

OPERATING INSTRUCTIONS
FOR
VACUUM TUBE TESTER
MODEL 536
Hickok
Transconductance Tube Tester

HICKOK



W O R L D F A M O U S

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 DUPONT AVENUE • CLEVELAND 8, OHIO

The Standard of Quality for Over 40 Years

BULLETIN T-105
January 24, 1951

FUSE IN BIAS CIRCUIT

This tube tester is equipped with a fuse in the Grid Bias Circuit as a protection for the Bias potentiometer in case an attempt is made to test a shorted tube.

NOTE: ALWAYS MAKE SHORT CHECK BEFORE MAKING QUALITY TEST.

The fuse is mounted in the main control panel where it is readily visible.

A burned out bias fuse lamp will result in failure of the mutual conductance meter to read when the GM button is pressed. If the fuse lamp burns out, replace only with a No. 49 panel lamp.

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
10514 Dupont Avenue
Cleveland, Ohio

44108

OPERATING INSTRUCTIONS

FOR

MODEL 536

TRANSCONDUCTANCE TUBE TESTER

IMPORTANT

SEE INSTRUCTIONS FOR TESTING
FILAMENT CONTINUITY ON PAGE 4.

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 Dupont Ave.

Cleveland 8, Ohio

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THE INSTRUMENT PACKED HEREWITH IS:

PACKER'S CHECK

1 MODEL 536 VACUUM TUBE TESTER _____

ACCESSORIES INCLUDED WITH THE TESTER ARE: _____

1 - BOOKLET INSTRUCTIONS _____

1 - GRID LEAD WITH CLIP _____

SERIAL NO. _____

SIGNED: _____

INSTRUCTIONS FOR OPERATION OF MODEL 536

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 1/4 watt, 110 volt, candelabra base neon signal lamp made by The General Electric Company. 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 536 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.

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.

The dialing system is designed so that a minimum of dial setting is required. For example, the heater setting is practically always JR so that these two dials seldom need resetting. It will also be noticed that when testing duodiode triode tubes the amount of dialing has been reduced to a minimum.

5. 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.

A short is indicated by a steady glow of the neon lamp in certain positions of the SHORTS switch. A momentary flash of the lamp as the switch is turned

from one position to another should be disregarded. This flashing is caused by the charging of a capacitor in the test circuit. A shorted tube should be discarded without further test.

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

KIND OF SHORT	1	2	3	4	5
FIL -- CATHODE			X		
FIL -- GRID	X	X			X
FIL -- PLATE	X	X		X	X
FIL -- SCREEN	X		X	X	X
FIL -- SUP		X			
GRID -- CATHODE	X	X	X		X
GRID -- PLATE				X	
GRID -- SCREEN		X	X	X	
GRID -- SUP	X				X
PLATE -- SCREEN		X	X		
PLATE -- SUP	X			X	X
SCREEN -- SUP	X	X	X	X	X

7. 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.

8. GAS TEST --DOES NOT APPLY TO RECTIFIER TUBES. The push switch P5 (Gas 1) and P6 (Gas 2) are used to test an amplifier tube for gas content.

a. The MICROMHO switch is set on 3000.

b. The push switch P5 is pressed and held down while the BIAS dial is turned to cause the pointer of the indicating meter to read 100 micromhos.

c. P5 is held down and P6 is pressed.

d. If the tube contains gas the meter pointer will move up the scale. If the pointer movement is not more than one small division of the scale the gas content is satisfactory.

With some tubes, such as the type 45, the micromho reading cannot be brought down to 100 by turning the BIAS dial. In such case turn the BIAS dial to 100 and test for gas.

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.

9. DYNAMIC TRANSCONDUCTANCE --The Push Switch P4 is pressed to indicate transconductance (or mutual conductance).

The indicating meter will register the tube's value in six ranges. English; 3000, 6000, 15000 Micromhos with HIGH Signal; 6000, 15000 Micromhos with LOW Signal.

The Micromho switch automatically changes the signal from HIGH, 5 volts to LOW, 1 volt when the appropriate setting is made.

The range, ENGLISH, on the MICROMHO switch is used when it is desired to test the tube in terms of GOOD-REPLACE. In this case the ENGLISH dial must be set in accordance with the figures given on the data chart under the heading, ENG. When using the ENGLISH range good tubes will cause the meter pointer to read in the GOOD sector. Worn out tubes will read in the REPLACE sector. Those tubes which read in the sector marked (?) have some useful life but should be replaced soon. The ENGLISH reading scale is also based on Transconductance. It is not an emission test.

