

***HICKOK***

**OPERATING INSTRUCTIONS**

**VACUUM TUBE TESTER**

**MODEL KS-15560-L2**

**The Hickok Electrical Instrument Company - 10514 Dupont Avenue, Cleveland 8, Ohio**

OPERATING INSTRUCTIONS

FOR

MODEL KS-15560-L2

TRANSCONDUCTANCE TUBE TESTER

THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10514 Dupont Avenue  
Cleveland 8, Ohio

## THE INSTRUMENT PACKED HEREWITH IS:

	PACKER'S CHECK
1 MODEL KS-15560-L2 VACUUM TUBE TESTER _____	
ACCESSORIES INCLUDED WITH THE TESTER ARE: _____	
1 - BOOKLET INSTRUCTIONS _____	
2 - GRID LEADS WITH CLIP _____	

SERIAL NO. \_\_\_\_\_

SIGNED: \_\_\_\_\_

## INSTRUCTIONS FOR OPERATION OF MODEL KS-15560-L2

Read these instructions through before attempting to operate the tester.

1. There are two rectifier tubes, an 83 and a 5Y3 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 KS-15560-L2 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. Reset the A.C. voltmeter to the red mark at 100 volts after depressing P4.

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 duo-diode triode tubes the amount of dialing has been reduced to a minimum.

The KS-15560-L2 set also provides a cathode activity test circuit controlled by the toggle switch designated "CATH. ACT" with a "NORM." position and a "TEST" position. In the "TEST" position the filament voltage of a tube is reduced by 10 percent of its Normal Value.

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 - Gas current in a tube or grid leakage current due to poor grid to filament insulation may be detected by the switch insertion of the Micromhos Meter into the grid circuit of a tube under test. In this setup the normal plate and screen grid voltages are applied by means of the P4 pushbutton switch. This test is made with the standard normal grid bias applied with the usual setting of the BIAS ADJUST dial as for a regular transconductance measurement. In addition, the gas test

P5 Push Switch is operated which transfers the DC Micromhos Meter from its normal plate circuit position directly into the control grid circuit to measure grid current, if any, directly in DC microamperes. The "SIG. OFF" P6 switch also is simultaneously operated with the P5 switch to remove the grid signal for the test, for the presence of a grid signal could, in certain cases, produce false readings. In this test, the Micromhos Meter, used as a DC Microammeter, is in series in the grid circuit. Under the test conditions just described the Micromhos Meter will read 3-1/3 microamperes per small scale division.

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 seven ranges: 3000, 6000, 15000 Micromhos with HIGH Signal; 60,000, 30,000, 15,000, 6,000 Micromhos with LOW Signal. A "SHUNT" range is also provided to be used when checking Diodes and Rectifier tubes.

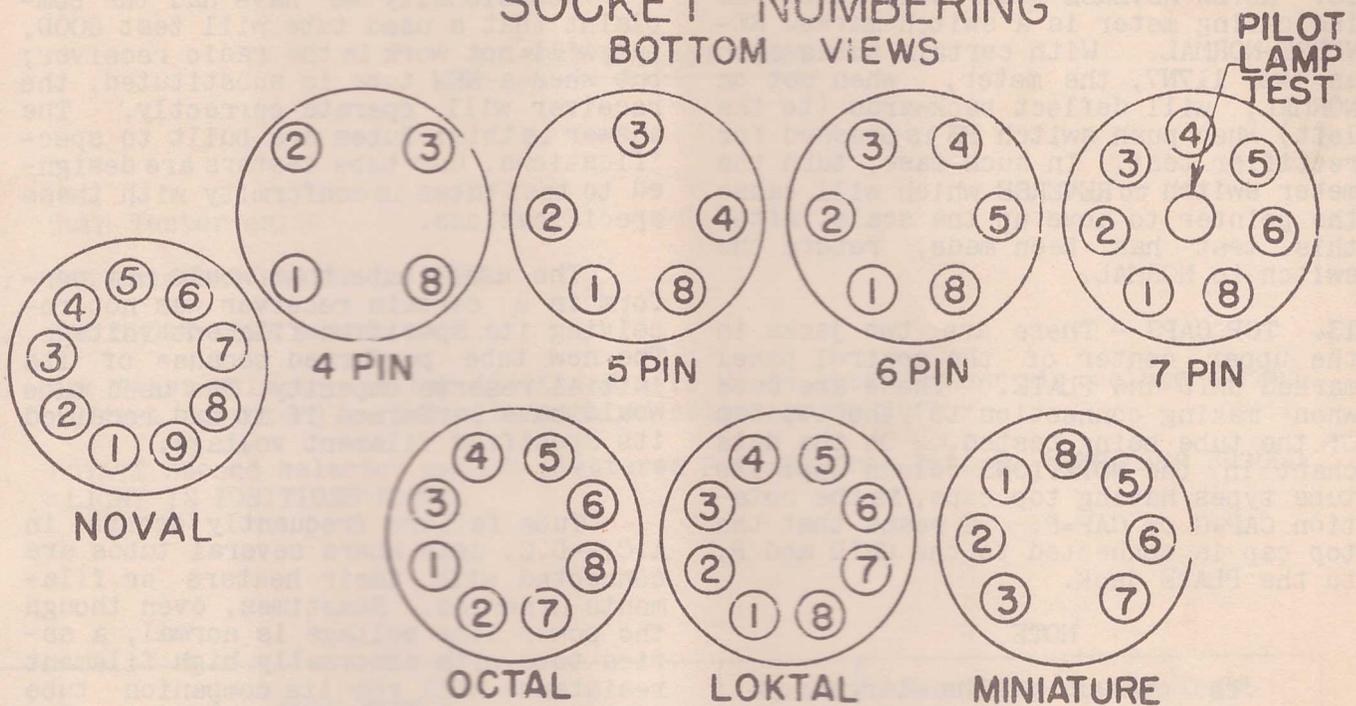
The Micromho switch automatically changes the signal from HIGH to LOW, when the appropriate setting is made.

On the roll chart following "SELECTORS" is a column designated "BIAS VOLTS". This is the negative grid bias to be applied to the tube being tested. The voltage is read on the small grid bias voltmeter in the upper left of the control panel. Bias voltage is read in two ranges, 0-5 and 0-50 D.C. volts. Make final adjustment after pressing P4 switch.

Directly above the grid bias voltmeter are two binding posts which are normally shorted by an attached bar. These posts are marked SELF BIAS + (pos.) and - (neg.). They provide means for

# SOCKET NUMBERING

## BOTTOM VIEWS



inserting a self biasing resistor into the cathode circuit of the tube being tested. These posts are bridged, within the tester, by a 2000 mfd capacitor. When using self bias set the normal bias to zero volts.

**NOTE**

A suitable low resistance D.C. milliammeter connected between these posts will measure the total cathode current.

The Micromho values printed on the data roll are minimum values. A satisfactory tube should read above the value given on the chart.

