



CALIBRATION

MODEL 111

GM & EM TUBE TESTER

precise

**ELECTRONICS AND
DEVELOPMENT CORP.**

CALIBRATION PRELIMINARY TESTS

OPERATIONAL PROCEDURE

All internal controls on the power supply chassis should be set to their maximum clockwise position. Shaft type controls are viewed from shaft side. Screwdriver controls or rheostats (those without shafts) are viewed from the side showing the entire control. Set all front panel controls and switches as follows:

- 1 - Controls A through O, BIAS, FILAMENT & METER TO THEIR EXTREME COUNTER-CLOCKWISE POSITION.
- 2 - TEST Switch to HOLD. LINE Pot to mid rotation (approximately).
- 3 - SHORT Switch to TEST (NOR.).
- 4 - Meter Slide Switch to NOR.
- 5 - Bias Slide Switch to 10V.
- 6 - OFF LIFE ON Slide Switch to OFF.
- 7 - Check the resistance from terminal #16 of PT4 to Ground. This should be at least 50,000 ohms. If a lower resistance is read, check wiring of H1, S6 and S2.
- 8 - Check the resistance to ground from pin #7 of the 7 Pin Miniature Socket (H61 on the Power Supply Chassis). This should be approximately 8,000 ohms. If a lower resistance is read, check wiring of H61, S3, S8, S12 and S2.
- 9 - Connect an AC Voltmeter from ground to terminal #14 of PT4. Use a range of at least 10 volts.
- 10 - Plug the line cord into any 110 volt, 50 or 60 cycle outlet and push Power Slide Switch to ON. The Pilot Light should light immediately. If it does not, turn set off at once and check Pilot Light and Filament transformer wiring.
- 11 - Set LINE ADJUST CONTROL, on front panel, for a 5 volt AC reading.
- 12 - Without changing any of the above settings, adjust the internal line potentiometer (P9), located on the Power Supply Chassis, for a center scale reading on the tube tester meter (center of Question Mark).
- 13 - Without changing any settings, connect an AC Voltmeter (VTVM) between chassis ground and terminal #2 (center arm) of P5. Adjust for 2.8 volts AC. If an AC VTVM is not available, an ohmmeter may be used as follows: a) Remove power by disconnecting Line Cord b) Temporarily remove the lead to P5#1. Connect an ohmmeter from P5#2 to P5#3 and adjust P5 for a reading of 560 ohms. Remove ohmmeter and reconnect lead to P5#1. (A more accurate adjustment would be to first measure the total resistance of P5 and multiply it by .56 for the ohmmeter setting. P5, of course, should be measured with the lead to P5#1 removed). A conventional "1 000 ohm/Voltmeter" is not recommended since it will load the potentiometer P5. Remove VTVM when finished.
- 14 - PLATE BRIDGE BALANCE. Turn Power Off. Make certain the Switch S5, PLATE SHUNT, is in position A, 30K. Temporarily attach a 2K, 10 Watt resistor from ground to S2#11 (The TEST SWITCH). If you do not have a 2K, 10 Watt resistor, you may disconnect R10 and use it. Make certain all controls are as follows:
 - a) Controls A through O, BIAS & FILAMENT at maximum counter-clockwise.
 - b) METER Switch to LINE.
 - c) SHORT Switch in TEST NOR.
 - d) METER Slide Switch to NOR.
 - e) BIAS Slide Switch to 10V.
 - f) TEST Switch to OFF.
 - g) Insert Line Cord and push OFF LIFE ON Switch to ON. Adjust LINE ADJUST panel control to center scale reading on the meter.
 - h) Switch meter switch to TEST.
 - i) Rotate Test Switch to TEST and note if meter deflects off zero. If it does deflect, try adjusting potentiometer P4, located on the power Supply Chassis, for practically no deflection when the TEST Switch is rotated to the TEST position. If the adjustment of P4 makes the condition worse, then P4 is the wrong leg. In the latter case, proceed as follows:
 - 1 - Disconnect Blue wire from H1#3 to P4#2. Remove on the H1#3 side only.
 - 2 - Disconnect Blue wire from H1#4 to P4#1. Remove on the H1#4 side only.
 - 3 - Solder a piece of wire from H1#3 to H1#4.
 - 4 - Remove wire from H1#5 to H1#6.
 - 5 - Solder Blue wire, which was left on P4#1 in Step 2 above, to H1#6.
 - 6 - Solder Blue wire, which was left on P4#2 in Step 1 above, to H1#5.
 - j) Repeat step i above.
 - k) Turn power off and remove 2K 10 Watt resistor which was attached in Step 14, above. Replace resistor into original location.
- 15 - Gm ADJUSTMENT. Set front panel controls for 6C4 as shown in Diagram A below. Insert 6C4 tube. Turn power on.

