HICKOK

INSTRUCTION MANUAL

for

MODEL 752A
DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

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CHAPTER I - INTRODUCTION

GENERAL DESCRIPTION

The Hickok Model 752A Tube Tester combines the characteristics of accuracy and dependability together with the advantages of portability and simplicity of operation to meet the needs of those technicians who maintain modern electronic equipment. The design specifications of the Model 752A include the very latest tube-testing techniques to provide an accurate evaluation of the performance capabilities of electron-tubes of the receiving and low power transmitting types.

The Model 752A employs the Dynamic Mutual Conductance test method to evaluate electron tubes of the amplifier type. The results obtained from this test method are indicative of the performance capabilities of a tube in actual equipment operation. The dynamic mutual conductance of the tube under test is quantitatively indicated directly in micromhos on the test meter.

The Model 752A employs a controlled emission test to provide a meaningful evaluation of diode tubes of the rectifier and detector types. The instrument also provides a voltage regulator tube test circuit which permits the testing of voltage regulator tubes in accordance with tube manufacturers' handbook operating conditions.

To insure a complete evaluation of the tube under test, the Model 752A provides three basic fringe tests: (1) An interelement short and leakage test is provided as a preliminary check on all electron-tubes. The resistance of interelement leakage paths is measured directly in ohms on the test meter. (2) A gas test is also provided; this test is an integral step in the evaluation of any amplifier type tube. (3) A life test, which determines the efficiency of the cathode, is provided to forecast the future life of the tube under test.

The outstanding feature of the Model 752A is the dual tube test which permits the testing of electron-tubes containing electrically similar sections with one setting of the selector switches. Each section of the tube is independently tested for interelement leakage, performance capability, and gas by simply depressing an additional push button which transfers the tube test conditions from one section of the tube to the other. This feature is particularly useful when testing and selecting tubes for use in balanced circuits.

Many new mechanical design features have been incorporated into this tester to facilitate the rapid selection of the proper test conditions for the tube under test. The panel layout is designed to provide a direct correlation between the order in which the roll chart data is presented and the order in which the tube-test selector switches are arranged. This arrangement not only reduces the time needed for testing a tube, but also reduces the possibility of operator-error in setting up the specific tube test conditions. To further reduce the time normally required in testing tubes and to aid in the interpretation of test results, the test meter scales have been simplified. Mutual conductance values are indicated on one basic 0-1500 micromho scale. The Gm of the tube under test can be determined by multiplying the indicated meter reading by the multiplier selector switch setting. Separate meter scales are provided for the interelement leakage and voltage regulator test circuits.

The Model 752A also makes available on its main panel ten of the most commonly used tube sockets. The various tube parameters are applied to the pins of these tube sockets through anti-oscillation wiring by a system of rotary selector switches. These selector switches are numbered in accordance with the EIA system of tube pin designation, and are wired in such a way 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 tester.

The following special tube adapters are available for use with the Model 752A:

NOMENCLATURE		HICKOK CODE NO.
Adapter:	Cathode ray tube	1050-28
Adapter:	2C39C tube	1050-50
Adapter:	Long-lead submin. tube	1050-89
Adapter:	829B tube	1050-107
Adapter:	4X150A/4X250B tube	1050-109
Adapter:	991 tube	1050-118
Adapter:	2C36 tube	1050-119
Adapter:	2-01C tube	1050-120
Adapter:	6263, 6173, 5675 pencil tubes	1050-121

The built-in roll chart provides the test data for all the tubes normally encountered in the servicing of modern electronic equipment. The roll chart is replaceable, and revised roll charts can be ordered direct from the factory. (See page 3).

Detailed information on the physical and electrical properties of the Model 752A can be found in the Specifications Section.

To ensure safe, accurate and efficient service from your tube tester, Chapter II (Operating Instructions), should be carefully read and understood.

MODIFICATION TO 230-VOLT OPERATION

The Model 752A Tube Testers, beginning with tube testers bearing serial numbers prefixed with 324 and above, are designed to operate on either 115 volts or 230 volts. They are shipped from the factory to operate on 115 volts. If 230-volt operation is desired, it is necessary to change the wiring of the power transformer from a parallel hookup to a series hookup. For 115-volt operation, no modification is necessary. For parallel and series hookups, see the schematic wiring diagram in the rear of this manual.

For modification of the Model 752A Tube Tester from 115 volts to 230 volts, proceed as follows:

a. POWER TRANSFORMER

1. Disconnect the black wire which is connected to the lug marked (w), and disconnect the white-black wire which is connected to the lug marked (x). Both located on transformer.

