CHAPTER 1

THEORY

Section I. GENERAL

1. Scope

a. This manual covers field and depot maintenance for Test Sets, Electron Tube TV–2/U, TV–2A/U, TV–2B/U and TV–2C/U. It includes instructions to fourth and fifth echelons for troubleshooting, testing, aligning, and repairing the equipment; replacing maintenance parts; and repairing specified maintenance parts. It also lists tools, materials, and test equipment for fourth and fifth echelon maintenance. There are no maintenance functions allocated to third echelon. Detailed functions of the equipment are covered in paragraphs 3 through 11.

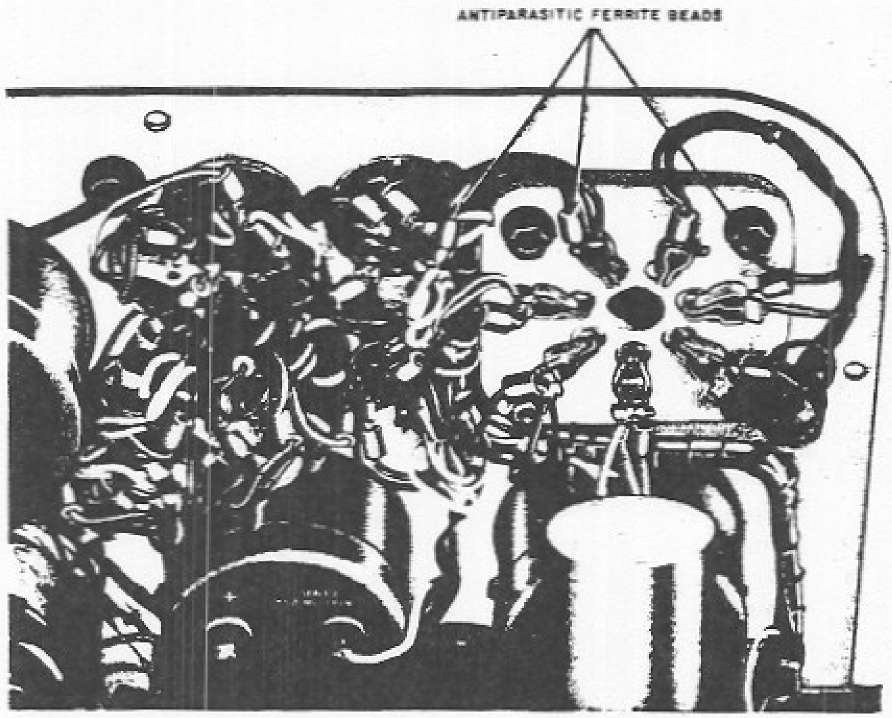
b. The complete technical instructions for this equipment includes TM 11–6625–316–12 and TM 11–6625–316–35P.

c. Forward comments concerning this manual to the Commanding Officer, U.S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N. J.

Note. For applicable forms and records, see paragraph 2, TM 11–6625–316–12.

2. Internal Differences in Models

On the TV–2B/U and the TV–2C/U, an anti-parasitic ferrite bead (fig. 1) is attached to one of the leads going to each terminal of the test sockets to prevent the tube under test from oscillating. On the TV–2/U, resistor R1 is 250 ohms; on TV–2A/U, TV–2B/U, and TV–2C/U, R1 is 300 ohms. On the TV–2C/U, resistors, R24 and R25 are connected differently to transformer T2. Refer to figure 26. For external differences, see TM 11–6625–316–12.



TM6625-316-35-1

Figure 1. Antiparasitic ferrite beads (used on TV-2B/U and TV-2C/U), typical application.

Section II. UNIT THEORY

3. Block Diagram
(fig. 2)

Test Set, Electron Tube TV-2(*)/U consists of a power supply for the electrodes of the tube to be tested and seven tube-testing circuits. These are a transconductance *(G_m)* test circuit, an emission test circuit, a gas test circuit, a voltage-regulator tube test circuit, a filament continuity test circuit, a short test circuit, and a leakage test circuit. SELECTORS and RANGE switches permit application of proper test voltages to the tube under test. Indicating meters and an indication lamp display the test results. The functional interrelation of the principal circuits and parts of the tube tester is shown in the block diagram. A complete schematic diagram is shown in figure 26.

a. Power Supply. The power supply consists of five supply voltage circuits.

(1) The filament supply provides 19 different filament voltages, that range from 0.625 to 117 volts alternating current (vac). FILAMENT VOLTS meter M1 indicates the filament voltage supplied to the tube. Full-wave rectifier tube V1 provides unfiltered, pulsating direct current (dc) voltage for the plate of the tube under test. Full-wave rectifier V3 furnishes filtered dc voltage for the screen of the tube under test.

(2) PLATE meter M5 and SCREEN VOLTS meter M6 indicate the plate and screen voltages that are supplied to the tube under test.

(3) Grid bias voltage is supplied to the tube under test by full-wave rectifier tube V2. The bias voltage is indicated by grid BIAS volts meter M2.

