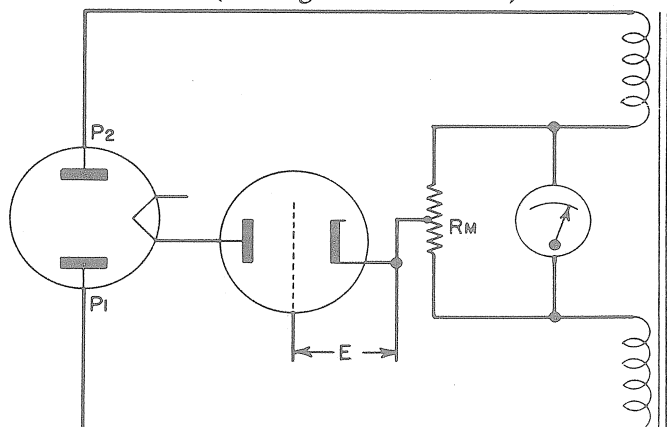


Figure 2-2. Basic Mutual Conductance
Circuit Illustrating Theory

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.

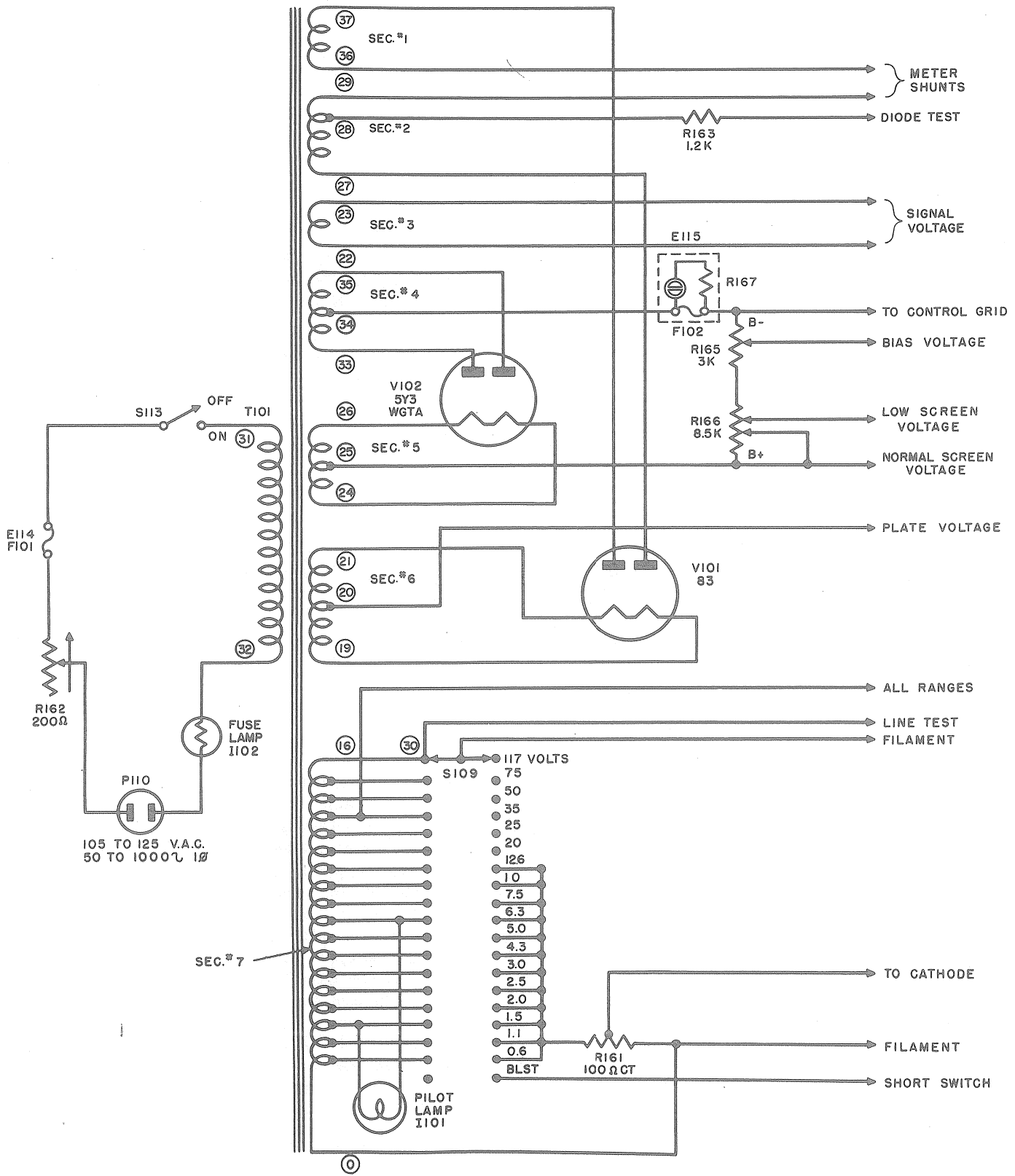


Figure 2-3.—Simplified Power Supply Circuit.

c. If an ac potential is applied to the grid of the tube under test in addition to the dc bias, the circuit become equivalent to that employed for quality and mutual conductance tests in Tube Tester TV-3C/U. 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, T-101, is supplied with primary voltage from a 105 to 125 volt 50 to 1000 cycle line through power ON - OFF switch S-113, LINE ADJUST control R-162, FUSE F-101, and FUSE lamp I-102. The LINE ADJUST control, when operated in conjunction with the line test circuit, standardizes the voltage across the primary of T-101 at 93 volts. The INTERLOCK will automatically shut off the equipment when the lid of the case is closed by deflecting POWER switch S-113 to the OFF position.

b. Secondary #7 of power transformer T-101 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 0 to point 30 will be approximately 121 volts with 93 volts on the primary. Secondary #7 also supplies voltage for rectifier emission tests.

c. Secondaries #1 and #2 supply approximately 154 volts ac to the plates of the type 83 tube V-101, 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 #6, a center tapped 5 volt winding, supplies filament voltage for the type 83 rectifier tube V-101.

e. Secondary #3 supplies the signal voltage for mutual conductance tests, 5 volts ac. A voltage divider network across this winding also provides signal voltage of 1 volt and 0.5 volt.

f. Secondary #4, 320 volts center tapped, supplies the plates of the screen voltage rectifier V-102, a type 5Y3WGTA tube, a voltage divider system consisting of BIAS FUSE F-102, BIAS control R-165 and adjustable resistor R-166 across the output of V-102 provide the bias voltage for mutual conductance tests.

g. Secondary #5, 5 volts center tapped, supplies the filament of the type 5Y3WGTA tube, V-102.

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

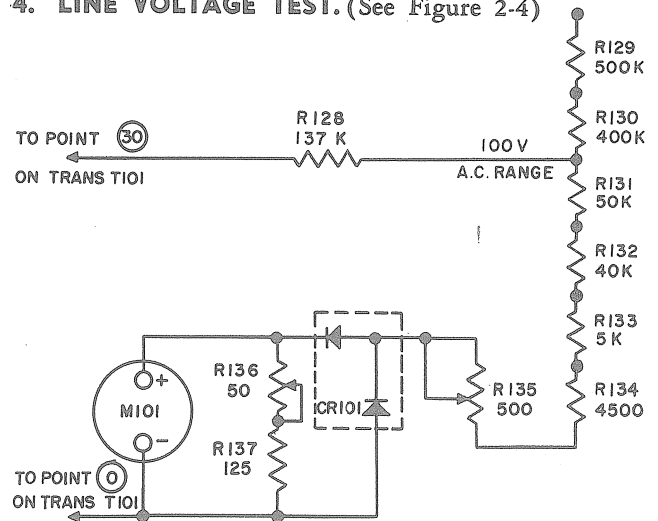


Figure 2-4.—Simplified Line Voltage Test Circuit.

a. Pressing the LINE ADJ. push button P-1 connects the 100 volt ac range of the multimeter section through series resistor R-128 to points 0 to 30 of the power transformer.

b. The value of series resistor R-128, is such that 121 volts RMS across 0 and 30 of the power supply will cause the METER M-101 to read at LINE TEST.

c. The design of the power transformer T-101 is such that 93 volts applied to the primary winding will induce 121 volts across the total secondary #7 winding or across points 0 and 30.

d. Therefore if, with the LINE ADJ. push button P-1 pressed down, the LINE ADJUST CONTROL R-162 is turned until the pointer of the METER, M-101, is exactly over the LINE TEST mark a standard voltage of 93 volts RMS will be established across the primary winding of T-101.

5. SHORT TEST. (See Figure 2-5 & 2-16)

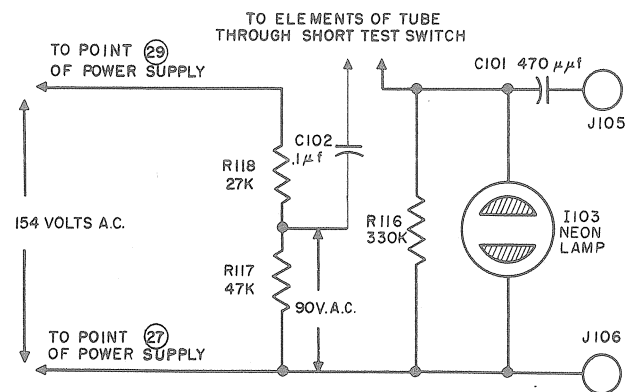


Figure 2-5.—Simplified Short Test Circuit.

a. An ac potential of approximately 154 volts RMS from secondary #2 of T-101 is applied to voltage divider resistors R-118 and R-117 developing a voltage of approximately 90 volts RMS across R-117. This voltage is applied to the elements of the tube under test through the capacitor C-102 and the neon short test lamp I-103 which is shunted by R-116.

b. Turning the SHORTS test switch S-108 through positions 1, 2, 3, 4 and 5 connects the various elements of the tube under test between the neon lamp I-103 and capacitor C-102. The SELECTORS must, of course, be set correctly for the particular tube. Any shorts between the elements will complete the circuit from capacitor C-102 to the neon lamp I-103 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, J-105 and J-106, to the antenna and ground posts of any radio receiver.

c. Turn the SHORTS test switch S-108 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)

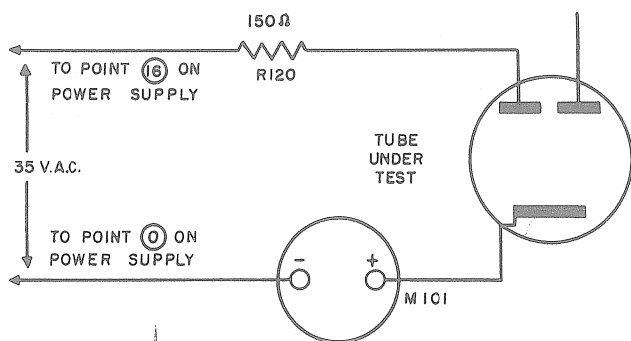


Figure 2-6.—Simplified Rectifier Test Circuit.

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 R-120 and the METER M-101 causing the tube to rectify. This test is used for power rectifiers such as the 5Y3 and 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, 330 volts ac, for testing rectifiers of the cold cathode type such as the OZ4 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 TEST.

(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 (ΔI_p) divided by the change in grid voltage (ΔE_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 5Y3WGTA, tube V-102. Setting BIAS control potentiometer R-165 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 signal voltage from a separate secondary winding (Sec. #3) on the power transformer, T-101, acts 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 (ΔE_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, V-101. The return lead contains the meter circuit which serves to measure the plate-current change (ΔI_p).

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

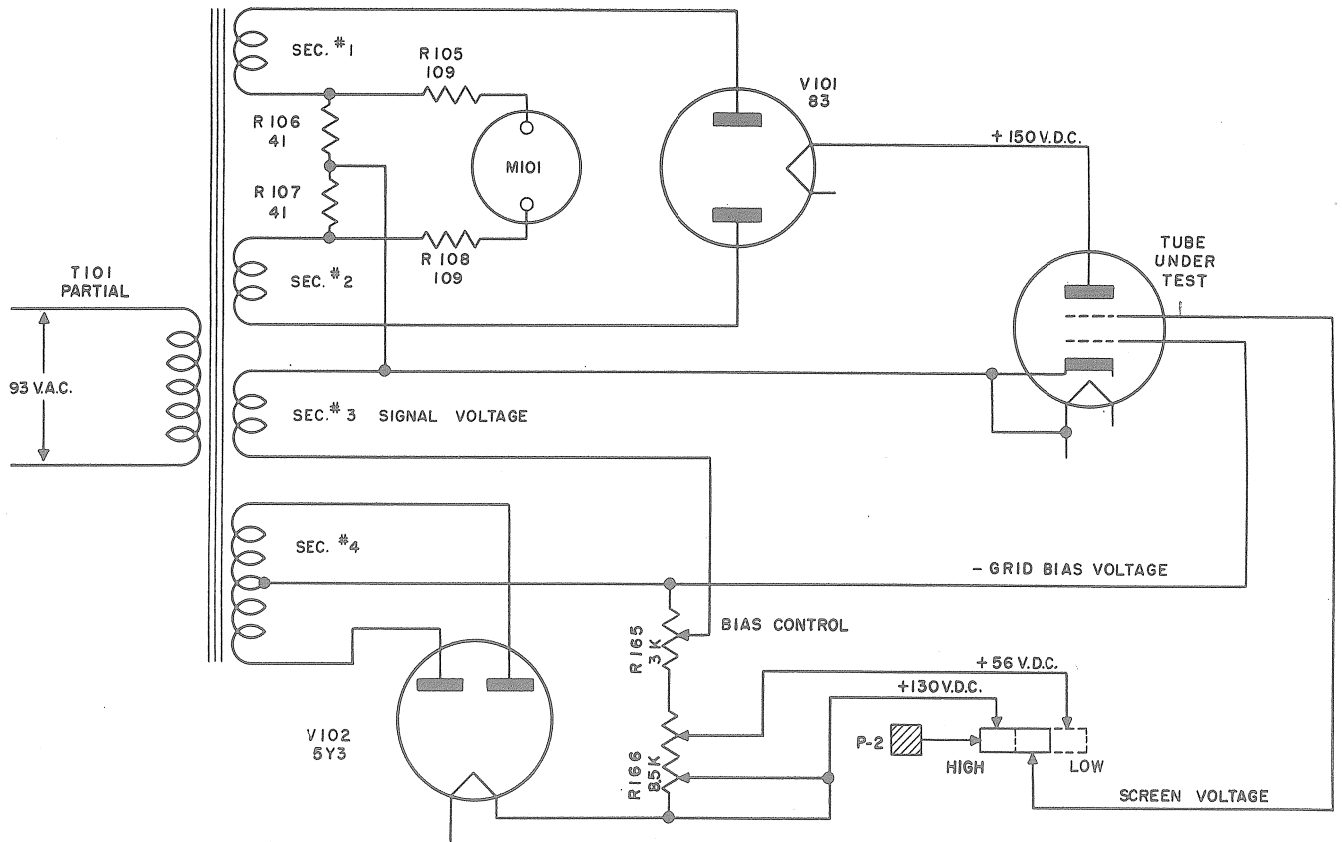


Figure 2-7.—Simplified Mutual Conductance Test Circuit.

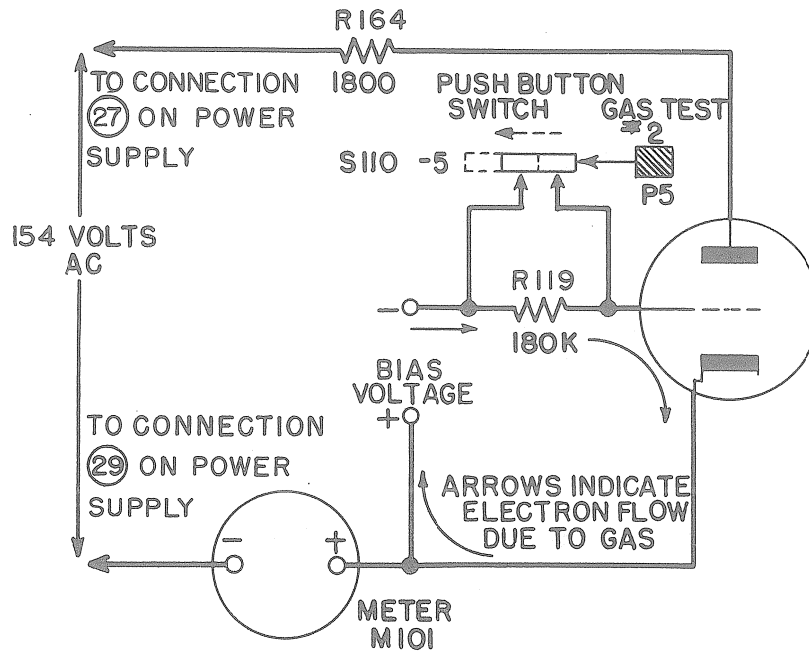


Figure 2-8.—Simplified Gas Test Circuit.

f. The normal screen voltage of 130 volts is excessive for testing certain tubes such as type 1R5. In such cases it is necessary to press push-button P-2 before pressing the red push-button P-3. Pressing P-2 operates switch S-110-2 and reduces the screen voltage to approximately 56 volts as illustrated by Figure 2-7.

9. SPECIAL TYPES.

a. THYRATRONS.

- (1) Thyratrons are tested by noting the negative grid bias potential at which the tube will strike, then checking its plate current.
- (2) Pressing button P-4 applies 130 volts pulsating direct current from a type 5Y3 rectifier (V-102) directly to the plate of the tube under test. A negative bias of 40 volts dc, from the BIAS potentiometer R-165, prevents the tube from striking. The bias is gradually reduced, by rotating the BIAS control counterclockwise until the tube strikes. This is indicated by a sharp rise of the meter pointer. The condition of the thyatron is then read as a rectifier. Incorrect striking potential or low emission is cause for rejection of the tube.
- (3) In certain type tubes, 130 volts applied to the plate will cause excessive plate current to flow. Pressing P-7 applies 35 volts ac from T-101 to the plate, safely limiting the current for testing.

b. TUNING EYE TUBES.

- (1) Tuning eye tubes are designed to visually indicate the effect of a change in the controlling voltage. For different controlling voltages the shaded pattern produced on the fluorescent target varies through an angle from 90° to approximately 0°. The extent of the shaded area is controlled by the voltage on the ray control electrode.
- (2) Pressing P-3 applies approximately 150 volts dc to the fluorescent screen. The first set of selector positions applies no voltage to the ray control electrode. This will produce a shadow angle of 90° on a good tube. The second set of selector positions applies 130 volts dc to the ray control electrode. The shadow will be reduced to approximately 0° on a good tube.

10. 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 M-101.

b. Pressing GAS-2 push-button, P-5 inserts a 180,000 ohms resistor, R-119, 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 R-119. This voltage drop will reduce the negative bias on the grid, causing a corresponding increase in the plate current being measured by the METER M-101.

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

d. The gas test is not performed on Thyratrons, Gas Vacuum, or Eye tubes as incorrect gas content will be indicated when these tubes are tested in the normal manner (See Sec. 4, pars. 25b and c).

11. MULTIMETER SECTION.

a. VOLTS DC (See Figure 2-9)

(1) The dc voltmeter circuit consists of the METER M-101 and a series of multiplier resistors, R-121 through R-126.

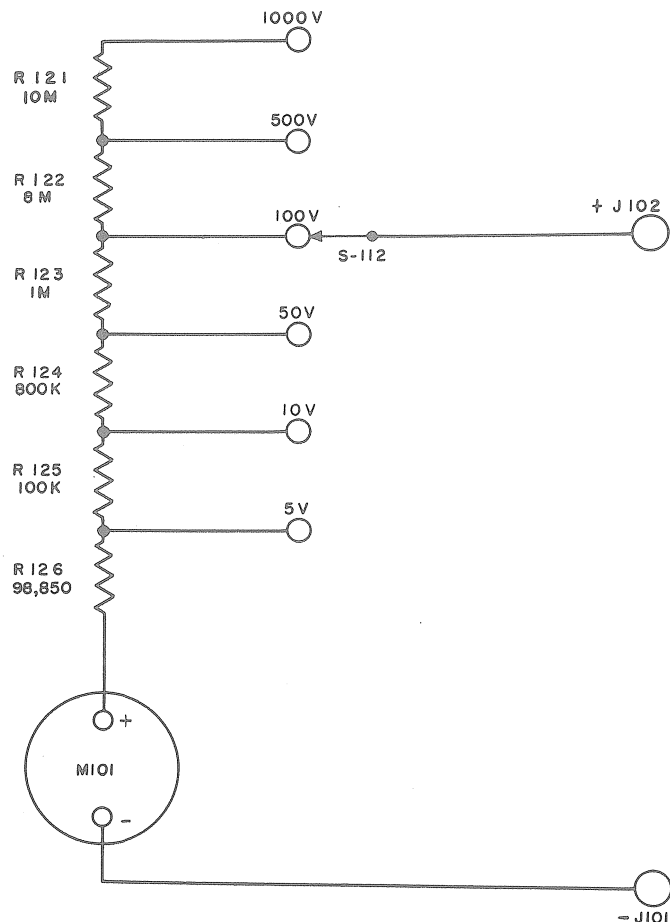


Figure 2-9.—Simplified DC Voltmeter Circuit.

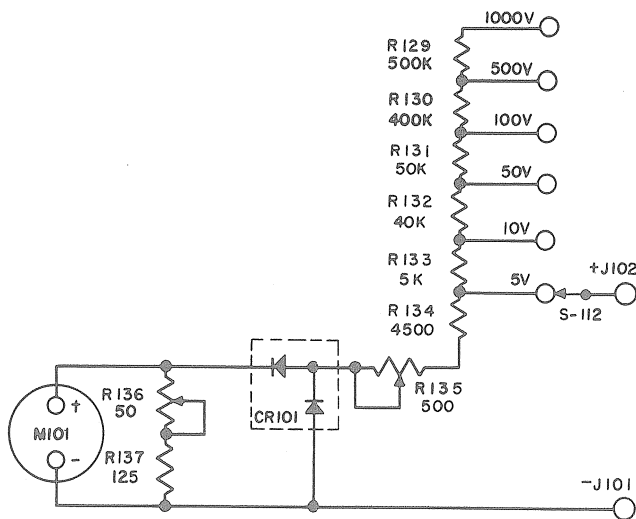


Figure 2-10.—Simplified AC Voltmeter Circuit.

(2) With the FUNCTION selector switch S-111 in the DC VOLTS position test jacks J-101 and J-102 are connected to the meter circuit through RANGE selector switch S-112 which selects the proper tap in the multiplier resistor series for the voltage to be measured.

(3) The sensitivity on the dc ranges is 20,000 ohms per volt.

b. VOLTS AC (See Figure 2-10)

(1) The circuit for ac voltage measurements consist of the METER M-101, copper oxide rectifier CR-101, and resistors, R-135, R-136 and R-137 as shown in Figure 2-10. R-135 and R-136 are adjusted to compensate for slight variations in rectifiers.

(2) When the FUNCTION selector switch is set at the AC VOLTS position the potential to be measured is connected to the bridge circuit through the RANGE selector switch S-112 which is used to select the proper tap on the series of multiplier resistors, R-129 through R-134.

(3) The sensitivity of the multimeter on the ac ranges is 1000 ohms per volt.

c. OHMS (See Figures 2-11 and 2-12)

(1) The low ranges: 3, 30 and 300 OHMS AT CENTER SCALE.

(a) The circuit established when the FUNCTION selector is set for OHMS and the RANGE selector is in one of the three low resistance positions is shown in Figure 2-11.

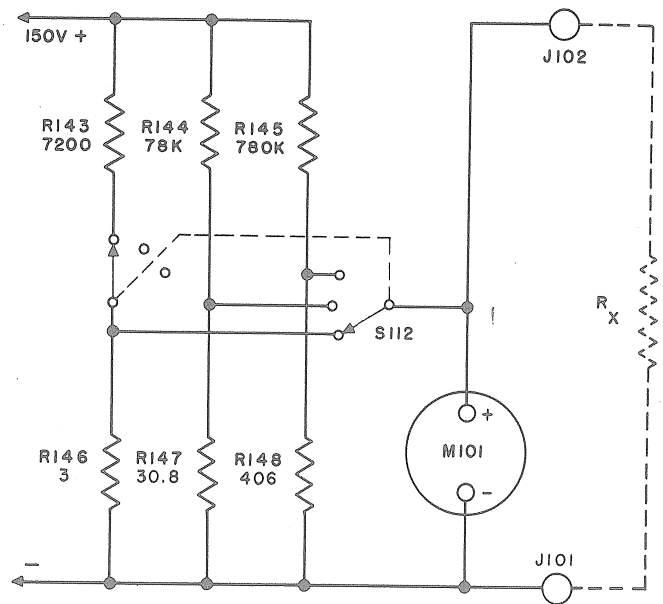


Figure 2-11.—Simplified Low Range Ohmmeter Circuit.

(b) A potential of approximately 150 volts dc is applied across the series-parallel network consisting of resistors R-143 through R-148. This voltage is adjusted by means of the LINE ADJUST control, R-162, until the pointer rests at full scale over the line marked INF. (infinity).

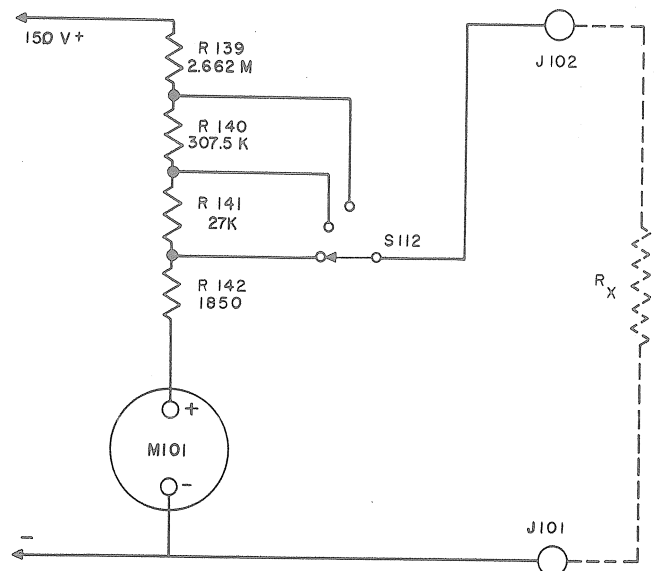


Figure 2-12.—Simplified High Range Ohmmeter Circuit.

- (c) When an unknown resistance R_x is connected between the test jacks J-101 and J-102 in shunt with the meter M-101, the current through the meter will be reduced, causing the pointer to move down scale and indicate the value of R_x in ohms. The most accurate readings will be obtained by selecting a range which will permit taking readings at or close to mid-scale, where the markings are more easily read.
- (2) The high ranges: 3000, 30,000 and 300,000 OHMS AT CENTER SCALE.
- (a) The circuit established when the FUNCTION selector is set for OHMS and the RANGE selector is in one of the three high resistance positions is shown in Figure 2-12.
- (b) A potential of approximately 150 volts dc is applied across the series network consisting of R-139 through R-142 and M-101.
- (c) An unknown resistance R_x , connected in parallel with M-101 and its series resistors, decreases the current through the meter causing the pointer to indicate the value of R_x .

d. MILLIAMPERES (See Figure 2-13)

- (1) When the FUNCTION selector switch is turned to the MILS position the basic circuit illustrated by Figure 2-13 is set up. Meter

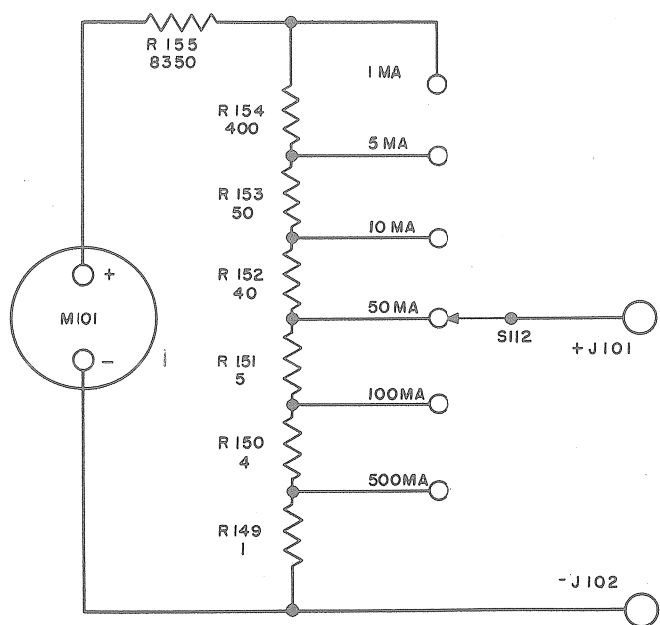


Figure 2-13.—Simplified Milliammeter Circuit.

M-101 in series with resistor R-155 is paralleled by the series of calibrated resistors R-149 through R-154.

- (2) Adjustment of the RANGE selector switch applies the current to be measured to the proper tap on the series of resistors.
- e. CAPACITY (See Figure 2-14)
- (1) With the FUNCTION selector set at CAP. the test circuit illustrated by Figure 2-14 is established.
- (2) Adjustment of the RANGE switch S-112 permits selection of the four ranges of capacity.
- (3) A standard ac voltage is applied across the unknown capacity C_x through a circuit consisting of CR-101, R-127, R-131 through R-138 and M-101 which acts as an ac milliammeter. The three high capacity ranges are obtain by inserting one of three shunt resistors R-156, R-157 or R-158, selected by S-112, in parallel with the ac milliammeter circuit.
- (4) The current through the capacitor under test and the ac milliammeter is inversely proportional to the reactance of the capacitor and is measured by the meter in terms of capacity in microfarads based on a line frequency of 60 cycles.
- (5) 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 4-6, Conversion Chart for Capacity Measurements At Frequencies Other Than 60 Cycles.

12. 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 fourth column of Table 8-2, Table of Replaceable Parts.

13. SPECIAL SWITCHING CIRCUITS.

a. The SELECTOR switches FILAMENT S-105 and S-104, GRID S-103, PLATE S-102, SCREEN S-101, CATHODE S-107, and SUPPRESSOR S-106 are so constructed and inter-connected 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 misadjustment of the switches. The basic principle of this interlocking circuit is illustrated by Figure 2-15.

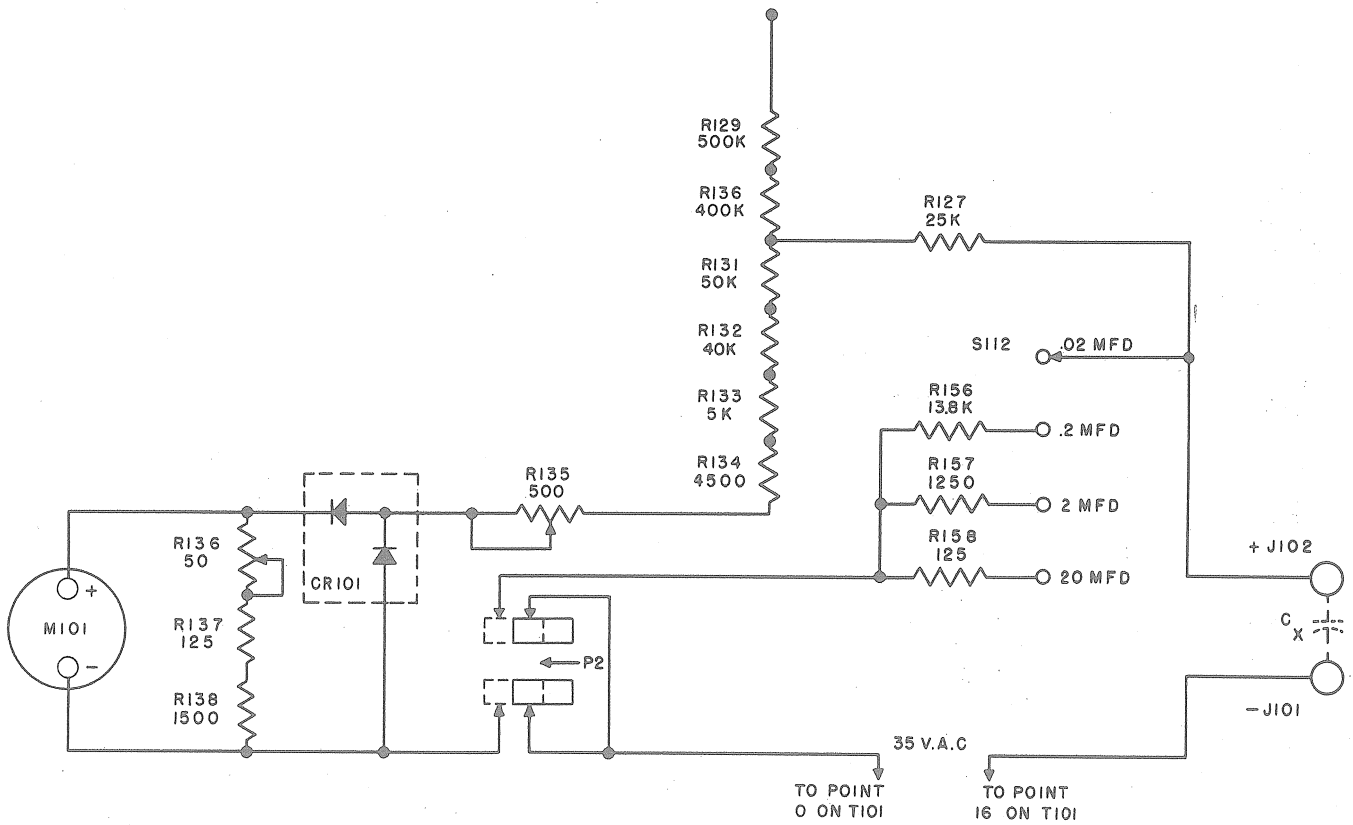


Figure 2-14.—Simplified Capacity Meter Circuit.

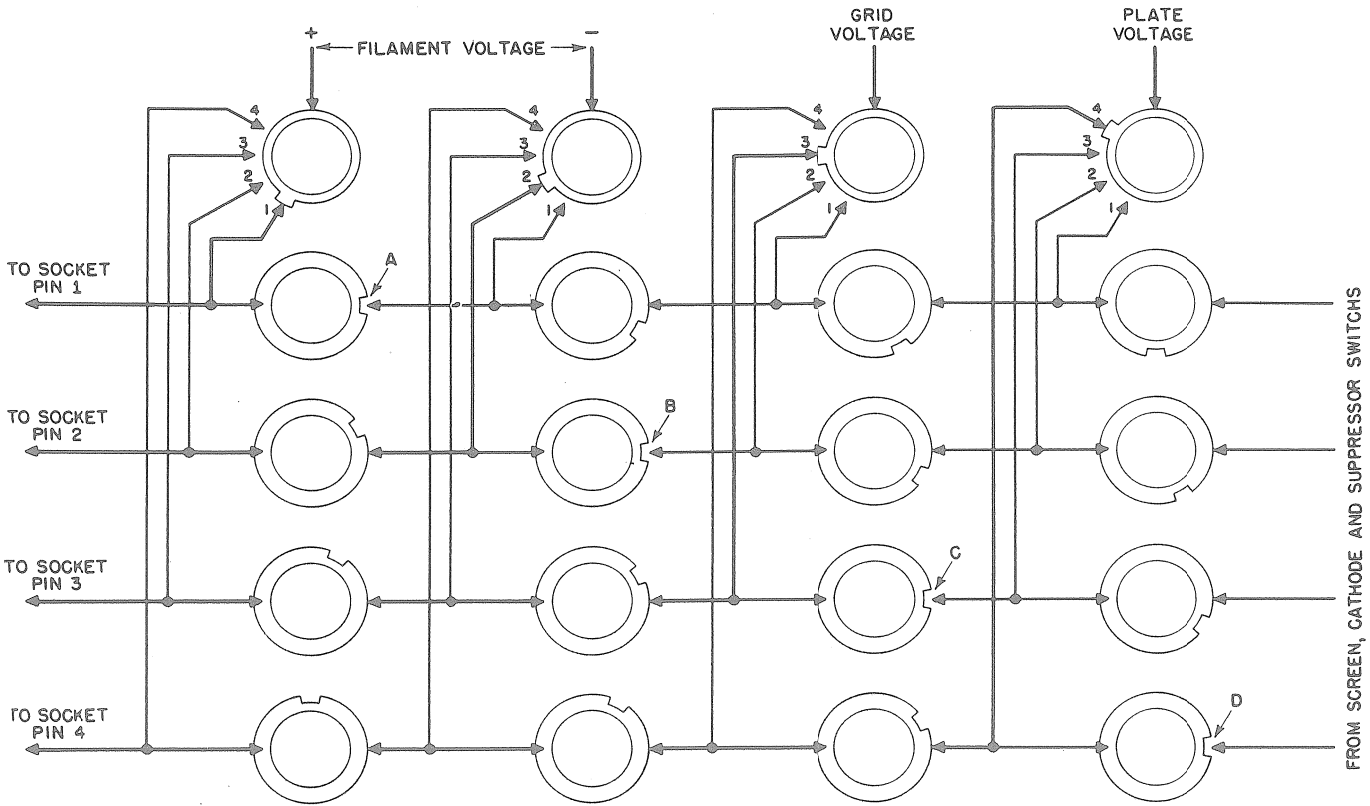
b. Conductors from the socket contacts 1 through 9, enter the switching circuit from the left and progress toward the right through the FILAMENT SELECTORS and the GRID, PLATE, SCREEN, CATHODE and SUPPRESSOR SELECTORS. In order to simplify the illustration, only portions of the first four selectors have 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 portion of S-108 is illustrated by figure 2-16 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 elements of segment #1 and those on segment #2 will complete the circuit between points X and Y causing the neon lamp I-103 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 neon 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.



NOTE:
CONNECTIONS FOR PINS 5 THRU 9
AND ASSOCIATED SWITCH SECTIONS
ARE NOT SHOWN.

Figure 2-15.—Simplified Selector Switch Diagram.

