# INSTRUCTIONS

FOR

# WESTON

## MODEL 798 TYPE 2

# Proportional Mutual Conductance Tubechecker

**WESTON ELECTRICAL INSTRUMENT CORPORATION**

NEWARK 5, NEW JERSEY, U.S.A.

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## DESCRIPTION

***GENERAL:*** The Model 798 Vacuum Tube Analyzing equipment consists of a vacuum tube and voltage regulator tester mounted in one complete assembly and housed in a welded aluminum case. The case is equipped with a hinged cover storage compartment with separate sections, one for the accessories and one for spare parts.

***ACCESSORIES:*** One Black Top Connector Grid Lead for Tube Testing

One Red Top Connector Plate Lead for Tube Testing

One Line Cord equipped with a Double Fused Plug (this line cord is permanently attached)

***METER RANGES:*** The tube tester section of the 798 has the following ranges:

0 to 3000 micromhos
0 to 6000 micromhos
0 to 12000 micromhos

(A Good-Bad scale is also provided)

The voltage regulator section uses the meter as a 200 volt d-c voltmeter for all voltage regulator tests.

***ACCURACY:*** The tube testing section is rated with an accuracy of 15% for all mutual conductance ranges and 2% for the voltage regulator section.

***POWER REQUIREMENTS:*** 115 volts 60 cycles, single phase, alternating current, 30 watts.

***METHOD:*** Of the many measurable characteristics of a vacuum tube, the mutual conductance is the one most closely associated with operating performance. For this reason, the factor which determines the end of useful life of vacuum tubes is generally taken to be the mutual conductance except in the case of diodes which have no grids, and other tubes in which the mutual conductance is not conveniently measured. The factor which determines the end of useful life of these latter tubes is generally taken to be cathode emission current measured under specified conditions.

The Model 798 equipment indicates mutual conductance by measuring the 5 kilocycle alternating current produced in the plate circuit by a 5 kilocycle signal applied to the grid of the tube under test. This grid signal may be varied in three steps providing three mutual conductance ranges. Since mutual conductance involves the ratio of the value of alternating plate current to the value of the alternating grid signal which produced that plate current, it is evident that the instrument which measures the 5 kilocycles component of the plate current may be calibrated in terms of micromhos of mutual conductance instead of microamperes of alternating current.

In the Model 798, all electrode potentials are applied to the tube under test at a frequency equal to that of the power line nominally 60 cycles. In other words the heater, grid, screen, plate, and suppressor voltages applied to the tube under test previous to the application of the grid signal, are supplied from a single power transformer.

This device operates on a differential frequency system, wherein a much higher frequency is used for the grid signal potential. This signal frequency is 5 kilocycles, and the signal potential is supplied from an oscillator or signal voltage generator which operates only when the $G_m$ signal switch is pulled. The potential for this signal voltage generator is supplied from the power transformer, and therefore, it actually operates only during the half-cycle of power line potential when the plate of the signal voltage generator tube is positive. Thus, 5 kilocycle signal pulses are supplied from the signal voltage generator tube to the grid of the tube under test in the Model 798. These pulses produced every 1/60 of a second are phased so that the pulse is applied to the grid of the tube under test, during the negative excursion of its grid potential. They are superimposed on this grid potential or grid bias. In this way we have a measured bias potential and a measured signal voltage applied in the test grid circuit.

The instrument indicating the condition, or mutual conductance of the tube under test is connected in a low pass filter network wherein a 60 cycle plate current will not cause an instrument indication. Thus, when a tube is plugged into the socket and allowed to warm up, the meter will not indicate normal plate current.

When the $G_m$ signal switch is operated, the 5 kilocycle signal pulses are supplied to the grid of the tube under test, and the meter in the low pass filter network indicates the higher frequency component of plate current resulting from the applied 5 kilocycle signal voltage. If we designate this current component $i_p$ and the signal voltage as $e_g$ then the well-known relation between this current and voltage is:

$$i_p = e_g \times g_m$$

where $g_m$ is the mutual conductance (transconductance) then:

$$g_m = \frac{i_p}{e_g}$$

if, therefore, the signal voltage is maintained at a constant value by the line check adjustment, the instrument may be calibrated directly in terms of mutual conductance. For example if the $G_m$ range switch is indexed to the correct position for a value of one volt, and the summation of the current through the meter circuit and its associated shunt resistor is adjusted for three milliamperes, the full

scale deflection on the instrument would correspond to 3000 micromhos; that is:

$$g_m = \frac{0.003}{1} \times 1{,}000{,}000 = 3{,}000$$

***POTENTIALS:*** The power transformer supplies all of the necessary potentials, and is metered at all times. A suitable line voltage adjustment is available for correction of any and all potentials. Grid bias, plate voltage, and meter sensitivity, are independently adjustable from three separate controls. The meter is used for all functions, including measurement of transconductance, emission of diodes and rectifiers. The functional switches set up the correct connections from all of the sockets for the particular type of potential required on each tube base pin.

***VOLTAGE REGULATOR TEST SECTION:*** A Testing section for voltage regulator tubes such as the VR105 through VR 150 and the type 874, is available in the tube checker. This section includes a separate d-c power supply which is switched into the circuit when the SELECTOR is indexed to the VOLTAGE REGULATOR TESTS ONLY position. The filtered d-c potential available from this supply is applied to the regulator tube under test, and can be varied in amplitude by rotation of the FILAMENT VOLTAGE and LINE controls. Starting or firing voltage can first be measured and then the regulation of the tube can be determined under the current range specified by the tube manufacturer. Both of these tests are important in determining the regulating ability of the tube in question.

The meter is connected into the circuit as a 200 volt d-c voltmeter for all voltage regulator tests.

## OPERATION

***GENERAL:*** Refer to the Panel of the Model 798. The sockets are all grouped along the top edge of the panel. Reading from left to right these include a combination 4-5-6 prong socket, a combination small and large 7 prong socket, an octal socket, and an acorn socket. Below and between the 7 prong and octal sockets is mounted a miniature socket. This is the group of regular sockets and these are always used unless specific instructions are noted in the Tube Data to use the special octal, loctal, and miniature sockets marked with a large letter A. These three A sockets along with a spare loctal and a spare miniature socket are in the right hand upper section of the panel. Directly below the octal and the octal A sockets are mounted grid and plate pin jacks respectively. These are used with the top cap connector leads stored in the lead compartment. Where tubes are encountered having top cap connectors, one or both of these leads may be used. When not required these leads should be kept in the lead compartment to avoid damage and to keep them out of the way of the various controls.

Red and green jewel pilot lamps are used, the red jewel lamp being an overload indicator. This lamp will flash when the tube tester or the tube under test is overloaded and the operator should immediately turn off the tube tester if this lamp glows and continues to glow brightly when a tube is inserted in one of the sockets. The green jewel lamp is a regular pilot, and will indicate at all times when the tube tester is turned on.

***CONTROLS:*** The filament voltage switch is prominently marked and is mounted to the left of the meter. This is the first control to set at all times. The operator must be sure this is set correctly to avoid damage to the tube. The switch to the right of the meter marked "SELECTOR" is a combination on-off switch for the Tube Tester and Voltage Regulator Tester. When an operator is through testing a tube, this switch should be indexed to the OFF position.

In a line across the panel are 5 controls, 4 of these marked A through D. These 4 controls set up the correct type of potential and correct bias and sensitivity. The plate voltage control prominently marked in the center of the panel applies one of three plate voltages to the tube under test. This is always kept in the HIGH or NORMAL position unless one of the other two positions is specified in the column "REMARKS" on the Tube Data Charts.

The A control sets up the correct grid voltage for all mutual conductance measurements. On rectifiers and diodes this control is used for the correct plate loading.

The B and C switches are used to connect the tube base pins to the correct portion of the tube testing circuit. In other words, these switches select the correct type of potential to be applied to the tube.

The D control functions as a sensitivity control for tube test readings.

The switch marked SHORT TESTS disconnects all of the tube electrodes from the tube testing circuit, and connects them into the short test circuit. This switch should be rotated through the 4 numbered positions for short testing all tubes, and turned to the cathode leakage position for checking cathode-heater shorts on those tubes manufactured with indirectly heated cathodes. It must be indexed to the TUBE TEST position for all $G_m$ or emission readings. When checking for shorts, the operator should watch the neon lamp "SHORT INDICATOR" to the right of the "OVERLOAD INDICATOR." Some tubes have inter-pin direct connections inside the tubes and this lamp will flash on some of the short test positions when checking

tubes of this type. The positions on which the lamp should glow are indicated in the column headed REMARKS on the Tube Test Data Charts.

The $G_m$ RANGE switch is located in the lower center section of the panel and must be indexed to the correct range both for red-green scale and mutual conductance readings.

The LINE CONTROL is used for setting the transformer potentials to the correct values. This is used in conjunction with the LINE CHECK toggle switch and the meter, wherein the instrument pointer should be set to the center scale arrow marked "LINE CHECK" using this line control. This line check reading must always be measured after the tube is in the socket to correct for any drop in transformer potentials due to tube loading.

There are three other toggle switches used for various purposes. The extreme right hand switch is of the momentary type, and applied to $G_m$ signal when measuring mutual conductance or when taking red-green scale readings, on tubes of the amplifier type. It is not used for rectifier and diode types. The toggle switch to the left of the $G_m$ range switch is indexed in the UP position for all amplifier types, and in the DOWN position for rectifer and diode types. The toggle switch to the left of the amplifier switch is used on double plate rectifiers, and diodes and for double section amplifier tubes. Where readings are listed in the REMARKS column, $P_1$ and $P_2$, this switch is used for the normal and second plate readings. It should always be kept in the NORMAL position except when taking these second plate readings.