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 the mark, DIODES OK. P1 also reduces the screen voltage to 1/2 normal value. Instructions for its use appear in Notations column of the data chart.

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 scale mark "RECTIFIERS OK."

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 scale mark "RECTIFIERS OK."

11. SOCKET NUMBERING - In order to reduce dialing to a minimum, the sockets in the Model KS-15560-L2 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.

15. MATCHING TUBES -The Model KS-15560-L2 is valuable in matching tubes for pushpull stages and other applications where matched tubes are essential.

16. Just below the left column of roll chart data is provision for recording "LAST TUBE". This means the last tube in the left column, thus saving time in selecting data.

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
	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			X
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
	J						X
L49F	D	R					
	J		S				X
M49H-M49HG	D	R					
	J	R				V	
KZ49B-KZ49C	J					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			
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-M55HQ	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		T			
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			T			X
8593-8598-8601-8664	J	R		T			X
3ER248	J			T			X
3CR241	J	R		T	U		X
	J	R		T			X

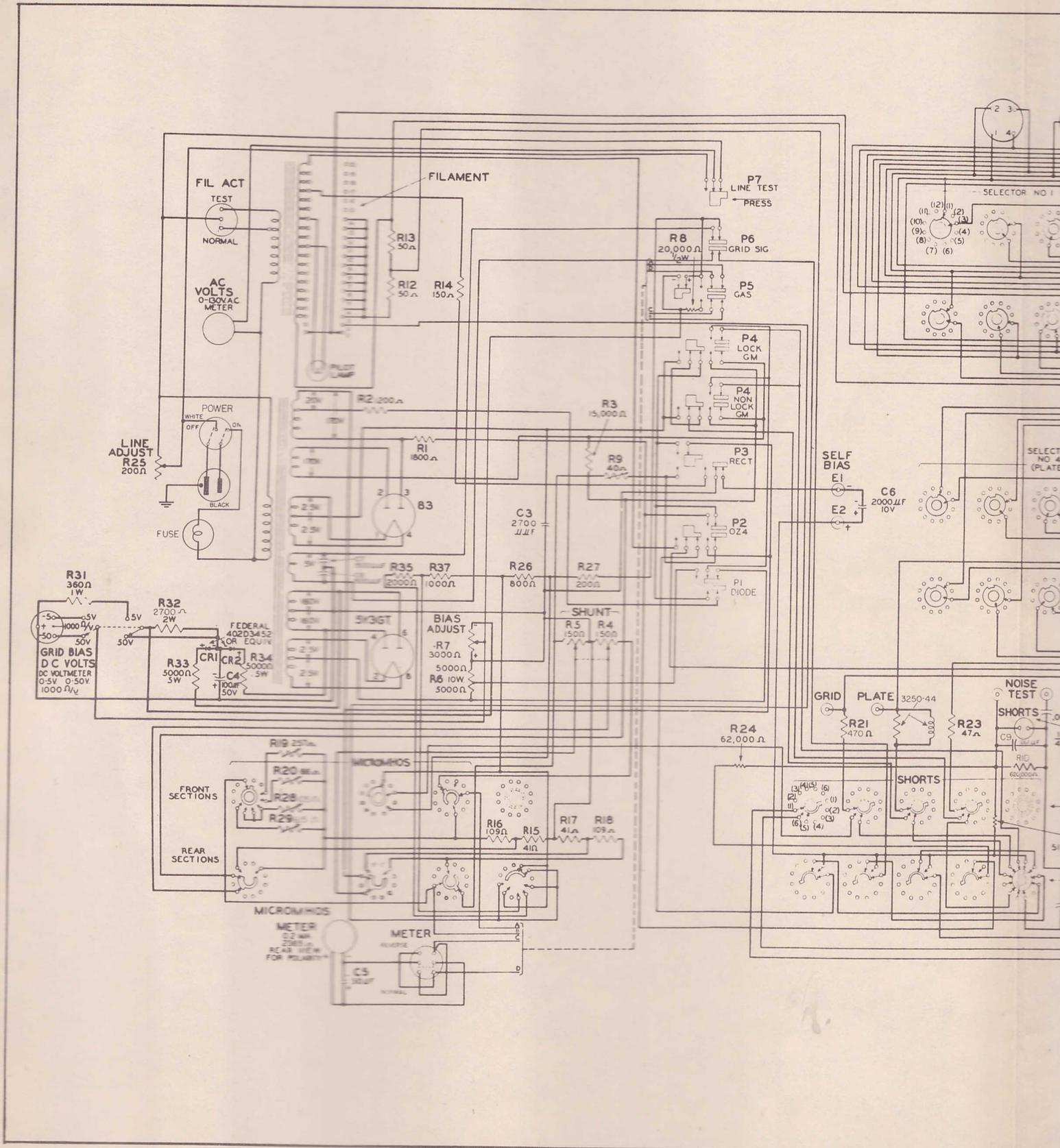
TUBE TYPE	First Selector	Neon lamp should light in these positions.							
B9M15822	B			T					
	E					V			
	G							X	Y
B9M16067	J	R		T		V	W	X	
B9M16275	B			T	U	V	W	X	Y
B9M16534	J	R		T		V	W	X	
B9M17571	H	R		T					
	J				U	V		X	
B9M18941	B		S	T					
	E					V			
	G							X	Y
17A470303	J	R	S			V			
	D	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

