HICKOK 580A

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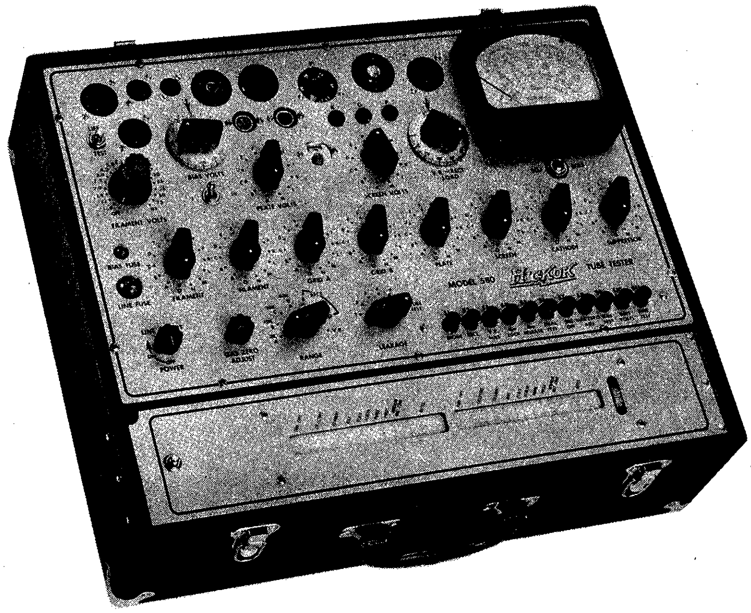
INSTRUCTION MANUAL

for

TUBE TESTER
MODEL 580A

THE HICKOK ELECTRICAL INSTRUMENT COMPANY • 10514 DUPONT AVENUE • CLEVELAND 8, OHIO



TUBE TESTER
MODEL 580A

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THE HICKOK ELECTRICAL INSTRUMENT COMPANY
Cleveland, Ohio

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SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION.

The Hickok Model 580A Tube Tester combined the characteristics desired for exacting laboratory tube testing as well as the portability and simplicity required by the technician for the maintenance of modern electronic equipment. The design specifications include all accepted standard tests and in addition have the facility to test tubes with individually variable potentials as required to comply with tube manufacturers' tube manuals. Filament, plate, and screen voltages can be preset to provide the voltages specified by the Tube Manuals. Three separate power supply transformers with solid state rectifiers supply stable, long-lasting, trouble-free operation (no vacuum tubes are used in the Model 580A Tube Tester). Filament voltages are variable from 0.6 to 117 v.a.c. in 19 steps. Plate voltages and screen voltages are each separately variable in 11 steps. These variable voltage values provide the combinations most specified in manufacturers' tube manuals.

The d.c. bias voltage is continuously variable from 0 to 50 volts and can be set by means of a calibrated dial or it can be read on the meter mounted on the panel. For accuracy in setting the bias voltage a two position switch is provided which permits readings of 0 to 5 or 0 to 50 volts full scale. A cathode resistor may be inserted into the SELF-BIAS jack on the front panel by means of a phone plug for making self-bias tests. This jack is internally shunted by a 1000 mfd capacitor making an external cathode bypass capacitor unnecessary.

A potentiometer concentrically mounted on the FILAMENT VOLTS switch provides a means of electrically centering the tube filament to prevent 60 cps modulation of the grid-filament circuit during Gm testing.

Dual diodes and triodes with electrically identical sections can be tested with one setting of the selector switches. Each section of the tube can be tested independently for interelement leakage, gas, and mutual conductance by transferring the tube test conditions (the selector switch settings) from one section of the tube under test to the other section by pressing one push button switch.

The Model 580A provides a gas test circuit that permits detection of as little as 50 millimicroamperes of grid current in the tube under test.

Plate, grid, and cathode jacks are provided on the front panel for easy connection to plate, grid, and cathode tube caps.

Life-test of a tube is provided for by means of a push button switch that reduces heater voltage. This permits evaluation of the cathode reserve and an approximation of the life expectancy of a tube.

A unique safety-interlock of the selector switches prevents possible damage to the tube under test or to the Tube Tester due to improper selector switch settings.

1-2. CHANGES.

At the time of publication of this manual no modification had been made to the equipment. A supplement or change sheet may be included with this manual to reflect any changes required to make this manual apply to the instrument with which it is shipped.

1-3. QUICK REFERENCE DATA.

a. POWER REQUIREMENTS - 105 to 125 volts, 50 to 60 cycles, 60 watts.

b. TUBE SOCKET COMPLEMENT -

(1) 9 pin Novar
(2) 12 pin Compactron
(3) 9 and 10 pin Miniature
(4) 7 pin Miniature
(5) 8 pin Loctal
(6) 5 pin Nuvistor
(7) 7 pin Nuvistor
(8) 8 pin Octal
(9) 8 pin Subminiature, Round
(10) 7 pin Subminiature, In-line
(11) 5-7 pin Acorn
(12) 7 pin Combination
(13) 4-5-6 pin Combination

c. Gm RANGE - 60,000 - 30,000 - 10,000 - 3,000 μmhos. In addition, three rectifier diode ranges and one voltage regulator range are provided.

d. INTER-ELEMENT LEAKAGE - Indicated directly on meter; sensitivity to 50 megohms.

e. TEST VOLTAGES -

(1) FILAMENT: 0-117 volts a.c. variable in 19 steps: .6 - 1.1 - 1.4 - 2.0 - 2.5 - 3.0 - 4.3 - 5.0 6.3 - 7.5 - 10.0 - 12.6 - 17 - 20 - 25 - 35 - 50 - 75 117.

(2) SIGNAL: 0.28 volts RMS.

(3) PLATE AND SCREEN voltages d.c., individually variable in 12 steps: 6.3 - 12.6 - 22.5 - 45 80 - 100 - 120 - 150 - 180 - 200 - 250 - and 300 v.d.c.

(4) FIXED BIAS: 0 to 50 v.d.c., continuously variable.

(5) SELF BIAS: Applied to the tube by inserting desired resistance into a phone jack mounted on front panel.

f. CASE - Wood, black leatherette covered.

g. SIZE - 19 inches wide, 15-1/2 inches deep, and 7 inches high. Includes compartment for illuminated roll chart - 3 inches wide, 18 inches long, and 4-1/2 inches deep.

h. weight - 30 pounds.

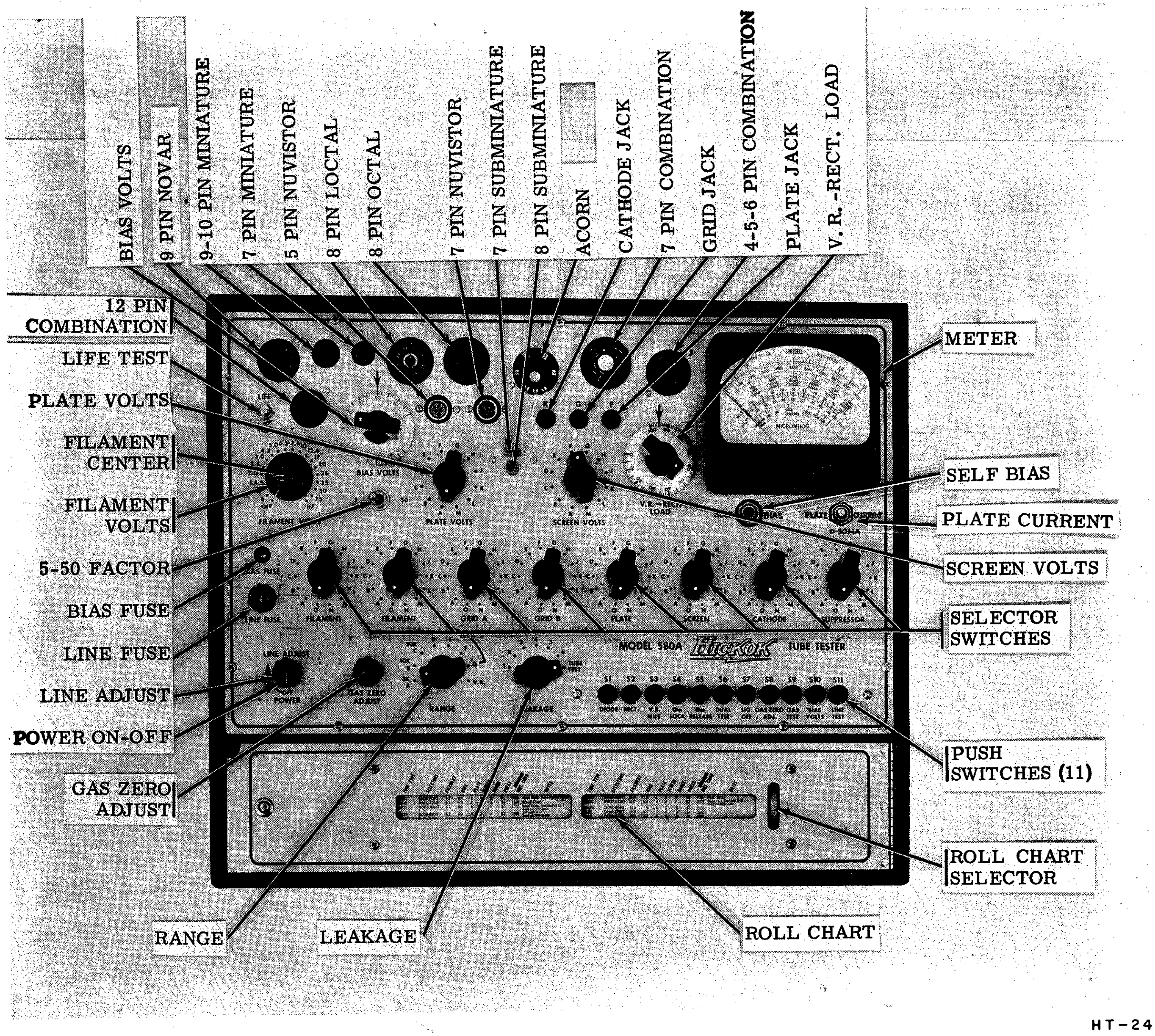

Figure 2-1. Front Panel Controls and Connectors

SECTION 2

OPERATION - GENERAL

2-1. POWER REQUIREMENTS.

The Model 580A is designed to operate on 105 to 125 volts, 50 to 60 cycles, 60 watts.

2-2. INSPECTION AND ADJUSTMENT.

Before placing the Model 580A into operation, visually inspect it for any physical damage such as broken or loose knobs, cracked meter glass, etc. All damage claims must be made to the carrier within 48 hours of receipt of the equipment. A damage report sheet is included with this shipment, giving detailed instructions for filing a damage report.

All calibration controls have been preset at the factory, therefore no adjustment of the Model 580A is necessary prior to operation.

2-3. FRONT PANEL CONTROLS AND CONNECTORS

The front panel controls, connectors, and their function or purpose are as follows (See Figure 2-1):

a. TUBE SOCKETS - Fifteen types and kinds of tube bases can be accommodated in the front panel sockets. This selection avoids the necessity of using socket adapters.

b. K, G, and P panel jacks accommodate leads for tube top caps, where required: (K) cathode, (G) grid, and (P) plate, respectively.

c. PLATE VOLTS and SCREEN VOLTS - Twelve position rotary switches provide independently selectable voltages in successive steps.

SWITCH POSITIONS	SCREEN & PLATE VOLTS
A	6.3
B	12.6
C	22.5
D	45.0
E	80.0
F	100.0
G	120.0
H	150.0
J	180.0
K	200.0
L	250.0
M	300.0

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Table 2-1. Screen and Plate Volts Available at Specific Switch Positions

SELECTOR SWITCH SETTING	TUBE PIN NUMBERS
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
J	9
K	10
L	11
M	12
N	NUVISTOR SHELL
O	OPEN

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Table 2-2. Selector Switch Settings and Corresponding Tube Pin Numbers.

d. V.R. - RECT.LOAD - Provides variable voltage to regulator tubes during VR tests and a variable load for testing rectifier tubes. Operates in conjunction with the RANGE switch and data on the roll chart.

e. MICROMHOS meter - Provides a quantitative indication of test results on eight separate scales: indicating transconductance in micromhos, leakage in ohms, grid bias in volts, VR tube plate potential in volts, VR tube current in milliamperes, and in addition indicates correct setting of the LINE ADJUST control.

f. SELF BIAS jack - Provides a means of inserting a self-bias resistor in the cathode circuit of the tube under test, as recommended by the roll chart or tube data handbook. The SELF BIAS jack is of the normally shorted type, unshorting only when the phone plug is inserted.

g. Selector Switches - FILAMENT (2), GRID A, GRID B, PLATE, SCREEN, CATHODE, and SUPPRESSOR selectors provide proper switching of internal circuits to apply the correct test potentials to the various pins of the tube under test. Switch positions are alphabetically identified on the panel in order to simplify tube data on the roll chart; A is pin 1, B is pin 2, C is pin 3, etc., except "I" is not represented. See Table 2-2. The pin number equivalent of the alphabetical switch positions are in accordance with the EIA system of pin designations. These selector switches are wired in such a manner that they are electrically interlocked to prevent the application of two different test potentials to the same tube pin. This not only prevents damage to the tube under test, but also prevents damage to the tube tester.

h. Test Switches - (S1 through S11) - Actuate the proper test circuits as indicated on the roll chart or in this instruction manual.

i. LEAKAGE switch - seven position rotary switch - provides circuitry for detecting inter-element leakage or shorts in the tube under test.