***TUBE TEST DATA CHARTS:*** Amplifier types of vacuum tubes can be tested using RED-GREEN (Good-Bad) scale indications or by using MUTUAL CONDUCTANCE ($G_m$) scale indications in conjunction with the $G_m$ range switch for three ranges calibrated: 0-3,000; 0-6,000 and 0-12,000 micromhos.

GOOD-BAD readings of the more frequently encountered types are listed in the Tube Test Data Charts in the cover of the instrument; a supplementary Tube Test Data Chart lists outdated and seldom encountered types. A special Chart is included covering GOOD-BAD readings on some tubes frequently encountered in railroad communications.

$G_m$ Readings are listed in the Tube Test Data Charts on pages 9-14 of this book.

On rectifier and diode types where emission readings only are required, Good-Bad indications are always used. However, readings on these tubes are duplicated in the $G_m$ Data Charts so that the operator can use either arrangement and have available in one table, readings on all of the types.

Referring to the Data Charts in the cover, the first column marked TUBE TYPE lists the R.M.A. number for the particular tube in question. Where tubes have more than one section such as twin-triodes, double listings are required as indicated by the brackets. The second column lists the HEATER or FILAMENT VOLTAGE.

The CONTROL SETTINGS for the knobs marked A, B, C, and D are listed in the 4 columns under this heading. These should all be set correctly before inserting the tubes in the socket. The next column lists the correct position of the $G_m$ range switch. On diode and rectifier types, this switch is not used, and it may remain in any position during the diode or rectifier test.

The last column headed REMARKS indicates low or medium plate voltages where they are required, any short test positions where the lamp will light due to internal pin connections in the tube under test, and pertinent data on double section tubes.

Note that a heavy star appears in front of the filament voltage listings for some of the tubes. Referring to the notes at the bottom of the chart, this star indicates that the particular tube in question is to be checked in the A socket and NOT in the regular socket. All so-called REGULAR SOCKETS are mounted to the left of the acorn socket. The A sockets are to the right of this acorn socket.

The Data Charts for the Mutual Conductance readings are on pages 9 through 14 of this book. The columns and headings through the "$G_m$ Range" are for the same as those listed in the tube data chart in the cover of the tube checker. The next column headed "Normal $G_m$" lists the normal mutual conductance for the tube in question. By comparing this reading with that obtained on the Model 798 the operator can determine the condition of the tube and note how much above or below the normal value the tube happens to be. The column headed "REMARKS" is the same as that listed in the Tube Data Charts in the cover of the device.

***DATA CHART ABBREVIATIONS:*** Certain abbreviations have been used in listing the Tube Data. Most of these are found in the column headed "Remarks". The operator should become familiar with these abbreviations as it will help considerably in following the test procedure.

| | |
|---|---|
| Cap | Tube Top Cap Connector |
| Conv | Converter |
| Di | Diode |
| $G_m$ | Mutual Conductance (Transconductance) |
| Hex | Hexode |
| Norm | Normal. This is the normal value for good tubes where the indications do not conform to the red-green scale or the mutual conductance scale. |
| Pe | Pentode |
| Rect | Rectifier |
| Lights on | Short test neon lamp glows when short test switch is on these positions, indicating internal tube connections. |

| | |
|---|---|
| Tr | Triode |
| Tw Pe | Twin Pentode |
| Tw Tr | Twin Triode |
| ★ | Test in A Socket |

***TUBE TESTING SECTION:***

1. Set up the Model 798 near a 105-125 volt 60 cycle outlet.

2. Open the cover and then open the lead compartment. Pull out the line cord and inspect the plug to be sure there is a fuse in each side.

3. Plug into the a-c line and turn the SELECTOR switch to the ON position. The green pilot lamp should light. If it does not, examine the lamp and the fuses in the plug.

4. Pull the LINE CHECK switch and be sure the instrument pointer can be set to the LINE CHECK position, by adjusting the LINE CONTROL. The tube testing section is then ready for operation.

***VOLTAGE REGULATOR SECTION:***

1. Refer to steps one and two under TUBE TESTING SECTION above.

2. Index the FILAMENT VOLTAGE Switch to any position between 1.1 and 35 volts. Rotate the LINE CONTROL to the extreme counter-clockwise position.

3. Plug into a-c line, and turn the SELECTOR switch to the VOLTAGE REGULATOR TESTS ONLY position. The green pilot light should glow.

4. Allow approximately a 30 second warm-up period for the internal rectifier tube. As this tube comes up to temperature, the meter pointer will move slowly up scale. As soon as the pointer has stopped moving, the voltage regulator test section is ready for operation.

***OPERATIONAL PROCEDURE—RED-GREEN SCALE READINGS:***

1. Locate the type number of the tube to be tested.

2. Set the FILAMENT VOLTS control first, and then the A, B, C, and D controls to the correct number as listed in the Tube Test Data Charts.

3. Index the SHORT TEST switch to position 4 and with the tester turned on, plug the tube into the correct socket. If a star appears in front of the filament voltage figure, insert the tube in the corresponding A socket.

4. Pull the LINE CHECK switch and adjust the LINE CONTROL until the instrument pointer indicates in the center of the LINE CHECK arrow.

5. Refer to the REMARKS column to see if there is a notation for low or medium plate voltage ($E_p$). If there is such a notation, index the PLATE VOLTAGE switch correctly.

6. Refer to the NORMAL PLATE — SECOND PLATE ($P_1$-$P_2$) toggle switch and be sure this is indexed to the normal plate position unless indicated otherwise in REMARKS. Likewise, refer to the AMPLIFIER-RECTIFIER switch and be sure this is indexed correctly for the type of measurement required.

7. Rotate the SHORT TEST switch through the positions 4-3-2-1 watching the neon lamp. If the lamp lights on any of these positions, refer to the column headed REMARKS to see if there are internal connections for the particular tube under test. If so, there will be a notation such as "Lights on 1 and 2." If the tube lights on other positions, it should be discarded as short circuited. If the tube has a cathode, rotate the SHORT TEST switch to the cathode leakage position and discard the tube if the SHORT INDICATOR lights showing a heater to cathode short circuit.

8. Set the $G_m$ range switch to the correct position as listed in the next column in the Data Chart and index the SHORT TEST switch to the TUBE TEST position.

9. Pull the $G_m$ signal switch, and note the condition of the tube as passed on the red-green scale. When the pointer will not come up to the green section, the tube should be discarded as unfit for service. If the pointer continues to move up scale, as this switch is depressed, this indicates that the tube has not come up to its normal temperature and the tube should be allowed to heat up until the readings stabilize.

10. Diodes do not check in green section. A special acceptance point will be noted about 1/3 the way up on the red scale.

11. Pull the LINE CHECK switch and recheck the line voltage. If any correction is required again, measure the tube condition, pulling the $G_m$ signal switch.

12. When rectifiers and diodes are tested, they are checked on medium and low plate voltage positions. Refer to the REMARKS column for these settings. Index the AMPLIFIER-RECTIFIER switch to the RECTIFIER and DIODES position.

**Note**

WHERE TWO DIFFERENT SETTINGS OF THE A, B, C, AND D CONTROLS ARE REQUIRED FOR TWO SECTIONS OF A TUBE, THESE CONTROLS SHOULD NOT BE CHANGED UNLESS THE TUBE TESTER IS TURNED OFF, OR THE SHORT TESTS SWITCH IS INDEXED TO ONE OF THE SHORT TEST POSITIONS AND NOT TO THE TUBE TEST POSITION. THE TUBE MAY BE DAMAGED IF THESE CONTROLS ARE MANIPULATED WITH THE TUBE IN THE SOCKET AND THE SHORT TEST SWITCH IN THE TUBE TEST POSITION.

IF THE OVERLOAD INDICATOR GLOWS

DURING ANY OF THESE OPERATIONS, THE TUBE TESTER SHOULD BE IMMEDIATELY TURNED OFF OR THE TUBE REMOVED FROM THE SOCKET. THE COMPLETE PROCEDURE SHOULD BE REPEATED, CHECKING ALL THE CONTROLS AND TESTING THE TUBE FOR SHORTS.