2. Splice together and solder the two above wires. Insulate connection with electrical insulating tape.

3. Do not disturb other wires which are connected to the lugs marked (w) and (x). Inspect (w) and (x) for good electrical connection.

b. LINE FUSE

1. Replace the No. 81 fuse lamp with a No. 63 lamp.

c. CALIBRATION

1. Plug tube tester into a 230-volt a. c. power source and turn on.

2. Rotate LINE ADJUST until the needle on the meter is in the area marked LINE TEST.

3. No further calibration is necessary.

d. For modification from 230 volts to 115 volts, reverse the above procedure.

SPECIFICATIONS

I POWER REQUIREMENTS:

A.	Voltage:	115 volts or 230 volts.
B.	Frequency:	50 - 60 Hz.
C.	Power Consumption:	40 watts, minimum. 70 watts, maximum.
D.	Protection:	Line fuse (#81 lamp), for 115-volt operation. Line fuse (#63 lamp), for 230-volt operation. Bias fuse (#49 lamp).

II TUBE-TEST POTENTIALS:

A.	Plate Voltages:	75 and 150 volts d. c.
B.	Screen Voltages:	56 and 130 volts d. c.
C.	Fixed Bias Voltages:	0 to -40 volts d. c., adjustable.
D.	Extra Negative Voltage:	-40 volts d. c.
E.	Provisions for Self-bias Tests.	
F.	Signal Voltages:	0.25, 0.5, 1.25, 2.5 volts a. c., 60 cycles.
G.	Diode Test Voltage:	20 volts RMS.
H.	V. R. Tube Test Voltages:	0-200 volts d. c., adjustable.
I.	0Z4 Test Voltage:	287 volts RMS.
J.	Filament Voltages:	0-117 volts a.c. (18 steps)

III TEST METER:

A.	Mutual Conductance Ranges:	0-1500/3000/6000/15,000/30,000μ mhos (Readings obtained from basic 0-1500 Gm scale and multiplier switch.)
B.	V. R. Test Scales:	0-200 volts d. c. 0-100 milliamperes.
C.	Leakage Scale:	Calibrated in ohms.

IV TUBE COMPLEMENT:

Quantity	Type
1 ea.	83
1 ea.	5Y3GT/G

V PHYSICAL SPECIFICATIONS:

A.	Height:	7-1/2"
B.	Width:	18-3/8"
C.	Depth:	16-3/4"
D.	Weight:	25 lbs.
E.	Case:	Portable, black leatherette covered.

ROLL CHART SUBSCRIPTION SERVICE: Roll charts for Hickok Tube Testers are up-dated twice a year. By subscribing to the roll chart service, you will automatically receive each new chart as it comes from the printer. For details on this subscription plan, contact the Parts Department, Hickok Electrical Instrument Company, 10514 Dupont Avenue, Cleveland, Ohio 44108.

TUBE DATA SUPPLEMENTS: Also available twice a year are up-to-date data on Foreign Tube Types and Obsolete Tube Types. Each of these manuals may be purchased on a per-issue basis from the Parts Department.

Don't allow your tester to become obsolete due to outdated information. Take advantage of these services, now.

CHAPTER II - OPERATING INSTRUCTIONS

SECTION I: PANEL COMPONENTS - IDENTIFICATION AND FUNCTION.

A. THE CONTROLS:

1. The POWER ON-OFF switch controls power input to Model 752A.

2. The LINE ADJUST controls the input voltage to the power transformer for proper standardization of test potentials applied to the tube under test.

3. The FILAMENT VOLTAGE switch provides an 18-step selection of filament or heater voltages from 0.6 volts through 117 volts a.c. An OFF position is also provided for use when testing V.R. tubes and cold cathode rectifiers.

4. Selector switches, FILAMENT (2), GRID A, GRID B, PLATE, SCREEN, CATHODE, and SUPPRESSOR, provide proper switching of the internal circuits to apply the correct test potentials to the various pins of the tube under test.

5. The BIAS control is used to adjust the bias voltage applied to the tube under test.

6. The SHUNT control is a dual potentiometer used to adjust the sensitivity of the meter circuit to the proper level required for testing rectifier and detector type diodes.

7. The MULTIPLIER switch is used to select the proper meter range for the particular type of tube under test. For mutual conductance tests, the MULTIPLIER switch is set to the X1, X2, X4, X10 or X20 position. This extends the full scale range of the basic 0-1500 micromho scale to 3000, 6000, 15,000 and 30,000 micromhos, respectively. For controlled emission tests on rectifier and detector type diodes, the MULTIPLIER switch is set to the SH or shunt position. This connects the SHUNT potentiometer into the circuit, and this control should then be set to the value indicated on the roll chart. For voltage regulator tests, the MULTIPLIER switch is set to the V.R. position. In the V.R. position, the test meter becomes a 0-200 VDC voltmeter, and when S-9 is depressed the test meter becomes a 0-100 milliammeter.