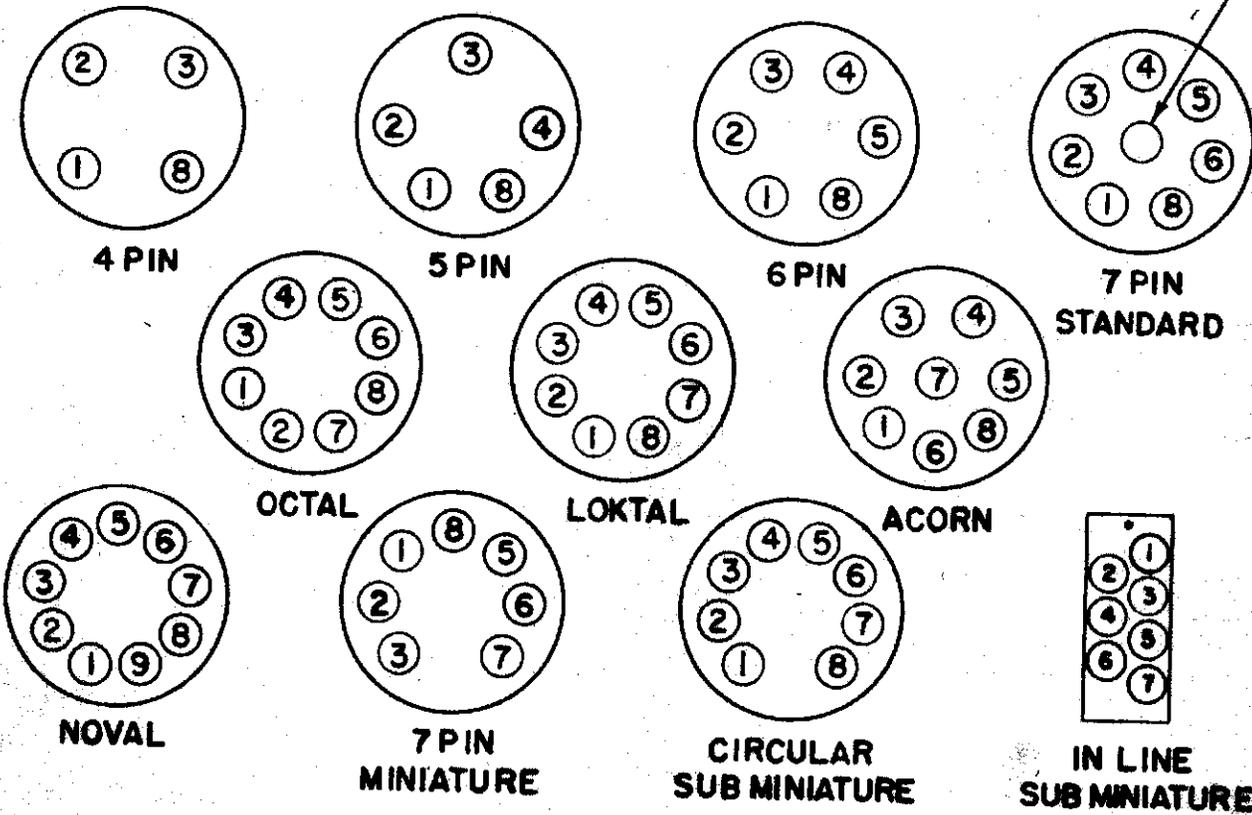
The Micromho values printed on the data roll are average values. A small variation above or below these average values is to be expected even with new tubes.

The ENGLISH scale is designed to make tubes read at the left edge of the GREEN (GOOD) sector when 20% below average for amplifier tubes and 35% below average for power tubes.

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

SOCKET NUMBERING BOTTOM VIEWS



the meter pointer to read above the mark, DIODES OK.

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 in the GREEN (GOOD) sector of the meter.

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 in the GREEN (GOOD) sector of the meter.

NOTE

On the data chart a star (*) following P1, P2 and P3 indicates that the MICROMHO switch is to be set on ENGLISH.

11. **SOCKET NUMBERING**--In order to reduce dialing to a minimum, the sockets in the Model 536 Tube Tester are numbered as

shown above. 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 JR. 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 about 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 536 is valuable in matching tubes for push-pull stages and other applications where matched tubes are essential.