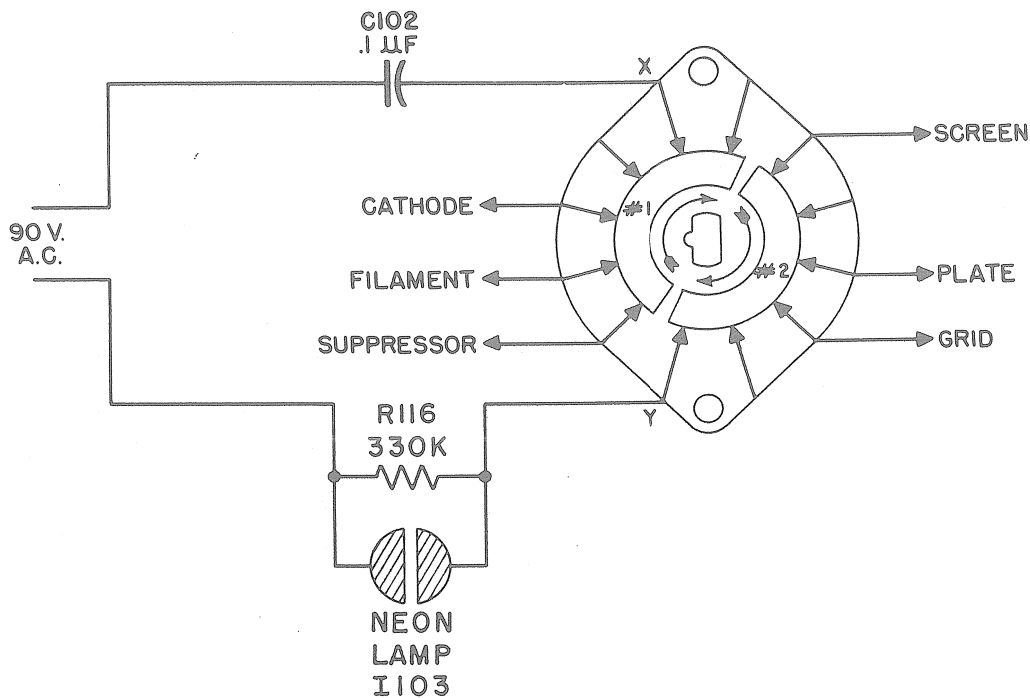


Figure 2-16. Simplified Short Test Switch Diagram

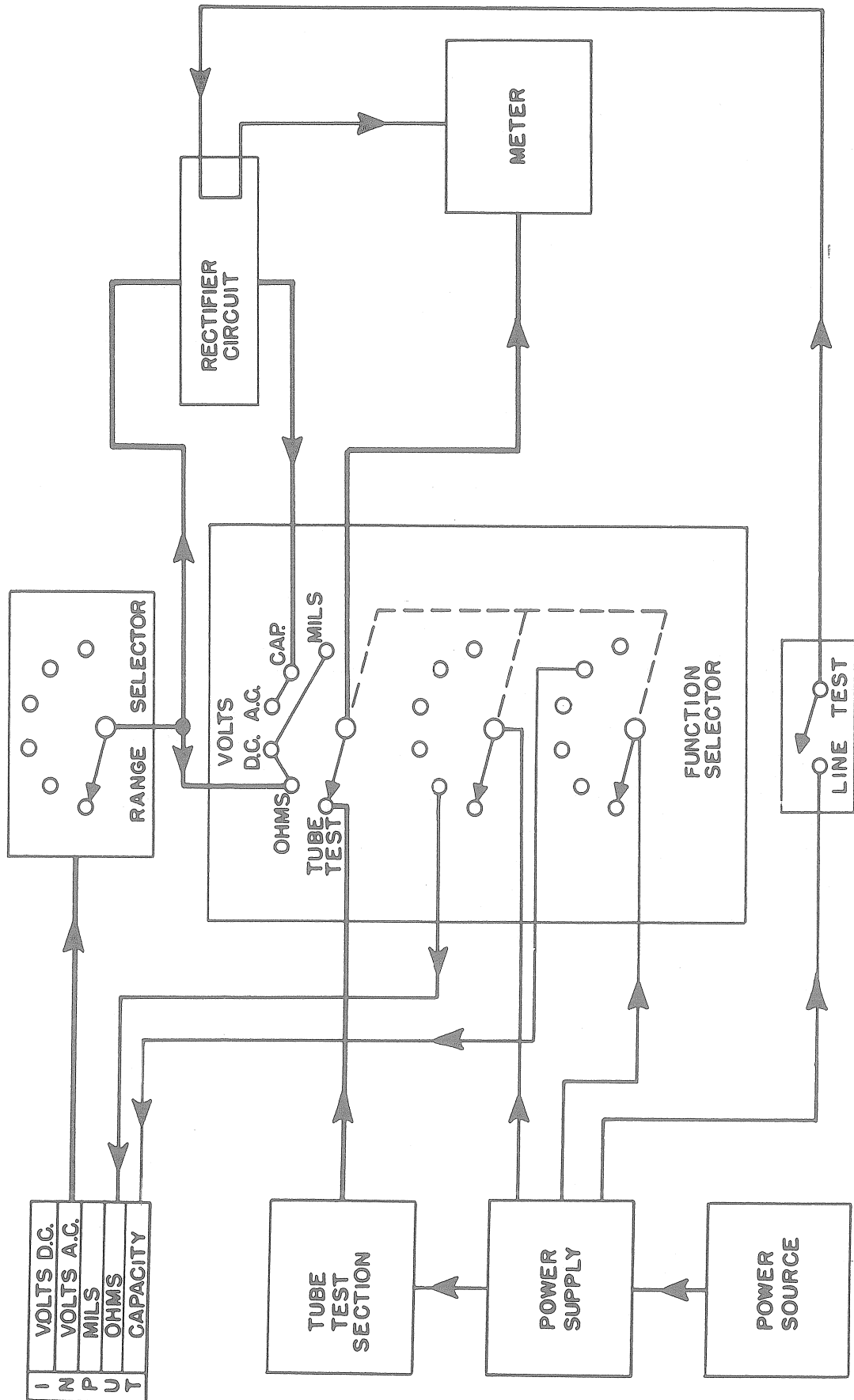


Figure 2-17.—Basic Block Diagram of Tube Tester TV-3C/U.

SECTION 3

INSTALLATION AND INITIAL ADJUSTMENTS

1. TUBE TESTER SECTION.

a. After carefully removing the TUBE TESTER TV-3C/U from its shipping container, set the Tester up near a 105 to 125 volt 50-1000 cycle ac outlet.

NEVER CONNECT THIS EQUIPMENT TO A DC POWER SOURCE.

b. Open the cover and uncoil the line cord. Check the FUSE lamp I-102 and the neon lamp I-103 to make sure they are properly seated in their sockets.

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

d. Plug the line cord into a 105 to 125 volt 50-1000 cycle ac outlet, and throw the POWER switch S-113 to the ON position. The red PILOT indicator E-101 should light. If it does not, unscrew the red jewel cover of indicator E-101 and make sure that the pilot lamp I-101 is properly seated in its socket. Should the indicator still fail to light, check pilot lamp I-101, FUSE lamp I-102 and FUSE F-101 for open elements; 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 M-101 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 1c.

2. MULTIMETER SECTION.

a. With the line cord connected to a 105 to 125 volt 50 to 1000 cycle ac source and the line switch S-113 in the ON position, turn the FUNCTION switch S-111 to the OHMS position. Turn the RANGE switch S-112 to the lowest ohms range.

b. The pointer of the meter M-101 should move up scale to the right.

c. Turn LINE ADJUST knob of R-162 until the pointer rests exactly over the end of the scale marked INF. (infinity).

d. Insert the red and black Test leads W-104 and W-105 in the test jacks J-102 and J-101 located directly below the FUNCTION and RANGE switches.

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

SECTION 4

OPERATION

Important

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

1. GENERAL.

a. Refer to the photograph of the Tube Tester TV-3C/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 test sockets for SUBMINIATURE tubes, 7 PIN MINIA-TURE tubes, 9 pin NOVAL base miniature tubes, LOKTAL and OCTAL tubes, a combination large and small radius socket for standard 7 pin tubes which also provides a pilot lamp test receptacle and, sockets for standard 6, 5 and 4 pin tubes. 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, W-103 and W-102, Figure 1-3. For lighthouse type tubes use E-104, 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, W-104 and W-105, used for VOLTS-MILS-OHMS and MICROFARADS measurements.
- (4) All leads referred to in the preceding paragraphs are kept in the lead compartment in the front of the case, as are the two adapters E-105 and E-106, Figure 1-4.
- (5) The FUSE lamp serves both as a protective fuse and an overload indicator. This lamp will flash brightly when an over-load is placed on the tube tester or the tube under test. When this occurs turn off the equipment immediately. A continued or excessive over-load will, of course, burn out the FUSE lamp, and a replacement will be necessary. The PILOT light serves only as a ON - OFF indicator for the equipment.

2. THE CONTROLS.

a. Power input to the TV-3C/U is controlled by the POWER switch, S-113.

b. The LINE ADJUST, R-162, controls the input voltage to the power transformer, T-101, for proper standardization of the tube tester section, and also the resistance and capacity measuring circuits.

c. The FUNCTION switch S-111, located in the lower right hand section of the panel, sets up the proper internal circuit connections for using the TV-3C/U equipment for TUBE TEST, or for testing OHMS, VOLTS (AC or DC), MICROFARADS or MILS in the ranges provided by RANGE switch S-112.

d. The INDEX ROLL CHART 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 S-109, provides a selection of filament or heater voltages from 0.6 volts through 117 volts ac in eighteen steps. Another position on this switch, marked BLST., provides for testing ballast tubes. An OFF position is also provided.

f. SELECTORS: FILAMENT S-105, FILAMENT S-104, GRID S-103, PLATE S-102, SCREEN S-101. CATHODE S-107, and SUPPRESSOR S-106 provide proper switching of the internal circuits to apply correct test voltages to the various pins of the tube under test.

g. BIAS control R-165 is used to adjust the bias voltage applied to the tube under test to the proper value.

h. SHUNT control, potentiometer R-110, controls the sensitivity of the meter circuit to the proper level for testing rectifier and diode type tubes.

i. SHORTS-MICROMHOS Switch, S-108, 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 R-110 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" at the five 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. This switch also 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 I-103.

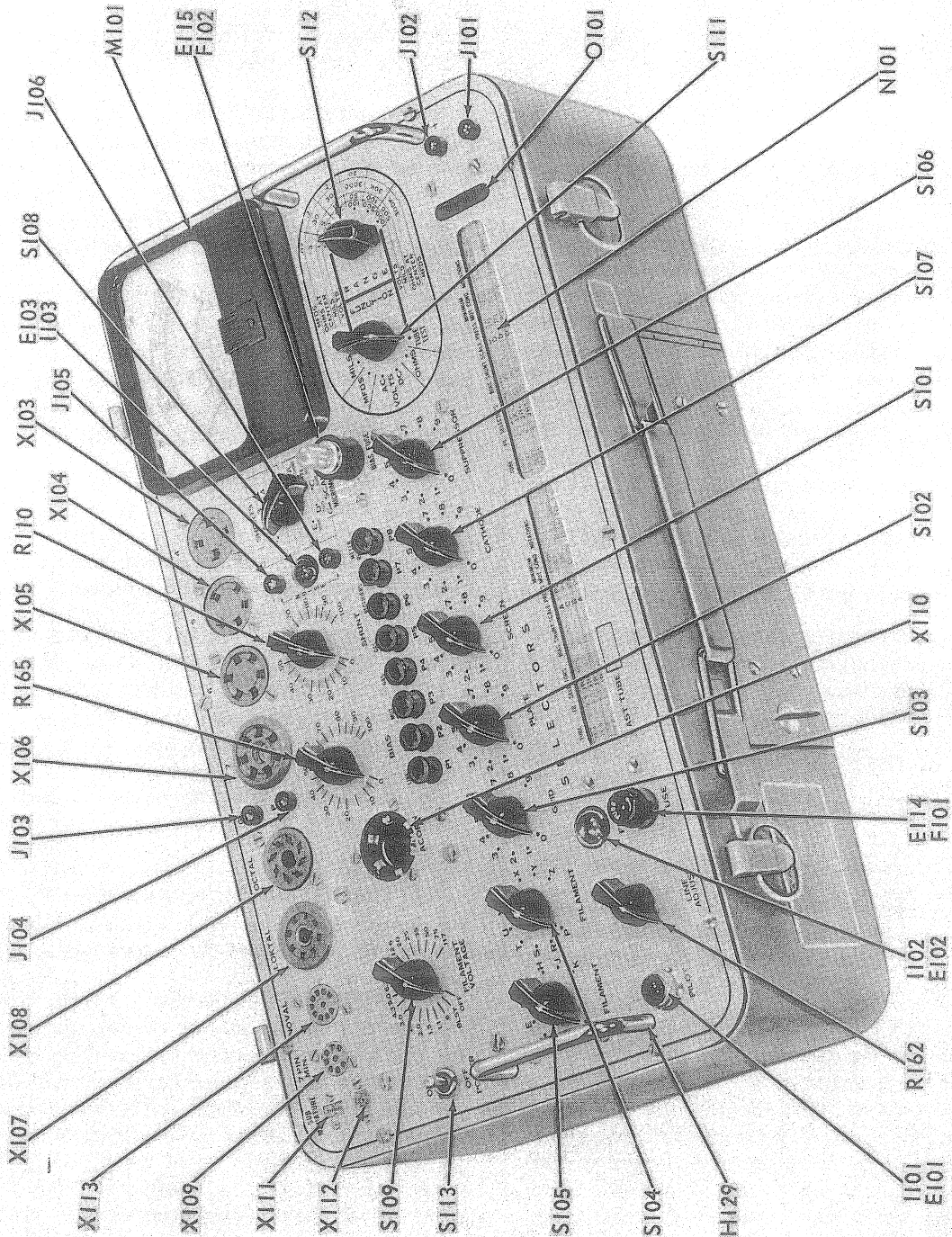


Figure 4-1.—Front View of Tube Tester TV-3C/U Showing Controls by Symbol Designation.

j. Push button switches located in the center of the 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, and for capacity measurements.
- (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 OZ4.
- (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.

m. METER M-101.

- (1) The mutual conductance, MICROMHOS, ranges are printed in black 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 at the positions of the MICROMHOS switch S-108: 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.
- (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 OHMS scale is read by applying the multiplying factor indicated by the "OHMS AT CENTER SCALE" value selected by the RANGE switch S-112. For example multiply the scale reading by 10 for the 30 ohms center scale position, by 100 for the 300 ohms center scale position etc.
- (4) The black VOLTS & MILS scale covers the six dc and ac voltage ranges as well as the six dc milliamperere ranges.
- (5) The orange MFDS. scale is used in making capacity measurements, and is read in microfarads by applying the multiplying factor indicated by the range in use.

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-3C/U is designed to test are listed numerically in this column starting with type OOA 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 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, and the GRID, PLATE, SCREEN, CATHODE, and SUPPRESSOR selector switches.
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 which controls the bias voltage applied to the tube under test.
- (5) SHUNT: This column lists the settings for the SHUNT dial, which controls the sensitivity of the meter circuit. 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. 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 having no mutual conductance

rating are indicated in this column by the following designations:

Rect. Rectifier (power type)
Volt Reg. Voltage regulator
Diode Detector type diode rectifier
Thyr. Thyatron
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 OOA through 12SA7 and the right hand section covering type numbers from 12SC7 through XXL.

c. All data shown on the roll chart originally accompanying the equipment is also contained in TABLE 4-3 of this section.

4. OPERATIONAL PROCEDURE.

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

(1) Remove the line cord W-101 from the lead compartment, uncoil and plug it into an outlet supplying 105 and 125 volts ac at 50 to 1000 cycles. NEVER CONNECT THIS EQUIPMENT TO A DC POWER SOURCE. The shield of the power cable, on the end having the 2-prong male plug is terminated in a lug suitable for retention by an 8-32 round head machine screw.

CAUTION

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

- (2) Turn the FUNCTION switch 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 to the voltage indicated on the chart under FIL.
- (5) Set the SELECTORS: The operation of setting these seven KNOBS 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 No. 1, FILAMENT No. 2, GRID,

PLATE, SCREEN, CATHODE, and SUPPRESSOR) until the letters and numbers indicated by the pointer 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 FILAMENT No. 1 SELECTOR switch knob to the letter J. Turn the FILAMENT No. 2 SELECTOR switch knob to the letter R. Turn the GRID SELECTOR knob to the number 6, the PLATE SELECTOR to number 2, SCREEN to No. 3, CATHODE to No. 7 and SUPPRESSOR to No. 5. The sequence of letters and numbers thus selected by the pointer knobs 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 to the point indicated on the roll chart under BIAS.
- (7) Set the SHUNT dial 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 SHORTS-MICROMHOS switch to the No. 1 position.
- (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 E-104, W-102, and W-103 as required.
- (10) Throw the POWER toggle switch to the ON position. The PILOT indicator 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, M-101, to move up scale to the right.
- (12) While still holding down Push Button P1, turn the knob of LINE ADJUST control 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-MICROMHOS switch 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 I-103 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. Absence of a shorted condition in these positions indicates a faulty tube.

- (14) LOCATING SHORTED ELEMENTS. In the following table (X) under any SHORT switch position indicates that the neon lamp glows in that position.
- (15) If the tube passes the short test OK, turn the SHORTS-MICROMHOS switch to the position indicated on the roll chart under the heading SCALE.

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. Tables 4-1 and 4-2 apply to the elements of these sections.

- (16) Press the test push button indicated on the Roll Chart in column headed PRESS.
P2 for DIODES.
P3 for mutual conductance test of AMPLIFIERS.
P6 for OZ4 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 will indicate the condition of the tube.
- (18) RECTIFIER TUBE TEST: Rectifier tubes including diode tubes and diode sections of multipurpose tubes, are tested for emission only since they have no mutual conductance characteristic.

TABLE 4-2. SHORT SWITCH POSITIONS

Neon lamp I-103 will light if a short exists between an element in Group I and an element in Group II.

SHORTS-MICROMHOS SWITCH POSITION	GROUP I	GROUP II
1	Cathode, Filament, Suppressor	Screen, Plate, Grid
2	Filament, Cathode, Screen	Plate, Grid, Suppressor
3	Cathode, Screen	Plate, Grid, Suppressor, Filament
4	Screen, Plate	Grid, Suppressor, Filament, Cathode
5	Screen, Plate, Grid	Cathode, Filament, Suppressor

CAUTION

NEVER PRESS THE RED MUTUAL CONDUCTANCE PUSH BUTTON P-3 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 the pointer of the METER 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 OZ4. This applies a voltage sufficiently high to ionize the tube and start conduction. Good tubes will cause the pointer of the meter 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 paragraph 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 proceed as follows:
- (a) Turn the SHORTS-MICROMHOS switch 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 if necessary.
 - (c) Press the amplifier test button P3. The METER will indicate the mutual conductance, G_m , of the tube directly in micromhos on the scale corresponding to the setting of the SHORTS-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 conductance 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 to the next lower voltage position. If the mutual conductance indicated by the METER with this reduced filament voltage applied to the tube, remains within 20% of the original reading, the tube has a large 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 paragraph 4a(28) of this section.
- (21) GAS TEST. The push switches P4 and P5 are used to test an amplifier tube for gas content.
- (a) Turn the SHORTS-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.

- (e) 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), J-103, and P (plate), J-104, 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 W-102 and W-103 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 J-105 and J-106 to the antenna and ground posts of any radio receiver. The tube under test is tapped with the finger as the SHORTS-MICROMHOS switch 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 manner: Set the controls as indicated by the roll chart and set the BIAS control dial to 100. Then insert the tube to be tested into the proper socket, press the

push button indicated and rotate the BIAS control dial slowly counterclockwise until the tube strikes as indicated by a glow between the elements and a sharp rise of the meter pointer.

CAUTION

DO NOT ROTATE THE BIAS CONTROL DIAL PAST THE POINT AT WHICH THE TUBE STRIKES AS THIS WILL CAUSE EXCESSIVE GRID CURRENT TO FLOW AND MAY PERMANENTLY DAMAGE THE TUBE. READ TUBE CONDITION QUICKLY. CONDITIONED TESTING MAY DAMAGE THE "BIAS" POTENTIOMETER R-165.

The bias limits between which the tube should strike are noted on the roll 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 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-3C/U by means of a special socket X-110, (See Figure 4-1). This socket has 8 contacts, numbers for 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 X-110. A good way to handle the leads is to grasp each lead about 1/8" from its end with the tips of a pair of long nose pliers, and insert the leads in their proper socket contacts. 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. The basing designation letter refers to the diagram shown in Figure 4-3.

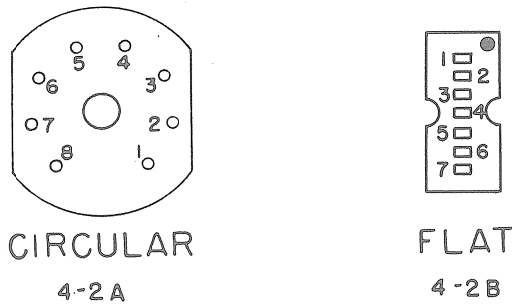


Figure 4-2.—Top View of Socket X-110 and X-111.

- (b) Sub-miniature tubes of the flat or inline contact type having either pins or leads are tested in the flat socket (X-111 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.
- (27) ADAPTERS: Due to special bases or unusual contact arrangement, tube types 829B, 832A and 2C39 cannot be tested directly in the regular test sockets of the TV-3C/U equipment. Tube Socket Adapters E-105 and E-106 are provided for use in testing these tubes.
- (28) 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 received 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.

(29) PRECAUTIONARY NOTES.

- (a) DON'T connect the TV-3C/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 1000 cycles.
- (b) DON'T insert a tube in any of the test sockets without first properly adjusting the controls.
- (c) DON'T attempt to test tubes for emission, or mutual conductance without first checking for shorted elements.
- (d) DON'T press the RED mutual conductance push button P3 when testing rectifier tubes.
- (e) DON'T fail to turn off the equipment and return all leads and adapters to the lead compartment when through using it.

BASING DIAGRAMS FOR
SUB MINIATURE TUBES

TUBES HAVING LESS THAN 8 LEADS HAVE AN ARROW ON THE SIDE OF TUBE INDICATING NO. 1 LEAD

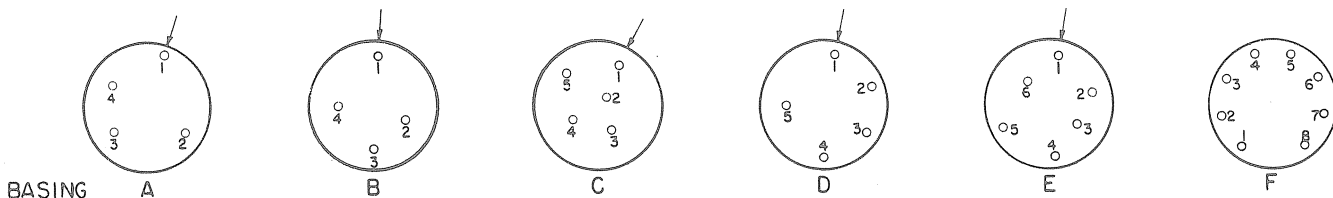


Figure 4-3. Basing Sub-Miniature Tubes (Bottom View)

TABLE 4-3 TUBE TEST DATA CHART

NOTE: Mutual Conductance values are minimum. Discard tubes which read lower. *Set BIAS control to 100. Press the proper pushbutton and rotate BIAS control counter-clockwise until tube strikes. Do not rotate BIAS control further. Wherever a crosshatch (#) or a double dagger (‡) appears refer to the notations column.

★ For Subminiature tube basing diagrams see Fig. 4-3 of instructions.

Tube Type	FiL Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	FiL Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations				
00A	5.0	JR3-2000	33	...	B	P3	420		1AF5	1.5	DX6-5800	0	...	B	*	380	Pent. Sect.				
01A	5.0	JR3-2000	48	...	B	P3	460		1AF5	#	Hold Down P2 And Press P3	0	...	A	P2	Diode	Diode Sect.				
0A2	BLST	KR0-3020	0	42	A	P4	Volt. Reg.	Read As Rectifier	1B3	OK	Over 250 On 3000 Scale	0	67	A	P4	Rect.	Cap = P				
0A3	JP0-5010	0	67	A	P4	Volt. Reg.	Read As Rectifier	1B4	1.1	JR0-0000	0	67	A	P4	Rect.	Cap = G				
0A4G	KS0-5810	100	87	A	P4	Volt. Reg.	Read As Rectifier	1B5	2.0	JR0-2300	18	...	B	*	410					
0B2	JP0-5020	0	42	A	P4	Volt. Reg.	Short on 3	1B5	#	Hold Down P2 And Press P3	0	...	B	P3	360	Triode Sect.				
0B3	JP0-5010	0	69	A	P4	Volt. Reg.	Read As Rectifier	1B5	2.0	JR5-2000	23	...	B	P3	Diode	Diode No. 1				
0C3	JP0-5010	0	65	A	P4	Volt. Reg.	Read As Rectifier	1B5	2.0	BY5-4000	0	0	A	P2	Diode	Diode No. 2				
0D3	JP0-5010	0	46	A	P4	Volt. Reg.	Read As Rectifier	1B7	2.0	JR5-3000	0	0	A	P2	Diode	Pent. Sect.				
0Y4	BLST	JX3-5020	0	50	A	P6	Rect.	Short on 1-2	1B7	1.5	JR0-3405	0	...	B	*	570					
0Z4	JR0-5070	0	70	A	P6	Rect.	Hold Button	1B7	#	Cap = G. Hold Down P2 And Press P3	20	...	B	*	440	Osc. Sect.				
0Z4	Down For 5 Seconds. Plate No. 1	0	70	A	P6	Rect.	Hold Button	1C3	1.5	JR5-6403	20	...	B	P3	480					
0Z4A	JR0-3070	0	70	A	P6	Rect.	Hold Button	1C5	1.5	DX8-2000	37	...	B	P3	480					
0Z4A	Down For 5 Seconds. Plate No. 2	0	70	A	P6	Rect.	Hold Button	1C6	1.5	JR5-3400	37	...	B	P3	410	Ampl. Sect.				
1A3	Down For 5 Seconds. Plate No. 1	0	70	A	P6	Rect.	Hold Button	1C6	2.0	JR0-2534	0	...	B	*	250	Osc. Sect.				
1A4	JR0-3070	0	70	A	P6	Rect.	Hold Button	1C7	#	Cap = G. Hold Down P2 And Press P3	20	...	B	*	410	Pent. Sect.				
1A5	1.5 HT0-2010	0	0	A	P2	Diode	Cap = G	1C7	2.0	JR0-3465	0	...	B	*	250	Osc. Sect.				
1A6	2.0 JR0-2300	18	...	B	*	470		1C7	#	Hold Down P2 And Press P3	20	...	B	*	250	Osc. Sect.				
1A6	#	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.
1A6	*	Cap = G. Hold Down P2 And Press P3	1A6	2.0	JR4-3502	24	...	B	*	190	Osc. Sect.	1A7	1.5	JR0-3465	0	...	B	*	410	Pent. Sect.
1A7	#	Hold Down P2 And Press P3	1A7	1.5	JR0-3465	0	...	B	*	315	Osc. Sect.	1A7	1.5	JR5-6430	24	...	B	*	190	Osc. Sect.
1A7	*	Cap = G. Hold Down P2 And Press P3	1A7	1.1	EV8-6702	45	...	B	P3	250	F Basing	1A8	1.1	EV8-6702	45	...	B	P3	250	F Basing
1A8	#	Hold Down P2 And Press P3	1A8	2.0	JR4-3502	24	...	B	*	470	Cap = G.	1A9	2.0	JR0-3400	18	...	B	*	470	Cap = G.
1A9	#	Hold Down P2 And Press P3	1A9	2.0	JR0-3400	18	...	B	*	315	Pent. Sect.	1A9	2.0	JR0-3465	24	...	B	*	315	Pent. Sect.
1A9	*	Cap = G. Hold Down P2 And Press P3	1A9	2.0	JR5-6430	24	...	B	*	190	Osc. Sect.	1A9	2.0	JR5-6430	24	...	B	*	190	Osc. Sect.
1A9	#	Hold Down P2 And Press P3	1A9	1.1	EV2-7800	22	...	B	P3	900	F Basing	1A9	1.1	EV2-7800	22	...	B	P3	900	F Basing
1A9	*	Cap = G. Hold Down P2 And Press P3	1A9	1.1	EV2-7800	22	...	B	P3	250		1A9	1.1	EV2-7800	22	...	B	P3	250	
1A9	#	Hold Down P2 And Press P3	1A9	1.1	DV4-1200	28	...	B	P3	880		1A9	1.1	DV4-1200	28	...	B	P3	880	
1A9	*	Cap = G. Hold Down P2 And Press P3	1A9	1.1	EV2-7800	0	...	B	*	410	F Basing	1A9	1.1	EV2-7800	0	...	B	*	410	F Basing
1A9	#	Hold Down P2 And Press P3	1A9	1.1	DX6-2100	22	...	B	P3	600		1A9	1.1	DX6-2100	22	...	B	P3	600	
1A9	*	Cap = G. Hold Down P2 And Press P3	1A9	1.5	DX6-2100	21	...	B	P3	440		1A9	1.5	DX6-2100	21	...	B	P3	440	

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fill Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fill Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
1F4	2.0	JR3-2400	23	...	B	P3	880		1LH4	1.5	JR6-2000	16	...	B	P3	175	Triode Sect.
1F5	2.0	JR5-3400	23	...	B	P3	880		1LH4	1.5	JR6-4000	0	0	A	P2	Diode	Diode Sect.
1F6	2.0	JR0-2300	8	...	B	*	410	Pent. Sect.	1LN5	1.5	JR6-2340	11	...	B	P3	480	
		* Cap = G, Hold Down	0	0	A	P2	Diode	Diode No. 1	1N5	1.5	JR0-3400	11	...	B	P3	480	Cap = G
		OK Above 500	0	0	A	P2	Diode	Diode No. 2	1N6	1.5	JR5-3400	43	...	B	P3	500	Pent. Sect.
		OK Above 500 On 3000 Scale	0	0	A	P2	Diode	Diode No. 2	1N6	1.5	JR0-6000	0	0	A	P2	Diode	Diode Sect.
1F7	2.0	JR0-3600	8	...	B	*	410	Pent. Sect.	1P5	1.5	JR0-3400	11	...	B	P3	500	Cap = G
		* Cap = G, Hold Down	0	0	A	P2	Diode	Diode No. 1	1Q5	1.5	JR5-3400	37	...	B	P3	1320	
		OK Above 500	0	0	A	P2	Diode	Diode No. 2	1Q6★	1.1	EV2-7800	0	...	B	*	190	F Basing
		OK Above 500 On 3000 Scale	0	0	A	P2	Diode	Diode No. 2	1Q6★	* Pent. Sect. Hold Down	P2 And Press	0	0	A	P2	Diode	F Basing
1G4	1.5	JR5-3000	49	...	B	P3	520	Triode Sect. Cap = G	1R4	1.1	EV0-6000	0	0	A	P2	Diode	
1G5	2.0	JR5-3400	37	...	B	P3	950	Triode Sect.	1R5	1.5	JR0-4070	0	0	A	P2	Diode	
1G6	1.5	JR5-6000	16	...	B	P3	420	Triode No. 1	1R5	1.5	DX8-2160	0	...	B	*	250	No. 1 Grid
1H4	2.0	JR4-3000	16	...	B	P3	420	Triode No. 2	1R5	* Hold Down	P2 And Press	0	...	B	*	220	No. 3 Grid
1H5	2.0	JR0-3000	40	...	B	P3	570	Pent. Sect.	1S4	* Hold Down	P2 And Press	31	...	B	*	950	* Hold Down
1H5	1.5	JR0-5000	0	0	A	P2	Diode	Diode Sect.	1S5	1.5	DX6-5800	13	...	B	*	330	Pent. Sect.
1H6	2.0	JR6-3000	23	...	B	P3	360	Triode Sect.	1S5	* Hold Down	P2 And Press	0	0	A	P2	Diode	
1H6	2.0	BY6-5000	0	0	A	P2	Diode	Diode No. 1	1S6★	1.1	EV3-1806	0	...	B	*	220	Diode Sect.
1H6	2.0	JR6-4000	45	...	B	P3	600	Diode No. 2	1S6★	* Pent. Sect. Hold Down	P2 And Press	0	0	A	P2	Diode	F Basing
1J5	2.0	JR5-3400	15	...	B	P3	630	Triode No. 1	1SA6	1.1	EV0-6000	0	0	A	P2	Diode	F Basing
1J6	2.0	JR4-3000	15	...	B	P3	630	Triode No. 2	1SA6	1.5	JR4-7630	0	...	B	*	500	* Hold Down
1L4	1.5	HT6-2100	19	...	B	*	650	Pent. Sect.	1SB6	1.5	JR7-3400	0	...	B	*	410	Pent. Sect.
1L6	1.5	DX6-2518	0	...	B	*	410	Osc. Sect.	1SB6	* Hold Down	P2 And Press	0	0	A	P2	Diode	Diode Sect.
1LA4	1.5	JR6-2300	43	...	B	P3	500	Pent. Sect.	1T4	OK Over 500	On 3000 Scale	0	...	B	*	470	* Hold Down
1LA6	1.5	JR6-2534	0	...	B	*	380	Osc. Sect.	1T5	1.5	DX6-2100	0	...	B	*	470	* Hold Down
1LA6	1.5	JR4-3526	32	...	B	*	190	Osc. Sect.	1T5	P2 And Press	P3	45	...	B	P3	725	
1LB4	1.5	JR6-2300	51	...	B	P3	580	Heptode Sect.	1T6★	1.1	JR5-3400	45	...	B	P3	125	F Basing.
1LB6	1.5	JR6-2437	0	...	B	P3	250	Osc. Sect.	1T6★	* Pent. Sect. Hold Down	P2 And Press	0	0	A	P2	Diode	F Basing
1LB6	1.5	JR6-3574	20	...	B	P3	950	Osc. Sect.	1U4	1.1	EV0-6000	0	0	A	P2	Diode	F Basing
1LC5	1.5	JR6-2340	0	...	B	*	470	* Hold Down	1U5	Diode Sect. OK Over 250	On 3000 Scale	14	...	B	P3	565	
1LC6	1.5	JR6-2534	30	...	B	P3	440	Pent. Sect.	1U5	1.5	DX6-2100	34	...	B	P3	330	Pent. Sect.
1LC6	1.5	JR4-3526	30	...	B	P3	240	Osc. Sect.	1U6	1.5	DX6-8100	0	0	A	P2	Diode	Diode Sect.
1LD5	1.5	JR6-2300	0	...	B	*	380	Pent. Sect.	1U6	1.5	DX6-2581	23	...	B	P3	470	Heptode Sect.
1LD5	1.5	JR6-4300	0	0	A	P2	Diode	Diode Sect.	1V	1.5	DX8-1562	0	...	B	P3	315	Osc. Sect.
1LE3	1.5	JR6-2050	0	...	B	P3	820	Diode Sect.	1V2	6.3	JR0-2030	0	44	A	P7	Rect.	
1LF3	1.5	JR6-2050	20	...	B	P3	760	Diode Sect.	1V5★	0.6	EV0-9000	0	25	A	P4	Rect.	
1LG5	1.5	JR6-2340	25	...	B	P3	660	Diode Sect.	1W4	* Hold Down	P2 And Press	49	...	B	P3	580	F Basing
					B	P3			1W5★	1.5	DX6-2100	27	...	D	P3	41n	F Basing

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
1X2	1.5	JR0-0000	0	70	A	P4	Rect.	Cap = P Short on 3	2E32	1.1	DV4-1200	0	...	B	#	250	
1Z2	1.5	DS0-0000	0	72	A	P4	Rect.	Cap = P	2E35	* Hold Down	P2 And Press	18	...	B	#	380	
2A3	2.5	JR3-2000	67	...	C	P3	1900		2E36	* Hold Down	P2 And Press	18	...	B	#	380	
2A4	2.5	JR5-3000	#	59	A	P7	* Thyr.	Read As Rectifier.	2E41	1.1	DV4-1200	18	...	B	#	250	Pent. Sect.
2A5	* Should Strike	Between 77 and 67					Read		2E41	* Hold Down	P2 And Press	20	...	B	#	250	Pent. Sect.
2A6	2.5	JR4-2350	29	...	B	P3	1260	Triode Sect. Cap = G	2E41	1.1	EW5-1200	20	...	B	#	250	Pent. Sect.
2A6	2.5	JR0-2050	11	...	B	P3	470	Diode No. 1	2E41	* Hold Down	P2 And Press	0	0	A	P2	Diode	Diode Sect.
2A6	2.5	JR0-4050	0	0	A	P2	Diode	Diode No. 2	2E42	1.1	EW0-3000	0	0	A	P2	Diode	Diode Sect.
2A7	2.5	JR0-3050	0	0	A	P2	Diode	Pent. Sect. Cap = G	2E42	OK Over 150	On 3000 Scale	...	...	B	#	250	Pent. Sect.
2A7	2.5	JR0-2365	22	...	B	P3	630	Osc. Sect.	2E42	1.1	EW5-1200	20	...	B	#	250	Pent. Sect.
2A7	2.5	JR5-4360	30	...	B	P3	250		2E42	* Hold Down	P2 And Press	0	0	A	P2	Diode	Diode Sect.
2B4	2.5	JR3-2040	#	92	A	P4	* Thyr	Read As Rectifier.	2V3	2.5	JR0-0000	0	70	A	P4	Rect.	Cap = P
2B6	* Should Strike	Between 77 and 67					Read		2W3	2.5	HRO-4000	0	0	A	P7	Rect.	Cap = P
2B7	2.5	JR4-2360	15	...	B	P3	950	Pent. Sect. Cap = G	2X2A	2.5	JR0-0000	0	80	A	P4	Rect.	Cap = P
2B7	2.5	JR0-2360	30	...	B	P3	630	Diode No. 1	2Z2	2.5	JR0-2000	0	0	A	P7	Rect.	
2B7	2.5	JR0-5360	0	0	A	P2	Diode	Diode No. 2	3A4	2.5	DX8-2100	33	...	B	P3	1260	
2B7	2.5	JR0-4360	0	0	A	P2	Diode	Cap = P	3A5	3.0	DX5-6000	32	...	B	P3	1260	
2B22	6.3	JR0-0070	0	46	A	P7	Diode		3A5	3.0	HT1-2000	32	...	B	P3	1260	
2B23	6.3	JR0-3070	0	51	A	P6	Rect.		3A8	2.5	JR0-3400	12	...	B	P3	470	
2C4	2.5	HT1-5080	#	92	A	P4	Thyr.	Read	3A8	Pent. Sect. Cap = G	Short on 3	...	B	P3	315		
2C21	* Should Strike	Between 75 and 65.					Read		3A8	Triode Sect.	Short on 3	...	A	P2	Diode		
2C21	6.3	JR4-5060	38	...	B	P3	860	Triode No. 1	3B4	2.5	JR0-7400	0	0	A	P2	Diode	
2C21	6.3	JR0-3020	38	...	B	P3	860	Triode No. 2	3B5	Diode Sect.	Short on 3	...	B	P3	1070		
2C22	6.3	JR0-0070	13	...	C	P3	1900	{ Upper Cap = G Lower Cap = P Upper Cap = P Lower Cap = G See Sect. 4.	3B7	2.5	JV1-7300	55	...	B	P3	950	
2C26	6.3	JR0-0070	18	...	B	P3	950		3B7	2.5	JR5-3400	60	...	B	P3	950	
2C39	6.3	JR6-5070	18	...	E	P3	12600		3B7	2.5	BY6-7000	25	...	B	P3	950	
2C40	6.3	JR0-0070	17	...	C	P3	1760	Cap = P. Ring = G	3B24	2.5	JR3-2000	25	...	B	P3	950	
2C43	6.3	JR0-0070	17	...	C	P3	2800	Cap = P. Ring = G	3B24	2.5	JR0-0000	0	85	A	P4	Rect.	Cap = P
2C45	7.5	JR3-2000	37	...	B	P3	1380		3B24	2.5	CR0-0000	0	85	A	P4	Rect.	Cap = P
2C50	12.6	JX2-1030	41	...	B	P3	1130	Triode No. 1	3B25	2.5	JR0-0000	0	90	A	P4	Rect.	Cap = P
2C50	12.6	JX4-5060	41	...	B	P3	1130	Triode No. 2	3B29	2.5	JR0-0000	0	90	A	P4	Rect.	Cap = P
2C51	6.3	KR3-4028	17	...	D	P3	3300	Triode No. 1	3C6	2.5	BY5-6000	10	...	B	P3	700	
2C51	6.3	KR7-6082	17	...	D	P3	3300	Triode No. 2	3C6	2.5	JR4-3000	10	...	B	P3	700	
2C52	12.6	JX4-5061	15	...	B	P3	630	Triode No. 1	3C22	6.3	JR0-0050	13	...	D	P3	3150	
2C52	12.6	JX2-1035	15	...	B	P3	630	Triode No. 2	3C24	Radiating Fins = P	Center Ring = G	Short on 3	B	P3	630	Top Cap = P	
2C53	6.3	JR5-0070	0	...	A	P4	250	Cap = P	3D6	2.5	JR0-0000	0	...	B	P3	1320	
2D21	6.3	JR3-6025	#	92	A	P4	* Thyr.	Read As Rectifier.	3E5	Side Cap = G	...	...	B	#	750		
2E5	* Should Strike	Between 35 and 25.					Read		3E5	2.5	JR6-2300	37	...	B	P3	1000	
2E5	2.5	JR5-4030	0	100	A	P3	Eye	Eye Open	3E6	2.5	JR6-2340	15	...	B	P3	1000	
2E22	2.5	JR5-4230	0	100	A	P3	Eye	Eye Closed	3E29	3.0	JR6-5620	0	...	D	P3	2500	
2E24	6.3	JR3-0240	0	...	C	P3	2500	Cap = P	3E29	* Short On 3 Hold	Down P2 And Press	...	B	P3	2500		
2E24	6.3	JR5-0300	35	...	C	P3	2000	Cap = P Short on 3	3E29	3.0	JR6-5620	0	...	D	P3	2500	
2E25	6.3	JR5-0470	0	...	C	P3	1900	Cap = P	3E29	Plate No. 1. See Sect. 4, Par. 4a (29).	...	...	D	P3	2500		
2E26	6.3	JR5-0327	37	...	C	P3	2200	Cap = P	3E29	6.3	JR4-7620	0	...	D	P3	2500	
2E30	6.3	JR3-5602	20	...	C	P3	1900		3E29	6.3	JR4-7620	0	...	D	P3	2500	
2E31	1.1	DV4-1200	0	...	B	#	250	* Hold Down	3E29	Plate No. 2. See Sect. 4, Par. 4a (29).	...	...	D	P3	2500		
		P2 And Press															