DIAGRAM A

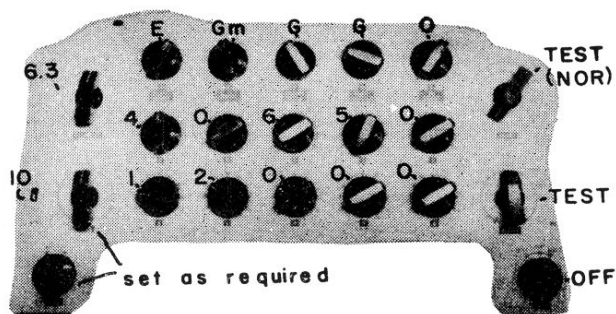
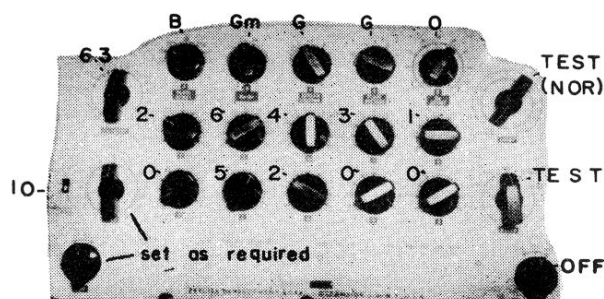


