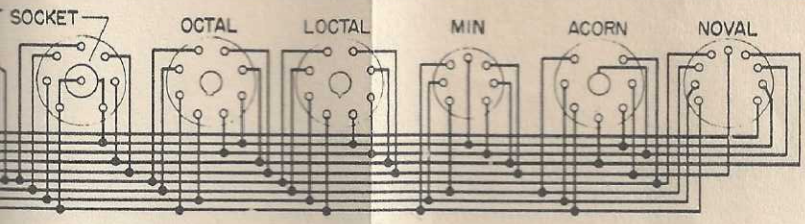
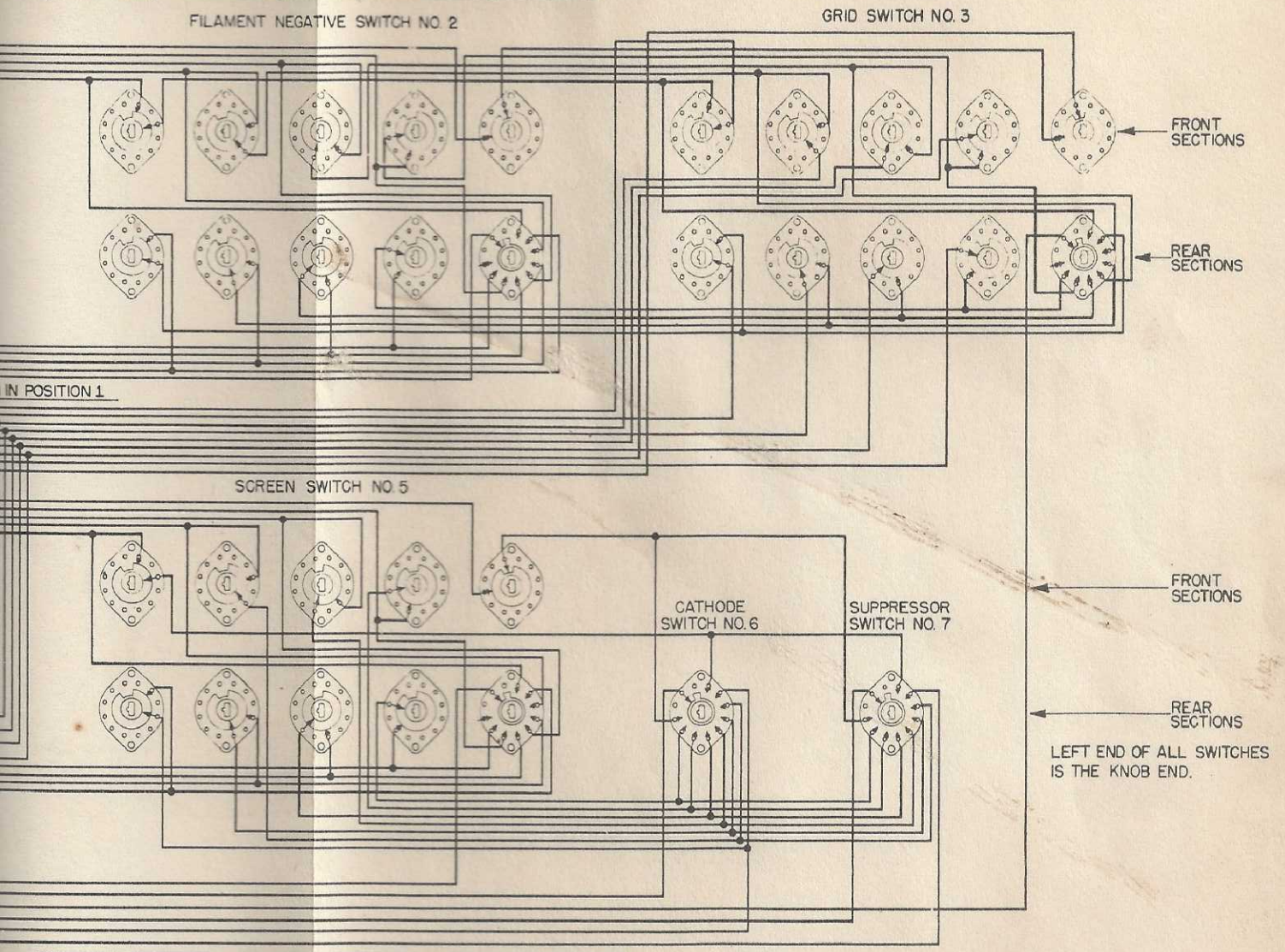
DRAWING NUMBER
705W





LEFT END OF ALL SWITCHES IS THE KNOB END.

