

OPERATING INSTRUCTIONS

FOR

MODEL 539B

TRANSCONDUCTANCE TUBE TESTER

BEARING SERIAL NUMBER ABOVE 152-10000

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

MODEL 539B

ERRATA TO INSTRUCTION BOOK

Disregard Paragraph 8b and c in book and proceed as follows:

GAS TEST

- b. Set the Bias Voltmeter switch to the 50 volt range and the Function switch to position D. Hold down P5 and adjust the Bias control to bring the meter reading down to 500 on the 3000 scale.

- c. Hold down P5 and press P6. Because of a charging capacitor the meter will deflect either up scale or down scale about one division, after P6 is pressed, and will settle to a new reading. An upscale reading after settling is the result of grid current due to gas or grid emission (sometimes referred to as poisoned grid). If the upward movement is not more than one large division (two small divisions), the gas content is satisfactory.

THE INSTRUMENT PACKED HEREWITH IS:

PACKER'S CHECK

1 MODEL 539B TRANSCONDUCTANCE TUBE TESTER _____	
ACCESSORIES INCLUDED WITH THE TESTER ARE:	
1 - BOOKLET INSTRUCTIONS _____	
2 - GRID LEADS _____	

SERIAL NO. _____

SIGNED: _____

FOREWORD

The Model 539B Mutual Conductance (Transconductance) Tube Tester is designed for use by technicians, engineers and others who demand an instrument of the very highest quality for rapid and accurate testing of vacuum tubes. Like all Hickok Tube Testers, it is based upon the well known formula for mutual conductance, $\frac{i_p}{e_g} \times G_m$, where i_p is the plate current change, e_g is the grid voltage change, and G_m is the Mutual Conductance (Transconductance). Mutual Conductance and Transconductance are used interchangeably.

This instrument is equipped with three meters, all made in our own plant, and calibrated with great accuracy.

- (a) A sensitive Transconductance meter measuring micromhos in six ranges

up to 60,000 micromhos. This meter also has a scale reading to 200 volts for V.R. tube testing, and a scale reading to 50 megohms for leakage testing.

- (b) An A.C. voltmeter which insures standardized voltages to the tube's base, and
 (c) a two range (0-10, 0-50) D.C. voltmeter to accurately adjust the negative bias on the tube's control grid. Also a scale to 100 M.A. d.c. for V.R. milliamperes.

Voltage adjustments are made while the tube being tested is delivering its rated load.

NOTE: *Always check a tube for shorts before proceeding with Mutual Conductance test.*

INSTRUCTIONS FOR THE OPERATION OF MODEL 539B

Read these instructions through before attempting to operate the tester.

1. There are two rectifier tubes, an 83 and a 5Y3GT necessary to operate this tester. They are included.

The Short Lamp is a 1/25 watt, 110 volt, miniature bayonet base neon signal

lamp. This lamp will last indefinitely unless broken.

The Fuse Lamp is a standard No. 81, single contact auto bulb. This can be procured from any auto dealer or gasoline station attendant. This fuse lamp is in the primary circuit of the transformer.

2. Use on 60 cycles, 110-125 volt circuit.

FUNCTIONS OF THE VARIOUS CONTROLS:

3. The line adjustment control rheostat in the 539B Tester is connected with a small A.C. voltmeter as a constant calibration indicator which is normally always in circuit. The small A.C. voltmeter may also be used to register 60 cycles A.C. line voltage fed to the set by operating the test button P7 designated "LINE TEST" in the lower right part of the control panel. Readjust after pressing the P4 Test Button.

4. SELECTORS: The row of selector dials across the center of the control panel is for the purpose of conducting proper voltages to the tube's base pins. The operation of setting these dials is similar to DIALING A TELEPHONE NUMBER. On the roll data chart, below the word SELECTORS, appear the dialing numbers. These dialing numbers consist of two letters and five figures. Example: JR-6237-5. Starting at the left, the first dial is turned until the letter "J" appears through the window. The second dial is turned until "R" appears. The third dial indicates 6; the fourth, 2; the fifth, 3; the sixth, 7 and the seventh, 5.

The lettered dials control the filament or heater connections. The numbered dials control the GRID, PLATE, SCREEN, CATHODE AND SUPPRESSOR in that order. In the example given above the heater terminals are connected to pins 8 and 1. The GRID is connected to pin 6; PLATE, to pin 2; SCREEN, to pin 3; CATHODE, to pin 7 and SUPPRESSOR, to pin 5.

These dial switches are electrically interlocked in such a way that it is impossible to connect two different voltage elements to the same pin. Thus accidental shorts are avoided.

5. SHORT TEST. In the Model 539B, Hickok has introduced an entirely new concept in short and leakage testing. In addition to the conventional neon lamp short indication, there is a d.c. leakage test which registers up to 50 megohms on the scale of the large Gm meter.