15. LIFE TEST--The model 536 MICROMHO DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER is equipped with a special feature to enable Life Test to be made on the tube. In the Lower Right of the control panel is a switch designated NORMAL and LIFE TEST.

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

b. Set the MICROMHO range switch on ENGLISH.

c. Press P4 and adjust the ENGLISH dial until the tube reads in the GREEN (GOOD) sector at 2000 on the scale.

d. While holding everything else constant, throw switch to LIFE TEST. This reduces cathode temperature.

e. If the meter still reads in the GREEN (GOOD) sector, the tube has a large life reserve and will perform satisfactorily.

f. After making LIFE TEST return the switch to NORMAL for all other tests.

g. In testing the 35Z5 and 45Z5 rectifier tubes it is advisable to turn the power off for about 15 seconds after throwing the LIFE TEST switch to LIFE TEST to allow the cathode to cool. Then turn the power on and note new reading of the meter.

16. CONTINUITY TEST--The Model 536 Tube Tester can be used to test for continuity through resistance up to 200,000 ohms.

a. Set SHORTS switch on position 4.

b. Connect two leads having prods and pin tips to the jacks marked PLATE and GRID.

c. Touch the prods to the terminals through which continuity is to be determined.

d. The neon lamp will glow if circuit is continuous.

17. FILAMENT AND HEATER CONTINUITY

1. Turn Tester on.

2. Set selectors as per chart for tube to be tested.

3. Set FILAMENT switch on BLST instead of voltage indicated on chart.

4. Set SHORT TEST switch on position 1.

5. Place tube in 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 all positions. If no shorts are indicated, set the switch in TUBE TEST position and proceed to test the tube as per chart.

If Neon lamp does not glow, 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.

TO TEST BALLAST TUBES

1. Turn Tester on.
2. Set filament switch to BLST.
3. Set SHORT TEST switch on 1.
4. Set first selector switch (lettered A to K) to letter shown in column marked (first selector) -- 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
1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1L1-1N1-1P1-1Q1-1R1G-1S1G-1T1G-1U1G-1V1-1Y1-1Z1-2	J	R						
2UR224	J			T				X
2LR212	H	R	S		U			
3	J	R						
03G	J			T				
4-5	J	R						
6-133	J			T				
6-6AA	J	R						
7-8-9	J	R						
10A-10AG	J			T				
10AB	J			T				X
K17B-M17C-BM17C	J			T				X
M17HG-M17H	J		S					X
	D	R						
K23B-K23C-KX23B-KX30C	J			T				X
M30H	J		S					X
	D	R						
30A-K30A	J			T				
K30D	J	R		T				X
33A-33AG	J			T				
K34B	J			T				X