## PARTS LIST FOR MODEL KS-15560-L2 TUBE TESTER

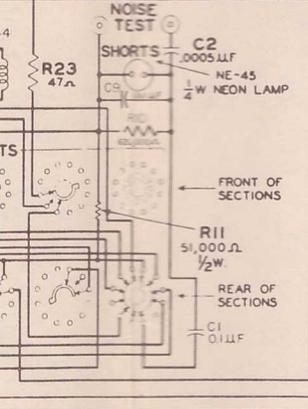
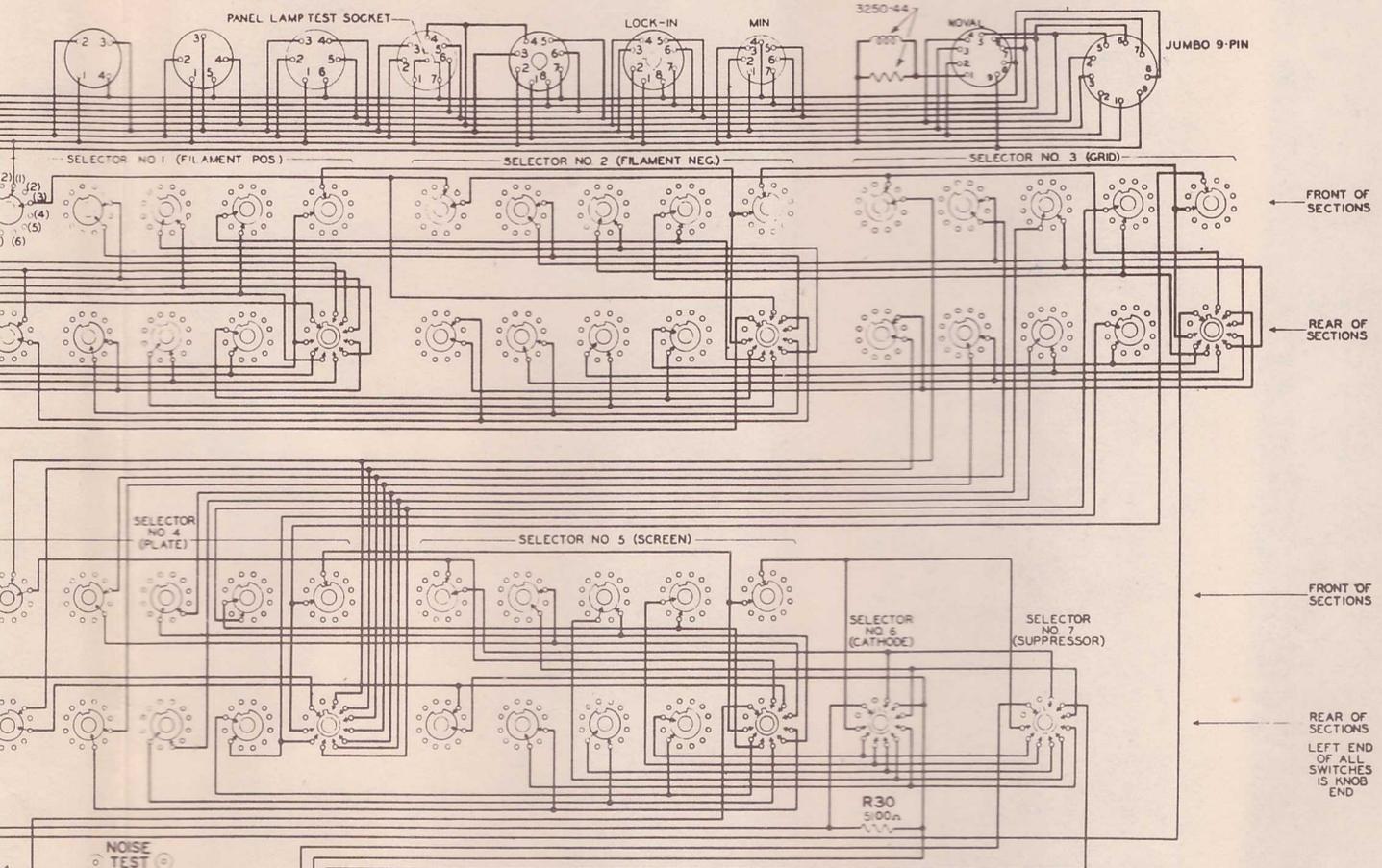
ITEM NO.	OUR PART NO.	DESCRIPTION	QUAN.	SOURCE	MAKERS PART NO.
1	2490-239	Booklet-instruction	1		
2	2920-7	Button-push, black	6	Recto Molded	
3	2920-8	Button-push, red	2	Recto Molded	
4	3145-149	Cabinet, portable wood, leatherette covered	1		
5	3105-24	Capacitor, 0.1 mfd, "C1"	1	Cornell-Dubilier	ZB-4027D
6	3095-8	Capacitor, .00047 mfd, "C2"	1	Cornell-Dubilier	
7	3095-41	Capacitor, .0027 mfd, "C3"	1		
8	3085-44	Capacitor, 100 mfd, "C4"	1	Sprague	DEE
9	3085-45	Capacitor, 50 mfd, "C5"	1	Sprague	DEE
10	3085-43	Capacitor, 200 mfd, "C6"	1	Sprague	
11	3095-50	Capacitor, 1500 mfd, "C7" and "C8"	2	Elec. Reactance	HQ
12	3110-12	Capacitor, .001 mfd, "C9"	1	Centralab	
13	3200-52	Chart-roll, tube test data	1	Gilkey Printing Co.	
14	3250-44	Choke, Retard	2	Hickok Elec. Inst. Co.	
15	3675-22	Cord-line, A.C.	1		
16	10300-1	Jack-pin, red	1	Hugh Eby	52
17	10300-2	Jack-pin, black	3	Hugh Eby	52
18	11500-11	Knob-Ass'y. with pointer	3	Hickok Elec. Inst. Co.	11500-11
19	12270-1	Lamp-neon 1/4 watt	1	General Elec.	NE-45
20	12270-2	Lamp-auto	1	Tung-Sol	81
21	12270-12	Lamp--6-8 volts, .15 amp	1	General Elec.	47
22	12450-145	Lead-assembly "Std. Grid"	2	Hickok Elec. Inst.	12450-145
23	440-434	Meter-Transconductance	1	Hickok Elec. Inst.	440-434
24	560-222	Meter-voltmeter, grid	1	Hickok Elec. Inst.	560-222
25	570-061	Meter-S57M voltmeter	1	Hickok Elec. Inst.	570-061
26	18575-12	Resistor, "R1", 1800 ohms	1	Ohmite Mfg. Co.	1377-2A
27	18422-122	Resistor, "R2", 1200 ohms	1	Allen-Bradley	
28	18423-151	Resistor, "R3", 15,000 ohms	1	Allen-Bradley	
29	16925-90	Potentiometer, "R4,R5", 150 ohms	1	P. R. Mallory	MM150P
30	18575-101	Resistor, "R6", 10,000 ohms	1	International Resistance Co.	ABA
31	16925-63	Potentiometer, "R7", 3,000 ohms	1	P. R. Mallory	M3MPX
32	18413-201	Resistor, "R8", 20,000 ohms	1	Allen-Bradley	
33	18670-412	Resistor-spool, "R9", 48 ohms	1	Hickok Elec. Inst.	18670-412
34	18414-621	Resistor, "R10", 620,000 ohms	1	Allen-Bradley	
35	18413-511	Resistor, "R11", 51,000 ohms	1	Allen-Bradley	
36	18575-19	Resistor, "R12,R13", 100 ohms	1		
37	18670-418	Resistor-spool, "R14", 150 ohms	1	Hickok Elec. Inst. Co.	18670-418
38	18679-90	Resistor-spool, "R15,R16,R17,R18", 41-109 ohms	2	Hickok Elec. Inst. Co.	18679-90
39	18670-421	Resistor-spool, "R19", 257 ohms	1	Hickok Elec. Inst. Co.	18670-421
40	18670-414	Resistor-spool, "R20", 66 ohms	1	Hickok Elec. Inst. Co.	18670-414
41	18411-471	Resistor-spool, "R21", 470 ohms	1	Allen-Bradley	
42	18410-472	Resistor, "R23", 47 ohms	1	Allen-Bradley	
43	18413-621	Resistor, "R24", 62,000 ohms	1	Allen-Bradley	
44	18750-24	Rheostat, "R25", 150 ohms	1	Hardwick Hindle	
45	18679-78	Resistor-spool, "R26,R27", 800-200 ohms	1	Hickok Elec. Inst. Co.	18679-78
46	18679-95	Resistor-spool, "R28,R29", 105-615 ohms	1	Hickok Elec. Inst. Co.	18679-95
47	18412-511	Resistor, "R30", 5100 ohms	1	Allen-Bradley	