j. RANGE - Eight position rotary switch - the switch position determines the proper scale to read on the MICROMHOS meter for specific tests. Positions A, B, C, and D are read on the 3000, 10000, 30000, and 60000 scale (full scale deflection), respectively. Positions E, F, G, and VR are read on scales as shown on the roll chart. The top scale of the MICROMHOS meter marked "BIAS VOLTS" and "LINE TEST" is used in connection with the test switches S10, S11, and LINE ADJUST control.

k. GAS ZERO ADJUST - Continuous rotary adjustment - permits a meter zero adjustment before making gas tests.

m. LINE ADJUST - POWER ON-OFF control - Permits turning the power to the tube tester "on" or "off", as well as adjusting the input voltage to the proper value as indicated on the MICROMHOS meter at the line marked "LINE ADJUST".

n. LINE FUSE lamp - Serves both as a protective device and an overload indicator. This lamp (#81) will light brightly when an overload is placed on the tester or the tube under test.

p. BIAS FUSE lamp - This lamp (#49) serves as a protection to the BIAS VOLTS control when testing a tube that may be shorted.

q. 5 - 50 switch - Two-way toggle switch - Provides multiplier or divider for use in connection with the BIAS VOLTS control.

r. FILAMENT VOLTS - A twenty position rotary switch which provides filament voltages in 19 steps from .6 to 117 volts and an OFF position. Also used in connection with filament continuity test.

s. Filament Center - Red knob concentrically mounted on the FILAMENT VOLTS switch - Continuously variable resistance which permits electrically centering filamentary type tubes under test.

t. PLATE VOLTS - A twelve position rotary switch which provides twelve selected plate voltages. See Table 2-1.

u. BIAS VOLTS - A continuously variable control which provides 0 to 5 and 0 to 50 volts for bias adjustment.

v. LIFE TEST - A push switch which provides a means of estimating life expectancy of a tube. When this switch is pressed, it reduces filament voltage of the tube under test by 10%, thus making it possible to determine the cathode efficiency and life expectancy of the tube.

2-4. PLATE CURRENT.

A push switch just below the meter is provided for reading plate current of amplifier tubes.

While S4 is held or locked down, press the "PLATE CURRENT" switch and read 0 - 50 milliamperes of plate current on the top scale of the meter.

2-5. GENERAL.

Model 580A Tube Tester is designed to test vacuum tubes in either one of two methods; by a set-up made with information found on the roll chart, or by information found in standard tube manuals. The roll chart method, setting switches by A, B, C, etc., offers simplicity and quick convenience for testing all the common types of tubes. Since the roll chart cannot be brought up-to-date more often than every six months, the tube manual method (transposing the A, B, C's of the switch settings into tube pin numbers 1, 2, 3, etc., see table 2-2) satisfies all requirements for new or experimental type tubes.

2-6. OPERATING PROCEDURES.

To place the Model 580A into operation for either method, proceed with the preliminary set-up in the following manner:

a. By means of the push-push latch to the left of the roll chart, open the lead compartment. Connect the line cord to a source of 105 to 125 volts, 50 to 60 cycle power.

> **CAUTION**
>
> Do not insert tube to be tested into test socket until correct settings of all controls have been made in accordance with the following steps.

OPERATION - ROLL CHART METHOD

3-1. ROLL CHART METHOD.

As a preliminary to further and more complete testing, a filament continuity check is desirable. To do this proceed as follows:

a. By means of the nylon gear, turn the roll chart until the type number of the tube to be tested appears in the roll chart window. An illuminated window slot aids in the selection of the correct data line.

b. Set the FILAMENT selectors according to the data on the roll chart.

c. Set the FILAMENT VOLTS switch to the OFF position. All other controls and switches may be in any position except as follows.

d. Insert the tube to be tested into the proper test socket, and if applicable make top cap connection as called for on the roll chart under heading "NOTES".

e. Set the POWER ON-OFF control to the ON position.

f. Depress LINE TEST (S11) push switch and hold down while rotating the LINE ADJUST control until meter pointer is directly over LINE TEST mark on the MICROMHOS meter. Release the LINE TEST (S11) push switch.

g. Rotate the LEAKAGE switch to position 6. If there is no reading on the MICROMHOS meter, the tube filament is open. Discard the tube without further testing. If there is a reading, further testing may proceed.

h. Set the balance (six) of the SELECTOR switches in accordance with the two groups of four letters shown in the column on the roll chart headed "SELECTORS". The SELECTOR switches are electrically interlocked 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.

i. Set the FILAMENT VOLTS switch as indicated on the roll chart under heading "FILAMENT".

j. Set the BIAS VOLTS control as indicated on the roll chart under heading BIAS.

> NOTE
>
> To obtain bias voltages under 5 volts, set the 5-50 switch (5-50 FACTOR, Figure 2-5) on the 5 position and read the BIAS VOLTS scale on the MICROMHOS meter as 0-5 volts. To obtain bias voltages over 5 volts, set the 5-50 switch (5-50 FACTOR, Figure 2-5) on the 50 position and read the BIAS VOLTS scale on the MICROMHOS meter as 0-50 volts.

k. Set the PLATE VOLTS switch as indicated on the roll chart under heading PLATE.

m. Set the SCREEN VOLTS switch as indicated on the roll chart under heading SCREEN.

n. Set the RANGE switch according to the alphabetical setting indicated on the roll chart under heading RANGE.

p. Set the LEAKAGE switch on the first (1) position.

3-2. LEAKAGE TEST.

All tube tests should begin with an inter-element leakage or shorts test. With the tester set-up as indicated above, proceed as follows:

a. Rotate the LEAKAGE switch from position 1, successively through position 6, while lightly tapping the tube at each step and watching the MICROMHOS meter for pointer deflection. Each of the switch positions in combination with one or more other positions indicate a specific leakage path as shown in the table 3-1, Inter-element Leakage Test Chart.

LEAKAGE PATH	LEAKAGE SWITCH POSITIONS					
	1	2	3	4	5	6
HEATER-CATHODE	X	X				
HEATER-GRID A			X	X	X	
HEATER-GRID B			X	X	X	X
HEATER-SCREEN			X			
HEATER-SUPPR.		X				
HEATER-PLATE			X	X		
CATH.-GRID A	X	X	X	X	X	
CATH.-GRID B	X	X	X	X	X	X
CATH.-SCREEN	X	X	X			
CATH.-SUPPR.	X					
CATH.-PLATE	X	X	X	X		
GRID A-GRID B						X
GRID A-SCREEN				X	X	
GRID A-SUPPR.		X	X	X	X	
GRID A-PLATE					X	
GRID B-SCREEN				X	X	X
GRID B-SUPPR.		X	X	X	X	X
GRID B-PLATE					X	X
SCREEN - SUPPR.		X	X			
SCREEN - PLATE				X		
SUPPR.-PLATE		X	X	X		

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Table 3-1. Inter-element Leakage Test Chart

Tubes having inter-element leakage paths or shorts will cause the meter pointer to move up scale in various positions of the LEAKAGE switch. A momentary deflection of the meter pointer when the LEAKAGE switch is turned from one position to another may be disregarded as it is caused by the charging of a capacitor in the leakage test circuit. Intermittent meter pointer deflections as a result of tapping the tube indicates loose elements in the tube which might cause noisy or erratic tube operation.

The bottom of the scale of the meter is the LEAKAGE scale. It is calibrated in ohms such that leakage path resistance to 50 megohms can be read directly from the scale. A leakage resistance of less than 50 megohms will cause the meter pointer to begin to indicate. A complete inter-element short will cause the meter pointer to deflect full scale to give a zero ohms reading.

b. A shorted tube or one with excessive inter-element leakage should be discarded with no further testing.

c. Multisection tubes containing dissimilar sections, such as the 6CG8, should be tested for leakage and shorts in both sections.

d. Multisection tubes containing electrically identical sections, such as the 6J6, can make use of the dual test circuit. As an example: For dual triodes make the normal leakage test as described above, then depress and hold down DUAL TEST (S6) push switch while repeating the leakage test for the second section.

e. The circuit used in testing dual triodes is arranged so that the SCREEN selector switch is used as the plate of the second section, and the SUPPRESSOR selector switch is used as the cathode of the second section of the tube under test. Thus, plate to plate, and cathode to cathode leakage or shorts will be identified on the Leakage Test Chart as plate to screen, and cathode to suppressor leakage or shorts.

f. Some tubes will show a shorted condition on certain positions of the LEAKAGE switch even though they are good tubes. These positions are noted in the NOTATIONS column of the roll chart. That is, "Short on 1 and 2" means that a short indication on positions 1 and 2 is normal.

3-3. MUTUAL CONDUCTANCE (Gm) TEST.

This is the basic quality test for tubes used as amplifiers. After the controls are properly set in accordance with the roll chart data and the tube has been tested for leakage or shorts, proceed as follows:

a. Set the LEAKAGE switch to the TUBE TEST position.

b. Recheck the line voltage by means of the MICROMHOS meter and the LINE ADJUST control, and the LINE TEST (S11) push switch. Reset, if necessary.

c. Depress the Gm LOCK (S4) push switch and observe the MICROMHOS meter reading on the particular scale as determined by the RANGE switch.

d. Compare the numerical meter reading with the minimum acceptable value as listed on the roll chart under column headed MINIMUM MUT COND.

e. Release the Gm LOCK (S4) push switch by depressing Gm RELEASE (S5) push switch.

f. In testing filamentary amplifiers, the meter deflection is proportional to the signal in the grid-filament circuit. Since the signal is of power line frequency, and the filament is heated by a.c. it is possible to pick up an additional unwanted signal from the filament. To cancel any such signal, push switch S7 SIG OFF with the Gm switch S4 locked and adjust the red filament centering knob until the meter reads zero. Release the signal switch S7 and read the mutual conductance on the meter.

g. NOTE: On some special types of amplifier tubes the push switch to be used may vary with the particular type of tube under test. Always refer to the roll chart for the correct push switch to use.

3-4. GAS TEST.

In the measurement of grid current due to gas under Class A operation of a tube, the same selector set up as for mutual conductance (Gm) is used. To test for gas (grid current) following the Gm test, proceed as follows:

a. Depress the Gm LOCK (S4) push switch.

b. Recheck the line voltage by means of the MICROMHOS meter and the LINE ADJUST control, and the LINE TEST (S11) push switch. Reset, if necessary.

c. Depress GAS ZERO ADJ (S8) push switch simultaneously with Gm LOCK (S4) push switch, in case (S4) has been released. By means of the GAS ZERO ADJUST control, reset MICROMHOS meter pointer to zero on the upper (0 to 5.0) scale.

d. Depress GAS TEST (S9) push switch and observe the up-scale reading of the meter pointer on the upper (0 to 5.0) scale. This indicates the grid current flow in microamps.

NOTE: Some tubes may tend to provide increasing amounts of grid current as they continue to be heated. Therefore, repeat the gas zero adjust step (sub-paragraph "c", above) prior to taking each successive reading of grid current flow with the S9 push switch.

If there is any grid current flowing due to gas in the tube under test, the meter will deflect up-scale. If the meter deflects down-scale, most likely the tube

under test has a bias of less than 1 volt from the fixed bias supply or from the developed self-bias across the external SELF-BIAS resistor. Grid current deflection down-scale on the meter for tubes under test when the bias is approximately 1 volt or less is known as grid current due to the contact potential. It is a fundamental property of all indirectly heated type amplifier tubes. Down-scale meter pointer deflection during gas testing is therefore to be disregarded as it is normal. Instead, the fixed bias method of testing using more than 1 volt should be used. For some tubes grid current due to contact potential may occur when the grid bias is as high as 1.3 volts.

Because of the varied applications under which various tubes function most satisfactorily, it is not practical to establish a hard and fast set of standards for maximum permissible grid currents in gas tests. A given grid current for a specific tube may be satisfactory in one application but entirely unsatisfactory in another. Personal experience is the best guide. For example, in an I. F. amplifier strip which has a common A. G. C. circuit, the summation of the grid currents may be detrimental to the circuit function whereas the grid current measurements of the individual tubes may be well within the maximum allowable tube manufacturer's limits. Table 3-2 provides a guide for the determination of maximum permissible grid currents based upon general tube application categories.

LOW LEVEL TRIODE AMPLIFIERS	MAX. PERMISSIBLE GRID CURRENT
6AT6	0.5 μa
12AT6	0.5 μa
6AV6	0.5 μa
12AV6	0.5 μa
12AX7	1 μa

LOW LEVEL TRIODE AMPLIFIERS	MAX. PERMISSIBLE GRID CURRENT
6BC8	1 μa
6BQ7	1 μa
6BS8	1 μa
6BZ7	1 μa
6DJ8	1 μa
6J6	2 μa

PENTODE AMPLIFIERS	MAX. PERMISSIBLE GRID CURRENT
6AU6	1 μa
6BA6	1 μa
6BC5	1.5 μa
6BH6	1 μa
6CB6	1.5 μa
6BZ6	1.5 μa
6CF6	1.5 μa
6DE6	1.5 μa
6DK6	1.5 μa
6EW6	1.5 μa

GENERAL PURPOSE TRIODES	MAX. PERMISSIBLE GRID CURRENT
6C4	1.5 μa
6CG7	2 μa
6S4	2.5 μa
6SN7	2 μa

POWER PENTODES	MAX. PERMISSIBLE GRID CURRENT
6CA5	1.5 μa
6AQ5	2 μa
6CL6	3 μa
6CM6	2 μa
6CU5	2 μa
50C5	2 μa
6EM5	3 μa
6L6	3 μa
6BG6	4 μa
6CD6	5 μa
6DQ6	4.5 μa

Table 3-2. Maximum Permissible Grid Current of Typical Tubes

3-5. RESERVE LIFE TEST.