NEON LAMP SHORT TEST. Turning the SHORTS switch successively through the positions 1-2-3-4-5 connects the various pairs of elements in turn across the test voltage. Tubes having shorted elements will complete the circuit and cause the neon SHORT lamp to glow. Tubes may be tested for shorts, either hot or cold. Normal sensitivity of the neon lamp is about 1/3 Megohm.

A short is indicated by a steady glow of the neon lamp in certain positions of the SHORTS switch. A shorted tube should be discarded without further test.

An improved neon Short Test is incorporated in the design of this tube tester. Wide experience has demonstrated that most satisfactory results are obtained when tubes are classified for short test purposes.

The toggle switch is thrown to miniature and subminiature position for all subminiature, button seven pin and button nine pin tubes. The other position is used for tubes having regular base pins, including loktal base tubes.

6. LOCATING SHORTED ELEMENTS BY NEON LAMP. In the following table (X) under any position indicates that the neon lamp glows in that position.

KIND OF SHORT	1	2	3	4	5
HEATER - CATH.	X				
HEATER - GRID.	X	X			
HEATER - SCR.N.	X	X	X		
HEATER - PLT.	X	X	X	X	
HEATER - SUP.	X	X	X	X	X
CATH. - GRID.		X			
CATH. - SCR.N.		X	X		
CATH. - PLT.		X	X	X	
CATH. - SUP.		X	X	X	X
GRID. - SCR.N.			X		
GRID. - PLT.			X	X	
GRID. - SUP.			X	X	X
SCR.N. - PLT.				X	
SCR.N. - SUP.				X	X
PLT. - SUP.					X

6a. HEATER CATHODE LEAKAGE. A particularly troublesome defect in tubes, especially those used in television, is a leakage between heater and cathode. This leakage may be quite high, sometimes running to several megohms. It may be too high to cause the neon lamp to glow in the ordinary way. However, these leaks may be detected on your new 539B.

You will note that a heater-cathode short will cause the neon lamp to glow on position 1 (one). While the short switch is resting on position 1 (one), during short test operation a condenser will be charging through the leak. If the switch is turned from position 1 (one) to position 2 (two), a sharp flash of the neon lamp will be seen. This will not repeat until the switch is again turned to position 1 (one) allowing the condenser to recharge through the leakage. Many baffling cases of trouble can be located in this way.

It has been established that heater cathode leakage as high as 30 megohms will cause "noise" in repeater circuits in television service on coaxial lines.

6b. **NOISE TEST.** The short test circuit is also used in making noise tests on vacuum tubes. Connections are made from the noise test jacks to the antenna and ground posts of any radio receiver. The tube under test is tapped with the finger as the SHORTS switch is turned through positions 1-2-3-4-5.

Intermittent disturbances which are too brief to register on the neon lamp will be reproduced by the loud speaker as static.

7. **LEAKAGE TEST ON METER.** An added feature in the Model 539B is its ability to measure element leakage up to 50 megohms on the dial of the large Gm meter. The research engineer and technician will find this feature a great aid in routine investigations.

Every engineer knows that in certain tube applications, leakage is more significant than in others. The metered leakage feature of the Model 539B will enable him to form sound judgment as to the leakage to be tolerated in different applications.

7a. **OPERATING LEAKAGE TEST.** Turning the SHORTS switch through positions A, B, C, D, E isolates tube elements successively from all other elements and registers the leakage in megohms between the chosen element and all others connected in parallel. Forty volts d.c. is applied in this test. The significance of the lettered positions of the short switch is as follows:

- A - HEATER isolated from other elements.
- B - GRID isolated from other elements.
- C - SCREEN isolated from other elements.

- D - PLATE isolated from other elements.
- E - SUPPRESSOR isolated from other elements.

*NOTE: *Position A includes heater-cathode leakage. In tubes having filamentary cathodes, the heater and cathode are identical; therefore the meter will normally indicate near the zero mark on position A of the shorts switch.*

8. **GAS TEST.** The push switches P5 (Gas 1) and P6 (Gas 2) are used to test amplifier tubes for gas content.

- a. Make Micromho test in the ordinary way.
- b. Set the Bias Voltmeter switch to the 50 volt range. Hold down P5 and adjust the Bias knob to bring the meter reading down to a point about 1/5th or 1/4th of full scale, say near the mark DIODES O.K. This is not critical.

c. Hold down P5 and press P6. A gassy tube will cause the pointer to move UP the scale. If the upward movement is not more than one large division (two small divisions), the gas content is satisfactory.

Some tubes develop gas after being heated for a period of time. If a tube is suspected, allow it to heat for a few minutes. This constitutes a very sensitive gas test. Gas content on the order of 0.1 microampere can be detected.