## PARTS LIST FOR MODEL KS-15560-L2 TUBE TESTER

ITEM NO.	OUR PART NO.	DESCRIPTION	QUAN.	SOURCE	MAKERS PART NO.
48	18421-361	Resistor, "R31", 360 ohms	1	Allen-Bradley	
49	18432-241	Resistor, "R32", 2400 ohms	1	Allen-Bradley	
50	18575-100	Resistor, "R33, R34", 5000 ohms	2	Sprague	5KT
51	18670-132	Resistor-spool, "R35", 2000 ohms	1	Hickok Elec. Inst. Co.	18670-132
52	18670-127	Resistor-spool, "R37", 1000 ohms	1	Hickok Elec. Inst. Co.	18670-127
53	18150-17	Rectifier, "CR1-CR2"	2	Federal	402D3452
54	19350-1	Socket-bayonet	1	Drake Mfg. Co.	614L-CH-LT
55	19350-2	Socket-Candelabra	1	Drake Mfg. Co.	414-14L
56	19350-58	Socket - 9-pin noval	1	Cinch Mfg. Co.	53F12884
57	19350-76	Socket - 7-pin miniature	1	American Phenolic	147-170-24
58	19350-77	Socket - 8-pin	1	American Phenolic	77-M1P-8
59	19350-78	Socket - 4-pin black	1	American Phenolic	77-M1P-4
60	19350-93	Socket - 4-pin	1	American Phenolic	S-4
61	19350-94	Socket - 5-pin	1	American Phenolic	S-5
62	19350-95	Socket - 6-pin	1	American Phenolic	S-6
63	19350-96	Socket - 7-pin	1	American Phenolic	78-7CD
64	19350-97	Socket - loktal	1	American Phenolic	78-8L
65	19350-112	Socket-assembly (Panel light)	1	Drake Mfg. Co.	40
66	19350-129	Socket - 8-pin	1	Cinch Mfg. Co.	
67	19350-135	Socket - Jumbo noval	1	Western Elec. Co.	KS-13976
68	19910-61	Switch-gang, P.B., 8 buttons	1	Oak Mfg. Co.	44983-130
69	19911-7	Switch-slide, D.P.D.T.	1	Oak Mfg. Co.	16743-78
70	19911-17	Switch-toggle, D.P.S.T.	1	Arrow Hart & Hagemann	20994-DA
71	19911-16	Switch-toggle, D.P.D.T.	1	Arrow Hart & Hagemann	
72	19911-19	Switch-S.P.D.T. (Cath. Act.)	1	Arrow Hart & Hagemann	21350
73	19912-175	Switch-short test	1	Oak Mfg. Co.	12782-H5
74	19912-176	Switch-cathode	2	P.R. Mallory	
75	19912-177	Switch-selector	5	Oak Mfg. Co.	31595-H5
76	19912-178	Switch-filament	1	Oak Mfg. Co.	34735-L2
77	19912-201	Switch-micromho	1	Oak Mfg. Co.	
78	20800-69	Transformer-plate	1	Transformer Eng. Co.	
79	20800-103	Transformer-filament	1	Transformer Eng. Co.	
80	20875-6	Tube-vacuum	1	RCA Mfg.	5Y3GT/G
81	20875-28	Tube-vacuum	1	RCA Mfg.	83