This test is used to approximate the future life of the tube under test. The same selector switch settings as for mutual conductance (Gm) are used for this test. After the set up, proceed as follows:

a. Depress the Gm LOCK (S4) push switch.

b. After the meter pointer has stabilized, observe and note the meter reading on the proper scale as determined by the position of the RANGE switch.

c. Depress and hold the LIFE TEST switch until the meter pointer stabilizes again. Note this reading.

d. Compare the two readings.

To consider the tube to have a satisfactory future life, the second reading must be in excess of 75% of the first reading. For example: if the first reading is 2000, the second reading must be above 1500. Above 1500 is satisfactory, 1500 is questionable, and if the reading is below 1500, the tube should be considered as having a limited future life.

The LIFE TEST switch reduces the filament voltage on the tube by 10%. The resultant reduction in cathode temperature establishes tube operation which is no longer dependent upon its reserve capacity. Depletion of this reserve will be evident by the decrease in meter reading when the LIFE TEST switch is operated.

CAUTION

It is imperative that grid current testing be terminated if more than 5 microamperes is indicated on the MICROMHOS meter. Under such conditions, as a safety measure, immediately depress the Gm RELEASE (S5) push switch and thus cut off all power. The tube causing this excessive grid current is defective and should be discarded.

3-6. RECTIFIER TUBE TEST.

Rectifier tubes, including diodes and diode sections of multisection tubes are tested for emission since they have no mutual conductance. The column headed MINIMUM MUT COND on the roll chart is used to indicate the meter reading which is the rejection point for rectifier tubes. To test rectifier tubes, set up the tube tester as outlined in paragraph 3-1, and proceed as follows:

a. Depress and hold down DIODE (S1) or RECT (S2) push switch, according to the roll chart.

b. Note the meter reading on the particular scale as indicated on the panel adjacent to the letter designations on the RANGE switch. An acceptable tube is one which indicates a meter reading in excess of the amount shown on the roll chart in the column headed MINIMUM MUT COND. This amount or less indicates the tube under test has reached the rejection point and should be discarded.

c. Release DIODE (S1) or RECT (S2) push switch.

d. To test dual section tubes, complete the above test and repeat for the dual section by depressing both DIODE (S1) or RECT (S2) and DUAL (S6) push switches simultaneously. For acceptable meter reading, again consult the roll chart.

3-7. SPECIAL TUBE TYPES.

The voltage regulator test circuit permits the testing of V. R. tubes under actual operating conditions. The V. R. test circuit measures the voltage drop across the tube under test; hence the striking voltage and the voltage drop for minimum and maximum load currents can be read directly in volts on the test meter.

With the RANGE switch in the V. R. position, the V. R. -RECT. LOAD control determines the magnitude of the test voltage applied to the tube. The V. R. - MILS (S3) push switch converts the test meter from a voltmeter to a milliammeter. The 0-100 MILS scale of the test meter is used to evaluate the results of V. R. test. It reads in ma. dc. Consult the roll chart for information concerning control positions for specific tubes. For example, to test the OA3 according to the roll chart, adjust the meter pointer to the LINE TEST position by means of the LINE TEST (S11) push switch and the LINE ADJUST control and proceed as follows:

a. Set the SELECTOR switches to 0000-E0B0 positions.

b. Set the V. R. RECT LOAD control to 0.

c. The BIAS VOLTS control may be in any position.

d. Set the PLATE VOLTS switch to the F position.

e. Set the SCREEN VOLTS switch to the A position.

f. Set the RANGE switch in the V. R. position.

g. In the notations column for the OA3 is the voltage value 100V. marked with a star. This notation represents the approximate starting voltage for the OA3. In the column MINIMUM MUT COND is the voltage value 75V. This represents the nominal operating voltage for the OA3.

h. Insert the OA3 into the proper test socket.

i. Depress the Gm LOCK push switch (S4).

j. Rotate the V. R. -RECT LOAD control slowly clockwise. The meter pointer should begin to indicate a reading. This voltage value is read on the 0 to 200 VOLTS scale.

k. When the meter indicates approximately 100 volts, the tube should fire. This will cause the meter pointer to hesitate and drop back to the operating voltage value under test. In the case of the OA3, it is 75 volts.

m. Depress V. R. MILS (S3) push switch. This converts the test meter from a voltmeter to a milliammeter. The meter pointer should indicate approximately 5 ma on the 0 to 100 MILS scale.

n. While holding the V. R. MILS (S3) depressed, rotate the V. R. -RECT. LOAD control until the meter pointer indicates 40 ma.

p. Release the V. R. MILS (S3) push switch and read the voltage indicated on the test meter. For a good OA3 tube, the voltage should not have risen more than 5 volts above the nominal operating voltage.

SECTION 4

OPERATION - TUBE DATA HANDBOOK METHOD

4-1. TUBE DATA HANDBOOK METHOD.

Considering the great many different kinds of tubes in use today, the roll chart method of referencing tube data for testing vacuum tubes is probably the most convenient method yet devised. New roll charts are published at regular intervals. Nevertheless, with the advent of new tubes almost daily, there is still a lag between the appearance of a new tube on the market and its appearance on the roll chart. Therefore, a knowledge of how to translate tube data handbook information to the controls of the Model 580A Tube Tester is desirable. As an example, using a 6AQ5 vacuum tube, proceed as follows:

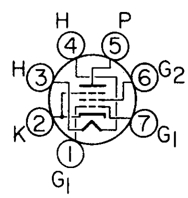
a. To make the preliminary set-up, remove the line cord from the lead compartment and connect to a source of 105-125 volts, 50-60 cycles power.

b. Consult a standard tube data handbook for the specific tube to be tested. See figure 4-1 below for a condensed version of such information. This condensed version eliminates data not pertinent to tube testing.

BEAM PENTODE

6AQ5

MINIATURE TYPE
COATED UNIPOTENTIAL CATHODE
HEATER
6.3 VOLTS 0.45 AMP.
AC OR DC
ANY MOUNTING POSITION



BASING SCHEMATIC

MINIATURE BUTTON
7 PIN BASE
7BZ

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS
CLASS A_1 AMPLIFIER

HEATER VOLTAGE	6.3	6.3	VOLTS
HEATER CURRENT	0.45	0.45	AMP.
PLATE VOLTAGE	180	250	VOLTS
GRID NO. 2 VOLTAGE	180	250	VOLTS
GRID NO. 1 VOLTAGE	- 8.5	- 12.5	VOLTS
TRANSCONDUCTANCE	3 700	4 100	μ MHOS

LD-44

Figure 4-1. Condensed 6AQ5 Tube Data

c. Set the first (left) FILAMENT selector on position C. This is the third switch position (counting A= 1, B= 2, and C= 3) and connects to pin three of the tube under test. See figure 4-1 for tube basing. Pin 3 connects one side of the filament of the tube.

d. Set the second FILAMENT selector on position D. This is the fourth switch position and connects to pin 4 of the tube under test. Pin 4 connects the other side of the filament of the tube.

e. Set the GRID A selector switch on position G. This is the seventh switch position and connects to pin 7 of the tube under test. Pin 7 connects to one terminal of grid 1.

NOTE	
Among the more common filament pin combinations are:	
7 pin miniature	3 & 4
Octal	2 & 7
Noval 9 pin miniature	4 & 5
Compactron	1 & 12

f. GRID B of the selector switches is for the second control grid in a dual tube and is not used in this test, therefore set it on the 0 or zero position.

g. Set the PLATE selector switch on position E. This is the fifth switch position and connects to pin 5 of the tube under test.

h. Set the SCREEN selector switch on position F. This is the sixth switch position and connects to pin 6 of the tube under test. Pin 6 connects to grid 2.

i. Set the CATHODE selector switch on position B. This is the second switch position and connects to pin 2 of the tube under test. Pin 2 connects to the cathode of the tube. It also has an internal connection to a third grid. See figure 4-1.

j. The SUPPRESSOR of the selector switches is not used in this test, therefore set it on position O.

k. Set the FILAMENT VOLTS switch to the 6.3 position.

l. Set the BIAS VOLTS switch to the 8.5 position, and the 5-50 switch to the 50 position.

m. Set the PLATE VOLTS switch to the J position as this is the 180 volts position according to table 2-1.

n. Set the SCREEN VOLTS switch to the J position as this is the 180 volts position according to table 2-1.

p. Set the RANGE selector to the B or 10K position. The 10K indicates that the final test reading will be taken from the 10000 scale of the test meter.

q. Set the LEAKAGE switch to the TUBE TEST position.

r. Insert the tube to be tested into the proper test socket, and where applicable (not this particular tube) make top cap connection.

s. Set the POWER ON-OFF control to the ON position. Allow sufficient time for the TUBE under test to reach its operating temperature before proceeding.

t. Depress LINE TEST (S11) push-button and hold down while rotating LINE ADJUST control until meter pointer is directly over LINE TEST on the MICROMHOS meter.

4-2. LEAKAGE TEST.

All tube tests should begin with an inter-element leakage or shorts test. With the tester set-up as indicated above, proceed as in paragraph 3-2. Subparagraph 3-2f is not applicable.

4-3. MUTUAL CONDUCTANCE (Gm) TEST.

This is the basic quality test for tubes used as amplifiers. After completing the above leakage test and without changing controls, proceed as follows:

a. Set the LEAKAGE switch to the tube test position.

b. Recheck the line voltage by means of the MICROMHOS meter and the LINE ADJUST control, and the LINE TEST (S11) push switch. Reset, if necessary.

c. Depress the Gm LOCK (S4) push switch and observe the test meter reading on the 10000 scale. Since the tube data book (figure 4-1) calls for 3700 μmhos transconductance with 180 volts on the plate, 180 volts on the screen (grid 2) and 8.5 volts on the control grid (grid 1) the meter pointer should indicate approximately that amount. The minimum acceptable reading under these conditions is 2300 μmhos. This amount represents 63% of the design center of 3700 μmhos. Any reading below 2300 indicates the tube should be discarded.

d. Release the Gm LOCK (S4) push switch by depressing Gm RELEASE (S5) push switch.

4-4. GAS TEST

In the measurement of grid current due to gas under Class A operation of a tube, the same selector switch set up is used as for mutual conductance (Gm) testing. To test for gas (grid current), proceed as in paragraph 3-4.

4-5. RESERVE LIFE TEST

This test is used to approximate the future life of the tube under test. The same selector settings used for mutual conductance (Gm) testing are used for this test. To make a reserve life test, proceed as in paragraph 3-5.

4-6. DETECTOR DIODE TEST

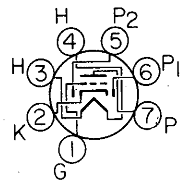
Rectifier tubes (including diodes and diode sections of multi-section tubes) are tested for emission, as this test best affords a true indication of a rectifier tube's quality. For the purpose of testing, these tubes may be roughly classified into two groups: the first group consists of detector diodes of the 10 volt, 2 ma and 10 volt, 4 ma types, and they are tested with the DIODE (S1) push switch and its associated circuitry. The second group consists of tubes whose primary function is power rectification; therefore, these tubes are tested under conditions closely simulating actual operating conditions by means of the circuitry associated with the RECT (S2) push switch.

To test detector diodes make the preliminary set-up by removing the line cord from the lead compartment and connect to a source of 105-125 volts, 50-60 cycles power. Proceed as follows:

DOUBLE-DIODE TRIODE

12AV6

MINIATURE TYPE
COATED UNIPOTENTIAL CATHODE
HEATER
12.6 ± 10% VOLTS 0.15 AMP.
AC OR DC
ANY MOUNTING POSITION



BASING SCHEMATIC

MINIATURE BUTTON
7 PIN BASE
7BT

THE 12AV6 COMBINES A HIGH-MU TRIODE AND TWO INDEPENDENT DIODE UNITS IN THE 7 PIN MINIATURE CONSTRUCTION. IT PERMITS A SINGLE TUBE TO FUNCTION AS A DETECTOR, AVC RECTIFIER, AND AUDIO AMPLIFIER.

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS
CLASS A_1 AMPLIFIER

PLATE VOLTAGE	100	250	VOLTS
GRID NO. 1 VOLTAGE	-1	-2	VOLTS
PLATE RESISTANCE	80 000	62 500	OHMS
AMPLIFICATION FACTOR	100	100	
TRANSCONDUCTANCE	1 250	1 600	μ MHOS
PLATE CURRENT	0.5	1.2	MA.
AVERAGE DIODE CURRENT AT 10 VOLTS DC (EACH UNIT)	2.0	2.0	MA.