R1	1800Ω
R2	1200Ω
R3	15000Ω
R4	150Ω
R5	150Ω
R6	6000Ω
R7	3000Ω POT.
R8	250,000Ω
R9	40Ω ADJ.
R10	100,000Ω
R12	50Ω
R13	50Ω
R14	150Ω
R15	41Ω
R16	109Ω
R17	41Ω
R18	109Ω
R19	257Ω ADJ.
R20	66Ω ADJ.
R21	47Ω
R22	47Ω
R23	47Ω

R25	200Ω
R26	800Ω
R27	200Ω
R28	102Ω ADJ.
R29	590Ω ADJ.
R30	3.6 MEG.
R31	10000Ω
R32	80 MEG.
R33	300,000Ω
R34	500,000Ω
R35	4 MEG.
R36	15,000Ω
R37	15,000Ω
R38	1.5 MEG.
R39	1.5 MEG.
R40	57Ω
R41	17Ω
R42	1.89Ω
R43	31Ω
R44	285Ω
R45	5750Ω
R46	6 MEG.

R47	400,000Ω
R48	2900Ω
R49	441Ω
R50	20000Ω
R51	20000Ω
R52	195,000Ω
R53	5.7Ω
C1	.1MFD. 400 V.
C2	.0005-1000 V.
C3	.0027-1000 V.
C4	5 MFD.
C5	5 MFD.