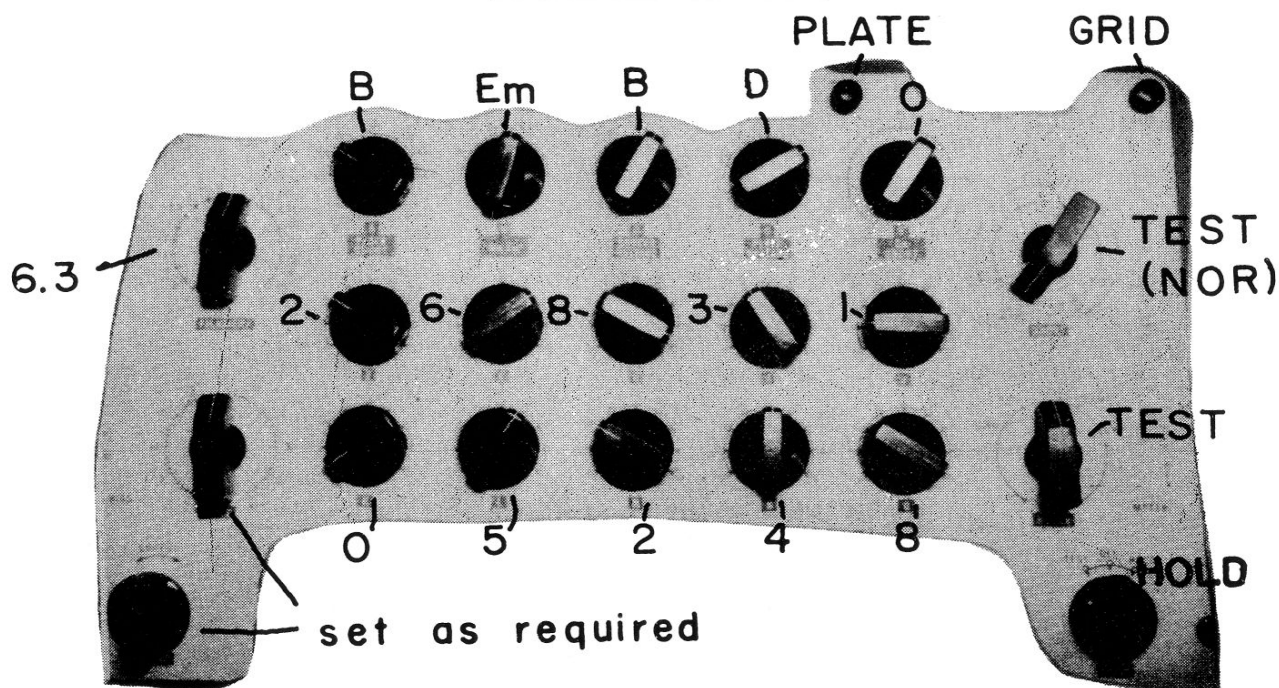
DIAGRAM B

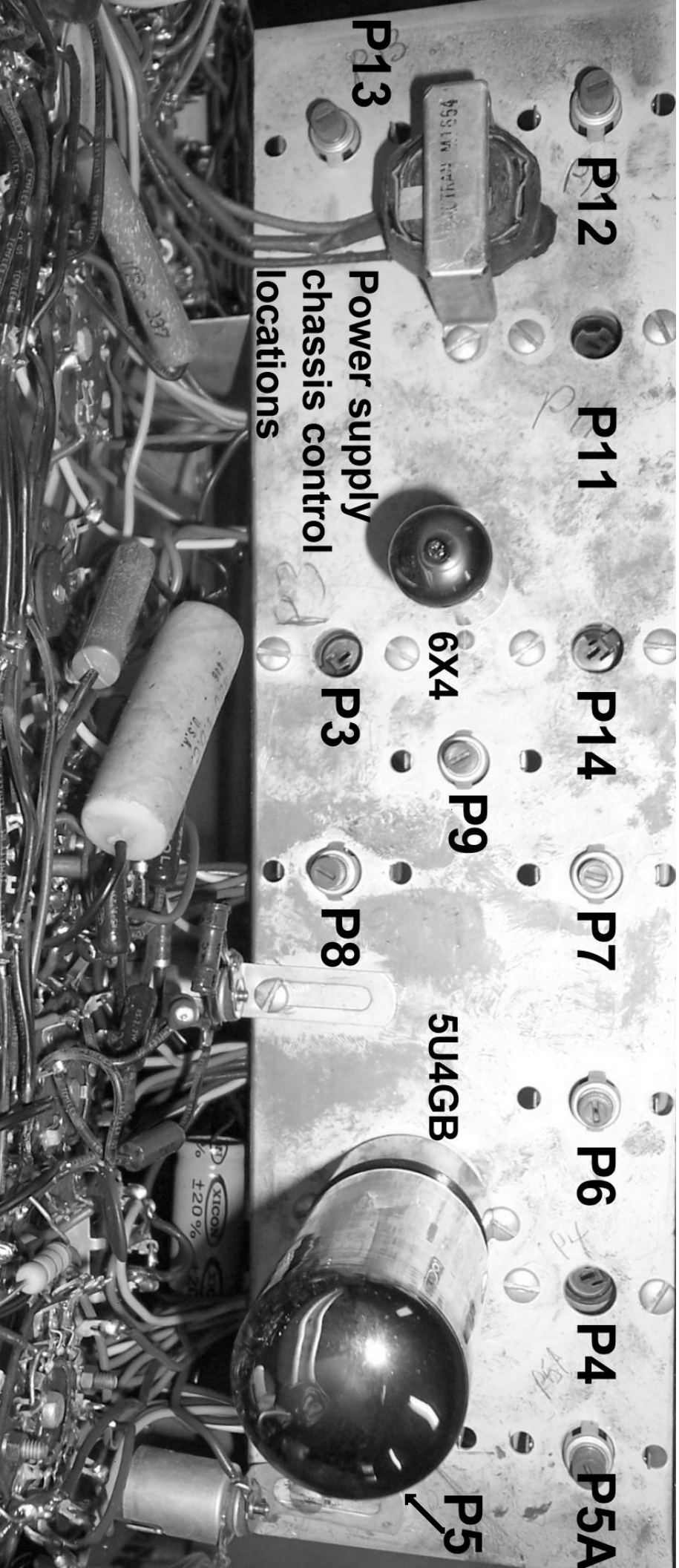


- a) Rotate SHORT Test Switch through all its positions and return to the TEST(NOR.) position. The SHORT Neon Bulb should only light in 1, 3, 4 and 5.
- b) Rotate the TEST Switch to HOLD.
- c) Rotate the METER Switch to LINE and adjust LINE ADJUST control, on front panel, for center scale reading.
- d) Rotate the METER Switch to BIAS and BIAS Slide Switch to 10. Adjust BIAS Potentiometer, on front panel, to 5 volts on 10 volt BIAS SCALE of Meter.
- e) Repeat sections c and d above.
- f) Rotate METER Switch to TEST and note reading on the 3,000 Gm scale. This is the 0 to 3 scale of the Meter.
- g) Without changing any settings, what-so-ever, rotate PLATE SHUNT Switch to "D" "6K". This changes the instrument to the 6,000 Gm scale. Adjust Potentiometer, P5A, on Power Supply Chassis, for the same reading on the 6,000 range as was observed on the 3,000 range. i.e. If the Meter indicated 2,000 on the 3,000 range, it should read 2,000 on the 6,000 range.
- h) Repeat g above except that the PLATE SHUNT Switch is rotated to the 'C' '8K' range. Adjust potentiometer, P6, for the same reading on the 8K as was observed on the 3K and 6K ranges.
- i) **Gm SCREEN BALANCE & VOLTAGE ADJUSTMENT.** Remove 60L, rotate switch "C" to "A" and rotate Switch '0' to position #3. Connect a DC Voltmeter from the PLATE Jack to Chassis Ground (use a range or at least 100 volts). Rotate the BIAS Potentiometer to 0 and the BIAS Slide Switch to 50. Turn the instrument on. Rotate the METER Switch to LINE and adjust the LINE ADJUST control for center scale. Adjust P14 for 60 volts on the DC Voltmeter. Adjust the front panel controls for a 6L6 tube as shown in Diagram B. Remove leads from previous step.
Repeat section 15(a), above, except that #2 and #7 are the only ones that should light. Repeat sections 15(b), 15(c), 15(d) and 15(e). Return TEST Switch to OFF and METER Switch to TEST. Without changing any of the settings, turn instrument off. Remove the lead to Lug #14 of PT4 and connect it to Lug #13 of PT4.
- j) Turn set on and allow a warm-up period of about 30 seconds. Rotate TEST Switch to TEST. If meter deflects from zero, adjust screw-driver potentiometer, P3, on Power Supply Chassis, until no deflection is noted when TEST Switch is rotated.
- k) If adjustment of P3 cannot bring meter to zero, turn instrument off and reverse leads going to Lugs #3 and #5 on PT4. Repeat step j.
- l) Replace lead moved to Lug #13 of PT4 in step i.
- m) Rotate PLATE SHUNT switch to 'C' '8K' and repeat steps b, c and d. Rotate METER Switch to TEST and note Gm reading on 8K scale.
- n) Rotate PLATE SHUNT Switch to 'B' '20K' and repeat steps b, c and d.
- o) Rotate METER Switch to TEST and adjust potentiometer, P7, on Power Supply Chassis, for the same reading on the 20K Gm scale as was observed in step m. If the reading was 5,000 on the 8K range it should read approximately the same on the 20K range.