8. The LEAKAGE switch, when rotated through positions 1, 2, 3, 4, 5 and 6, connects the various elements of the tube under test across a test voltage. In certain positions of the LEAKAGE switch, tubes having interelement leakage paths will complete the test circuit and cause the pointer of the test meter to move up scale.

9. The ten push-button switches located in the lower right-hand portion of the panel actuate the proper test circuit, as indicated on the roll chart. Their designation and function is as follows:

   a. S1 - DIODE: used when testing low-power diodes, such as the 6H6.
   b. S2 - 0Z4: used when testing cold cathode rectifiers, such as the 0Z4.
   c. S3 - RECT: used when testing rectifiers, such as the 5Y3, 6X4, etc.
   d. S4 - LOW PLT: used when testing amplifier type tubes, such as the 1R5 and 1S4.
   e. S5 - RED GM: push button for mutual conductance test on amplifier tubes only. NEVER USE THIS BUTTON WHEN TESTING RECTIFIER TUBES.
   f. S6 - GAS #1, and S7 - GAS #2: used when making gas test on amplifier tubes.
   g. S8 - PLT #2: used when testing multiunit tubes with electrically similar sections. By depressing S8, the test conditions are transferred from one section of the tube to the other; thus, each section can be independently evaluated.
   h. S9 - VR MILS: this switch converts the test meter into a 0-100 milliammeter during the V.R. tests.
   i. S10 - LINE: used in conjunction with the LINE TEST point on the meter to standardize tube test potentials.

10. The VR VOLTAGE adjust is used to control the voltage applied to voltage regulator tubes during a V.R. test.

11. The LIFE TEST switch is used when making a reserve life test on a tube. When this switch is pressed, the filament voltage of the tube under test is reduced by approximately 10% of its normal value. The efficiency of the cathode of the tube under test can then be evaluated and the future life of the tube approximated.

B. The TEST METER gives a quantitative indication of the tube-test results on three separate scales.

1. The LEAKAGE scale is calibrated in ohms. Interelement leakage paths up through 10 megohms can be measured.

2. The MICROMHOS scale is used to give a quantitative indication of the results of the Gm, Emission, and Gas tests. The range of the basic 0-1500 micromho scale is extended by use of the MULTIPLIER switch. The readings obtained on this scale, when compared with the MINIMUM MUT. COND. column of the roll chart, are indicative of the performance capabilities of the tube under test.

3. The VOLTS-MILS scale is calibrated in d.c. volts and milliamperes. During V.R. tests, it indicates the striking, operating and regulating

voltage of the V. R. tube, along with the current range over which the tube is regulating.

C. The TEST SOCKETS are located along the upper edge of the panel and to the left of the test meter. The 15 tube sockets provided will accommonate the following tube-types: In-line and 8 pin Subminiatures, Octal, Loktal, 7 pin Miniature, 4, 5, 6 and 7 pin Standard, Acorn, and 9/10 pin miniature, 5 pin Nuvistor, 7 pin Nuvistor, Compactron and Novar.

D. LEADS, LAMPS and CONNECTIONS:

1. Two TEST LEADS are provided to make connections from the G, P and K panel jacks to the top caps of tubes as required. When the leads are not in use, they can be stored in the lead compartment at the top of the case.

The LINE FUSE lamp serves both as a protective device and an overload indicator. This lamp will light brightly when an overload is placed on the tester or the tube under test. When this occurs, turn OFF the equipment immediately. The LINE FUSE lamp (#81 or #63, depending upon the input voltage) is mounted in the upper left-hand portion of the main panel, where it is readily visible.

3. The BIAS FUSE lamp is connected into the bias supply circuit. It serves as a protection for the bias potentiometer in case an attempt is made to test a shorted tube. A burned-out BIAS FUSE lamp will result in the failure of the test meter to read when the Gm button is pressed. The BIAS FUSE lamp (#49) is mounted in the upper left-hand portion of the main panel, where it is readily visible.

4. One red and two black jacks, marked P, G and K, respectively, provide connections for the test leads necessary to test tubes with top cap connections.

5. The EXT. SELF BIAS RES. jacks provide the means of making self bias tests. IMPORTANT- the shorting link across the SELF BIAS terminals must be in place when these terminals are not in use.