LD-45

Figure 4-2. Condensed 12AV6 Tube Data

a. Consult a standard tube data handbook for the specific tube to be tested. As an example see figure 4-2, for a condensed version of such information. This condensed version eliminates data not pertinent to tube testing.

b. Set the first (left) FILAMENT selector on position C. This is the third switch position (counting A= 1, B= 2, and C= 3) and connects to pin 3 of the tube under test. See figure 4-2 for tube basing. Pin 3 connects one side of the filament of the tube.

c. Set the second FILAMENT selector on position D. This is the fourth switch position and connects to pin 4 of the tube under test. Pin 4 connects the other side of the filament of the tube.

d. GRID A and GRID B selectors are not used in this test, therefore set both on 0 or zero positions.

e. Set the PLATE selector on position E. This is the fifth switch position and connects to pin 5 of the tube under test. Pin 5 connects to one of the diode plates of the tube.

f. Set the SCREEN selector on position F. This is the sixth switch position and connects to pin 6 of the tube under test. Pin 6 connects to the other diode plate of the tube.

g. Set the CATHODE selector on position B. This is the second switch position and connects to pin 2 of the tube under test. Pin 2 connects to the cathode of the tube.

h. The SUPPRESSOR selector is not used in this test, therefore set it on position 0 or zero.

i. Set the FILAMENT VOLTS switch on the 12.6 volts position.

j. Set the BIAS VOLTS control on the 0 or zero position.

k. To set the PLATE VOLTS, the SCREEN VOLTS, and the RANGE switches, apply the following rule. If the tube under test is rated at 10 volts, 2 ma., set the PLATE VOLTS switch on position B, the SCREEN VOLTS switch on position A, and the RANGE switch on position B. That is B, A, B, in that order.

If the tube under test is rated at 10 volts, 4 ma., set the PLATE VOLTS switch on position C, the SCREEN VOLTS switch on position A, and the RANGE switch on position C. That is C, A, C, in that order.

In this case, since the 12AV6 is rated at 10 volts, 2 ma., use the first rule, i. e., (BAB).

Set the PLATE VOLTS switch on position B,
Set the SCREEN VOLTS switch on position A, and
Set the RANGE switch on position B.

m. Set the POWER ON-OFF switch to the ON position.

n. Depress LINE TEST (S11) push switch and hold down while rotating LINE ADJUST control until meter pointer is directly over LINE TEST on the MICROMHOS meter.

p. Insert the 12AV6 tube to be tested into the proper test socket. Allow sufficient time for the tube to warm to operating temperature.

q. Depress DIODE (S1) push switch and observe the reading on the MICROMHOS meter. With the RANGE switch on position B, any reading below 5000 indicates the tube should be discarded. If the RANGE switch is on position C (as in 10 volts, 4 ma., tests) any reading below 10000 indicates the tube should be discarded.

In this case, since the RANGE switch is on position B, any reading below 5000 should be cause for rejection of the tube.

r. Release DIODE (S1) push switch.

s. Depress and hold down DUAL TEST (S6) push switch.

t. Depress DIODE (S1) push switch and observe the reading on the MICROMHOS meter. This combination of switches provides for testing the other section of dual tubes. The same rules for rejection prevail on both sections of the tube.

u. Release both push switches.

4-7. POWER RECTIFIER TEST.

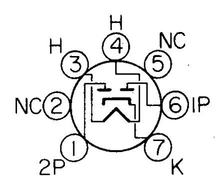
Rectifier tubes other than 2 and 4 milliamperes at 10 volts dc (detector diodes) are set-up for testing in a different manner than in paragraph 4-6. Figure 4-4, Power Rectifier Emission Nomograph, provides a means of programming the tester to check cathode emission of power rectifier tubes by the tube data handbook method. Control and switch positions obtained from the nomograph (figure 4-4) will not necessarily agree with the roll chart information given for the same tube type; nor will an "unsafe" combination of control settings, as determined from the nomograph, necessarily reflect an "unsafe" condition when the same combination of settings is given on the roll chart. This is because a complex programming sequence is used in determining roll chart information. To reduce this sequence to a nomograph, certain simplifying assumptions are made. In spite of these assumptions, the nomograph method provides information only slightly less accurate than the roll chart method.

To use the nomograph, one operating point on the geometrical index line A of the nomograph must be determined. The information to determine this point is derived from a tube data handbook in one of two ways: first, this information may be found under "Typical Operating Conditions" as the tube voltage drop per plate at a rated plate current, and second, this point may be found as a point on the "E-I Characteristic Curve". Once the operating point is known, the nomograph is used to determine the settings for the V.R.-RECT.LOAD control and the SCREEN VOLTS and RANGE switches.

FULL WAVE RECIFIER

6X4

MINIATURE TYPE
COATED UNIPOTENTIAL CATHODE
ANY MOUNTING POSITION



BASING SCHEMATIC

JEDEC 5BS

THE 6X4 IS A HEATER-CATHODE TYPE POWER RECTIFIER IN THE MINIATURE CONSTRUCTION.

HEATER CHARACTERISTICS AND RATINGS
DESIGN MAXIMUM VALUES-SEE EIA STANDARD RS-239

AVERAGE CHARACTERISTICS	6.3 VOLTS	600	MA.
TUBE VOLTAGE DROP (MEASURED WITH TUBE CONDUCTING 70 MA EACH PLATE)		22	VOLTS
HEATER SUPPLY LIMITS: VOLTAGE OPERATION		6.3 ± 0.6	VOLTS

LD-47

Figure 4-3. Condensed 6X4 Tube Data

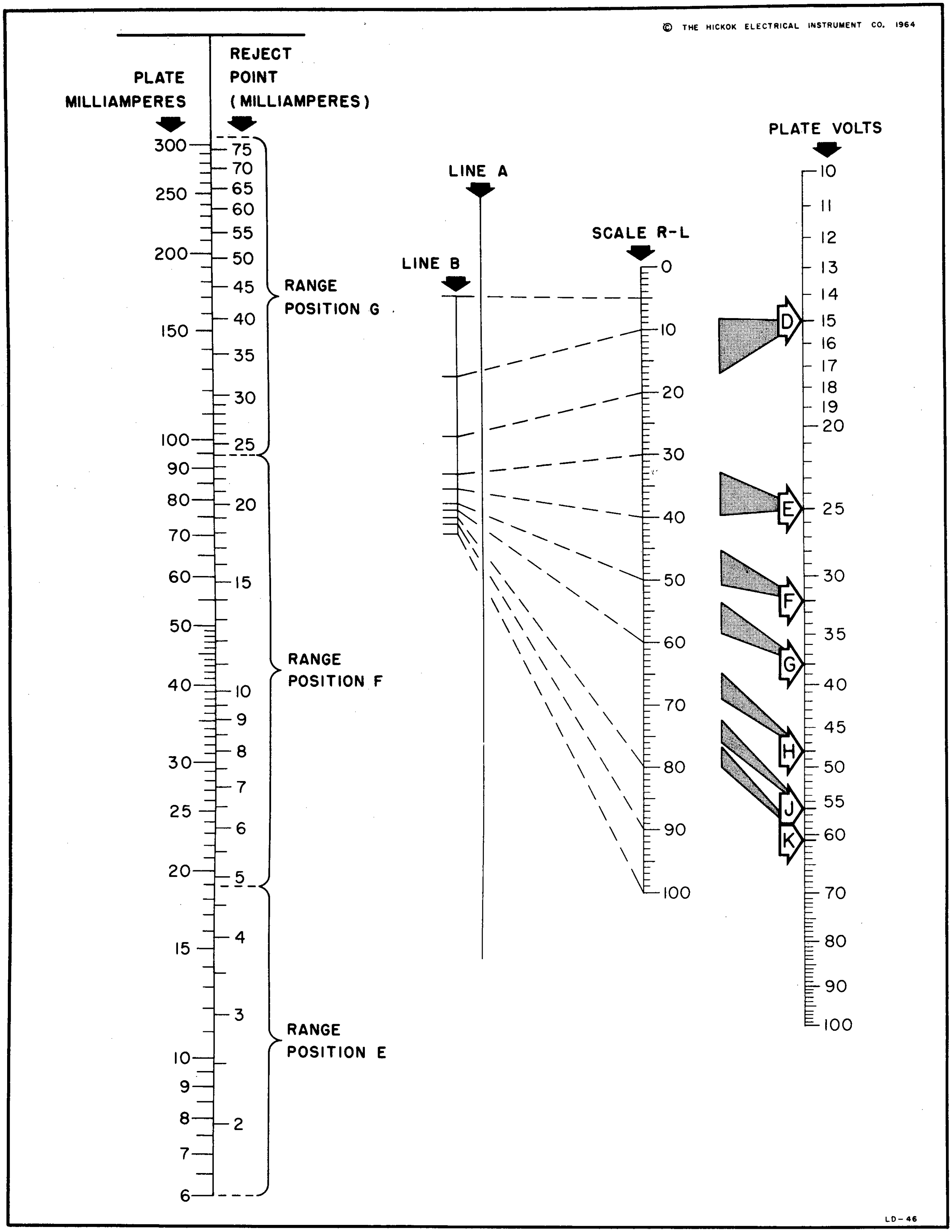


Figure 4-4. Power Rectifier Emission Nomograph

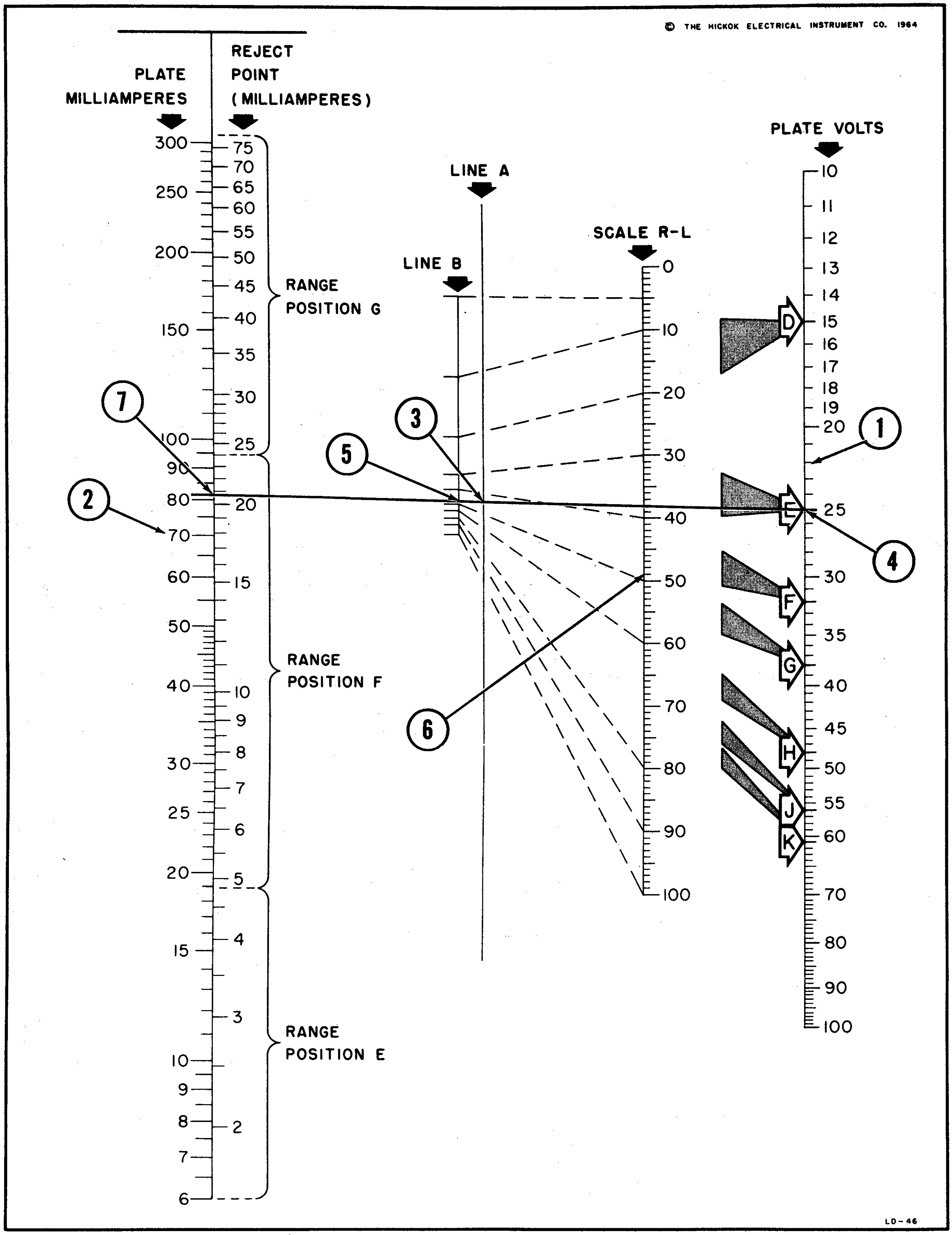


Figure 4-5. Method of Using the Power Rectifier Emission Nomograph

To test rectifier tubes other than detector diodes, consult a standard tube data handbook for the specific tube to be tested. As an example, see figure 4-3 of tube 6X4 for a condensed version of such information. This condensed version eliminates data not pertinent to tube testing.

To test the 6X4 make the preliminary set-up (remove the line cord from the lead compartment, connect to a source of 105-125 volts, 50-60 cycles power) and proceed as follows:

a. Set the first (left) FILAMENT selector on position C. This is the third switch position (counting A= 1, B= 2, and C= 3) and connects to pin three of the tube under test. See figure 4-3 for tube basing. Pin 3 connects one side of the filament of the tube.

b. Set the second FILAMENT selector on position D. This is the fourth switch position and connects to pin 4 of the tube under test. Pin 4 connects the other side of the filament of the tube.

c. Set the GRID A and GRID B selectors on position O. These are the off positions.

d. Set the PLATE selector on position A. This is the first switch position and connects to pin 1 of the tube under test. Pin 1 connects to plate 2 of the tube.

e. Set the SCREEN selector on position F. This is the sixth switch position and connects to pin 6 of the tube under test. Pin 6 connects to plate 1 of the tube.

f. Set the CATHODE selector on position G. This is the seventh switch position and connects to pin 7 of the tube under test. Pin 7 connects to the cathode of the tube.

g. Set the LEAKAGE switch on the TUBE TEST position.

h. Set the FILAMENT VOLTS switch on the 6.3 position.

i. Determine the SCREEN VOLTS switch setting by using the nomograph (figure 4-5), in the following manner:

1). Using the 6X4 tube (figure 4-3) as an example, place a straightedge on the nomograph between Plate Volts (22 volts) indicated by a number 1 in a circle, and Plate Milliamperes (70ma.) indicated by a number 2 in a circle in figure 4-5.

