INSTRUCTIONS FOR NO. 245 TUBE AND SET TESTER

A very complete three meter tester. Polarity cords —red and black—with tips, are furnished for using meters individually. Also a special cord with clips is supplied for connecting the control grid of screen grid tubes. No extra adapter is required for screen grid testing. A four-prong adapter is a part of the equipment, used with the five-prong plug on cable for connecting set socket with tester. These parts are held in the cover which makes a very compact and convenient outfit.

SERVICE PROCEDURE

Check line voltage by connecting red and black tipped cords at + — and 140. The other end of tipped cord insert in a divided plug which is screwed into outlet of line supply. Adjust if necessary compensating device on set when not supplied with automatic voltage regulator. Start with the first R. F. tube and test straight thru to the power tubes. Do not insert tester plug in rectifier socket which is furnished with raw A. C. See instructions for comparative testing of rectifier tubes. Keep all tubes in set sockets except the one under test in tester. Place cable tips in tester jacks according to colors as described herein. Always do this before plugging into set socket.

FILAMENT VOLTS

Place brown tip of cable in 10 jack and white tip of cable in + — jack. Read directly upper scale of A. C. Voltmeter which indicates equally accurate D. C. volts.

GRID VOLTS

By noting the plate and filament voltage for a corresponding plate current in milliamperes a grid bias voltage will be determined from the tube chart under that heading.

To test Grid volts at tester socket: Set D. C. volt switch OFF.

Place (red) tipped wire in 60 jack and touch to K jack.

Place (black) tipped wire in B– jack and touch to Grid jack.

Reverse leads if D. C. voltmeter reads below zero.

GRID CONDITION

Push button to note grid condition indicating change in the plate milliampere reading.

PLATE VOLTAGE

Connect all cable tips in their respective colored jacks, except YELLOW place in B– jack.

Have D. C. volt switch ON. Read 0-300 upper scale of D. C. Voltmeter.

PLATE CURRENT

With cable tips in their respective colored jacks set MIL-AMPS switch at 100. If milliammeter shows less than 20 set switch at 20. Read upper scale on milliammeter with switch at 20 and lower scale with switch at 100. Use 100 for power tubes.

CATHODE VOLTS

Set D. C. volt switch OFF. Place (black) tipped wire in B– jack and touch to 10 jack.
Place (red) tipped wire in 60 jack and touch to K jack.

SCREEN GRID VOLTS

Set D. C. volt switch OFF. YELLOW tipped cable wire in B– jack. Insert a tipped wire lead in 60 or 300 jack and touch to Grid jack.

SCREEN GRID CONTROL VOLTS

Set D. C. volt switch OFF. Attach wire with clips to pig tail in receiving set and to top of tube in tester.
Place the red and black tipped wire leads in 60 and B– jacks. Touch B– wire to top of tube, and B+ or 60 wire to YELLOW jack.

GENERAL

Testing with meters individually the usual practice is to have tester plug removed from set socket, and all cable tips used for connecting set with tester removed from their respective jacks.

To test 0-10 A. C.-D. C. volts plug one tipped cord into jack marked + — and other tipped cord in jack marked 10 v. Read directly on upper scale of voltmeter.

To test Line Voltage plug into jacks marked + — and 140 v. Read lower scale on voltmeter.

To test Milliamperes plug black tipped cord in jack marked –M. A. and red cord in jack marked +M. A. Set MIL-AMPS switch to 20 or 100 according to measurement taken.

To measure the total plate current set MIL-AMPS switch to 100. Open the B– lead to set operated with batteries or eliminator and connect the end from set to jack marked +MIL-AMPS on tester. Connect the other lead from eliminator to

jack on tester marked –MIL-AMPS. If current is below 20 set switch to the lower reading.

For A. C. sets this test is not important.

To make continuity or open circuit tests. With plug in receiver socket and tube in tester socket the deflection of the Milliammeter shows circuit is continuous in the primary load. Testing transformers, chokes, etc., may be done by disconnecting them and connecting same between the plate voltage source and the B voltmeter. The voltmeter should show a lower reading if the circuit is continuous with the added resistance of a transformer, etc. between one of the connections to the voltmeter and the B voltage supply. Usually a 22½ volt C battery is used for this purpose.