Gas content is a very important factor in modern receivers of all types, containing AVC and AFC circuits as the presence of gas causes the grid to become conductive and as changes in grid bias operate through resistors of comparatively high value, correct functioning cannot be obtained with a gassy tube. The presence of gas results in actually changing the grid bias. Gas is especially harmful in television tubes.

9. **DYNAMIC TRANSCONDUCTANCE.** The Push Switch P4 is mechanically divided into two sections, non-locking and locking. Both sections perform identical electrical functions. If momentary contact is needed, press the non-locking button. If extensive tests are to be made, use the locking button. The locking button is released by pressing the non-locking button.

The indicating meter will register the tube's value in eight ranges:

- A. 60,000 μ mho at .25 Volt signal.
- B. 30,000 μ mho at .25 Volt signal.
- C. 15,000 μ mho at .25 Volt signal.
- D. 6,000 μ mho at .5 Volt signal.
- E. 3,000 μ mho at 2.5 Volt signal.
- F. 600 μ mho at 1. Volt signal.
- G. Rectifiers and Diodes, no signal.
- H. Voltage Regulator tubes.

The 600 micromho range was designed especially to test subminiature tubes. Low plate and screen volts are automatically applied when FUNCTION switch is set on position F.

The FUNCTION switch automatically changes the signal volts when the appropriate setting is made.

The chart setting for the tube to be tested will indicate where the FUNCTION switch should be set, such as A, B, C, D, E, F, G, or H, in the column preceding Micromhos.

The Micromho values printed on the data roll are minimum values. Good tubes will read above these values.

In the column headed BIAS VOLTS is listed the exact voltage to which the BIAS VOLTS meter is to be set when testing a tube. Make final bias adjustment after the P4 button is pressed.

Certain pentode tubes, such as the 3A4, are tested with reduced screen voltage. This is accomplished by holding down P1 and pressing P4. Specific instructions are printed in the NOTATIONS column for each tube requiring reduced screen voltage.

10. RECTIFIER TEST. The push switches P1, P2 and P3 are used to test various types of rectifier elements.

a. The push switch P1 is used when testing detector diodes. It applies a low voltage which will not injure the delicate cathode. Good diodes will cause the meter pointer to read above mark, RECTIFIERS and DIODES O.K.

b. Push switch P2 is used when testing cold cathode rectifiers such as the OZ4. This applies a voltage sufficiently high to ionize the tube and start conduction. Good tubes will read above the mark, RECTIFIERS and DIODES O.K.

c. Push switch P3 is used when testing ordinary rectifier tubes such as the 5Y3. This switch applies a medium voltage which is best adapted to reveal defects in this type of tube. Good tubes will read above the mark, RECTIFIERS and DIODES O.K.

In the chart column headed SHUNT are listed the numbers to which the SHUNT dial is to be set when testing Rectifiers and Diodes.

11. SOCKET NUMBERING. Sockets are wired according to RETMA numbering, and the numerical values of the lettered dials are as follows:

0	----	A	----	P
1	----	B	----	R
2	----	C	----	S
3	----	D	----	T
4	----	E	----	U
5	----	F	----	V
6	----	G	----	W
7	----	H	----	X
8	----	J	----	Y
9	----	K	----	Z

The letter "I" was omitted because of its resemblance to the figure "1". The letter "Q" was omitted because of its resemblance to the figure "0".

12. METER REVERSE. Directly below the indicating meter is a switch marked REVERSE-NORMAL. With certain tubes such as the 117N7, the meter, when set on NORMAL, will deflect backwards (to the left) when push switch P3 is pressed for rectifier test. In such case turn the meter switch to REVERSE which will cause the pointer to move up the scale. After this test has been made, return the switch to NORMAL.

13. TOP CAPS. There are two jacks in the upper center of the control panel marked GRID and PLATE. These are used when making connection to the top cap of the tube being tested. On the data chart in the NOTATIONS column opposite tube types having top caps, is the notation CAP=G, or CAP=P. G means that the top cap is connected to the GRID and P, to the PLATE jack.

NOTE

The center of the large 7-pin socket is used to check pilot lamps. Set the filament selector switches on HR. Set the filament voltage switch to the proper voltage for the lamp being tested.

14. SPECIAL NOTES. Power line voltage varies with different localities. It may also vary with the different hours of the day.

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

Occasionally we have had the complaint that a used tube will test GOOD, but will not work in the radio receiver; but when a NEW tube is substituted, the receiver will operate correctly. The answer is this: Tubes are built to specifications. Our tube testers are designed to test tubes in conformity with these specifications.

The used tube that would not perform in a certain receiver was not receiving its specified filament voltage. The new tube performed because of its initial reserve capacity. The used tube would have performed if it had received its specified filament voltage.

