CHAPTER IV - CORRECTIVE MAINTENANCE

A. Line Voltage

1. Check the line voltage from the power source using an ac voltmeter of suitable range.

2. The Model 752 is designed to operate on line voltage from 105 to 125 volts ac at frequencies from 50 to 60 cycles per second.

3. Low line voltage may make it impossible to adjust the meter to LINE TEST as required for proper voltage standardization within the equipment and impair the accuracy of the tester.

B. Line Fuse

1. One side of the primary circuit of the power transformer, T1, is protected by a combination LINE FUSE lamp and overload indicator, a type 81 lamp.

2. If the Roll Chart and Meter Illumination do not glow when the tester is connected and turned on, remove the LINE FUSE lamp and check it for continuity using a low range ohmmeter.

C. Roll Chart and Meter Illumination Lamps

1. Both the Roll Chart and the Meter should be illuminated when the tester is turned on.

2. If the METER LAMPS do not light, turn the tester OFF and remove the small cover located on the front of the meter.

   CAUTION: BE SURE THE TESTER IS OFF WHEN REMOVING OR REPLACING THE COVER FOR THE METER LAMPS TO PREVENT DAMAGE TO THE METER.

   Check the two #51 METER LAMPS for continuity and looseness in the sockets.

3. If the ROLL CHART LAMP does not light, disconnect the tester from the power source and remove the ten panel mounting screws. Carefully remove the tester from the case and place face down on a bench or other flat surface. The 120 volt, 7 watt ROLL CHART LAMP is located beneath the front panel. Check the lamp for continuity and looseness in the socket.

D. Bias Fuse

1. A type 49 lamp serves as the BIAS FUSE and overload indicator to protect the BIAS control R28 from accidental damage.

2. If the BIAS FUSE is burned out, no bias voltage will be present and the test circuits will be inoperative.

3. If no bias voltage is present check the lamp for continuity and looseness in the socket.

E. Tubes

1. Two full wave rectifier tubes are used in the tester. One type 83 tube, V1, is used in the mutual conductance test circuit to supply plate voltage. The 5Y3GT, V2 supplies dc screen and bias voltages for the tube under test.

2. Failure of both halves of the type 83 tube, V1, will cause loss of the plate supply voltage and the pointer of the METER will remain on zero when a tube is tested for

Mutual Conductance by pressing the RED push button, S5. Failure of only one half of the type 83 tube, V1, will cause a decrease in the plate supply voltage, and the pointer of the METER will move sharply off scale to the left or right when a tube is tested for Mutual Conductance.

3. Failure of the type 5Y3GT tube would result in lack of voltage in the screen and bias circuits of the tube under test. To check bias and screen voltages refer to paragraph G of this section.

4. To remove rectifier tubes V1 and V2 for test, or replacement:

   a. Disconnect the power cable.
   b. Remove the ten mounting screws around the edge of the panel.
   c. Carefully lift the entire unit out of its case, and turn face down on the test bench or other flat surface.
   d. Depress the tube base spring clamps and remove the tube from the socket.

F. Test Leads

1. Inspect all test leads for defective insulation and test for continuity. Make any minor repairs necessary, but if leads are in poor condition, or beyond repair, order replacements immediately.

G. Voltage and Calibration Check

The Model 752 may be checked for proper calibration and voltages by using the following procedure:

WARNING
HIGH VOLTAGE
Dangerous voltages are present within this equipment
Use caution when servicing or testing.

1. Switch and control settings: Set FILAMENT switch on OFF, VR VOLTAGE control fully counter-clockwise, SELECTORS on 7256-3481, BIAS control on zero, SHUNT control on 100, MULTIPLIER on X2, LEAKAGE switch on TUBE TEST. Turn tester ON and set LINE ADJUST for LINE TEST mark on the meter.

NOTE

All dc voltage readings with the exception of the bias cut-off voltage (D.C.) are to be made with a 1000 ohms/volt meter. The bias cut-off voltage reading is to be made with a dc vacuum tube voltmeter. All ac measurements, except for the signal voltages, are to be made with a 1000 ohms/volt ac voltmeter. The signal voltages are to be measured with an ac vacuum tube voltmeter. Suitable meter ranges should be used to give a reading near full scale.