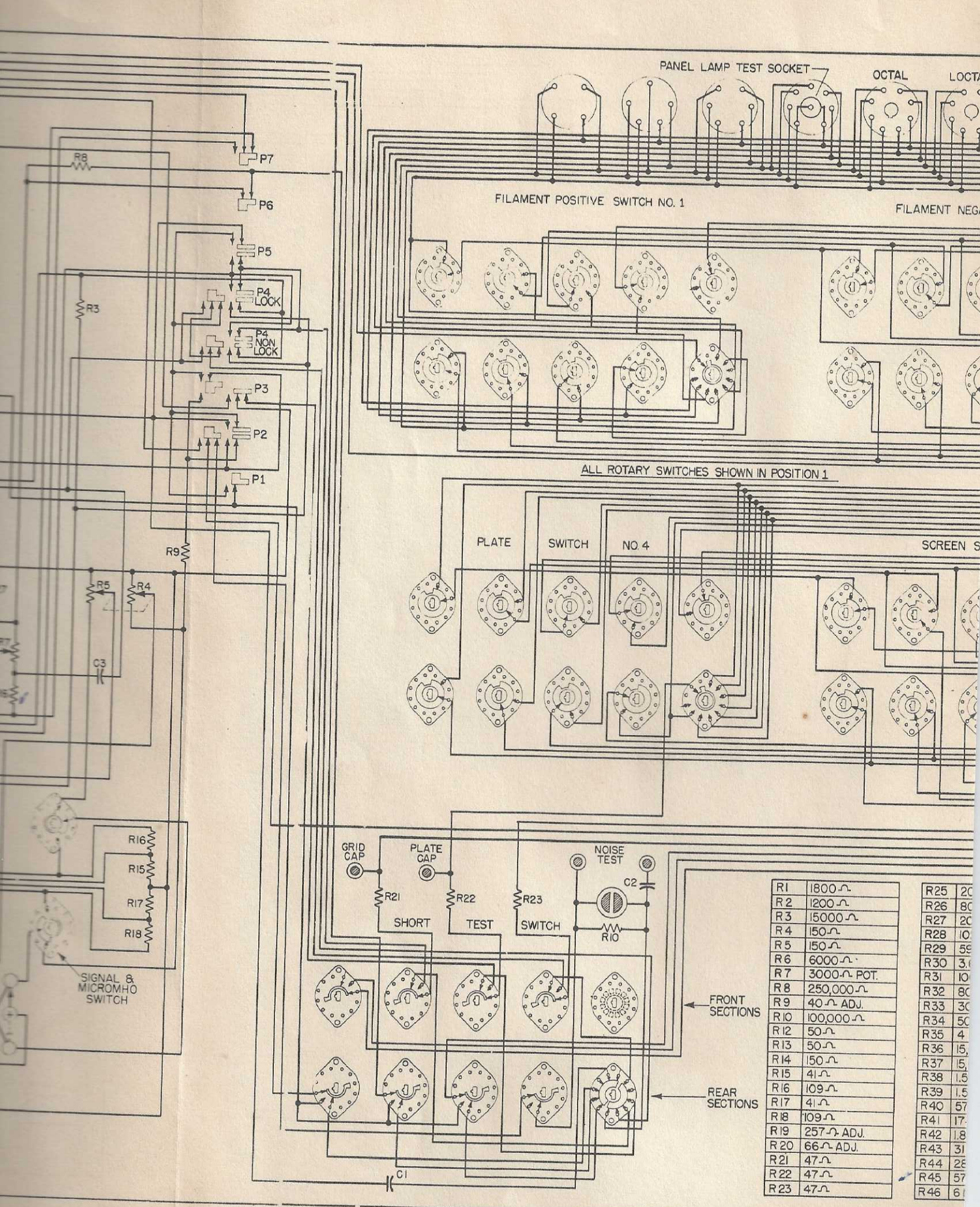
SCHEMATIC

MODEL 538A TUBE TESTER

MADE BY
THE HICKOK ELECTRICAL INSTRUMENT COMPANY
CLEVELAND, OHIO.