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

The Model 539B is valuable in matching tubes for push-pull stages and other applications where matched tubes are essential.

15. LIFE TEST. The Model 539B DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER is equipped with a special feature to enable Life Test to be made on the tube. In the center of the control panel is a switch designated CATH. ACT., NORM. and TEST. While holding everything else at normal this switch reduces the filament voltage by 10%.

a. Measure the mutual conductance in the ordinary way with switch set on NORMAL.

b. Throw the CATH. ACT. switch to TEST position. The mutual conductance should not drop more than 20%.

c. After making life test return the switch to NORMAL for all other tests.

In testing the 35Z5 and 45Z5 rectifier tubes it is advisable to turn the power off for about 15 seconds after

throwing the CATH. ACT. switch to TEST to allow the cathode to cool. Then turn the power on and note new reading of the meter.

16. SELF BIAS. Provision is made to test tubes under self bias condition. In the upper edge of the control panel are two binding posts designated SELF BIAS. These posts are normally shorted by an attached bar. To use SELF BIAS, connect a suitable bias resistor together with an electrolytic capacitor of 2000 μ fd in parallel across these binding posts. The positive terminal of the capacitor should be connected to the positive binding post.

The toggle switch in the upper left of the control panel is thrown from NORMAL position to the SELF BIAS position. The bias volts under self bias condition depends upon the value of the resistor inserted between the self bias posts mentioned above, and also upon the plate current flowing.

Tube handbooks can be used as a guide to the value of the self bias resistance to use. When completing the self bias test, reconnect the two binding posts by the normal shorting bar and throw the toggle switch back to the NORMAL position.

17. PLATE CURRENT. In the upper center of the control panel are two posts designated PLATE CURRENT. These posts are normally shorted by an attached bar. A suitable low resistance D.C. milliammeter connected across these posts will measure the plate current flowing through the tube being tested. Connect the positive terminal of the meter to the positive binding post.

NOTE

A D.C. milliammeter connected into the SELF BIAS circuit will measure the total cathode current. In measuring rectifier tube current the meter reading must be multiplied by two, because rectifier tubes conduct only during a positive half-cycle, whereas the meter integrates over a complete cycle.

In checking thyratrons such as the 884 and 885, the bias voltmeter should be set initially at its highest negative value (about 40 volts). The designated

button is held down while the bias voltage is gradually reduced until the tube "strikes", that is, begins to conduct which is indicated by a sudden deflection of the meter. The chart indicates the approximate voltage at which the tube strikes. There may be a small variation above or below the given striking voltage. The meter indication for a good tube is above the point designated "RECTIFIERS OK".

18. FILAMENT AND HEATER CONTINUITY.

1. Turn the Tester on.
2. Set the selectors as per chart for the tube to be tested.
3. Set the FILAMENT switch on BLST instead of voltage indicated on the chart.
4. Set the SHORT TEST switch on position 5.
5. Place the tube in the proper socket.

If the neon lamp glows, the filament is good and a complete test should then be made on the tube, by setting FILAMENT switch on the proper tap, and while the tube heats, rotate the SHORT TEST SWITCH several times thru 1 to 5 positions. If no shorts are indicated, set the switch in TUBE TEST position and proceed to test the tube as per chart.

If the neon lamp does not glow, the filament is open and further test is unnecessary. Certain tubes such as the 35Z5-50Z7, etc., with tapped filaments have special continuity test settings; see roll chart.

NOTE

It sometimes happens that a filament will show continuity when cold, but will open when it warms up.

19. VOLTAGE REGULATOR TUBES.

- (a) Set the selectors for V.R. tube to be tested. The test data for V.R. tubes will be found at the top end of the roll chart. For example, the OA3.
- (b) Set FIL VOLTAGE switch to OFF.
- (c) Set selector switches to AP-0502-0.
- (d) Set function switch on range H, V.R. TEST.
- (e) Turn the bias volts toggle switch to V.R. volts and mils.
- (f) Turn V.R. volts knob fully counter clockwise.
- (g) Turn power adjust knob fully clockwise. Press P4-LOCK.
- (h) Place V.R. tube in proper socket and turn power ON.
- (i) Turn V.R. voltage control knob slowly clockwise. The large Gm meter should start to read d.c. volts on the 0-200 volt scale.
- (j) Example: In the notations column for the OA3 tube appears, "Starts at about 100 Volts - Regulation = 5 Volts from 5 to 40 m.a." In the column marked MIN. MUT. COND. is the nominal operating voltage for this tube - 75V.
- (k) When the V.R. tube strikes as explained in (j) above the voltmeter reading will drop back to operating voltage. The V.R. current is read on the 0-100 m.a. range of the bias meter.
- (l) For the OA3 example adjust the m.a. current from 5 to 40 milliamperes by turning the V.R. volts and mils knob. The OA3 tube should not exhibit a voltage change of more than 5 volts.
- (m) When completing a V.R. tube test unlock P4 push button.