TV-3C/U

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil. Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil. Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
3LE4	2.5	JR6-2374	55	...	B	P3	700	Short on 3	{6AB8	6.3	EV9-6837	24	...	C	P3	1750	Pent. Sect.
3LF4	2.5	JR6-2300	30	...	B	P3	1200		{6AB8	6.3	EV2-1030	35	...	B	P3	500	Triode Sect.
3Q4	3.0	HT1-2800	24	...	B	P3	1340		6AC5	6.3	JR5-3070	0	...	B	P3	530	
3O5	2.5	JR5-3400	38	...	B	P3	1130		6AC6	6.3	JR5-3470	0	...	B	P3	1500	
3S4	2.5	HT1-2800	28	...	B	*	940		6AC7	6.3	JR4-7653	10	...	D	P3	3800	
		# Hold Down			P2 And Press				6AD4★	6.3	DU2-1050	15	...	D	P3	1325	C Basing
3V4	3.0	DX6-2100	31	...	B	P3	1040		{6AD6	6.3	JR4-3570	0	100	A	P3	Eye	{Eye 1 Open
{4A6	3.0	JR5-6000	16	...	B	P3	630	Triode No. 1	{6AD6	6.3	JR3-4570	0	100	A	P3	Eye	{Eye 2 Closed
{4A6	3.0	BY4-3000	16	...	B	P3	630	Triode No. 2	{6AD7	6.3	JR5-3476	29	...	B	P3	1260	{Eye 2 Open
5A6	5.0	EV7-1603	46	...	C	P3	1900		6AE5	6.3	JR2-6073	0	...	B	P3	380	{Eye 1 Closed
{5AX4	5.0	HR0-6000	0	35	A	P7	Rect.	Plate No. 1	{6AE6	6.3	JR5-4073	0	...	B	P3	750	Pent. Sect.
{5AX4	5.0	HR0-4000	0	27	A	P7	Rect.	Plate No. 2	{6AE6	6.3	JR5-3074	0	...	B	P3	540	Triode Sect.
5AZ4	5.0	JS0-4006	0	0	A	P7	Rect.	Plate No. 1	{6AE7	6.3	JR5-3074	0	...	B	P3	470	Triode No. 1
5AZ4	5.0	JS0-6004	0	0	A	P7	Rect.	Plate No. 2	{6AE7	6.3	JR6-3074	33	...	B	P3	950	Triode No. 2
5R4	5.0	HR0-6000	0	17	A	P7	Rect.	Plate No. 1	6AF4	6.3	JR2-3056	33	...	B	P3	950	Triode No. 1
5R4	5.0	HR0-4000	0	11	A	P7	Rect.	Plate No. 2	6AF5	6.3	JR2-3050	36	...	D	P3	2840	Triode No. 2
5T4	5.0	HR0-6000	0	43	A	P7	Rect.	Plate No. 1									
5T4	5.0	HR0-4000	0	34	A	P7	Rect.	Plate No. 2									
5U4	5.0	HR0-6000	0	35	A	P7	Rect.	Plate No. 1									
5U4	5.0	HR0-4000	0	27	A	P7	Rect.	Plate No. 2									
5V4	5.0	HR0-6000	0	59	A	P7	Rect.	Plate No. 1	{6AF6	6.3	JR4-3570	0	100	A	P3	Eye	{Eye 1 Open
5V4	5.0	HR0-4000	0	59	A	P7	Rect.	Plate No. 2	{6AF6	6.3	JR3-4570	0	100	A	P3	Eye	{Eye 2 Closed
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	35	A	P7	Rect.	Plate No. 1	6AG5	6.3	JR3-5620	10	...	D	P3	2500	
5X4	5.0	JX0-3000	0	27	A	P7	Rect.	Plate No. 2	6AG7	6.3	JR4-7652	10	...	D	P3	3800	
5Y3	5.0	HR0-6000	0	0	A	P7	Rect.	Plate No. 1	6AH4	6.3	JR2-5070	47	...	C	P3	2840	
5Y3	5.0	HR0-4000	0	0	A	P7	Rect.	Plate No. 2	6AH5	6.3	JR6-4270	23	...	D	P3	3150	
5Y4	5.0	JX0-5000	0	0	A	P7	Rect.	Plate No. 1	6AH6	6.3	JR3-5672	10	...	D	P3	3800	
5Y4	5.0	JX0-3000	0	0	A	P7	Rect.	Plate No. 2	{6AH7	6.3	JX5-6040	20	...	D	P3	1510	Triode No. 1
{5Z3	5.0	JR0-3000	0	35	A	P7	Rect.	Plate No. 1	{6AH7	6.3	JX2-3010	20	...	D	P3	1510	Triode No. 2
{5Z3	5.0	JR0-2000	0	27	A	P7	Rect.	Plate No. 2	6AJ5	6.3	JR3-5620	12	...	D	*	1730	
5Z4	5.0	HR0-6000	0	57	A	P7	Rect.	Plate No. 1									
5Z4	5.0	HR0-4000	0	57	A	P7	Rect.	Plate No. 2									
6A3	6.3	JR3-2000	67	...	C	P3	1900		6AJ7	6.3	JR4-7653	10	...	D	P3	3800	
6A4	6.3	JR3-2400	28	...	B	P3	1260		6AK5	6.3	JR3-5620	10	...	D	P3	2780	
6A5	6.3	JR5-3000	67	...	C	P3	1900		6AK6	6.3	JR4-5672	23	...	B	P3	1320	
{6A6	6.3	JR5-6040	12	...	C	P3	950	Triode No. 1	6AK7	6.3	JR4-7652	10	...	D	P3	3800	
{6A6	6.3	JR3-2040	12	...	B	P3	950	Triode No. 2	{6AL5	6.3	JR0-7030	0	67	A	P2	Diode	Diode No. 1
{6A7	6.3	JR0-2365	22	...	B	P3	630	Pent. Sect. Cap=G	{6AL5	6.3	JR0-2050	0	67	A	P2	Diode	Diode No. 2
{6A7	6.3	JR5-4362	30	...	B	P3	190	Osc. Sect.	6AL6	6.3	JR5-0470	23	...	C	P3	3150	Cap=P
{6A8	6.3	JR0-3475	22	...	B	P3	630	Pent. Sect. Cap=G	{6AL7	6.3	JR6-3570	Vary 100	100	A	P3	Eye	{Bias Controls
{6A8	6.3	JR5-6473	30	...	B	P3	190	Osc. Sect.	{6AL7	6.3	JR5-3470	Vary 100	100	A	P3	Eye	{Left Pattern
{6AB4	6.3	JR6-3070	14	...	D	P3	2500		6AL7	6.3	JR4-3570	Vary 100	100	A	P3	Eye	{Bias Controls
{6AB5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open	6AN5	6.3	JR3-5670	0	...	D	*	3800	{Both Patterns
{6AB5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed									{Right Pattern
6AB6	6.3	JR5-3470	0	...	B	P3	920										
6AB7	6.3	JR4-7653	0	...	C	P3	2200										

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
{6AN6	6.3	DX0-2060	0	37	A	P2	Diode	Diode No. 1	6BC5	6.3	JR3-5620	0	...	C	P3	2000	
{6AN6	6.3	DX0-8060	0	37	A	P2	Diode	Diode No. 2	{6BC7	6.3	EV0-8090	0	67	A	P2	Diode	Diode No. 2
{6AN6	6.3	DX0-1060	0	37	A	P2	Diode	Diode No. 3	{6BC7	6.3	EV0-6070	0	67	A	P2	Diode	Diode No. 2
{6AO5	6.3	DX0-5060	0	37	A	P2	Diode	Diode No. 4	{6BC7	6.3	EV0-2010	0	67	A	P2	Diode	Diode No. 3
{6AO6	6.3	JR3-5620	21	...	C	P3	2320	Triode Sect.	6BD5	6.3	JR2-5730	18	...	D	P3	3150	
{6AO6	6.3	JR3-7020	6	...	B	P3	725	Diode No. 1	6BD6	6.3	JR3-5672	13	...	D	P3	1260	Ampl. Sect.
{6AO6	6.3	JR0-6020	0	0	A	P2	Diode	Diode No. 2	{6BE6	6.3	JR7-5623	11	...	B	P3	900	Osc. Sect.
{6AO6	6.3	JR0-5020	0	0	A	P2	Diode	Diode No. 2	{6BE6	6.3	JR3-5627	0	...	B	P3	1000	
{6AO7	6.3	JX4-5016	13	...	B	P3	630	Triode Sect.	6BE7	6.3	EV7-1639	29	...	B	P3	630	
{6AO7	6.3	JX4-2016	0	35	A	P2	Diode	Diode No. 1	6BF5	6.3	JR3-5620	49	...	C	P3	2140	Triode Sect.
{6AO7	6.3	JX4-3016	0	35	A	P2	Diode	Diode No. 2	6BF6	6.3	JR3-7020	18	...	B	P3	1200	Diode No. 1
6AR5	6.3	JR3-5620	34	...	B	P3	1000		6BF6	6.3	JR3-6020	0	0	A	P2	Diode	Diode No. 2
6AR6	6.3	GX8-3520	34	...	C	P3	3400		6BF6	6.3	JR3-5020	0	0	A	P2	Diode	F Basing
6AS5	6.3	JR2-7630	25	...	D	P3	3530		6BF7★	6.3	DW7-8050	22	...	C	P3	1575	
6AS6	6.3	JR3-5627	10	...	D	P3	1540		Triode No. 1								
{6AS7	6.3	JX4-5061	100	...	C	P3	1800	Triode No. 1	6BF7★	6.3	DW2-1040	22	...	C	P3	1575	F Basing
{6AS7	6.3	JX2-1035	100	...	C	P3	1800	Triode No. 2	Triode No. 2								
6AT6	6.3	JR3-7020	18	...	B	P3	750	Triode Sect.	6BG6	6.3	JR5-0730	18	...	D	P3	3800	Cap=P
6AT6	6.3	JR0-6020	0	0	A	P2	Diode	Diode No. 1	6BG7★	6.3	DW7-8050	22	...	C	P3	1575	F Basing
{6AT6	6.3	JR0-5020	0	0	A	P2	Diode	Diode No. 2	Triode No. 1								
6AU5	6.3	JR2-5730	41	...	C	P3	1780		6BG7★	6.3	DW2-1040	22	...	C	P3	1575	F Basing
6AU6	6.3	JR3-5672	10	...	D	P3	2050		Triode No. 2								
6AV5	6.3	JR2-5730	50	...	C	P3	2450										
{6AV6	6.3	JR3-7025	12	...	B	P3	800	Triode Sect.	6BH6	6.3	JR3-5627	15	...	B	P3	1260	
6AV6	6.3	JR3-6025	0	0	A	P2	Diode	Diode No. 1	6BJ6	6.3	JR3-5627	0	...	C	P3	2400	
6AV6	6.3	JR3-5027	0	0	A	P2	Diode	Diode No. 2	{6BK6	6.3	JR3-7025	6	...	B	P3	790	Triode Sect.
6AW7	6.3	JX1-6020	8	...	B	P3	570	Triode Sect.	{6BK6	6.3	JR0-6025	0	0	A	P2	Diode	Diode No. 1
6AW7	6.3	JX1-3050	0	65	A	P2	Diode	Diode No. 1	{6BK6	6.3	JR0-5027	0	0	A	P2	Diode	Diode No. 2
6AW7	6.3	JX1-4020	0	65	A	P2	Diode	Diode No. 2	{6BK7	6.3	EV7-6089	8	...	D	P3	5350	Triode No. 1
6AX4	6.3	JX0-5030	0	46	A	P7	Rect.		{6BK7	6.3	EV2-1039	8	...	D	P3	5350	Triode No. 2
6AX5	6.3	JR0-5073	0	0	A	P7	Rect.	Plate No. 1	6BL7	6.3	JX2-1030	24	...	D	P3	3150	Triode No. 1
6AX5	6.3	JR0-5075	0	0	A	P7	Rect.	Plate No. 2	{6BL7	6.3	JX4-5060	24	...	D	P3	3150	Triode No. 2
6AX6	6.3	JR0-5070	0	62	A	P7	Rect.	Plate No. 1	{6BN6	6.3	JR2-7536	0	...	B	P3	440	Limiter Grid
6AX6	6.3	JR0-3040	0	62	A	P7	Rect.	Plate No. 2	{6BN6	6.3	JR6-7532	0	...	B	P3	570	Quadrature Grid
6B4	6.3	JR5-3000	67	...	C	P3	1900		6BQ6	6.3	JR5-0470	50	...	C	P3	2800	Cap=P
6B5	6.3	JR4-2350	0	...	B	P3	950		{6BQ7	6.3	EV7-6080	17	...	D	P3	3300	Triode No. 1
{6B6	6.3	JR0-3070	15	...	B	P3	470	Triode Sect. Cap=G	{6BQ7	6.3	EV2-1030	17	...	D	P3	3300	Triode No. 2
6B6	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1	6BT6	6.3	JR3-7020	13	...	B	P3	820	Triode Sect.
6B6	6.3	JR0-4070	0	0	A	P2	Diode	Diode No. 2	6BT6	6.3	JR3-6020	0	35	A	P2	Diode	Diode No. 1
6B7	6.3	JR0-2360	30	...	B	P3	630	Pent. Sect. Cap=G	6BT6	6.3	JR3-5020	0	35	A	P2	Diode	Diode No. 2
6B7	6.3	JR0-5360	0	0	A	P2	Diode	Diode No. 1	6BU6	6.3	JR3-7020	34	...	B	P3	940	Triode Sect.
6B7	6.3	JR0-4360	0	0	A	P2	Diode	Diode No. 2	6BU6	6.3	JR3-6020	0	25	A	P2	Diode	Diode No. 1
6B8	6.3	JR0-3672	24	...	B	P3	720	Pent. Sect. Cap=G	6BU6	6.3	JR3-5020	0	25	A	P2	Diode	Diode No. 2
6B8	6.3	JR0-5672	0	0	A	P2	Diode	Diode No. 1	6BX6	6.3	EV2-7819	13	...	C	P3	1900	
6B8	6.3	JR0-4672	0	0	A	P2	Diode	Diode No. 2	{6BY5	6.3	JR0-5070	0	38	A	P7	Rect.	Plate No. 1
6B8★	6.3	JR3-1520	15	...	D	P3	2080	E Basing	{6BY5	6.3	JR0-4020	0	38	A	P7	Rect.	Plate No. 2
6BA5★	6.3	EW3-1520	15	...	D	P3	2700		6C4	6.3	JR6-3070	24	...	B	P3	1380	
6BA6	6.3	JR3-5672	9	...	C	P3	470		6C5	6.3	JR5-3070	21	...	B	P3	1260	
6BA7	6.3	EV7-9132	17	...	B	P3	470	Ampl. Sect.	6C6	6.3	JR0-2354	21	...	B	P3	770	Cap=G
6BA7	6.3	EV2-9137	25	...	B	P3	470	Osc. Sect.									

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

TV-3C/U

Tube Type	Fil Volls	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volls	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
{6C7	6.3	JR0-2060	29	...	B	P3	780	Triode Sect. Cap=G	6K6	6.3	JR5-3470	34	...	B	P3	1000	Cap=G
{6C7	6.3	JR0-5060	0	0	A	P2	Diode	Diode No. 1	6K7	6.3	JR0-3475	19	...	B	P3	910	Hexode Sect. Cap=G
{6C7	6.3	JR0-4060	0	0	A	P2	Diode	Diode No. 2	{6K8	6.3	JR5-3476	11	...	B	P3	630	Triode Sect.
{6C8	6.3	JR5-6070	17	...	B	P3	630	Triode No. 1	{6K8	6.3	JR5-6473	0	...	C	P3	1500	
{6C8	6.3	JR0-3040	17	...	B	P3	630	Triode No. 2	6L4	6.3	JR2-3060	25	...	D	P3	3150	
{6CB6	6.3	JR3-5627	11	...	D	P3	3500	Cap=P	6L5	6.3	JR5-3070	27	...	B	P3	950	
{6CD6	6.3	JR3-0730	42	...	D	P3	4100	Cap=P	6L6	6.3	JR5-3472	23	...	D	P3	3150	
6D4	6.3	JR3-7050	*	40	A	P7	*Thyr.	Read As Rectifier.	{6L7	6.3	JR0-3475	23	...	B	P3	410	Cap Grid. Cap=G
									6N4	6.3	JR5-3472	27	...	B	P3	410	Pin Grid
										6.3	JR3-5020	18	...	D	P3	3800	
6D5	6.3	JR5-3070	57	...	B	P3	1260	Cap=G	{6N5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open
6D6	6.3	JR0-2354	21	...	B	P3	1000	Cap=G	{6N5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed
6D7	6.3	JR0-2364	24	...	B	P3	770	Cap=G	6N6	6.3	JR5-3470	0	...	B	P3	950	
{6D8	6.3	JR0-3475	22	...	B	P3	630	Pent. Sect. Cap=G	{6N7	6.3	JR5-6073	12	...	B	P3	950	Triode No. 1
{6D8	6.3	JR5-6473	30	...	B	P3	190	Osc. Sect.	{6N7	6.3	JR4-3076	12	...	B	P3	950	Triode No. 2
{6E5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open	{6N8	6.3	EV2-6139	17	...	B	P3	1380	Pent. Sect.
{6E5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed	{6N8	6.3	EV2-7139	0	0	A	P2	Diode	Diode No. 1
{6E6	6.3	JR5-6040	54	...	B	P3	880	Triode No. 1	{6N8	6.3	EV2-8139	0	0	A	P2	Diode	Diode No. 2
{6E6	6.3	JR3-2040	54	...	B	P3	880	Triode No. 2	6P5	6.3	JR5-3070	29	...	B	P3	910	
6E7	6.3	JR0-2364	24	...	B	P3	950	Cap=G	{6P7	6.3	BT0-4576	28	...	B	P3	700	Pent. Sect. Cap=G
6F4	6.3	JR2-3060	30	...	D	P3	3800	Cap=G	{6P7	6.3	BT8-6074	28	...	B	P3	315	Triode Sect.
6F5	6.3	JR0-4072	12	...	B	P3	630	Cap=G	6Q4	6.3	EV1-9030	0	...	D	P3	6300	Short on 1-2-3-5
6F6	6.3	JR5-3472	29	...	B	P3	1260	Cap=G	6Q5	6.3	JR5-3070	*	92	A	P4	*Thyr.	
{6F7	6.3	JR0-2365	28	...	B	P3	700	Pent. Sect. Cap=G								Read As Rectifier.	
{6F7	6.3	JR5-4362	28	...	B	P3	315	Triode Sect.									
{6F8	6.3	JR5-6070	23	...	B	P3	1260	Triode No. 1	{6O6	6.3	JR0-3070	17	...	B	P3	630	Triode Sect. Cap=G
{6F8	6.3	JR0-3040	23	...	B	P3	1260	Triode No. 2	{6O6	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1
{6G5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open	{6O6	6.3	JR0-4070	0	0	A	P2	Diode	Diode No. 2
{6G5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed	{6O7	6.3	JR0-3072	17	...	B	P3	500	Triode Sect. Cap=G
6G6	6.3	JR5-3470	12	...	D	P3	1450	Eye Closed	{6O7	6.3	JR0-5073	0	0	A	P2	Diode	Diode No. 1
{6G7S	6.3	JR0-2354	36	...	B	P3	940	Pent. Sect. Cap=G	{6O7	6.3	JR0-4073	0	0	A	P2	Diode	Diode No. 2
{6G7S	6.3	JR0-6030	0	62	A	P2	Diode	Diode No. 1	6R4	6.3	EV1-8030	23	...	C	P3	2500	
{6G7S	6.3	JR0-4030	0	62	A	P2	Diode	Diode No. 2	{6R7	6.3	JR0-3072	18	...	B	P3	1200	Triode Sect. Cap=G
6H4	6.3	JR0-4070	0	62	A	P2	Diode	Diode	{6R7	6.3	JR0-5073	0	0	A	P2	Diode	Diode No. 1
{6H5	6.3	JR5-4030	0	100	A	P3	Eye	Eye Open	{6R7	6.3	JR0-4073	0	0	A	P2	Diode	Diode No. 2
{6H5	6.3	JR5-4230	0	100	A	P3	Eye	Eye Closed	{6R8	6.3	EV8-9072	13	...	B	P3	1200	Triode Sect.
{6H5	6.3	JR0-5070	0	62	A	P2	Diode	Diode No. 1	{6R8	6.3	EV0-1078	0	67	A	P2	Diode	Diode No. 1
{6H6	6.3	JR0-3040	0	62	A	P2	Diode	Diode No. 2	{6R8	6.3	EV0-6078	0	67	A	P2	Diode	Diode No. 2
{6H7M	6.3	JR5-3476	29	...	B	P3	1260	Pent. Sect.	{6R8	6.3	EV0-2039	0	67	A	P2	Diode	Diode No. 3
{6H7M	6.3	JR0-6073	0	...	B	P3	100	Triode Sect. Cap=G	6S4	6.3	EV6-9020	17	...	C	P3	2600	
6J4	6.3	JR3-7020	15	...	D	P3	5700		6S7	6.3	JR0-3475	27	...	B	P3	1100	Cap=G
6J5	6.3	JR5-3070	22	...	D	P3	1640	Triode No. 1	{6S8	6.3	JX0-6010	10	...	B	P3	570	Triode Sect. Cap=G
{6J6	6.3	JR5-2070	15	...	D	P3	2800	Triode No. 2	{6S8	6.3	JX0-4010	0	0	A	P2	Diode	Diode No. 1
{6J6	6.3	JR6-3070	15	...	D	P3	2800	Triode No. 2	{6S8	6.3	JX0-2010	0	0	A	P2	Diode	Diode No. 2
6J7	6.3	JR0-3475	22	...	B	P3	770	Cap=G	6S8	6.3	JX0-3050	0	0	A	P2	Diode	Diode No. 3
{6J8	6.3	JR5-3476	18	...	B	P3	630	Heptode Sect Cap=G	{6SA7	6.3	JR7-3465	21	...	B	P3	470	Ampl. Sect.
{6J8	6.3	JR5-6473	30	...	B	P3	315	Triode Sect.	{6SA7	6.3	JR5-3467	21	...	B	P3	470	Osc. Sect.
6K4★	6.3	DU2-1050	31	...	D	P3	2000	C Basing	{6SB7	6.3	JR7-3465	16	...	B	P3	470	Ampl. Sect.
6K5	6.3	JR0-3070	21	...	B	P3	630	Cap=G	{6SB7	6.3	JR5-3467	40	...	B	P3	190	Osc. Sect.

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations		
{6SC7	6.3 JX4-5061		10		D	P3	840	Triode No. 1	{6U8	6.3 EV2-6370	15		B	P3	1420	Pent. Sect.			
{6SC7	6.3 JX3-1065		10		D	P3	840	Triode No. 2	{6U8	6.3 EV9-1080	16		C	P3	2840	Triode Sect.			
6SD7	6.3 JR4-7653		10		D	P3	1900		6V3	6.3 EV0-0020	0	51	A	*	Rect.	Cap = P			
6SF5	6.3 JX3-5012		10		D	P3	940		* Hold Down P8 And Press P7									Rect.	Plate No. 1
{6SF7	6.3 JX1-6432		0		B	P2	1260	Pent. Sect.										Rect.	Plate No. 2
{6SF7	6.3 JX0-5436		0	0	A	P2	Diode	Diode Sect.	{6V4	6.3 EV0-1037	0	0	A	P7	Rect.				
6SG7	6.3 JR4-7652		0		C	P3	2100		6V5	6.3 JX5-3400	31		C	P3	2600				
6SH7	6.3 JR4-7652		0		C	P3	2150		6V6	6.3 JR5-3472	21		C	P3	2320				
6SJ7	6.3 JR4-7653		20		D	P3	1040		{6V7	6.3 JR0-3070	39		B	P3	610	Triode Sect. Cap=G			
6SK7	6.3 JR4-7653		10		D	P3	1260		{6V7	6.3 JR0-5070	0	0	A	P2	Diode	Diode No. 1			
{6SL7	6.3 JX4-5061		7		D	P3	1000	Triode No. 1	{6V7	6.3 JR0-4070	0	0	A	P2	Diode	Diode No. 2			
{6SL7	6.3 JX2-1035		7		D	P3	1000	Triode No. 2	{6V8	6.3 EV6-1038	11		B	P3	760	Triode Sect.			
6SN7	6.3 JX2-1035		22		D	P3	1650	Triode No. 1	{6V8	6.3 EV0-9032	0	13	A	P2	Diode	Diode No. 1			
6SN7	6.3 JX2-1035		22		D	P3	1650	Triode No. 2	{6V8	6.3 EV0-7086	0	71	A	P2	Diode	Diode No. 2			
6SQ7	6.3 JX1-6032		11		D	P3	700	Triode Sect.	{6V8	6.3 EV0-2038	0	71	A	P2	Diode	Diode No. 3			
6SQ7	6.3 JX0-5036		0	0	A	P2	Diode	Diode No. 1	6W4	6.3 JX0-5030	0	56	A	P7	Rect.				
6SQ7	6.3 JX0-4036		0	0	A	P2	Diode	Diode No. 2	{6W5	6.3 JR0-5070	0	23	A	P7	Rect.	Plate No. 1			
6SR7	6.3 JX1-6032		18		B	P3	1200	Triode Sect.	{6W5	6.3 JR0-3070	0	23	A	P7	Rect.	Plate No. 2			
6SR7	6.3 JX0-5036		0	0	A	P2	Diode	Diode No. 1	6W6	6.3 JR5-3470	56		C	P3	1900				
6SR7	6.3 JX0-4036		0	0	A	P2	Diode	Diode No. 2	6W7	6.3 JR0-3475	22		B	P3	770	Cap=G			
6SS7	6.3 JR4-7653		19		B	P3	1160		{6X4	6.3 JR0-6070	0	14	A	P7	Rect.	Plate No. 1			
6ST7	6.3 JX1-6032		15		B	P3	1200	Triode Sect.	{6X4	6.3 JR0-3070	0	14	A	P7	Rect.	Plate No. 2			
6ST7	6.3 JX0-5036		0	0	A	P2	Diode	Diode No. 1	{6X5	6.3 JR0-5072	0	23	A	P7	Rect.	Plate No. 1			
6ST7	OK Above 500 On 3000 Scale		0	0	A	P2	Diode	Diode No. 2	{6X5	6.3 JR0-3072	0	23	A	P7	Rect.	Plate No. 2			
6ST7	6.3 JX0-4036		0	0	A	P2	Diode	Diode No. 2	{6X8	6.3 EV7-9861	9		D	P3	2900	Pent. Sect.			
6SU7	OK Above 500 On 3000 Scale		0	0	A	P2	Diode	Diode No. 1	{6X8	6.3 EV2-3861	15		D	P3	2840	Triode Sect.			
6SU7	6.3 JX4-5061		7		D	P3	1000	Triode No. 1	{6Y5	6.3 JR0-5040	0	56	A	P7	Rect.	Plate No. 1			
6SU7	6.3 JX2-1035		7		D	P3	1000	Triode No. 2	{6Y5	6.3 JR0-3040	0	56	A	P7	Rect.	Plate No. 2			
6SV7	6.3 JX1-6430		12		B	P3	1320	Pent. Sect.	6Y6	6.3 JR5-3470	33		D	P3	3800				
6SV7	6.3 JX1-5430		0	62	A	P2	Diode	Diode Sect.	{6Y7	6.3 JR5-6073	15		B	P3	630	Triode No. 1			
6SZ7	6.3 JX1-6032		10		B	P3	760	Triode Sect.	{6Y7	6.3 JR4-3076	15		B	P3	630	Triode No. 2			
6SZ7	6.3 JX0-5032		0	0	A	P2	Diode	Diode No. 1	{6Z4	6.3 JR0-3040	0	35	A	P7	Rect.	Plate No. 1			
6SZ7	OK Above 500 On 3000 Scale		0	0	A	P2	Diode	Diode No. 2	{6Z4	6.3 JR0-2040	0	35	A	P7	Rect.	Plate No. 2			
6SZ7	6.3 JX0-4032		0	0	A	P2	Diode	Diode No. 2	{6Z5	12.6 JS0-5040	0	20	A	P7	Rect.	Plate No. 1			
6T5	OK Above 500 On 3000 Scale		0	0	A	P2	Diode	Diode No. 2	{6Z5	12.6 JS0-3040	0	20	A	P7	Rect.	Plate No. 2			
6T5	6.3 JR5-4030		0	100	A	P3	Eye	Eye Open	{6Z7	6.3 JR4-3070	0	9	A	P7	Rect.	Plate No. 1			
6T5	6.3 JR5-4230		0	100	A	P3	Eye	Eye Closed	{6Z7	6.3 JR0-5070	0	9	A	P7	Rect.	Plate No. 2			
6T7	6.3 JR0-3070		17		B	P3	630	Triode Sect. Cap=G	{6Z7	6.3 JR5-6070	0	9	A	P7	Rect.	Plate No. 1			
6T7	6.3 JR0-5070		0	0	A	P2	Diode	Diode No. 1	{6ZY5	6.3 JR0-3070	0	0	A	P7	Rect.	Plate No. 2			
6T7	6.3 JR0-4070		0	0	A	P2	Diode	Diode No. 2	7A4	6.3 JR6-2070	22		D	P3	1640				
6T8	6.3 EV8-9076		11		B	P3	760	Triode Sect.	7A5	6.3 JR6-2370	25		D	P3	3800				
6T8	6.3 EV0-6071		0	67	A	P2	Diode	Diode No. 1	{7A6	6.3 JR0-6075	0	62	A	P2	Diode	Diode No. 1			
6T8	6.3 EV0-2037		0	67	A	P2	Diode	Diode No. 2	{7A6	6.3 JR0-3025	0	62	A	P2	Diode	Diode No. 2			
6T8	6.3 EV0-1078		0	67	A	P2	Diode	Diode No. 3	7A7	6.3 JR6-2374	27		B	P3	1100				
6U4	6.3 JX0-5030		0	56	A	P7	Rect.		{7A8	6.3 JR6-2574	24		B	P3	630	Ampl. Sect.			
6U5	6.3 JR5-4030		0	100	A	P3	Eye	Eye Open	{7A8	6.3 JR4-3576	26		B	P3	315	Osc. Sect.			
6U5	6.3 JR5-4230		0	100	A	P3	Eye	Eye Closed	7AB7	6.3 HS5-3140	10		B	P3	1140				
6U6	6.3 JR5-3470		30		D	P3	3900												
6U7	6.3 JR0-3475		21		B	P3	1000	Cap=G											

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
7AD7	6.3	JR6-2374	0	...	D	P3	3900	Triode No. 1	{7S7	6.3	JR6-2574	18	...	B	P3	950	Heptode Sect.
{7AF7	6.3	JR5-6070	21	...	C	P3	1640	Triode No. 2	{7S7	6.3	JR4-3576	0	...	B	P3	950	Triode Sect.
{7AF7	6.3	JR4-3020	21	...	C	P3	1640		7T7	6.3	JR6-2374	9	...	C	P3	1900	
7AG7	6.3	JR6-2374	0	...	C	P3	1900		7V7	6.3	JR6-2374	6	...	C	P3	2500	
7AH7	6.3	JR6-2374	0	...	C	P3	2100		7W7	6.3	JR6-2375	10	...	D	P3	2200	
7AJ7	6.3	JR6-2374	0	...	D	P3	1430		{7X6	6.3	JR0-6075	0	51	A	P7	Rect.	Plate No. 1
7AK7	6.3	JR6-2374	0	...	C	P3	2500		{7X6	6.3	JR0-3025	0	51	A	P7	Rect.	Plate No. 2
7B4	6.3	JR6-2070	10	...	D	P3	940		7X7	6.3	JR3-2040	10	...	A	P7	630	Triode Sect.
7B5	6.3	JR6-2370	34	...	B	P3	1000		7X7	6.3	JR0-5040	0	67	A	P2	Diode	Diode No. 1
{7B6	6.3	JR3-2070	11	...	D	P3	700	Triode Sect.	7X7	6.3	JR0-6070	0	67	A	P2	Diode	Diode No. 2
{7B6	6.3	JR0-6072	0	0	A	P2	Diode	Diode No. 1	{7Y4	6.3	JR0-6070	0	28	A	P7	Rect.	Plate No. 1
{7B6	6.3	JR0-5072	0	0	A	P2	Diode	Diode No. 2	{7Y4	6.3	JR0-3070	0	28	A	P7	Rect.	Plate No. 2
7B7	6.3	JR6-2374	27	...	B	P3	1070		{7Z4	6.3	JR0-6070	0	0	A	P7	Rect.	Plate No. 1
{7B8	6.3	JR6-2574	18	...	B	P3	950	Pent. Sect.	{7Z4	6.3	JR0-3070	0	0	A	P7	Rect.	Plate No. 2
{7B8	6.3	JR4-3576	18	...	B	P3	410	Osc. Sect.	10	7.5	JR3-2000	39	...	B	P3	790	
7C4	6.3	JR0-4070	0	51	A	P2	Diode		10Y	7.5	JR3-2000	12	...	B	P3	950	
7C5	6.3	JR6-2370	30	...	C	P3	1900		12A	5.0	JR3-2000	44	...	B	P3	1040	
{7C6	6.3	JR3-2070	10	...	B	P3	380	Triode Sect.	12A4	12.6	EV2-9010	25	...	D	P3	4900	
{7C6	6.3	JR0-6072	0	0	A	P2	Diode	Diode No. 1	12A5	12.6	JR4-2350	51	...	B	P3	1130	
{7C6	6.3	JR0-5072	0	0	A	P2	Diode	Diode No. 2	12A6	12.6	JR5-3472	12	...	C	P3	1900	
7C7	6.3	JR6-2374	22	...	B	P3	820		{12A7	12.6	JR0-2365	48	...	B	P3	610	Pent. Sect. Cap=G
7E5	6.3	JS1-3040	15	...	C	P3	1900		{12A7	12.6	JR0-5042	0	35	A	P7	Rect.	Rect. Sect.
{7E6	6.3	JR3-2070	12	...	B	P3	1380	Triode Sect.	{12A8	12.6	JR0-3475	22	...	B	P3	630	Pent. Sect. Cap=G
{7E6	6.3	JR0-6072	0	0	A	P2	Diode	Diode No. 1	{12A8	12.6	JR5-6473	37	...	B	P3	190	Osc. Sect.
{7E6	6.3	JR0-5072	0	0	A	P2	Diode	Diode No. 2	{12AH7	12.6	JX5-6043	20	...	B	P3	1260	Triode No. 1
7E7	6.3	JR6-2570	22	...	B	P3	820	Pent. Sect.	{12AH7	12.6	JX2-3016	20	...	B	P3	1260	Triode No. 2
{7E7	6.3	JR0-4072	0	0	A	P2	Diode	Diode No. 1	{12AL5	12.6	JR0-2050	0	67	A	P2	Diode	Diode No. 1
{7E7	6.3	JR0-3072	0	0	A	P2	Diode	Diode No. 2	{12AL5	12.6	JR0-7030	0	67	A	P2	Diode	Diode No. 2
7F7	6.3	JR5-6073	0	...	B	P3	820		{12AT6	12.6	JR3-7020	18	...	B	P3	750	Triode Sect.
{7F7	6.3	JR4-3026	0	...	B	P3	820	Triode No. 1	{12AT6	12.6	JR3-6020	0	0	A	P2	Diode	Diode No. 1
{7F7	6.3	HS8-6050	10	...	C	P3	3150	Triode No. 2	{12AT6	12.6	JR3-5020	0	0	A	P2	Diode	Diode No. 2
{7F8	6.3	HS1-3040	10	...	C	P3	3150	Triode No. 1	{12AT7	12.6	EV7-6080	14	...	D	P3	2500	Triode No. 1
{7F8	6.3	HS1-3040	10	...	C	P3	3150	Triode No. 2	{12AT7	12.6	EV2-1030	14	...	D	P3	2500	Triode No. 2
7G7	6.3	JR6-2374	18	...	B	P3	1260		{12AU6	12.6	JR3-5672	10	...	D	P3	2050	Triode No. 1
{7G8	6.3	JR5-7362	10	...	B	P3	1320	Tetrode No. 1	{12AU7	12.6	EV7-6080	24	...	D	P3	1400	Triode No. 2
{7G8	6.3	JR4-2367	10	...	B	P3	1320	Tetrode No. 2	{12AU7	12.6	EV2-1030	24	...	B	P3	1400	Triode Sect.
7H7	6.3	JR6-2374	10	...	D	P3	2400		{12AV6	12.6	JR3-7025	12	...	B	P3	790	Diode No. 1
{7J7	6.3	JR6-2574	18	...	B	P3	500	Heptode Sect.	{12AV6	12.6	JR3-6025	0	0	A	P2	Diode	Diode No. 1
{7J7	6.3	JR4-3576	18	...	B	P3	630	Triode Sect.	{12AV6	12.6	JR3-5026	0	0	A	P2	Diode	Diode No. 2
{7K7	6.3	JR4-3020	10	...	D	P3	1000	Triode Sect.	{12AV7	12.6	EV7-6082	18	...	D	P3	2580	Triode No. 1
{7K7	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1	{12AV7	12.6	EV2-1037	18	...	D	P3	2580	Triode No. 2
{7K7	6.3	JR0-6070	0	0	A	P2	Diode	Diode No. 2	{12AW6	12.6	JR3-5627	10	...	D	P3	2500	
7L7	6.3	JR6-2374	12	...	B	P3	1260		12AX4	12.6	JX0-5030	0	46	A	P7	Rect.	Triode No. 1
{7N7	6.3	JR5-6073	29	...	B	P3	1260	Triode No. 1	{12AX7	12.6	EV7-6080	8	...	D	P3	950	Triode No. 2
{7N7	6.3	JR4-3026	29	...	B	P3	1260	Triode No. 2	{12AX7	12.6	EV2-1030	8	...	D	P3	950	Triode No. 1
7Q7	6.3	JR6-2374	21	...	B	P3	500	Ampl. Sect.	{12AY7	12.6	EV7-6080	15	...	D	P3	1100	Triode No. 2
{7Q7	6.3	JR4-2376	21	...	B	P3	500	Osc. Sect.	{12AY7	12.6	EV2-1030	15	...	D	P3	1100	Triode No. 1
{7R7	6.3	JR6-2570	10	...	C	P3	1900	Pent. Sect.	{12AZ7	12.6	EV7-6080	14	...	D	P3	2500	Triode No. 1
{7R7	6.3	JR0-4072	0	0	A	P2	Diode	Diode No. 1	{12AZ7	12.6	EV2-1030	14	...	D	P3	2500	Triode No. 2
{7R7	6.3	JR0-3072	0	0	A	P2	Diode	Diode No. 2									