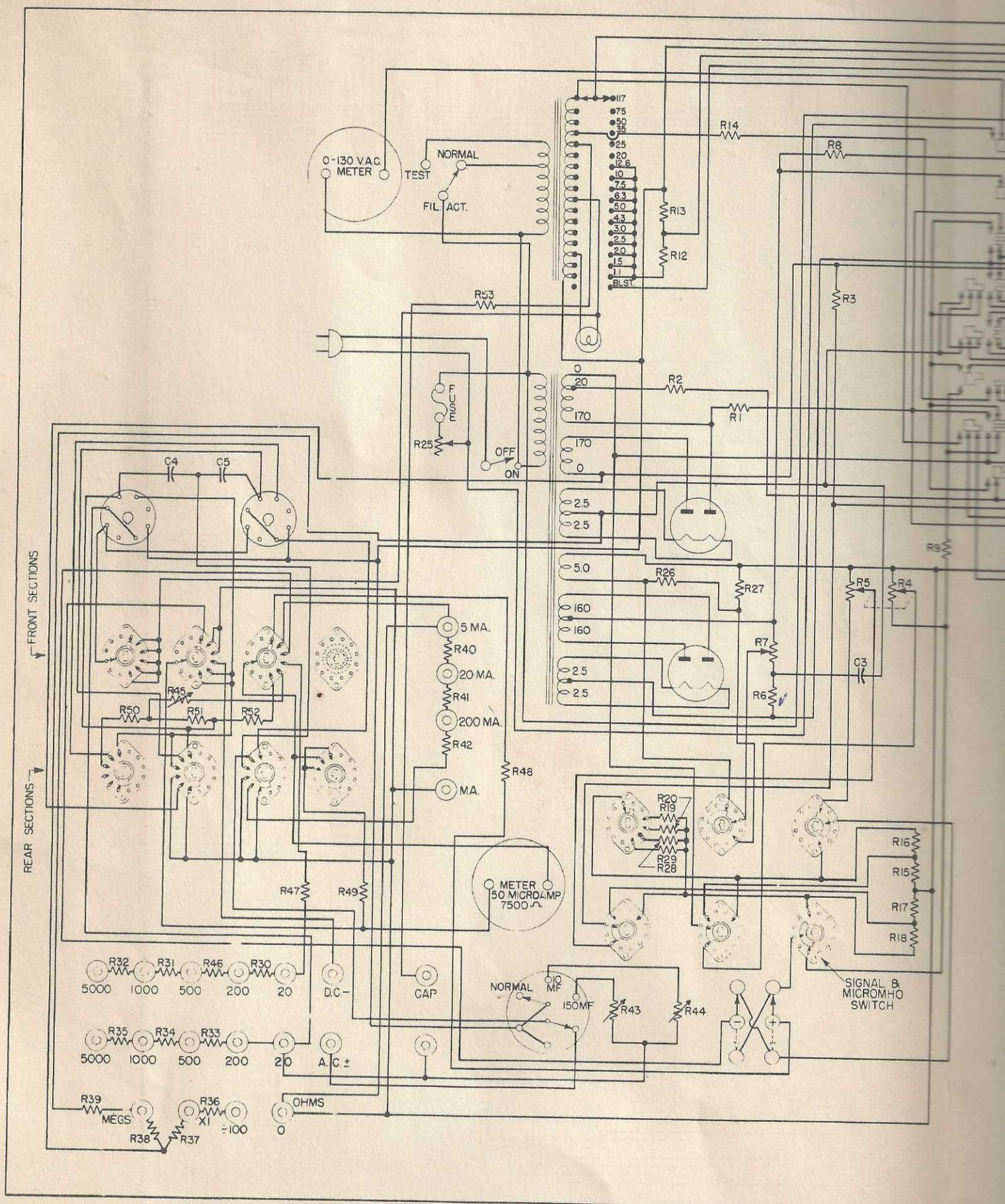
SCHEMATIC WIRING DIAGRAM

USED ON 538A TUBE TESTER			DATE 10-26-48
DRAWN	CHECKED	APPROVED	DRAWING NUMBER
B.J.K.	H.G.M.	J.R.B.	705W



R1	1800Ω
R2	1200Ω
R3	15000Ω
R4	150Ω
R5	150Ω
R6	6000Ω
R7	3000Ω POT.
R8	250,000Ω
R9	40Ω ADJ.
R10	100,000Ω
R12	50Ω
R13	50Ω
R14	150Ω
R15	41Ω
R16	109Ω
R17	41Ω
R18	109Ω
R19	257Ω ADJ.
R20	66Ω ADJ.
R21	47Ω
R22	47Ω
R23	47Ω

R25	20
R26	80
R27	20
R28	10
R29	59
R30	3.(
R31	10(
R32	80
R33	30
R34	50
R35	4
R36	15,
R37	15,
R38	1.5
R39	1.5
R40	57
R41	17
R42	1.8
R43	31
R44	28
R45	57
R46	6(


0-130 V.A.C. METER
TEST
NORMAL
FIL. ACT.
117
75
50
35
25
20
12.6
10
7.5
6.3
5.0
4.3
3.0
2.5
2.0
1.5
1
BLST.
R14
R8
R13
R12
R53
R3
FUSE
R25
OFF
ON
0
20
170
170
0
R2
R1
2.5
2.5
5.0
160
160
2.5
2.5
C4
C5
R26
R27
R5
R4
R9
R7
C3
R6
5 MA.
R40
20 MA.
R41
200 MA.
R42
MA.
R48
R45
R50
R51
R52
R20
R19
R29
R28
R16
R15
R17
R18
R47
R49
METER
50 MICROAMP
7500Ω
5000
1000
500
200
20
D.C.-
CAP
R32
R31
R46
R30
R35
R34
R33
A.C.±
NORMAL
.10 MF
.150MF
R43
R44
SIGNAL & MICROMHO SWITCH
R39
MEGS
R38
R37
R36
X1
÷100
0
OHMS
FRONT SECTIONS
REAR SECTIONS

CAPACITY IN M.F.	VOLTMETER READING ON 200 VOLT SCALE
.0001	1.5 Volts
.0002	3. "
.00025	3.5 "
.0005	7. "
.001	13. "
.002	25. "
.003	37. "
.004	49. "
.005	59. "
.006	70. "
.007	79. "
.008	85. "
.009	92. "
.01	99. "
.015	125. "
.02	139. "
.025	147. "
.03	153. "
.035	156. "
.04	160. "
.05	162. "

e. In checking smaller condensers set the capacity switch on CAP-10 M.F. The meter scale is then 0-10 M.F.

NOTE

Set FIL. switch to OFF when measuring CAPACITY or INDUCTANCE.

22. INDUCTANCE.

a. In measuring the inductance of choke coils, place the connecting leads in the pin jacks marked "CAP". Adjust the meter as for capacity, see paragraph 21a above. Set the capacity switch on Capacity 10MF. Connect the ends of the leads to the terminals of the choke and read the capacity scale on the meter.

b. EXAMPLE - If the meter reads .4 microfarads, divide this into 7.04 which gives 17.6 henries. In like manner, when measuring chokes of any size divide the reading in microfarads into 7.04 which will give the result in henries.

c. Conversion table for Inductance Values.