20. OHMMETER FEATURE. The Model 539B tube tester can be used as a utility ohmmeter as follows:

- (a) Set the SHORTS switch on position B.
- (b) Connect two prod leads into the grid and plate jacks in the center of the control panel. The red plate jack will be the positive lead.
- (c) Touch together the two prods and adjust the ohmmeter pointer to zero. Resistance up to 50 megohms can be read directly on the megohm range.
- (d) Electrolytic capacitors can be checked for leakage. Observe that the red (plate) jack is connected to the positive pole of the capacitor.

21. NORMAL - LOW PLATE VOLTS. In the NOTATIONS column of the data chart for some tubes will be found PLATE VOLTS = LOW. This notation indicates that the PLATE VOLTS switch located just above the FUNCTION switch is to be set on the LOW position. Return the switch to NORMAL for all other tubes.

22. HEATER - CURRENT. In the lower right hand corner of the panel will be found two binding posts which are normally connected together by a jumper. By removing this jumper and connecting a suitable Milliammeter or Ammeter between these two binding posts, the indicating instrument will read the current being drawn by the heaters of the tube under test.

The actual voltage at the tube under test will be the voltage as indicated by

the filament selector switch minus the voltage drop across the indicating Milliammeter or Ammeter. This voltage will generally be of a very low magnitude, but can be calculated by multiplying the current normally drawn by the tube under test by the impedance of the meter connected in series with this tube, or it can be actually measured with a sensitive AC Voltmeter.

If the impedance of the meter is much more than 0.2 ohms, the voltage drop might be appreciable percentage-wise to the voltage delivered to the tube. For example, if the current at the tube is normally 0.6 amperes, and the impedance of the current measuring instrument were 0.5 ohms, the resultant loss would be the product of these two, or 0.3 of one volt.

TO TEST BALLAST TUBES

1. Turn Tester on.
2. Set filament switch to BLST.
3. Set SHORT TEST switch on 5.
4. Set first selector switch (letter A to

K) to letter shown in column marked (first selector switch). Set all numbered selectors on zero.

5. ROTATE second selector switch (lettered P to Z) from P to Z. NEON LAMP SHOULD LIGHT IN POSITIONS NOTED.

TUBE TYPE	First Selector	Neon lamp should light in these positions.							
		R	S	T	U	V	W	X	Y
1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1V1-1Y1-1Z1	E	R							
1L1-1N1-1P1-1Q1-1R1G-1S1G-1T1G-1U1G	H		S						
2	E	R							
2UR224	H			T					Y
2LR212	J	R	S		U				
3	E	R							
O3G	H			T					
4-5	E	R							
6-133	H			T					
6-6AA-7-8-9	E	R							
10A-10AG	H			T					
10AB	E	R							
K17B-M17C-EM17C	H			T					Y
M17HG-M17H	H	R							Y
	D		S						
K23B-K23C	H			T					Y
KX23B	E	R		T					
KX30C	E	R		T					
M30H	H	R							Y
	D		S						
30A-K30A	H			T					
K30D	H		S	T					Y
33A-33AG	H			T					
K34B	H			T					Y
36A	H			T					

TUBE TYPE	First Selector	Neon lamp should light in these positions.									
K36B-BK36B-L36B-L36C	H			T							Y
KX36A	E	R									
KX36C	E	R		T							
36D-L36D	H		S	T							Y
L36DJ	H	R	S	T	U						Y
K36H-M36H-M36HG	H	R									Y
	D		S								
40A1	H		S								
L40S1-L40S2	H		S	T		V					
42A	H			T							
42A1	J				U						
42A2-42B2	J	R			U						
K42B-L42B-M42B	H			T							Y
KX42B-LX42B-L42BX	E	R		T							
K42C-L42C-M42C	H			T							Y
BK42D-K42D-L42D	H		S	T							Y
LX42D-L42DX	E	R	S	T							
K42E-L42E	H			T							Y
L42F	H										Y
	D		S								
42HA-42HJ	H	R									
	E		S	T							
M42H-M42HG	H	R									Y
	D		S								
KX42C	E	R		T							
L42S1	H		S	T		V					
49A-49AJ-K49AJ	H			T							
KX49A	E	R		T							
49A1	J				U						
49A2-49B2	J	R			U						
K49B-L49B-M49B-BM49B-K49C	H			T							Y
M49C-BM49C-BK49C-K49E-L49E											
K49D-BK49D-L49D	H		S	T							Y
L49F	H										Y
	D		S								
M49H-M49HG	H	R									Y
	D		S								
KZ49B-KZ49C	H		S			V					
K49BJ-L49BJ	H			T	U						Y
L49S2	H		S	T		V					
49AJ-K49AJ	H			T							
KX49B-LX49B-LX49C	E	R		T							
L49DJ	H		S	T	U						Y
L49S3	H		S	T		V					
50A2	E	R		T							
50A2MG-50B2	H		S			V					
50X3	E	R									
K52H-M52H	H	R									Y
	D		S								
K54B	H			T							Y
55A-K55A	H			T							
55A1	J				U						
KX55A	E	R									
55B-K55B-M55B-BM55B-L55BG	H			T							Y
LX55B	E	R		T							