E. TUBE TEST DATA:

1. 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:

a. TUBE TYPE: All currently available type numbers for the tubes which the Model 752 is designed to test are listed numerically in this column, starting with type 0A2 and continuing through type AX9903.

b. FILAMENT: Correct filament or heater voltages for the tube type to be tested are shown in this column. The FILAMENT VOLTAGE switch must be adjusted BEFORE inserting a tube in any of the test sockets.

c. SELECTORS: The tube pin selectors FILAMENT (2), GRID A, GRID B, PLATE, SCREEN, CATHODE and SUPPRESSOR are to be set in accordance with the two groups of four digit numbers appearing in this column. For example, the selector settings for the 12AT7 are listed as 4572-6183; the selectors are set as follows:

SELECTOR	POSITION NO.
FILAMENT	4
FILAMENT	5
GRID A	7
GRID B	2
PLATE	6
SCREEN	1
CATHODE	8
SUPPRESSOR	3

d. BIAS: This column lists the proper settings for the BIAS dial which controls the bias voltage applied to the tube under test.

e. SHUNT: This column lists the settings for the SHUNT dial which controls the sensitivity of the meter circuit. Adjustment of this dial is only required when the MULTIPLIER switch is in the SH position.

f. MULT: This column lists the position to which the MULTIPLIER switch should be set to provide the proper meter range for the type of tube under test.

g. PRESS: This column lists the proper push button switches to be pressed to complete the various test circuits applicable to the tube under test.

h. MINIMUM MUT. COND: In this column are the minimum mutual conductance rejection values for amplifier tubes and amplifier sections of multi-purpose tubes. The rejection values for rectifier and detector type diodes are also listed in this column, along with the nominal operating voltage for V. R. tubes.

i. NOTATIONS: Listed in this column is special information applicable to the tube under test.

SECTION II: GENERAL OPERATING PROCEDURES

A. PRELIMINARY PROCEDURES:

1. Remove the line cord from the lead compartment and connect its plug into a power outlet of either 115 volts or 230 volts, 60 cycles, depending upon the mode of operation. See the instructions on pages two and three for the

correct hook-up of 115-volt operation or 230-volt operation. NEVER CONNECT THIS EQUIPMENT TO A DC POWER SOURCE.

> CAUTION
>
> DO NOT INSERT TUBE TO BE TESTED INTO TEST SOCKET UNTIL CORRECT SETTING OF ALL CONTROLS HAS BEEN MADE IN ACCORDANCE WITH THE FOLLOWING STEPS.

2. Operate the thumb gear which turns the roll chart mechanism until the tube number of the tube to be tested appears in the roll chart window. A red index line aids in selecting correct data line from the roll chart.

3. Turn the knob of the FILAMENT VOLTAGE switch to the voltage indicated on the roll chart under the heading FIL.

4. Set the eight tube pin selector switches in accordance with two groups of four digit numbers appearing in the column 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.

5. Set the BIAS dial to the numerical setting listed on the roll chart under the heading of BIAS.

6. Set the SHUNT dial to the numerical setting listed on the roll chart under the heading of SHUNT. If no setting of this dial is required, a short dotted line will appear in the column.

7. Set the MULTIPLIER switch to the position indicated on the roll chart.

8. Set the LEAKAGE switch to the TUBE TEST POSITION.

9. Insert the tube to be tested into the proper test socket, and if applicable, make top cap connection as called for in NOTATIONS column of the roll chart.

10. Set the POWER ON-OFF to the ON position.

    NOTE: ALLOW SUFFICIENT TIME FOR THE TUBE UNDER TEST TO REACH ITS OPERATING TEMPERATURE BEFORE PROCEEDING.

11. LINE TEST: Depress push button S10 and rotate the LINE ADJUST control until the test meter pointer indicates to the line marked "Line Test".

B. THE LEAKAGE TEST PROCEDURES:

1. Rotate the LEAKAGE switch from position number 1 through position number 6, while tapping the tube lightly with your finger and watching the test meter for pointer deflection.

   Tubes having interelement shorts and leakage paths will cause the meter pointer to move up scale in various positions of the LEAKAGE switch. A momentary deflection of the test meter pointer when the LEAKAGE switch is turned from one position to the next should be disregarded. These meter pointer deflections are caused by the charging of a capacitor in the leakage test circuit. Intermittent meter pointer deflections as a result of tapping the tube indicate loose elements which may cause noisy or erratic tube operation.

   A leakage resistance of 10 megohms will cause the meter pointer to begin to indicate. A complete interelement short will cause the pointer to deflect full scale to give a zero ohms reading. The top scale of the meter is the LEAKAGE scale, and it is calibrated in ohms such that the resistance of leakage paths up to 10 megohms can be read directly from the scale.