(4) The potentials made available by the power supply are fed to the various test sockets through seven electrode Selectors switches, and to the tube test circuits through test position press to test switches P1 through P6.

b. Transconductance (G_m) Test Circuit. This circuit gives an indication of the overall merit of amplifier tubes under simulated operating conditions by measuring the transconductance (G_m) of the tube under test. Indication in percent quality is shown on PERCENT QUALITY meter M3. The test is selected by operating PRESS TO TEST P4 switch S19.

c. Emission Test Circuit. The quality of diode detectors, vacuum-tube rectifiers, and multielement tubes is checked by measuring the dc emission under static conditions. PRESS TO TEST P2 switch S17 is used to check diode emission; P2 switch S17 and P3 switch S18 are used simultaneously for multigrid emission.

d. Gas Test Circuit. This circuit is used to check the presence of excessive amounts of gas in vacuum-type tubes by indicating the shift in the operating points of the tubes because of gas current in the grid circuit. The test is performed by operating PRESS TO TEST P6 switch S21 with the transconductance test.

e. Voltage-Regulator Tube Test Circuit. The quality of voltage-regulator tubes, gas rectifier tubes, and other gas-filled tubes is determined by measuring the regulation of the tube under test under varying load conditions. The voltage drop across the tube under minimum and maximum load conditions is indicated on PERCENT QUALITY meter M3. PRESS TO TEST P5 switch S20 selects the voltage regulator test.

f. Filament Continuity Test Circuit. This test provides visual indication of the continuity check of the filament of hot cathode tubes, ballast tubes, indicator lamps, and other filament-type devices. If the filament of the device under test is continuous, FIL. CONT. SHORT indicator lamp I2 will light. The test is selected by operating PRESS TO TEST P1 switch S16.

g. Short Test Circuit. Interelectrode shorts in the tube under test are detected by this circuit, which is basically the same as the filament continuity test circuit. A short between any two elements of the tube will light FIL. CONT. SHORT indicator lamp I2. SHORT TEST switch S11 is used to select any tube electrode and test it for shorts to all other elements.

h. Leakage Test Circuit. Leakage between the elements of an electron tube is detected by this circuit, which is essentially a simple ohmmeter circuit. The leakage between the elements of the tube is indicated in megohms on PLATE meter M5. Each position of the SHORT TEST switch selects one element of the tube for measuring the leakage to all other elements.

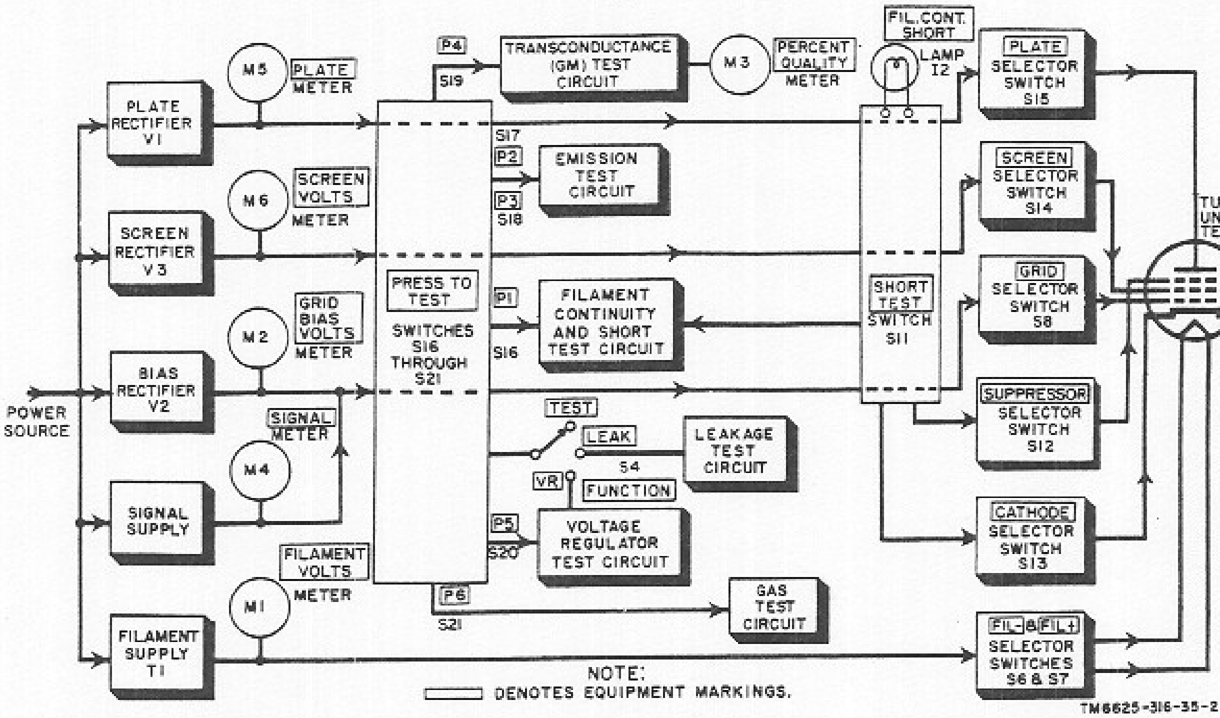


Figure 2. Test Set, Electron Tube TV–2(*)/U, block diagram.

4. Power Supply Circuits

a. General. Input power for the primary of filament transformer T1 (fig. 3) is fed through power switch S9, line fuses F1 and F2, and FILAMENT rheostat R1. Input power for the primary of power transformer T2 (fig. 3 and 4) is fed through power switch S9, line fuses F1 and F2, and PLATE potentiometer R45. R1 and R45 are used to adjust actual filament and plate voltages, respectively, to the reference value given in the tube test data roll chart. Resistor R18 limits the amount of current to indicator lamp I1 and resistor R2 is the filament primary shunt resistor (fig. 3).

b. Filament Transformer T1. Secondary winding 3–22 of filament transformer T1 (fig. 3) has 20 terminals nominally rated to 117 volts ac with the use of terminal 22 as the reference. Any one of these voltages can be selected and fed to the tube under test by setting FILAMENT RANGE switch S1 to the position corresponding to the desired filament voltage. The voltage selected is indicated on FILAMENT VOLTS meter M1. The proper FILAMENT VOLTS meter multipliers, resistors R65, R3, R4, R5, and R64, are connected into the meter circuit through the rear of section 1 of switch S1. Resistor network R6, R7, R8, and R9 places the filament and cathode of the tube under test to the same dc potential.