TUBE TYPE	First Selector	Neon lamp should light in these positions.									
		R				U					
55A2-55B2	J	R				U					
K55C-L55C	H				T						Y
KX55C	E	R			T						
K55CP	H				T		V				Y
K55D-L55D	H			S	T						Y
L55E-M55E	H				T						Y
L55F-M55F-BL55F	H										Y
	D			S							
K55H-M55H-M55HG	H	R									Y
	D			S							
L55S1-L55S2	H			S	T		V				
60R30G	E	R			T						
64.23	H				T						
67A	H				T						
K67B-L67B	H				T						Y
L73B-K74B-L74B	H				T						Y
KX74C	E	R			T						
80A	H				T						
K79B-K80B-K80C-L80B	H				T						Y
KX80B	E	R			T						
K80F	H										Y
	D			S							
KX87B-LX87B	E	R			T						
L90B	H				T						Y
K90F-M90F-K92F-M92F	H										Y
	D			S							
92A	H				T						
L92B-95K2	H				T						Y
L99D	H			S	T						Y
I00R8	E	R			T						
I20R	E	R									
I20R8	E	R			T						
I35K1	H				T						Y
I35K1A	H				T	U					Y
I40L4-I40L8-I40R4-I40R8	E	R			T						
I40R	E	R									
I40L44	E	R			T						
I40R44	E	R	S		T						
I65L4-I65R4-I65R8	E	R			T						
I65R	E	R									
I65L44-I65R44	E	R	S		T						
I85L4-I85L8-I85R4-I85R8	E	R			T						
I85R	E	R									
I85L44-I85R44	E	R	S		T						
I200R-250R	E	R									
I250R8	E	R			T						
I290L4	E	R			T						
I300R4-I320R4	E	R			T						
I340	E	R									
I808-1	H				T	U					Y
EI4980-W43357-W45788-3613	H				T						Y
I3334-I3334A	H			S	T						Y
I3613	H				T						Y
I8593-I8598-I8601-I8664	H				T						Y
I3CR241	H			S	T						Y

TUBE TYPE	First Selector	Neon lamp should light in these positions.							
3ER248	H		S	T	U				Y
B9M15822	C E G			T		V		X	Y
B9M16067	H		S	T		V	W		Y
B9M16275	C			T	U	V	W	X	Y
B9M16534	H		S	T		V	W		Y
B9M17571	J H		S	T	U	V			Y
B9M18941	C E G	R		T		V		X	Y
17A470303	H J E	R	S			V	W		
17A485459	H E	R	S	T			W		
TBR102D-TBR104D	C G	R		T	U	V		X	Y
TBR103D	C G	R			U	V		X	Y
397021	C	R		T					
397022	E					V	W		
397023	H								Y
397036	B					V			
407100	H	R	S			V			
408100	H D	R	S		U	V			
SW507300	H		S	T		V	W		Y
571606	C E H	R		T		V	W		Y

PARTS LIST FOR MODEL 539B

NOTE: There is a minimum billing charge of \$1.50 for any one parts order.
Prices will be furnished upon request.