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Mut. Cond.	Scale	Press	Mut. Cond.	Notations
12B4	12.6	EV2-9010	50	.....	D	P3	4100		4100		P3	470	
12B7	12.6	JR6-2374	22	.....	B	P3	1200		470		P3	470	Ampl. Sect. Osc. Sect.
{12B8	12.6	JR0-3420	22	.....	B	P3	1140	Pent. Sect. Cap=G					
{12B8	12.6	JR7-5050	0	.....	B	P3	1260	Triode Sect.					Triode No. 1
12BA6	12.6	JR3-5672	9	.....	C	P3	2700						Triode No. 2
{12BA7	12.6	EV7-9132	17	.....	B	P3	470	Ampl. Sect.					Pent. Sect.
{12BA7	12.6	EV2-9137	25	.....	B	P3	470	Osc. Sect.					Diode Sect.
12BD6	12.6	JR3-5672	13	.....	D	P3	1260						Diode
12BE6	12.6	JR7-5623	11	.....	B	P3	900	Ampl. Sect.					2100
12BE6	12.6	JR3-5627	0	.....	B	P3	1000	Osc. Sect.					2150
{12BF6	12.6	JR3-7020	14	.....	B	P3	1200	Triode Sect.					1050
12BF6	12.6	JR3-6020	0	0	A	P2	Diode	Diode No. 1					1260
12BF6	12.6	JR3-5020	0	0	A	P2	Diode	Diode No. 2					1000
{12BH7	12.6	EV7-6082	29	.....	C	P3	1500	Triode No. 1					1000
{12BH7	12.6	EV2-1037	29	.....	C	P3	1500	Triode No. 2					1650
12BK6	12.6	JR3-7025	6	.....	B	P3	790	Triode Sect.					1650
12BK6	12.6	JR0-6025	0	0	A	P2	Diode	Diode No. 1					700
12BK6	12.6	JR0-5027	0	0	A	P2	Diode	Diode No. 2					Diode
12BN6	12.6	JR2-7536	0	.....	B	P3	440	Limiter Grid					1200
12BN6	12.6	JR6-7532	0	.....	B	P3	570	Quadrature Grid					Diode
12BT6	12.6	JR3-7020	13	.....	B	P3	820	Triode Sect.					Diode
12BT6	12.6	JR3-6020	0	35	A	P2	Diode	Diode No. 1					Diode
12BT6	12.6	JR3-5020	0	35	A	P2	Diode	Diode No. 2					Diode
12BU6	12.6	JR3-7020	34	.....	B	P3	940	Triode Sect.					1200
12BU6	12.6	JR3-6020	0	25	A	P2	Diode	Diode No. 1					Diode
12BU6	12.6	JR3-5020	0	25	A	P2	Diode	Diode No. 2					Diode
12BY7	12.6	EV2-7813	9	.....	D	P3	5700						1200
{12BZ7	12.6	EV7-6080	8	.....	D	P3	2200	Triode No. 1					Diode
{12BZ7	12.6	EV2-1030	8	.....	D	P3	2200	Triode No. 2					Diode
12C8	12.6	JR0-3672	24	.....	B	P3	725	Pent. Sect. Cap=G					470
12C8	12.6	JR0-5073	0	0	A	P2	Diode	Diode No. 1					470
12C8	12.6	JR0-4073	0	0	A	P2	Diode	Diode No. 2					Rect.
12F5	12.6	JR0-4070	10	.....	D	P3	950	Cap=G					Rect.
{12H6	12.6	JR0-5072	0	62	A	P2	Diode	Diode No. 1					1650
{12H6	12.6	JR0-3042	0	62	A	P2	Diode	Diode No. 2					1900
12J5	12.6	JR5-3072	22	.....	D	P3	1640						1200
12J7	12.6	JR0-3475	22	.....	B	P3	770	Cap=G					1570
12K7	12.6	JR0-3475	19	.....	B	P3	920	Cap=G					1570
12K8	12.6	JR5-3476	11	.....	B	P3	630	Heptode Sect. Cap=G					700
{12K8	12.6	JR5-6473	0	.....	C	P3	1500	Triode Sect.					Diode
{12L8	12.6	JW2-7513	10	.....	B	P3	1340	Pent. No. 1					Diode
{12L8	12.6	JW3-4512	10	.....	B	P3	1340	Pent. No. 2					Diode
{12O7	12.6	JR0-3070	17	.....	B	P3	500	Triode Sect. Cap=G					Pent. Sect.
{12O7	12.6	JR0-5070	0	0	A	P2	Diode	Diode No. 1					Osc. Sect.
{12O7	12.6	JR0-4070	0	0	A	P2	Diode	Diode No. 2					2330
12S8	12.6	JX0-6010	10	.....	B	P3	570	Triode Sect. Cap=G					990
12S8	12.6	JX0-3050	0	0	A	P2	Diode	Diode No. 1					1380
12S8	12.6	JX0-4010	0	0	A	P2	Diode	Diode No. 2					Diode
12S8	12.6	JX0-2010	0	0	A	P2	Diode	Diode No. 3					Diode

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	
14E7	12.6	JR6-2570	24	...	B	P3	820	Pent. Sect.	VX21	1.1	CX0-4000	0	0	A	P2	Diode	Pins: F- = 2,	
14E7	12.6	JR0-4072	0	0	A	P2	Diode	Diode No. 1		F + = 7, P = 4.	OK	Above	250	On	3000	Scale		
14E7	12.6	JR0-3072	0	0	A	P2	Diode	Diode No. 2	21A6	20.0	EV2-0839	45	...	D	P3	3800	Cap = P	
14F7	12.6	JR5-6073	0	...	B	P3	1000	Triode No. 1	22	3.0	JR0-2300	20	...	B	*	315	Cap = G	
14F7	12.6	JR4-3026	0	...	B	P3	1000	Triode No. 2		*	Hold Down	P2	And	Press	P3			
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		24	2.5	JR0-2340	12	...	B	P3	630	Cap = G	
14J7	12.6	JR6-2574	18	...	B	P3	500	Heptode Sect.	24A	2.5	JR0-2340	12	...	B	P3	630	Cap = G	
14J7	12.6	JR4-3576	18	...	B	P3	630	Triode Sect.	VT25A	7.5	JR3-2000	30	...	B	P3	1260		
14N7	12.6	JR5-6073	20	...	D	P3	1640	Triode No. 1	25A6	25.0	JR5-3470	43	...	B	P3	1450		
14N7	12.6	JR4-3026	20	...	D	P3	1640	Triode No. 2	{25A7	25.0	JR5-3476	50	...	B	P3	1130	Pent. Sect.	
14Q7	12.6	JR6-2374	21	...	B	P3	500	Pent. Sect.	{25A7	25.0	JR0-6023	0	51	A	P7	Rect.	Rect. Sect.	
14Q7	12.6	JR4-2376	21	...	B	P3	500	Osc. Sect.	25AC5	25.0	JR5-3070	0	...	B	P3	950		
14R7	12.6	JR6-2570	10	...	B	P3	1900	Pent. Sect.	25AV5	25.0	JR2-5730	50	...	C	P3	2450		
14R7	12.6	JR0-4072	0	0	A	P2	Diode	Diode No. 1	25B5	25.0	JR4-2350	0	...	B	P3	1570		
14R7	12.6	JR0-3072	0	0	A	P2	Diode	Diode No. 2	25B6	25.0	JR5-3470	52	...	C	P3	2500		
14S7	12.6	JR6-2574	18	...	B	P3	950	Heptode Sect.	{25B8	25.0	JR0-3420	22	...	B	P3	1260	Pent. Sect. Cap = G	
14S7	12.6	JR4-3576	0	...	B	P3	950	Triode Sect.	{25B8	25.0	JR7-5060	10	...	C	P3	950	Triode Sect.	
14V7	12.6	JR6-2374	6	...	C	P3	2500		25BQ6	25.0	JR5-0470	50	...	C	P3	2800	Cap = P	
14W7	12.6	JR6-2375	10	...	D	P3	2200		25C6	25.0	JR5-3470	33	...	D	P3	3800		
14X7	12.6	JR3-2040	10	...	D	P3	630	Triode Sect.	{25D8	25.0	JR0-3420	18	...	B	P3	1200	Pent. Sect. Cap = G	
14X7	12.6	JR0-5040	0	67	A	P2	Diode	Diode No. 1	{25D8	25.0	JR5-6020	0	...	B	P3	700	Triode Sect.	
14X7	12.6	JR0-6070	0	67	A	P2	Diode	Diode No. 2	{25D8	25.0	JR5-7020	0	25	A	P2	Diode	Diode Sect	
14Y4	12.6	JR0-6070	0	0	A	P7	Rect.	Plate No. 1	25L6	25.0	JR5-3472	10	...	D	*	5650		
14Y4	12.6	JR0-3070	0	0	A	P7	Rect.	Plate No. 2		*	Hold Down	P2	And	Press	P3			
14Z3	12.6	JR0-2030	0	46	B	*	390	Cap = G	25N6	25.0	JR5-3470	0	...	B	P3	1570		
15	2.0	JR0-2340	10	...	B	*	390	Cap = G	25T	6.3	JR3-0000	0	...	B	P3	630		
		*	Hold Down	P2	And	Press	P3		25W4	25.0	JX0-5030	0	56	A	P7	Rect.	Cap = P	
15A6	12.6	EV2-7136	7	...	D	P3	6300		{25Y5	25.0	JR0-5040	0	0	A	P7	Rect.	Plate No. 1	
{19	2.0	JR4-5000	15	...	B	P3	630	Triode No. 1	{25Y5	25.0	JR0-2030	0	0	A	P7	Rect.	Plate No. 2	
{19	2.0	JR3-2000	15	...	B	P3	630	Triode No. 2	25Z3	25.0	JR0-2030	0	46	A	P7	Rect.		
19BG6	20.0	JR5-0730	18	...	D	P3	3800	Cap = P	25Z4	25.0	JR0-5070	0	56	A	P7	Rect.		
19C8	20.0	EV8-9070	12	...	D	P3	790	Triode Sect.	{25Z5	25.0	JR0-5040	0	51	A	P7	Rect.	Plate No. 1	
19C8	20.0	EV8-6070	0	67	A	P2	Diode	Diode No. 1	{25Z5	25.0	JR0-2030	0	51	A	P7	Rect.	Plate No. 2	
19C8	20.0	EV8-2030	0	67	A	P2	Diode	Diode No. 2	{25Z5MG	25.0	JR0-5070	0	51	A	P7	Rect.	Plate No. 1	
19C8	20.0	EV8-1070	0	67	A	P2	Diode	Diode No. 3	{25Z5MG	25.0	JR0-3040	0	51	A	P7	Rect.	Plate No. 2	
19J6	20.0	JR5-2076	17	...	D	P3	3350	Triode No. 1	{25Z6	25.0	JR0-5072	0	51	A	P7	Rect.	Plate No. 1	
19J6	20.0	JR6-3075	17	...	D	P3	3350	Triode No. 2	{25Z6	25.0	JR0-3042	0	51	A	P7	Rect.	Plate No. 2	
19T8	20.0	EV8-9076	11	...	B	P3	760	Triode Sect.	26	1.5	JR3-2000	43	...	B	P3	725		
19T8	20.0	EV0-6071	0	67	A	P2	Diode	Diode No. 1	26A6	25.0	JR3-5672	9	...	C	P3	2500		
19T8	20.0	EV0-2037	0	67	A	P2	Diode	Diode No. 2	{26A7	25.0	JW2-7513	11	...	D	*	3450	Pent. No. 1.	
19T8	20.0	EV0-1078	0	67	A	P2	Diode	Diode No. 3		*	Hold Down	P2	And	Press	P3			
19V8	20.0	EV6-1038	11	...	B	P3	760	Triode Sect.	26A7	25.0	JW3-4512	11	...	D	*	3450	Pent. No. 2	
19V8	20.0	EV0-9032	0	13	A	P2	Diode	Diode No. 1		*	Hold Down	P2	And	Press	P3			
19V8	20.0	EV0-7086	0	71	A	P2	Diode	Diode No. 2	{26BK6	25.0	JR3-7025	6	...	B	P3	790	Triode Sect.	
19V8	20.0	EV0-2038	0	71	A	P2	Diode	Diode No. 3	{26BK6	25.0	JR0-6025	0	0	A	P2	Diode	Diode No. 1	
20	3.0	JR3-2000	77	...	B	P3	330	Cap = P	{26BK6	25.0	JR0-5027	0	0	A	P2	Diode	Diode No. 2	
RK20A	7.5	JR3-0240	0	...	C	P3	1600	Cap = P										

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
{26C6	25.0	JR3-7020	18	...	B	P3	1200	Triode Sect.	{40Z5	BLST	JR0-5370	...	...	...	...	...	Short on 1-2-3-4-5
{26C6	25.0	JR3-6020	0	0	A	P2	Diode	Diode No. 1	{40Z5	50.0	JR0-5070	0	56	A	P7	Rect.	
{26C6	25.0	JR3-5020	0	0	A	P2	Diode	Diode No. 2	41	6.3	JR4-2350	34	...	B	P3	1000	
{26D6	25.0	JR7-5623	11	...	B	P3	900	Ampl. Sect.	42	6.3	JR4-2350	29	...	B	P3	1260	
{26D6	25.0	JR3-5627	0	...	B	P3	1000	Osc. Sect.	43	25.0	JR4-2350	43	...	B	P3	1450	
27	2.5	JR3-2040	41	...	B	P3	630		45	2.5	JR3-2000	61	...	B	P3	1170	
{28D7	25.0	JR3-2040	41	...	B	P3	630		{45Z3	50.0	HTO-2080	0	51	A	P7	Rect.	
{28D7	25.0	JR7-5362	20	...	D	...	2140	Pent. No. 1	{45Z5	BLST	JR0-5370	...	...	...	...	...	Short on 1-2-3-4-5
{28D7	25.0	JR2-4367	20	...	D	...	2140	Pent. No. 2	{45Z5	50.0	JR0-5070	0	56	A	P7	Rect.	
30	2.0	JR3-2000	40	...	B	P3	570		46	2.5	JR3-2400	30	...	B	P3	1260	
31	2.0	JR3-2000	65	...	B	P3	580		47	2.5	JR3-2400	22	...	B	P3	1260	
32	2.0	JR0-2300	19	...	B	...	400	Cap = G	48	25.0	JR4-2350	58	...	B	P3	1260	
{32L7	35.0	JR5-3470	34	...	C	P3	3000	Ampl. Sect.	49	2.0	JR3-2400	49	...	B	P3	710	
{32L7	35.0	JR0-6023	0	51	A	P7	Rect.	Rect. Sect.	50	7.5	JR3-2000	61	...	B	P3	950	
33	2.0	JR3-2400	35	...	B	P3	900		50A5	50.0	JR6-2370	10	...	D	...	5650	
{RK33	6.3	JR4-5060	38	...	B	P3	860	Triode No. 1	50B5	50.0	JR3-5620	10	...	D	...	5650	
{RK33	6.3	JR0-3020	38	...	B	P3	860	Triode No. 2	50C5	50.0	JR2-7630	10	...	D	...	5650	
34	2.0	JR0-2300	17	...	B	...	380	Cap = G	50C6	50.0	JR5-3472	33	...	D	P3	3800	
{RK34	6.3	JR3-0040	18	...	B	P3	1670	Triode No. 1	50L6	50.0	JR5-3472	10	...	D	...	5650	
{RK34	6.3	JR5-0040	18	...	B	P3	1670	Triode No. 2	{50X6	50.0	JR0-6075	0	51	A	P7	Rect.	
35	2.5	JR0-2340	24	...	B	P3	650	Cap = G	{50X6	50.0	JR0-3025	0	51	A	P7	Rect.	
35A5	35.0	JR6-2370	33	...	D	P3	3700		{50Y6	50.0	JR0-5070	0	51	A	P7	Rect.	
35B5	35.0	JR3-5620	32	...	D	P3	2830		{50Y6	50.0	JR0-3040	0	51	A	P7	Rect.	
35C5	35.0	JR2-7630	32	...	D	P3	2830		{50Y6	50.0	JR0-3040	0	51	A	P7	Rect.	
35L6	35.0	JR5-3470	33	...	D	P3	3700		{50Y7	BLST	JR0-0600	...	...	...	...	...	Short on 1-2-3-4-5
{35W4	BLST	JR0-3670	...	...	...	...	...	Short on 1-2-3-4-5	{50Y7	50.0	JR0-5070	0	51	A	P7	Rect.	
{35W4	35.0	JR0-5070	0	56	A	P7	Rect.	Rect. Sect.	{50Y7	50.0	JR0-3040	0	51	A	P7	Rect.	
{35Y4	BLST	JR0-2470	...	...	...	...	...	Short on 1-2-3-4-5	HD51	BLST	KR0-3020	0	42	A	P4	Reg. Read As Rectifier	
{35Y4	35.0	JR0-2070	0	56	A	P7	Rect.	Rect. Sect.	51/51S	2.5	JR0-2340	24	...	B	P3	640	Cap = G
35Z3	35.0	JR0-2070	0	56	A	P7	Rect.		52	6.3	JR3-2400	33	...	C	P3	1500	
35Z4	35.0	JR0-5070	0	56	A	P7	Rect.		{53	2.5	JR5-6042	12	...	B	P3	950	Triode No. 1
{35Z5	BLST	JR0-5370	...	...	...	...	...	Short on 1-2-3-4-5	{53	2.5	JR3-2046	12	...	B	P3	950	Triode No. 2
{35Z5	35.0	JR0-5070	0	56	A	P7	Rect.	Rect. Sect.	{55	2.5	JR0-2050	39	...	B	P3	610	Triode Sect. Cap = G
{35Z6	35.0	JR0-5070	0	56	A	P7	Rect.	Plate No. 1	{55	2.5	JR0-4050	0	0	A	P2	Diode	
{35Z6	35.0	JR0-3040	0	56	A	P7	Rect.	Plate No. 2	{55	2.5	JR0-3050	0	0	A	P2	Diode	
36	6.3	JR0-2340	24	...	B	P3	660	Cap = G	56	2.5	JR3-2040	29	...	B	P3	920	
37	6.3	JR3-2040	41	...	B	P3	570		57	2.5	JR0-2354	21	...	B	P3	770	Cap = G
38	6.3	JR0-2340	39	...	B	P3	660		57A	6.3	JR0-2354	21	...	B	P3	770	Cap = G
39/44	6.3	JR0-2340	28	...	B	P3	630	Cap = G	58	2.5	JR0-2354	24	...	B	P3	900	Cap = G
T40	7.5	JR3-0000	0	...	B	P3	760	Cap = G	58A/58AS	6.3	JR0-2354	24	...	B	P3	900	Cap = G
40	5.0	JR3-2000	32	...	B	P3	125	Cap = P	59	2.5	JR4-2365	22	...	B	P3	1260	Cap = P
									HY65	6.3	JR5-0407	0	...	C	P3	1900	Cap = P

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
VT67	2.0	JR3-2000	40	...	B	P3	570	Cap=P	HY114	1.5	JR0-0000	19	...	B	P3	700	Right Cap=P
HY69	6.3	JR3-0240	0	...	C	P3	1900	Cap=P	{117L7	117.0	JR4-3570	37	...	C	P3	2500	Pent. Sect.
{70A7	75.0	JR5-3470	-50	...	C	P3	1900	Pent. Sect.	{117L7	117.0	JR0-6020	0	56	A	P7	Rect.	Rect. Sect.
{70U7	75.0	JR0-2000	0	56	A	#	Rect.	Rect. Sect.	{117M7	117.0	JR4-3570	37	...	C	P3	2500	Pent. Sect.
{70L7	75.0	JR5-3460	41	...	C	P3	3150	Pent. Sect.	{117M7	117.0	JR0-6020	0	56	A	P7	Rect.	Rect. Sect.
{70L7	75.0	JR0-7023	0	56	A	P7	Rect.	Rect. Sect.	{117N7	117.0	JR4-3560	37	...	D	P3	3150	Pent. Sect.
71A	5.0	JR3-2000	73	...	B	P3	1040	Rect. Sect.	{117N7	117.0	JR0-7000	0	56	A	#	Rect.	Rect. Sect.
72	2.5	JR0-0000	0	86	A	P4	Rect.	Cap=P	{117P7	117.0	JR4-3560	37	...	C	P3	2500	Pent. Sect.
{75	6.3	JR0-2050	11	...	B	P3	470	Triode Sect. Cap=G	{117P7	117.0	JR0-7000	0	67	A	#	Rect.	Rect. Sect.
{75	6.3	JR0-4052	0	0	A	P2	Diode	Diode No. 1	{117Z3	117.0	JR0-5060	0	56	A	P7	Rect.	Rect.
{75	6.3	JR0-3052	0	0	A	P2	Diode	Diode No. 2	{117Z4	117.0	JR0-5070	0	56	A	P7	Rect.	Rect.
{75MG	6.3	JR0-4070	11	...	B	P3	470	Triode Sect. Cap=G	{117Z6	117.0	JR0-5070	0	56	A	P7	Rect.	Plate No. 1
{75MG	6.3	JR0-5070	0	0	A	P2	Diode	Diode No. 1	{117Z6	117.0	JR0-5070	0	56	A	P7	Rect.	Plate No. 2
{75MG	6.3	JR0-6070	0	0	A	P2	Diode	Diode No. 2	{117Z6	117.0	JR0-3040	0	56	A	P7	Rect.	Rect.
76	6.3	JR3-2040	29	...	B	P3	900	Cap=G	C182	5.0	JR3-2000	83	...	B	P3	630	Cap=G
77	6.3	JR0-2354	21	...	D	P3	770	Cap=G	C182A	5.0	JR3-2000	79	...	B	P3	950	Cap=G
78	6.3	JR0-2354	24	...	B	P3	630	Triode No. 1 Cap=G	182B	5.0	JR3-2000	58	...	B	P3	950	Cap=G
{79	6.3	JR0-5040	15	...	B	P3	630	Triode No. 2	183	5.0	JR3-2000	79	...	B	P3	950	Cap=G
{79	6.3	JR3-2040	15	...	B	P3	630	Triode No. 1	205F	5.0	JR3-2000	34	...	B	P3	920	Cap=G
{80	5.0	JR0-3000	0	0	A	P7	Rect.	Plate No. 1	231D	3.0	JR3-2000	49	...	B	P3	340	Cap=G
{80	5.0	JR0-2000	0	0	A	P7	Rect.	Plate No. 2	244A	2.0	JR3-2040	42	...	B	P3	570	Cap=G
81	7.5	JR0-2000	0	35	A	P6	Rect.	Plate No. 1	245A	2.0	JR0-2340	55	...	B	P3	460	Cap=G
82	2.5	JR0-3000	0	46	A	P7	Rect.	Plate No. 2	247A	2.0	JR3-2040	33	...	B	P3	580	Cap=G
82	2.5	JR0-2000	0	46	A	P7	Rect.	Plate No. 1	{TS251	50.0	JR5-3476	50	...	B	P3	1130	Pent. Sect.
83	5.0	JR0-3000	0	64	A	P7	Rect.	Plate No. 1	{TS251	50.0	JR0-6023	0	51	A	P7	Rect.	Rect. Sect.
83	5.0	JR0-2000	0	51	A	P7	Rect.	Plate No. 2	257A	3.0	JR0-2000	49	...	B	P3	340	Cap=G
83V	5.0	JR0-3000	0	59	A	P7	Rect.	Plate No. 1	259A	2.0	JR0-2340	33	...	B	P3	700	Cap=G
83V	5.0	JR0-2000	0	59	A	P7	Rect.	Plate No. 2	262B	10.0	JR0-2030	31	...	B	P3	630	Cap=G
84	6.3	JR0-3040	0	35	A	P7	Rect.	Plate No. 1	264B	1.5	JR3-2000	49	...	B	P3	365	Cap=G
84	6.3	JR0-2040	0	35	A	P7	Rect.	Plate No. 2	264C	1.5	JR3-2000	54	...	B	P3	365	Cap=G
85	6.3	JR0-2050	39	...	B	P3	620	Triode Sect. Cap=G	271A	5.0	JR3-2040	32	...	C	P3	1830	Cap=G
85	6.3	JR0-4052	0	0	A	P2	Diode	Diode No. 1	272A	10.0	JR3-2040	51	...	B	P3	600	Plate No. 1
85	6.3	JR0-3052	0	0	A	P2	Diode	Diode No. 2	{274A	5.0	JR0-2000	0	0	A	P7	Rect.	Plate No. 2
{85AS	6.3	JR0-2050	28	...	B	P3	700	Triode Sect. Cap=G	{274A	5.0	JR0-3000	0	0	A	P7	Rect.	Plate No. 1
{85AS	6.3	JR0-4052	0	0	A	P2	Diode	Diode No. 1	{274B	5.0	HR0-6000	0	14	A	P7	Rect.	Plate No. 1
{85AS	6.3	JR0-3052	0	0	A	P2	Diode	Diode No. 2	{274B	5.0	HR0-4000	0	14	A	P7	Rect.	Plate No. 2
89/89Y	6.3	JR0-2354	37	...	B	P3	980	Cap=G	{275A	5.0	JR3-2000	68	...	C	P3	1700	Cap=G
99	3.0	JR3-2000	55	...	B	P3	270	Cap=G	283A	2.0	JR0-2340	28	...	B	P3	630	Cap=G
101D	4.3	JR3-2000	55	...	B	P3	700	Cap=G	285A	2.0	JR0-2304	40	...	B	P3	570	Cap=G
101F	4.3	JR3-2000	53	...	B	P3	700	Cap=G	290A	10.0	JR0-2354	31	...	B	P3	640	Cap=G
102D	2.0	JR3-2000	25	...	B	P3	315	Cap=G	{291A	10.0	JR0-2365	21	...	B	#	440	Ampl. Sect.
102F	2.0	JR3-2000	25	...	B	P3	365	Cap=G	{291A	10.0	JR0-2365	21	...	B	#	440	Ampl. Sect.
104D	4.3	JR3-2000	75	...	B	P3	700	Cap=G	{291A	10.0	JR5-4362	47	...	B	P3	315	Osc. Sect.
CK108	6.3	JR0-2354	21	...	D	P3	770	Cap=G	{292A	10.0	JR0-2050	36	...	B	P3	410	Triode Sect.
112A	5.0	JR3-2000	44	...	B	P3	1040	Cap=G	{292A	10.0	JR0-4052	0	0	A	P2	Diode	Diode No. 1
{CK113	50.0	JR5-3476	48	...	B	P3	1130	Pent. Sect.	{292A	10.0	JR0-3052	0	0	A	P2	Diode	Diode No. 2
{CK113	50.0	JR0-6020	0	46	A	P7	Rect.	Rect. Sect.									

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
293A	10.0	JR4-2350	43		B	P3	660	Cap = G	{420	2.5	JR0-3000	0	56	A	P7	Rect.	Plate No. 1
294A	10.0	JR0-2340	43		B	P3	660		420	2.5	JR0-2000	0	56	A	P7	Rect.	Plate No. 2
300B	5.0	JR3-2000	60		C	P3	2900		{420A	12.6	EV6-8073	0		B	P3	630	Triode No. 1
303A	2.0	JR0-2050	36		B	P3	400	{ Triode Sect. Cap = G	{420A	12.6	EV3-1026	0		B	P3	630	Triode No. 2
	2.0	JR0-4052	0	0	A	P2	Diode		{421A	6.3	JX4-5061	63		D	P3	5000	Triode No. 1
303A	2.0	JR0-3052	0	0	A	P2	Diode	{421A	6.3	JX2-1035	63		D	P3	5000	Triode No. 2	
307A	5.0	JR3-0204	32		B	P3	1600	Cap = P	{422A	5.0	HR0-6000	0	54	A	P7	Rect.	Plate No. 1
309A	10.0	JR0-2340	31		B	P3	570	Cap = G	{422A	5.0	HR0-4000	0	54	A	P7	Rect.	Plate No. 2
310A	10.0	JR0-2354	19		D	P3	1130	Cap = G	446A	6.3	JR0-0070	0		C	P3	1510	Cap = P Ring = G
310B	10.0	JR0-2354	26		B	P3	750	Cap = G	482A	5.0	JR3-2000	79		B	P3	950	
311A	10.0	JR0-2340	38		B	P3	1500	Cap = G	482B	5.0	JR3-2000	57		B	P3	950	
313CA		AP8-2010	0	72	A	P4	Rect.		483	5.0	JR3-2000	79		B	P3	850	
328A	7.5	JR0-2354	19		D	P3	1130	Cap = G	484	3.0	JR3-2040	37		B	P3	820	
329A	7.5	JR0-2340	38		C	P3	1550	Cap = G	484A	3.0	JR3-2040	37		B	P3	820	
336A	10.0	JR4-2350	10		D	P3	1950	Cap = G	485	3.0	JR3-2040	37		B	P3	820	
337A	10.0	JR0-2354	21		D	P3	1070	Cap = G	486	3.0	JR3-2040	43		B	P3	280	
339A	5.0	JR3-0240	0		C	P3	2000	Cap = P	GL502	6.3	JR5-3670	* 51		A	P7	* Thyr.	
347A	6.3	JR0-4070	30		B	P3	570	Cap = G	* Should Strike Between 70 and 60. Read As Rectifier.								
348A	6.3	JR0-3475	19		D	P3	1130	Cap = G									
349A	6.3	JR5-3470	10		D	P3	2500	Cap = G	CK502AX	1.1	DV4-1200	18		B	#	380	
350A	6.3	JR3-0240	21		D	P3	4000	Cap = P	CK503AX	1.1	DV4-1200	30		B	#	150	
350B	6.3	JR5-3470	25		D	P3	3900		CK505AX	0.6	DV4-1200	0		B	#	100	
351A	6.3	JR0-5072	0	46	A	P7	Rect.	Plate No. 1	CK506AX	1.1	DV4-1200	33		B	#	315	
	6.3	JR0-3072	0	46	A	P7	Rect.	Plate No. 2									
352A	10.0	JR0-2050	36		B	P3	410	Triode Sect. Cap = G	{ CK510AX	0.6	EX1-2300	0	0	A	P4	†	
352A	10.0	JR0-4050	0	25	A	P2	Diode	† Section No. 1 OK Above 100 On 3000 Scale									
367A	6.3	JV6-1470	24		D	P3	3800		{ CK510AX	0.6	EX6-5300	0	0	A	P4	†	
373A	2.0	JR4-7603	17		D	P3	850		CK512AX	0.6	DV4-1200	30	0	A	P4	†	
374A	3.0	JR4-7602	40		D	P3	1700		CK518AX	1.1	DV4-1200	43	0	A	P4	*	#OK over Diodes OK
375A	20.0	JR5-3470	53		C	P3	2330			CK522AX	1.1	DV4-1200	38	0	A	P4	*	#OK over Diodes OK
381A	6.3	HR0-5020	0	67	A	P2	Diode		CK523AX	1.1	DV4-1200	46	0	A	P4	*	#OK over Diodes OK
383A	6.3	HR4-6020	25		D	P3	1480	Cap = P	CK524AX	1.1	DV4-1200	73	0	A	P4	*	#OK over Diodes OK
385A	6.3	HR5-0328	15		D	P3	2000	Cap = P	CK525AX	1.1	DV4-1200	48	0	A	P4	*	#OK over Diodes OK
387A	6.3	HR5-0328	15		D	P3	3300	Triode No. 1	CK526AX	1.1	DV4-1200	59	0	A	P4	*	#OK over Diodes OK
396A	6.3	KR3-4028	17		D	P3	3300	Triode No. 2	CK527AX	1.1	DV4-1200	32	0	A	P4	*	#OK over Diodes OK
	6.3	KR7-6082	17		D	P3	3350										
398A	6.3	JR4-7603	35		D	P3	440		CK528AX	* OK Over 500 On 3000 Scale							
399A	1.1	DX6-2100	9		B	#	440		CK529AX	1.1	DV4-1200	37	0	A	P4	*	#OK over Diodes OK
{400A	1.1	DX6-2185	35		B	P3	315	Pent. Sect.	CK543DX	1.1	DV4-1200	64	0	A	P4	*	#OK over Diodes OK
	1.1	DX8-2165	35		B	P3	315	Osc. Sect.									
401A	6.3	JR3-5670	12		B	#	1260		CK544DX	† OK Over 275 On 3000 Scale.							
403A	* Hold Down P2 And Press P3								GL546	6.3	JR3-7520	* 46		A	P7	* Thyr.	
	6.3	JR3-5620	10		D	P3	2750										
409A	6.3	JR3-5627	10		D	P3	1540		* Should Strike Between 70 and 60. Read As Rectifier.								
{412A	6.3	EV0-9073	0	49	A	P7	Rect.										
412A	6.3	EV0-1037	0	49	A	P7	Rect.										