2. A shorted tube or one with excessive interelement leakage should be discarded with no further testing.

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

4. Multisection tubes containing electrically similar sections, such as the 6J6, can make use of the DUAL TEST circuit.

   FOR EXAMPLE: For dual triodes, make the normal leakage test as described in step 1 of part (B); then depress push button S8 and repeat the leakage test for the second section.

5. Table No. 1: Leakage Test Chart, is to be used for identifying interelement leakage paths. In Table No. 1 an (X) under any LEAKAGE switch position represents a meter pointer deflection in that position; thus, by referring to the Leakage Path column of Table No. 1, the defective elements can be identified.

6. The circuit used in testing dual triodes is such that the SCREEN selector is used as the plate of the second section, and the SUPPRESSOR selector is used as the cathode of the second section. Thus, plate to plate and cathode to cathode, shorts or leakages will be identified on the Leakage Test Chart as plate to screen and cathode to suppressor shorts or leakages.

7. 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.

C. MUTUAL CONDUCTANCE (Gm) TEST: This is the basic quality test for tubes used as amplifiers.

TABLE NO. I: 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		

After the controls are properly set in accordance with the roll chart data as outlined in Part A of this section and the tube has been tested for leakage in accordance with Part B of this section, proceed as follows:

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

2. Recheck LINE ADJUST TEST and reset if necessary.

3. Press the Gm push button S5 and observe the test meter indication.

4. Compare the numerical value of the meter reading on the 0-1500 scale with the minimum acceptable value listed on the roll chart under the column headed MINIMUM MUT. COND.

5. The meter reading can be read directly in micromhos through the use of the MULTIPLIER setting and the basic 0-1500 micromho scale.

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

D. GAS TEST: The push buttons S6 and S7 are used to test an amplifier tube for gas content. After the tube under test has been tested for Gm, proceed as follows:

1. Set the MULTIPLIER switch to the X2 position. This extends the Micromho Scale to the 0-3000 range.

2. Turn the BIAS dial full clockwise to indicate 100.

3. Depress push button S6 and hold in the down position while adjusting the BIAS dial until the pointer of the meter indicates 100 micromhos on the 0-3000 range.

4. Hold down S6 and depress push button S7 while observing the meter pointer.

5. If the tube contains gas, the pointer of the meter will move up scale. If the pointer movement is not more than two small scale divisions, the gas content is negligible.

6. With some tubes, such as the Type 45, the micromho reading cannot be brought down to 100 micromhos by turning the BIAS dial. In such cases, turn the BIAS dial clockwise to 100. Test for gas by noting whether the pointer moves more than two divisions up scale when S6 is held down and S7 is depressed.

7. Some tubes will give an indication of gas only after they have been operating for a period of time. If a tube is suspected of being gassy, allow it to heat for a few minutes.

E. RESERVE LIFE TEST: This test is used to approximate the future life of the tube. After the mutual conductance test has been made as previously described, proceed as follows:

1. Set the MULTIPLIER switch to the SH position.

2. Turn the SHUNT dial full clockwise to indicate 100.

3. Depress push button S5 and hold in down position while adjusting the SHUNT dial until the meter pointer indicates to 1000 on the 0-1500 scale.

4. Hold down S5 and depress the LIFE TEST switch. This switch reduces the filament voltage applied to the tube under test.

5. If the meter reading remains above mid-scale, the reserve life of the tube under test may be considered satisfactory.

F. RECTIFIER TUBE TEST: Rectifier tubes, including diode tubes and diode sections of multisection tubes, are tested for emission characteristics, since they have no mutual conductance characteristic. The push button switches S1, S2 and S3 are used to test various types of rectifiers and detector diodes.

1. The push button switch S1 is used when testing detector diodes. This switch supplies a test voltage sufficiently low in magnitude so as not to damage the delicate cathode of the diode under test.

2. The push button S2 is used when testing cold cathode rectifiers such as the 0Z4. This switch applies a test voltage sufficiently high to ionize the tube and start conduction.

3. The push button S3 is used when testing rectifier tubes such as 5Y3. This switch applies a test voltage of sufficient magnitude to reveal the defects in this type of tube.

G. DUAL TEST: For multisection tubes containing electrically similar sections, the notation DUAL TRIODE or DUAL DIODE will appear in the NOTATIONS column of the roll chart. When the dual test is called for, the following procedure is applicable:

1. DUAL TRIODE: After the controls are properly set in accordance with the roll chart data as outlined in Part A of this section, proceed as follows:

   a. Rotate the LEAKAGE switch from position 1 through position 6 and observe the test meter for indications of leakage paths.

   b. Depress push button S8 and repeat the leakage test for the second section of the tube.