c. Power Transformer T2. Power transformer T2 (fig. 4) has six secondary windings: winding 3–14, split between terminals 9 and 10 for the plate supply rectifier; winding 15–25 for the screen supply rectifier; winding 26–28 for the bias supply rectifier; two filament windings, 33–35 and 31–32, to heat the filaments of the 83 rectifier tube V1 and the 6X4 or 6X4W rectifier tubes V2 and V3 respectively, and signal supply winding 29–30 to provide ac signal voltage to the grid of the tube under test. PLATE-SCREEN RANGE switch S3 is used to select the required voltage range by selecting various taps or combinations of taps on the plate and screen windings up to a maximum of 250 volts dc.

d. Plate Supply. Plate rectifier tube V1 (fig. 4) is an 83 mercury-vapor rectifier tube connected in a full-wave rectifier circuit. Winding 3–14 of transformer T2, which feeds the plates of tube V1, is split into two parts to permit proper interconnection of the transconductance (G_m) test circuit (par. 5). The dc output voltage for the plate of tube under test is taken from center tap 34 of the 5-volt filament winding 33–35 of transformer T2. PLATE meter M5 indicates the dc output voltage.

e. Screen Supply. Screen supply rectifier tube V3 (fig. 4) is a 6X4 or a 6X4W electron tube, connected in a full-wave rectifier circuit. The plates of tube V3 are connected to winding 15–25 of transformer T2 through sections 3 and 4 (rear) of PLATE-SCREEN RANGE switch S3; the dc output voltage for the screen of tube under test is taken from the common cathode. A ripple filter, that consists of capacitors C4A and C4B and SCREEN potentiometer R54, is connected across the output of tube V3. Potentiometer R54 also permits adjustment of dc screen voltage within the limits set by switch S3. The screen voltage selected is indicated on SCREEN VOLTS meter M6, which is connected to the filter output through multiplier resistor R56. Bleeder resistor R55 improves the voltage regulation of the screen supply.

f. Bias Supply. Bias supply rectifier tube V2 (fig. 4) is also a 6X4 or a 6X4W tube, connected in a full-wave rectifier circuit. In this case, however, the normally positive dc cathode of the tube is grounded, and places center tap 27 of bias voltage winding 26–28 of transformer T2 at a negative potential with respect to ground. The dc bias output voltage, therefore, is taken from center tap 27. Capacitor C3 filters the ac ripple. A bleeder and voltage divider, which consists of resistors R34, R26, R27, and R28, is connected across the output of tube V2. A choice of —50, —10, or —5 volts fixed bias is available through corresponding settings of BIAS RANGE switch S2. Section 1 (rear) of switch S2 connects the proper multiplier resistor (R10, R11, or R12) in series with GRID BIAS VOLTS meter M2 for each range selected. BIAS potentiometer R29 provides fine control of the bias voltage. If required, cathode-biasing resistors R13 through R17 are connected into the cathode circuit of the tube under test through positions A, B, C, D, and E of switch S2; capacitor C1 bypasses these cathode-biasing resistors.

g. Signal Supply. Ac signal voltage winding 29–30 of transformer T2 (fig. 4) is shunted by a voltage divider that consists of SIGNAL-V.R. potentiometer R46A and resistors R47, R49, and R50. A signal voltage of 2.5, 0.5, or 0.25 volts ac, selected by GM-SIGNAL RANGE switch S5, is provided to the tube under test. In positions A, B, and C of switch S5, the signal voltage supplied is 0.25 volt; in position D, the signal voltage is 0.5 volt; in position E, the signal voltage is 2.5 volts; in position F, the voltage is zero. Fine control of the signal supply voltage is provided through potentiometer R46A. The correct signal voltage for the tube under test is obtained by adjusting this control until the SIGNAL meter M4 deflects to the redline at the 35 milliampere (ma) calibration.