CAPACITY READING M. F.		INDUCTANCE HENRIES
.1	-	70.4
.2	-	35.2
.3	-	23.4
.4	-	17.6
.5	-	14.1
.6	-	11.7
.7	-	10.1
.8	-	8.8
.9	-	7.8
1.0	-	7.0

23. MILLIAMPERES, D. C.

a. IN MEASURING MILLIAMPERES BE SURE TO TURN THE OFF-ON SWITCH TO "OFF" POSITION.

b. The four jacks -, 5, 20, 200 are used in measuring milliamperes, giving the three ranges 0-5, 0-20, 0-200 M. A.

c. Set the Master Switch on MA.

d. Set CAPACITY Switch on Normal.

e. Milliamperes are read on VOLTS-MILS scale of the meter.

24. HUM VOLTAGE IN THE FILTER SYSTEM CAN BE MEASURED AS FOLLOWS:

a. Disconnect the antenna and ground wires.

b. Turn down the volume control.

c. Turn on the power.

d. Set CAPACITY Switch on Normal.

e. Connect the 0-20 volt A.C. range of the Model 538 TESTER from plate to cathode of any socket in which it is desired to check hum.

f. The meter reads ripple volts directly. Disregard the swing of the pointer as connection is first made. The 0-20 A. C. voltage range does not respond to direct current.

25. TO CHECK SMALL CAPACITORS.--Capacitors from .0001 to .05 M.F. may be checked as follows:

a. Make Line Adjustment the same as for tube testing. See paragraph 3, page 1.

b. Set the master switch on A.C. volts 200.

c. Set CAPACITY Switch on Normal.

d. Set Selectors: JR-0204-0.

e. Furnished with the Model 538 TESTER is a special cable. One end of this cable is equipped with a 5 pin plug. The black wire terminates in a pin tip. The red wire terminates in an alligator clip. ⊗ IMPORTANT

f. Insert the plug in the 5 pin socket. Insert the pin tip in the plus -minus (±) pin jack, A.C. Volts.

g. Connect the alligator clip to one terminal of the capacitor to be measured. Insert one of the voltmeter leads in the 200 V. pin jack and hold the prod on the other terminal of the capacitor.

h. Press button marked P5 and note the reading of the voltmeter. The value of the capacitor is found in the table below.

SECTION III

FUNCTIONS OF THE COMPONENTS USED AS AN ANALYZER

16. The small panel mounted in the upper left corner of the main panel of the Model 538 contains the controls which are used when measuring volts, ohms, milliamperes and microfarads.

This panel contains 22 jacks and two rotary switches. The analyzer section is entirely independent of the tube tester section but uses the same indicating meter. The rotary switch at the right is the MASTER SWITCH. The switch at the left is the CAPACITY SWITCH.

17. VOLTS D. C.

a. In measuring D.C. volts the meter has a sensitivity of 20,000 ohms per volt. Volts are measured in five ranges 0-20, 0-200, 0-500, 0-1000, 0-5000.

b. Set the master switch on VOLTS D. C.

c. Furnished with the model 538 are two test leads with pin tips on one end and prods on the other end.

d. Insert the pin tips in the jacks giving the proper range. Apply the prods to the source being measured and read the voltage on the VOLTS scale of the meter.

18. VOLTS A. C.

a. In measuring A.C. volts the meter has a sensitivity of 1000 ohms per volt. A. C. volts are measured in the same ranges as D. C. volts and are read on the same scale of the meter.

b. Power must be turned on for A.C. volts in order to heat the 6H6 diode tubes. Approximately 10 seconds are required to heat these tubes.

c. When using the 0-20 volt range set the master switch on VOLTS A.C. 20.

d. When using the 0-200, 0-500, 0-1000, 0-5000 ranges set the master switch on VOLTS A.C. 200-500-1000-5000. Set CAPACITY Switch on Normal.

19. OHMS.--Ohms are measured in three overlapping ranges, the center scale readings of which are respectively 75, 7500 and 0.75 megs. The scale on the meter is read directly when the master switch is set on Ohms X1 and the connecting leads are placed in the corresponding pin jacks. To measure lower resistance, move the connector lead from the pin jack marked X1 to the pin jack marked ÷ 100. Then the center scale reading of the meter is 75 ohms. In this position, resistance as low as 1/10 ohm can be estimated. The third range is designated MEGS. In this range, the center reading of the scale is 0.75 MEGS. The connecting leads are placed in the corresponding pin jacks. In this position, resistance as high as 100 megohms can be measured. To operate, throw the master switch to the range desired. The pointer of the meter will move to the end of the "Ohms" scale marked infinity (INF). By means of the "Line Adjustment" knob bring the pointer of the meter exactly over the "INF" mark. Resistance is then determined by connecting the flexible lead wires to the resistor being measured and noting the reading of the meter on the ohms scale.