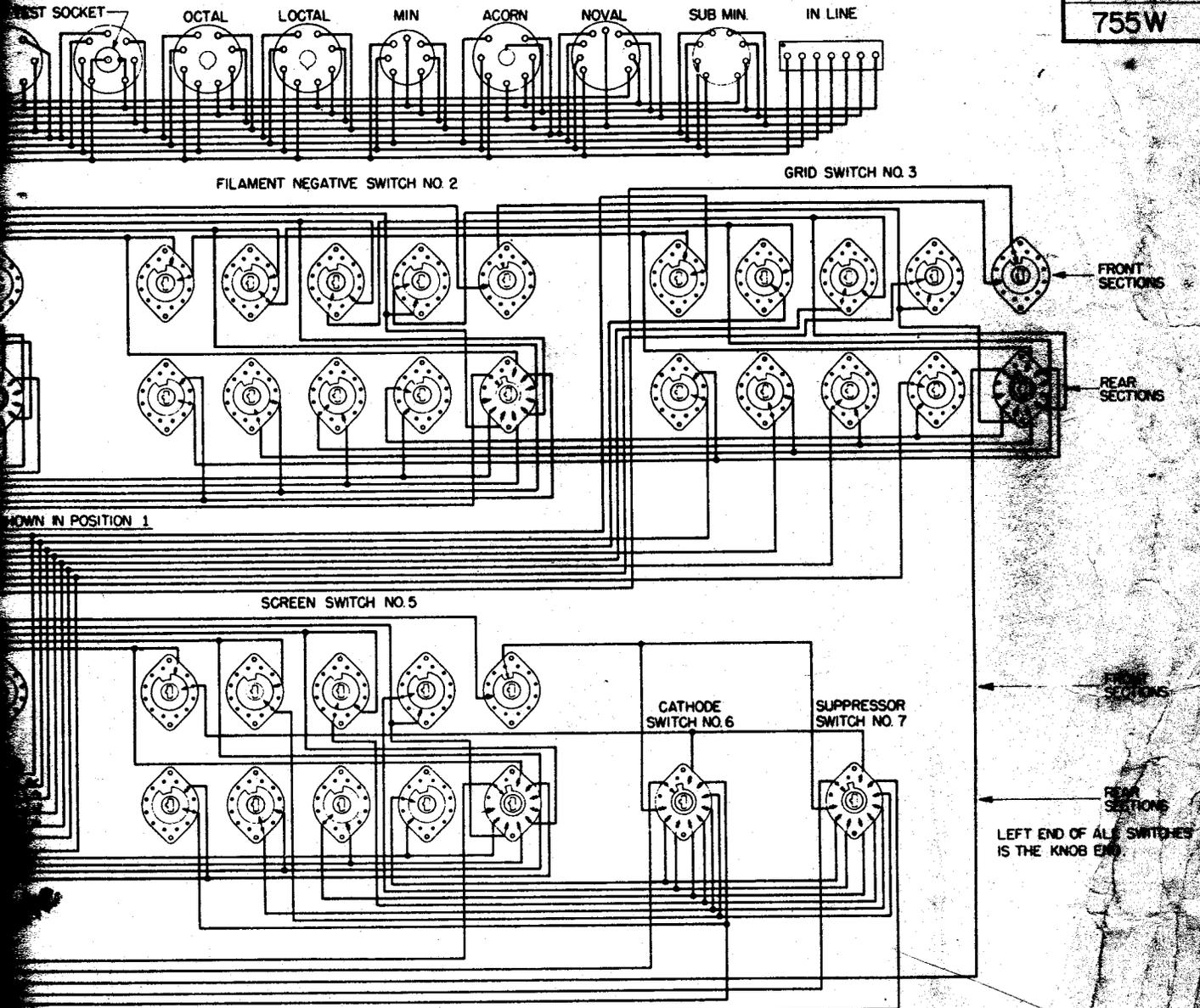
TUBE TYPE	First Selector	Neon lamp should light in these positions.					
36A	J			T			
K36B-BK36B-L36B-BM-L36C-KX36C	J			T			X
KX36A	J	R					
36D-L36D	J	R		T			X
L36DJ	J	R		T	U		X
K36H-M36H-M36HG	J		S				X
L40S1-L40S2	D	R					
42A	J	R		T		V	
42A1	J			T			
42A1	H				U		
42A2-42B2	H		S		U		
K42B-L42B-M42B-KX42B-LX42B-L42BX-K42C-L42C-M42C	J			T			X
KB42D-K42D-L42D	J	R		T			X
LX42D-L42DX	J	R	S	T			
K42E-L42E	J			T			X
L42F	J						X
	D	R					X
42HA-K42HJ-M42H-M42HG	J		S				X
KX42C	E	R		T			
L42S1	J			T			X
49A-49AJ-K49AJ	J	R		T		V	
KX49A	J			T			X
49A1	H				U		
49A2-49B2	H		S		U		
K49B-L49B-M49B-BM49B-K49C-M49C-BM49C-BK49C-K49E-L49E	J			T			X
K49D-BK49D-L49D	J			T			X
L49F	J						X
	D	R					X
M49H-M49HG	J		S				X
	D	R					
KZ49B-KZ49C	J	R				V	
K49BJ-L49BJ	J			T	U		X
L49S2	J	R		T		V	
49AJ-K49AJ	J			T			
KX49B-LX49B-LX49C	J			T			X
L49DJ	J	R		T	U		X
L49S3	J	R		T		V	
50A2	J	R		T			
50A2MG-50B2	J	R				V	
50X3	J	R					
K52H-M52H	J		S				X
	D	R					