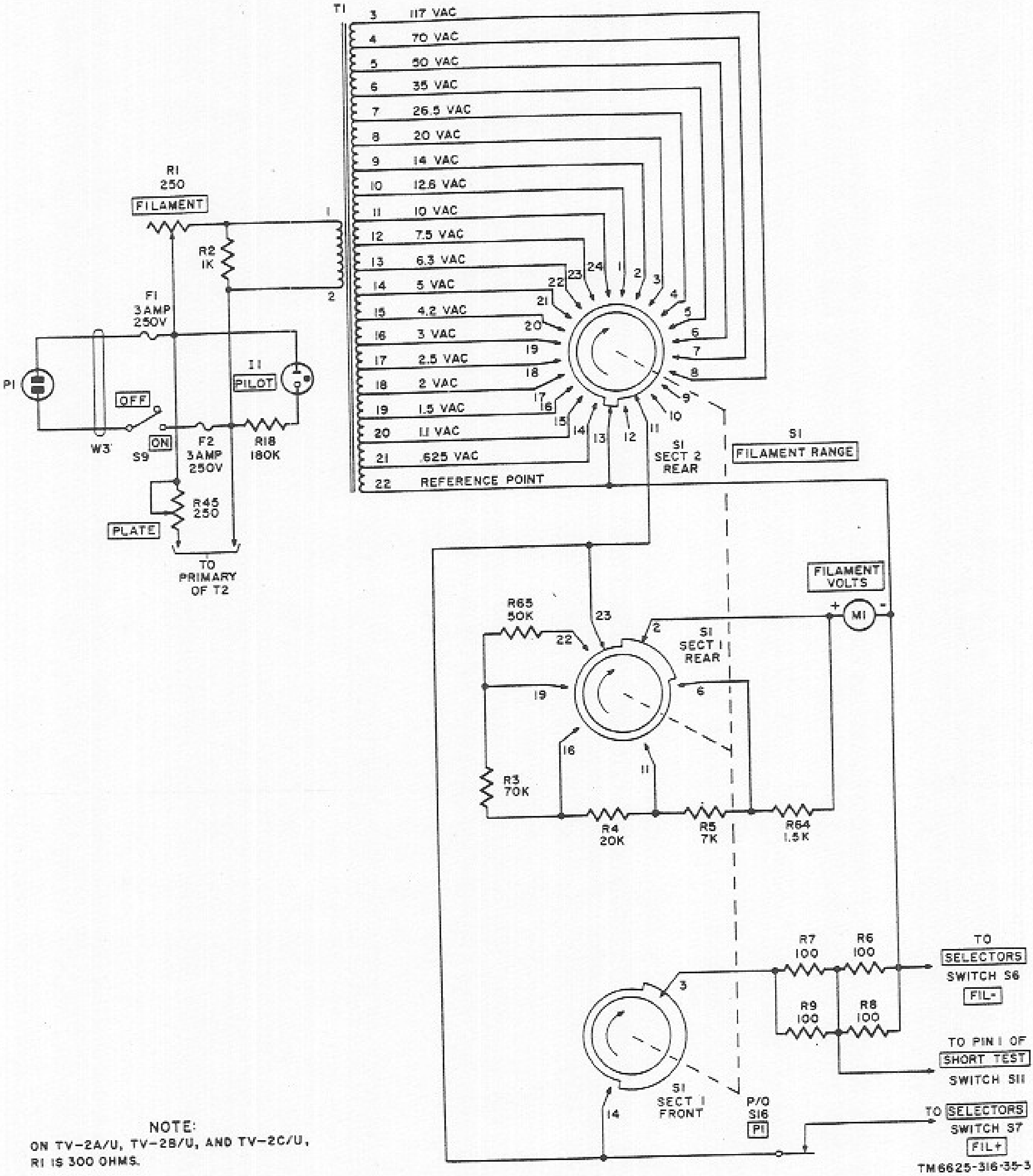


Figure 3. *Simplified filament power supply circuit.*

Figure 4. *Simplified power supply circuit.*
(Located in back of manual)

5. Transconductance Test Circuit

(figs. 5 and 26)

a. In an amplifier tube, a small change in grid voltage causes a large change in plate current. The greater the change in plate current produced by a given change in the applied grid potential (ac signal), the better the performance of the tube as an amplifier if other characteristics remain constant. The amount of plate current change (ΔI_p) produced by a grid voltage change (ΔE_g) will give the measure of the quality of a tube which can be used to compare other tubes. This quality figure of a tube is called mutual conductance or grid-plate transconductance (G_m) and may be defined by:

$$G_m = \frac{\Delta I_p}{\Delta E_g} = \frac{\text{Change in plate current produced (microamperes) (plate voltage kept constant)}}{\text{Change in grid voltage producing change in plate current (volts)}}$$

Mutual conductance is measured in micromhos. The rated value of mutual conductance in micromhos for each tube type represents the transconductance at the optimum point of the tube's characteristics. The characteristics of a tube, designated by a series of curves, are used in the design of electron tube circuits to get the best possible performance from a tube.

b. The quality test circuit of Test Set, Electron Tube TB–2(*)/U, shown in figure 5, measures the mutual conductance of electron tubes. Because a figure of merit of the relative performance of a tube is more valuable than the actual value of mutual conductance, the scale of PERCENT QUALITY meter M3 is calibrated directly in percent quality of the rated mutual conductance. The actual value of mutual conductance of the tube under test can be obtained by multiplying the value indicated on the scale of meter M3 by the rated value of mutual conductance of the tube:

$$\text{Mutual conductance } (G_m) = \frac{\text{Percent quality x rated value of } G_m \text{ (micromhos)}}{100}$$

c. The transconductance measuring circuit used in Test Set, Electron Tube TV–2(*)/U consists essentially of a simple full-wave rectifier circuit, that uses plate supply rectifier tube V1 and split plate voltage winding 3–14 of power transformer T2. Various plate voltages are selected by PLATE-SCREEN RANGE switch S3 through sections 1 and 2. Terminals 9 and 10 of transformer T2 are connected to the PERCENT QUALITY meter M3. Quality SHUNT potentiometer R33, connected in parallel with meter M3, permits adjustment of meter sensitivity. The rear section of GM-SIGNAL RANGE switch S5 connects quality meter multiplier resistors R30 and R31 in series with meter M3. The center-tapped resistance network that consists of resistors R40 and R42 and GM CENTERING potentiometer R44 are placed in parallel with meter M3. The center tap of potentiometer R44 is connected to ground and to the cathode of the tube under test to maintain the proper balance of resistance in this network, and to adjust for zero deflection of meter M3. The tube under test is the load of the rectifier circuit. Fixed or cathode bias, as well as various signal voltages, is applied to the grid of the tube under test through GM-SIGNAL RANGE switch S5.

d. When plate No. 1 of tube V1 is at an instantaneous positive potential, plate No. 2 is at an instantaneously negative potential; electron flow is through resistor R40 and potentiometer R44 to the tube under test, as indicated by the solid arrows in figure 5 (press to test switch S19 is open). This would cause meter M3 to deflect in one direction. During the next half-cycle of the ac signal voltage, plate No. 1 is at a negative potential while plate No. 2 is at a positive potential; electron flow is through resistor R42 and potentiometer R44 to the tube under test, as indicated by the broken arrows. This would cause meter M3 to deflect in the opposite direction. Equal currents flow in the directions of both the solid and broken arrows. Because meter M3 is incapable of following the equal and opposite positive and negative deflections at the power line frequency, however, the pointer remains at zero. Therefore, when the current that flows through resistor R40 and potentiometer R44 is exactly equal to the current that flows through resistor R42 and potentiometer R44, they will balance out and meter M3 will not deflect. If the currents are not exactly equal, potentiometer R44 is used to achieve this balanced condition.