***THE MUTUAL CONDUCTANCE READINGS:***

a. Refer to the Test Data Charts on pages 9 through 14 for the Mutual Conductance settings.

b. Follow the procedure outlined in Operational Procedure on page 6.

c. Pull the $G_m$ signal switch and note the mutual conductance of the tube as read in micromhos on the lower or inside scale. Use the correct set of figures as indicated by the position of the $G_m$ range switch. Pull the line check switch and recheck the line votlage. If any correction is required, again measure the mutual conductance.

d. Compare the meter reading with that in the column headed "Normal $G_m$."

e. When rectifiers and diodes are tested, these tubes are checked on MEDIUM AND LOW plate voltage positions. Refer to the "Remarks" column for these settings. Be sure the AMPLIFIER-RECTIFIER switch is indexed to the RECTIFIER-DIODE position. The readings on these tubes are emission readings, and therefore, the $G_m$ SIGNAL and RANGE switches are not used. On rectifiers be sure to recheck the line voltage before noting the condition of the tube on the red-green scale. Rectifier loading of the transformer will require an appreciable readjustment of the line voltage control.

f. WHERE TWO DIFFERENT SETTINGS OF THE A, B, C, AND D CONTROLS ARE REQUIRED FOR TWO SECTIONS OF A TUBE, THESE CONTROLS SHOULD NOT BE CHANGED UNLESS THE TUBE TESTER IS TURNED OFF, OR THE SHORT TESTS SWITCH IS INDEXED TO ONE OF THE SHORT TEST POSITIONS AND NOT TO THE TUBE TEST POSITION. THE TUBE MAY BE DAMAGED IF THESE CONTROLS ARE MANIPULATED WITH THE TUBE IN THE SOCKET AND THE SHORT TEST SWITCH IN THE TUBE TEST POSITION.

g. IF THE OVERLOAD INDICATOR GLOWS DURING ANY OF THESE OPERATIONS, THE TUBE TESTER SHOULD BE IMMEDIATELY TURNED OFF OR THE TUBE REMOVED FROM THE SOCKET. THE COMPLETE PROCEDURE SHOULD BE REPEATED CHECKING ALL OF THE CONTROLS AND TESTING THE TUBE FOR SHORTS.

***VR TYPES:*** **The VR-150-30**, also listed as a type OD3, is a cold glow discharge gas regulator tube, with a current regulating range from 5 to 30 milliamperes. Over this range the regulated potential should hold within 2 volts. To test this tube proceed as follows:

1. Set FILAMENT VOLTS to 13 or 27.5.

2. Set LINE CONTROL to extreme counter-clockwise position.

3. Index B switch to 2.

4. Index C switch to 4.

5. Set SELECTOR to "Voltage Regulator Tests Only", and allow 30 second warm-up time for internal rectifier.

6. Place tube in Regular Octal socket. The voltage as read on the meter should be below 150 volts, under average line conditions.

7. Rotate the LINE CONTROL slowly in a clockwise direction watching the voltmeter. As the pointer approaches the 160 volt mark, the tube should fire as indicated by a sudden drop in meter reading to 150 volts. The tube may be checked visually also, as a glow will appear in the tube when it fires.

8. Limits on firing are from 155 to 185 volts. If full rotation of the LINE CONTROL will not fire the tube, or will not bring the instrument pointer up to the 185 mark, then return the LINE CONTROL to the extreme counter-clockwise position and increase the FILAMENT VOLTS one position and bring the pointer up to 185 volts by rotation of the LINE CONTROL.

9. If the tube is within starting voltage limits, set the LINE CONTROL to a position just above the firing point and note the meter reading. This should be close to 150 volts. Rotate the FILAMENT VOLTS switch to the 115 volt position. The instrument reading should not change more than 2 volts.

**The VR-105** sometimes listed as the OC3 may be tested following the same procedure as that outlined above for the VR-150:

1. Set FILAMENT VOLTS to 1.1.

2. LINE CONTROL set to minimum (counter-clockwise).

3. Index B switch to 2.

4. Index C switch to 4.

5. Index SELECTOR for VR tests and place tube in regular octal socket.

6. Rotate LINE CONTROL and note firing potential. Limits are from 110 to 133 volts.

7. If tube fires within limits, note regulation by increasing FILAMENT VOLTS to 85. Regulation should be within 1 volt.

**PRECAUTIONS IN TESTING VR TUBES**

(1) Don't insert tube in socket until steps one through five have been completed.

(2) Be sure SELECTOR is indexed to "VOLTAGE REGULATOR TYPES ONLY" before attempting to test any VR tube.

(3) Don't change position of B & C switches when the tube is in the socket.

(4) Keep the NORMAL PLATE-SECOND PLATE toggle switch in the NORMAL

PLATE position, and the Amplifier-Rectifier toggle Switch in the Amplifier position.

(5) Keep the AMPLIFIER-RECTIFIER toggle switch in the AMPLIFIER position.

(6) The A and C controls, the SHORT TEST switch, the PLATE VOLTAGE and $G_m$ switches are not used for VR tests.

## MAINTENANCE

***PILOT LAMPS:*** Two 6.3 volt, brown bead miniature base lamps are used, one in the Pilot Lamp socket, and one in the Overload Indicator socket. The overload lamp will show a very slight indication when the tester is turned on, and will show a short interval glow when a cold, heater type tube is first inserted in the tester.

Replace burned out lamps using a 6.3 volt brown bead miniature bayonet type.

***NEON LAMPS:*** To be sure this lamp, marked Short Indicator, is operating: check a filament tube, i.e., a directly heated tube or one having no cathode. Index the Short Tests switch to Cathode Leakage. The lamp should light. If it does not glow, first be sure it has not worked loose in the socket before replacing.

***TUBES:*** Two miniature type 3A4 tubes are used; one is the signal voltage generator tube, and the other is the short test rectifier tube. They are mounted under the panel in sockets with spring clamp shield covers.

If no meter deflection is noted when the $G_m$ signal switch is pulled, but the Model 798 operates correctly on diode or rectifier tests, then the $G_m$ signal tube should be examined. The panel assembly must be removed from the case in order to examine this tube.

To remove the panel assembly from the case: (1)—Remove the panel bracket screw from the bottom of the case (Refer to Figure 1). (2)—Remove the four corner panel to case screws. (3)—Lift the panel assembly carefully and feed aproximately two feet of line cord through the rubber grommet in the accessory compartment partition. The panel assembly can then be set face down on the bench.

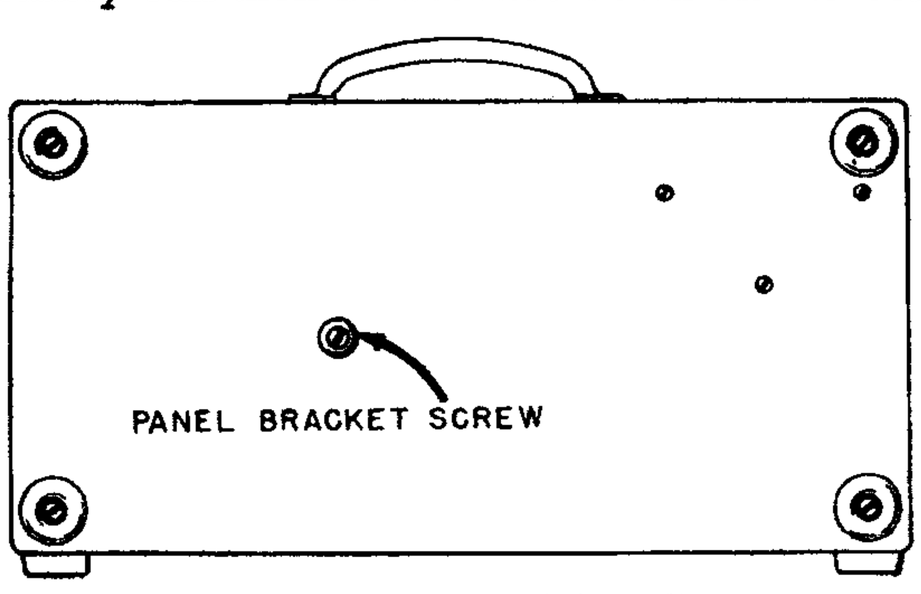


**Figure 1—Bottom View of Case Showing Location of Panel Bracket Screw.**

Examine the $G_m$ signal tube and check across pins 1 and 7 for continuity using the low or x1 ohmmeter range. If the filament is open, replace with a new 3A4 tube. No adjustments are necessary.

If no "short test" indications are noted, and the short test neon lamp has been checked, examine the short test rectifier tube next to the $G_m$ signal tube. Inspect this tube as noted above and replace it if necessary.

Replace the panel assembly in the case. **Be sure to replace all four panel bracket screws and bottom bracket screw.**

***FUSES:*** Standard 2 Amp automotive type fuses are used in the line cord plug. To remove push the fuse out of the plug using a pencil or one of the test prods.

## PREVENTIVE MAINTENANCE

***PRECAUTIONS:*** The following precautions should be observed when testing tubes in the Model 798.

(1) DON'T plug the Model 798 into a DC line. Be sure the power line to be used operates at a potential of 105 to 125 volts, 60 cycles.

(2) DON'T insert a tube in the socket before setting the FILAMENT VOLTS switch, and the A, B, C, and D controls.

(3) DON'T insert a tube in the socket with the SHORT TESTS switch in the TUBE TEST position. Index this switch to position 4 so that all short testing can be completed before setting the switch to the TUBE TEST position.

(4) DON'T change the position of the FILAMENT VOLTS switch when a tube is in one of the test sockets.

(5) DON'T change the position of the A, B, C, or D controls, when the SHORT TESTS switch is indexed to the TUBE TEST position.

(6) DON'T fail to change the setting of the PLATE VOLTAGE switch to MEDIUM or LOW, when listed in the "Remarks" column.

(7) DON'T fail to keep the $P_1 - P_2$ switch in the NORMAL PLATE position at all times, except when otherwise specified in the "Remarks" column.

(8) DON'T fail to keep the AMPLIFIER-RECTIFIER switch in the AMPLIFIER position except when making emission tests on rectifier and diodes.

(9) DON'T fail to shut off the device when through using it, and return all leads and line cords to the side compartment.

SPARE SOCKETS—Two unwired spare sockets are included. These are the loctal socket in the right hand corner, and the miniature socket nearest this loctal socket. These are available for new tube types that might require special electrode connections.