TUBE TYPE	First Selector	Neon lamp should light in these positions.					
K54B	J			T			X
55A-K55A	J			T			X
55A1	H				U		
KX55A	J	R					
55B-K55B-M55B-BM55B-L55BQ-LX55B	J			T			X
55A2-55B2	H		S		U		
K55C-L55C-KX55C	J			T			X
K55CP	J			T		V	X
K55D-L55D	J	R		T			X
L55E-M55E	J			T			X
L55F-M55F-BL55F	J						X
	D	R					
K55H-M55H-M55HG	J		S				X
	D	R					
L55S1-L55S2	J	R		T		V	X
60R30G	J	R		T			
64.23	J			T			
67A	J			T			
K67B-L67B	J			T			X
L73B-K74B-L74B-CX74C	J			T			X
80A	J			T			
K79B-K80B-M80B-K80C-KX80B-L80B	J			T			X
K80F	J						X
	D	R					
KX87B-LX87B-L90B	J			T			X
K90F-M90F-K92F-M92F	J						X
	D	R					
92A	J			T			
L92B-95K2	J			T			X
L99D	J	R		T			X
100R8	J			T			X
120R	J	R					
120RS-135K1	J			T			X
135K1A	J			T	U		X
140L4-140L8-140R4-140R8	J	R		T			
140R	J	R					
140L44-140R44	J	R	S	T			
165L4-165R4-165R8	J	R		T			
165R	J	R					
165L44-165R44	J	R	S	T			
185L4-185L8-185R4-185R8	J	R		T			
185R	J	R					
185L44-185R44	J	R	S	T			
200R-250R	J	R					
250R8-290L4	J			T			X
300R4-320R4	J			T			X
340	J	R					
808-1	J			T	U		X
E14980-W43357-W4588-3613	J			T			X
3334-3334A	J	R		T			X
8593-8598-8601-8664	J			T			X
3ER248	J	R		T	U		X
3CR241	J	R		T			X

Parts List For Model 536 Tube Tester

Item No.	Code Number	Description
1	2490-37	Booklet-instruction
2	2920-7	Button-push, black
3	2920-8	Button-push, red
4	3145-149	Case carrying, wood
5	3200-24	Chart-roll tube data
6	11500-11	Knob Ass'y with pointer
7	10300-1	Jacks-red
8	10300-2	Jacks-black
9	12270-1	Lamp-neon, 1/4 watt
10	12270-2	Lamp-auto #81
11	12270-12	Lamp-mazda #47
12	12450-180	Lead assembly
13	440-412	Meter-microamps
14	570-061	Meter-voltmeter
15	19350-43	Socket-acorn
16	19350-92	Socket 9-pin
17	19350-76	Socket-miniature, 7-pin
18	19350-93	Socket 4-pin
19	19350-94	Socket 5-pin
20	19350-95	Socket 6-pin
21	19350-96	Socket 7-pin
22	19350-97	Socket-loktal 8-pin
23	19350-98	Socket-octal 8-pin
24	19350-101	Socket sub-miniature
25	19350-119	Socket in-line, sub-miniature
26	19910-54	Switch push-button, 7-gang
27	19912-175	Switch short test
28	19912-176	Switch-cathode
29	19912-177	Switch-selector
30	19912-186	Switch-micromho
31	19912-202	Switch-filament
32	20800-69	Transformer-plate
33	20800-103	Transformer-filament
34	20875-6	Tube-vacuum #5Y3GT
35	20875-28	Tube-vacuum #83

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



R1	1800 Ω
R2	1200 Ω
R3	15000 Ω
R4	150 Ω DUAL POT.
R5	150 Ω
R6	8500 Ω ADJUST
R7	3000 Ω POT.
R8	250,000 Ω
R9	40 Ω ADJUST
R10	100,000 Ω
R12	50 Ω
R13	50 Ω
R14	150 Ω
R15	41 Ω
R16	109 Ω
R17	41 Ω
R18	109 Ω
R19	257 Ω ADJUST
R20	66 Ω ADJUST
R21	47 Ω
R22	47 Ω
R23	47 Ω