2. Plate Voltages Check (150 VDC) (68 VDC)

   a. Connect the positive (+) lead of the dc voltmeter to Pin #3 of the OCTAL test socket and the negative (-) lead of the voltmeter to Pin #8 of the same socket. Press push button S5. The voltmeter should read 150 volts, ± 5 volts.

   b. With the voltmeter connected to the same OCTAL socket pins, press push button S4. The voltmeter meter should read 68 volts, ± 3 volts.

   c. These voltages are the NORMAL and LOW PLATE potentials used to make Mutual Conductance tests.

3. Screen Voltages Check (130 VDC) (56 VDC)

a. Connect the positive (+) lead of the dc voltmeter to Pin #4 of the OCTAL test socket and the negative (-) lead of the voltmeter to Pin #8 of the same socket. Press push button S5. The voltmeter should read 130 volts, ± 5 volts.

b. With the same voltmeter connections press push button S4. The voltmeter should read 56 volts, ± 3 volts.

c. These checks are the NORMAL and LOW SCREEN potentials used to make Mutual Conductance tests on heptode and pentode type tubes.

4. Bias Voltage Check (39 VDC) (3 VDC) (30 VDC)

a. Set BIAS control on 100. Connect the positive (+) lead of voltmeter to Pin #8 of the OCTAL socket and connect the negative (-) lead of the voltmeter to Pin #5 of the same socket. Press push button S5 and read 39 volts ± 1 volt on the dc voltmeter.

b. With the same voltmeter connection turn the BIAS control to 22. Voltmeter should read 3.0 volts ± .2 volts.

NOTE

Use a DC Vacuum Tube Voltmeter for this check.

c. Connect the positive (+) lead of the dc Vacuum Tube Voltmeter to pin #8 of the OCTAL socket and connect the negative (-) lead to Pin #5 of the same socket. Hold down push button S8 and press S5. Read over 30 volts. This is the bias cut-off voltage used for dual tests.

5. Signal Voltage Check (2.5 VAC, 1.25 VAC, 2.5 VAC, 1.25 VAC, 0.5 VAC, 0.25 VAC USE VACUUM TUBE VOLTMETER)

a. Set Bias control on 0 and connect AC Vacuum Tube Voltmeter between Pins No. 5 and 8 on the OCTAL test socket. Set MULTIPLIER switch on SHUNT position. Press push button S5 and read 2.40 to 2.55 volts.

b. With the same voltmeter connection set MULTIPLIER switch to the X1 position. Press S5 and read 1.23 to 1.30 volts.

c. Set MULTIPLIER switch to the X2 position. Press S5 and read 2.40 to 2.55 volts.

d. Set MULTIPLIER switch to X4 position. Press S5 and read 1.23 to 1.30 volts.

e. Set MULTIPLIER switch to X10 position. Press S5 and read 0.48 to 0.52 volts.

f. Set MULTIPLIER switch to X20 position. Press S5 and read .240 to .255 volts.

6. A.C. Plate Voltages (20 VAC, 35 VAC, 175 VAC, 290 VAC)

a. Connect an ac voltmeter, 1,000 ohms per volt, between Pins #3 and 8 of OCTAL socket. Press push button S1 and read 18 to 20 volts. This voltage is used to test detector type diodes.

b. With the same voltmeter connection press push button S3 and read 35 to 38 volts. This voltage is used to test power rectifiers.

c. With the same voltmeter connection press S6 and read 165 to 175 volts. This voltage is used as the plate potential during gas test.

d. With the same voltmeter connection press S2 and read 285 to 300 volts. This voltage is used to test cold cathode rectifiers.

7. Leakage Circuit Check

a. Set the LEAKAGE switch on position 5 and insert a 500,000 ohm resistor between the plate jack, P, and the grid jack G. Read 500K on meter. To determine tolerance read 0 to 1500 scale; 500K on the LEAKAGE scale equals 425 on the 0 to 1500 scale. Tolerance on the 0 to 1500 scale is 375 to 475 (± 2 divisions).