# MUTUAL CONDUCTANCE TEST DATA

| Tube Type | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 01A | 5 | 30 | 3 | 5 | 0 | 3000 | 800 | |
| 1A3 | 1.5 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, Lights on 1 & 2 |
| 1A4P | 2.0 | 30 | 3 | 1 | 0 | 3000 | 750 | Hi. Ep |
| 1A5-G | 1.5 | 20 | 1 | 2 | 23 | 3000 | 850 | Med. Ep |
| 1A6 | 2.0 | 30 | 10 | 2 | 42 | 3000 | G-B Scale | Hi. Ep |
| 1A7 | 1.5 | 30 | 2 | 2 | 50 | 3000 | G-B Scale | Med. Ep |
| 1B4-P | 2.0 | 30 | 3 | 1 | 0 | 3000 | 650 | Hi. Ep |
| 1B5 | 2.0 | 10 | 6 | 6 | 23 | 3000 | 575 | Hi. Ep, Tr. |
| | 2.0 | 50 | 5 | 11 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 1B7GT | 1.5 | 20 | 2 | 2 | 43 | 3000 | G-B Scale | Med. Ep |
| 1C5G | 1.5 | 30 | 1 | 2 | 28 | 3000 | 1550 | Med. Ep |
| 1C6 | 2.0 | 20 | 10 | 2 | 36 | 3000 | G-B Scale | Hi. Ep |
| 1C7G | 2.0 | 30 | 2 | 2 | 36 | 3000 | G-B Scale | Hi. Ep |
| 1D5GP | 2.0 | 30 | 1 | 2 | 0 | 3000 | 750 | Hi. Ep |
| 1D7G | 2.0 | 30 | 2 | 2 | 39 | 3000 | G-B Scale | Hi. Ep |
| 1D8G | 1.5 | 20 | 7 | 2 | 10 | 3000 | 925 | Med. Ep, Pe.=$P_1$ |
| | 1.5 | 0 | 7 | 2 | 10 | 3000 | 575 | Med. Ep, Tr.=$P_2$ |
| | 1.5 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, Di.=$P_2$ |
| 1E4 | 1.5 | 10 | 1 | 1 | 18 | 3000 | 825 | Med. Ep |
| 1E5GP | 2.0 | 30 | 1 | 2 | 0 | 3000 | 650 | Hi. Ep |
| 1E7G | 2.0 | 20 | 4 | 3 | 46 | 3000 | 1425 | $P_1$ & $P_2$, Tw. Tr. |
| 1F4 | 2.0 | 20 | 4 | 3 | 28 | 3000 | 1700 | Hi. Ep |
| 1F5G | 2.0 | 20 | 1 | 2 | 15 | 3000 | 1700 | Hi. Ep |
| 1F6 | 2.0 | 0 | 7 | 3 | 30 | 3000 | 650 | Hi. Ep |
| | 2.0 | 50 | 5 | 3 | 50 | Diode | | Use $P_2$, LO. Ep |
| | 2.0 | 50 | 3 | 3 | 50 | Diode | | Use $P_1$, LO. Ep |
| 1F7G | 2.0 | 15 | 2 | 6 | 0 | 3000 | 650 | Pe. |
| | 2.0 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 1G4G | 1.5 | 20 | 1 | 1 | 23 | 3000 | 825 | Med. Ep |
| 1G5 | 2.0 | 30 | 1 | 2 | 5 | 3000 | 1550 | Hi. Ep |
| 1G6GT | 1.5 | 0 | 7 | 3 | 18 | 3000 | 675 | Med. Ep, $P_1$ & $P_2$ |
| 1H4 | 2.0 | 30 | 1 | 1 | 26 | 3000 | 900 | Hi. Ep |
| 1H5 | 1.5 | 5 | 1 | 11 | 2 | 3000 | 275 | Med. Ep, Tr. |
| | 1.5 | 50 | 1 | 11 | 50 | Diode | | LO. Ep, Use $P_2$ |
| 1H6 | 2.0 | 10 | 1 | 6 | 23 | 3000 | 575 | Hi. Ep |
| 1J5 | 2.0 | 30 | 1 | 2 | 0 | 3000 | 950 | Hi. Ep |
| 1J6 | 2.0 | 0 | 7 | 3 | 35 | 3000 | G-B Scale | Hi. Ep, $P_1$ & $P_2$ Tw. Tr. |
| 1L4 | 1.5 | 0 | 4 | 5 | 23 | 3000 | 1025 | Med. Ep |
| 1LA4 | 1.5 | 20 | 5 | 1 | 23 | 3000 | 850 | Med. Ep |
| 1LA6 | 1.5 | 20 | 5 | 3 | 49 | 3000 | G-B Scale | Med. Ep |
| 1LB4 | 1.5 | 20 | 5 | 1 | 10 | 3000 | 925 | Med. Ep |
| 1LC5 | 1.5 | 5 | 5 | 10 | 0 | 3000 | 775 | Med.Ep,Lights on 1 |
| 1LC6 | 1.5 | 20 | 5 | 3 | 50 | 3000 | G-B Scale | Med. Ep |
| 1LD5 | 1.5 | 10 | 5 | 1 | 5 | 3000 | 575 | Med. Ep |
| 1LE3 | 1.5 | 0 | 5 | 1 | 10 | 3000 | 1300 | Med. Ep |
| 1LH4 | 1.5 | 5 | 5 | 1 | 2 | 3000 | 275 | Med. Ep |
| 1LN5 | 1.5 | 0 | 5 | 10 | 5 | 3000 | 800 | Med.Ep,Lights on1 |
| 1N5G | 1.5 | 0 | 1 | 2 | 0 | 3000 | 750 | Med. Ep |
| 1N6 | 1.5 | 20 | 4 | 2 | 19 | 3000 | 800 | Med. Ep |
| | 1.5 | 50 | 4 | 2 | 50 | Diode | | LO. Ep, Use $P_2$ |
| 1P5GT | 1.5 | 0 | 1 | 2 | 0 | 3000 | 750 | Med. Ep |
| 1Q5G | 1.5 | 10 | 1 | 2 | 22 | 6000 | 2200 | Med. Ep |
| 1R4/1294 | 1.5 | 50 | 2 | 2 | 50 | Diode | | LO. Ep |
| 1R5 | 1.5 | 15 | 8 | 5 | 43 | 3000 | G-B Scale | Med. Ep, Use $P_2$ |
| 1S4 | 1.5 | 20 | 11 | 9 | 22 | 3000 | 1575 | Med. Ep, Lights on 2 & 1 |
| 1S5 | 1.5 | 0 | 2 | 3 | 0 | 3000 | 625 | Med. Ep, Pe. |
| | 1.5 | 50 | 10 | 5 | 50 | Diode | | LO. Ep |
| 1SA6 | 1.5 | 0 | 3 | 5 | 0 | 3000 | 970 | Med. Ep |
| 1T4 | 1.5 | 0 | 4 | 5 | 25 | 3000 | 900 | Med. Ep |
| 1T5GT | 1.5 | 20 | 1 | 2 | 20 | 3000 | 1150 | Med. Ep |
| 1-V | 6.3 | 12 | 3 | 8 | 0 | Rect. | | Med. Ep |
| 2A3 | 2.5 | 50 | 3 | 5 | 44 | 6000 | 5250 | |
| 2A5 | 2.5 | 40 | 9 | 2 | 40 | 3000 | 2500 | |
| 2A6 | 2.5 | 5 | 1 | 6 | 32 | 3000 | 1100 | Tr. |
| | 2.5 | 50 | 12 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 2A7 | 2.5 | 30 | 3 | 3 | 34 | 3000 | G-B Scale | |
| 2B7 | 2.5 | 20 | 2 | 6 | 18 | 3000 | 1325 | Pe. |
| | 2.5 | 50 | 8 | 11 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 2C22 | 6.3 | 15 | 1 | 1 | 32 | 6000 | 3000 | |
| 2C26 | 6.3 | 20 | 1 | 1 | 42 | 3000 | 2200 | |
| 2X2 | 2.5 | 50 | 1 | 1 | 0 | Rect. | | Hi. Ep, Pl. on Cap |
| 3A4 | 3.3 | 30 | 8 | 9 | 19 | 3000 | 1900 | Lights on 1 & 2 |
| 3A5 | 3.3 | 10 | 5 | 11 | 28 | 3000 | 1800 | Med. Ep |
| 3A8 | 3.3 | 0 | 5 | 11 | 9 | 3000 | 750 | Pe. Med. Ep, |
| | 3.3 | 0 | 5 | 3 | 46 | 3000 | G-B Scale | Tr. Lights on 1 |
| 3B5 ★ | 1.5 | 40 | 2 | 2 | 33 | 3000 | 1500 | Med. Ep |
| 3B7/1291 | 3.3 | 10 | 5 | 12 | 36 | 3000 | 1850 | $P_1$ Med. Ep, |
| | 3.3 | 3 | 5 | 12 | 36 | 3000 | 1850 | $P_2$ Tw. Tr. |
| 3D6/1299 | 3.3 | 30 | 5 | 1 | 14 | 3000 | 2200 | Lights on 1 |
| 3LF4 | 3.3 | 10 | 5 | 1 | 22 | 6000 | 2200 | Med.Ep,Lights on 1 |
| 3Q4 | 2.5 | 20 | 11 | 9 | 29 | 3000 | 2150 | Med. Ep, Lights on 1 & 2 |
| 3Q5 ★ | 1.5 | 20 | 2 | 2 | 17 | 3000 | 2000 | |
| 3S4 | 3.3 | 20 | 11 | 9 | 23 | 3000 | 1425 | Med. Ep, Lights on 1 & 2 |