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
{CK551AX	1.1 EW5-1200	20	...	B	#	Pent. Sect.	250		{832	6.3 JR4-5620	0	...	C	P3	2200	Plate No. 1	
	# Hold Down P2 And Press P3									See Sect. 4, Par. 4a (29)							
CK551AX	1.1 EW0-3000	0	0	A	P2	Diode	Diode Sect.		832	6.3 JR4-7620	0	...	C	P3	2200	Plate No. 2	
	OK Over 150 On 3000 Scale								{832A	See Sect. 4, Par. 4a (29)						Plate No. 1	
CK553AX	1.1 DV4-1200	0	...	B	#	250			{832A	6.3 JR4-5620	0	...	C	P3	2200	Plate No. 2	
	# Hold Down P2 And Press P3									See Sect. 4, Par. 4a (29)							
CK556AX	1.1 ES3-1000	31	...	D	P3	1000	Cap = P		834	7.5 JR0-0000	0	...	B	P3	1140	(Near Cap = G Far Cap = P	
559	6.3 JR0-0070	0	62	A	P2	Diode			836	4.3 JR0-0000	0	40	A	P7	Rect.	Cap = P	
CK568AX	1.1 ES3-1000	40	...	B	P3	280			837	12.6 JR4-0365	0	...	C	P3	2500	Cap = P	
CK569AX	1.1 DV4-1200	18	...	D	P3	630			SN838E★	6.3 EW3-0512	17	...	D	P3	1825	Cap = P	
CK571AX	1.1 DU7-1200	92	...	B	P3	100				E Basing Top Lead = P							
CK573AX	1.1 CU3-1000	34	...	B	P3	1260	†		841	7.5 JR3-2000	0	...	B	P3	630		
CK574AX	0.6 DV4-2100	0	0	A	P2				842	7.5 JR3-2000	61	...	D	P3	750		
	† OK Over 275 On 3000 Scale								843	2.5 JR3-2040	12	...	B	P3	1050		
CK605CX	6.3 DU7-1265	10	...	D	P3	2780			864	1.1 JR3-2000	45	...	B	P3	410	Cap = P	
CK606BX	6.3 CT0-1040	0	67	A	P2	Diode			865	7.5 JR3-0200	34	...	B	P3	390	Cap = P	
CK608CX	6.3 DU5-1060	21	...	D	P3	3150			866A	2.5 JR0-0000	0	51	A	P7	Rect.	Cap = P	
CK619CX	6.3 CT4-1050	8	...	D	P3	2500	* Thyr.		871	2.5 JR0-0000	0	51	A	P7	Rect.	Cap = P	
629	2.5 JR3-2040	#	92	A	P4		Read As Rectifier.		874	... AP0-3010	0	62	A	P4	Volt. Reg.	Read As Rectifier	
	# Should Strike Between 35 and 25.								879	2.5 JR0-0000	0	80	A	P4	Rect.	Cap = P	
713A	6.3 JR4-7630	0	...	C	P3	2200			884	6.3 JR5-3070	#	92	A	P4	* Thyr.		
717A	6.3 JR4-7630	0	...	C	P3	2200			885	* Should Strike Between 77 and 67.	#	92	A	P4	* Thyr.	Read As Rectifier.	
801A	7.5 JR3-2000	0	...	B	P3	950			SD917A★	6.3 DU2-1050	17	...	D	P3	950	Read As Rectifier.	
802	6.3 JR4-0365	22	...	B	P3	1260	Cap = P		SN944★	6.3 EW3-0512	15	...	D	P3	1500	C Basing	
807	6.3 JR3-0240	33	...	C	P3	2400	Cap = P			E Basing Top Lead = P							
809	6.3 JR3-0000	0	...	B	P3	1050	Cap = P		SN946★	6.3 CT0-1040	0	67	A	P2	Diode	A Basing	
811	6.3 JR3-0000	0	...	B	P3	900	Cap = P		SN947C★	6.3 CU6-1350	54	...	C	P3	1900	E Basing	
812	6.3 JR3-0000	0	...	B	P3	1400	Cap = P		SN947D★	6.3 DW1-5782	54	...	C	P3	1900	F Basing	
814	10.0 JR3-0240	0	...	C	P3	1900	Cap = P		SN948★	6.3 FT4-1020	16	...	D	P3	950	D Basing	
{815	12.6 HS8-0430	21	...	C	P3	2500	Left Cap = P		SN949C★	6.3 DW7-1250	#	56	A	P7	* Thyr.	F Basing	
{815	12.6 HS1-0430	21	...	C	P3	2500	Right Cap = P			* Should Strike Between 70 and 60.	#	60.	A	P7	Read As Rectifier.		
816	2.5 JR0-0000	0	62	A	P3	2080	E Basing		950	2.0 JR3-2400	45	...	B	P3	600	Cap = G	
SD828A★	6.3 EW3-1520	18	...	D	P3	2500	Plate No. 1		951	2.0 JR0-2300	18	...	B	#	410		
										* Hold Down P2 And Press P3							
{829	6.3 JR4-5620	0	...	D	P3	2500	Plate No. 2		SN953D★	6.3 DW1-5720	25	...	D	P3	2650	F Basing	
	See Sect. 4, Par. 4a (29)								954	6.3 JR7-0364	21	...	B	P3	700	Cap = P	
829	6.3 JR4-7620	0	...	D	P3	2500	Plate No. 1		SN954★	6.3 ES0-1030	0	20	A	P7	Rect.	B Basing	
{829A	6.3 JR4-5620	0	...	D	P3	2500	Plate No. 2		SN954B★	6.3 DW0-2050	0	20	A	P7	Rect.	F Basing	
	See Sect. 4, Par. 4a (29)								955	6.3 JR4-3060	22	...	B	P3	1200		
829A	6.3 JR4-7620	0	...	D	P3	2500	Plate No. 1		{SN955B★	6.3 DW1-7084	16	...	D	P3	2200	F Basing Triode No. 1	
	See Sect. 4, Par. 4a (29)								{SN955B★	6.3 DW2-5084	16	...	D	P3	2200	F Basing Triode No. 2	
829B	6.3 JR4-5620	0	...	D	P3	2500	Plate No. 1		956	6.3 JR7-0364	17	...	B	P3	950	Cap = P	
	See Sect. 4, Par. 4a (29)																
{829B	6.3 JR4-7620	0	...	D	P3	2500	Plate No. 2										
	See Sect. 4, Par. 4a (29)																

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
SN956B	1.1	BS0-0000	0	0	A	P7	Rect.	Top Lead = P	1284	12.6	JR6-2374	28	...	B	P3	1250	
		OK Over 100 On 3000 Scale							1285	25.0	JR5-3470	36	...	D	P3	3650	
957	1.5	JR4-3000	28	...	B	P3	400	D Basing	{1291	2.5	BY6-7000	25	...	B	P3	950	Triode No. 1
SN957A★	6.3	FT4-1020	29	...	D	P3	1380		1293	2.5	JR3-2000	25	...	B	P3	950	Triode No. 2
958	1.5	JR4-3000	41	...	B	P3	750		1294	1.5	JR6-2000	30	...	B	P3	820	
959	1.5	JR7-0300	25	...	B	#	380		1299	1.5	JR0-4070	0	0	A	P2	Diode	
		* Cap = P Hold Down P2 And Press P3							SRI553D	6.3	JR6-2300	37	...	B	P3	1300	
SN972D★	6.3	DW1-5740	21	...	B	P3	1260	F Basing	1602	7.5	JR3-2000	39	...	D	P3	4700	
SN973B★	6.3	GT1-5740	21	...	D	P3	1900	F Basing	1603	6.3	JR0-2354	21	...	B	P3	790	
SN976C★	6.3	DW1-5740	49	...	C	P3	2500	F Basing	1609	1.1	JR3-2400	0	...	B	P3	770	Cap = G
SD993C★	6.3	DW1-8050	20	...	D	P3	3660	F Basing		# Hold Down P2 And Press P3							
SD995B★	6.3	DW1-5740	21	...	B	P3	1260	F Basing	1610	2.5	JR3-2400	22	...	B	P3	1260	
{FM1000	6.3	JR2-4536	12	...	B	P3	950	No. 1 Grid	1611	6.3	JR5-3472	29	...	B	P3	1260	
{FM1000	6.3	JR6-4532	12	...	B	P3	950	No. 2 Grid	{1612	6.3	JR0-3475	23	...	B	P3	410	Cap Grid Cap = G
{1003	...	JR0-5070	0	70	A	P6	Rect.	Plate No. 1	{1612	6.3	JR5-3472	27	...	B	P3	410	Pin Grid
		Hold Button Down For 5 Seconds							1613	6.3	JR5-3470	0	...	B	P3	1400	
{1003	...	JR0-3070	0	70	A	P6	Rect.	Plate No. 2	1614	6.3	JR5-3472	23	...	D	P3	3150	
		Hold Button Down For 5 Seconds							1616	2.5	JR0-0000	0	40	A	P6	Rect.	Cap = P
{CK1005	6.3	GX0-3050	0	92	A	P4	Rect.	Plate No. 1	1619	2.5	JR5-3407	12	...	C	P3	2150	Cap = G
{CK1005	6.3	GX0-5030	0	92	A	P4	Rect.	Plate No. 2	1620	6.3	JR0-3475	22	...	B	P3	770	
SN1006★	6.3	FT4-1020	28	...	B	P3	300	D Basing	1621	6.3	JR5-3470	29	...	B	P3	1250	
{1007	1.1	JX0-3020	0	40	A	P6	Rect.	Plate No. 1	1622	6.3	JR5-3470	23	...	D	P3	3150	
{1007	1.1	JX0-5020	0	40	A	P6	Rect.	Plate No. 2	1623	6.3	JR3-0000	0	...	B	P3	1400	
CK1027	...	AP0-8070	0	85	A	P4	Rect.	Cap = P	1624	2.5	JR3-0200	17	...	C	P3	2500	Cap = P
		* Cap = G Hold Down P2 And Press P3							1625	12.6	JR4-0360	33	...	C	P3	2000	Cap = P
E1148	6.3	JR0-0070	14	...	B	P3	1390	{Upper Cap = P Lower Cap = G	1626	12.6	JR5-3070	52	...	B	P3	1325	Eye Open
1201	6.3	JS1-3040	18	...	D	P3	1900		{1629	12.6	JR5-4070	0	100	A	P3	Eye	
1203	6.3	JR0-4070	0	51	A	P2	Diode		{1629	12.6	JR5-4370	0	100	A	P3	Eye	
1204	6.3	HS5-3140	10	...	D	P3	1150		1631	12.6	JR5-3472	23	...	D	P3	3150	Eye Closed
{1206	6.3	JR5-7362	10	...	B	P3	1320	Tetrode No. 1	1632	12.6	JR5-3470	10	...	D	#	5650	
{1206	6.3	JR4-2367	10	...	B	P3	1320	Tetrode No. 2		# Hold Down P2 And Press P3							
1229	2.0	JR0-2300	19	...	B	#	400		{1633	25.0	JX4-5060	23	...	D	P3	1650	Triode No. 1
		* Cap = G Hold Down P2 And Press P3							1633	25.0	JX2-1030	23	...	D	P3	1650	Triode No. 2
1230	2.0	JR3-2000	40	...	B	P3	570		1634	12.6	JX4-5062	0	...	D	P3	650	Triode No. 1
1231	6.3	JR6-2374	0	...	C	P3	1600		{1634	12.6	JX3-1062	0	...	B	P3	650	Triode No. 2
1232	6.3	JR6-2374	18	...	B	P3	1250		1635	6.3	JR4-3070	0	...	B	P3	540	Triode No. 1
{1237	2.5	JR0-3000	0	73	A	P7	Rect.	Plate No. 1	1635	6.3	JR5-6070	0	...	B	P3	540	Triode No. 2
		Short On 1-2-4-5							1642	6.3	JR4-5060	38	...	B	P3	875	Triode No. 1
{1237	2.5	JR0-6000	0	73	A	P7	Rect.	Plate No. 2	1644	6.3	JR0-3020	38	...	B	P3	875	Triode No. 2 Cap = G
		Short On 1-2-4-5							1644	12.6	JW2-7513	10	...	B	P3	1350	Pentode No. 1
1247★	0.6	EVO-0000	0	0	A	P2	Diode	{F Basing Top Lead = P	1644	12.6	JW3-4512	10	...	B	P3	1350	Pentode No. 2
		* Cap = G Hold Down P2 And Press P3							1650	6.3	JR4-3060	22	...	B	P3	1200	
HY1269	12.6	JR3-0240	0	...	C	P3	2500	Cap = P	1654	1.5	DX0-0000	0	56	A	P4	Rect.	Cap = P Short on 3
1273	6.3	JR6-2374	11	...	B	P3	1450		{1655	6.3	JX4-5061	10	...	D	P3	840	Triode No. 1
1280	12.6	JR6-2374	11	...	B	P3	1450		{1655	6.3	JX3-1065	10	...	D	P3	840	Triode No. 2
1282	6.3	JR6-2375	10	...	D	P3	2200		1657	6.3	JR5-3670	#	90	A	P4	*Thyr.	
		* Should Strike Between 50 and 40.							1658	2.0	JR3-2000	40	...	B	P3	570	Read As Rectifier.

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations
{1659	2.5	JR0-2050	11	...	B	P3	470	Triode Sect. Cap = G	{5660	12.6	JR0-3670	8	...	B	P3	840	Pent. Sect. Cap = G
1659	2.5	JR0-4050	0	0	A	P2	Diode	Diode No. 1	{5660	12.6	JR0-5670	0	0	A	P2	Diode	Diode No. 1
1659	2.5	JR0-3050	-0	0	A	P2	Diode	Diode No. 2	{5660	12.6	JR0-4670	0	0	A	P2	Diode	Diode No. 2
1662	2.5	DX8-2100	33	...	B	P3	1260	Cap = G	5661	12.6	JR4-7653	21	...	B	P3	1250	
1851	6.3	JR0-3475	10	...	D	P3	3150		5662	6.3	JR3-7050	#	92	A	P4	*Thyr.	
1852	6.3	JR4-7653	10	...	D	P3	3800			* Should Strike Between 35 and 25.							
1853	6.3	JR4-7653	0	...	C	P3	2200		5663	6.3	JR3-7520	#	56	A	P7	*Thyr.	Read As Rectifier.
2050	6.3	JR5-3670	#	90	A	P4	*Thyr.			* Should Strike Between 70 and 60.							
2051	6.3	JR5-3670	#	90	A	P4	*Thyr.		{5670	6.3	KR7-6080	17	...	D	P3	3300	Read As Rectifier.
									{5670	6.3	KR3-4020	17	...	D	P3	3300	Triode No. 1
5516	6.3	JR5-0320	20	...	C	P3	2500	Read As Rectifier.	5672	1.1	DV4-1200	55	...	D	P3	350	Triode No. 2
5517	BLST	AP0-8070	0	51	A	P6	Reg. Cap = P		5676	1.1	ES3-1000	31	...	D	P3	1000	
5556	4.3	JR3-2000	26	...	B	P3	625		5677	1.1	ES3-1000	40	...	B	P3	280	
5590	6.3	JR3-5670	12	...	B	#	1260		5678	1.1	DV4-1200	18	...	D	P3	630	
									{5679	6.3	JR0-6075	0	62	A	P2	Diode	Diode No. 1
5591	6.3	JR3-5620	10	...	D	P3	2650		{5679	6.3	JR0-3025	0	62	A	P2	Diode	Diode No. 2
5603	6.3	JR4-7603	35	...	D	P3	3350		5686	6.3	EV2-7630	18	...	C	P3	1950	
{5608A	2.5	JR5-6042	12	...	B	P3	950	Triode No. 1	{5687	12.6	EV7-9061	23	...	D	P3	4800	Triode No. 1
{5608A	2.5	JR3-2046	12	...	B	P3	950	Triode No. 2	{5687	12.6	EV2-1039	23	...	D	P3	4800	Triode No. 2
5610	6.3	JR6-3020	27	...	C	P3	2500		{5691	6.3	JX4-5061	7	...	D	P3	1000	Triode No. 1
5618	6.3	DX6-2180	24	...	C	P3	1900		{5691	6.3	JX2-1035	7	...	D	P3	1000	Triode No. 2
5633★	6.3	EW3-0512	15	...	D	P3	1500		{5692	6.3	JX4-5061	22	...	D	P3	1650	Triode No. 1
5634★	E Basing	Top Lead = P			D	P3	1825		{5693	6.3	JR4-7653	20	...	D	P3	1040	Triode No. 2
									{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	#	56	A	P7	*Thyr.	
										* Should Strike Between 70 and 60.							
{5635★	6.3	DW1-7084	16	...	D	P3	2200		5702	6.3	DU7-1265	10	...	D	P3	2780	
{5635★	F Basing	Triode No. 1			D	P3	2200		5703	6.3	DU5-1060	21	...	D	P3	3150	
									5704	6.3	CT0-1040	0	67	A	P2	Diode	
5637★	6.3	DU2-1050	17	...	D	P3	950	C Basing	5718★	6.3	DW1-8057	22	...	D	P3	3460	F Basing
5638★	6.3	EW3-1520	18	...	D	P3	2080	E Basing	5719★	6.3	DW1-8057	23	...	D	P3	500	F Basing
5639★	6.3	DW1-5720	25	...	D	P3	2650	F Basing	5725	6.3	JR3-5627	10	...	D	P3	1540	
5640★	6.3	DW1-5782	54	...	C	P3	1900	F Basing	{A5726	6.3	JR7-5623	20	...	B	P3	760	Ampl. Sect.
5641★	6.3	ES0-1030	0	20	A	P7	Rect.	Top Lead = P	{A5726	6.3	JR3-5627	10	...	B	P3	940	Osc. Sect.
5642	1.1	BS0-0000	0	0	A	P7	Rect.	Top Lead = P	{5726	6.3	JR0-7030	0	67	A	P2	Diode	Diode No. 1
									{5726	6.3	JR0-2050	0	67	A	P2	Diode	Diode No. 2
5643★	6.3	DW7-1250	#	56	A	P7	Thyr.	F Basing.	5727	6.3	JR3-6025	#	90	A	P4	*Thyr.	
										* Should Strike Between 40 and 30.							
5644★	6.3	FT4-1020	16	...	D	P3	950	D Basing	5731	6.3	JR4-3060	20	...	D	P3	1400	
5645★	6.3	FT4-1020	29	...	D	P3	1380	D Basing	5742	4.3	JR3-2000	10	...	B	P3	530	
5646★	6.3	FT4-1020	28	...	B	P3	300	D Basing	5744	6.3	CT4-1050	8	...	D	P3	2500	
5647★	6.3	CT0-1040	0	67	A	P2	Diode	A Basing	5749	6.3	JR3-5672	9	...	C	P3	2700	
5651	AP0-3070	0	56	A	P4	Diode	Ref. Volt.	Read As Rectifier	{5750	6.3	JR7-5623	11	...	B	P3	900	Ampl. Sect.
5654	6.3	JR3-5620	10	...	D	P3	2700		{5750	6.3	JR3-5627	0	...	B	P3	1000	Osc. Sect.
5659	12.6	JR5-3470	22	...	C	P3	1900										

TABLE 4-3 (Cont.) TUBE TEST DATA CHART

Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	Tube Type	Fil Volts	Selectors	Bias	Shunt	Scale	Press	Mut. Cond.	Notations	
{5751	12.6	EV7-6080	8	...	D	P3	950	Triode No. 1	{5915	6.3	JR7-5623	20	...	B	P3	760	Ampl. Sect.	
{5751	12.6	EV2-1030	8	...	D	P3	950	Triode No. 2	{5915	6.3	JR3-5627	10	...	B	P3	950	Osc. Sect.	
{5755	12.6	EV6-8073	0	...	B	P3	630	Triode No. 1	5916★	25.0	DW1-5724	22	...	B	P3	820	F Basing	
{5755	12.6	EV3-1026	0	...	B	P3	630	Triode No. 2	{5963	12.6	EV7-6080	30	...	B	P3	1260	Triode No. 1	
5763	6.3	EV9-1673	8	...	D	P3	4400		{5963	12.6	EV2-1030	30	...	B	P3	1260	Triode No. 2	
5783	.....	AP0-3050	0	72	A	P4	Volt. Ref. Read As Rectifier		5977★	6.3	DW1-8053	29	...	D	P3	2840	F Basing
5784	6.3	DU7-1265	20	0	B	P3	1130		5977★	6.3	DW1-2050	74	...	D	P3	1160	F Basing	
5785	1.1	GX0-1000	0	0	A	P2	Rect.		{5998	6.3	JX4-5061	63	...	D	P3	5000	Triode No. 1	
		OK Over 500 On 3000 Scale							{5998	6.3	JX2-1035	63	...	D	P3	5000	Triode No. 2	
5787	BLST	JPO-3010	0	67	A	P4	Volt. Ref. Read As Rectifier		6005	6.3	JR3-5620	21	...	C	P3	2320		
5812	6.3	JR3-5602	34	...	C	P3	2700		6026★	6.3	EV7-8030	21	...	D	P3	3700	F Basing	
{5814	12.6	EV7-6080	24	...	B	P3	1400	Triode No. 1	6055★	25.0	DW1-8050	43	...	B	P3	630	F Basing	
{5814	12.6	EV2-1030	24	...	B	P3	1400	Triode No. 2	6146	6.3	JR5-0327	30	...	D	P3	4400	Cap = P	
5823	BLST	AP8-3010	100	87	A	P4	Volt. Reg. Read As Rectifier		6159	25.0	JR5-0327	30	...	D	P3	4400	Cap = P	
5824	25.0	JR5-3470	52	...	C	P3	2500		6169★	6.3	DW1-2040	12	...	D	P3	3800	F Basing	
5825	1.5	JR0-0000	0	0	A	P4	Rect.	Cap = P	7193	6.3	JR0-0070	13	...	C	P3	1900	{ Upper Cap = G Lower Cap = P	
		OK Above 250 On 3000 Scale							8005	10.0	JR3-0000	22	...	B	P3	1260	Rect.	
{5829	6.3	DV0-6070	0	67	A	P2	Diode	Diode No. 1	8016	1.1	JR0-0000	0	67	A	P4	700	Cap = P	
{5829	6.3	DV0-1020	0	67	A	P2	Diode	Diode No. 2	9001	6.3	JR3-5670	21	...	B	P3	700	Cap = P	
5840★	6.3	DW1-5740	22	...	C	P3	1575	F Basing	9002	6.3	JR6-3070	22	...	B	P3	1200		
{5844	6.3	JR5-2070	26	...	C	P3	1900	Triode No. 1	9003	6.3	JR3-5620	17	...	B	P3	950		
{5844	6.3	JR6-3070	26	...	C	P3	1900	Triode No. 2	9004	6.3	JR0-3040	0	67	A	P2	Diode		
5854★	1.1	DV4-1200	38	...	B	P3	350		9005	4.3	JR0-4030	0	51	A	P2	Diode		
{5873★	6.3	BY6-7050	20	...	D	P3	1650	F Basing	9006	6.3	JR0-3070	0	51	A	P2	Diode		
{5873★	6.3	BY3-2040	20	...	D	P3	1650	F Basing	38142	7.5	JR3-2000	37	...	B	P3	1400		
5879	6.3	EV1-8739	21	...	B	P3	630		{XXB	2.5	BY5-6000	10	...	B	P3	700	Triode No. 1	
5881	6.3	JR5-3472	23	...	D	P3	3150		{XXB	2.5	JR4-3000	10	...	B	P3	700	Triode No. 2	
{5896★	6.3	DW0-5070	0	64	A	P2	Diode	F Basing	{XXD	12.6	JR5-6070	13	...	D	P3	1575	Triode No. 1	
{5896★	6.3	DW0-1020	0	64	A	P2	Diode	F Basing	{XXD	12.6	JR4-3020	13	...	D	P3	1575	Triode No. 2	
5897★	6.3	DW1-8050	20	...	D	P3	3660	F Basing	{XXFM	6.3	JR3-2040	10	...	D	P3	630	Triode Sect.	
5898★	6.3	DW1-8050	23	...	B	P3	500	F Basing	{XXFM	6.3	JR0-5040	0	67	A	P2	Diode		
5899★	6.3	DW1-5740	21	...	B	P3	1260	F Basing	{XXFM	6.3	JR0-6070	0	67	A	P2	Diode		
5900★	6.3	DW1-5740	21	...	B	P3	1260	F Basing	XXL	6.3	JR6-2070	18	...	D	P3	1900	Diode No. 2	
5901★	6.3	DW1-5740	22	...	C	P3	1575	F Basing										
5902★	6.3	DW1-5740	22	...	C	P3	1575	F Basing										
5902★	6.3	DW1-5720	43	...	C	P3	2650	F Basing										
5903★	25.0	DW0-5074	0	48	A	P7	Rect.	F Basing										
		Plate No. 1																
5903★	25.0	DW0-1024	0	48	A	P7	Rect.	F Basing										
		Plate No. 2																
5904★	25.0	DW1-8050	43	...	B	P3	630	F Basing										
5905★	25.0	DW1-5720	12	...	D	#	1900	F Basing										
		# Hold Down P2 And Press P3																
5906★	25.0	DW1-5720	6	...	D	P3	3150	F Basing										
5907★	25.0	DW1-5720	12	...	D	#	1900	F Basing										
		# Hold Down P2 And Press P3																
5908★	25.0	DW1-5784	15	...	D	#	1400	F Basing										
		# Hold Down P2 And Press P3																

TABLE 4-4. CROSS INDEX OF ELECTRON TUBE TYPES

Note

Certain tube types have alternate or obsolete designations but are directly interchangeable with currently listed types. The chart below lists the more common of these types cross-referenced to their current service designation which will be found on the roll chart.

TUBE TYPE	CURRENT SERVICE DESIGNATION	TUBE TYPE	CURRENT SERVICE DESIGNATION
3D6	1299	CK1013	5517
6AS7W	5725	1201	7E5
6N5	6AB5	1203A	7C4
6T7	6Q6	1204	7AB7
6U5	6G5	1206	7G8
6Z3	1V	1232	7G7
6Z4	84	1291	3B7
6Z5	1225	1294	1R4
PJ8	5556	1299	3D6
12B7	14A7	1852	6AC7
25S	1B5	1853	6AB7
45Z5	40Z5	5654	6AK5
44	39	5726	6AL5
51	35	5727	2D21
HD52	OB2	5930	2A3
VR75	OA3	R6160	1C21
G84	2Z2	XXB	3C6
VR90	OB3	XXD	14AF7
VR105	OC3	XXFM	7X7
VR150	OD3		
398A	5603		
482B	182B		
483	183		
879	2X2		
CK1003	OZ4		

For complete listings of these tubes refer to Catalog of Navy Material, Section 16-820 Bureau of Ships Section—Part II, entitled, "ARMED FORCES CROSS INDEX OF ELECTRON TUBE TYPES AND ALLIED DEVICES."

(30) TESTING BALLAST TUBES.

- (a) Turn the tester ON.
- (b) Set FILAMENT voltage switch S-109 to BLST.
- (c) Set SHORTS test switch on position 1.
- (d) Refer to TABLE 4-5. Set first FILAMENT SELECTOR No. 1 switch S-105 (lettered A to K) to letter in column headed "First Selector". Set all numbered SELECTORS on zero.
- (e) Rotate second FILAMENT SELECTOR switch S-104 (lettered P to Z) from P to Z. Neon lamp, I-103, should light on positions noted in Table 4-5.

TABLE 4-5. TEST DATA FOR BALLAST TUBES

TUBE TYPE	FIRST SELECTOR	NEON LAMPS SHOULD LIGHT IN THESE POSITIONS OF SECOND SELECTOR					
		R	S	T	U	V	X
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					
O3G	J			T			
4-5	J	R					
6-133	J			T			
6-6AA	J	R					
7-8-9	J	R					
10A-10AG	J			T			

TABLE 4-5. TEST DATA FOR BALLAST TUBES (Cont'd)

TUBE TYPE	FIRST SELECTOR	NEON LAMPS SHOULD LIGHT IN THESE POSITIONS OF SECOND SELECTOR					
10AB	J			T			X
K17B-M17C-BM17C	J			T			X
M17HG-M17H	J		S				X
	D	R					
M23B-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-LY42B-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

TABLE 4-5. TEST DATA FOR BALLAST TUBES (Cont'd)

TUBE TYPE	FIRST SELECTOR	NEON LAMPS SHOULD LIGHT IN THESE POSITIONS OF SECOND SELECTOR					
		R	S	T	U	V	X
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

TABLE 4-5. TEST DATA FOR BALLAST TUBES (Cont'd)

TUBE TYPE	FIRST SELECTOR	NEON LAMPS SHOULD LIGHT IN THESE POSITIONS OF SECOND SELECTOR					
		R		T			X
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

TABLE 4-5. TEST DATA FOR BALLAST TUBES (Cont'd)

TUBE TYPE	FIRST SELECTOR	NEON LAMPS SHOULD LIGHT IN THESE POSITIONS OF SECOND SELECTOR							
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	

b. When the TV-3C/U equipment is used as a Multimeter.

CAUTION

AVOID DAMAGE TO THE EQUIPMENT.

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 necessary switch to one of the lower ranges. The lowest multimeter range which can be used will give the greatest accuracy.

(1) **TEST LEADS.** Insert the tip plugs of W-104 and W-105 in test jacks J-102 and J-101 located below the FUNCTION and RANGE SWITCHES. These leads are used for all multimeter measurements. The red lead and red jack are positive when polarity is involved.

(2) **D.C. VOLTS.** Potentials up to 1000 volts dc may be measured in six ranges. The circuit sensitivity is 20,000 ohms per volt.

(a) Set the FUNCTION selector at VOLTS D.C.

(b) Turn the RANGE selector to the proper range.

(c) Make contact with the voltage to be measured by means of the insulated test prods.

(3) **VOLTS A.C.** Alternating current voltages up to 1,000 volts may be measured in six ranges. The sensitivity of the ac circuit is 1000 ohms per volt.

(a) Set the FUNCTION selector switch for A.C. VOLTS.

(b) Turn the RANGE switch to the proper range.

(c) Apply the prod tips to the points between which measurements are to be taken.

(4) **OHMS.** Resistance may be measured in six ranges as follows:

0 to 1,000 3 ohms center scale
0 to 10,000 30 ohms center scale
0 to 100,000 300 ohms center scale
0 to 1 megohm 3000 ohms center scale
0 to 10 megohms 30,000 ohms center scale
0 to 100 megohms 300,000 ohms center scale

(a) Plug the line cord of the tester into a 115 volt ac outlet and turn the POWER switch to the ON position.

(b) Set the FUNCTION selector at OHMS.

(c) Turn the RANGE selector to the desired position.

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

(e) Touch the prod tips of the test leads to the terminals of the resistance to be measured. The meter will indicate the value of the resistance in ohms. In measuring resistance elements be sure that no parallel current paths in the form of other resistors or circuit components are included between the contacts.

(f) The most accurate results will be obtained by selecting the range whose center scale value most closely corresponds to that of the resistor being measured.

(5) **MFDS.** Capacities may be measured from 0 to 20 microfarads in four ranges.

(a) Connect the equipment to a 115 volt ac power source. A line frequency of 60 cycles is required if direct meter readings are to be obtained. For other line frequencies it will be necessary to apply a corrective factor to the meter reading by using the conversion chart figure 4-4.

(b) Turn the FUNCTION switch to MFDS.

(c) Press LINE ADJ. push button P1 and operate the LINE ADJUST control until the pointer of the meter rests exactly over the LINE ADJ. mark at the center of the scale.

(d) Set the RANGE selector for the desired range.

(e) Touch the prod tips of the test leads to the terminals of the capacitor under test, after first making sure that no parallel current paths exist between the points of measurement. Press push button P2 for capacity reading.

TV3-C/U
CONVERSION CHART
FREQUENCY VS. METER READING

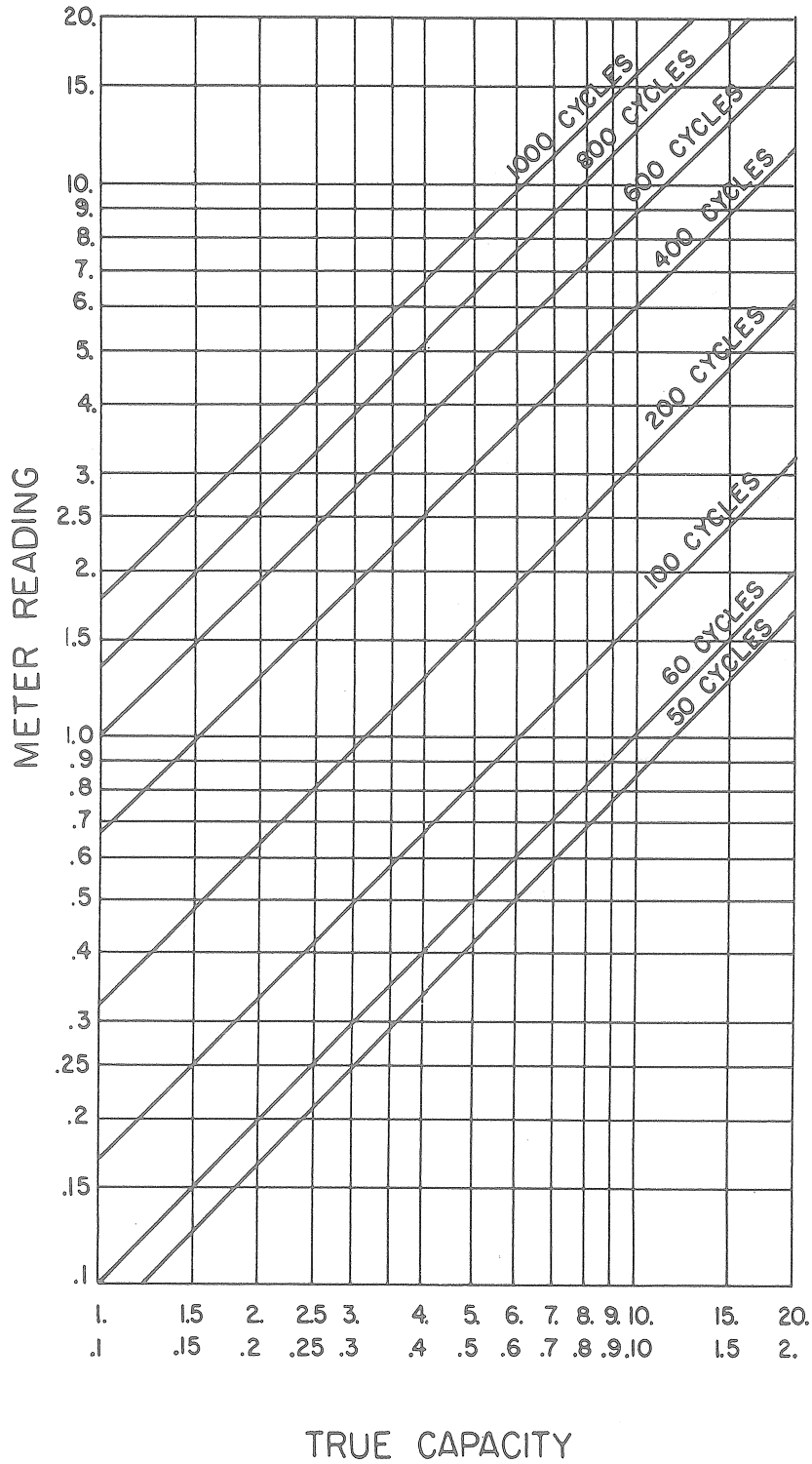


Figure 4-4. Conversion Chart for Capacity Measurements at Frequencies Other Than 60 Cycles

- (f) If the power supply frequency is 60 cycles the meter will indicate the value of the capacitor directly in microfarads. For other power line frequencies the meter reading must be corrected using the Conversion Chart for Capacity Measurements at Frequencies Other Than 60 Cycles, Figure 4-4.
- (6) MILS. Current measurements may be made from 0 to 500 milliamperes dc in 6 ranges.
 - (a) Turn the FUNCTION selector to MILS.
 - (b) Set the RANGE selector for the desired range.
 - (c) Make connection to the points between which current is to be measured by means of the test leads.
- (7) INDUCTANCE: In addition to the regular multimeter measurements it is possible to make inductance measurements of choke coils with the TV-3C/U equipment.
 - (a) Make same preliminary adjustments and switch settings as for capacity measurements. (See paragraph 4b(5) of this section).
 - (b) Connect the test leads to the terminals of the inductance to be measured, and note the reading on the capacity scale of the meter.

- (c) Divide the reading in microfarads into 7.04 to obtain the inductance value in henries at 60 cycles power supply frequency.
- (d) Table 4-6 provides a conversion chart for quickly estimating inductance values for capacity meter readings at 60 cycles.
- (e) For any line frequency the inductance can be calculated 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:

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

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
1.1	6.4
1.2	5.9
1.3	5.4
1.4	5.0
1.5	4.7
1.6	4.4
1.7	4.1
1.8	3.9
1.9	3.7
2.0	3.5

TABLE 4-6. CONVERSION FROM CAPACITY READING TO INDUCTANCE AT 60 CYCLES

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 the braided shield, the cord should be replaced.

b. If the PILOT indicator E-101 does not light when the Tube Tester TV-3C/U is connected to a live 105-125 volt ac 50-1000 cycle outlet (see paragraph c below), check the FUSE lamp I-102 and FUSE F-101 for possible burnout. If fuses are OK unscrew the red jewel of indicator E-101 and check pilot lamp I-101 for loose socket connection, or burn out.

c. Check the ac voltage source using the 500 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 30 OHM range of the Multimeter section. If leads are badly damaged or open they should be replaced.

3. LINE FUSES.

I-102, a type 81 lamp, is used as a fuse and overload indicator. F-101, a 1-1/2 ampere fuse, protects the other side of the line. A spare lamp and fuse are supplied with the equipment spares which are stowed in the lead compartment.

4. BIAS FUSE.

F-102, a 1/8 ampere fuse, is used to protect the BIAS Potentiometer R-165 from accidental overload. It is mounted in an indicator type fuse holder E-115. If the indicator E-115 glows when power is applied to the tester the BIAS FUSE F-102 has opened due to a defective tube under test or incorrect setting of the controls. Replace F-102, check control settings and recheck tube, as described in Section 4, paragraph 4. A spare fuse is supplied with the equipment spares.

5. PILOT LAMP.

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

6. NEON LAMP.

a. The neon lamp I-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 FUNCTION switch S-111 to TUBE TEST.

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

- (4) Turn the SHORTS test switch S-108 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 equipment spares in the lead compartment.

Note

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

7. TUBES.

a. Two full wave rectifier tubes are used in the TV-3C/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 5Y3WGTA, 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 5Y3WGTA 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 the 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."

Because of the nature and design of the TV-3C/U equipment, no special preventive maintenance procedures are required.

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 the nearest district printing and publication office.

FAILURE REPORT—ELECTRONIC EQUIPMENT
NAVSHIPS (NBS) 383 (REV. 11-45)
FORMERLY NAVSHIPS (NBS) 383 AND NAVSHIPS (NBS) 383

SHIP NUMBER AND NAME OR STATION _____

CHECK ONE: RADIO
EQUIPMENT MODEL DESIGNATION _____

TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED _____

TUBE TYPE, INCLUDING PREFIX LETTERS _____

TUBE MANUFACTURER _____

FAILURE OCCURRED IN:
 STORAGE OPERATING
 HANDLING OTHER (SPECIFY) _____
NATURE OF FAILURE AND REMARKS _____

NOTICE.—Read notes on reverse side. Additional forms and envelopes may be obtained from nearest RMO.

NAME OF PERSON MAKING REPORT _____ DATE _____

ELECTRONIC EQUIPMENT FAILURE REPORT (SIG)

NAVSHIPS (NBS) 383 (REV. 11-45)

ORGANIZATION PERFORMING MAINTENANCE _____ NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE _____

*REPORT No. _____ DATE _____

NOTICE.—Read notes on cover prior to preparing this form.