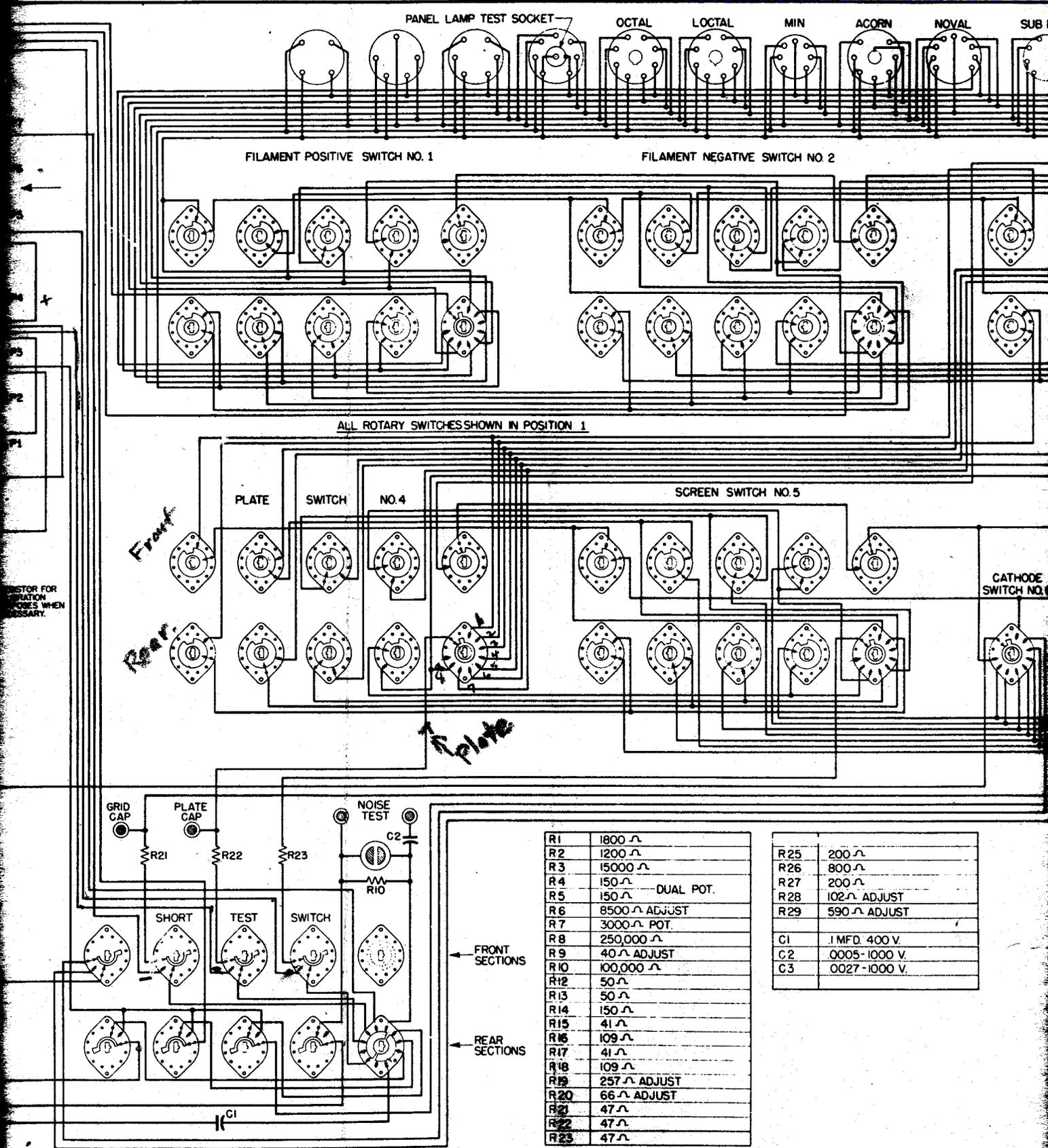
R25	200 Ω
R26	800 Ω
R27	200 Ω
R28	102 Ω ADJUST
R29	590 Ω ADJUST
C1	1 MFD. 400 V.
C2	0005-1000 V.
C3	0027-1000 V.

FRONT SECTIONS

REAR SECTIONS

SCHMATIC MODEL 536 TUBE TESTER
 MADE BY THE HICKOK ELECTRICAL INSTRUMENT COMPANY
 CLEVELAND, OHIO

SCHEMATIC WIRING DIAGRAM			
USED ON: 536	TUBE TESTER	DATE:	
DRAWN / CHECKED: JRB	APPROVED:	DRAWING NUMBER:	755W



R1	1800 Ω
R2	1200 Ω
R3	15000 Ω
R4	150 Ω
R5	150 Ω — DUAL POT.
R6	8500 Ω ADJUST
R7	3000 Ω POT.
R8	250,000 Ω
R9	40 Ω ADJUST
R10	100,000 Ω
R12	50 Ω
R13	50 Ω
R14	150 Ω
R15	41 Ω
R16	109 Ω
R17	41 Ω
R18	109 Ω
R19	257 Ω ADJUST
R20	66 Ω ADJUST
R21	47 Ω
R22	47 Ω
R23	47 Ω

R25	200 Ω
R26	800 Ω
R27	200 Ω
R28	102 Ω ADJUST
R29	590 Ω ADJUST
C1	.1 MFD. 400 V.
C2	0005-1000 V.
C3	0027-1000 V.

← FRONT SECTIONS

← REAR SECTIONS

НІСКОК

K4XL's  **BAMA**

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