# MUTUAL CONDUCTANCE TEST DATA (continued)

| Tube Type | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 5R4-GY | 5 | 14 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5T4 | 5 | 12 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5U4-G | 5 | 15 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5V4 | 5 | 11 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5W4 | 5 | 16 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5X3 | 5 | 14 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5X4 | ✱ 5 | 14 | 4 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5Y3-GT | 5 | 16 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5Y4 | ✱ 5 | 16 | 4 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5Z3 | 5 | 13 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 5Z4 | 5 | 11 | 2 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 6A3 | 6.3 | 50 | 3 | 5 | 44 | 6000 | 5250 | |
| 6A4/LA | 6.3 | 40 | 4 | 3 | 25 | 3000 | 2200 | |
| 6A5 | 6.3 | 50 | 8 | 1 | 46 | 12000 | 5250 | Lights on 1 & K |
| 6A6 | 6.3 | 0 | 1 | 3 | 37 | 6000 | 3300 | |
| 6A7 | 6.3 | 30 | 3 | 3 | 34 | 3000 | G-B Scale | |
| 6A8 | 6.3 | 30 | 7 | 2 | 41 | 3000 | G-B Scale | |
| 6AB6 | 6.3 | 0 | 1 | 1 | 45 | 3000 | 1800 | |
| 6AB7 | 6.3 | 5 | 3 | 8 | 20 | 12000 | 5000 | |
| 6AC5 | 6.3 | 0 | 1 | 1 | 43 | 6000 | 3400 | |
| 6AC7 | 6.3 | 5 | 3 | 8 | 14 | 12000 | 9000 | |
| 6AD6 | 6.3 | 0 to 50 | 1 | 5 | | | | Swing. "A" from 0 to 50 Incr. Green approx. 50% |
| 6AD7 | 6.3 | 30 | 9 | 2 | 30 | 3000 | 2500 | Pe. |
| | 6.3 | 20 | 9 | 2 | 20 | 3000 | 325 | Use $P_2$, Tr. |
| 6AE5 | 6.3 | 50 | 1 | 1 | 14 | 3000 | 1200 | |
| 6AE6 | 6.3 | 5 | 1 | 1 | 37 | 3000 | 1000 | Use $P_1$ |
| | 6.3 | 5 | 1 | 1 | 37 | 3000 | 950 | Use $P_2$ |
| 6AE7 | 6.3 | 15 | 1 | 7 | 14 | 6000 | 3000 | |
| 6AF5 | 6.3 | 40 | 1 | 1 | 32 | 3000 | 1500 | |
| 6AF6 | 6.3 | 0 to 50 | 1 | 5 | | | | Swing. "A" from 0 to 50 Incr. Green approx. 50% |
| 6AG5 | ✱ 6.3 | 5 | 10 | 8 | 28 | 6000 | 5000 | |
| 6AG7 | 6.3 | 15 | 3 | 7 | 41 | 12000 | 7700 | |
| 6AK5 | ✱ 6.3 | 10 | 10 | 8 | 32 | 6000 | 5000 | |
| 6AK6 | ★ 6.3 | 30 | 10 | 3 | 40 | 6000 | 2250 | |
| 6AL5 | ✱ 6.3 | 45 | 7 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ Lights on 1 |
| 6AQ5 | ★ 6.3 | 10 | 4 | 8 | 44 | 6000 | 3700 | Lights on 4 & 1 |
| 6AQ6 | ✱ 6.3 | 5 | 2 | 7 | 30 | 3000 | 1200 | Tr. |
| | 6.3 | 50 | 8 | 6 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |

| Tube Type | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 6AS6 | ★ 6.3 | 5 | 6 | 8 | 13 | 6000 | 3500 | |
| 6AS7 | 6.3 | 50 | 5 | 5 | 45 | 3000 | G-B Scale | Med. Ep, Tr. #1 |
| | ★ 6.3 | 50 | 10 | 1 | 45 | 3000 | G-B Scale | Med. Ep, Tr. #2 |
| 6AT6 | 6.3 | 5 | 2 | 7 | 20 | 3000 | 1200 | Tr. |
| | ★ 6.3 | 50 | 8 | 6 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6AU6 | ★ 6.3 | 10 | 10 | 8 | 33 | 12000 | 5200 | |
| 6B4 | 6.3 | 50 | 1 | 1 | 42 | 6000 | 5250 | |
| 6B5 | 6.3 | 0 | 9 | 1 | 48 | 3000 | 2400 | |
| 6B6 | 6.3 | 5 | 1 | 6 | 35 | 3000 | 1125 | Tr. |
| | 6.3 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6B7 | 6.3 | 20 | 2 | 6 | 18 | 3000 | 1325 | Pe. |
| | 6.3 | 50 | 8 | 11 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6B8 | 6.3 | 30 | 12 | 6 | 28 | 3000 | 1125 | Pe. |
| | 6.3 | 50 | 12 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6BA6 | ★ 6.3 | 10 | 10 | 3 | 30 | 6000 | 4400 | |
| 6BE6 | ★ 6.3 | 15 | 8 | 8 | 32 | 6000 | G-B Scale | |
| 6BF6 | 6.3 | 20 | 2 | 7 | 37 | 3000 | 1900 | Tr. |
| | ★ 6.3 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6C4 | ✱ 6.3 | 15 | 10 | 11 | 33 | 3000 | 2200 | |
| 6C5 | 6.3 | 10 | 1 | 1 | 32 | 6000 | 2100 | |
| 6C6 | 6.3 | 15 | 9 | 2 | 24 | 3000 | 1225 | |
| 6C7 | 6.3 | 15 | 2 | 6 | 28 | 3000 | 1250 | Tr. |
| | 6.3 | 50 | 3 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6C8 | 6.3 | 5 | 7 | 6 | 23 | 3000 | 1600 | Use $P_1$ |
| | 6.3 | 5 | 7 | 2 | 23 | 3000 | 1600 | Use $P_2$, Lights on 2 |
| 6D6 | 6.3 | 20 | 9 | 2 | 27 | 3000 | 1600 | |
| 6D8G | 6.3 | 30 | 7 | 2 | 38 | 3000 | G-B Scale | |
| 6E5 | 6.3 | 10 | 1 | 3 | 50 | 3000 | G-B Scale | |
| 6E6 | 6.3 | 40 | 1 | 3 | 45 | 6000 | 2800 | |
| 6F5 | 6.3 | 5 | 1 | 2 | 30 | 3000 | 1500 | |
| 6F6 | 6.3 | 30 | 1 | 2 | 34 | 3000 | 2500 | |
| 6F7 | 6.3 | 10 | 2 | 3 | 8 | 3000 | 1100 | Pe. |
| | 6.3 | 40 | 3 | 8 | 10 | 3000 | 500 | Tr. |
| 6F8 | 6.3 | 10 | 7 | 6 | 20 | 6000 | 2600 | Use $P_1$ |
| | 6.3 | 10 | 7 | 2 | 20 | 6000 | 2600 | Use $P_2$, Lights on2 |
| 6G6 | 6.3 | 30 | 1 | 2 | 37 | 3000 | 2300 | |
| 6H4 | 6.3 | 50 | 1 | 2 | 50 | Diode | G-B Scale | LO. Ep |
| 6H6 | 6.3 | 50 | 1 | 4 | 50 | Diode | G-B Scale | LO. Ep, $P_1$ & $P_2$ |
| 6J4 | ★ 6.3 | 5 | 11 | 7 | 28 | 12000 | 10000 | 5 min. warm-up time |
| 6J5 | 6.3 | 15 | 1 | 1 | 36 | 6000 | 2600 | |
| 6J6 | ✱ 6.3 | 5 | 6 | 11 | 24 | 12000 | 5300 | $P_1$ & $P_2$, Tw. Tr. |
| 6J7 | 6.3 | 15 | 1 | 2 | 22 | 3000 | 1225 | |
| 6J8 | 6.3 | 20 | 7 | 2 | 30 | 3000 | 1600 | |
| 6K5 | 6.3 | 5 | 1 | 1 | 25 | 3000 | 1475 | |
| 6K6 | 6.3 | 30 | 1 | 2 | 32 | 3000 | 2300 | |