EQUIPMENT INVOLVED
 Navy Army USMC JAGC 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		THIS SIDE FOR PARTS (NOTE 9)			
TUBE TYPE, INCLUDING PREFIX LETTERS	SERIAL NO. (NOTE 8)	NAME OF PART	CIRCUIT SYMBOL (Eg R-134)	NAVY TYPE NO.	
TUBE MANUFACTURER	CONTRACT NO. (NOTE 8)	SERIAL NO.	*CONTRACT DATA	*DATE RECD.	*ARMY STOCK NO.
FAILURE OCCURRED IN	GUARANTEED HOURS (NOTE 8)	DATE OF ACCEPTANCE (NOTE 8)	*CHECK-OFF OR TAG DATA (NOTE 9)		*MANUFACTURER'S DATA (NOTE 9)
<input type="checkbox"/> Storage <input type="checkbox"/> Operation	ACTUAL HOURS	DATE OF FAILURE	BRIEF DESCRIPTION AND CAUSE OF FAILURE, INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)		
<input type="checkbox"/> Handling <input type="checkbox"/> Other (Specify in remarks)	TYPE OF FAILURE (NOTE 7)	TUBE CIRCUIT SYMBOL Y-			
NATURE OF FAILURE AND REMARKS (NOTE 8) (CONTINUE ON BACK)					
CONCLUSION: <input type="checkbox"/> Normal replacement <input type="checkbox"/> Shortage <input type="checkbox"/> Recondition <input type="checkbox"/> Failure <input type="checkbox"/> Transportation breakage <input type="checkbox"/> Other _____ (Specify)					

*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES. 16-66001-1 U. S. GOVERNMENT PRINTING OFFICE

SECTION 7

CORRECTIVE MAINTENANCE

1. FUSES.

a. The Tube Tester TV-3C/U is protected by a combination FUSE lamp and overload indicator, I-102, and FUSE F-101 in the primary circuit of power transformer T-101. If the PILOT indicator E-101 does not glow when the tester is connected to a live ac line of proper voltage, remove FUSE lamp I-102 and FUSE F-101 from their holders and check for continuity using a low range ohmmeter. If either FUSE is open replace from spares found in the lead compartment.

b. Line voltage of the power source may be checked by using the 500 volt ac range of the TV-3C/U Multimeter section. Low line voltage may make it impossible to adjust the meter to LINE TEST and impair the accuracy of the equipment.

c. The BIAS potentiometer R-165 is protected from accidental overloads by the BIAS FUSE F-102 which is in series with the potentiometer. If the indicator E-115 glows when power is applied to the tester, the BIAS FUSE F-102 has opened, and should be replaced with a 1/8 ampere fuse from the equipment spares stowed in the lead compartment.

2. PILOT LAMP.

a. The type 47, 6.3 volt bayonet base pilot lamp I-101 should light when the TV-3C/U is plugged into a live 115 volt ac outlet, and the power switch S-113 is turned ON. If the lamp does not light, but FUSE lamp I-102 checks OK, unscrew the red jewel cover of the PILOT indicator E-103 and check the lamp for continuity and looseness in the socket.

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

3. NEON LAMP.

a. The neon lamp I-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 no tube in test sockets, set the FUNCTION switch S-111 to TUBE TEST.

(3) Set SELECTORS to JR 1-1111.

(4) Turn the SHORTS-MICROMHOS test switch S-109 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 equipment spares in the lead compartment.

Note

Do not deplete the supply of equipment 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-3C/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 5Y3WGTA, V-102, supplies 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 5Y3WGTA 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.

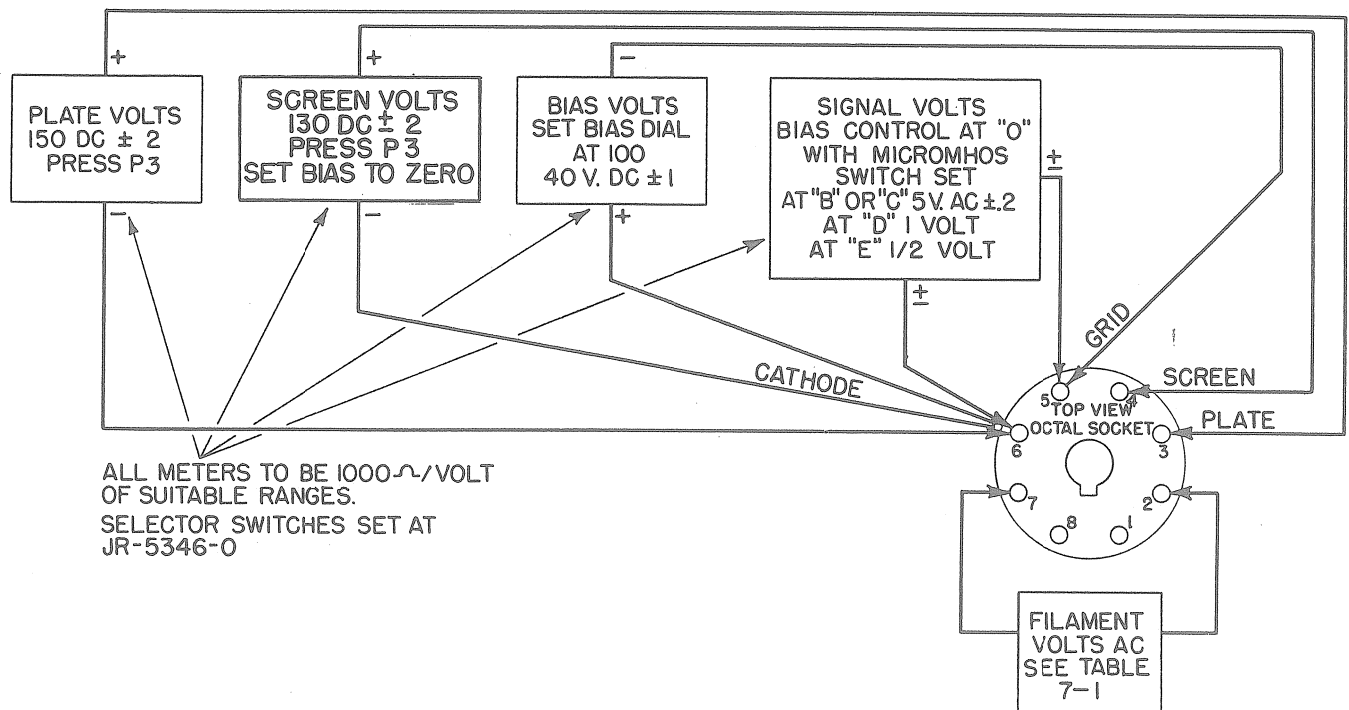


Figure 7-1. Voltage Calibration Check Diagram

Note

After the 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 condition, or beyond repair, requisition replacements immediately.

6. SCHEMATIC WIRING DIAGRAM.

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

7. VOLTAGE AND CALIBRATION CHECK.

a. The tube tester section of the TV-3C/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 FUNCTION switch, S-111, and the SHORTS-MICROMHOS switch, S-108, to TUBE TEST. Set the SELECTORS, S-105, S-104, S-103, S-102, S-101, S-107, S-106 to JR 5-3460. Turn POWER switch, S-113, ON. Press LINE ADJ. push button P1 and turn LINE ADJUST control R-162 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-3C/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, X-108, 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, X-108, 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 control R-165, at 100.
 - (b) Connect the positive (+) terminal of the voltmeter to contact No. 6 of the OCTAL test socket X-108 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 control R-165 at zero.
 - (b) Connect the terminals of the ac voltmeter to contacts 5 and 6 of the OCTAL test socket X-108. (See figure 7-1.)
 - (c) With the SHORTS-MICROMHOS switch S-108 set at "B" or "C" the meter should read 5 volts ac plus or minus 0.2 volt.
 - (d) With the SHORTS-MICROMHOS switch set at "D" the meter should read approximately 1 volt ac.
- (e) With the SHORTS-MICROMHOS switch 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 S-109 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 X-108.
 - (c) The meter should read within the limits indicated in Table 7-1 for the various nominal setting of the FILAMENT VOLTAGE switch S-109.
- (7) BIAS control and SHUNT control should indicate zero when they are in full counter-clockwise positions. If they do not, loosen the set screws and reset the dials on the shafts.

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 R-128 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 his section. Also check rectifier CR-101 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 T-101.

b. Incorrect Plate Voltage.

- (1) High plate voltage can only result from the application of incorrect voltage to the primary of T-101, see paragraph (a) above.
- (2) Low plate voltage will result from a defective 83 tube V-101.

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

d. Replacement of Resistor R-166.
After replacement of this resistor it will be necessary to adjust the two sliding contacts "A" and "B" to establish proper voltage distribution.

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

NOMINAL	MINIMUM	MAXIMUM
0.6	.65	.72
1.1	1.06	1.16
1.5	1.28	1.42
2.0	1.9	2.1
2.5	2.58	2.85
3.0	3.25	3.6
4.3	4.3	4.75
5.0	5.15	5.68
6.3	6.2	6.8
7.5	7.32	8.1
10.0	9.8	10.8
12.6	12.3	13.5
20.0	19.	21.
25.0	25.3	28.
35.0	35.2	39.
50.0	51.5	57.
75.	74.	82.
117.	116.	128.

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 V-101. Shorted capacitor C-104. Open winding secondary 1 or 2.	Replace Replace Replace T-101
Zero Plate Voltage	Defective 83 tube V-101. Open winding secondary 1, 2 or 6 of T-101.	Replace Replace T-101
High Screen Voltage	BIAS control R-165 open at positive end. Resistor R-166 open.	Replace Replace
Low Screen Voltage	5Y3WGTA tube V-102 weak. Open winding secondary 3 or 4.	Replace Replace T-101
Zero Screen Voltage	Defective 5Y3WGTA tube V-102. BIAS control R-165 open at negative end. Open winding secondary 3 and 4 or 5 of T-101. BIAS FUSE F-102 open.	Replace Replace Replace T-101 Replace
High Bias Voltage	BIAS control R-165 open at negative end.	Replace
Low Bias Voltage	Weak 5Y3WGTA tube V-102. Open winding secondary 3 or 4.	Replace Replace T-101
Zero Bias Voltage	BIAS control R-165 open at positive end. Resistor R-166 open. Defective 5Y3WGTA tube V-102. Open winding secondary 3 and 4 or 5 of T-101. BIAS FUSE F-102 open.	Replace Replace Replace Replace T-101 Replace
High Signal Voltage	BIAS control R-165 not set at zero. Defective resistor R-113, R-114 or R-115.	Re-adjust Replace
Low Signal Voltage	Defective resistor R-113, R-114 or R-115.	Replace
Zero Signal Voltage	Defective resistor R-113, R-114 or R-115. Open winding secondary 3 of T-101.	Replace Replace T-101

- (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 X-108 as illustrated by figure 7-1.
- (3) Set BIAS control R-165 at 100.
- (4) Adjust slider "A" of R-166 until the meter reads 40 volts dc.
- (5) Connect a voltmeter between pins 4 and 6 of OCTAL socket as in figure 7-1.
- (6) Press buttons P3 and P2 and adjust slider "B" of R-166 until the meter reads 56 volts dc.
- (7) Tighten the slider screws and recheck the voltages.

9. RESISTANCE CHECK FOR MULTIMETER SECTION.

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

b. An ohmmeter or multimeter having suitable ranges should be connected to the test jacks, J-101 and J-102.

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

POSITION OF FUNCTION SWITCH	POSITION OF RANGE SWITCH	RESISTANCE ACROSS PIN JACKS J-101 and J-102	COMPONENT PARTS BY SYMBOL DESIGNATION WHICH SHOULD BE CHECKED FOR POSSIBLE FAILURE IF PROPER RESISTANCE READING ACROSS PIN JACKS IS NOT OBTAINED
OHMS	3 OHMS AT CENTER 30 OHMS AT CENTER 300 OHMS AT CENTER 3000 OHMS AT CENTER 30K OHMS AT CENTER 300K OHMS AT CENTER	3 OHMS* 30.8 OHMS* 406 OHMS* 1850 OHMS† 28,850 OHMS† 298.5K OHMS†	R146 R147 R148, R147 R142 R142, R141 R142, R141, R140
VOLTS AC	5 VOLTS 10 VOLTS 50 VOLTS 100 VOLTS 500 VOLTS 1000 VOLTS	100K OHMS 200K OHMS 1 MEGOHM 2 MEGOHMS 10 MEGOHMS 20 MEGOHMS	R126 R125, R126 R124, R125, R126 R123, R124, R125, R126 R122, R123, R124, R125, R126 R121, R122, R123, R124 R125, R126
VOLTS DC	5 VOLTS 10 VOLTS 50 VOLTS 100 VOLTS 500 VOLTS 1000 VOLTS	5000 to 6000 OHMS 10,000 to 11,000 OHMS 50K to 52K OHMS 100K to 102K OHMS 500K to 505K OHMS 1 MEGOHM	CR101, R134, R135, R136, R137 CR101, R133 to R137 incl. CR101, R132 to R137 incl. CR101, R131 to R137 incl. CR101, R130 to R137 incl. CR101, R129 to R137 incl.
MFDS.	.02 MFD. .2 MFD. 2 MFD. 20 MFD.	125K to 128K OHMS _# 12K to 13K OHMS _# 1200 to 1300 OHMS _# 140 to 150 OHMS _#	CR101, R127, R131 to R138 incl. CR101, R127, R131 to R138 incl., R156 CR101, R127, R131 to R138 incl., R157 CR101, R127, R131 to R138 incl., R158
MILS	1 M.A. 5 M.A. 10 M.A. 50 M.A. 100 M.A. 500 M.A.	500 OHMS* 100 OHMS* 50 OHMS* 10 OHMS* 5 OHMS* 1 OHM *	R149, R150, R151 R152, R153, R154
<p>*Open one lead to METER M101. †Short out METER M101. #Read with PB2 Depressed.</p>			

CAUTION

DISCONNECT POWER CORD BEFORE STARTING RESISTANCE MEASUREMENTS.

10. COPPER OXIDE RECTIFIER.

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

b. A defective rectifier CR-101 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 CR-101 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 CR-101, 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.

d. After replacement of the rectifier CR-101 the LOW AC CAL control, R-135, and the HIGH AC CAL control, R-136 must be adjusted to establish the proper AC VOLTS calibration.

- (1) Set the POWER switch S-113 to OFF position.
- (2) Set the FUNCTION switch S-111 to AC VOLTS position and the RANGE switch S-112 to the 100 volt position.
- (3) Apply 80 volts AC to J-101 and J-102. The 80 volts should be monitored with an ac voltmeter of 2 percent accuracy or better.
- (4) Adjust the HIGH AC CAL control R-136 until the meter pointer of the TV-3C/U indicates exactly 80 volts on the 100 volt scale.
- (5) Apply 4 volts ac to J-101 and J-102. The 4 volts should be monitored with an ac voltmeter of 2 percent accuracy or better.
- (6) Set the RANGE switch S-112 to the 5 volt scale.
- (7) Adjust the LOW AC CAL control R-135 until the meter pointer of the TV-3C/U indicates exactly 4 volts on the 5 volt scale.
- (8) Tighten the locking nuts and recheck the meter indications.

Note

THE AC CALIBRATION CONTROLS ON THE TV-3C/U ARE EQUIPPED WITH SHAFT LOCKS TO PREVENT VIBRATION FROM CHANGING THE SETTINGS. IT IS NOT NECESSARY TO TIGHTEN THESE LOCKS TO THE POINT WHERE IT IS IMPOSSIBLE TO ROTATE THE SHAFT WITH A SCREWDRIVER. TO DO SO MIGHT INJURE THE CONTROL. ENOUGH TENSION TO CAUSE APPRECIABLE FRICTION ON THE SHAFT IS JUST AS EFFECTIVE AND AT THE SAME TIME ALLOWS ADJUSTMENT WITHOUT LOOSENING THE SHAFT LOCK EACH TIME.

TABLE 7-4. CROSS REFERENCE LIST FOR LOCATION OF PARTS BY SYMBOL DESIGNATION

SYMBOL DESIG.	LOCATION OF COMPONENTS OR ILLUSTRATION ON WHICH IT IS CALLED OUT
A-101	Figures 1-1, 1-2, 1-3
A-102	Figures 1-1, 1-2, 1-3
C-101	Figures 7-4 and 7-5
C-102	Figure 7-4
C-103	Mounted directly behind C102 (See figure 7-4 for C102)
C-104	Figure 7-3
C-105	Figure 7-4
CR-101	Mounted on underside of terminal board TB101 between resistors R136 and R135. (See figure 7-3 for R136 and R135)
E-101	Figures 4-1 and 7-2
E-102	Figure 4-1
E-103	Figure 7-4
E-104	Figure 1-3
E-105	Figure 1-4
E-106	Figure 1-4
E-107	Part of test lead W102 (See figure 1-3 for W102)
E-108	Part of test lead W102 (See figure 1-3 for W102)
E-109	Part of adapter E105 (See figure 1-4 for E105)
E-110	Part of adapter E105 (See figure 1-4 for E105)
E-111	Part of adapter E105 (See figure 1-4 for E105)
E-112	Part of adapter E105 (See figure 1-4 for E105)
E-113	Part of adapter E104 (See figure 1-3 for E104)
E-114	Figures 4-1 and 7-2
E-115	Figures 4-1 and 7-3
F-101	Figures 4-1 and 7-2
F-102	Figures 4-1 and 7-3
H-123	Figure 7-5
H-124	Figure 7-5
H-125	Figure 7-3
H-126	Part of tester case (See figures 1-1, 1-2, 1-3)
H-127	Part of tester case (See figures 1-1, 1-2, 1-3)
H-128	Mounted in front of data chart N101 (See figure 4-1)
H-129	Figure 4-1
I-101	Figures 4-1 and 7-2
I-102	Figure 4-1
I-103	Figures 4-1 and 7-4
J-101	Figures 4-1 and 7-2
J-102	Figures 4-1 and 7-2
J-103	Figure 4-1
J-104	Figure 4-1
J-105	Figures 4-1 and 7-4
J-106	Figure 4-1
M-101	Figure 4-1
N-101	Figures 4-1 and 7-3
N-102	Mounted in tester cover (See figure 1-1 for cover)
O-101	Figures 4-1 and 7-2
P-101	Part of test lead W102 (See figure 1-3)
P-102	Part of test lead W103 (See figure 1-3)
P-103	Part of test lead W104 (See figure 1-3)
P-104	Part of test lead W105 (See figure 1-3)
P-105	Part of test lead W104 (See figure 1-3)
P-106	Part of test lead W105 (See figure 1-3)
P-107	Part of adapter E104 (See figure 1-3)
P-108	Part of adapter E104 (See figure 1-3)
R-101	Figure 7-2
R-102	Figure 7-3
R-103	Figure 7-3
R-104	Figure 7-3
R-105	Figure 7-4
R-106	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-107	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-108	Mounted on TB102 (See figure 7-4 for TB102)
R-109	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-110	Figures 4-1 and 7-4
R-111	Mounted on TB102 (See figure 7-4 for TB102)
R-112	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-113	Mounted on TB102 (See figure 7-4 for TB102)
R-114	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-115	Mounted on TB102 (See figure 7-4 for TB102)
R-116	Figure 7-4
R-117	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-118	Mounted on rear of TB102 (See figure 7-4 for TB102)
R-119	Figure 7-4
R-120	Mounted on S108 just above R119 (See figure 7-4 for R119)
R-121	Mounted on rear of TB101 (See figure 7-5 for TB101)
R-122	Figure 7-2
R-123	Mounted on rear of TB101 (See figure 7-5 for TB101)
R-124	Figure 7-2
R-125	Mounted on rear of TB101 (See figure 7-5 for TB101)

TABLE 7-4. CROSS REFERENCE LIST FOR LOCATION OF PARTS BY SYMBOL DESIGNATION (Cont'd)

SYMBOL DESIG.	LOCATION OF COMPONENTS OR ILLUSTRATION ON WHICH IT IS CALLED OUT
R-126	Figure 7-2
R-127	Figure 7-3
R-128	Mounted under TB101, directly opposite R127 (See figure 7-3 for R127)
R-129	Figure 7-3
R-130	Mounted under TB101, directly opposite R129 (See figure 7-3 for R129)
R-131	Figure 7-3
R-132	Mounted under TB101, directly opposite R131 (See figure 7-3 for R131)
R-133	Figure 7-3
R-134	Mounted under TB101, directly opposite R133 (See figure 7-3 for R133)
R-135	Figure 7-3
R-136	Figure 7-3
R-137	Figure 7-3
R-138	Mounted under TB101, directly opposite R137 (See figure 7-3 for R137)
R-139	Mounted under TB101, directly opposite R140 (See figure 7-2 for R140)
R-140	Figure 7-2
R-141	Mounted under TB101, directly opposite R142 (See figure 7-2 for R142)
R-142	Figure 7-2
R-143	Figure 7-4
R-144	Figure 7-2
R-145	Figure 7-2
R-146	Figure 7-3
R-147	Figure 7-2
R-148	Mounted under TB101, directly opposite R145 (See figure 7-2 for R145)
R-149	Figure 7-3
R-150	Figure 7-3
R-151	Figure 7-3
R-152	Figure 7-3
R-153	Figure 7-3
R-154	Figure 7-3
R-155	Figure 7-3
R-156	Figure 7-3
R-157	Mounted under TB101, directly opposite R144 (See figure 7-2 for R144)
R-158	Figure 7-2
R-159	Figure 7-2
R-160	Mounted under TB101, directly opposite R159 (See figure 7-2 for R159)
R-161	Figure 7-3
R-162	Figures 4-1 and 7-2
R-163	Figure 7-3
R-164	Figure 7-3
R-165	Figures 4-1 and 7-4
R-166	Figure 7-3
R-167	Mounted on E115 (See figures 4-1 and 7-3 for E115)
S-101	Figures 4-1 and 7-2
S-102	Figures 4-1 and 7-2
S-103	Figures 4-1 and 7-2
S-104	Figures 4-1 and 7-2
S-105	Figures 4-1 and 7-2
S-106	Figures 4-1 and 7-2
S-107	Figures 4-1 and 7-2
S-108	Figure 4-1
S-109	Figure 4-1
S-110	Figure 7-2
S-111	Figures 4-1 and 7-2
S-112	Figure 4-1
S-113	Figure 4-1
T-101	Figures 7-2 and 7-4
TB-101	Figure 7-5
TB-102	Figure 7-4
V-101	Figure 7-5
V-102	Figure 7-5
W-102	Figure 1-3
W-103	Figure 1-3
W-104	Figure 1-3
W-105	Figure 1-3
W-107	Part of test lead W103 (See figure 1-3)
X-101	Figure 7-2
X-102	Figure 7-2
X-103	Figures 4-1 and 7-4
X-104	Figures 4-1 and 7-4
X-105	Figures 4-1 and 7-4
X-106	Figures 4-1 and 7-4
X-107	Figures 4-1 and 7-4
X-108	Figures 4-1 and 7-4
X-109	Figures 4-1 and 7-4
X-110	Figure 4-1
X-111	Figures 4-1 and 7-4
X-112	Figures 4-1 and 7-4
X-113	Figures 4-1 and 7-4

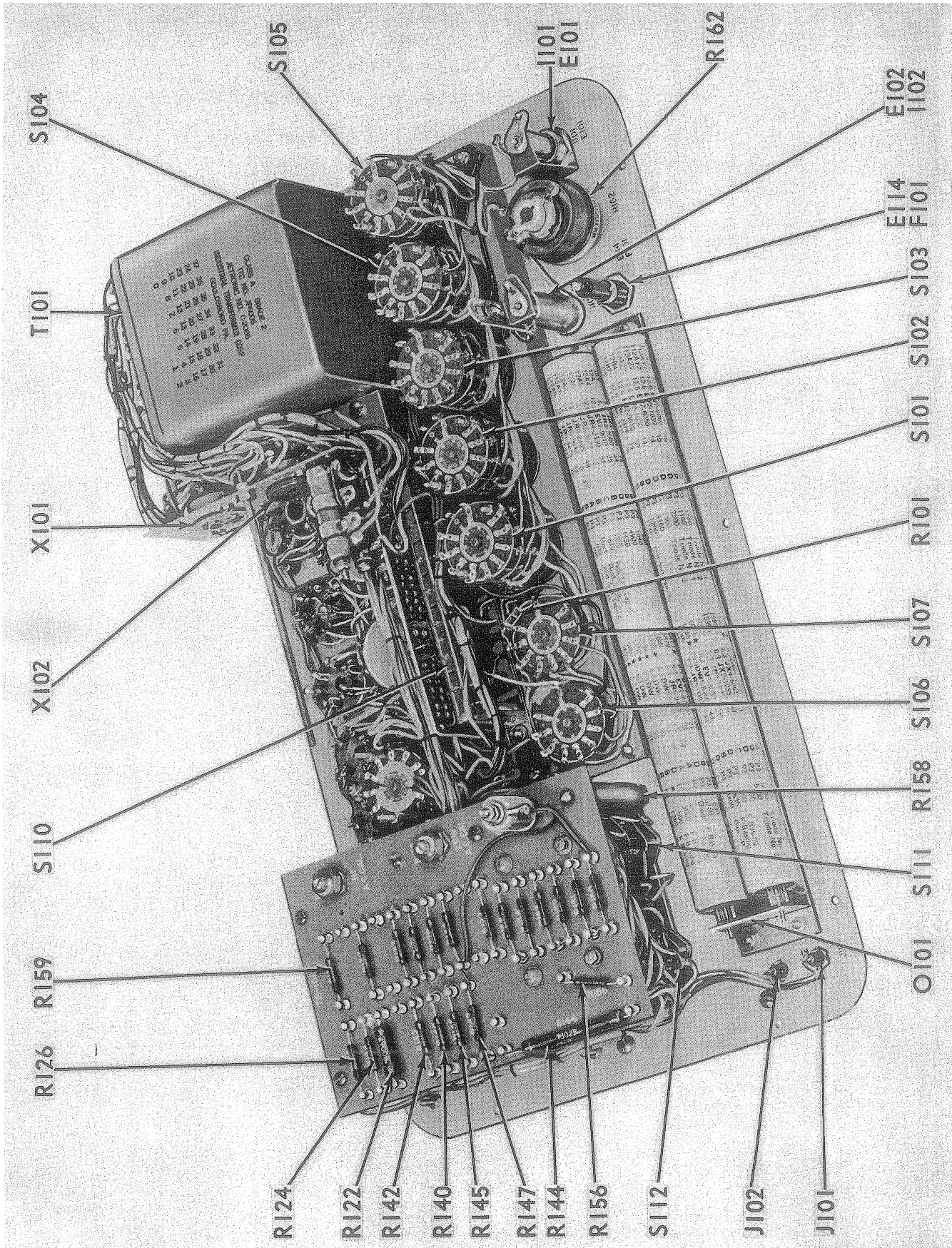


Figure 7-2.—Internal View of Tube Tester TV-3C/U Front Left Oblique.

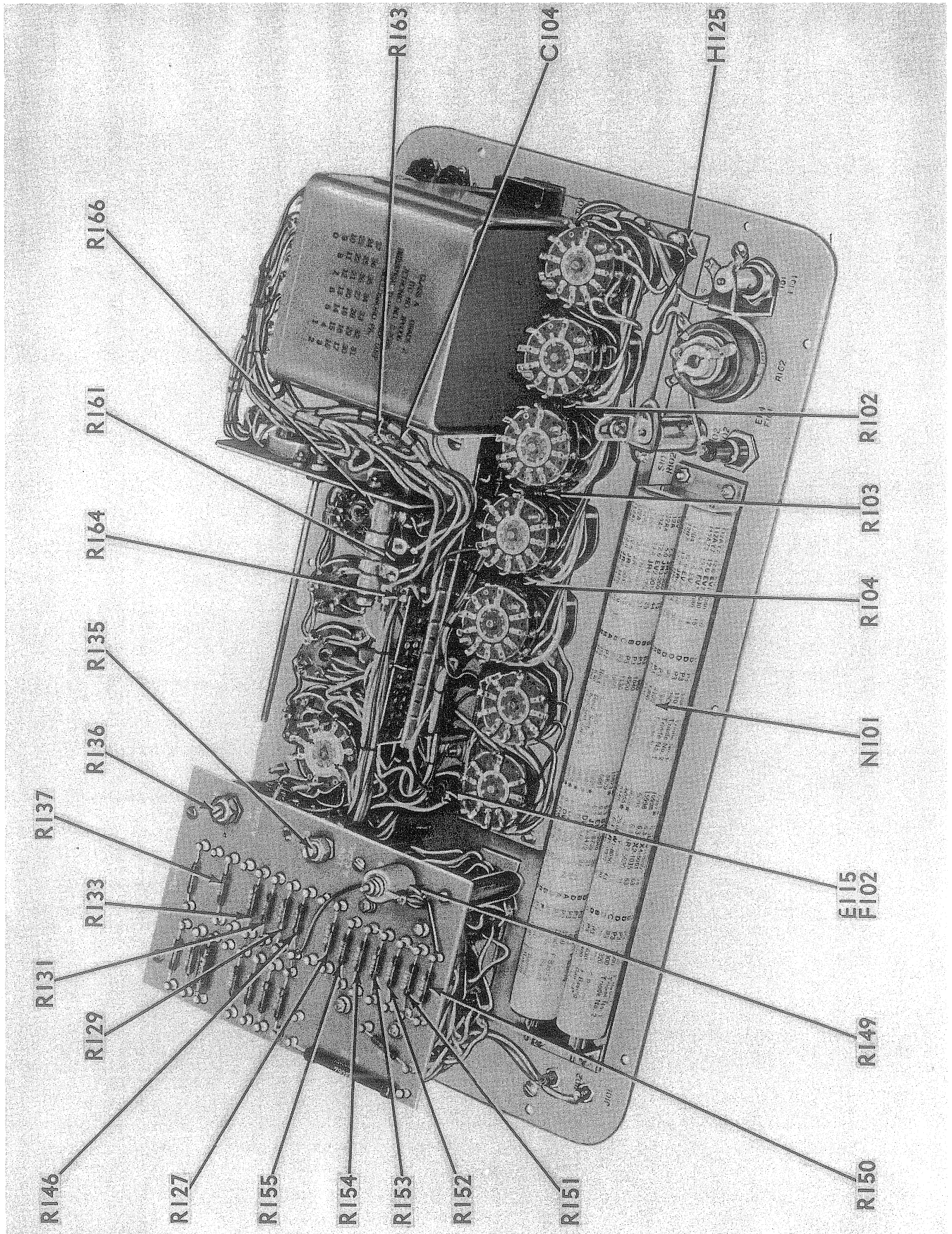


Figure 7-3.—Internal View of Tube Tester TV-3C/U Front Right Oblique.

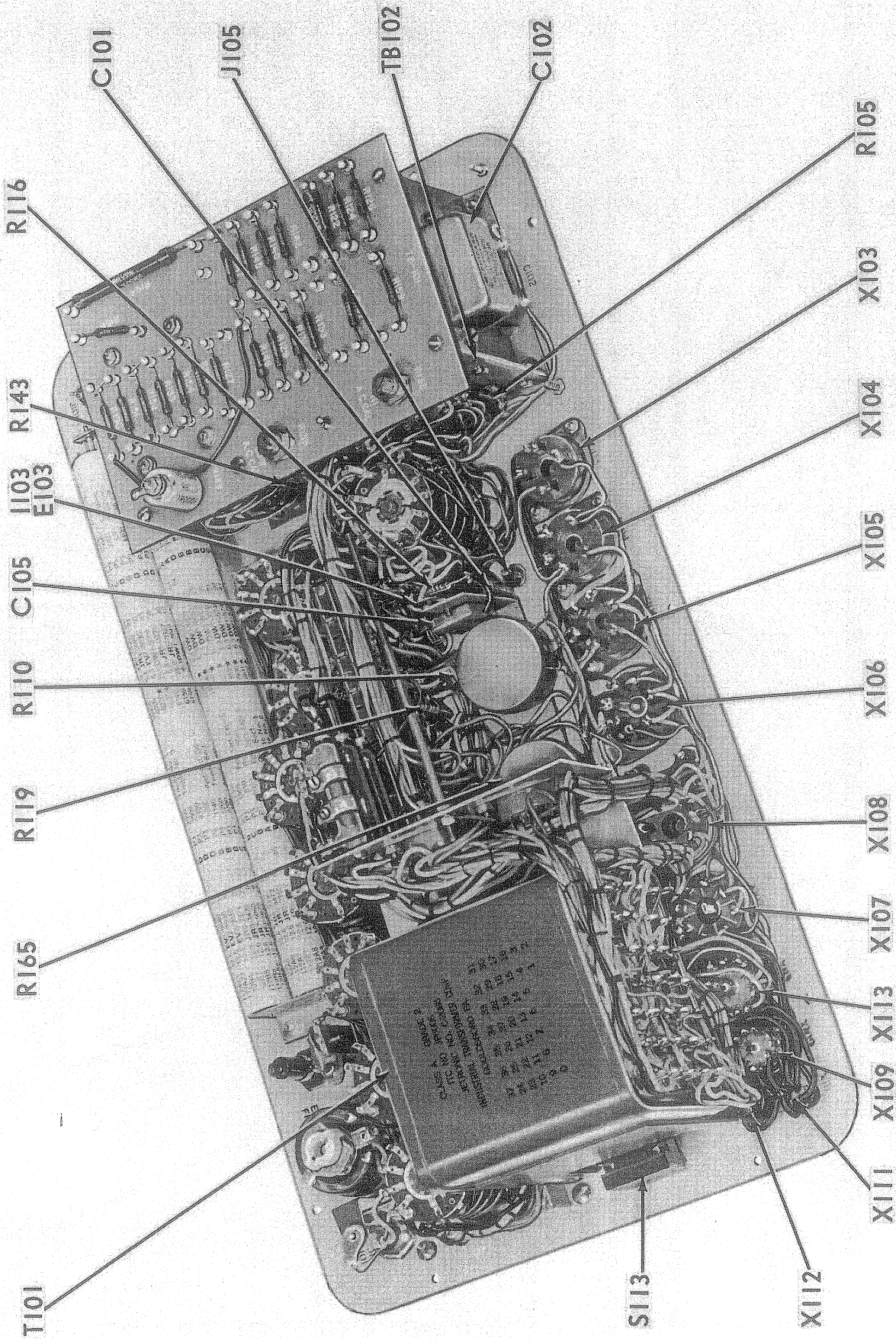


Figure 7-4.—Internal View of Tube Tester TV-3C/U Rear Left Oblique.

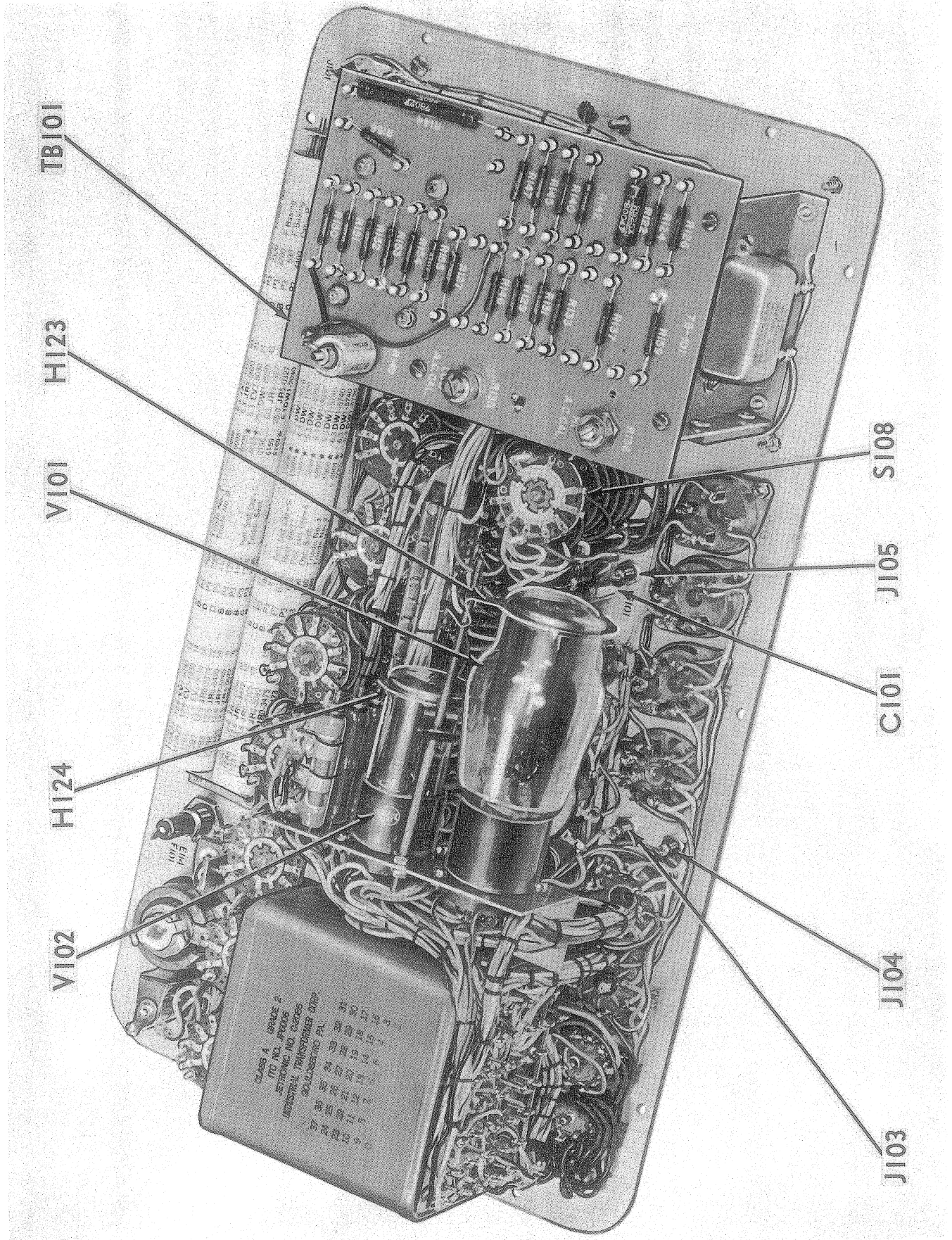
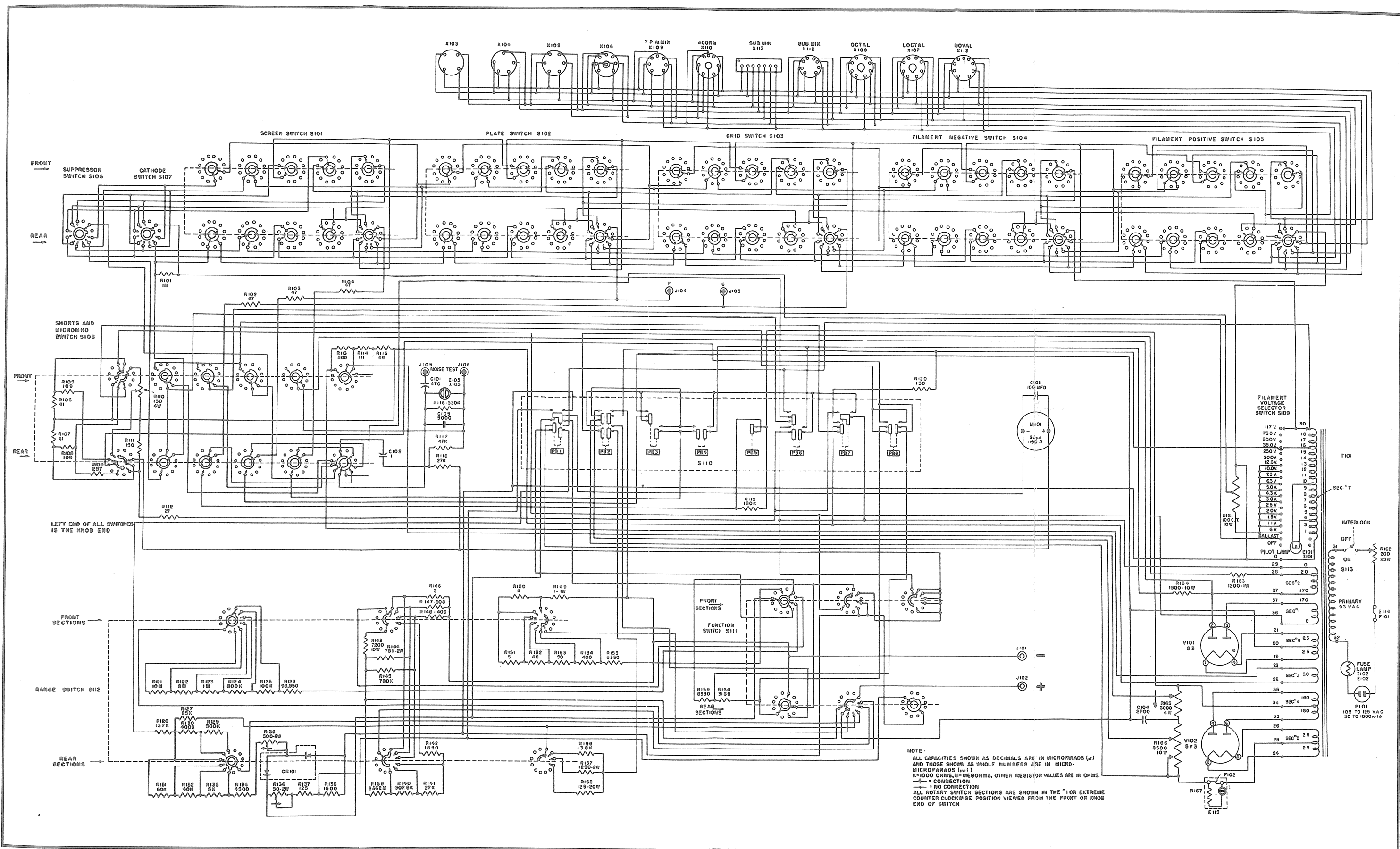


Figure 7-5.—Internal View of Tube Tester TV-3C/U Rear Right Oblique.