20. TO CHECK LEAKAGE OF ELECTROLYTIC CAPACITORS. --Set the master switch on MEGS. Adjust the meter to "INF". Place one connecting lead in the pin jack marked "OHMS 0" and the other lead in the pin jack marked "MEGS". The pin jack marked "0" is to be connected to the negative terminal of the electrolytic capacitor, the MEGS jack is connected to the positive terminal. When connection is made to the electrolytic capacitor, the pointer of the meter will drop back about half-scale then gradually rise to about 2 megohms if the capacitor leakage is normal. If the capacitor is OK for leakage, check for capacity as explained in the following paragraph.

21. CAPACITY.

a. Set the master switch on MEGS and adjust meter to INF.

b. Turn master switch to VOLTS A.C. 20-CAP.

c. Place the connecting leads in the two jacks marked CAP.

d. For electrolytic condensers set the CAPACITY switch on CAP 150 M.F. Capacity can then be read directly in microfarads on the scale of the meter 0-150 M.F.

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
K54B	J			T				X
55A-K55A	J			T				
55A1	H				U			
KX55A	J	R						
55B-K55B-M55B-BM55B-L55BG-LX55B	J			T				X
55A2-55B2	H		S		U			
K55C-L55C-KX55C	J			T				X
K55CP	J			T		V		X
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

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
	D	R						
L40S1-L40S2	J	R		T		V		
42A	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						
42HA-K42HJ-M42H-M42HG	J		S					X
	E	R		T				
KX42C	J			T				X
L42S1	J	R		T		V		
49A-49AJ-K49AJ	J			T				
KX49A	J			T				X
49A1	H				U			
49A2-49B2	H		S		U			
K49B-L49B-M49B-BM49B-K49C-M49C-BM49C-BK49C-K49E-L49E	J			T				X
K49D-BK49D-L49D	J			T				X
L49F	J							X
	D	R						
M49H-M49HG	J		S					X
	D	R						
KZ49B-KZ49C	J	R				V		
K49BJ-L49BJ	J			T	U			X
L49S2	J	R		T		V		
49AJ-K49AJ	J			T				
KX49B-LX49B-LX49C	J			T				X
L49DJ	J	R		T	U			X
L49S3	J	R		T		V		
50A2	J	R		T				
50A2MG-50B2	J	R				V		
50X3	J	R						
K52H-M52H	J		S					X
	D	R						

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.						
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

the bottom views. 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 "O".

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 a 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 various 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.