# MUTUAL CONDUCTANCE TEST DATA (continued)

| Tube Type | | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 6K7 | | 6.3 | 20 | 1 | 2 | 25 | 3000 | 1450 | |
| 6K8 | | 6.3 | 20 | 7 | 2 | 47 | 6000 | G-B Scale | Hex. |
| | | 6.3 | 0 | 7 | 2 | 42 | 6000 | G-B Scale | Tr. |
| 6L5 | | 6.3 | 15 | 1 | 1 | 35 | 3000 | 1900 | |
| 6L6 | | 6.3 | 10 | 1 | 2 | 44 | 12000 | 6000 | Med. Ep |
| 6L7 | | 6.3 | 20 | 1 | 2 | 7 | 3000 | 1100 | |
| 6N6 | | 6.3 | 0 | 1 | 2 | 20 | 3000 | 2400 | |
| 6N7 | | 6.3 | 10 | 7 | 3 | 43 | 3000 | 1600 | $P_1$ & $P_2$ |
| 6P5GT/G | | 6.3 | 20 | 1 | 1 | 30 | 3000 | 1450 | |
| 6Q6 | | 6.3 | 5 | 1 | 11 | 19 | 3000 | 1050 | Tr. |
| | | 6.3 | 50 | 1 | 11 | 50 | Diode | | LO. Ep, Use $P_2$ |
| 6Q7 | | 6.3 | 10 | 1 | 6 | 35 | 3000 | 1200 | Tr. |
| | | 6.3 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6R7 | | 6.3 | 15 | 1 | 6 | 35 | 3000 | 1900 | Tr. |
| | | 6.3 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6S7 | | 6.3 | 20 | 1 | 2 | 26 | 3000 | 1750 | |
| 6S8 | | 6.3 | 5 | 7 | 8 | 34 | 3000 | 1100 | Tr. |
| | ★ | 6.3 | 50 | 12 | 1 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$, Dl. 2 & 3 |
| | | 6.3 | 50 | 2 | 7 | 50 | Diode | | LO. Ep, Lights on K |
| 6SA7 | | 6.3 | 20 | 11 | 2 | 40 | 6000 | G-B Scale | |
| 6SC7 | ✶ | 6.3 | 10 | 8 | 5 | 50 | 3000 | 1375 | $P_1$ & $P_2$, Tw. Tr. |
| 6SD7GT | | 6.3 | 10 | 3 | 8 | 27 | 6000 | 4250 | |
| 6SF5 | ✶ | 6.3 | 5 | 1 | 4 | 30 | 3000 | 1500 | |
| 6SF7 | | 6.3 | 20 | 6 | 2 | 28 | 3000 | 2050 | Pe. |
| | ★ | 6.3 | 50 | 6 | 9 | 50 | Diode | | LO. Ep |
| 6SG7 | | 6.3 | 10 | 3 | 8 | 30 | 6000 | 4700 | |
| 6SH7 | | 6.3 | 5 | 3 | 8 | 32 | 6000 | 4900 | |
| 6SJ7 | | 6.3 | 20 | 3 | 8 | 28 | 3000 | 1650 | |
| 6SK7 | | 6.3 | 20 | 3 | 8 | 25 | 3000 | 2000 | |
| 6SL7 | | 6.3 | 5 | 10 | 1 | 33 | 3000 | 1600 | Tr. 1 |
| | ★ | 6.3 | 5 | 7 | 5 | 33 | 3000 | 1600 | Tr. 2 |
| 6SN7 | | 6.3 | 20 | 10 | 1 | 50 | 6000 | 2600 | Tr. 1 |
| | ★ | 6.3 | 20 | 7 | 5 | 50 | 6000 | 2600 | Tr. 2 |
| 6SQ7 | | 6.3 | 5 | 6 | 6 | 32 | 3000 | 1100 | Tr. |
| | ★ | 6.3 | 50 | 6 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6SR7 | | 6.3 | 20 | 6 | 6 | 37 | 3000 | 1900 | Tr. |
| | ★ | 6.3 | 50 | 6 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6SS7 | | 6.3 | 20 | 3 | 8 | 25 | 3000 | 1850 | |
| 6ST7 | | 6.3 | 20 | 6 | 6 | 37 | 3000 | 1900 | Tr. |
| | ★ | 6.3 | 50 | 6 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6T7G | | 6.3 | 5 | 1 | 6 | 25 | 3000 | 1050 | Tr. |
| | | 6.3 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |

| Tube Type | | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 6U5/6G5 | | 6.3 | 0 | 1 | 3 | 42 | 3000 | G-B Scale | |
| 6U6GT | | 6.3 | 50 | 1 | 2 | 48 | 12000 | 6200 | |
| 6U7G | | 6.3 | 20 | 1 | 2 | 25 | 3000 | 1600 | |
| 6V6 | | 6.3 | 30 | 1 | 2 | 44 | 6000 | 4100 | |
| 6V7G | | 6.3 | 25 | 1 | 6 | 19 | 3000 | 1100 | Tr. |
| | | 6.3 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 6W5G | | 6.3 | 12 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 6W7G | | 6.3 | 15 | 1 | 2 | 22 | 3000 | 1225 | |
| 6X4 | | 6.3 | 14 | 6 | 8 | 0 | Rect. | | Med. Ep, Use $P_1$ |
| | ★ | 6.3 | 14 | 6 | 9 | 0 | Rect. | | Med. Ep, Use $P_2$ |
| 6X5 | | 6.3 | 13 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 6Y5 | | 6.3 | 13 | 8 | 2 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 6Y6 | | 6.3 | 50 | 1 | 2 | 50 | 12000 | 6000 | |
| 6Y7 | | 6.3 | 0 | 7 | 3 | 40 | 3000 | G-B Scale | $P_1$ & $P_2$ |
| 6Z7G | | 6.3 | 0 | 7 | 3 | 42 | 3000 | G-B Scale | $P_1$ & $P_2$, Tw. Tr. |
| 6ZY5G | | 6.3 | 13 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 7A4 | | 6.3 | 15 | 6 | 1 | 36 | 6000 | 2600 | |
| 7A5 | | 6.3 | 30 | 6 | 1 | 45 | 12000 | 6000 | |
| 7A6 | | 6.3 | 50 | 8 | 1 | 50 | Diode | G-B Scale | LO. Ep, $P_1$ & $P_2$ |
| 7A7 | | 6.3 | 20 | 6 | 3 | 28 | 3000 | 2000 | |
| 7A8 | | 6.3 | 40 | 6 | 3 | 43 | 3000 | G-B Scale | |
| 7B4 | | 6.3 | 5 | 6 | 1 | 34 | 3000 | 1500 | |
| 7B5 | | 6.3 | 40 | 6 | 1 | 39 | 3000 | 2300 | |
| 7B6 | | 6.3 | 5 | 2 | 9 | 34 | 3000 | 1100 | Lights on 1, Tr. |
| | | 6.3 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 7B7 | | 6.3 | 20 | 6 | 3 | 30 | 3000 | 1700 | |
| 7B8 | | 6.3 | 30 | 6 | 3 | 34 | 3000 | G-B Scale | |
| 7C4/1203A | | 6.3 | 50 | 2 | 2 | 50 | Diode | | LO. Ep |
| 7C5 | | 6.3 | 25 | 6 | 1 | 37 | 6000 | 3700 | |
| 7C6 | | 6.3 | 5 | 2 | 9 | 35 | 3000 | 1325 | Lights on 1 |
| 7C7 | | 6.3 | 10 | 6 | 3 | 13 | 3000 | 1300 | |
| 7E5/1201 | ✶ | 6.3 | 5 | 5 | 6 | 21 | 6000 | 3075 | Lights on 4, 1 & K |
| 7E6 | | 6.3 | 15 | 2 | 9 | 35 | 3000 | 1900 | Lights on 1, Tr. |
| | | 6.3 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 7E7 | | 6.3 | 20 | 6 | 4 | 24 | 3000 | 1300 | Pe. |
| | | 6.3 | 50 | 7 | 1 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 7F7 | | 6.3 | 5 | 8 | 7 | 45 | 3000 | 1600 | $P_1$ & $P_2$, Tw. Tr. |
| 7F8 | ★ | 6.3 | 5 | 6 | 5 | 3 | 12000 | 5000 | Lights on K |
| 7G7/1232 | | 6.3 | 5 | 6 | 3 | 0 | 12000 | 4500 | |
| 7G8/1206 | | 6.3 | 10 | 12 | 7 | 18 | 6000 | 4200 | |
| 7H7 | | 6.3 | 15 | 6 | 3 | 40 | 6000 | 3800 | |
| 7J7 | | 6.3 | 0 | 7 | 7 | 34 | 3000 | G-B Scale | Tr. |
| | | 6.3 | 20 | 6 | 8 | 40 | 3000 | G-B Scale | Hep. |
| 7K7 | | 6.3 | 5 | 8 | 10 | 35 | 3000 | 1600 | Tr. |
| | | 6.3 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 7L7 | | 6.3 | 10 | 6 | 3 | 27 | 6000 | 3100 | |
| 7N7 | | 6.3 | 10 | 8 | 7 | 26 | 6000 | 2600 | $P_1$ & $P_2$, Tw. Tr. |