HICKOK CODE NO.	NAME AND DESCRIPTION	REF. SYMBOL OR FUNCTION
2490-273	BOOKLET: Instructions	
2920-7	BUTTON - Push: Black	
2920-8	BUTTON - Push: Red	
3085-40	CAPACITOR: 100 Mfd - 6 volts	C4
3085-68	CAPACITOR: 8 Mfd - 350V	C1
3095-8	CAPACITOR: 470 Mmf - 10%, 500 Volts	C5
3105-112	CAPACITOR: .5 Mfd - 200V	C3
3105-175	CAPACITOR: .05 Mfd - 400 Volts	C2
3200-55	CHART: Data Roll	
3250-44	CHOKER: Retard	L1-L2-L3
4160-66	DIAL: Shunt	
10300-1	JACK: Pin Plug Type - Red	
10300-2	JACK: Pin Plug Type - Black	
11500-11	KNOB: with pointer	
11505-46	KNOB: With white dot	
11505-49	KNOB: 1"	
12270-2	LAMP: #81	Fuse Lamp
12270-12	LAMP: #47	Pilot Lamp
12270-14	LAMP: NES1	Short Test
12450-145	LEAD: Ass'y, Plate	
12450-180	LEAD: Ass'y, Plate	
16925-88	POTENTIOMETER: 1000 ohms	R25
16925-270	POTENTIOMETER: 3000 - 1000 ohms	R14-R16
18413-361	RESISTOR: 36K, 5%, 1/2 watt	R47
18414-121	RESISTOR: 120K, 5%, 1/2 watt	R35-R36
18414-151	RESISTOR: 150K, 5%, 1/2 watt	R34
18415-102	RESISTOR: 1 Meg., 10%, 1/2 watt	R46
18414-472	RESISTOR: 470K, 10%, 1/2 watt	R2
18422-101	RESISTOR: 1000 ohms, 5%, 1 watt	R20-R21
18422-122	RESISTOR: 1200 ohms, 10%, 1 watt	R6
18423-151	RESISTOR: 15K, 5%, 1 watt	R5
18525-685	RESISTOR: 150 ohms, 1%, 1/2 watt	R26
18525-686	RESISTOR: 50 ohms, 1%, 1/2 watt	R11-R12
18525-687	RESISTOR: 470K, 1%, 1/2 watt	R23
18525-700	RESISTOR: 200 ohms, 1%, 1/2 watt	R51
18525-719	RESISTOR: 270 ohms, 1%, 1/2 watt	R29
18525-717	RESISTOR: 40K, 1%, 1/2 watt	R49
18525-722	RESISTOR: 9900 ohms, 1%, 1/2 watt	R50
18550-153	RESISTOR: 1200 ohms, 1%, 1 watt	R19
18525-718	RESISTOR: 100 ohms, 1%, 1/2 watt	R10-R28
18525-720	RESISTOR: 230 ohms, 1%, 1/2 watt	R33
18525-723	RESISTOR: 750 ohms, 1%, 1/2 watt	R27
18525-721	RESISTOR: 300 ohms, 1%, 1/2 watt	R9
18550-154	RESISTOR: 2250 ohms, 1%, 1 watt	R17
18525-681	RESISTOR: 500 ohms, 1%, 1/2 watt	R13-R37-R42
18525-729	RESISTOR: 330K, 1%, 1/2 watt	R48
18575-12	RESISTOR: 1800 ohms, 10%, 10 watt	R7
18575-19	RESISTOR: 100 ohms, 10%, 10 watt, center tapped	R3-R4
18575-89	RESISTOR: 8500 ohms, 10%, 10 watt	R18
18575-126	RESISTOR: 150 ohms, 1%, 2 watt	R1
18750-24	RHEOSTAT: 150 ohms	R13
18750-26	RHEOSTAT: 10K, 50 watt	R24
19350-1	SOCKET: Bayonet for 81 Lamp	
19350-113	SOCKET: Bayonet Neon and Pilot Lamp	
19350-43	SOCKET: Acorn	
19350-58	SOCKET: Noval	

PARTS LIST FOR MODEL 539B

NOTE: There is a minimum billing charge of \$1.50 for any one parts order.
Prices will be furnished upon request.

HICKOK CODE NO.	NAME AND DESCRIPTION	REF. SYMBOL OR FUNCTION
19350-76	SOCKET: 7 pin miniature	
19350-93	SOCKET: 4 pin	
19350-94	SOCKET: 5 pin	
19350-95	SOCKET: 6 pin	
19350-96	SOCKET: 7 pin	
19350-97	SOCKET: Loktal	
19350-98	SOCKET: Octal	
19350-101	SOCKET: Subminiature	
19350-119	SOCKET	
19910-61	SWITCH: Gang, 8 Buttons	
19911-7	SWITCH: Meter reverse	
19911-55	SWITCH: Toggle DP-DT	
19912-176	SWITCH: Suppressor and Cathode	
19912-177	SWITCH: Selectors	
19912-202	SWITCH: Filament Volts	
19912-304	SWITCH: 3 P-DT	
19912-308	SWITCH: Function	
19912-312	SWITCH: Short Test	
20800-103	TRANSFORMER: Filament	
20800-169	TRANSFORMER: Plate	
20875-6	TUBE: 5Y3GT/G	
20875-28	TUBE: 83	

TEST DATA FOR CRT ADAPTER

MODEL 539B:

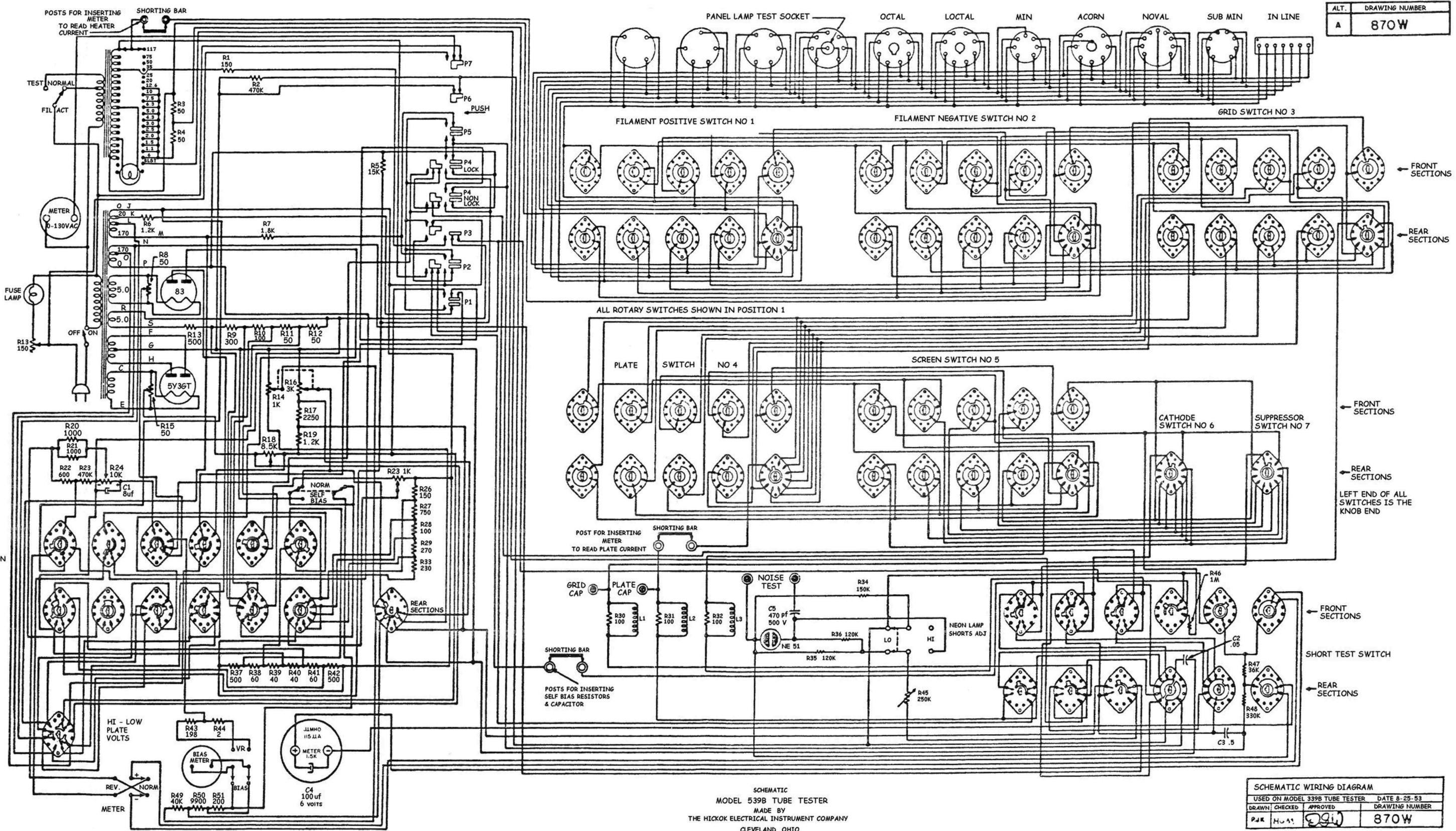
	<u>SELECTORS</u>	<u>FIL</u>	<u>BIAS</u>	<u>SHUNT</u>	<u>RANGE</u>	<u>PRESS</u>
Emission	HS-3508-4	6.3	----	0	G	P1

Good tubes should read above line marked RECTIFIERS AND DIODES OK.

Grid Control and Gas Test	HS-5308-4	6.3	*	----	D	P5
	* Hold down P5 and rotate Bias knob. Meter should move up and down scale if grid is operating.					

GAS TEST: Hold down P5 and adjust bias until meter reads one small division. While holding P5 down, press P6. If meter pointer moves up scale more than one division, tube is gassy.

NOTE: In ordering parts or materials for this instrument, the serial number must be given in order to identify properly the material required.



ALT.	DRAWING NUMBER
A	870W

SCHMATIC
 MODEL 539B TUBE TESTER
 MADE BY
 THE HICKOK ELECTRICAL INSTRUMENT COMPANY
 CLEVELAND, OHIO

SCHEMATIC WIRING DIAGRAM			
USED ON MODEL 339B TUBE TESTER		DATE 8-25-53	
DRAWN	CHECKED	APPROVED	DRAWING NUMBER
PJK	HUA	[Signature]	870W