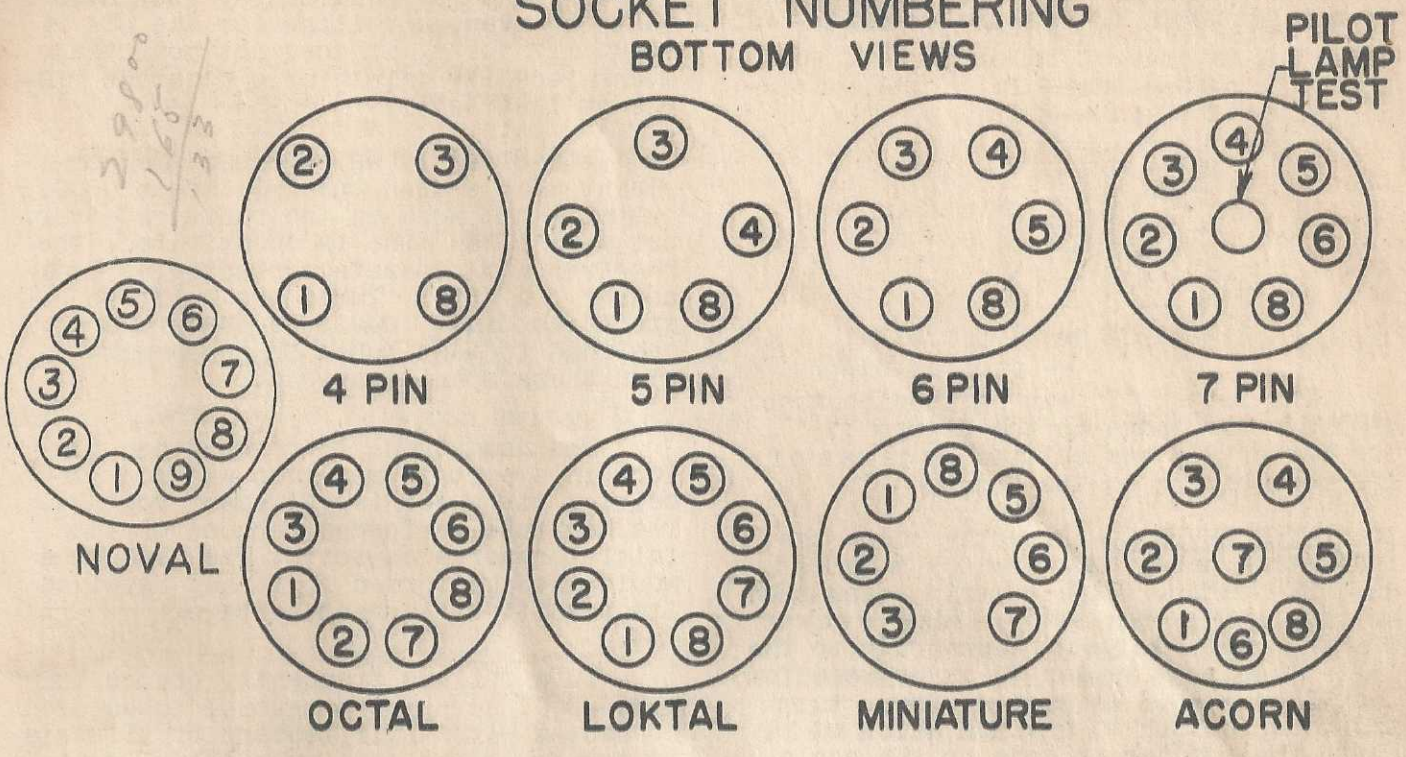
Occasionally we have had the complaint that a used tube will test GOOD, but will not work in the radio receiver; but when a NEW tube is substituted, the receiver will operate correctly. The answer is this: Tubes are built to specifications. Our tube testers are designed to test tubes in conformity with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

15. MATCHING TUBES.--The Model 538A is valuable in matching tubes for push-pull stages and other applications where matched tubes are essential

SOCKET NUMBERING
BOTTOM VIEWS



Tubes on which LOW signal is recommended have the legend LOW SIG printed on the data chart in the column ordinarily listing the ENGLISH dial setting. The ENGLISH scale is NOT USED when LOW signal is used. When using the ENGLISH scale a GOOD tube will then cause the meter to indicate in the GREEN sector. Tubes having a normal mutual conductance less than 500 MICROMHOS cannot be made to read in the GREEN sector. In such case the data chart under notations,will say "OK over" a certain value of micromhos. EXAMPLE: The 1H5 tube is "OK over 220".

LOW SIGNAL voltage has been provided to enable improved test results to be obtained when testing tubes having low bias and sharp cut-off. This prevents grid swing from going into the positive region and also from going to the cut-off point.

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 doides. It applies a low voltage which will not injure the delicate cathode. Good diodes will cause the meter pointer to read above the mark, DIODES OK.

b. Push switch P2 is used when testing cold cathode rectifiers such as the 0Z4. 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 MICHOMHO switch is to be set on ENGLISH.

11. SOCKET NUMBERING.---In order to reduce dialing to a minimum, the sockets in the Model 538A Tube Tester are numbered as shown in Plate 1, which shows

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 duo - diode 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.--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, High Signal.

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.

NOTE

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 mechanically divided into two sections, non-locking and locking. Both sections perform indentical 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 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.

HICKOK MODEL 538A TUBE TESTER AND ANALYZER
As used by the Western Union Telegraph Company

PACKER'S CHECK

MODEL 538A TESTER

SERIAL NUMBER
INSTRUCTION BOOK, MODEL 538A
DATE
SIGNED

PACKER

NOTE

READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO OPERATE THIS ANALYZER.