Schematic Drawing of Model KS-15560

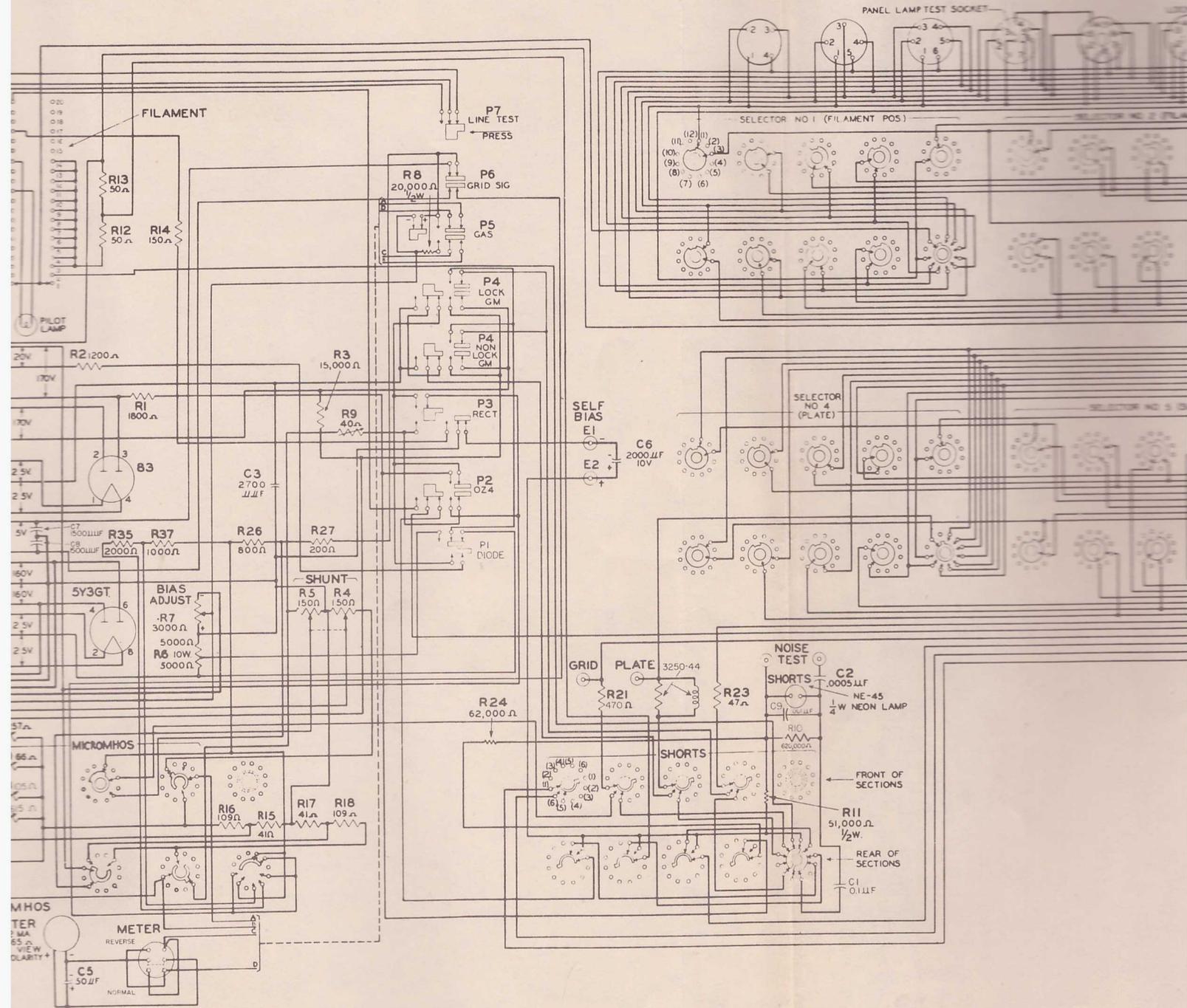


SWITCH POS	SELECTOR NO 1	SELECTOR NO 2	SELECTOR NOS 3-7	SHORTS	FILAMENT	MICROMHOS
1	A FIL OFF	P	0	1	OFF	SHUNT HIGH SIG.
2	B	R	1	2	BLST.	3000 HIGH SIG.
3	C	S	2	3	.6	6000 HIGH SIG.
4	D	T	3	4	1.1	15000 HIGH SIG.
5	E	U	4	5	1.5	60000 LOW SIG.
6	F	V	5	TUBE TEST	2.0	30000 LOW SIG.
7	G	W	6		2.5	15000 LOW SIG.
8	H	X	7		3.0	6000 LOW SIG.
9	J	Y	8		4.3	
10	K	Z	9		5	
11					6.3	
12					7.5	
13					10	
14					12.6	
15					20	
16					25	
17					35	
18					50	
19					75	
20					117	

NOTES:  
 1. ALL ROTARY SWITCHES SHOWN IN EXTREME COUNTER CLOCKWISE POSITION (POSITION 1). FRONT AND REAR OF SECTIONS ARE SHOWN AS VIEWED FROM THE KNOB END.  
 2. IN CASES WHERE FALSE LAMP GLOW INDICATIONS PERSIST WITH NO TUBE IN ANY TEST SOCKET, RESISTOR R11 (51,000 OHMS) MAY BE REPLACED BY A SIMILAR RESISTOR OF LOWER VALUE (APPROX. 47,000 OHMS) TO REDUCE THE AC DIVIDER POTENTIAL IMPRESSED ON THE SHORTS TEST CIRCUIT PATH.

MODEL KS-15560-L2 TUBE TESTER			
SCHEMATIC WIRING DIAGRAM		BELL LABS	
DRAWN / CHECKED	APPROVED	DATE	10-26-53
E.J.T.	JRB	826W	

KS-15560-L1 Vacuum Tube Tester



Schematic Drawing of Model KS-15560-L1 Vacuum Tube Tester

TUBE TYPE	FIL.	SELECTORS	BIAS VOLTS	MIC-SW SHUNT	PRESS	MIN. TRANSC.	NOTATIONS
0Y4	BLST	JX-3502-0	0.0	Sh-68	P2	★	Short on 1-2
1A7	1.5	JR-0346-5	1.5	Lo-6	P1, 4#	775	Pent. Sect. Cap= G
1A7	1.5	JR-5643-0	9.0	Hi-3	P1, 4#	300	Osc. Sect.
1AE4	1.1	DX-6210-0	2.5	Hi-3	P4	1000	
1AF4	1.5	DX-6210-0	1.5	Lo-6	P4	780	
1AF5	1.5	DX-6580-0	1.5	Lo-6	P1, 4#	550	Pent. Sect.
1AF5	1.5	DX-0100-0	0.0	Sh-0	P1	★	Diode OK Over 250 on 3000 Scale
1B4P	2.0	JR-0230-0	4.5	Lo-6	P1, 4#	390	Cap= G
1C3	1.5	DX-8200-0	10.0	Hi-3	P4	500	
1C5	1.5	JR-5340-0	16.0	Hi-3	P4	925	
1D5	2.0	JR-0340-0	2.0	Hi-3	P1, 4#	500	Cap= G
1E3	1.1	EV-1800-0	3.6	Lo-6	P4	2100	
1H5	1.5	JR-0300-0	2.0	Hi-3	P4	175	Triode Sect. Cap= G
1H5	1.5	JR-0500-0	0.0	Sh-0	P1	★	Diode Sect.
1H6	2.0	JR-6300-0	6.0	Lo-6	P4	375	Triode Sect.
1H6	2.0	JR-0500-0	0.0	Sh-0	P1	★	Diode No. 1
1H6	2.0	JR-0400-0	0.0	Sh-0	P1	★	Diode No. 2
1L4	1.5	HT-6210-0	7.0	Hi-3	P4	625	
1L6	1.5	DX-6251-8	2.0	Lo-6	P1, 4#	650	Pent. Sect.
1L6	1.5	DX-8152-6	2.0	Lo-6	P1, 4#	390	Osc. Sect.
1LA4	1.5	JR-6230-0	10.0	Hi-3	P4	450	
1LA6	1.5	JR-6253-4	2.0	Lo-6	P1, 4#	700	Pent. Sect.
1LA6	1.5	JR-4352-6	1.0	Lo-6	P1, 4#	325	Osc. Sect.
1LB4	1.5	JR-6230-0	19.0	Hi-3	P4	600	
1LC5	1.5	JR-6234-0	1.5	Lo-6	P1, 4#	650	
1LC6	1.5	JR-6253-4	2.0	Lo-6	P1, 4#	700	Pent. Sect.
1LC6	1.5	JR-4352-6	1.0	Lo-6	P1, 4#	325	Osc. Sect.
1LD5	1.5	JR-6230-0	1.0	Lo-6	P1, 4#	650	Pent. Sect.
1LD5	1.5	JR-0400-0	0.0	Sh-0	P1	★	Diode Sect.
1LE3	1.5	JR-6205-0	0.0	Lo-6	P4	750	
1LF3	1.5	JR-6205-0	2.4	Hi-3	P4	720	
1LG5	1.5	JR-6234-0	1.5	Lo-6	P1, 4#	520	
1LH4	1.5	JR-6200-0	2.0	Hi-3	P4	175	Triode Sect.
1LH4	1.5	JR-0400-0	0.0	Sh-0	P1	★	Diode Sect.
1LN5	1.5	JR-6234-0	2.0	Hi-3	P4	500	
1N5	1.5	JR-0340-0	3.0	Lo-6	P4	460	Cap= G
1Q5	1.5	JR-5340-0	10.0	Hi-3	P4	1250	
1V	6.3	JR-0203-0	0.0	Sh-74	P3	★	
2B7	2.5	JR-0236-0	9.0	Hi-3	P4	650	Pent. Sect. Cap= G
2B7	2.5	JR-0506-0	0.0	Sh-0	P1	★	Diode No. 1
2B7	2.5	JR-0406-0	0.0	Sh-0	P1	★	Diode No. 2
2C21	6.3	JR-4506-0	9.5	Hi-3	P4	900	Triode No. 1
2C21	6.3	JR-0302-0	9.5	Hi-3	P4	900	Triode No. 2 Cap= G
2C22	6.3	JR-0007-0	5.0	Lo-6	P4	1900	Connect Grid Cap Cord to upper flange. Connect Plate Cap Cord to lower flange.
2C52	12.6	JX-4506-1	1.0	Lo-6	P4	975	Triode No. 1
2C52	12.6	JX-2103-5	1.0	Lo-6	P4	975	Triode No. 2
2C53	6.3	JR-5007-0	0.0	Hi-3	P4	250	Cap= P
2E22	6.3	JR-3024-0	0.0	Hi-6	P4	2400	Cap= P
2E24	6.3	JR-5030-0	8.0	Hi-6	P4	2080	Short on 3. Cap= P
2E25	6.3	JR-5047-0	0.0	Hi-6	P4	1800	Cap= P
2E26	6.3	JR-5032-7	9.0	Hi-6	P4	2275	Cap= P
2E30	6.3	JR-3560-2	1.5	Hi-6	P4	1800	
3A4	2.5	DX-8210-0	16.5	Hi-3	P4	1200	