2). Scribe a mark on the nomograph at the intersection of the straightedge and the geometrical index line, Line A. This is the operating point for use with the 6X4 tube. This operating point is indicated on the sample nomograph by a number 3 in a circle.

3). Connect with a straightedge the operating point on Line A (circle 3) with the point of the lettered triangle immediately below the Plate Volts point (circle 1). This point is indicated on the sample nomograph by a number 4 in a circle. This line, determined by the straightedge is called the information line. The letter within the lettered triangle is the test setting for the SCREEN VOLTS switch. In this case set the SCREEN VOLTS switch on the E position.

NOTE

The information line determined by circle 3 and circle 4 must pass through the shaded triangle adjacent and to the left of the lettered triangle. If the information line does not meet this condition, use the closest lettered triangle that will permit the information line to pass through a shaded triangle. The lower edges of the shaded triangles represent the maximum possible setting of the V.R.-RECT. LOAD control. The upper edges of the shaded triangles represent the lowest possible setting that will not cause damage to the tester components due to excessive current.

j. Project the information line across the full width of the nomograph. Mark the point at which this line intersects Line B. This point (circle 5) when proportionally projected to Scale R-L (rectifier load) provides the V.R.-RECT. LOAD control setting. In this case the projection indicates a Scale R-L reading of 49 (circle 6). Set the V.R.-RECT. LOAD control on 49.

k. The projected information line for any tube must pass through one of the three brackets titled "Range Position E, F, or G". These brackets indicate the test settings for the RANGE switch. In this case it passes through Range Position F. Set the RANGE switch in the F position.

m. The point at which the information line intersects the Reject Point (Milliamperes) scale indicates in milliamperes the meter reading for tube rejection. In this case 20.8 ma is shown, therefore any reading below 20.8 ma is cause to discard the tube as having unsatisfactory life expectancy. See circle 7 on the nomograph.

n. Set the POWER ON-OFF control to the ON position.

p. Depress LINE TEST (S11) push switch and hold down while rotating the LINE ADJUST control until meter pointer is directly over LINE TEST on the MICROMHOS meter.

q. Insert the 6X4 tube to be tested into the proper test socket. Allow sufficient time for the tube to warm to operating temperature.

r. Depress RECT. (S2) push switch and observe reading on the MICROMHOS meter. Any reading below 20.8 ma indicates the tube should be discarded.

SECTION 5

CIRCUIT DESCRIPTION

5-1. GENERAL.

The Model 580A Tube Tester provides all the requirements for determining the condition of new replacement tubes as well as that of tubes which have been in service for some time. Various categories of tests, their requirements, and their characteristics are as follows:

a. The Model 580A Tube 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 maybe defined as the ratio between the change of plate current due to a small change in control grid voltage itself. Used as a figure of merit. Characteristic symbol G_m.

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

c. In connection with diodes, a straight emission test must be employed rather than the mutual conductance test.

d. To evaluate the quality of a voltage regulator tube a means must be provided to measure the voltage drop across the tube under varying conditions of current conduction.

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

5-2. POWER SUPPLY CIRCUIT DESCRIPTION.

The transformers, T101, T102, and T103 are supplied with primary voltage from a 105-125 volt, 50-60 cycle line through the POWER ON-OFF control, the LINE FUSE lamp, and the LINE ADJUST control R130. The LINE ADJUST control standardizes the voltage across the primaries of the transformers at 100 volts. See figure 5-1.

The secondary of transformer T101 consists of a multi-tapped winding designed to supply the various filament or heater voltages for the tubes under test. Voltages shown on the schematic wiring diagram in the back of this manual are nominal and may vary slightly under load, depending on the type of tube under test. Switch S102 provides for reduction of filament voltage by 10% for LIFE TEST of tubes.

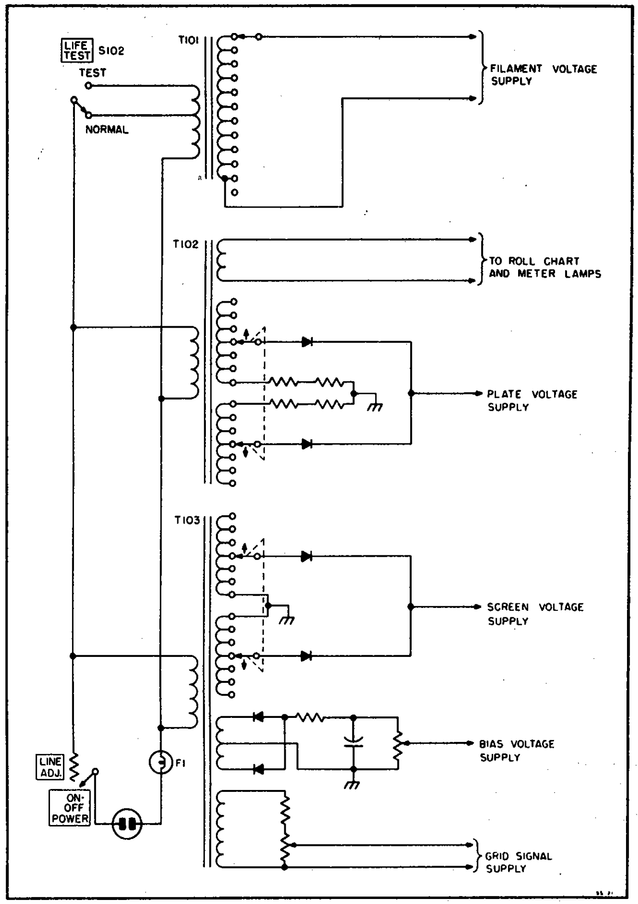


Figure 5-1. Simplified Schematic of Power Supply

The secondary of transformer T102 is tapped to supply 6.3, 12.6, 22.5, 45, 80, 100, 120, 150, 180, 200, 250, or 300 volts to the semiconductor rectifier network consisting of CR4, CR5, CR6, and CR7 which in turn supplies this rectified voltage to the plate of the tube under test. The PLATE VOLTS switch selects the appropriate plate voltage according to the roll chart or according to table 2-1.

The secondary of transformer T103 is tapped to supply 6.3, 12.6, 22.5, 45, 80, 100, 120, 150, 180, 200, 250, or 300 volts to the semiconductor rectifier network consisting of CR8, CR9, CR10, and CR11 which in turn supplies the rectified voltage to the screen grid of the tube under test. The SCREEN VOLTS switch selects the appropriate screen voltage according to the roll chart or according to table 2-1.

WARNING
HIGH VOLTAGE

Dangerous voltages are present within this equipment and at the top cap connections of certain tubes when under test.

The secondary winding of transformer T103 also supplies voltage for mutual conductance tests. This signal voltage is taken from the tap on resistor R142 and is held to 0.28 volts RMS. The 100 volt secondary winding of transformer T103 supplies the bias voltage. This bias voltage is rectified by semi-conductors CR12 and CR13. The appropriate bias voltage is obtained by the setting of the BIAS VOLTS control according to the roll chart or according to the data in the tube data handbooks.

5-3. LEAKAGE TEST CIRCUIT DESCRIPTION.

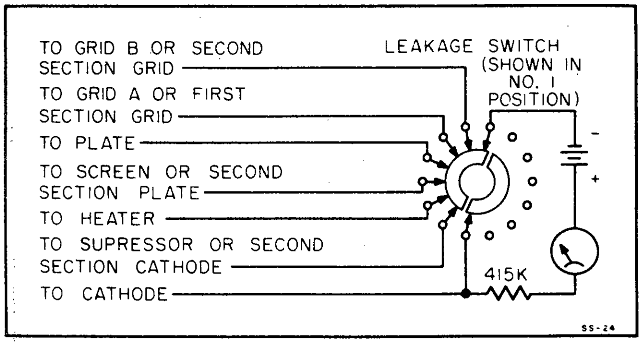


Figure 5-2. Leakage Test Circuitry

To determine the extent of inter-element leakage or to detect the presence of an inter-element short, the LEAKAGE switch is used to establish circuitry as shown in figure 5-2. The negative supply, taken directly from the grid bias rectifiers, in series with the meter and a resistance, effectively form an ohmmeter which is sensitive from 50 megohms to 0 ohms (full scale deflection).

5-4. MUTUAL CONDUCTANCE (Gm) TEST CIRCUIT DESCRIPTION.

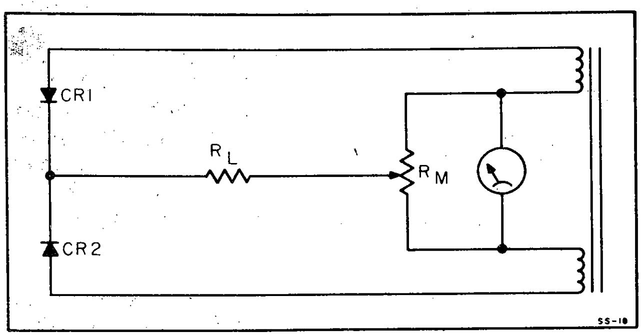


Figure 5-3. Simplified Schematic of Full-wave Rectifier Circuit

Examine first the simple full-wave rectifier circuit shown in figure 5-3. The two power transformer secondary windings have their inner ends connected to a 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 cathodes in any full-wave rectifier circuit. When the anode of CR1 is positive, electron flow is through the upper half of R_M, and the meter pointer tends to deflect in one direction. When the anode of CR2 is positive, electron flow is through the lower half of R_M, and the meter pointer tends to deflect in the opposite direction. With the load resistance R_L fixed and equal forces acting on the meter in both cases, the meter pointer stays at zero because of its inertia; it cannot follow variations at the power line frequency.

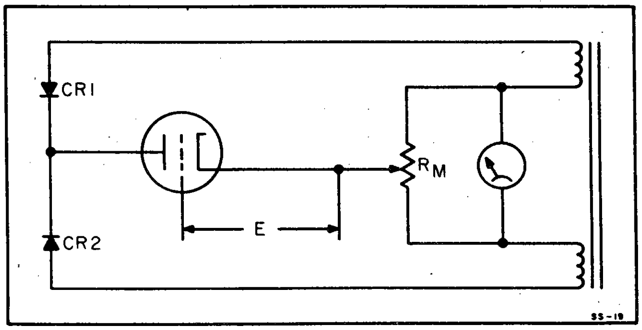


Figure 5-4. Substitution of Electron Tube

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 5-4, the meter will still read zero because an electron tube under steady-state conditions acts like a fixed resistance.

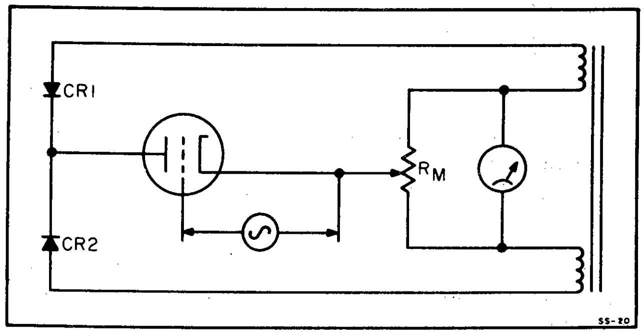


Figure 5-5. Addition of AC Potential

If an ac potential is applied to the grid of the tube under test in addition to the dc bias as in figure 5-5, the circuit becomes equivalent to that employed for quality and mutual conductance tests in the Model 580. When this ac potential swings the grid positive, the plate current of the tube is increased, and 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.

5-5. GAS TEST CIRCUIT DESCRIPTION.

The gas test circuit consists of a transistorized dc current amplifier as one arm of a bridge. See figure 5-6. To set up the circuitry of figure 5-6, the GAS ZERO ADJ. (S8) push switch must be depressed.

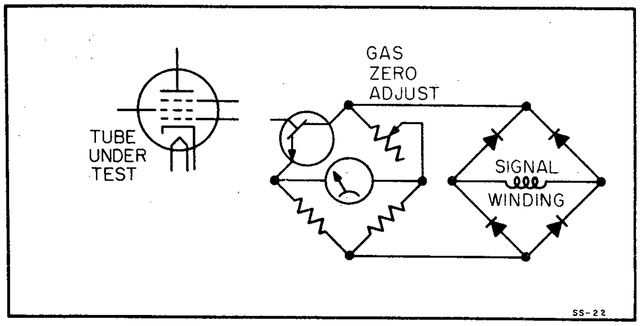


Figure 5-6. Simplified Schematic of Gas Test Bridge Circuit

The GAS ZERO ADJ (S8) push switch when depressed, mechanically actuates the SIG. OFF (S7) push switch which connects the signal winding to the circuit as a source of power. The GAS ZERO ADJ. (S8) push switch places the meter in the bridge circuit. The bridge may now be balanced by means of the GAS ZERO ADJUST control.