NOTES



ORIGINAL

Figure 7-6.—Schematic Diagram—Tube Tester TV-3C/U.

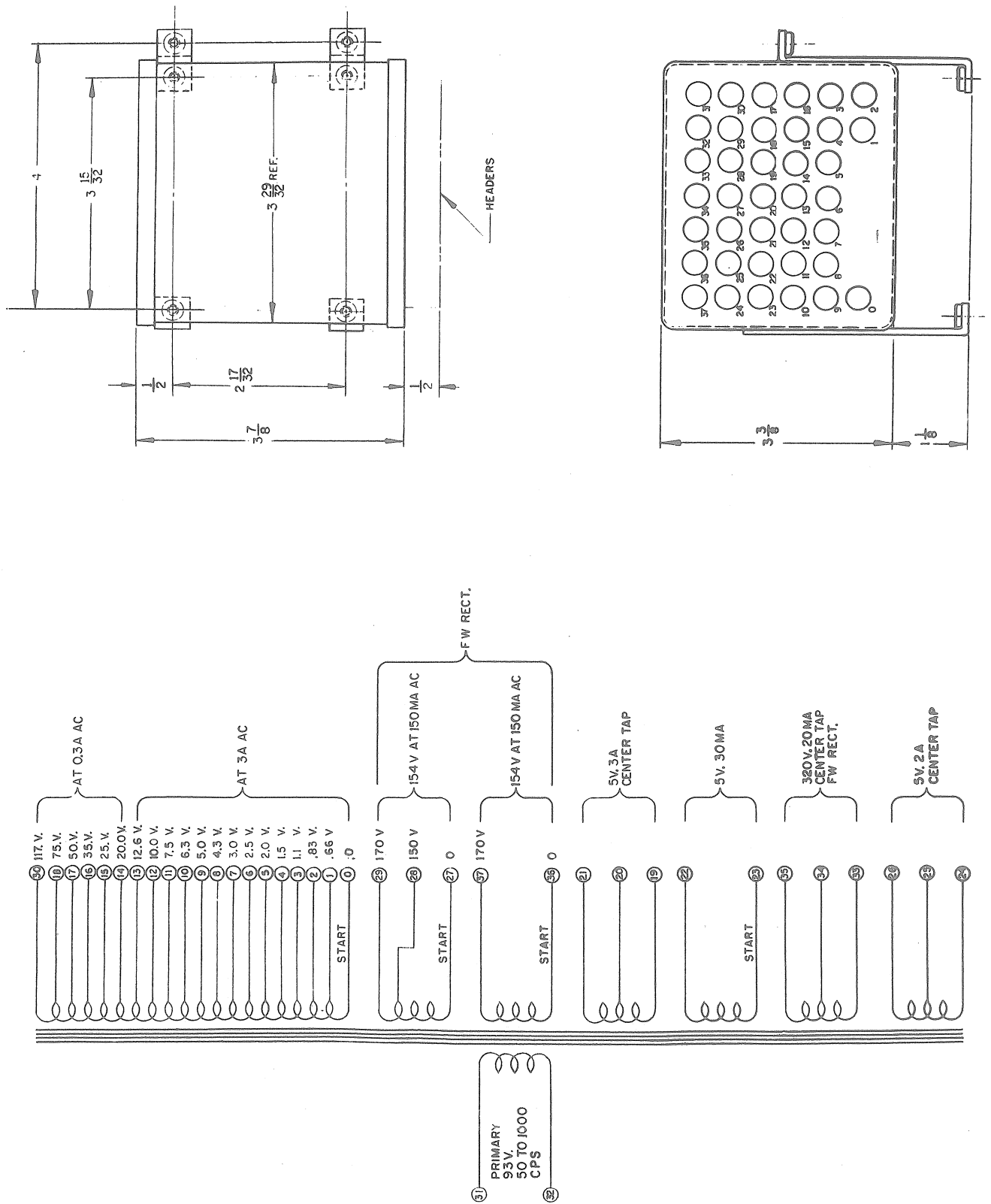


Figure 7-7. Transformer Diagram

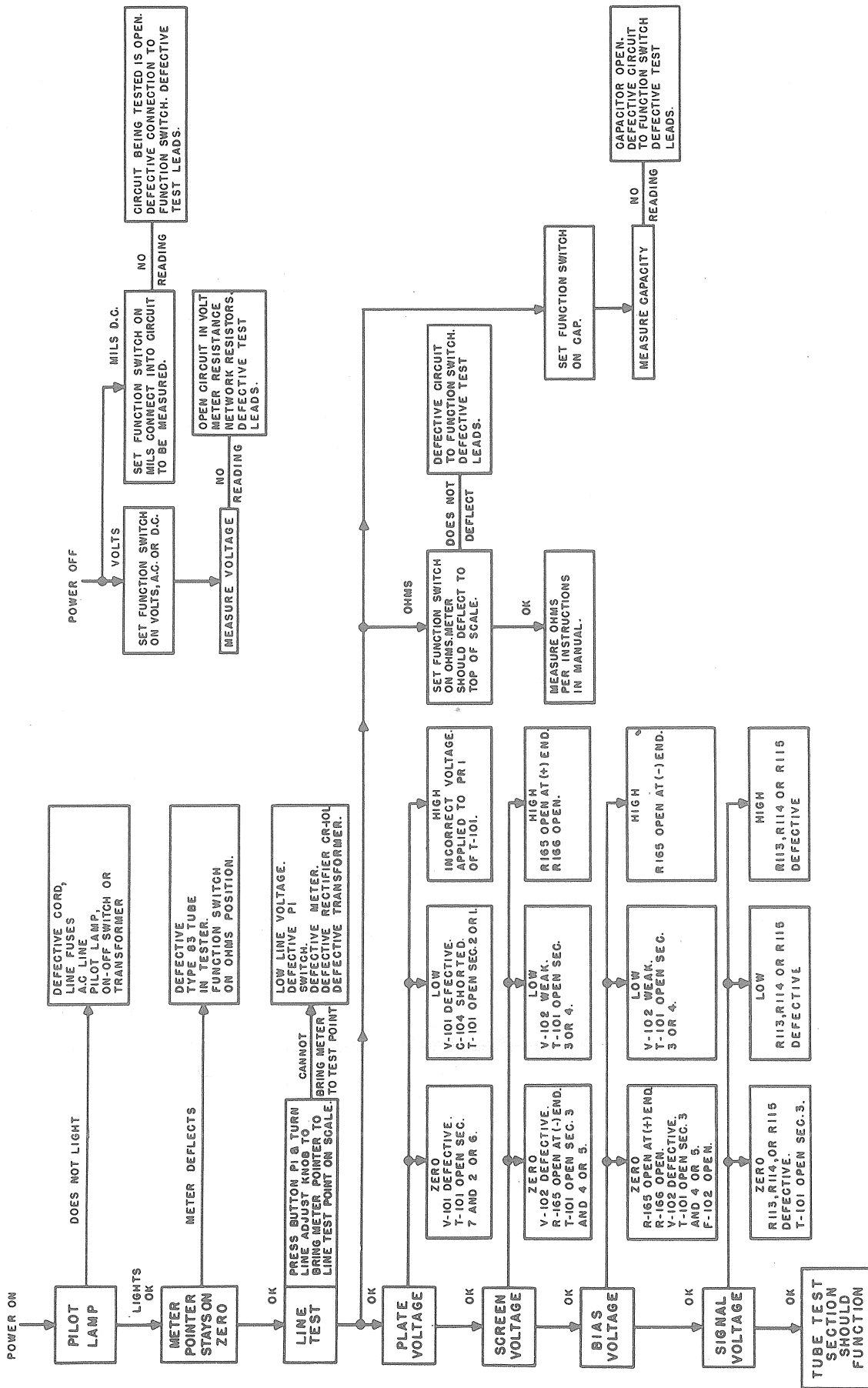


Figure 7-8. Trouble Shooting Diagram

TABLE 8-1. LIST OF MAJOR UNITS

SYMBOL GROUP	QUANTITY	NAME OF MAJOR UNIT	DESIGNATION
100	1	TUBE TESTER	TV-3C/U

Standard Navy Stock No.

Signal Corps Stock No.

TABLE 8-2. TABLE OF REPLACEABLE PARTS

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	SIG. CORPS STD. NAVY AIR CORPS	LOCATING FUNCTIONS
A-101	CASE, ELECTRON TUBE TESTER; aluminum; grey enamel finish inside and out; 18-1/8 in. wide, 5-1/8 in. deep; 1 handle, located on front; contains 1 Navy Tube Tester, model TV-3C/U; built in stowage compartment. Jetronic part no. E3058	_____	_____	Equipment case.
A-102	COVER, ELECTRON TUBE TESTER; aluminum; grey enamel finish inside and out; 18-1/8 in. lg, 10-1/8 in. wide, 2 in. deep; instruction sheet mtd inside under flange on welded-on channel; Part of Tube Tester TV-3C/U. Jetronic part no. E3059.	_____	_____	Equipment cover.
C-101	CAPACITOR, FIXED, MICA DIELECTRIC; 470 mmf, $\pm 10\%$; 500V DCW, 7/16 in. wide, 25/32 in. lg; 3/16 in. high; Spec JAN-C-5, type no. CM20A471K; Electro-Motive Mfg. Co., type no. RCM20A471K.	N16-C-30114-4271	_____	Isolating capacitor to prevent shorts when making noise test.
C-102	CAPACITOR, FIXED, PAPER DIELECTRIC; 0.1 mfd, $\pm 10\%$; 600V DCW; 1-13/16 in. lg, 1 in. wide, 23/32 in. high; Spec JAN-C-25, type no. CP53BIEF104K; Chicago Condenser Corp., Chicago, Ill., type no. 1173.	N16-C-45777-3122	_____	DC blocking capacitor. Isolating capacitor short test.
C-103	CAPACITOR, FIXED, ELECTROLYTIC; 100 mfd; 15V DCW; 1-3/4 in. lg, 1 in. wide, 7/8 in. high; Spec JAN-C-62, type no. CE63A-101E; Acorvox Corp., New Bedford, Mass., type no. CE63A-101E.	_____	For replacement use N16-C-20179-5441	Meter filter.
C-104	CAPACITOR, FIXED, MICA DIELECTRIC; 2700 mmf, $\pm 10\%$; 500V DCW; 13/16 in. wide, 13/16 in. deep, 1/4 in. high; Spec JAN-C-5, type no. CM35A272K; Electro-Motive Mfg. Co., type no. CM35A272K.	_____	For replacement use N16-C-32145-5164	Prevents oscillations in tube under test.
C-105	CAPACITOR, FIXED, MICA DIELECTRIC; 4700 mmf, $\pm 10\%$, 500V DCW, 53/64 in. lg, 53/64 in. wide, 11/32 in. high; Spec JAN-C-5, type no. CM35A472M Electro-Motive Mfg. Co., type 502-L-A.	N16-C-32651-9283	_____	Part of short test circuit.
CR-101	RECTIFIER, METALLIC; copper oxide; designed for half wave meter circuit, MBCA Ref Dwg Group 28; 1 phase, 4.5V AC input; half wave, 5 ma max, 3V DC output; 19/32 in. lg, 3/8 in. wide, 17/64 in. deep over-all; Bradley Laboratories, Inc., part no. CX2E2D.	N-17-R-50882-2838	_____	Meter rectifier to permit measurement of AC voltages.

E-101	LIGHT, INDICATOR; supplied with 1/2 in. dia red lens, smooth back, smooth face, translucent, threaded mtg for lensholder; accommodates T-3-1/4 miniature bayonet base lamp; no electrical rating; 1-1/16 in. high, 7/8 in. wide, 1-11/16 in. lg over-all; lamp replaceable from front of panel; Drake Mfg. Co., type no. 40.	N17-L-76854-3964	Socket assembly for pilot light.
E-102	LAMPHOLDER; accommodates candelabra bayonet lamp base; rated at 115V, 75W; 2 in. lg, 1 in. wide, 11/16 in. high over-all; no switch included; Drake Mfg. Co., part no. 614-L-CH-LT.	N17-L-51678-5660	Fuse lamp holder.
E-103	LAMPHOLDER; accommodates candelabra screw base; 75W, 115V max electrical rating; 5/8 in. high, 1 in. wide, 1-3/4 in. lg, over-all; Drake Mfg. Co., type 414-L-CH-LT.	N17-L-50844-4672	Socket assembly for 'SHORTS' lamp.
E-104	ADAPTER, TEST; for connection to grid and plate of lighthouse tubes; two no. 18AWG stranded copper conductors, rubber insulation, one red and one black; 5-1/4 in. lg less terminals; both leads terminating one end in special grid and plate connector for lighthouse tubes; Ucinite part no. J-1348-1-2; other end of red lead terminates in red tip plug, Herman H. Smith Inc., part no. 203-Red; other end of black lead terminates in black tip plug, Herman H. Smith, Inc., part no. 203-Black. Includes P-107, P-108, W-112, W-113 and E-113. Jetronic part no. B218. Listed for reference only.	For replacement use N17-L-63201-2527	Adapter for making contact to grid and plate of lighthouse tubes.
E-105	ADAPTER, ELECTRON TUBE SOCKET; for adapting 829 tube to standard octal socket; phenolic body; silver-plated phosphor bronze socket contacts; plugs into octal socket; two 6 in. lg shielded leads with clips for connection to top tube contacts; includes W-110, W-111, E-109, E-110, E-111, and E-112. Jetronic part no. C2120. Listed for reference only.	For replacement use N16A-22620-7391	Provides means of testing special base tubes in standard test socket.
E-106	ADAPTER, ELECTRON TUBE SOCKET; for adapting 2C39 tube to standard octal socket; phenolic body; silver-plated phosphor bronze contacts; plugs into octal socket. Jetronic part no. C2119.	For replacement use N16-A-22604-5321	Provides means of testing special contact tube in standard and test socket.
E-107	CLIP, ELECTRICAL; battery style no. 1, MBCA ref dwg group .37; cadmium-plated steel; 1-1/2 in. lg, 5/16 in. wide, 1/2 in. high; no electrical rating; Mueller Electric Co., Cleveland, Ohio, part no. 45 (less screw).	N17-C-801899-101	Electron tube contact clip.

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	SIG. CORPS STD. NAVY AIR CORPS	LOCATING FUNCTIONS
E-108	CABLE NIPPLE, ELECTRICAL; plastic; angle type; 1-45/64 in. lg over-all, 29/64 max ID; Mueller Electric Co., Cleveland, Ohio, part no. 87.	N17-C-945001-299		Insulator for electrical clip E-107.
E-109	CLIP, ELECTRICAL; coil test style 1, MBCA Ref Dwg Group 37; phosphor bronze; 1-11/16 in. lg, 3/16 in. wide, 7/32 in. high; no electrical rating; Mueller Electric Co., Cleveland, Ohio, part no. 88.	N17-C-803722-316		Electron tube contact connection.
E-110	CLIP, ELECTRICAL; Same as E-109.			
E-111	CABLE NIPPLE, ELECTRICAL; plastic; straight type; 2-1/16 in. lg over-all, 17/64 in. max ID; Mueller Electric Co., Cleveland, Ohio, part no. 93-P.	Low failure item — if required req. from ESO ref. NavShips 900,180A		Insulator for electrical clip E-109.
E-112	CABLE NIPPLE, ELECTRICAL; Same as E-111.			
E-113	CLIP, ELECTRICAL; grid-plate style no. 5, MBCA Ref Dwg Group 37, blued steel; 1-1/8 in. dia, 1 in. lg; no electrical rating; The Ucinite Co., part no. J-1348-1-2.	N17-C-800730-881		Used as grid and plate connector for lighthouse tubes.
E-114	FUSEHOLDER; extractor post type; 250V, 5 amp rating; accommodates fuse, cartridge type, 1-1/4 in. lg, 1/4 in. dia; 2-1/4 in. lg, 1/16 in. dia over-all; Bussman Mfg. Co., type HKP.	N17-F-74267-5075		Fuseholder for line fuse F-101.
E-115	FUSEHOLDER; extractor post indicating type; 250V 20 amp rating; accommodates fuse, cartridge type, 1-1/4 in. lg, 1/4 in. dia; 2-3/4 in. lg, 0.820 in. dia; Bussman Mfg. Co., type HKL-JW.			Fuseholder for bias voltage fuse F-102.
F-101	FUSE, CARTRIDGE; 250V, 1-1/2 amp rating; instantaneous; ferrule type terminals, 1/4 in. lg, 1/4 in. dia; inclosed type; one time; 1-1/4 in. lg, 1/4 in. dia; Bussman Mfg. Co., part no. AGC-1-1/2.	G17-F-16302-90		Line fuse.

F-102	FUSE, CARTRIDGE; 250V, 1/8 amp rating; instantaneous; ferrule type terminals, 1/4 in. lg, 1/4 in. dia; inclosed type; one time; 1-1/4 lg, 1/4 in. dia over-all, Bussman Mfg. Co., part no. AGC-1/8.	<u>N17-F-16302-30</u>	Bias voltage fuse.
H-101	KNOB; phenolic; black; natural finish; 1-1/4 in. lg, 5/8 in. high over-all; white depressed line; Kurz-Kasch, part no. S-292-3L-W/1 set screw.	<u>N16-K-700065-545</u>	Panel control actuators.
H-102	KNOB; Same as H-101.		
H-103	KNOB; Same as H-101.		
H-104	KNOB; Same as H-101.		
H-105	KNOB; Same as H-101.		
H-106	KNOB; Same as H-101.		
H-107	KNOB; Same as H-101.		
H-108	KNOB; Same as H-101.		
H-109	KNOB; Same as H-101.		
H-110	KNOB; Same as H-101.		
H-111	KNOB; Same as H-101.		
H-112	KNOB; Same as H-101 except tapped for 2 set screws; Kurz-Kasch, part no. S-292-3L-W/2 set screws.	<u>For replacement use N16-K-700065-545</u>	Panel control actuators.
H-113	KNOB; Same as H-112.		
H-114	KNOB; Same as H-112.		
H-115	KNOB; bakelite; black, natural finish; 15/32 in. lg, 7/16 in. dia; no markings; Kurz-Kasch, Inc., part no. S-328-30 Black.	<u>For replacement use N17-B-840101-117</u>	Push buttons for push switch S-110.
H-116	KNOB; Same as H-115.		
H-117	KNOB; Same as H-115.		
H-118	KNOB; Same as H-115.		
H-119	KNOB; Same as H-115.		
H-120	KNOB; Same as H-115.		
H-121	KNOB; Same as H-115.		

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	SIG. CORPS STD. NAVY AIR CORPS	LOCATING FUNCTIONS
H-122	KNOB; bakelite; red; natural finish; 15/32 in. lg, 7/16 in. dia; no markings; Kurz-Kasch, Inc., part no. S-328-30 Red.	_____	_____	Push button for section 3 of switch S-110.
H-123	CLAMP, ELECTRICAL; stainless steel; 1 clip type fastener; 2-9/16 in. lg, 2-1/8 in. wide, 3/4 in. high; designed to hold electron tubes having max top dia of 1-9/16 in.; Times Facsimile Corp., part no. 3-HAT.	N-16-R-503580-226	_____	Locks type 83 rectifier in socket.
H-124	CLAMP, ELECTRICAL; stainless steel; 1 clip type fastener; 2-1/32 in. lg, 1-7/16 in. wide, 23/32 in. high; designed to hold electron tubes having max. top dia. of 1-3/16 in.; Times Facsimile Corp., part no. 2-HAT.	N16-R-503580-212	_____	Locks type 5Y3 rectifier in socket.
H-125	CLAMP, ELECTRICAL; nylon; 1 screw type fastening; 1/2 in. wide, .036 in. thk.; designed to hold material .234 in. max. dia.; Weckesser Co, Chicago, Ill., "Nyloc Cable Clip", nominal size 1/4 in. type 3.	_____	_____	Secures power cord within equipment.
H-126	CATCH, DOOR; steel, cad. plated; wing-type head, 7/16 in. high, 1-1/8 in. wide; .625 in. lg. by .290 in. dia. shaft, designed to accommodate materials from .170 in. to .189 in. thick; Lion Fastener, Inc., Homeoye Falls, N.Y., type 5-W-180.	_____	_____	Secures stowage compartment door.
H-127	GROMMET, RUBBER; synthetic rubber; flat-washer type; 7/16 in. OD, 5/32 in. ID, 5/64 in. thk.; durometer hardness rating not determined; Lion Fastener, Inc., Homeoye Falls, N. Y., type GR-1.	_____	_____	Retainer for door catch H-126.
H-128	PLATE, INDICATOR; for index guide marker, cellulose acetate, clear; rect., 11-5/8 in. lg., by 1-1/2 in. wide, .040 in. thk.; 4 mtg. holes .177 in. dia. on 1 in. by 11-1/4 in. mtg. centers; single red filled indicating line .010 in. wide, lengthwise, 5/64 in. from center; 1-1/4 in. by 5/16 in. cutout at one end to clear roller index knob; Jetronic part no. B-1216.	_____	_____	Test chart guide line.
H-129	HANDLE; squared 'U' shape; 1-5/16 in. high, 3-5/16 in. lg, 5/16 in. dia.; each end tapped 1/4 in. min. for 8-32NC-2 machine screw; Jetronic part no. A560.	_____	_____	Grip for lifting equipment from case.

I-101	LAMP, INCANDESCENT; 6 to 8 volts, 1.2 W, .15 amp; miniature bayonet base, T-3-1/4 clear bulb, white light emission; 1 C-2 tungsten filament; 1-1/8 in. max. over-all height; over 25 hrs. rated life; J. B. Hudson, Inc., Phila., Pa., type no. 47.	G17-L-6297	Pilot lamp.
I-102	LAMP, INCANDESCENT; 6 to 8 volts, 6 CP; candelabra base bayonet, G6 clear bulb, white light emission, 1 C-2R filament, tungsten, 1-7/16 in. max. over-all height; over 25 hrs. rated life; J. B. Hudson, Inc., Phila., Pa., type no. 81.	G17-L-6686	Fuse and overload indicator in primary circuit of transformer T-101.
I-103	LAMP, GLOW; neon gas; 1/4 W, 65V AC striking voltage, 90V DC striking voltage; over 25 hrs. rated life; GE type NE45.	G17-L-6807	Short test indicator.
J-101	CONNECTOR, RECEPTACLE; single type; 1 rd. female contact; non-polarized; not grounded; straight type; phone type connector; 3/4 in. lg. excluding solder lug terminal, 3/8 in. dia. over-all; no electrical rating; non-RF connector; cylindrical phenolic body; mtd. with 1/4-20 mtg. nut threaded on body through 1/4 in. dia. panel hole; Alden Product Co., part no. 110BCS-Black.	For replacement use N17-C-73108-1985	Panel connection for insertion of plate cap lead.
J-102	CONNECTOR, RECEPTACLE; single type; 1 rd. female contact; non-polarized; not grounded; straight type; phone type connector; 3/4 in. lg. excluding solder lug terminal, 3/8 in. dia. over-all; no electrical rating; non-RF connector; cylindrical phenolic body; mtd. with 1/4-20 mtg. nut threaded on body through 1/4 in. dia. panel hole; Alden Product Co., part no. 110BCS-Red.	N17-C-73108-1901	Panel connection for insertion of grid cap lead.
J-103	CONNECTOR, RECEPTACLE; Same as J-101.		
J-104	CONNECTOR, RECEPTACLE; Same as J-102.		
J-105	CONNECTOR, RECEPTACLE; Same as J-101.		
J-106	CONNECTOR, RECEPTACLE; Same as J-101.		

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	LOCATING FUNCTIONS
M-101	METER, ELECTRON TUBE TESTER; 50 microamps full scale deflection; calibrated for microhms, volts, mils, ohms, microfarads, 0 to 3000/6000/15,000/30,000 microhms, 0 to 5/10 volts and mils, 0 to 1000 ohms, 0 to 2 microfarads; 19/32 in. thick, 4-5/8 in. wide, 4-3/16 in. high flange; 2-23/32 in. body dia., 1 in. body depth from mtg. surface; scale colors microhms, volts and mils black, ohms green, microfarads orange, white background; Beede Electric Co., Panacook, NH, model no. 16-C (special face per Jetronic dwg. C-2104).	<p>=====</p> <p>=====</p> <p>=====</p>	Test Indicator.
N-101	CHART; paper; "Tube Test Data", 12 ft. 6 in. lg., approx. by 10-3/16 in. wide; each end mts. on chart drive roller; tube types and instrument settings; black print on white background; Jetronic part no. A-594.	<p>=====</p> <p>=====</p> <p>=====</p>	Test Chart.
N-102	SHEET, INSTRUCTION; condensed operating data for tube test and multimeter sections; laminated plastic; 16-7/8 in. lg., 4-3/16 in. wide; mtd. by sliding under flanged edging inside tester cover; Jetronic part no. C-2128.	<p>=====</p> <p>Low failure item — if required req. from ESO Ref. NavShips 900,180A</p> <p>=====</p>	Operating instructions.
O-101	DRIVE, CHART; c/o dual fiber rollers; 3/4 in. dia., mtd. and geared on cadmium plated welded panel assembly; rect.; 1-1/2 in. wide by 11-5/8 in. lg. by 1-1/2 in. deep; 4 mtg. holes 3/16 in. dia. on 1 in. by 11-1/4 in. mtg/c; Jetronic part no. C-2121.	<p>=====</p> <p>=====</p> <p>=====</p>	Drive for tube test chart.
P-101	CONNECTOR; PLUG; 1 rd. male contact; not polarized or grounded; straight type; phone type connector, black phenolic; 1-17/32 in. lg., 3/8 in. dia.; contacts not rated electrically; non-RF connector; cylindrical nickel-plated brass body; accommodates .140 in. OD insulated wire; Herman H. Smith, Inc., Brooklyn, N.Y., part no. 203-Black.	<p>=====</p> <p>For replacement use N-17-C-71419-3324</p> <p>=====</p>	Part of test leads W-102, W-103, W-105 and adapter E-104.
P-102	CONNECTOR, PLUG; Same as P-101.		

P-103	CONNECTOR, PLUG; 1 rd. male contact; not polarized or grounded, straight type; phone type connector; black phenolic; 1-17/32 in. lg., 3/8 in. dia.; contacts not rated electrically; non-RF connector; cylindrical nickel-plated brass body; accommodates .140 in. OD insulated wire; Herman H. Smith, Inc., Brooklyn, N.Y., part no. 203-RED.	For replacement use N17-C-71408-3050	Part of test lead W-104 and adapter E-104.
P-104	CONNECTOR, PLUG; Same as P-101.		
P-105	PROD. TEST; no power rating; not frequency or capacitance rated; replaceable phone tip; 4 in. lg. red tenite handle; wire attached through solder connection; 3/8 in. dia., 5-3/16 in. lg. over-all; Herman H. Smith, Inc., Brooklyn, N.Y., part no. 319-Red.	For replacement use N17-P-84940-5101	Multimeter test lead prod.
P-106	PROD. TEST; no power, frequency or capacitance rating; replaceable phone tip; 4 in. lg. black tenite handle; wire attached through solder connection; 3/8 in. dia., 5-3/16 in. lg. over-all; Herman H. Smith, Inc., Brooklyn, N.Y., part no. 319-Black.	For replacement use N17-P-84940-5126	Multimeter test lead prod.
P-107	CONNECTOR, PLUG; Same as P-101.		
P-108	CONNECTOR, PLUG; Same as P-103.		
R-101	RESISTOR, FIXED, COMPOSITION; 1 megohm total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length, 1/8 in. OD, 3/8 in. lg., per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF105K; International Resistance Co., type JAN RC20BF105K.	3RC20BF105K N16-R-50975-811	Grid resistor for converter tubes.
R-102	RESISTOR, FIXED, COMPOSITION; 47 ohms total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg. C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length, 1/8 in. OD, 3/8 in. lg., per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF470K; Stackpole Carbon Co., JAN type RC20BF470K.	3RC20BF470K N16-R-49427-811	Neutralizing resistor-oscillation suppressor.
R-103	RESISTOR, FIXED, COMPOSITION; Same as R-102.		
R-104	RESISTOR, FIXED, COMPOSITION; Same as R-102.		

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	SIG. CORPS STD. NAVY AIR CORPS	LOCATING FUNCTIONS
R-105	RESISTOR, FIXED, FILM; 109 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia., Spec. MIL-R-10509A, type RN15R109RF; Electra Mfg. Co., Kansas City, Mo., type DC1/2A.	|||		Part of shunt network for micromho measurements.
R-106	RESISTOR, FIXED, FILM; 41 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia., Spec. MIL-R-10509A, type RN15R41RF; Electra Mfg. Co., Kansas City, Mo., type DC1/2A.	|||		Part of shunt network for micromho measurements.
R-107	RESISTOR, FIXED, FILM; Same as R-106.	|||		
R-108	RESISTOR, FIXED, FILM; Same as R-105.	|||		
R-109	RESISTOR, FIXED, FILM; 257 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R257RF; Electra Mfg. Co., Kansas City, Mo., type DC1/2A. Meter shunt for 6000 micromho range.	|||		Meter shunt for 6000 micromho range.
R-110	RESISTOR, VARIABLE; wire-wound element; 1 section; 150 ohms total resistance, $\pm 10\%$ tolerance; 4W nom. power rating; standard A taper, MBCA Ref. Dwg. Group 3; no switch attached; Spec. JAN-R-19, type RA30-AIRD151AK; Chicago Telephone Supply Corp., type 25.	|||		Meter sensitivity control for diode and rectifier tests.
R-111	RESISTOR, FIXED, FILM; 150 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R150RF; Electra Mfg. Co., Kansas City, Mo., type DC1/2A.	|||		Meter Shunt.
R-112	RESISTOR, FIXED, FILM; 27 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R27RF; Electra Mfg. Co., Kansas City, Mo., type DC1/2A.	|||		Meter Shunt.

R-113	RESISTOR, FIXED, FILM; 800 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R800RF; Electra Mfg. Co., type DC1/2A.	Part of voltage divider for signal voltage.
R-114	RESISTOR, FIXED, FILM; 111 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R111RF; Electra Mfg. Co., type DC1/2A.	Part of voltage divider for signal voltage.
R-115	RESISTOR, FIXED, FILM; 89 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R89RF; Electra Mfg. Co., type DC1/2A.	Part of voltage divider for signal voltage.
R-116	RESISTOR, FIXED, COMPOSITION; 330,000 ohms total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg. C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length, 1/8 in. OD, 3/8 in. lg, per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF334K; International Resistance Co., type JAN RC20F334K.	Shunt for neon lamp.
R-117	RESISTOR, FIXED, COMPOSITION; 47,000 ohms total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg. C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length; 1/8 in. OD, 3/8 in. lg. body dim, per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF473K; International Resistance Co., JAN type RC20BF473K.	Limiting resistor for short test circuit.
R-118	RESISTOR, FIXED, COMPOSITION; 27,000 ohms total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg. C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length; 1/8 in. OD, 3/8 in. lg. body dim, per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF273K; International Resistance Co., Jan Type RC20BF273K.	Limiting resistor for short test circuit.
R-119	RESISTOR, FIXED, COMPOSITION; 180,000 ohms total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg. C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length; 1/8 in. OD, 3/8 in. lg. body dim, per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF184K; International Resistance Co., type JAN RC20BF184K.	Series grid resistor for gas test circuit.
R-120	RESISTOR, FIXED, FILM; Same as R-111.	

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	LOCATING FUNCTIONS
R-121	RESISTOR, FIXED, FILM; 10 megohms total resistance, $\pm 1\%$ tolerance; 1W, 500V power rating; 15/16 in. lg., 1/4 in. dia.; Spec. MIL-R-10509A, RN25R1005F; Electra Mfg. Co., type DC1.	<p>_____</p> <p>_____</p>	Part of DC voltmeter multiplier network.
R-122	RESISTOR, FIXED, FILM; 8 megohms total resistance, $\pm 1\%$ tolerance; 1W, 500V power rating; 7/8 in. lg., 1/4 in. dia.; Spec. MIL-R-10509A, type RN25R8004F; Electra Mfg. Co., type DC1.	<p>_____</p> <p>_____</p>	Part of DC voltmeter multiplier network.
R-123	RESISTOR, FIXED, FILM; 1 megohm total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R1004F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>For replacement use N16-R-73308-3062</p> <p>_____</p>	Part of DC voltmeter multiplier network.
R-124	RESISTOR, FIXED, FILM; 800,000 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R8003F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>For replacement use N16-R-73293-4701</p> <p>_____</p>	Part of DC voltmeter multiplier network.
R-125	RESISTOR, FIXED, FILM; 100,000 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R1003F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>For replacement use N16-R-73191-6876</p> <p>_____</p>	Part of DC voltmeter multiplier network.
R-126	RESISTOR, FIXED, FILM; 98,850 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R98850RF; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p>	Part of DC voltmeter multiplier network.
R-127	RESISTOR, FIXED, FILM; 25,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R2502F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p>	Part of capacity test circuit.
R-128	RESISTOR, FIXED, FILM; 137,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R1373F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p>	Part of line test circuit.

R-129	RESISTOR, FIXED, FILM; 500,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R5003F; Electra Mfg. Co., type DC1/2A.	For replacement use N16-R-73271-1558	Part of AC voltmeter multiplier network.
R-130	RESISTOR, FIXED, FILM; 400,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R4003F; Electra Mfg. Co., type DC1/2A.	For replacement use N16-R-73261-1191	Part of AC voltmeter multiplier network.
R-131	RESISTOR, FIXED, FILM; 50,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R5002F; Electra Mfg. Co., type DC1/2A.	For replacement use N16-R-73149-6865	Part of AC voltmeter multiplier network.
R-132	RESISTOR, FIXED, FILM; 40,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R4002F; Electra Mfg. Co., type DC1/2A.	For replacement use N16-R-73139-7657	Part of AC voltmeter multiplier network.
R-133	RESISTOR, FIXED, FILM; 5000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R5001F; Electra Mfg. Co., type DC1/2A.	For replacement use N16-R-73045-5721	Part of AC voltmeter multiplier network.
R-134	RESISTOR, FIXED, FILM; 4500 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R4501F; Electra Mfg. Co., type DC1/2A.	N16-R-87189-4475	Part of AC voltmeter multiplier network.
R-135	RESISTOR, VARIABLE; composition element; 1 section, 500 ohms total resistance, $\pm 10\%$ tolerance; 2W nom. power rating; not tapped; no switch; Allen-Bradley Co., part no. JLU5001.	N16-R-87012-5535	Corrects meter to be 1000 ohms/V for low AC ranges.
R-136	RESISTOR, VARIABLE; composition element; 1 section, 50 ohms total resistance, $\pm 10\%$ tolerance; 2W nom. power rating; not tapped; no switch; Allen-Bradley Co., part no. JLU5001.		Corrects meter to be 1000 ohms/V for high AC ranges.
R-137	RESISTOR, FIXED, FILM; 125 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R125RF; Electra Mfg. Co., type DC1/2A.		Part of correction network placing meter sensitivity at 1000 ohms/V on high AC ranges.

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	LOCATING FUNCTIONS
R-138	RESISTOR, FIXED, FILM; 1500 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R1501F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p> <p>_____</p>	Meter compensation resistor for capacity test.
R-139	RESISTOR, FIXED, FILM; 2.662 megohms total resistance, $\pm 1\%$ tolerance; 1W, 500V power rating; 15/16 in. lg, 1/4 in. dia.; Spec. MIL-R-10509A, type RN25R2662000 RF; Electra Mfg. Co., type DC1.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter multiplier network for high ranges.
R-140	RESISTOR, FIXED, FILM; 307,500 ohms total resistance, $\pm 1\%$ tolerance, 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R307500RF; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter multiplier network for high ranges.
R-141	RESISTOR, FIXED, FILM; 27,000 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R2702F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter multiplier network for high ranges.
R-142	RESISTOR, FIXED, FILM; 1850 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R1851F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter multiplier network for high ranges.
R-143	RESISTOR, FIXED, WIRE-WOUND; inductive winding; 7200 ohms total resistance, $\pm 2\%$ tolerance; 10W power dissipation, rated at 25 deg. C ambient temp.; not tapped; not adjustable; 1-3/4 in. lg, 11/32 in. OD, 3/16 in. ID, 3/8 in. lg. terminals, 3/8 in. wide terminals; TRU-OHM Products, Huntington, Ind., type FR-TER. No. 10, less mounting brackets.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter shunt network for low ranges.
R-144	RESISTOR, FIXED, FILM; 78,000 ohms total resistance, $\pm 1\%$ tolerance; 2W, 750V power rating; 2 in. lg, 1/4 in. dia.; Spec. MIL-R-10509A, type RN30R7803F; Electra Mfg. Co., type DC2.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter shunt network for low ranges.
R-145	RESISTOR, FIXED, FILM; 780,000 ohms total resistance, $\pm 1\%$ tolerance, 1/2W, 350V power rating; 5/8 in. lg, 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R7803F; Electra Mfg. Co., type DC1/2A.	<p>_____</p> <p>_____</p> <p>_____</p>	Part of ohmmeter shunt network for low ranges.