To test for shorts in condensers, resistors, etc. With tube in tester connect condenser to jacks –M. A. and +MIL-AMPS. If Milliammeter shows change in reading the part tested is shorted. Resistors, etc. may be tested by the same method as noted above for continuity tests, or by disconnecting tester plug from set socket and connecting part to be tested between an external source of current and individual meter.

Manufacturers of sets generally furnish their dealers with servicing data showing normal testing conditions in each socket. As a rule the filament volts will be near the rated voltage of the tube. The B volts will be highest in the power tube socket. Always make allowance for drop in voltage in circuits containing resistance such as the secondary of an audio transformer. Too great a resistance, like a grid leak, allows little or no current to pass in the circuit.

Consult the tube chart below for voltages and plate current of the more commonly used tubes. When two voltmeter readings and the plate current are known the third voltage may be determined by consulting the table. As an example, if plate and filament voltages and plate current are according to table the grid volts will be noted by reference to the corresponding column marked Grid Volts. We can not give here every possible voltage and plate current reading. If the set manufacturers ratings at each socket is not available use the list in the table corresonding nearest to the readings taken. We have made the listing of each tube to cover the average conditions met with in practice. Any tube showing one-half the chart reading in plate milliamperes should be discarded. Only thoriated filament tubes can be re-activated.

Testing Rectifier Tubes

Usually this testing is done after all other tubes and circuits are checked. If it is found that the proper voltages are furnished to the plates at the different sockets then the rectifying tube would not necessarily require testing. The comparative method of testing is done by substituting a tube of known value for the one in the rectifier socket. Then with the tester plugged into another of the set sockets, after removing the tube and placing in the tester, the readings of the instruments will show any difference in output of the two rectifier tubes as supplied to the tube in the tester.

As the A. C. supply to the rectifying tube plate varies in its form for measuring on D. C. instruments it is not possible to expect accurate or reliable measurements in every instance. This applies to all types of D. C. instruments, and for this reason the comparative method of testing rectifier tubes mentioned above is recommended for quick results in servicing practice.

When testing A. C. power supply circuits this should be done by using the tipped cords and attaching to the tester jacks connected with the filament A. C. Voltmeter. If higher voltages than 140 are to be measured the proper multiplier should be used which are obtainable extra at small cost. Be careful in handling all high voltages. Avoid touching the instruments, jacks, or other exposed metal parts where shocks may be received. The double tipped cords are well insulated and there is no chance of receiving a shock when handled at the insulated parts.

Type Tube	Plate Volts	Filament Volts	Grid Volts	Normal Plate Milliamperes
201-A	45	5	0	1.7
	45	5	−1	1
	67.5	5	0	3.5
	67.5	5	−1	2.4
	90	5	0	6.5
	90	5	−1	4.8
	90	5	−4.5	2
	135	5	−9	2.7
199	45	3	0	1.5
	67.5	3	0	2.5
	90	3	0	3.5
	90	3	−4.5	2.5
112-A	90	5	0	13.5
	90	5	−6	6.7
	135	5	−9	11.5
171-A	90	5	0	35
	135	5	−27	12
	180	5	−40	18
210	180	7.5	−12	6.5
	250	7.5	−18	11
	350	7.5	−27	17
	425	7.5	−35	22
250	250	7.5	−45	28
	300	7.5	−54	35
	350	7.5	−63	45
	400	7.5	−70	55
	450	7.5	−84	55
220	90	3	0	9
	135	3	−22.5	6.5
12	90	1.1	0	5
226	90	1.5	−6	5
	135	1.5	−6	6
	135	1.5	−12	5
	180	1.5	−13.5	10
227	45	2.5	0	3
	45	2.5	−4.5	.5
	90	2.5	−9	.9
	135	2.5	−9	5.2
	180	2.5	−13.5	6
245	180	2.5	−33	22
	250	2.5	−50	30
280	250	5	no	45 ea. plate
281	600	7.5	no	65

			Screen Grid Volts	Control Grid Volt	M. A.
222	135	3.3	+45	−1.5	2
224	180	2.5	+75	−1.5	4