e. In addition to the dc bias voltage normally present, an ac signal voltage is applied to the grid of the tube under test (press to test switch

S19 is closed). During the first half-cycle of the input voltage when plate No. 1 of tube V1 is positive, the ac signal voltage also swings the grid of the tube under test to a positive potential. The plate current is increased and more current flows through resistor R40 and potentiometer R44. As a result, the deflection on the scale of meter M3 is greater than in the absence of the signal voltage. During the next half-cycle when plate No. 2 of tube V1 is positive, the signal voltage will swing the instantaneous voltage at the grid of the tube under test to a negative potential. The plate current is decreased and less current flows through resistor R42 and potentiometer R44. Consequently, the deflection of meter M3 is now in the opposite direction and is less than in the absence of the ac signal voltage. During each succeeding half-cycle, the current is now opposite and unequal, and the meter reading will be proportional to the difference in current between two half-cycles. The same unbalance in current exists during each succeeding cycle and thus, over a period of time, the meter reading will be proportional to the average value of the difference in instantaneous currents produced by the ac grid signal voltage. Meter M3 indicates the plate current changes caused by applied grid voltage changes, or the mutual conductance.

f. During operation, PERCENT QUALITY meter M3, shunt resistors R40 and R42, and potentiometer R44 are switched into the circuit by operating FUNCTION switch S4 to the TEST position and depressing PRESS TO TEST P4 switch S19. PRESS TO TEST P4 switch S19 applies plate and screen voltages to the tube under test. Ac signal voltages are applied to the grid of the tube by the front of GM-SIGNAL RANGE switch S5, while the rear of switch S5 connects the proper multiplier resistors in series with quality SHUNT potentiometer R33 for each signal voltage range. When in position F, switch S5 removes signal voltage from the tube under test to permit zero adjustment of meter M3 by GM CENTERING potentiometer R44. (In position F, no signal voltage is applied, but SIGNAL meter M4 still will deflect.) Various values of either cathode or fixed bias can be applied to the grid of the tube under test by bias range switch S2.

Figure 5. Transconductance measurement circuit of Test Set, Electron Tube TV-2(*)/U.
(Located in back of manual)

6. Emission Measuring Circuit
(figs. 6 and 26)

a. An emission test performed on rectifier tubes and diode sections of multielement tubes will indicate whether the tube can provide a sufficient number of electrons for satisfactory operation under normal service. The emission or saturation current of a two-element tube can be measured if all electrons emitted by the cathode are drawn to the plate. Emission falls off as a tube wears out, therefore, low emission is indicative of the end of the normal life of a tube. The test for emission is limited, because it does not test the tube under normal operating conditions, but only for static voltages. Residual gas current, nonuniform cathodes, and other faults may supply normal emission current when the tube actually is in an unsatisfactory condition. Some tubes will operate satisfactorily after emission has dropped far below the original or rated value.

b. A simplified schematic diagram of the emission measuring circuit of Test Set, Electron Tube TV-2(*)/U is shown in figure 6. The circuit is a simple series circuit with the tube under test, and the meter circuit serves as a load for the applied ac voltages. One-half of the high-voltage plate supply of power transformer T2 provides ac test voltages from taps 3, 6, and 7 (3, 6, 7, and 8 on TV-2C/U). These voltages are selected by the settings of PLATE-SCREEN RANGE switch S3 through section 1. Current-limiting resistors R19 through R25, connected in series with the tube under test, limit the total current to a safe value. The total current in the circuit is determined by the series-limiting resistors selected, the resistance of the tube under test, and the resistance of the meter circuit. Because the tube under test rectifies the current, PERCENT QUALITY meter M3 is used to measure the emission. Quality SHUNT potentiometer R33, connected across meter M3, permits adjustment of meter sensitivity and limits the total current. Meter multiplier resistors R30 and R31 can be connected in series with meter M3 through GM-SIGNAL RANGE switch S5.

c. For diodes, depressing PRESS TO TEST P2 switch S17 applies voltage to the tube under test and emission current is read in percent quality of the rated value on PERCENT QUALITY meter M3.

d. For multigrid tubes, the control and screen grids are connected to the plate while the suppressor grid is tied to the cathode; the tube then functions as a diode. When PRESS TO TEST P3 switch S18 is depressed at the same time as P2 switch S17, emission current is read in percent quality of the rated value on PERCENT QUALITY meter M3.