TUBE TYPE	FIL.	SELECTORS	BIAS VOLTS	MIC-SW SHUNT	PRESS	MIN. TRANSC.	NOTATIONS
3A5	3.0	DX-5600-0	12.0	Lo-6	P4	1300	Triode No. 1
3A5	3.0	HT-1200-0	12.0	Lo-6	P4	1300	Triode No. 2
3D6	2.5	JR-6230-0	12.0	Hi-3	P4	1250	
3E5	2.5	DX-6215-0	8.0	Hi-3	P1, 4#	725	Short on 3
3E6	3.0	JR-6234-0	5.0	Lo-6	P4	1150	
3LE4	2.5	JR-6230-0	28.0	Hi-3	P4	650	
3LF4	2.5	JR-6230-0	14.0	Hi-3	P4	1150	
3Q4	3.0	HT-1280-0	13.5	Lo-6	P4	1200	
3Q5	2.5	JR-5340-0	12.0	Hi-3	P4	1025	
4A6	3.0	JR-5600-0	5.0	Lo-6	P4	600	Triode No. 1
4A6	3.0	JR-4300-0	5.0	Lo-6	P4	600	Triode No. 2
5A6	5.0	EV-7160-3	10.0	Hi-6	P4	1800	
6A3	6.3	JR-3200-0	17.5	Hi-6	P4	1800	
6A5	6.3	JR-5300-0	16.5	Hi-6	P4	1800	
6A6	6.3	JR-5604-0	2.5	Lo-6	P4	975	Triode No. 1
6A6	6.3	JR-3204-0	2.5	Lo-6	P4	975	Triode No. 2
6A7	6.3	JR-0236-5	6.0	Hi-3	P4	650	Pent. Sect. = Cap G
6A7	6.3	JR-5436-2	7.5	Hi-3	P4	300	Osc. Sect.
6A8	6.3	JR-0347-5	6.0	Hi-3	P4	800	Pent. Sect. Cap= G
6A8	6.3	JR-5647-3	7.5	Hi-3	P4	450	Osc. Sect.
6AB7/1853	6.3	JR-4765-3	1.0	Lo-6	P4	3250	
6AD7	6.3	JR-5347-6	0.0	Hi-3	P4	1200	Pent. Sect.
6AD7	6.3	JR-2607-3	0.0	Hi-3	P4	400	Triode Sect.
6B4	6.3	JR-5300-0	17.5	Hi-6	P4	1800	
6B7	6.3	JR-0236-0	4.5	Lo-6	P4	750	Pent. Sect. Cap= G
6B7	6.3	JR-0506-0	0.0	Sh-20	P1	★	Diode No. 1
6B7	6.3	JR-0406-0	0.0	Sh-20	P1	★	Diode No. 2
6C5	6.3	JR-5307-0	4.0	Lo-6	P4	1300	
6C6	6.3	JR-0235-4	5.0	Lo-6	P4	800	Cap= G
6D4	6.3	JR-3705-0	†	Sh-79	P3	★	†Strikes at about 49V.
6D6	6.3	JR-0235-4	7.0	Lo-6	P4	1000	Cap= G
6E5	6.3	JR-5403-0	0.0	---	P4	---	Eye Open
6E5	6.3	JR-5423-0	0.0	---	P4	---	Eye Closed
6F5	6.3	JR-0407-2	0.9	Lo-6	P4	975	Cap= G
6F6	6.3	JR-5347-2	2.0	Lo-6	P4	1550	
6F7	6.3	JR-0236-5	5.5	Lo-6	P4	700	Pent. Sect. Cap= G
6F7	6.3	JR-5406-2	8.0	Lo-6	P4	325	Triode Sect.
6F8	6.3	JR-5607-0	5.0	Lo-6	P4	1700	Triode No. 1
6F8	6.3	JR-0304-0	5.0	Lo-6	P4	1700	Triode No. 2 Cap= G
6G6	6.3	JR-5347-0	8.0	Lo-6	P4	1300	
6H5	6.3	JR-5403-0	0.0	---	P4	---	Eye Open
6H5	6.3	JR-5423-0	0.0	---	P4	---	Eye Closed
6J7	6.3	JR-0347-5	6.0	Lo-6	P4	780	Cap= G
6J8	6.3	JR-0347-5	4.4	Hi-3	P4	650	Heptode Cap= G
6J8	6.3	JR-5647-3	3.0	Lo-6	P4	1050	Triode Sect.
6K7	6.3	JR-0347-5	4.0	Lo-6	P4	1100	Cap= G
6K8	6.3	JR-0347-5	3.6	Hi-3	P4	325	Hexode Cap= G
6K8	6.3	JR-5647-3	0.5	Lo-6	P1, 4#	1800	Triode Sect.
6L4	6.3	JR-2306-0	6.0	Lo-6	P4	3250	Alden No. 978ATA Acorn Tube Adapter for KS-15560-L1 & L2 Only
6L5	6.3	JR-5307-0	5.0	Lo-6	P4	1200	
6L7	6.3	JR-0347-5	11.0	Hi-3	P4	500	Cap Grid. Cap= G
6L7	6.3	JR-5347-2	11.0	Hi-3	P4	475	Pin Grid
6N4	6.3	JR-3502-0	4.0	Lo-6	P4	3250	