8. Voltage Regulator Circuit Check (150 VDC, 50 MA).

a. Set the LEAKAGE switch on TUBE TEST position and the MULTIPLIER switch on VR position. Turn the VR VOLTAGE control fully counter-clockwise. Connect the positive (+) lead of the DC voltmeter to Pin #3 of the OCTAL socket and connect the negative (-) lead to Pin #8 of the same socket.

b. Adjust the VR VOLTAGE control for 150 volts on the external voltmeter. The tester meter, M1, should read 150 volts ± 2%, plus tolerance of external meter.

c. Turn the VR VOLTAGE control fully counter-clockwise. Connect the positive (+) lead of a DC milliammeter to Pin #3 of the OCTAL socket and connect the negative (-) lead to Pin #8.

d. Hold down push button S9, VR MILS, and adjust the VR VOLTAGE control for 50 MA on the external milliammeter. The tester meter, M1, should read 50 MA ± 1 MA plus tolerance of external meter.

9. Filament Voltage Check (.6 to 117 VAC)

a. Set the FILAMENT switch to the desired voltage.

b. Connect the terminals of the ac voltmeter between Pins #2 and 7 of the OCTAL test socket.

c. The meter should indicate within the limits indicated in Table 4-1 for various nominal settings of the FILAMENT switch.

10. The BIAS and SHUNT controls should indicate zero when they are in full counter-clockwise positions. If they do not, loosen set screws and reset knobs on the shafts.

H. Suggestions for Locating Trouble

If proper voltages are not present in the tester the following suggestions are offered for locating and correcting the trouble.

1. If all voltages are found to be either high or low it is possible that the trouble is in the line test circuit. Check calibration of line test circuit (see paragraph I. of this chapter). An excessively high or low resistance adjustment of R5 would result in improper adjustment of the line voltage causing high or low test voltages at the points covered in paragraph G of this chapter.

2. Incorrect Plate Voltages

a. High plate voltage can only result from the application of incorrect voltage to

TABLE 4-1 FILAMENT VOLTAGE CHART

NOMINAL	MIN	MAX
.6	.5	.7
1.1	1.0	1.2
1.4	1.3	1.6
2.0	1.8	2.2
2.5	2.3	2.9
3.0	2.7	3.5
4.3	3.9	4.7
5.0	4.5	5.6
6.3	6.0	6.7
7.5	7.0	8.2
10.0	9.0	11.0
12.6	11.5	13.8
17.0	15.5	18.7
20	18.0	22.0
25	23.0	28.0
35	33.0	39.0
50	45.0	56.0
75	70.0	83.0
117	107.0	128.0

CHART 4-3 VOLTAGE AND RESISTANCE TEST

TUBE	SOCKET PINS (OR TRANSFORMER TAPS)								
	1	2	3	4	5	6	7	8	
V1, 83	185VDC	190VDC 15K	190VDC 200	185VDC					VOLTS OHMS
V2, 5Y3GT		90VDC 10K		160VAC 400		160VAC 400		90VDC 10K	VOLTS OHMS

All readings are referenced to CATHODE (Self-Bias jacks with the link closed), with the tubes in the sockets.

All DC voltage measurements are made with a 20,000 ohms/volt meter and all AC measurements are made with a 1000 ohms/volt meter, Hickok Model 456 or equivalent.

the primary of T1, see paragraph A1, above.

b. Low plate voltage will result from a defective 83 tube V1.

3. Probable causes of incorrect voltages in the tube tester are listed in Table 4-3.

4. Replacement of Resistor R27.

If it is necessary to replace this resistor, adjustment of the sliding contacts must be made to establish the proper bias and low screen voltages. Resistor R27 is located between the transformer, T1, and the base of the 83 tube, V1.

a. Set all controls in accordance with paragraph G-1 of this chapter. Be sure to make LINE TEST.

b. Connect the positive (+) lead of a DC voltmeter (1000 ohms/volt) to Pin #8 of the OCTAL socket and connect the negative (-) lead to Pin #5.

c. Set the BIAS control at 100.

d. Adjust the shorting slider of R27 until the meter reads 39 volts.

e. Connect the positive (+) lead of the voltmeter to Pin #4 of the OCTAL socket and the negative (-) lead to Pin #8. Press push button S4 and adjust the voltage tap slider until the meter reads 56 volts DC.

f. Tighten the slider screws and recheck the voltages. The proper bias and low screen voltage are now established.