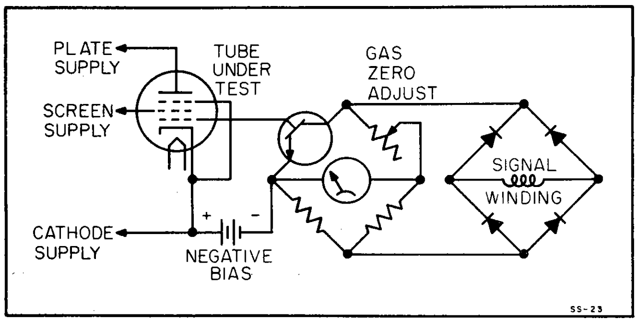


Figure 5-7. Simplified Schematic of Gas Test Circuitry

Depressing the GAS TEST (S9) push switch will result in the circuitry shown in figure 5-7. Note that the Gm LOCK push switch must be actuated to supply tube potentials and that the GAS ZERO ADJ. (S8)push switch must be actuated to keep the meter in the bridge circuit. Any grid current will result in a change of the apparent collector-emitter resistance of the transistor, thus unbalancing the bridge and causing a current to flow through the meter. The amount of current flow is indicative of the amount of unwanted gas in a tube. Therefore, it is an accurate measure of the acceptance or rejection of a tube under test.

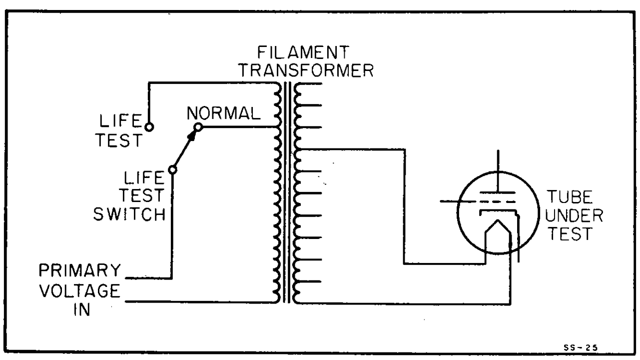


Figure 5-8. Simplified Schematic of Life Test Circuitry

5-6. LIFE TEST CIRCUIT DESCRIPTION.

The major indication of the amount of reserve life remaining in a vacuum tube is its ability to maintain (re: Gm or emission) the same value of quality under conditions of slightly lower than normal filament voltage. The life test is effected by reducing the filament voltage more than slightly and observing the resultant change in the quality reading. This reduction in filament voltage is accomplished by increasing the number of turns in the primary winding of the filament transformer, and thus reducing the secondary voltage. See figure 5-8. Filament voltage is reduced so that the resultant change in cathode temperature will be sufficient to lower the quality reading of tubes with maximum reserve capacity. This filament voltage reduction permits a continuous grading (from maximum to minimum) of the quantity of reserve life remaining in the tube under test.

5-7. RECTIFIER TEST CIRCUIT DESCRIPTION

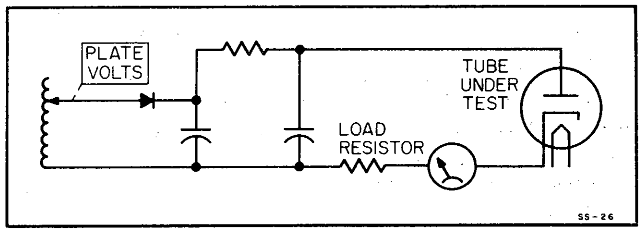


Figure 5-9. Simplified Detector Diode Test Circuit

Two separate test circuits are employed in the testing of rectifier tubes, depending upon whether the tube is a detector diode or a power rectifier. For the testing of detector diodes the DIODE (S1) push switch is used to establish the circuitry shown in figure 5-9. Note that filtered dc is applied to the plate of the tube under test and that cathode current is measured.

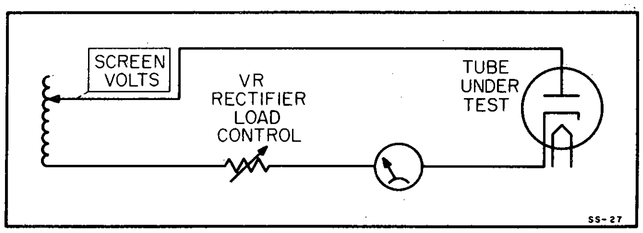


Figure 5-10. Simplified Power Rectifier Test Circuit

For testing of power rectifier tubes the RECT. (S2) push switch is used to establish the circuitry shown in figure 5-10. Note that the circuitry of figure 5-10 differs from that of figure 5-9 in that ac voltage is applied to the plate in figure 5-10. Cathode current is again used as an indication of the tube's quality.

Measuring the cathode current of a rectifier is an evaluation of its emission characteristics. Therefore, it is a measure of the acceptance or rejection of the tube under test. This measure is obtained from either the roll chart or a tube data handbook.

5-8. VR TUBE TEST CIRCUIT DESCRIPTION.

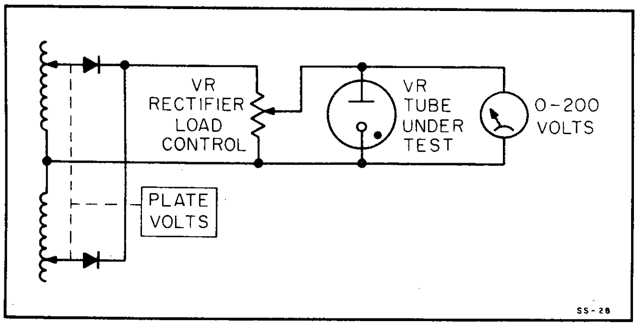


Figure 5-11. Simplified VR Tube Test Voltage Measuring Circuit

The quality of a voltage regulator tube is determined by its ability to satisfactorily pass a given range of current with a limited change in voltage drop across the tube. This quality is called regulation. To test VR tubes it is necessary to determine the firing point of the tube or that point where the minimum amount of voltage will make the tube conduct current.

The RANGE switch position VR in conjunction with the Gm LOCK (S4) push switch will establish the circuitry shown in figure 5-11. To determine how well the VR tube is regulating, the current through the tube must be changed and the corresponding change in anode-to-cathode voltage must be noted.

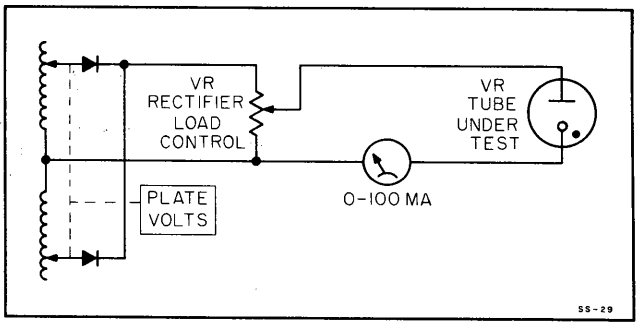


Figure 5-12. Simplified VR Tube Test Current Measuring Circuit

Hence, the VR MILS (S3) push switch is actuated to convert the voltmeter of figure 5-11 to a milliammeter in the cathode circuit as shown in figure 5-12. After changing the current by means of the V. R. -RECT. LOAD control, the V.R. MILS (S3) push switch may be released to re-establish the circuitry of figure 5-11, thus permitting the change in anode-to-cathode voltage to be observed.

5-9. DUAL TEST CIRCUIT DESCRIPTION.

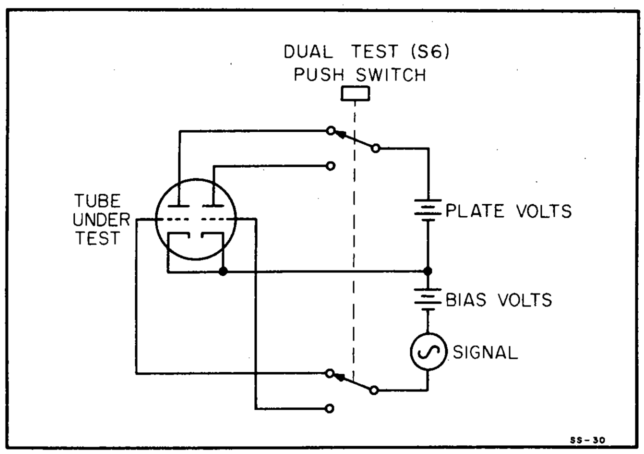


Figure 5-13. Dual Test Switching Circuitry

The DUAL TEST (S6) push switch establishes the circuitry to permit testing of multi-section tubes. This switch transfers the test circuitry from the first section of the tube under test (plate number 1 and grid number 1) to the second section of the tube (plate number 2 and grid number 2). Keeping in mind that the SCREEN selector is used as the plate number 2 selector and that the GRID B selector is used as the grid number 2 selector, observe in figure 5-13 how this circuit is affected.

SECTION 6

MAINTENANCE AND CALIBRATION

6-1. GENERAL.

The Model 580A Tube Tester is a precision test instrument, ruggedly built to give years of trouble-free operation. However, if through electrical or mechanical accident, damage should result, the following may be sufficient to restore the tester to operation.

SYMPTOM	POSSIBLE SOLUTION
Tester will not turn on	Check LINE FUSE (F1) lamp. Replace with a standard number 81 lamp.
Checks rectifiers and diodes only	Check BIAS FUSE (F2) lamp. Replace with a standard number 49 lamp.
Switch operates intermittently	Check for foreign matter in switch contacts.
	Check for switch compliance.
	Check push switches for bent wiper contacts.

The calibration pots on the circuit board (inside the tester) have been set at the factory and should not require further adjustment. If the setting or settings of the LINE TEST CAL ADJ, the SIGNAL CAL ADJ, or the BIAS CAL ADJ controls have been disturbed, they may be re-set by following the procedures outlined in paragraphs 6-2, 6-3, and 6-4, respectively. See figure 6-1. The remaining five (pots) controls on the circuit board should be re-set, only by an authorized factory representative or repair station.

6-2. LINE TEST CALIBRATION ADJUSTMENT.

To adjust and calibrate the LINE TEST circuitry, remove the Tube Tester from its case and proceed as follows:

a. Connect an AC voltmeter from the gray wire on the LINE FUSE lamp socket to the white wire on the LIFE TEST switch.

b. Depress and hold down the LINE TEST (S11) push switch and simultaneously standardize the line by means of the LINE ADJUST control.

c. If the AC voltmeter does not read 100 volts, connect the Tester to the line through a Variac autotransformer adjusted for 115 volt output. Re-set the LINE ADJUST control to its approximate midpoint and by means of the line test calibration adjustment (R102, figure 6-1), adjust the meter pointer of the MICROMHOS meter to read over the LINE TEST mark while depressing the LINE TEST (S11) push switch.

6-3. SIGNAL VOLTAGE CALIBRATION.

To adjust and calibrate the signal voltage circuitry, remove the Tube Tester from its case and proceed as follows:

a. Set the selectors to 00A0 00B0 positions.

b. Connect an AC-VTVM (Ballantine 300, or equivalent) between pins 1 and 2 of any convenient panel test socket. Note that pins are numbered counterclockwise from the index key or space when viewed from above.

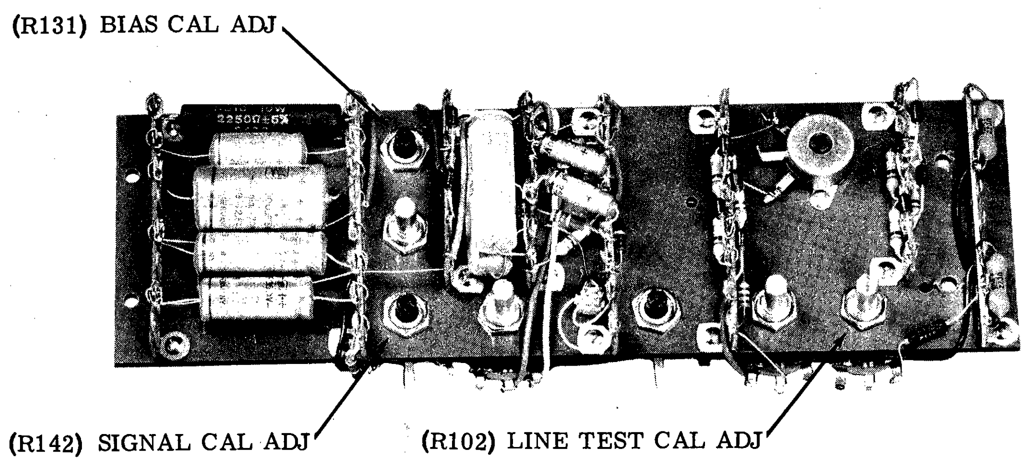


Figure 6-1. Circuit board with some Components Removed for Clarity

HT-22

c. Set the BIAS VOLTS control to zero (0).

d. Depress LINE TEST (S11) push switch and hold down while rotating the LINE ADJUST control until meter pointer is directly over LINE TEST mark on the MICROMHOS Meter. Release LINE TEST (S11) push switch.

e. Adjust the signal calibration adjustment (R142, figure 6-1), for a reading of 0. 278 volts, ±1%, on the AC-VTVM.

6-4. BIAS VOLTAGE CALIBRATION.

