AC-47 RADIO TUBE TESTER
Series B
THE HICKOK ELECTRICAL INSTRUMENT COMPANY
Cleveland, Ohio

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INSTRUCTIONS FOR USE

1. Use on 60 or 50 cycle, 110 volt circuit. 25 cycle supplied on special order at extra cost.
2. Operate in a horizontal position.
3. Always remove tester from carrying case when in use to allow full ventilation.
4. An automobile bulb, 3 to 4 volts, 2 CP (Mazda No.61) is used as a protection against short circuits. This bulb should burn dimly under normal operating conditions. Should it burn brightly or burn out, the tube under test has a short circuit.
5. A 280 Rectifier tube is required at all times to supply the DC plate voltage. It is important that this tube be carefully selected as follows:
6. Insert the 280 tube in socket marked 280.
7. Set the "High - Low" switch in "Low" position for testers with 0 to 35 Milliammeter, and on "High" position if Milliammeter has 0 to 50 scale.
8. Insert the 280 test plug in 227 socket.
9. Set the "Tube Test - Line Test" switch in "Line Test" position.
10. Adjust the voltage control until the Mutual Conductance meter indicates Line Test or 2000 on scale.
11. The Plate Milliammeter should now indicate 19 to 21 milliamperes with switch in "Low" position, and 39 to 42 Milliamperes with switch in "High" position.
12. The purpose of the above tests is to ascertain if the 280 tube has sufficient emission.
13. To determine if the emission from both plates is the same, place a 227 or 224 receiving tube in the tester and when the Mutual Conductance meter is indicating micromhos, operate the reversing switch. If the 280 tube has equal emission from both plates, the indications of the Mutual Conductance meter will not change in value.
14. The Mutual Conductance meter is arranged to indicate Line Voltage, and adjustment is made by means of the compression rheostat which is operated by means of the knob located between the two meters. The tester is designed to operate on line voltages from 100 to 130. To adjust for correct line voltage, proceed as follows:
15. Insert the 280 Rectifier tube in the 280 socket and the tube to be tested in its correct socket.
16. Set the "Line Test - Tube Test" switch in "Line Test" position.
17. Adjust the compression rheostat until the Mutual Conductance meter indicates 2000 or "Line Test" position.
18. The "Tube Test - Line Test" switch may be operated in either "Tube Test" or "Line Test" position while the tube is in the tester at any time, in order to ascertain if the line voltage has changed while the tube is being tested.
19. Test all 4-prong tubes in the 226 socket except Screen Grid types such as the 222, 232 and 234.
20. In testing the several types of the receiving tubes, place the filament voltage change plug in the correct position to give the filament voltage which the tube requires, such as 1.5 volts for type 226; 2.5 for 227, etc. Set the Potentiometer, located at the lower right hand corner of the instrument over the type tube marked on the dial. This adjusts the Potentiometer to give the proper grid bias. In testers equipped with "0" filament taps, insert one filament plug in "0" jack for all tubes except those requiring 6.3 volts. For 6.3 insert in 1.5 and 7.5 jacks.

21. Should a capacity effect be noticed where the hand is placed over or near the tube which causes a change in the mutual conductance indication, same can be eliminated by reversing the plug in the AC supply line.

22. The values of plate current and mutual conductance as given in the table mounted on the tube tester, and values of special tubes as given in the table, are average values supplied by the tube manufacturer, and it should not be expected that a quantity of tubes will give these precise values. A tube which shows values of within 25% plus or minus from given values, in most cases operates satisfactorily when used in a radio set. Output tubes such as 245, 171-A, etc., can usually be used when the mutual conductance values are 35% from average. It is advisable if best results are expected, to select tubes for a given radio set, which are as near alike as possible. This is particularly true of tubes used in radio frequency positions and in push-pull amplifier stages.

23. Particular attention is called to the mutual conductance value of a radio tube as this is the most important constant of any tube used in radio sets, except for detector position. If this value is correct and the plate current is considerably lower or higher than the correct value, the tube will operate satisfactorily, providing the mutual conductance is up to correct value. Soft tubes usually show high plate current and low mutual conductance.

24. The 281 Rectifier tube should be tested in 226 socket, setting filament volts at 7.5. Use a regular 280 tube in 280 socket.

25. Set Plate Switch in 90 position. Tube should read 45 to 50 milliamperes.

26. The UX and UV199 tube values are the same. The No. 7-A Adapter is required for the UV type and is inserted in the 226 socket.

27. The No. 222, 232 and 234 tubes require the AC-945 adapter and are tested in the 224 socket. Do not attempt to test these tubes in the 226 socket.

28. The Cardon and Kellogg tubes, such as the Kellogg 401 type with heater terminals at the top of the tube require the No. 5-A adapter. To test, insert the tube in 226 socket and insert the two plugs on the end of the cords attached to the 5-A adapter to the jacks marked 2 and 5 volts. The regular filament plug should not be connected to anything. The Potentiometer settings, plate current and mutual conductance values are given in table on last page of these instructions.