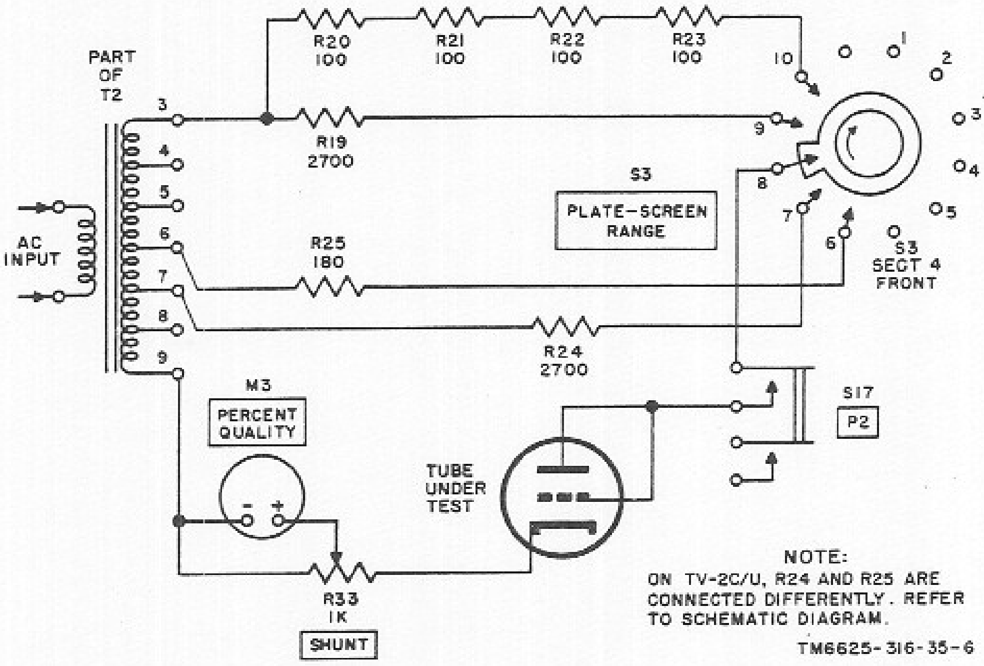


Figure 6. Emission measurement circuit of Test Set, Electron Tube TV-2(*)/U, simplified schematic diagram.

7. Gas Test Circuit
(figs. 7 and 26)

a. A gas test performed on an amplifier-type tube will detect an excessive amount of gas in the tube. A gassy tube will not function correctly. Ionization of residual gas in a tube causes grid current to flow, and thus changes the grid-bias voltage and other operating characteristics of a tube.

b. The gas test circuit of Test Set, Electron Tube TV-2(*)/U is part of the transconductance test circuit (par. 5); only parts involving the grid circuit are shown in the simplified schematic diagram (fig. 7). Plate current through the tube under test has a certain value, which depends on the plate and grid voltages set up for the transconductance test of the tube (par. 5). Depress PRESS TO TEST P6 switch S21 to insert resistor R58 into the grid circuit of the tube under test. If the tube is gassy, the source of grid-bias voltage C will cause current to flow through the grid circuit in the direction indicated by the arrows (fig. 7). The gas current develops a voltage drop across resistor R58, which tends to place the grid end of the resistor at a positive potential and reduce the negative grid bias; an increase in plate current results. This increase in plate current is indicated on PERCENT QUALITY meter M3. The pointer of meter M3 will move less than three-scale divisions if the tube under test has a negligible gas content.

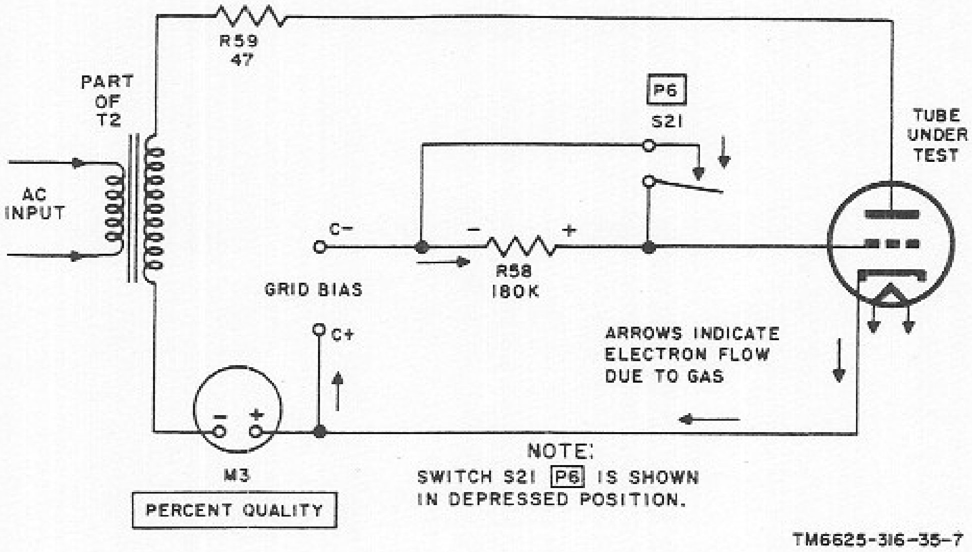


Figure 7. Gas test circuit of Test Set, Electron Tube TV–2(*)/U, simplified schematic diagram.

8. Voltage Regulator and Thyraton Tube Test Circuit

(figs. 8 and 26)

a. Voltage-regulator tubes, gas-filled rectifier tubes, and thyratron tubes must have low-voltage regulation to perform efficiently. A test that measures the voltage drop across a tube under test can be used to determine the regulation of the tube under varying load conditions. By measuring the voltage drop of the tube under minimum and maximum load conditions, the regulation of the tube in volts can be obtained by using the following equation:

$$\text{Regulation} = E^{max} - E^{min}$$

In this formula, E^{max} and E^{min} represents the voltage drops across the tube under maximum and minimum load conditions.

b. The voltage regulator and thyratron tube test circuit used in Test Set, Electron Tube TV–2(*)/U is shown in figures 8 and 26. Filtered voltage taken from bleeder resistor R55 of the screen supply circuit is fed to the plate of the tube under test through PRESS TO TEST P5 switch S20 and SIGNAL-V.R. potentiometer R46B. The voltage drop across the tube is measured by PERCENT QUALITY meter M3, which is placed in parallel with quality SHUNT potentiometer R33. The load current through the tube under test is indicated on PLATE meter M5. Tube V1 is used as a meter rectifier for meter M5 when the plate voltage is either 20 or 35 volts ac. The total amount of load current depends on the resistance network of the meter and the setting of potentiometer R46B. With SIGNAL-V.R. potentiometer R46B, PLATE potentiometer R45, and SCREEN potentiometer R54 adjusted for the minimum and maximum load currents specified for the tube under test, the voltage drop across the tube is indicated on meter M3 for each load condition. Minimum limits for the tube under test are specified in the tube test data roll chart.