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

d. Depress push button S5 - Gm, and observe the test meter for an indication of the Gm of the first section. Release S5.

e. A Gas Test for the first section should be performed as described in Part D of this section.

f. After the first section has been completely tested, depress push button S8 and hold in down position while S5 is again depressed and the second section of the tube under test is checked for Gm.

h. During testing of each section of the dual triode, the grid of the unused section is kept at cut-off bias by the extra negative bias supply.

2. DUAL DIODE: The testing of dual diodes is performed as described above, with two exceptions:

a. The diode test push button (S1, S2 or S3) as called for in the PRESS column of the roll chart is to be used in conjunction with S8.

b. The Gas Test is not applicable to diodes and rectifiers.

H. SPECIAL TUBE TYPES:

1. Voltage Regulator Tubes: 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 MULTIPLIER switch in the V. R. position, the VR VOLTAGE dial controls the magnitude of the test voltage applied to the tube. The push button switch S9 converts the test meter from a voltmeter to a milliammeter. The bottom scale of the meter is used to evaluate the results of the V. R. test. This scale is calibrated in VOLTS (0-200 v. d. c.) and MILS (0-100mA d. c.).

For example, the 0A3:

a. Set the FILAMENT voltage switch to the OFF position.

b. Set the tube pin selector switches to 0000-5020.

c. Set the MULTIPLIER switch to the V. R. position.

d. Turn the VR VOLTAGE control fully counterclockwise.

e. Turn the LINE ADJUST control fully clockwise.

f. Insert the 0A3 into its proper test socket and turn the tester ON.

g. In the NOTATIONS column for the 0A3 is the voltage value 100V with a star in front of it. This notation represents the approximate starting voltage for the V. R. tube. In the column MINIMUM MUT. COND. is the voltage value 75V. This represents the nominal operating voltage for the V. R. tube.

h. Rotate the VR VOLTAGE control slowly clockwise. The meter pointer should begin to indicate. The voltage value is read on the 0-200 volts scale.

i. 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 of the tube under test. In the case of the 0A3, it is 75V.

j. Depress push button S9 - VR MILS. This converts the test meter from a voltmeter to a milliammeter, and it should indicate approximately 5mA on the 0-100 MILS scale.

k. While holding S9 in the down position, continue to rotate the VR VOLTAGE control clockwise until the test meter indicates 40mA.

l. Release S9 and read the voltage indicated on the test meter. For a good 0A3, the operating voltage should not have risen more than 5 volts above the nominal operating voltage.

2. Certain pentode tubes, such as the 6AJ5, require a low screen voltage and a normal plate voltage during test. This is accomplished by holding down S1 and pressing S5. When applicable, a note is printed on the roll chart under the heading of NOTATIONS: HOLD DOWN S1 AND PRESS S5.

3. Cathode-Ray Tube Test. With the use of the Hickok CRT Adapter, magnetic or electrostatic type T. V. picture tubes having a small shell duo-decal base can be given an interelement leakage test, a cathode emission test, a control grid test and a gas test.

a. Preliminary Instructions:

(1) Remove the socket from the cathode-ray tube to be tested.

(2) Affix the CRT Adapter to the tube to be tested.

(3) Attach the red lead to the No. 2 anode of the tube under test.

(4) Insert the 8 pin plug on the cable of the CRT Adapter into the octal tube test socket on the main panel of the Model 752A.

b. Cathode Emission Test.

(1) Set the selectors and dials as follows:

FIL	SELECT.	BIAS	SH	MULT	PRESS	MIN. MUT. COND.
6.3	7230-5084	0	75	SH	S1	650

(2) Make an interelement leakage test by rotating the LEAKAGE switch through positions 1 through 6.

(3) Set the LEAKAGE switch to the TUBE TEST position.

(4) Depress S1 and observe the test meter indication. A good tube should read above the recommended reject value noted above.

c. Grid Control and Gas Test.

(1) Set the selectors and dials as follows:

FIL	SELECTORS	BIAS	SHUNT	MULT	PRESS
6.3	7250-3084	*	0	SH	S6

(2) Make an interelement leakage test as described above.

(3) Set the LEAKAGE switch to the TUBE TEST position.

(4) * Hold down S6 and rotate the BIAS dial. If the control grid is functioning, the meter pointer will move up and down scale.

(5) Gas Test: Adjust BIAS control until the test meter reads one small scale division. Hold down S6 and depress S7.

If the meter pointer moves up scale more than one division, the tube is gassy.

The Hickok CRT Adapter (Code No. 1050-28) is available through Hickok distributors.