TUBE TYPE	FIL.	SELECTORS	BIAS VOLTS	MIC-SW SHUNT	PRESS	MIN. TRANSC.	NOTATIONS
6N5	6.3	JR-5403-0	0.0	-----	P4	---	Eye Open
6N5	6.3	JR-5423-0	0.0	-----	P4	---	Eye Closed
6N7	6.3	JR-5607-3	2.5	Lo-6	P4	1100	Triode No. 1
6N7	6.3	JR-4307-6	2.5	Lo-6	P4	1100	Triode No. 2
6N8	6.3	EV-2613-9	3.0	Hi-3	P4	1425	Pent. Sect.
6N8	6.3	EV-2713-9	0.0	Sh-0	P1	★	Diode No. 1
6N8	6.3	EV-2813-9	0.0	Sh-0	P1	★	Diode No. 2
6P5	6.3	JR-5307-0	7.5	Lo-6	P4	950	
6Q4	6.3	EV-1903-0	0.0	Lo-15	P4	6000	Short on 1-2-3-5
6Q5	6.3	JR-5307-0	†	Sh-62	P3	★	†Strikes at about 46V.
6Q7	6.3	JR-0307-2	1.9	Lo-6	P4	780	Triode Sect. Cap= G
6Q7	6.3	JR-0507-2	0.0	Sh-0	P1	★	Diode No. 1
6Q7	6.3	JR-0407-2	0.0	Sh-0	P1	★	Diode No. 2
7A4	6.3	JR-6207-0	4.0	Lo-6	P4	1700	
7A5	6.3	JR-6237-0	7.5	Hi-15	P4	3600	
7A6	6.3	JR-0607-5	0.0	Sh-60	P1	★	Diode No. 1
7A6	6.3	JR-0302-5	0.0	Sh-60	P1	★	Diode No. 2
7A8	6.3	JR-6257-4	10.0	Hi-3	P4	650	Ampl. Sect.
7A8	6.3	JR-4357-6	10.0	Hi-3	P4	325	Osc. Sect.
7B4	6.3	JR-6207-0	0.9	Lo-6	P4	1000	
7B7	6.3	JR-6237-4	7.0	Lo-6	P4	1100	
7C6	6.3	JR-3207-0	0.5	Lo-6	P4	520	Triode Sect.
7C6	6.3	JR-0607-2	0.0	Sh-0	P1	★	Diode No. 1
7C6	6.3	JR-0507-2	0.0	Sh-0	P1	★	Diode No. 2
7E5	6.3	JS-1304-0	2.7	Hi-6	P4	1950	
12A7	12.6	JR-0236-5	19.0	Hi-3	P4	590	Pent. Sect. Cap= G
12A7	12.6	JR-0504-2	0.0	Sh-72	P3	★	Rect. Sect.
12A8	12.6	JR-0347-5	6.0	Hi-3	P4	800	Pent. Sect. Cap= G
12A8	12.6	JR-5647-3	7.5	Hi-3	P4	450	Osc. Sect.
12H6	12.6	JR-0507-0	0.0	Sh-61	P1	★	Diode No. 1
12H6	12.6	JR-0304-0	0.0	Sh-61	P1	★	Diode No. 2
12J5	12.6	JR-5307-2	4.0	Lo-6	P4	1700	
12J7	12.6	JR-0347-5	6.0	Lo-6	P4	780	Cap= G
12Z5	12.6	JS-0504-0	0.0	Sh-63	P3	★	Plate No. 1
12Z5	12.6	JS-0304-0	0.0	Sh-63	P3	★	Plate No. 2
24A	2.5	JR-0234-0	7.5	Hi-3	P4	650	Cap= G
30	2.0	JR-3200-0	13.0	Hi-3	P4	575	
32	2.0	JR-0230-0	4.5	Lo-6	P1, 4#	420	Cap= G
33	2.0	JR-3240-0	18.0	Hi-3	P4	875	
34	2.0	JR-0230-0	3.0	Lo-6	P1, 4#	400	Cap= G
41	6.3	JR-4235-0	9.0	Hi-3	P4	1500	
42	6.3	JR-4235-0	5.0	Lo-6	P4	1550	
43	25.0	JR-4235-0	20.0	Hi-3	P4	1380	
45	2.5	JR-3200-0	24.0	Hi-3	P4	1100	
46	2.5	JR-3240-0	12.0	Hi-3	P4	1200	
47	2.5	JR-3240-0	3.0	Hi-3	P4	1150	
48	25.0	JR-4235-0	43.0	Hi-3	P4	1200	
52	6.3	JR-3240-0	6.0	Hi-3	P4	1450	
53	2.5	JR-5604-2	2.5	Hi-3	P4	975	Triode No. 1
53	2.5	JR-3204-6	2.5	Hi-3	P4	975	Triode No. 2
55	2.5	JR-0205-0	14.0	Lo-6	P4	550	Triode Sect. Cap= G
55	2.5	JR-0405-0	0.0	Sh-0	P1	★	Diode No. 1
55	2.5	JR-0305-0	0.0	Sh-0	P1	★	Diode No. 2
56	2.5	JR-3204-0	7.5	Lo-6	P4	1050	
57	2.5	JR-0235-4	5.5	Lo-6	P4	800	Cap= G
58	2.5	JR-0235-4	6.0	Lo-6	P4	1050	Cap= G
59	2.5	JR-4236-5	6.5	Hi-3	P4	1200	

TUBE TYPE	FIL.	SELECTORS	BIAS VOLTS	MIC-SW SHUNT	PRESS	MIN. TRANSC.	NOTATIONS
89/89Y	6.3	JR-0235-4	13.5	Hi-3	P4	925	Cap= G
112A	5.0	JR-3200-0	16.5	Hi-3	P4	1000	
X-155	6.3	EV-7608-9	1.7	Lo-15	P4	5000	Triode No. 1
X-155	6.3	EV-2103-9	1.7	Lo-15	P4	5000	Triode No. 2
629	2.5	JR-3204-0	†	Sh-75	P3	★	†Strikes at about 44V.
1201	6.3	JS-1304-0	2.7	Lo-6	P4	1950	
1203	6.3	JR-0407-0	0.0	Sh-46	P1	★	
1204	6.3	HS-5314-0	2.7	Lo-6	P4	1175	
1853/6AB7	6.3	JR-4765-3	1.0	Lo-6	P4	3250	

***HICKOK***

**OPERATING INSTRUCTIONS**

**VACUUM TUBE TESTER**

**MODEL KS-15560-L2**

**The Hickok Electrical Instrument Company - 10514 Dupont Avenue, Cleveland 8, Ohio**

**OPERATING INSTRUCTIONS**

**FOR**

**MODEL KS-15560-L2**

**TRANSCONDUCTANCE TUBE TESTER**

**THE HICKOK ELECTRICAL INSTRUMENT COMPANY**

**10514 Dupont Avenue  
Cleveland 8, Ohio**

THE INSTRUMENT PACKED HEREWITH IS:

PACKER'S CHECK

1 MODEL KS-15560-L2 VACUUM TUBE TESTER	
ACCESSORIES INCLUDED WITH THE TESTER ARE:	
1 - BOOKLET INSTRUCTIONS	
2 - GRID LEADS WITH CLIP	

SERIAL NO. \_\_\_\_\_

SIGNED: \_\_\_\_\_

### INSTRUCTIONS FOR OPERATION OF MODEL KS-15560-L2

Read these instructions through before attempting to operate the tester.