To adjust and calibrate the voltage bias circuitry, remove the Tube Tester from its case and proceed as follows:

a. Set the selectors to 00A0 00B0 positions.

b. Set the 5-50 factor switch to the 50 position.

c. Set the BIAS VOLTS control to the 50 setting.

d. Connect the negative lead of a VTVM to pin 1 of any convenient panel test socket. Connect the positive lead to pin 2 of the same socket. Note that the pins are numbered counterclockwise from the index key or space when viewed from above.

e. Set the POWER ON-OFF control to the ON position.

f. Depress the LINE TEST (S11) push switch and hold down while rotating the LINE ADJUST until meter pointer is directly over LINE TEST on the MICROMHOS meter.

g. Adjust the bias calibration adjustment (R131, figure 6-1), for a 50 volt reading on the VTVM. If the VTVM indicates zero (0) volts, check BIAS FUSE lamp (F2). Replace with No. 49 if necessary.

h. Depress the BIAS VOLTS (S10) push switch and observe the reading on the MICROMHOS meter. If the MICROMHOS meter does not indicate 50 volts, either the DC-VTVM is inaccurate or the magnetic shunt on the MICROMHOS meter requires adjustment. If the latter is the case, the adjustment should be made only by an authorized factory representative or repair station.

SECTION 7 - PARTS LIST

7-1. INTRODUCTION

Reference designations are assigned to identify all parts of the Model 580 Tube Tester. These designations are used in the parts list and the schematic wiring diagram. The letter prefix of a reference designation indicates the kind of part - resistor, capacitor, electron tube, etc. The number differentiates between parts in the same group.

REF. DESIG.	NOTES	NAME AND DESCRIPTION	HICKOK PART NO.	PRICE EACH
A1		SWITCH ASSEMBLY: wired, consists of pushbutton switches S1 to S11 with associated components	19910-167	30.00
A2		DIAL ASSEMBLY: Bias	4160-117	1.00
A3		DIAL ASSEMBLY: for VR	4160-66	.65
A4		LEAD ASSEMBLY: plate, red	12450-388	1.25
A5		LEAD ASSEMBLY: grid	12450-387	1.25
A6		INDEX ROLLER ASSEMBLY	9600-48	6.20
A7		SOCKET ASSEMBLY: 5 pin nuvistor	19350-381	.25
A8		SOCKET ASSEMBLY: 7 pin nuvistor	19350-383	.25
C101		CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, 6 volts	3085-45	.55
C102		CAPACITOR, FIXED, MYLAR: .27 uf, 200 volts	3090-30	.45
C103		Same as C102		
C104		CAPACITOR, FIXED, ELECTROLYTIC: 250 uf, 6 volts	3085-181	.90
C105		CAPACITOR, FIXED, ELECTROLYTIC: 20-20 uf, 25 volts	3085-190	.85
C106		Same as C105		
C107		CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, 50 volts	3085-44	.85
C108		CAPACITOR, FIXED, ELECTROLYTIC: 8 uf, 350 volts	3085-68	.75
C109		CAPACITOR, FIXED, ELECTROLYTIC: 10-10 uf, 50 volts	3085-189	.85
C110		Same as C109		
C111		CAPACITOR, FIXED, ELECTROLYTIC: 1000 uf, 15 volts	3085-188	1.50
C112		CAPACITOR, FIXED, ELECTROLYTIC: 1000uf, 6 volts	3085-187	1.41
CR1		RECTIFIER: full wave, copper oxide	18150-42	1.80
CR2		Same as CR1		
CR3		SEMI-CONDUCTOR DEVICE, DIODE: SC2, 200 PIV.	3870-107	3.00
CR4		SEMI-CONDUCTOR DEVICE, DIODE: SC6, 600 PIV, 1 Amp	3870-101	3.75

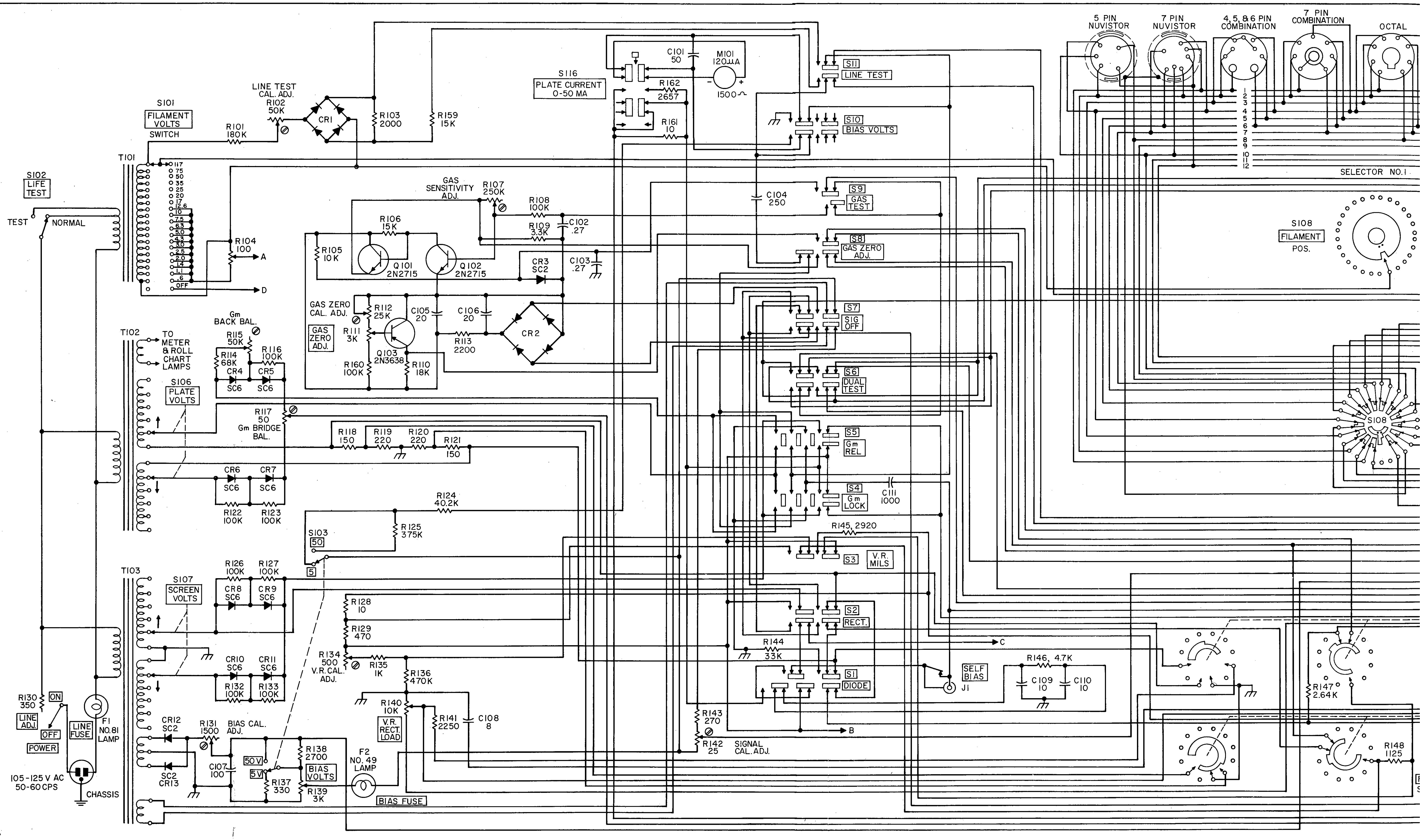
REF. DESIG.	NOTES	NAME AND DESCRIPTION	HICKOK PART NO.	PRICE EACH
CR5		Same as CR4		
CR6		Same as CR4		
CR7		Same as CR4		
CR8		Same as CR4		
CR9		Same as CR4		
CR10		Same as CR4		
CR11		Same as CR4		
CR12		Same as CR3		
CR13		Same as CR3		
DS1		LAMP: #47 pilot, 6-8 V, 150 ma, bayonet base, used on roll chart.	12270-12	.10
F1		LAMP: #81, bayonet type (LINE FUSE)	12270-2	.10
F2		LAMP: #49 pilot, .06 Amp, 2 Volt, bayonet base (BIAS FUSE)	12270-17	.10
J1		JACK: 2 circuit, 3/8" bushing lgth	10300-57	.50
J2		JACK: black, pin plug	10300-2	.10
J3		Same as J2		
J4		Same as J2		
M1		METER: Model 168, 120 ua, 1500 ohms	680-233	24.95
MP1		BUTTON: molded, push, red	2920-8	.10
MP2		Same as MP1		
MP3		BUTTON: molded, push, black	2920-7	.10
MP4		Same as MP3		
MP5		Same as MP3		
MP6		Same as MP3		
MP7		Same as MP3		
MP8		Same as MP3		
MP9		Same as MP3		
MP10		Same as MP3		
MP11		BUTTON: molded, push, green	2920-13	.10
MP12		KNOB: bar type with white dot, with pointer	11500-11	.10
MP13		Same as MP12		
MP14		Same as MP12		

REF. DESIG.	NOTES	NAME AND DESCRIPTION	HICKOK PART NO.	PRICE EACH
MP15		Same as MP12		
MP16		Same as MP12		
MP17		Same as MP12		
MP18		Same as MP12		
MP19		Same as MP12		
MP20		Same as MP12		
MP21		Same as MP12		
MP22		Same as MP12		
MP23		Same as MP12		
MP24		KNOB: molded, black, hole for 1/4" shaft	11505-140	.40
MP25		KNOB: with indicator, black, hole for 1/4" shaft	11505-142	.25
MP26		Same as MP25		
MP27		KNOB: molded, red.	11505-	.25
Q101		TRANSISTOR: 2N2715	20861-46	1.25
Q102		Same as Q101		
Q103		TRANSISTOR: 2N3638	20861-65	1.53
R101		RESISTOR, FIXED, FILM: 180K ohms, 5%, 1/2 watt	18414-181	.25
R102		RESISTOR, VARIABLE: composition, 50K ohms, 10%, 1/2 Watt	40300-503	1.00
R103		RESISTOR, FIXED, COMPOSITION: 2000 ohms, 5% 1/2 Watt	18412-201	.25
R104		Part of S101 (RESISTOR, VARIABLE: 100 ohms, 5 Watt)		
R105		RESISTOR, FIXED, COMPOSITION: 10K ohms, 5%, 1/2 Watt	18413-101	.25
R106		RESISTOR, FIXED, COMPOSITION: 15K ohms, 5%, 1/2 Watt	18413-151	.25
R107		RESISTOR, VARIABLE: Composition, 250K ohms, 10%, 1/2 Watt	40300-254	1.00
R108		RESISTOR, FIXED, COMPOSITION: 100K ohms, 5%, 1/2 Watt	18414-101	.25
R109		RESISTOR, FIXED, COMPOSITION: 3300 ohms, 10%, 1/2 Watt	18412-332	.15
R110		RESISTOR, FIXED, COMPOSITION: 18K ohms, 10%, 1/2W	18413-182	.15
R111		RESISTOR, VARIABLE: composition, 3000 ohms, 20%, 1/2 Watt	16925-11	1.00
R112		RESISTOR, VARIABLE: composition, 25,000 ohms, 10%, 1/2 Watt	40300-253	1.00