J. DIODE TESTING:

1. Silicon of Germanium Diodes are tested for their rectification quality. To test these types on the Model 752A Tube Tester, proceed as follows:

a. Set the FILAMENT switch to the OFF position.

b. Set the tube pin selector switches to 0000-6030.

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

d. Set the BIAS control to 0.

e. Set the MULTIPLIER switch to the SH position.

f. Set the SHUNT control to the 65 dial mark.

g. Connect the cathode lead of the diode to pin 3 of the octal test socket and the anode lead of the diode to pin 6 of the octal test socket. (If more convenient, the grid and plate leads supplied with the tester may be used to make these connections.)

h. Place the POWER ON-OFF switch to the ON position and make line test in the usual manner.

i. Depress push button S3 and observe the test meter. The test meter reading should be above 650 to indicate a good diode. A zero test meter reading indicates that the diode is either shorted or open. NOTE: If the test meter indicates down scale, reverse the diode leads and repeat this step.

CHAPTER III
PARTS LIST

Reference designations have been assigned to identify all parts used in this instrument. An asterisk designates a part which should be replaced by authorized Hickok repair stations or factories. It is therefore recommended that the entire instrument be returned for repair if trouble exists with such a part.

In ordering parts, refer to the current parts price list for this instrument. Prices are subject to change without notice, and the minimum billing charge is $3.50.

REF. DESIG.	NAME AND DESCRIPTION	HICKOK PART NO.
A1	DIAL ASSEMBLY: SHUNT	4160-66
A2	DIAL ASSEMBLY: BIAS	4160-67
A3	INDEX ROLLER ASSEMBLY	9600-42
C1	Not assigned	
C2	CAPACITOR, FIXED, PLASTIC: .5 uf, 200 volts	3105-206
C3	CAPACITOR, FIXED, PLASTIC: .1 uf, 200 volts	3105-210
C4	CAPACITOR, FIXED, ELECTROLYTIC: 8 uf, 350 volts	3085-68
C5	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, 6 volts	3085-45
C6	CAPACITOR, FIXED, CERAMIC: .005 uf, -0 +100%, disc type	3110-7
CR1	RECTIFIER: full wave, copper oxide	18150-42
CR2	CRYSTAL: SC91	3870-41
DS1	LAMP: Roll chart, 7 watt, 115 volts	12270-41
DS1	LAMP: #10S6/10, clear, 10W, 230V, used on roll chart for 230 V operation	12270-59
DS2, DS3	LAMP: #51 supplied with meter	
E1	BAR: shorting	2145-2
F1	LAMP: #81 auto tungsol, bayonet base (LINE FUSE) for 115 V operation	12270-2
F1	LAMP: #63 bayonet base for 230 V operation	12270-58
F2	LAMP: #49 pilot, bayonet base, (BIAS FUSE)	12270-17
M1	METER: Model 68	680-303
MP1	BUTTON: push, black	2920-7
MP2	BUTTON: push, red	2920-8
MP3	BUTTON: push, green	2920-13
MP4 thru MP15	KNOB: phenolic, black	11505-55
MP16	KNOB: machined, bar type, with white dot and pointer	11500-11
MP17 thru MP23	Same as MP1	
P1	CORD: AC line	3675-34
J1	JACK: pin plug type, red, (PLATE)	10300-1
J2	JACK: pin plug type, black, (GRID)	10300-2
J3, J4	BINDING POST	2360-51
J5	Same as J2, (CATHODE)	
R1	RESISTOR: 100 ohms, 10%, 10 watt, center tapped	18575-19
R2	RESISTOR, FIXED: 215K ohms, 1%, 1/2 watt	18537-61
R3	RESISTOR, FIXED: 270 ohms, 5%, 1/2 watt	18411-271
R4	Not assigned	
R5	POTENTIOMETER: 50K ohms, screw driver slot	16925-473
R6	RESISTOR, FIXED: 200 ohms, 1%, 2 watt	18540-5
R7	Same as R1	
R8	RESISTOR, FIXED: 180K ohms, 10%, 1/2 watt	18414-182
R9	RESISTOR, FIXED: 2 megohms, 5%, 1/2 watt	18415-201
R10	POTENTIOMETER: 500 ohms	16925-376
R11	RESISTOR, FIXED: 470K ohms, 1%, 1/2 watt	18537-66
R12	RESISTOR, FIXED: 470 ohms, 5%, 2 watt	18431-471
R13	RESISTOR, FIXED, FILM: 10 ohms, 1%, 1/2 watt	18537-217
R14	RHEOSTAT: 10,000 ohms, 50 watt	18750-26
R15	RESISTOR, FIXED: 2920 ohms, 1%, 1/2 watt	18537-67
R16	RESISTOR, FIXED: 1200 ohms, 10%, 1 watt	18422-122
R17	RESISTOR, FIXED: 1800 ohms, 10%, 10 watt	18575-12
R18	RHEOSTAT: 350 ohms, 25 watt	18750-37
R19	RESISTOR, FIXED: 12 ohms, 1%, 1/2 watt	18537-59
R20	POTENTIOMETER: 50 ohms	16925-271
R21	RESISTOR, FIXED: 119 ohms, 1%, 1/2 watt	18537-62
R22	RESISTOR, FIXED: 47 ohms, 10%, 1/2 watt	18410-472
R23, R24	RESISTOR, FIXED: 41 ohms, 1%, 1/2 watt	18537-60