SECTION I
DESCRIPTION

1. PURPOSE.

a. The Model 538A Tester is used to test and measure mutual conductance values of vacuum tubes used in radio receivers and transmitting tubes delivering less than 25 watts of power. It is used also as a complete radio set analyzer measuring volts, ohms, milliamperes, microfarads, etc.,

b. The Model 538A Tester is fundamentally of the Dynamic Mutual conductance type designed to provide either REPLACE - GOOD readings or mutual conductance values in micromhos. Provision is made for locating shorts and leakages between tube elements. A sensitive noise test is also provided.

c. Mutual conductance values in three ranges can be measured: 0-3000, 0-6000, and 0-15,000 micromhos. Included is an ENGLISH reading range. By means of this range, a good tube will cause the pointer of the indicating meter to rest in the GREEN (GOOD) sector of the meter scale. A bad tube will read in the RED (REPLACE) or doubtful (?) sector. The English range is not used with Low Signal, See Paragraph 9.

d. Gas Test: Provision is made to test amplifying vacuum tubes for gas content. Gassy tubes will ruin the automatic volume control or intermediate stages of a radio receiver.

e. The Model 538A also provides a filament activity test circuit controlled by the toggle switch with a NORMAL and Life Test position. This switch is set on NORMAL at all times except when making the special filament activity test. In the test position the filament voltage is reduced by 10% while all other voltages remain constant. This test enables you to determine the probable life of the tube. If the mutual conductance drops to 75% of its normal reading when "Life Test" is made the tube can be considered as having reached the end of its useful life. After making "Life Test" return the toggle switch to NORMAL position.

2. TUBE COMPLEMENT.--The Model 538A requires one #83 mercury vapor rectifier, one 5Y3GT vacuum rectifier and two 6H6 diode tubes for its operation. These tubes are supplied and installed in the tester. The fuse lamp is a standard #81 auto lamp. The neon lamp is a G.E. 1/4 watt, 105-125 volts, candelabra base.

SECTION II
FUNCTIONS OF THE COMPONENTS USED AS A TUBE TESTER

3. The line adjustment control rheostat in the 538A 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.

MODEL 538A TUBE TESTER AND ANALYZER

Following are the principal features incorporated in the circuit design.

Read the detailed instruction book for further information.

1. Mutual Conductance (Transconductance) is measured in Micromhos. Also available is a GOOD-REPLACE SCALE which translates the micromho reading into simple English words, GOOD which means that the tube is still useful, and REPLACE which means that a new tube should be substituted.

2. Volts D. C. are measured up to 5000 volts at 20,000 ohms per volt. Volts A. C. are measured to 5000 volts at 1000 ohms per volt. Because an electronic rectifier is used when measuring A. C. volts the Model 538A tester should have the power turned on when making A. C. measurements.

POWER ON FOR AC VOLTS

3. Milliamperes D. C. to 200 mils can be measured. When measuring D. C. Mils or volts the power is not turned on.

4. Ohms up to 100 megohms are measured in three overlapping ranges. When measuring ohms the power must be turned on because there are no batteries used in the Model 538A tester. The ohms jack marked O is common to all ranges and is the negative terminal. The jack marked X1 is the other terminal to be used when measuring resistances ranging from 1000 to 500,000 ohms. The jacked marked ÷ 100 is to be used when measuring resistances ranging from 1 ohm to 500 ohms. The jack marked MEGS is used when measuring resistances from .1 megohms to 100 megohms. The meter scale for megohms is lettered .5-1.-1.5-2.-2.5 etc., up to 100. When testing electrolytic condensers for leakage the "O" jack. is always negative See Par. 20.

5. Capacity. When measuring Capacity the power must be turned on. See Par. 21. Capacity is measured in two scales, O-10 M.F. and O-150 M.F. The scale O-150 is in heavy type and the Capacity Switch is set on CAP-150. The O-10 scale is in light type and the Capacity Switch is set on CAP-10.

6. 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 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.

OPERATING INSTRUCTIONS

FOR

MODEL 538A

DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER AND ANALYZER

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 Dupont Ave.
Cleveland 8, Ohio

HICKOK

OPERATING INSTRUCTIONS

for

DYNAMIC
MUTUAL CONDUCTANCE
PROFESSIONAL TUBE TESTER
and ANALYZER

Model 538A

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Dynamic Mutual
Conductance Tester

Reads Directly In
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