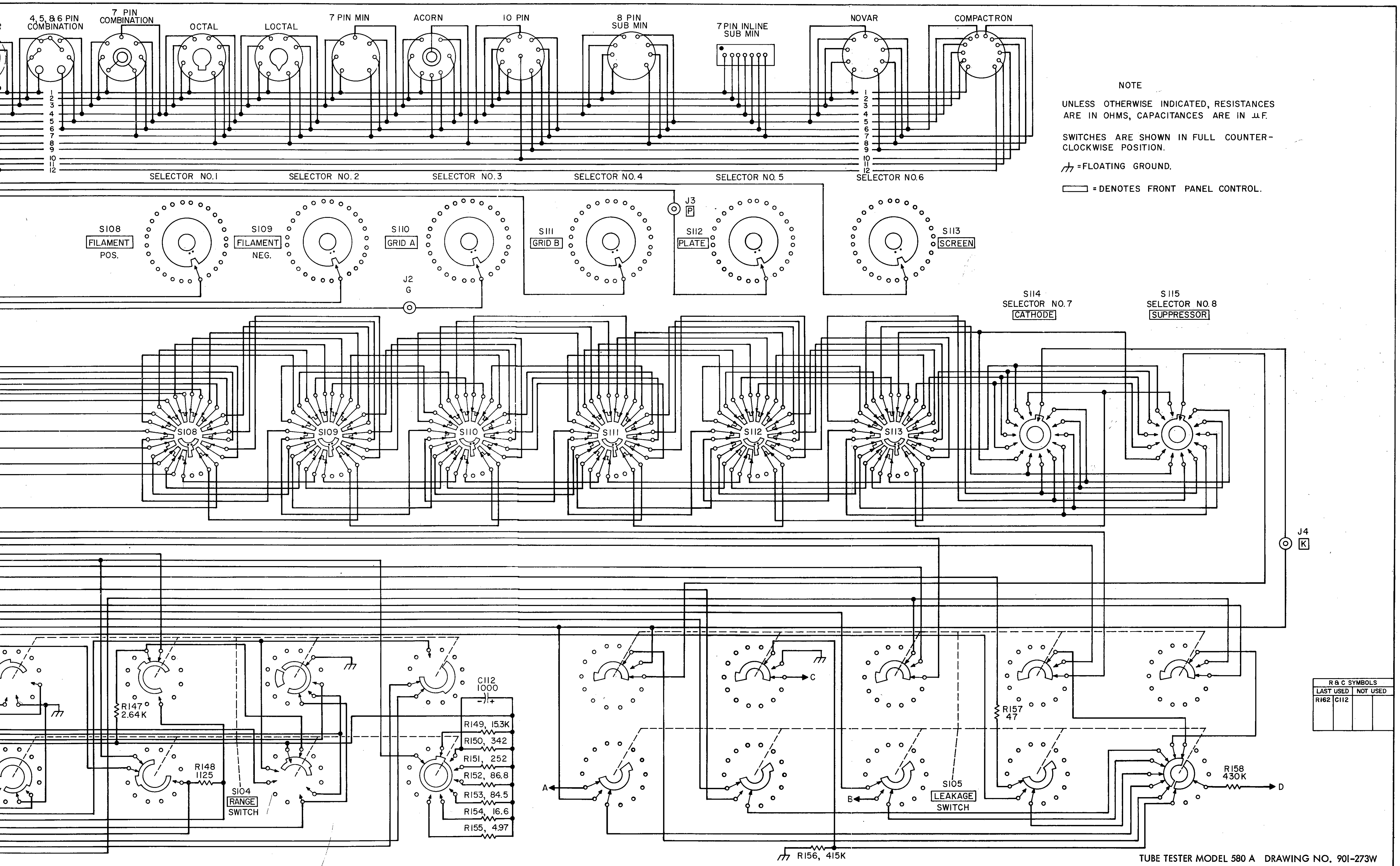
REF. DESIG.	NOTES	NAME AND DESCRIPTION	HICKOK PART NO.	PRICE EACH
R113		RESISTOR, FIXED, COMPOSITION: 2200 ohms, 10%, 1/2 Watt	18412-222	.15
R114		RESISTOR, FIXED, COMPOSITION: 68K ohms, 10%, 1/2 Watt	18413-682	.15
R115		Same as R102		
R116		Same as R108		
R117		RESISTOR, VARIABLE: 50 ohms, 2 Watt	16925-469	1.50
R118		RESISTOR, FIXED, WIRE WOUND: 150 ohms, 1%, 2 Watt	18575-417	1.25
R119		RESISTOR, FIXED, FILM: 220 ohms, 1%, 1/2 Watt	18537-200	.55
R120		Same as R119		
R121		Same as R118		
R122		Same as R108		
R123		Same as R108		
R124		RESISTOR, FIXED, FILM: 40.2K ohms, 1%, 1/2 Watt	18537-260	.55
R125		RESISTOR, FIXED, FILM: 375K ohms, 1%, 1/2 Watt	18537-134	.55
R126		Same as R108		
R127		Same as R108		
R128		RESISTOR, SPOOL: 10 ohms	18670-105(10)	1.75
R129		RESISTOR, FIXED, COMPOSITION: 470 ohms, 5%, 2 Watt	18431-471	.50
R130		RHEOSTAT: 350 ohms, 25 Watt	18750-37	4.00
R131		RESISTOR, VARIABLE: 1500 ohms, 20%, 2 Watt	16925-483	1.50
R132		Same as R108		
R133		Same as R108		
R134		RESISTOR, VARIABLE: 500 ohms, 20%, 2 Watt	16925-491	1.50
R135		RESISTOR, FIXED, COMPOSITION: 1000 ohms, 10%, 1/2 Watt	18412-102	.15
R136		RESISTOR, FIXED, FILM: 470K ohms, 1%, 1/2 Watt	18537-66	.55
R137		RESISTOR, FIXED, FILM: 330 ohms, 1%, 1 Watt	18539-57	.75
R138		RESISTOR, FIXED, COMPOSITION: 2700 ohms, 5%, 2 Watt	18432-271	.50
R139		POTENTIOMETER: adjusted, 3000 ohms	16926-5	6.20
R140		RHEOSTAT: 10K ohms, 50 Watt	18750-26	5.15

REF. DESIG.	NOTES	NAME AND DESCRIPTION	HICKOK PART NO.	PRICE EACH
R141		RESISTOR, FIXED, WIRE WOUND: 2250 ohms, 5%, 10 Watt	18575-418	1.50
R142		RESISTOR, VARIABLE: 25 ohms, 20%, 2 Watt	16925-482	1.50
R143		RESISTOR, FIXED, COMPOSITION: 270 ohms, 10%, 1/2 Watt	18411-272	.15
R144		RESISTOR, FIXED, COMPOSITION: 33K ohms, 5%, 1/2 Watt	18413-331	.25
R145		RESISTOR, FIXED, FILM: 2920 ohms, 1%, 1/2 Watt	18537-67	.55
R146		RESISTOR, FIXED, COMPOSITION: 4700 ohms, 10%, 1 Watt	18422-472	.15
R147		RESISTOR, FIXED, FILM: 2640 ohms, 1%, 1/2 Watt	18537-80	.55
R148		RESISTOR, FIXED, FILM: 1125 ohms, 1%, 1/2 Watt	18537-239	.55
R149		RESISTOR, FIXED, FILM: 15.3K ohms, 1%, 1/2 Watt	18537-242	.55
R150		RESISTOR, FIXED, FILM: 342 ohms, 1%, 1/2 Watt	18537-243	.55
R151		RESISTOR, FIXED, FILM: 252 ohms, 1%, 1/2 Watt	18537-244	.55
R152		RESISTOR, FIXED, FILM: 86.8 ohms, 1%, 1/2 Watt	18537-245	.65
R153		RESISTOR, FIXED, FILM: 84.5 ohms, 1%, 1/2 Watt	18537-246	.65
R154		RESISTOR, FIXED, FILM: 16.6 ohms, 1%, 1/2 Watt	18537-247	.65
R155		RESISTOR, FIXED, FILM: 4.97 ohms, 1%, 1/2 Watt	18537-248	.65
R156		RESISTOR, FIXED, FILM: 415K ohms, 1%, 1/2 Watt	18537-241	.55
R157		RESISTOR, FIXED, COMPOSITION: 47 ohms, 10%, 1/2 Watt	18410-472	.15
R158		RESISTOR, FIXED, COMPOSITION: 430K ohms, 5%, 1/2 Watt	18414-431	.25
R159		Same as R106		
R160		Same as R108		
R161		RESISTOR, FIXED, FILM: 10 ohms, 1%, 1/2 Watt	18694-100	.32
R162		RESISTOR, FIXED, FILM: 2657 ohms, 1%, 1/2 Watt	18537-281	.32
S1 thru S11		SWITCH: push button, 11 gang	19910-165	17.95
S101		SWITCH, ROTARY: filament volts, 1 section, 20 position with 100 ohms, 5W potentiometer R104 (FILAMENT VOLTS)	19912-536	5.95
S102		SWITCH, push button, DPDT (LIFE TEST)	19910-118	1.50
S103		SWITCH: toggle, DPDT, no off position (5V-50V)	19911-55	1.45
S104		SWITCH, ROTARY: range, 5 section, 8 position (RANGE SWITCH)	19912-534	6.95

REF. DESIG.	NOTES	NAME AND DESCRIPTION	HICKOK PART NO.	PRICE EACH
S105		SWITCH, ROTARY: leakage, 5 section, 7 position (LEAKAGE SWITCH)	19912-373	6.00
S106		SWITCH, ROTARY: 2 section, 12 position (PLATE VOLTS)	19912-535	4.95
S107		Same as S106 (SCREEN VOLTS)		
S108		SWITCH, ROTARY: selector interlock, 1 section 14 position (FILAMENT POS.)	19912-477	4.25
S109		Same as S108 (FILAMENT NEG.)		
S110		Same as S108 (GRID A)		
S111		Same as S108 (GRID B)		
S112		Same as S108 (PLATE)		
S113		Same as S108 (SCREEN)		
S114		SWITCH (CATHODE) SELECTOR: 1 sect., 14 pos.	19912-469	
S115		Same as S114 (SUPPRESSOR)		
S116		SWITCH, PUSH (PLATE CURRENT)	19910-157	
T101		TRANSFORMER: filament	20800-289	17.00
T102		TRANSFORMER: plate	20800-290	15.00
T103		TRANSFORMER: screen	20800-291	15.00
XF1		SOCKET: miniature bayonet base	19350-203	.25
XF2		SOCKET: bayonet, small	19350-1	.30
XV2		SOCKET: Acorn, 7 contact	19350-43	1.60
XV3		SOCKET: pin (S/W 18825-3 ring)	19350-96	.65
XV4		SOCKET: loctal, 8 pin (S/W 18825-2 ring)	19350-97	.30
XV5		SOCKET: octal, 8 pin (S/W 18825-2 ring)	19350-99	.35
XV6		SOCKET: 7 pin, black bakelite, bottom mtg, no center shield, less tube shield base	19350-136	.35
XV7		SOCKET: combination, 7-8 pin, sub-miniature	19350-220	.85
XV8		SOCKET: 9/10 pin, black, saddle mtg	19350-364	.25
XV9		SOCKET: 12 pin, black phenolic, saddle mtg	19350-365	.25
XV10		SOCKET: 9 pin, saddle mtg, black phenolic	19350-367	.25
XV11		SOCKET: composite 4, 5, 6 pin	19350-401	1.00
		BOOKLET: Instructions	2490-531	1.50
		CASE: Wood, black, leatherette covered	3145-618	17.00
		CHART: data roll	3200-97	1.75
		SOCKET: roll chart	19350-414	.35



S102 LIFE TEST
TEST
NORMAL
S101 FILAMENT VOLTS SWITCH
T101
R101 180K
LINE TEST CAL. ADJ. R102 50K
CR1
R103 2000
R159 15K
S116 PLATE CURRENT 0-50 MA
C101 50
M101 120μA
1500∿
R162 2657
R161 10
S11 LINE TEST
S10 BIAS VOLTS
5 PIN NUVISTOR
7 PIN NUVISTOR
4, 5, & 6 PIN COMBINATION
7 PIN COMBINATION
OCTAL
SELECTOR NO. 1
117 75 50 35 25 20 17 12.6 10 7.5 6.3 5.0 4.3 3.0 2.5 2.0 1.4 1.1 .6 OFF
R104 100
A
D
GAS SENSITIVITY ADJ.
R107 250K
R108 100K
R109 3.3K
C102 .27
R106 15K
R105 10K
Q101 2N2715
Q102 2N2715
CR3 SC2
C103 .27
C104 250
S9 GAS TEST
S8 GAS ZERO ADJ.
S108 FILAMENT POS.
GAS ZERO CAL. ADJ.
R112 25K
C105 20
C106 20
CR2
GAS ZERO ADJ.
R111 3K
Q103 2N3638
R113 2200
R160 100K
R110 18K
S7 SIG OFF
S6 DUAL TEST
T102
TO METER & ROLL CHART LAMPS
Gm BACK BAL.
R115 50K
R114 68K
R116 100K
CR4 SC6
CR5 SC6
S106 PLATE VOLTS
R117 50 Gm BRIDGE BAL.
R118 150
R119 220
R120 220
R121 150
S5 Gm REL
S4 Gm LOCK
C111 1000
CR6 SC6
CR7 SC6
R122 100K
R123 100K
R124 40.2K
R125 375K
S103 50 5
R145, 2920
S3 V.R. MILS
T103
S107 SCREEN VOLTS
R126 100K
R127 100K
CR8 SC6
CR9 SC6
R128 10
R129 470
S2 RECT.
C
R144 33K
S1 DIODE
SELF BIAS
J1
R146, 4.7K
C109 10
C110 10
CR10 SC6
CR11 SC6
R132 100K
R133 100K
R134 500 V.R. CAL. ADJ.
R135 1K
R136 470K
R140 10K
V.R. RECT. LOAD
R141 2250
C108 8
R143 270
R142 25
SIGNAL CAL. ADJ.
B
R147 2.64K
R148 1125
R130 350
ON
LINE ADJ.
OFF
POWER
LINE FUSE
F1 NO. 81 LAMP
CR12 SC2
R131 1500
BIAS CAL. ADJ.
C107 100
SC2 CR13
50 V
5 V
R137 330
R138 2700
BIAS VOLTS
R139 3K
F2 NO. 49 LAMP
BIAS FUSE
105-125 V AC 50-60 CPS
CHASSIS



4, 5, & 6 PIN COMBINATION
7 PIN COMBINATION
OCTAL
LOCTAL
7 PIN MIN
ACORN
10 PIN
8 PIN SUB MIN
7 PIN INLINE SUB MIN
NOVAR
COMPACTRON
SELECTOR NO. 1
SELECTOR NO. 2
SELECTOR NO. 3
SELECTOR NO. 4
SELECTOR NO. 5
SELECTOR NO. 6
NOTE
UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN µF.
SWITCHES ARE SHOWN IN FULL COUNTER-CLOCKWISE POSITION.
= FLOATING GROUND.
= DENOTES FRONT PANEL CONTROL.
S108 FILAMENT POS.
S109 FILAMENT NEG.
S110 GRID A
J2 G
S111 GRID B
J3 P
S112 PLATE
S113 SCREEN
S114 SELECTOR NO. 7 CATHODE
S115 SELECTOR NO. 8 SUPPRESSOR
J4 K
R147 2.64K
R148 1125
S104 RANGE SWITCH
C112 1000
R149, 153K
R150, 342
R151, 252
R152, 86.8
R153, 84.5
R154, 16.6
R155, 4.97
A
C
B
R157 47
S105 LEAKAGE SWITCH
R158 430K
D
R156, 415K
R & C SYMBOLS
LAST USED | NOT USED
R162 C112
TUBE TESTER MODEL 580 A DRAWING NO. 901-273W