- p) Rotate PLATE SHUNT Switch to 'A' '30K' and repeat steps b, c and d.
- q) Rotate METER Switch to TEST and adjust potentiometer, P8, on Power Supply Chassis, for the same readings on the 30K Gm scale as was observed in step m. You have now completed the calibration of the Gm section of your instrument.
- r) **EMISSION CALIBRATION.** Turn instrument off and set up for Em check of 6L6 as shown below. Connect a milliammeter (DC) from the GRID to the PLATE Jacks on the front panel. Use a meter with a full scale reading of at least 50ma. Connect the negative side of the milliammeter to the PLATE Jack. (Note:- Steps r, s and t may be omitted by rotating potentiometer, P11, to approximately seven ohms when the wires going to it are disconnected. This is not as accurate a method as listed in steps r, s and t, but it is quite sufficient for most cases. Reconnect wires to P11 after adjustment is made). Insert 6L6.
- s) Turn instrument on and allow a thirty second warm-up period. Adjust BIAS potentiometer for 20 milliamperes of Plate current on the DC milliammeter.
- t) Without changing any settings, adjust Potentiometer, P11, on the Power Supply Chassis, for a reading of 3 on the 10 volt Bias scale of the tube tester meter.
- u) **FILAMENT CURRENT CALIBRATION.** Rotate TEST Switch to OFF and remove leads going to GRID and PLATE Jacks. Rotate METER Switch to LINE and adjust for center scale reading. Rotate METER Switch to 3 AMP and adjust P12 on Power Supply Chassis, for a reading of .9 on the 3 FIL AMPS Meter scale. (A 6L6 tube draws about .9 amperes at 6.3 volts. An AC Ammeter placed in series with one of the 6L6 filament leads would, of course, be a better method of calibration. This method is not listed due to the scarcity of AC Ammeters in the average service lab).
Remove the 6L6 tube. Rotate Switch H to 5 and Switch I to 6. Make certain the TEST Switch is in the OFF position. The FILAMENT Switch should be at 6.3. Insert 60L tube. Rotate METER Switch to LINE and adjust for center scale reading. Rotate METER Switch to .3 AMP and adjust potentiometer, P13, on the Power Supply Chassis, for a reading of .15 on the .3 FIL AMPS scale of the Meter. The same note applies to this adjustment as applied to the 6L6, regarding the use of an AC Ammeter.

You have now completed the calibration of your model 111. Slip H type Speed Nut (# H117) over Hole #2, DIAGRAM 9 with concave side up. Place instrument into cabinet being very careful not to damage any switch connections, etc. Secure chassis and Unit to rear of cabinet with 6-32x1" screw and metal washer. Secure panel to cabinet by using the wood screws provided. If possible drill very thin pilot holes to prevent the wood from possibly cracking.

DIAGRAM C





P13

P12

P11

P14

P9

P7

P6

P4

P5A

Power supply
chassis control
locations

6X4

P3

P8

5U4GB

P5