c. In the case of thyratron tubes and gas triodes, a bias voltage normally is applied to the grid of the tube under test which is at a sufficiently negative voltage to prevent ionization of the gas in the tube. As grid bias is reduced, a critical voltage, called striking voltage, is reached. At this point, the electrons emitted from the cathode gain sufficient energy to ionize the gas within the tube. At the striking point, all gas in the tube is suddenly ionized and a large gas current, which is no longer controlled by the grid bias voltage, results. The important characteristic of gas triodes, therefore, is the striking voltage of the tube.

d. To measure the striking voltage of gas triodes, BIAS potentiometer R29 and BIAS RANGE switch S2 are adjusted until the tube under test strikes. This is indicated by a flow of plate current and a reduced voltage drop across the tube. The ionization or striking voltage of the tube under test is indicated on GRID BIAS VOLTS meter M2.

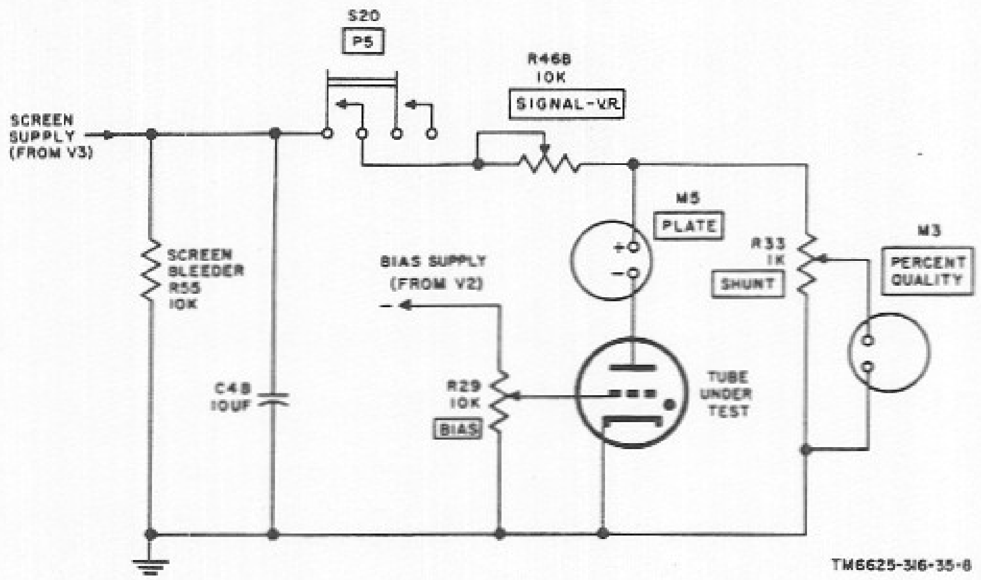


Figure 8. Voltage regulator and thyratron tube test circuit of Test Set, Electron Tube TV-2(*)/U, simplified schematic diagram.

9. Short Test Circuit

(figs. 9 and 26)

a. A simplified schematic diagram of the circuit used for detecting interelement shorts in the tube under test is shown in figure 9. A portion of the bias voltage is taken from bias rectifier tube V2 and applied to a bridge network formed by resistors R35, R60, R61, and R62. The voltage at point 1 is constant and depends only on the bias supply voltage and on the values of resistors R35 and R62. The voltage at point 2 is a function of the bias supply voltage and the values of resistors R60 and R61. When no elements of the tube under test are short-circuited, the difference in potential between points 1 and 2 is below the striking voltage of FIL. CONT. SHORT lamp I2. When there is a short circuit between elements of the tube under test, the voltage at point 2 is reduced. Because the voltage at point 1 is constant, the difference in potential at points 1 and 2 is increased until FIL. CONT. SHORT lamp I2 lights. Actually, an effective resistance of 3,000 ohms or less across resistor R61 is sufficient to light the FIL. CONT. SHORT lamp.

b. When PRESS TO TEST P1 switch S16 is in its normal unoperated position and FUNCTION switch S4 is in the TEST position, SHORT TEST switch S11 is connected across resistor R61. Selection of any one of the electrodes, except the filament in the tube under test, is made through the front portion of section 1 of switch S11. If a short circuit exists between the filament and any other element of the tube, the rear of section 1 of switch S11 completes the circuit to ground, and thus shorts out resistor R61 and causes FIL. CONT. SHORT lamp I2 to light. The selection of the cathode of the tube under test by the front of section 1 of switch S11 will test for a short circuit between the cathode and filament.