# MUTUAL CONDUCTANCE TEST DATA (continued)

| Tube Type | | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 7Q7 | | 6.3 | 30 | 6 | 7 | 33 | 3000 | G-B Scale | |
| 7R7 | | 6.3 | 10 | 6 | 4 | 33 | 6000 | 3200 | |
| | | 6.3 | 50 | 7 | 1 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 7S7 | | 6.3 | 20 | 6 | 3 | 32 | 3000 | G-B Scale | |
| 7V7 | | 6.3 | 10 | 6 | 3 | 30 | 12000 | 5800 | |
| 7W7 | | 6.3 | 10 | 6 | 6 | 28 | 12000 | 5800 | |
| 7Y4 | | 6.3 | 13 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 7Z4 | | 6.3 | 16 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 10 | | 7.5 | 40 | 3 | 5 | 23 | 3000 | 1330 | |
| 12A | | 5.0 | 40 | 3 | 5 | 21 | 3000 | 1800 | |
| 12A5 | | 13 | 50 | 5 | 6 | 36 | 3000 | 2400 | Lights on 1 & K |
| 12A6 | | 13 | 25 | 1 | 2 | 36 | 6000 | 3000 | |
| 12A7 | | 13 | 40 | 2 | 1 | 20 | 3000 | 975 | Use $P_1$ } No K |
| | | 13 | 10 | 2 | 1 | 0 | Rect. | | Med. Ep, Use $P_2$ } LeakTest |
| 12A8 | | 13 | 30 | 7 | 2 | 35 | 3000 | G-B Scale | |
| 12AH7GT | | 13 | 10 | 9 | 7 | 0 | 3000 | 1000 | $P_1$ |
| | | 13 | 10 | 9 | 7 | 39 | 3000 | 1000 | $P_2$ } Lights on 4 & K |
| 12AT6 | ★ | 13 | 5 | 2 | 7 | 20 | 3000 | 1200 | Tr. |
| | ★ | 13 | 50 | 8 | 6 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 12B7/14A7 | | 13 | 20 | 6 | 3 | 26 | 3000 | 2000 | |
| 12B8 | | 13 | 20 | 11 | 11 | 27 | 3000 | 1800 | Use $P_1$, Pe. |
| | | 13 | 0 | 11 | 11 | 15 | 3000 | 2400 | Use $P_2$, Remove Grid Cap Lead, Tr. |
| 12BA6 | ★ | 13 | 10 | 10 | 3 | 30 | 6000 | 4400 | |
| 12BE6 | ★ | 13 | 15 | 8 | 8 | 32 | 6000 | G-B Scale | |
| 12BF6 | ✶ | 13 | 20 | 2 | 7 | 37 | 3000 | 1900 | Tr. |
| | ✶ | 13 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 12C8 | | 13 | 25 | 12 | 6 | 26 | 3000 | 1325 | Pe. |
| | | 13 | 50 | 12 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 12F5 | | 13 | 5 | 1 | 2 | 30 | 3000 | 1500 | |
| 12H6 | | 13 | 50 | 1 | 4 | 50 | Diode | G-B Scale | LO. Ep, $P_1$ & $P_2$ |
| 12J5 | | 13 | 15 | 1 | 1 | 36 | 6000 | 2600 | |
| 12J7GT | | 13 | 15 | 1 | 2 | 22 | 3000 | 1225 | |
| 12K7 | | 13 | 20 | 1 | 2 | 25 | 3000 | 1450 | |
| 12K8 | | 13 | 20 | 7 | 2 | 47 | 6000 | G-B Scale | Hex. |
| | | 13 | 0 | 7 | 2 | 42 | 6000 | G-B Scale | Tr. |
| 12Q7 | | 13 | 10 | 1 | 6 | 35 | 3000 | 1200 | Tr. |
| | | 13 | 50 | 1 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 12SA7 | | 13 | 20 | 11 | 2 | 40 | 6000 | G-B Scale | |
| 12SC7 | ✶ | 13 | 10 | 8 | 5 | 50 | 3000 | 1325 | $P_1$ & $P_2$, Tw. Tr. |
| 12SF5 | ✶ | 13 | 5 | 1 | 4 | 30 | 3000 | 1500 | |
| 12SF7 | | 13 | 20 | 6 | 2 | 28 | 3000 | 2050 | Pe. |
| | ★ | 13 | 50 | 6 | 9 | 50 | Diode | | LO. Ep |
| 12SG7 | | 13 | 10 | 3 | 8 | 35 | 6000 | 4700 | |
| 12SH7 | | 13 | 5 | 3 | 8 | 32 | 6000 | 4800 | |

| Tube Type | | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 12SJ7 | | 13 | 20 | 3 | 8 | 28 | 3000 | 1650 | |
| 12SK7 | | 13 | 20 | 3 | 8 | 25 | 3000 | 2000 | |
| 12SL7 | ✶ | 13 | 5 | 10 | 1 | 33 | 3000 | 1600 | Tr. 1 |
| | ✶ | 13 | 5 | 7 | 5 | 33 | 3000 | 1600 | Tr. 2 |
| 12SN7 | ✶ | 13 | 20 | 10 | 1 | 50 | 6000 | 2600 | Tr. 1 |
| | ✶ | 13 | 20 | 7 | 5 | 50 | 6000 | 2600 | Tr. 2 |
| 12SQ7 | ✶ | 13 | 5 | 6 | 6 | 32 | 3000 | 1100 | Tr. |
| | ✶ | 13 | 50 | 6 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 12SR7 | ✶ | 13 | 20 | 6 | 6 | 37 | 3000 | 1900 | Tr. |
| | ✶ | 13 | 50 | 6 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 12Z3 | | 13 | 11 | 3 | 8 | 0 | Rect. | | Med. Ep |
| 14A4 | | 13 | 20 | 6 | 1 | 45 | 6000 | 2600 | |
| 14A7/12B7 | | 13 | 20 | 6 | 3 | 26 | 3000 | 2000 | |
| 14B6 | | 13 | 5 | 2 | 9 | 27 | 3000 | 1100 | Lights on 1, Tr. |
| | | 13 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$, Lights on 4 |
| 14B8 | | 13 | 30 | 6 | 3 | 34 | 3000 | G-B Scale | |
| 14C5 | | 13 | 20 | 6 | 1 | 33 | 6000 | 3250 | |
| 14C7 | | 13 | 10 | 6 | 3 | 10 | 3000 | 1625 | |
| 14E6 | | 13 | 20 | 2 | 9 | 38 | 3000 | 1900 | Lights on 1, Tr. |
| | | 13 | 50 | 8 | 8 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$, Lights on 4 |
| 14E7 | | 13 | 20 | 6 | 4 | 24 | 3000 | 1300 | Pe. |
| | | 13 | 50 | 7 | 1 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 14H7 | | 13 | 10 | 6 | 3 | 30 | 6000 | 3800 | |
| 14J7 | | 13 | 30 | 6 | 3 | 40 | 3000 | G-B Scale | |
| 14N7 | | 13 | 10 | 8 | 7 | 26 | 6000 | 2600 | $P_1$ & $P_2$, Tw. Tr. |
| 14Q7 | | 13 | 30 | 6 | 7 | 33 | 3000 | G-B Scale | |
| 14R7 | | 13 | 10 | 6 | 4 | 33 | 6000 | 3200 | Pe. |
| | | 13 | 50 | 7 | 1 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 14S7 | | 13 | 20 | 6 | 3 | 32 | 3000 | G-B Scale | |
| 14W7 | | 13 | 10 | 6 | 6 | 28 | 12000 | 5800 | |
| 14Y4 | | 13 | 13 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 19 | | 2.0 | 10 | 10 | 3 | 19 | 3000 | 2000 | |
| 24 A | | 2.5 | 20 | 1 | 2 | 24 | 3000 | 1050 | |
| 25A6 | | 27.5 | 50 | 1 | 2 | 35 | 3000 | 2450 | |
| 25A7GT | | 27.5 | 50 | 7 | 2 | 26 | 3000 | 1800 | Pe. |
| | | 27.5 | 12 | 7 | 2 | 0 | Rect. | | Med. Ep, Use $P_2$ |
| 25AC5 | | 27.5 | 0 | 1 | 1 | 35 | 6000 | 3800 | |
| 25B5 | | 27.5 | 40 | 9 | 2 | 36 | 3000 | 2300 | |
| 25B6 | | 27.5 | 50 | 1 | 2 | 47 | 12000 | 5000 | |
| 25B8 | | 27.5 | 20 | 11 | 2 | 28 | 3000 | 2000 | Pe. |
| | | 27.5 | 5 | 11 | 4 | 34 | 3000 | 1500 | Tr. |
| 25C6 | | 27.5 | 50 | 1 | 2 | 50 | 12000 | 6000 | |
| 25L6 | | 27.5 | 30 | 1 | 2 | 47 | 6000 | G-B Scale | Med. Ep |
| 25N6 | | 27.5 | 40 | 1 | 1 | 47 | 3000 | 2300 | Use $P_2$ |
| 25Z5 | | 27.5 | 11 | 8 | 6 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |

# MUTUAL CONDUCTANCE TEST DATA (continued)

| Tube Type | | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 25Z6 | | 27.5 | 11 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 26 | | 1.5 | 30 | 3 | 5 | 23 | 3000 | 1100 | |
| 26A6 | ★ | 27.5 | 10 | 10 | 8 | 17 | 12000 | 4000 | |
| 26C6 | ★ | 27.5 | 20 | 2 | 7 | 34 | 3000 | 1900 | Tr. |
| | | 27.5 | 50 | 8 | 6 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 26D6 | ★ | 27.5 | 0 | 10 | 8 | 17 | 6000 | G-B Scale | |
| 27 | | 2.5 | 20 | 1 | 3 | 12 | 3000 | 1000 | |
| 28D7 | | 27.5 | 7 | 11 | 3 | 50 | 3000 | G-B Scale | Med.Ep,Te.1 Lights |
| | | 27.5 | 7 | 11 | 11 | 50 | 3000 | G-B Scale | Med.Ep,Te.2 on 4 |
| 30 | | 2.0 | 25 | 3 | 5 | 16 | 3000 | 900 | |
| 31 | | 2.0 | 40 | 3 | 5 | 16 | 3000 | 1050 | |
| 32 | | 2.0 | 30 | 3 | 1 | 14 | 3000 | 650 | |
| 32L7 | | 27.5 | 20 | 7 | 2 | 42 | 12000 | 6000 | Med. Ep, Te. |
| | | 27.5 | 11 | 7 | 2 | 0 | Rect. | | Med. Ep, Use $P_2$ |
| 33 | | 2.0 | 50 | 4 | 3 | 40 | 3000 | 1700 | |
| 34 | | 2.0 | 20 | 3 | 1 | 0 | 3000 | 750 | |
| 35 | | 2.5 | 20 | 1 | 2 | 25 | 3000 | 1050 | |
| 35A5 | | 35 | 20 | 6 | 1 | 40 | 12000 | 5900 | |
| 35L6 | | 35 | 40 | 1 | 2 | 47 | 12000 | 5900 | |
| 35W4 | ★ | 35 | 11 | 10 | 1 | 0 | Rect. | | Med. Ep |
| 35Y4 | | 35 | 11 | 3 | 3 | 0 | Rect. | | Med. Ep, Lights on 4 & K |
| 35Z3 | | 35 | 10 | 2 | 1 | 0 | Rect. | | Med. Ep |
| 35Z4 | | 35 | 11 | 1 | 4 | 0 | Rect. | | Med. Ep |
| 35Z5 | | 35 | 10 | 1 | 4 | 0 | Rect. | | Med. Ep, Lights on 1 & K |
| 35Z6 | | 35 | 10 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 36 | | 6.3 | 15 | 1 | 2 | 16 | 3000 | 1100 | |
| 37 | | 6.3 | 20 | 1 | 3 | 18 | 3000 | 1100 | |
| 38 | | 6.3 | 40 | 1 | 2 | 24 | 3000 | 1050 | |
| 39 | | 6.3 | 20 | 1 | 2 | 18 | 3000 | 1000 | |
| 40 | | 5.0 | 10 | 3 | 5 | 45 | 3000 | G-B Scale | |
| 41 | | 6.3 | 40 | 9 | 2 | 37 | 3000 | 2300 | |
| 42 | | 6.3 | 30 | 9 | 2 | 30 | 3000 | 2500 | |
| 43 | | 27.5 | 50 | 9 | 2 | 36 | 3000 | 2500 | |
| 45 | | 2.5 | 50 | 3 | 5 | 32 | 3000 | 2175 | |
| 45Z3 | | 47 | 12 | 6 | 9 | 0 | Rect. | | Med. Ep, Lights on 2 & 1 |
| 45Z5 | | 47 | 10 | 1 | 4 | 0 | Rect. | | Med. Ep, Lights on 1 & K |
| 46 | | 2.5 | 40 | 4 | 3 | 28 | 3000 | 2350 | |
| 47 | | 2.5 | 25 | 4 | 3 | 32 | 3000 | 2500 | |
| 48 | | 27.5 | 50 | 9 | 2 | 46 | 6000 | 3900 | |
| 49 | | 2.0 | 0 | 5 | 3 | 10 | 3000 | 1150 | |
| 50 | | 7.5 | 50 | 3 | 5 | 32 | 3000 | 2000 | |
| 50A5 | | 47 | 30 | 6 | 1 | 45 | 12000 | 8200 | |
| 50B5 | ★ | 47 | 30 | 4 | 8 | 47 | 6000 | G-B Scale | Lights on 4 & 1 |
| 50C6 | | 47 | 50 | 1 | 2 | 43 | 6000 | G-B Scale | |
| 50L6 | | 47 | 30 | 1 | 2 | 47 | 6000 | G-B Scale | Med. Ep |
| 50Y6 | | 47 | 11 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 50Z7 | ★ | 47 | 11 | 7 | 9 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 53 | | 2.5 | 0 | 1 | 3 | 32 | 3000 | 2400 | |
| 55 | | 2.5 | 25 | 7 | 1 | 25 | 3000 | 1100 | Tr. |
| | | 2.5 | 50 | 12 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 56 | | 2.5 | 20 | 1 | 3 | 30 | 3000 | 1450 | |
| 57 | | 2.5 | 10 | 9 | 2 | 5 | 6000 | 1200 | |
| 58 | | 2.5 | 30 | 9 | 2 | 37 | 3000 | 1600 | |
| 59 | | 2.5 | 40 | 6 | 3 | 41 | 3000 | 2500 | |
| 70L7 | | 70 | 20 | 8 | 2 | 48 | 12000 | 7500 | Med. Ep, Te. |
| | | 70 | 11 | 8 | 2 | 0 | Rect. | | Med. Ep, Use $P_2$ |
| 71A | | 5.0 | 50 | 3 | 5 | 31 | 3000 | 1820 | |
| 75 | | 6.3 | 5 | 7 | 1 | 32 | 3000 | 1100 | Tr. |
| | | 6.3 | 50 | 12 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 76 | | 6.3 | 20 | 1 | 3 | 30 | 3000 | 1450 | |
| 77 | | 6.3 | 10 | 9 | 2 | 5 | 6000 | 1200 | |
| 78 | | 6.3 | 20 | 9 | 2 | 25 | 3000 | 1450 | |
| 79 | | 6.3 | 0 | 8 | 3 | 50 | 6000 | 4000 | $P_1$ & $P_2$, Tw. Tr. |
| 80 | | 5.0 | 16 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 81 | | 7.5 | 19 | 3 | 1 | 0 | Rect. | | Med. Ep |
| 82 | | 2.5 | 11 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 83 | | 5.0 | 11 | 3 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 84 | | 6.3 | 12 | 1 | 1 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 85 | | 6.3 | 25 | 7 | 1 | 25 | 3000 | 1100 | Tr. |
| | | 6.3 | 50 | 12 | 9 | 50 | Diode | | LO. Ep, $P_1$ & $P_2$ |
| 89 | | 6.3 | 40 | 9 | 2 | 33 | 3000 | 1800 | |
| 117L7 | | 115 | 20 | 7 | 10 | 47 | 12000 | 5300 | Med. Ep, Te. |
| | | 115 | 11 | 7 | 10 | 0 | Rect. | | Med. Ep, Use $P_2$ |
| 117N7 | | 115 | 20 | 8 | 10 | 50 | 12000 | 7000 | Med. Ep, No Short Test, Pe. |
| | | 115 | 35 | 8 | 10 | 0 | Rect. | | LO. Ep, Use $P_2$ |
| 117P7 | | 115 | 20 | 8 | 10 | 47 | 12000 | 5300 | Med. Ep, No Short Test, Pe. |
| | | 115 | 35 | 8 | 10 | 0 | Rect. | | LO. Ep, Use $P_2$ |
| 117Z3 | ★ | 115 | 12 | 1 | 4 | 0 | Rect. | | Med. Ep, Lights on 2 |
| 117Z4 | | 115 | 11 | 1 | 4 | 0 | Rect. | | Med. Ep |
| 117Z6 | | 115 | 10 | 1 | 4 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |

# MUTUAL CONDUCTANCE TEST DATA (continued)

| Tube Type | Filament Volts | CONTROL SETTINGS A | B | C | D | Gm Range | Normal Gm | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 807 | 6.3 | 40 | 1 | 3 | 50 | 6000 | 4300 | Plate on Cap |
| 954 | 6.3 | 15 | 10 | 5 | 22 | 3000 | 1400 | |
| 955 | 6.3 | 15 | 3 | 5 | 35 | 3000 | 2200 | |
| 956 | 6.3 | 20 | 10 | 5 | 27 | 3000 | 1800 | |
| 957 | 1.1 | 20 | 3 | 9 | 25 | 3000 | 650 | |
| 958A | 1.1 | 20 | 3 | 9 | 20 | 3000 | 1200 | |
| 1005 | * 6.3 | 11 | 2 | 12 | 0 | Rect. | | Med. Ep, $P_1$ & $P_2$ |
| 1609 | 1.1 | 20 | 4 | 3 | 19 | 3000 | 725 | |
| 1612 | 6.3 | 20 | 1 | 2 | 7 | 3000 | 1100 | |
| 1621 | 6.3 | 30 | 1 | 2 | 33 | 3000 | 2500 | |
| 1622 | 6.3 | 10 | 1 | 2 | 44 | 12000 | 6000 | Med. Ep |
| 1629 | 13 | 10 | 1 | 2 | 50 | 3000 | G-B Scale | |
| 1851 | 6.3 | 5 | 1 | 2 | 18 | 12000 | 9000 | |
| 9001 | * 6.3 | 10 | 10 | 8 | 0 | 6000 | 1400 | |
| 9002 | * 6.3 | 15 | 10 | 11 | 40 | 3000 | 2200 | Lights on 1 |
| 9003 | * 6.3 | 30 | 10 | 8 | 40 | 3000 | 1800 | |
| 9004 | 6.3 | 50 | 3 | 8 | 50 | Diode | G-B Scale | LO. Ep |
| 9005 | 3.3 | 50 | 1 | 1 | 50 | Diode | G-B Scale | LO. Ep |
| 9006 | * 6.3 | 10 | 10 | 2 | 20 | Diode | | Med.Ep,Lights on4 |

| | |
|---|---|
| Cap | Tube Top Cap Connector |
| Conv | Converter |
| Di | Diode |
| $G_m$ | Mutual Conductance (Transconductance) |
| Hex | Hexode |
| Norm | Normal. This is the normal value for good tubes where the indications do not conform to the red-green scale or the mutual conductance scale. |
| Pe | Pentode |
| Rect | Rectifier |
| Lights on | Short test neon lamp glows when short test switch is on these positions, indicating internal tube connections. |
| Tr | Triode |
| Tw Pe | Twin Pentode |
| Tw Tr | Twin Triode |
| ★ | Test in A Socket |