1. There are two rectifier tubes, an 83 and a 5Y3 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 gas-line 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 KS-15560-L2 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. Reset the A.C. voltmeter to the red mark at 100 volts after depressing P4.

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 duo-diode triode tubes the amount of dialing has been reduced to a minimum.

The KS-15560-L2 set also provides a cathode activity test circuit controlled by the toggle switch designated "CATH. ACT" with a "NORM." position and a "TEST" position. In the "TEST" position the filament voltage of a tube is reduced by 10 percent of its Normal Value.

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 - Gas current in a tube or grid leakage current due to poor grid to filament insulation may be detected by the switch insertion of the Micromhos Meter into the grid circuit of a tube under test. In this setup the normal plate and screen grid voltages are applied by means of the P4 pushbutton switch. This test is made with the standard normal grid bias applied with the usual setting of the BIAS ADJUST dial as for a regular transconductance measurement. In addition, the gas test

P5 Push Switch is operated which transfers the DC Micromhos Meter from its normal plate circuit position directly into the control grid circuit to measure grid current, if any, directly in DC microamperes. The "SIG. OFF" P6 switch also is simultaneously operated with the P5 switch to remove the grid signal for the test, for the presence of a grid signal could, in certain cases, produce false readings. In this test, the Micromhos Meter, used as a DC Microammeter, is in series in the grid circuit. Under the test conditions just described the Micromhos Meter will read 3-1/3 microamperes per small scale division.

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.

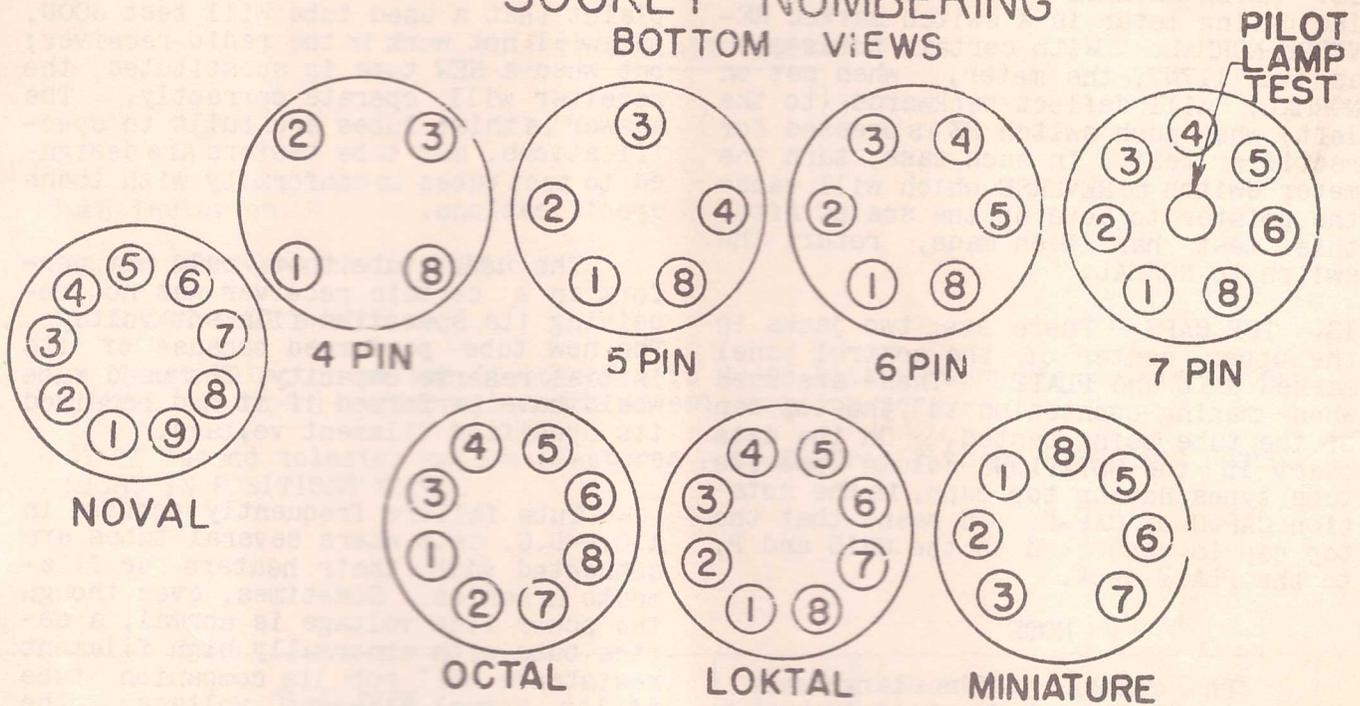
The indicating meter will register the tube's value in seven ranges: 3000, 6000, 15000 Micromhos with HIGH Signal; 60,000, 30,000, 15,000, 6,000 Micromhos with LOW Signal. A "SHUNT" range is also provided to be used when checking Diodes and Rectifier tubes.

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

On the roll chart following "SELECTORS" is a column designated "BIAS VOLTS". This is the negative grid bias to be applied to the tube being tested. The voltage is read on the small grid bias voltmeter in the upper left of the control panel. Bias voltage is read in two ranges, 0-5 and 0-50 D.C. volts. Make final adjustment after pressing P4 switch.

Directly above the grid bias voltmeter are two binding posts which are normally shorted by an attached bar. These posts are marked SELF BIAS + (pos.) and - (neg.). They provide means for

## SOCKET NUMBERING BOTTOM VIEWS



inserting a self biasing resistor into the cathode circuit of the tube being tested. These posts are bridged, within the tester, by a 2000 mfd capacitor. When using self bias set the normal bias to zero volts.

### NOTE

A suitable low resistance D.C. milliammeter connected between these posts will measure the total cathode current.

The Micromho values printed on the data roll are minimum values. A satisfactory tube should read above the value given on the chart.

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 the mark, DIODES OK. P1 also reduces the screen voltage to 1/2 normal value. Instructions for its use appear in Notations column of the data chart.

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 scale mark "RECTIFIERS OK."

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 scale mark "RECTIFIERS OK."

11. **SOCKET NUMBERING** - In order to reduce dialing to a minimum, the sockets in the Model KS-15560-L2 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.

15. MATCHING TUBES - The Model KS-15560-L2 is valuable in matching tubes for pushpull stages and other applications where matched tubes are essential.

16. Just below the left column of roll chart data is provision for recording "LAST TUBE". This means the last tube in the left column, thus saving time in selecting data.

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.							
1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1L1-1M1-1P1-1Q1-1R1G-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.						
				T				
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
	J							X
L42F	D	R						
	J		S					X
42HA-K42HJ-M42H-M42HG	E	R		T				
	J			T				X
KX42C	J							
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
	J							X
L49F	D	R						
	J		S					X
M49H-M49HG	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						
	J		S					X
K52H-M52H	D	R						