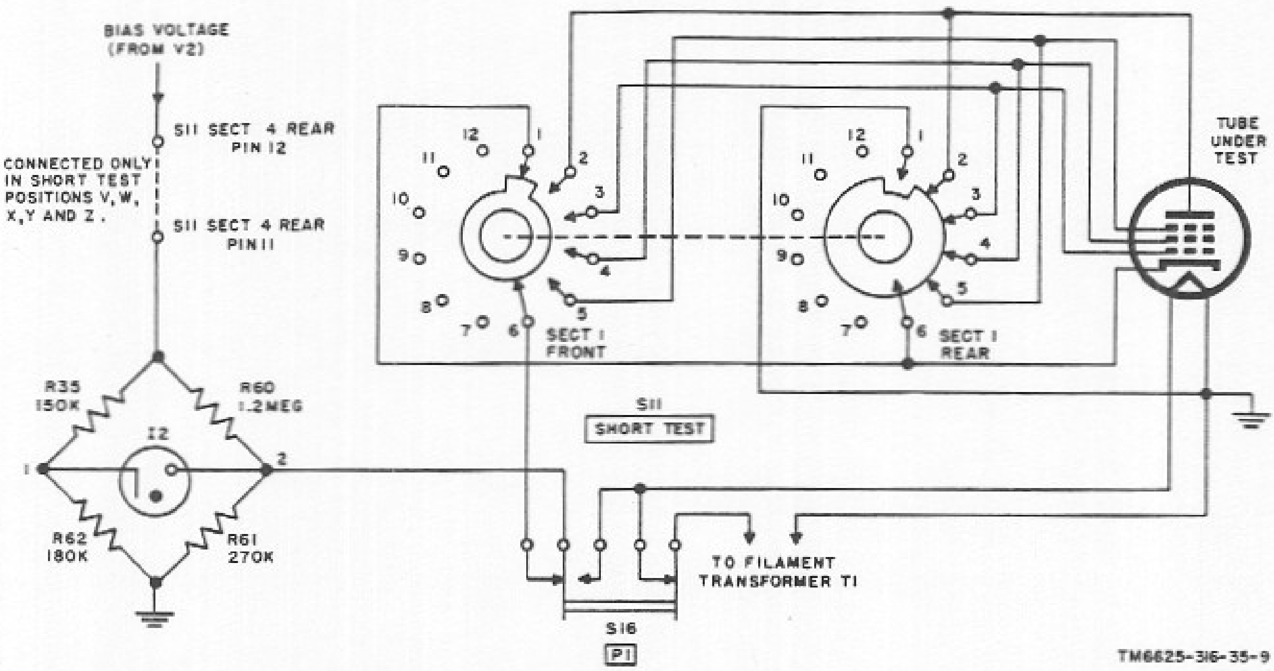


Figure 9. Short and filament continuity test circuit of Test Set, Electron Tube TV–2(*)/U, simplified schematic diagram.

10. Filament Continuity Test Circuit

The filament continuity test circuit of Test Set, Electron Tube TV–2(*)/U provides visual indication of filament continuity of hot-cathode electron tubes, ballast tubes, and indicator lamps. The action of this circuit is identical with that of the short test circuit (par. 9); a simplified schematic diagram is shown in figure 9. The operation of PRESS TO TEST P1 switch S16 connects the filament or filaments of the tube under test across resistor R61 and removes filament voltage from the tube. If the filament is closed, its low resistance, placed in parallel with FIL. CONT. SHORT lamp I2, will increase the voltage across lamp I2 and the lamp will light. If the filament of the tube under test is open, the voltage across lamp I2 is too low for the lamp to light.

11. Leakage Test Circuit
(figs. 10 and 26)

In Test Set, Electron Tube TV–2(*)/U, a conventional ohmmeter circuit measures the inter-element leakage resistance in a tube under test. A simplified schematic diagram of this circuit is shown in figure 10. When FUNCTION switch S4 is in the LEAK position, a portion of the bias voltage from tube V2 is applied to the tube under test through SHORT TEST switch S11 and PLATE meter M5. Resistor R38 is a series-multiplier for meter M5, which serves as an ohmmeter. Any element of the tube under test can be selected by switch S11. If low leakage resistance exists between the element selected and any other element of the tube, leakage current completes the series circuit and meter M5 indicates the equivalent leakage resistance in megohms. If there is no leakage, meter M5 will not deflect; this will indicate a high resistance. The scale of meter M5 is not designed to indicate a very low leakage resistance of a few hundred ohms or less. However, such a partially short-circuited condition can be detected by performing the short test (par. 9).

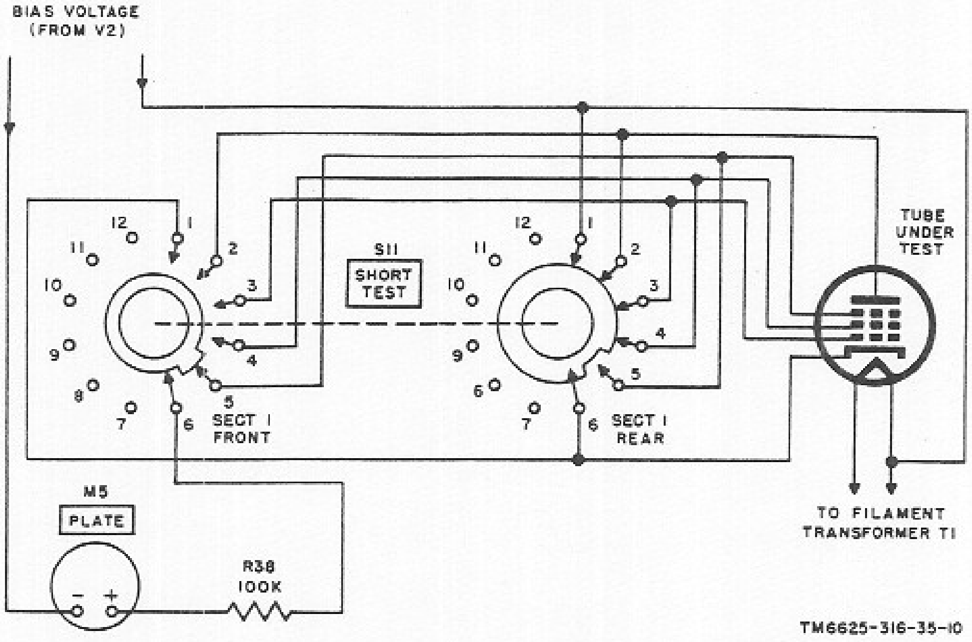


Figure 10. Leakage test circuit of Test Set, Electron Tube TV-2(*)/U, simplified schematic diagram.