R-146	RESISTOR, FIXED, FILM; 3 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R3RF; Electra Mfg. Co., type DC1/2A.	Part of ohmmeter shunt network for low ranges.	=====
R-147	RESISTOR, FIXED, FILM; 30.8 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R30R8F; Electra Mfg. Co., type DC1/2A.	Part of ohmmeter shunt network for low ranges.	=====
R-148	RESISTOR, FIXED, FILM; 406 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 500V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R406RF; Electra Mfg. Co., type DC1/2A.	Part of ohmmeter shunt network for low ranges.	=====
R-149	RESISTOR, FIXED, WIRE-WOUND; 1 ohm total resistance, $\pm 1\%$ tolerance; 1W, rated at 25 deg. C ambient temp.; not tapped or adjustable; 31/32 in. lg., 5/8 in. OD, 11/32 in. lg. terminals, 5/32 in. wide terminals; Spec. MIL-R-93A, type RB12B1R000F; Resistance Products Co., Harrisburg, Pa., type AGE.	Part of milliammeter shunt network.	=====
R-150	RESISTOR, FIXED, FILM; 4 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R4RF; Electra Mfg. Co., type DC1/2A.	Part of milliammeter shunt network.	=====
R-151	RESISTOR, FIXED, FILM; 5 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R5RF; Electra Mfg. Co., type DC1/2A.	Part of milliammeter shunt network.	=====
R-152	RESISTOR, FIXED, FILM; 40 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R40RF; Electra Mfg. Co., type DC1/2A.	Part of milliammeter shunt network.	=====
R-153	RESISTOR, FIXED, FILM; 50 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R50RF; Electra Mfg. Co., type DC1/2A.	Part of milliammeter shunt network.	=====
R-154	RESISTOR, FIXED, FILM; 400 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R400RF; Electra Mfg. Co., type DC1/2A.	Part of milliammeter shunt network.	=====

For replacement use N16-R-78568-5801

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	SIG. CORPS STD. NAVY AIR CORPS	LOCATING FUNCTIONS
R-155	RESISTOR, FIXED, FILM; 8350 ohms total resistance $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R8351F; Electra Mfg. Co., type DC1/2A.	=====		Part of milliammeter and meter shunt circuits respectively.
R-156	RESISTOR, FIXED, FILM; 13,800 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R1382F; Electra Mfg. Co., type DC1/2A.	=====		Meter shunt for 0.2 mfd. capacity range.
R-157	RESISTOR, FIXED, FILM; 1250 ohms total resistance, $\pm 1\%$ tolerance; 2W, 750V power rating; 2 in. lg., 1/4 in. dia.; Spec. MIL-R-10509A, type RN30R1251F; Electra Mfg. Co., type DC2.	=====		Meter shunt for 2 mfd. capacity range.
R-158	RESISTOR, FIXED, WIRE-WOUND; inductive winding; 125 ohms total resistance, $\pm 2\%$ tolerance; 25W, rated at 25 deg. C ambient temp. power rating; 2 in. lg., 1/2 in. OD, 1/4 in. ID, terminals 3/8 in. lg., 3/16 in. wide; Not tapped or adjustable; TRU-OHM Products, Huntington, Ind.; type FR (less mtg. brackets).	=====		Meter shunt for 20 mfd. capacity range.
R-159	RESISTOR, FIXED, FILM; Same as R-155.	=====		Part of meter shunt.
R-160	RESISTOR, FIXED, FILM; 3160 ohms total resistance, $\pm 1\%$ tolerance; 1/2W, 350V power rating; 5/8 in. lg., 1/8 in. dia.; Spec. MIL-R-10509A, type RN15R3161F; Electra Mfg. Co., type DC1/2A.	=====		Part of meter shunt.
R-161	RESISTOR, FIXED, WIRE-WOUND; inductive winding; 100 ohms total resistance, $\pm 10\%$ tolerance; 10W rated at 25 deg. C ambient temp. power rating; center tapped; 50 ohms each section; not adjustable; 1-3/4 in. lg., 11/32 in. OD, 3/16 in. ID, terminals 13/32 in. lg., 7/64 in. wide; P. R. Mallory and Co., Inc., part no. IHJ100CT.	=====	N16-R-67393-2596	Provides center tap for cathode connection of filament type tubes.
R-162	RESISTOR, VARIABLE; wire-wound element; 200 ohms total resistance, $\pm 10\%$ tolerance; 1 section; 25W nom. power rating; not tapped; no switch; Spec. JAN-R-22, type RP101RD201KK; Ohmite Mfg. Co., Jan type RP101RD201KK.	=====	N16-R-90301-2675	Line adjust rheostat.

R-163	RESISTOR, FIXED, COMPOSITION; 1200 ohms total resistance, $\pm 10\%$ tolerance; 1/2W power dissipation, rated at 40 deg. C ambient temp.; resistance temp. characteristic F; 1-1/2 in. lead length, 1/8 in. OD, 3/8 in. lg. body diam., per MBCA Ref. Dwg. Group 2; Spec. JAN-R-11, type RC20BF122K; International Resistance Co., type JAN RC20BF122K.	3RC20BF122K For replacement use N16-R-49941-231	Limiting resistor for diode test circuit.
R-164	RESISTOR, FIXED, WIRE-WOUND; inductive winding; 1800 ohms total resistance, $\pm 5\%$ tolerance; 10W rated at 25 deg. C. ambient temp.; power rating; 1-3/4 in. lg., 21/64 in. OD, 3/16 in. ID, terminals 11/32 in. lg., 7/64 in. wide; P. R. Mallory & Co., type IHJ1800 $\pm 5\%$.	For replacement use N16-R-66094-5706	Limiting resistor for OZ4 test circuit.
R-165	RESISTOR, VARIABLE; wire-wound element; 3000 ohms total resistance, $\pm 10\%$ tolerance; 4W nom. power rating; not tapped; no switch; Clarostat Mfg. Co., Dover, NH, type CM12985 as specified per Jetronic dwg. B-1201.		Bias control, adjusts bias voltage applied to tube under test.
R-166	RESISTOR, FIXED, WIRE-WOUND; inductive winding; 8500 ohms total resistance, $\pm 10\%$ tolerance; power rating 10W, rated at 25 deg. C ambient temp.; adjustable type, 2 slides; 1-3/4 in. lg., 11/32 in. OD, 7/32 in. ID, terminals 7/16 in. lg., 3/16 in. wide; Ward Leonard Electric Co., type 10A8500WL.	For replacement use N16-R-43688-3689	Adjusts bias and low screen voltages for micromhos test.
R-167	RESISTOR, FIXED, COMPOSITION; 220,000 ohms total resistance; $\pm 10\%$ tolerance; 1/4W, power dissipation; Part of E-115.	For replacement use N16-R-50372-811	Limiting resistor.
S-101	SWITCH, ROTARY; sectional type, 5 sections; 10 positions, max. no. switching positions possible; non 'pile-up' type, 10 moving contacts, 28 fixed contacts, 10 poles, 10 throws; not rated electrically; non-shorting contacts, 2 in. lg., 1-17/32 in. high, 1-13/32 in. wide; half-rd. shaft, 5/8 in. lg., 5/32 in. dia.; Spec. MIL-S-3786; Oak Mfg. Co., Chicago, Ill., type N (per Jetronic dwg. A-488).		Screen, Plate, Grid, negative and positive filament, voltage selectors.
S-102	SWITCH, ROTARY; Same as S-101.		
S-103	SWITCH, ROTARY; Same as S-101.		
S-104	SWITCH, ROTARY; Same as S-101.		
S-105	SWITCH, ROTARY; Same as S-101.		

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	SIG. CORPS STD. NAVY AIR CORPS	LOCATING FUNCTIONS
S-106	SWITCH, ROTARY; sectional type, 1 section, 10 positions possible; non 'pile-up' type; 1 moving contact, 10 fixed contacts, 1 pole, 10 throws; not rated electrically; non-shorting contacts; 3/8 in. lg., 1-17/32 in. high, 1-13/32 in. wide; half-rd. shaft, 5/8 in. lg., 5/32 in. dia.; Spec. MIL-S-3786; Oak Mfg. Co., Chicago, Ill., type N (per Jetronic dwg. A-489).	|| || ||		Suppressor and cathode voltage selector.
S-107	SWITCH, ROTARY; Same as S-106.			Short test switch.
S-108	SWITCH, ROTARY; sectional type, 6 sections, 10 positions possible; non 'pile-up' type; 15 moving contacts, 50 fixed contacts, 10 throws; not rated electrically; non-shorting contacts; 2-7/8 in. lg., 1-17/32 in. high, 1-13/32 in. wide; half-rd. shaft, 5/8 in. lg., 5/32 in. dia.; Spec. MIL-S-3786; Oak Mfg. Co., Chicago, Ill., type N (per Jetronic dwg. A-487).	|| || ||		Selects proper filament voltage for tube under test.
S-109	SWITCH, ROTARY; sectional type, 1 section, 20 positions possible; non 'pile-up' type; 2 poles, 20 throws; not rated electrically; non-shorting contacts; 13/16 in. lg., 1-15/16 in. wide, 2-5/16 in. high; half-rd. shaft, 5/8 in. lg., 5/32 in. dia.; Spec. MIL-S-3786; Oak Mfg. Co., Chicago, Ill., type MF (per Jetronic dwg. B-1189).	|| || ||		Applies test voltage for various tube types.
S-110	SWITCH, PUSH; 8 sections, each operated by separate pushbutton independently of other sections; 6-9/32 in. lg., 15/16 in. high, 1-15/16 in. deep behind mtg. surface excluding push-rods and terminals; momentary action; solder lug terminals; two 140 dia. mtg. holes on 6 in. mtg/c, 8 pushrods .052 in. thk., 13/16 in. wide extend 29/32 in. from mtg. surfaces; Oak Mfg. Co., Chicago, Ill., type 130 (per Jetronic dwg. B-1190).	|| || ||		Selector for multimeter circuit.
S-111	SWITCH, ROTARY; sectional type, 3 sections; 6 positions possible; non 'pile-up' type, 7 poles, 6 throws, 3-3/32 in. lg., 1-17/32 in. high, 1-13/32 in. wide; non-shorting contacts; half-rd. shaft, 5/8 in. lg., 5/32 in. dia.; Spec. MIL-S-3786; Oak Mfg. Co., Chicago, Ill., type K (per Jetronic dwg. A-486).	|| || ||		

S-112	SWITCH, ROTARY; sectional type, 3 sections; 6 positions, max. number of switching positions possible; non pile-up type, 7 poles, 6 throws; 3-3/32 in. lg., 1-17/32 in. high, 1-13/32 in. wide; non-shorting contacts; half-rd. shaft, 5/8 in. lg., 5/32 in. dia.; Spec. MIL-S-3786; Oak Mfg. Co., Chicago, Ill., type K (Per Jetronic dwg. A-485).	=====	Range selector for multimeter circuit.
S-113	SWITCH, TOGGLE; SPST; 2 positions; 6 amps, 125V AC electrical rating; 1-5/32 in. lg., 21/32 in. wide; 19/32 in. high over-all, excluding terminals, bushing and handle; 11/16 in. lg. Arrow Hart and Hedgeman Electric Co., type bat type handle; Spec. JAN-S-23, type ST16A; JAN ST16A.	3Z9863-16A NI17-S-70778-4234 =====	Power switch ON-OFF.
T-101	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP; fully enclosed, hermetically sealed; 93V AC, 50 to 1000 CPS single phase primary; no. 1 secondary 170V @ 150 ma., no. 2 secondary 170V @ 150 ma., tapped at 150V, no. 3 secondary 5V @ 30 ma., no. 4 secondary 320V @ 20 ma. center tapped, no. 5 secondary 5V at 2a center tapped, no. 6 secondary 12.6V @ 3 amps center tapped, no. 7 secondary 12.6V @ 3 amps, tapped at .66-.83-1.1-1.5-2.0-2.5-3.0-4.3-5.0-6.3-7.3-10.0-12.6 volts. no. 8 secondary 97V @ 0.3 amps, tapped at 5-15-30-55-97 volts; 4 in. lg., 3-3/8 in. wide, 3-9/16 in. high; Spec. MIL-T-27, grade 2; Industrial Transformer Corp., Gouldsboro, Pa., (per Jetronic dwg. C-2086)	=====	Supplies AC voltage to filament and rectifier circuits.
TB-101	TERMINALS BOARD; laminated paper base phenolic; incl. 53 miniature swaged stud type terminals; 6-5/8 in. lg., 4-1/2 in. wide, 3/32 in. thk.; 2.1495 mtg. holes on 3 in. centers one end, 4.1285 in. dia. mtg. holes or 2 in. by 1-1/4 in. centers; 2.3906 in. dia. holes for mtg. variable resistors; 2 .096 in. dia. holes for mtg. metallic rectifiers; 2 .1495 in. dia. holes for mtg. fixed resistors, 1 .177 in. dia. hole for mtg. fixed resistor; Jetronic part no. B-1240.	=====	Component mounting.
TB-102	TERMINAL BOARD; XXP laminated paper base phenolic; incl. 15 miniature swaged stud type terminals; w/o barriers; 3-3/8 in. lg., 2-1/8 in. wide, 3/32 in. thk., 4.1495 mtg. holes on 1-1/2 in. by 2-7/8 in. mtg. centers; Jetronic part no. A-610.	=====	Component mounting.
V-101	ELECTRON TUBE; Spec. MIL-E-1, type 83; RCA type CRC-83.	N16-T-60830 =====	Rectifier, plate supply voltage.
V-102	ELECTRON TUBE; Spec. MIL-E-1, type 5Y3WGTA; RCA type CRP5Y3.	N16-T-55738-5 =====	Rectifier, screen and bias voltages.

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	LOCATING FUNCTIONS
W-101	CABLE ASSEMBLY, POWER, ELECTRICAL; 2 conductor shielded cable, type AN RG108/U; 7 ft. 8-11/16 in. extreme over-all length; one end terminated in plug connector with integral 6 in. lgth. of lead terminated in spade lug, used to ground shield, other end stripped of insulation for 5 in., ends of two conductors tinned for 1/2 in.; over-all assembly not rated electrically; Jetronic part no. B-1236.	Low failure item — if required req. from ESO ref. NavShips 900,180A	Power cord.
W-102	LEAD, TEST; 1 conductor, no. 18AWG stranded copper; cotton wrap, rubber insulated conductor; 5000V max. rated working voltage of conductor; conductor, Belden Mfg. Co., type no. 8899-Black; 11-7/8 in. over-all; 1 plug connector, Herman H. Smith, Inc., part no. 203-Black, one end, 1 electrical clip and 1 cable nipple, Mueller Electric Co., parts no. 45 and 87 respectively, other end; consists of W-106, E-107, E-108, and P-101. Listed for reference only.	Low failure item — if required req. from ESO ref. NavShips 900,180A	Connects plate caps to panel jack.
W-103	LEAD, TEST; 1 conductor, no. 20AWG stranded copper; cotton wrap, rubber insulated conductor; 5000V max. rated working voltage of conductor; approx. 10-1/2 in. lg. over-all; 1 grid-cap, American Phenolic Corp., part no. 63-1, one end, 1 plug connector, Herman H. Smith, Inc., part no. 203-Black. Grid cap and conductor come as integral unit, American Phenolic part no. 63-1-W. Consists of W-107 and P-102. Listed for reference only.	Low failure item — if required req. from ESO ref. NavShips 900,180A	Connects grid caps to panel jack.
W-104	LEAD, TEST; 1 conductor, no. 18AWG stranded, tinned copper, cotton wrap, rubber insulation, red, 5000V max. rated working voltages; conductor Belden Mfg. Co., type 8899-Red; approx. 4 ft. 2 in. lg. over-all; 1 plug connector, Herman H. Smith, Inc., part no. 203-Red, one end, 1 test prod., Herman H. Smith, Inc., part no. 319-Red, other end; Consists of W-108, P-103, P-105. Listed for reference only.	Low failure item — if required req. from ESO ref. NavShips 900,180A	Test lead for multimeter positive jack.
W-105	LEAD TEST; 1 conductor, no. 18AWG, stranded, tinned copper, cotton wrap, rubber insulation, Black, 5000V max. rated working voltage; conductor, Belden Mfg. Co., type 8899-Black; approx. 4 ft. 2 in. lg. over-all; 1 plug connector, Herman H. Smith, Inc., part no. 203-Black, one end, 1 test prod., Herman H. Smith, Inc., part no. 319-Black, other end; consists of W-109, P-104 and P-106.	Low failure item — if required req. from ESO ref. NavShips 900,180A	Test lead for multimeter negative jack.

W-106	WIRE, ELECTRICAL; stranded conductor; rd. conductor; no. 18AWG, 65 strands no. 36AWG; 0.140 in. OD incl. insulation; cotton wrap, rubber covering from bare conductor out; 5000V max. rated working voltage; colored black; moisture and oil resistant; Belden Mfg. Co., Chicago, Ill., type no. 8899-Black. Part of test lead W-102. Ten in. lg.	For replacement use N15-W-2195-5100	Test lead wire.
W-107	CLIP, ELECTRICAL; grid-plate style no. 13, MBCA Ref. Dwg. Group 37; cadmium-plated spring brass; 1-1/4 in. lg., 23/32 in. wide, 29/64 in. high; phenolic insulation; no electrical rating; American Phenolic Corp., part no. 63-1-W. Part of test lead W-103.	N17-C-800828-601	Test lead clip.
W-108	WIRE, ELECTRICAL; stranded conductor; rd. conductor; no. 18AWG, 65 strands no. 36AWG; 0.140 in. OD incl. insulation; cotton wrap, rubber covering from bare conductor out; 5000V max. rated working voltage; colored red; moisture and oil resistant; Belden Mfg. Co., Chicago, Ill., type no. 8899-Red. Part of test lead W-104. Four ft. lg.	For replacement use N15-W-2645-450	Test lead wire.
W-109	WIRE, ELECTRICAL; stranded conductor; rd. conductor; no. 18AWG, 65 strands, no. 36AWG; 0.140 in. OD incl. insulation; cotton wrap, rubber covering from bare conductor out; 5000V max. rated working voltage; colored black; moisture and oil resistant; Belden Mfg. Co., Chicago, Ill., type no. 8899-Black. Part of Test Lead W-105. Four ft. lg.	For replacement use N15-W-2195-5100	Test lead wire.
W-110	WIRE, ELECTRICAL; stranded conductor; rd. conductor, no. 20AWG, 10 strands no. 30-AWG; 0.177 in. OD incl. insulation; cellulose-acetate yarn braid, fungus resistant lacquer coating, rubber covering, tinned copper braid shield from bare conductor out; 4000V AC max. rated working voltage; fungus resistant; Belden Mfg. Co., Chicago, Ill., type no. 8885. Part of Adapter E-105. Six in. lg.	For replacement use N15-C-34947-100	Adapter lead.
W-111	WIRE, ELECTRICAL; Same as W-110.		
W-112	WIRE, ELECTRICAL; stranded conductor; rd. conductor, no. 18AWG, 65 strands no. 36-AWG; 0.140 in. OD incl. insulation; cotton wrap, rubber covering from bare conductor out; 5000V max. rated working voltage; colored red; moisture and oil resistant; Belden Mfg. Co., Chicago, Ill., type no. 8899-Red; Part of Adapter E-104. Six in. lg.	For replacement use N15-W-2645-450	Adapter lead.

TABLE 8-2. TABLE OF REPLACEABLE PARTS (Cont'd)

REF. DESIG.	NAME OF PART AND DESCRIPTION	STOCK NOS.	LOCATING FUNCTIONS
W-113	WIRE, ELECTRICAL; stranded conductor; rd conductor, no. 18AWG, 65 strands no. 36-AWG; 0.140 in. OD incl. insulation; cotton wrap, rubber covering from bare conductor out; 5000V max. rated working voltage; colored black; moisture and oil resistant; Belden Mfg. Co., Chicago, Ill., type no. 8899-Black. Part of Adapter E-104. Six in. lg.	<p>For replacement use N15-W-2195-5100</p>	Adapter lead.
X-101	SOCKET, ELECTRON TUBE; 4 phosphor bronze silver-plated contacts; medium body size; 1-7/8 in. lg, 1-9/32 in. wide, 7/16 in. high over-all; Spec. JAN-S-28; American Phenolic Corp., part no. 77MIP4TM.	<p>N16-S-60852-2111</p>	Socket for 83 rectifier tube V-101 and test socket for 4 pin tubes respectively.
X-102	SOCKET, ELECTRON TUBE; 8 beryllium copper silver-plated contacts; medium size; 1-13/16 in. lg, 1-9/32 in. wide, 15/32 in. high; Spec. JAN-S-28; American Phenolic Corp., part no. 77MIP8T.	<p>N16-S-63516-6564</p>	Socket for 5Y3WGTA rectifier tube V-102 and test socket for octal base tubes respectively.
X-103	SOCKET, ELECTRON TUBE; Same as X-101	<p>For replacement use N16-S-61703-9581</p>	Test socket for 5 pin tubes.
X-104	SOCKET, ELECTRON TUBE; 5 phosphor bronze silver-plated contacts; medium size; 1-7/8 in. lg, 1-9/32 in. wide, 27/64 in. high; Spec. JAN-S-28; American Phenolic Corp., part no. 77MIP5 T.	<p>N16-S-62157-6041</p>	Test socket for 6 pin tubes.
X-106	SOCKET, ELECTRON TUBE; 7 phosphor bronze silver-plated contacts; medium size; 1-3/8 in. dia., 13/32 in. deep over-all; JAN-S-28; American Phenolic Corp., part no. 78-7CDTM.	<p>N16-S-62762-2635</p>	Test socket for 7 pin tubes and pilot lamps.

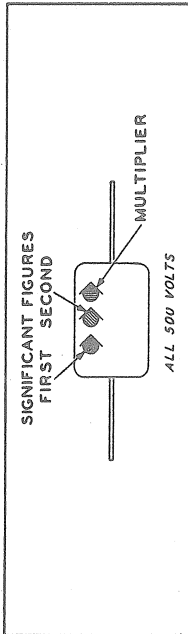
X-107	<p>SOCKET, ELECTRON TUBE; 8 phosphor bronze silver-plated contacts; medium size body; 1-1/4 in. dia., 11/32 in. deep; Spec. JAN-S-28; American Phenolic Corp., part no. 78-S8LT.</p>	<p>For replacement use N16-S-63579-2631</p>	<p>Test socket for loctal base tubes.</p>
X-108	<p>SOCKET, ELECTRON TUBE; Same as X-102</p>		
X-109	<p>SOCKET, ELECTRON TUBE; 7 phosphor bronze silver-plated contacts; miniature size; no metal shock shield included; 7/64 in. ID center shield included; 1-1/8 in. lg., 3/4 in. wide, 11/32 in. high over-all, excluding terminals; Spvc. JAN-S-28; American Phenolic Corp., part no. 1470505.</p>	<p>For replacement use N16-S-62603-6899</p>	<p>Test socket for 7 pin miniature tubes.</p>
X-110	<p>SOCKET, ELECTRON TUBE; 7 phosphor bronze silver-plated contacts; 1-7/8 in. dia., 1-1/2 in. deep over-all excluding terminals; Spec. JAN-S-28; Alden Products Co., part no. 457V-1.</p>	<p>N16-S-62646-8291</p>	<p>Test socket for acorn tubes.</p>
X-111	<p>SOCKET, ELECTRON TUBE; 7 beryllium copper silver-plated contacts; sub-miniature size; 3/4 in. lg., 9/16 in. wide, 9/32 in. high over-all, excluding terminals; Spec. JAN-S-28; Cinch Mfg. Co., part no. 8694.</p>	<p>N16-S-62597-1028</p>	<p>Test socket for sub-miniature in-line tubes.</p>
X-112	<p>SOCKET, ELECTRON TUBE; 8 phosphor bronze silver-plated contacts; sub-miniature size; 7/8 in. lg., 1/2 in. wide, 9/32 in. deep over-all, excluding terminals; JAN-S-28; Cinch Mfg. Co., part no. 8736-B1.</p>	<p>N16-S-63656-2460</p>	<p>Test socket for sub-miniature rigid pin tubes.</p>
X-113	<p>SOCKET, ELECTRON TUBE; 9 phosphor bronze silver-plated contacts; miniature size; 1-11/32 in. lg., 29/32 in. wide, 11/32 in. high over-all, excluding terminals; Spec. JAN-S-28; Hugh H. Eby, Inc., part no. 9713-20.</p>	<p>N16-S-64063-6227</p>	<p>Test socket for noval tubes.</p>

TABLE 8-3. MAINTENANCE PARTS KIT LIST

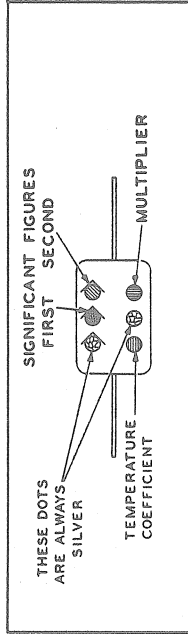
KEY DESIGNATION	QUANTITY
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F-102	1
I-101	1
I-102	1
I-103	1

CAPACITOR COLOR CODES

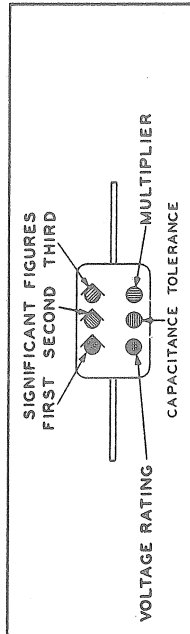
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



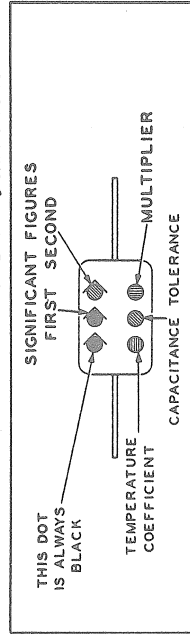
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



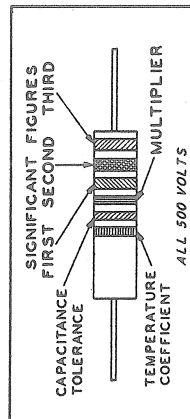
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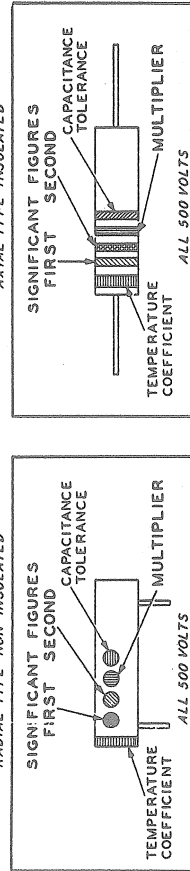
JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

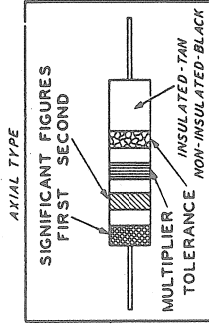


RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

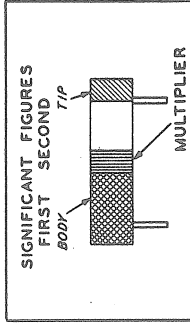
RESISTORS		CAPACITORS						
TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	RMA MICA AND CERAMIC-DIELECTRIC	JAN MICA AND PAPER-DIELECTRIC	JAN CERAMIC DIELECTRIC	VOLTAGE RATING	TEMPERATURE COEFFICIENT
	1	0	BLACK	1	1	1		A
	10	1	BROWN	10	10	10	100	B
	100	2	RED	100	100	100	200	C
	1000	3	ORANGE	1000	1000	1000	300	D
	10000	4	YELLOW	10000	10000		400	E
	100000	5	GREEN	100000			500	F
	1000000	6	BLUE	1000000			600	G
	10000000	7	VIOLET	10000000			700	
	100000000	8	GRAY	100000000		0.01	800	
	1000000000	9	WHITE	1000000000		0.1	900	
5	0.1		GOLD	0.1			1000	
10	0.01		SILVER	0.01			2000	
20			NO COLOR				500	

RESISTOR COLOR CODES

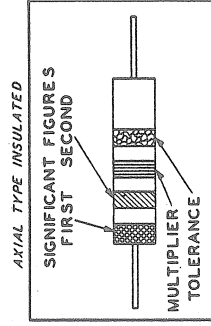
RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



RADIAL TYPE



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS



RADIAL TYPE NON-INSULATED

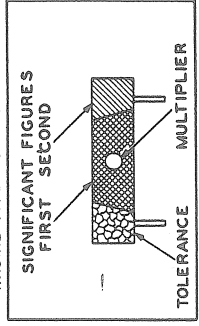


TABLE 8-5. APPLICABLE COLOR CODES

TABLE 8-6. LIST OF MANUFACTURERS

ABBREVIATION	PREFIX	NAME	ADDRESS
Aerovox	AX	Aerovox Corp.	742 Belleville Ave., New Bedford, Mass.
Alden	CYA	Alden Products Co.	117 N. Main St., Brockton 64, Mass.
Allen-Bradley	CBZ	Allen Bradley Company	134 W. Greenfield Avenue, Milwaukee, Wis.
A H & H	CHH	Arrow-Hart & Hegeman Elect. Co.	102 Hawthorne St., Hartford, Conn.
Amphenol	CPH	American Phenolic Corp.	1830 S. 54th Ave., Chicago 50, Ill.
Belden	CQG	Belden Mfg. Co.	P. O. Box 5070A, Chicago, Ill.
Bradley	BRLA	Bradley Laboratories, Inc.	80 Meadow St., New Haven 10, Conn.
Bussman	CGA	Bussmann Mfg. Co.	2538 W. University St., St. Louis 7, Mo.
Beede	BEI	Boede Electric Company	Penacook, New Hampshire
Cinch	CMG	Cinch Mfg. Co.	2335 W. Van Burn, Chicago 12, Ill.
Clarostat	CMC	Clarostat Mfg. Co., Inc.	1 Washington St., Dover, N. H.
Chicago Tel.	CPH	Chicago Telephone Supply Corp.	1142-1232 W. Beardsley, Elkark, Ind.
Chicago Cond.	CCCP	Chicago Condenser Corp.	3255 W. Armitage Ave., Chicago, Ill.
Drake	CAYS	Drake Mfg. Co.	1713 W. Hubbard St., Chicago 22, Ill.
El Menco	EMM	Electro-Motive Mfg. Co., Inc.	S. John & Park Sts., Willimantic, Conn.
Electra	ELG	Electra Mfg. Co.	2537 Madison Ave., Kansas City, Mo.
Eby	CEB	Hugh H. Eby, Inc.	18 W. Chelton Ave., Phila. 44, Penna.
G.E.	CG	General Electric Co.	1 River Road, Schenectady, N. Y.
Hudson	HBJ	J. B. Hudson, Inc.	Vankirk & Erdrich Sts., Phila. 24, Penna.
H. H. Smith	SHHI	Herman H. Smith, Inc.	436 18th St., Brooklyn 15, N. Y.
I.R.C.	CIR	International Resistance Company	401 N. Broad Street, Phila., Penna.
Ind. Trans.	INTR	Industrial Transformer Corp.	ITC Building, Gouldsboro, Pa.
Jetronic	CBUA	Jetronic Industries, Inc.	Main and Cotton Sts., Phila., Penna.
Kurz-Kasch	KK	Kurz-Kasch, Inc.	1417 S. Broadway, Dayton, Ohio
Lion	LFK	Lion Fastener, Inc.	250 Main St., Honeoye Falls, N. Y.
Mueller	ME	Mueller Electric Co.	1597 E. 31st St., Cleveland 14, Ohio
Mallory	CMA	P. R. Mallory & Co., Inc.	3029 E. Washington St., Indianapolis, Ind.
Oak	COC	Oak Mfg. Co.	1260 Clybourne Ave., Chicago 10, Ill.
Ohmite	OH	Ohmite Mfg. Co.	4837 W. Flourney St., Chicago 44, Ill.
Resistance Prod.	RESP	Resistance Products Co.	714 Race St., Harrisburg 5, Pa.
R.C.A.	RCA	Radio Corp. of America	30 Rockefeller Plaza, New York, N. Y.
Stackpole	CSA	Stackpole Carbon Company	1942 Tannery St., St. Mary's, Penna.
Times Facsimile	TTE	Times Facsimile Corp.	540 W. 58th St., New York 19, N. Y.
TRU-OHM		TRU-OHM Products	Huntingdon, Ind.
Ucinite	CUF	The Ucinite Co.	1 Nevada St., Newtonville, Mass.
Ward Leonard	WLEC	Ward Leonard Electric Co.	6 South St., Mount Vernon, N. Y.
Weckesser	WECK	Weckesser Co.	5261 N. Avondale Ave., Chicago 30, Ill.

DRAWING NUMBER 785W

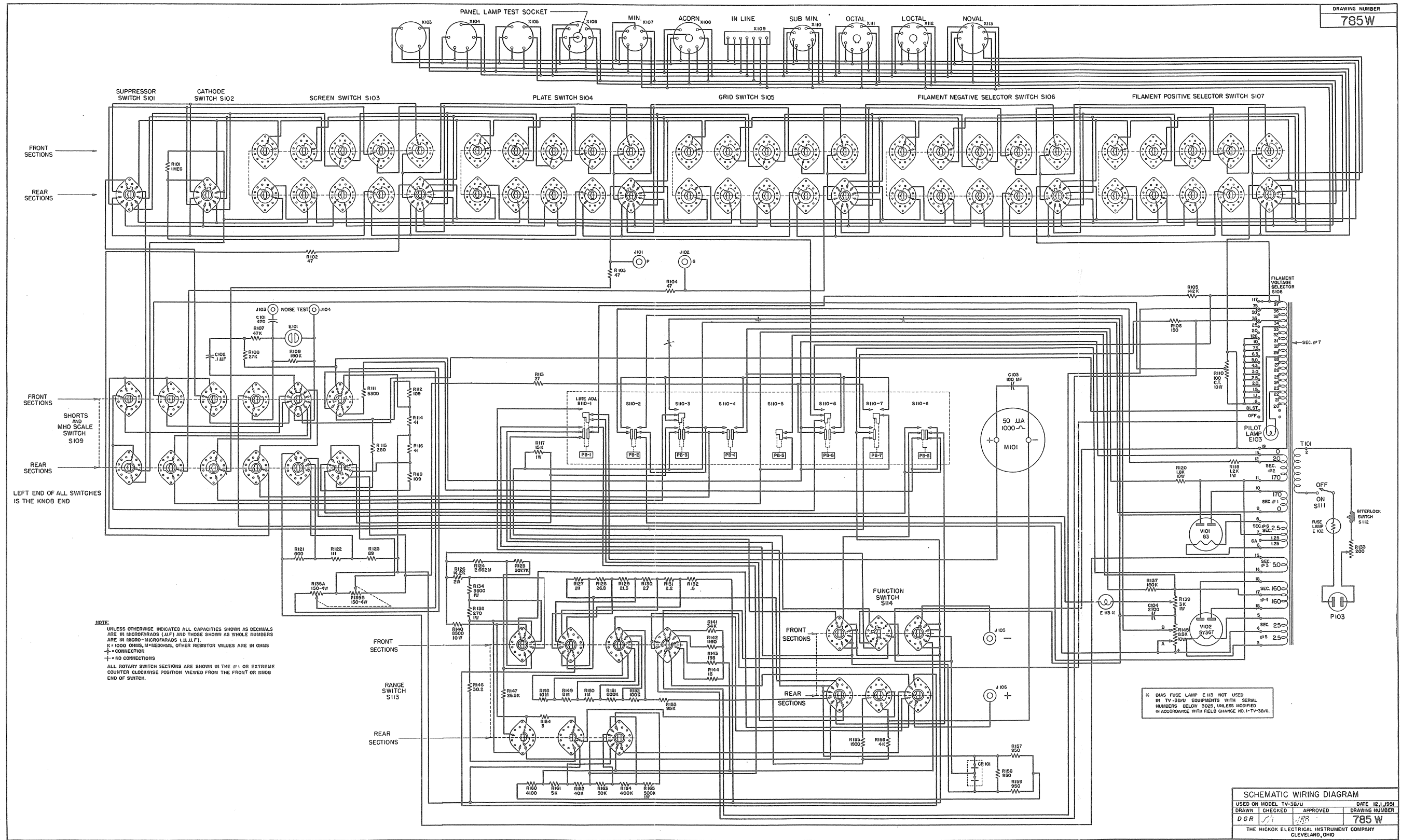


Figure 7-7 Schematic Wiring Diagram for Tube Tester TV-3B/U After Completion of Field Change No. 1-TV-3B/U

NOTES

ADDENDUM TO
TABLE 8-2 COMBINED PARTS AND SPARE PARTS LIST

SYMBOL	NAME OF PART AND DESCRIPTION	FUNCTION	AWS JAN OR NAVY TYPE DESIG.	NAVY STOCK NO.	ARMY STOCK NO.	MFR. AND MFR'S DESIG.	CONTRACTORS DRAWING & PART NO.	ALL SYMBOL DESIGNATIONS INVOLVED	TOTAL PER EQUIP.
E-113	LAMP, INCANDESCENT; 2 volts, @ 0.060 amps; bulb T 3 1/4 clear 1 1/8" lg. o/a; miniature bayonet base; C-2 filament; burn any position.	Protective fuse and overload indicator for bias control circuit.		G-17-L-6271-501		General Electric Type 49	12270-17	E-113	1
I-104	LIGHT, INDICATOR; with 1/2" dia. clear plastic dome; for miniature bayonet base T-3 1/4 lamp; open frame brass nickel plated; 1 1/16" x 7/8" x 1 11/16" d. behind mtg. surface o/a; plastic dome extends approx. in. above mtg. surface; mounts in 11/16" dia. panel hole, 1/4" max. panel thickness; lamp removable from front threaded dome; two solder lug terminals.	Receptacle and cover for bias fuse lamp		A-semble from Component Parts		Drake Type 40	19350-202	I-104	1
I-104A	LENS, PLASTIC DOME: p/o I-111.			N-6210-299-6114		Drake No. 25 PF	19350-197	I-104A	1
I-104B	SOCKET: p/o I-111.			N-17-L-76656-1527		Drake No. 221V S/W H'dware	19350-113 S/W H'dware	I-104B	1