I. Calibration of Line Test Circuit

1. Remove the test set from its case.

2. Set all controls in accordance with paragraph G-1 of this chapter.

3. Connect tester to 115 volt AC source and turn it on.

4. Connect the positive (+) lead of a DC voltmeter (1000 ohms/volt, on suitable range to make 150 volt measurement) to Pin #3 of the OCTAL socket and connect the negative (-) to Pin #8 of the same socket.

5. Hold down push button S5 and turn the LINE ADJUST control until the external voltmeter reads 150 volts.

6. Change the positive lead (+) of the voltmeter from Pin #3 to Pin #4. Press push button S5 and check for a reading of 128 to 134 volts DC. These two readings (150 volts and 130 volts) establish correct plate and screen voltages.

7. If the screen voltage check falls outside the 128 to 134 volt tolerance, reset the LINE ADJUST knob until the plate voltage (Pins #3 to #8) falls between 148 to 152 volts and the screen voltage (Pins #4 to #8) falls between 128 to 134 volts.

8. After the conditions stated in I-7 have been met, the adjustment of the calibration control, R5, can be made. (Control R5 is the screw driver adjusted control located nearest the outer edge of the tester and fastened tothe phenolic board which is mounted on the transformer.) To make the adjustment, press the LINE ADJUST push button, S10, and adjust R5 until the pointer of the test meter, M1, indicates exactly to the line marked LINE TEST.

TABLE 4-2 VOLTAGE TROUBLE CHART

CONDITION	POSSIBLE CAUSE	REMEDY
Plate Voltage High	LINE ADJUST Calibration off	Calibrate
Plate Voltage Low	Defective 83 tube V1. Open winding T1 secondary R to T or U to V	Replace Replace T1
Plate Voltage Zero	Defective 83 tube V1 Open winding T1 secondary R to T, U to V, or 18 to 20	Replace Replace T1
NOTE: Conditions apply to both NORMAL and LOW PLATE voltages		
NORMAL Screen Voltage High	BIAS control, R28, open at positive end Resistor R27 open LINE ADJUST calibration off	Replace Replace Calibrate
NORMAL Screen Voltage Low	5Y3GT tube V2 weak Open winding T1 secondary, M, N, O, or J, K, L.	Replace Replace T1
NORMAL Screen Voltage Zero	BIAS control R28 open at (-) end Defective 5Y3GT tube V2 Open windings T1 secondary M, N, O, or J, K, L.	Replace Replace Replace T1
LOW Screen Voltage High	LINE ADJUST calibration off Slider taps on R27 off	Calibrate Adjust
LOW Screen Voltage Low	5Y3GT Tube V2 weak Open winding T1 secondary, M, N,O, or J, K, L. Slider Taps on R27 off	Replace Replace T1 Adjust
LOW Screen Voltage Zero	Defective 5Y3GT tube V2 Resistor R27 or BIAS control R28 open	Replace Replace
Bias Voltage High	BIAS control, R28, open at negative end Shorting slider on resistor R27 off	Replace Adjust
Bias Voltage Low	Weak 5Y3GT tube V2 Shorting slider on resistor R27 off Open winding on T1 secondary J, K, L or M, N, O.	Replace Adjust Replace
Bias Voltage Zero	BIAS control R28 open at positive end Resistor R27 open Defective 5Y3GT tube V2 Open windings on T1 secondary J, K, L, or M, N, O.	Replace Replace Replace Replace T1
Cut-off Bias Voltage Low	Capacitor C3 open	Replace
Cut-off Bias Voltage Zero	1N91 diode CR2 defective	Replace
VR Voltage Checks Low	Capacitor C4 open	Replace
VR Voltage Zero	VR VOLTAGE control open Resistors R12 or R13 open	Replace Replace
Signal Voltage High	BIAS control R28 not set at zero Defective resistor R31, R32, R33, R34 or R35	Reset Replace
Signal Voltage Low	Defective resistor R31, R32, R33, R34 or R35	Replace
Signal Voltage Zero	Defective resistor R31, R32, R33, R34 or R35 Open winding T1 secondary P.Q.	Replace Replace T1