REF. DESIG.	NAME AND DESCRIPTION	HICKOK PART NO.
R25	RESISTOR, FIXED: 15,000 ohms, 5%, 1 watt	18423-151
R26	Same as R21	
R27	RESISTOR: wire wound, 8500 ohms, 10%, 10 watt	18575-89
R28	POTENTIOMETER: adjusted, 3000 ohms	16926-5
R29, R30	POTENTIOMETER: 150-150 ohms, wire wound	16925-90
R31	RESISTOR, FIXED: 500 ohms, 1%, 1/2 watt	18537-58
R32	RESISTOR, FIXED: 250 ohms, 1%, 1/2 watt	18537-63
R33	RESISTOR, FIXED: 150 ohms, 1%, 1/2 watt	18537-64
R34, R35	RESISTOR, FIXED: 50 ohms, 1%, 1/2 watt	18537-65
R36	RESISTOR, FIXED: 200K ohms, 1%, 1/2 watt	18537-46
R37	RESISTOR, FIXED: 1000 ohms, 10%, 1/2 watt	18412-102
S1	SWITCH: push type, (DIODE)	19910-132
S2	Same as S1 (OZ4)	
S3	Same as S1 (RECT)	
S4	Same as S1 (LOW PLATE)	
S5	Same as S1 (Gm)	
S6	Same as S1 (GAS 1)	
S7	Same as S1 (GAS 2)	
S8	Same as S1 (PLATE 2)	
S9	Same as S1 (VR MILS)	
S10	Same as S1 (LINE ADJ)	
S11	SWITCH: toggle, S. P. S. T.	19911-9
S12	SWITCH: push button, D. P. D. T. (LIFE TEST)	19910-118
S13	SWITCH, ROTARY: 2 section, 3 pole, 20 position (FILAMENT)	19912-386
S14	SWITCH, ROTARY: 1 section, interlocking, 14 position (FILAMENT)	19912-477
S15	Same as S14 (FILAMENT)	
S16	Same as S14 (GRID A)	
S17	Same as S14 (GRID B)	
S18	Same as S14 (PLATE)	
S19	Same as S14 (SCREEN)	
S20, S21	SWITCH, ROTARY: 1 section, 14 position (CATHODE)	19912-469
S22	SWITCH, ROTARY: 5 section, 7 position (MULTIPLIER)	19912-374
S23	SWITCH, ROTARY: 5 section, 7 position (LEAKAGE)	19912-373
T1	TRANSFORMER: power	20800-304
V1	TUBE: #83	20875-28
V2	TUBE: #5Y3GT/G	20875-6
W1	LEAD ASSEMBLY:	12450-145
W2	LEAD ASSEMBLY:	12450-180
XDS1	SOCKET: bayonet, small	19350-1
XF1	SOCKET: bayonet, miniature	19350-203
XF2	SOCKET: candelabra	19350-2
XV1	SOCKET: wafer, octal	19350-156
XV2	SOCKET: wafer, 4 pin	19350-157
X1	SOCKET: 4 pin	19350-93
X2	SOCKET: 5 pin	19350-94
X3	SOCKET: 6 pin	19350-95
X4	SOCKET: 7 pin	19350-270
X5	SOCKET: 8 pin octal	19350-97
X6	SOCKET: 8 pin, loctal	19350-99
X7	SOCKET: 7 pin	19350-136
X8	SOCKET: acorn, 7 contact	19350-43
X9	SOCKET: 10 pin	19350-364
X10, X11	SOCKET: combination, 7-8 pin (sub-miniature and in-line)	19351-16
X12	SOCKET: Nuvistor, 5 pin	19350-336
X13	SOCKET: 9 pin	19350-367
X14	SOCKET: Compactron	19350-365
X15	SOCKET: Nuvistor, 7 pin	19350-382
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