29. Filament Cathode Shorts. The push button located at the left of the 226 socket is for the purpose of locating short circuits between filament and cathode of 227 and 224 type tubes and other tubes containing cathode. When the tube is being tested and the tester is indicating plate current and Mutual conductance, press this button. If no short exists between filament and cathode, both the Plate Milliammeter and Mutual Conductance meter should return to zero. A partial return to zero indicates leakage between the filament and cathode.

30. Noisy Tubes. Noisy tubes can usually be detected by gently tapping the tubes with the finger tips. Should the value of plate current and mutual conductance fluctuate, the tube will be noisy in the receiver.

31. The tube holders in the AC-47 Tube Tester are of the removable type and can be removed and replaced with a new one by removing the screw in center of holder. In ordering, specify style desired such as 280, 227, etc.
List Price, each $ 1.00
List Price, set of four, $ 3.00

32. The F.Z. Adapter, AC-57-58 Adapter and 280 Test Plug are supplied as standard equipment after November 16th, 1932. All other adapters are supplied extra at extra cost.

# INSTRUCTIONS FOR OPERATING GAS TEST IN AC-47 RADIO TUBE TESTER.

The Gas test in the AC-47 Tube Tester operates by the insertion of a high resistance in the grid circuit and then balancing out the increase in plate current by the insertion in the cathode circuit of tube, sufficient resistance to restore the plate current to the original value. To operate proceed as follows:

After testing the tube in the regular manner for plate current and mutual conductance, set the small dial located at the left of the 226 socket to "0" and depress the button marked "Gas". If the tube is gassy, the plate current milliammeter will increase in its reading. Now rotate the gas content dial until the plate current is restored its original values. When the position of gas rheostat dial is thought to be exact, operate the gas button rapidly and note reading of milliammeter for final exact adjustment. The dial of gas rheostat is marked with average permissible values of gas content, but if the exact amount of gas or grid current is desired, proceed as follows:

After securing balance of plate current as given above, read the Ohm scale on gas rheostat and plate current on Milliammeter and multiply the two readings and the result will be the grid current in micro-amperes.

Example: Plate Milliamperes 25 equal .025 amperes.
Gas rheostat setting 200 ohms equal 200 ohms times .025 amperes
or 5 micro-amperes.

In testing tubes for gas content, such as 224, etc., where the potentiometer setting is less than 15, move the potentiometer to 15.

Note: The Gas Test is not supplied as regular equipment.

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FOREWORD

The Multiplex is not an adapter. It simply makes available three additional sockets for testing new type tubes. It is used in the same manner as the sockets originally built in your tester. Each of the new sockets is marked with the tubes it accommodates.

Instructions for using Multiplex & socket with 10-47, 4300, 4301, 4302, 4303 and Statiktester.

1. Insert Multiplex socket in the 26, 27 and 24 sockets.

2. Insert tube to be tested in proper socket.

3. Insert plug on right end of Multiplex as per instructions. When testing tubes not listed on end of Multiplex, insert plug in Screen Grid Jack of tester. If tester is not equipped with Screen Grid Jack, insert plug in Screen Grid hole of 47 or 38 socket.

4. Follow regular instructions as to filament voltage, plate voltage and potentiometer setting.

5. In testing Rectifier tubes, such as 82, 83, etc., Plate Milliammeter will read as soon as the tube is inserted in the Multiplex. This is reading of one plate only. Press button marked "No. 2 Plate" for other plate.

6. All Rectifier tubes should read 39 to 42 milliamperes per plate, with plate switch in 180 volt position.

7. The push button marked "Test Plug" replaces the regular test plug originally supplied with your tester. To use, insert 80 tube in 80 socket, and press button marked "Test Plug". Milliammeter should read 39 to 42 mills, with plate switch in 180 volt position.

## FOREWORD

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Instructions for using the Multiplex B socket with AC-47, 4300, 4301 4302 and 4303 Tube Testers and StatiKtester.

1. Insert Multiplex socket in the 26, 27 and 24 sockets.

2. Insert tube to be tested in proper socket.

3. Insert plug on right end of Multiplex as per instructions. Tubes not listed on end are not affected by plug position.

4. Follow regular instructions as to plate voltage and potentiometer setting. For tubes requiring not more than 7-1/2 volts on filament, throw toggle switch on end to "TRANS.OUT". For tubes requiring more than 7-1/2 volts on filament, throw toggle switch to "TRANS.IN" and set filament volts as per F figure following tube number. Example: 25Z5F5 means that when testing the 25Z5 tube, the transformer is in, and the filament voltage is set at 5 volts.

5. In testing Rectifier tubes, Plate Milliammeter will read as soon as the tube is inserted in the Multiplex. This is reading of one plate only. Press button marked " No. 2 Rect.Plate" for other plate. Reading should be 40 or more milliamperes with plate switch on 180 volts.

6. The push button marked " No. 2 Amp. Plate" is for testing the second plate of the 19 and 79 tubes.

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Instructions for using Multiplex C Socket with AC-47, 4300, 4301, 4302, 4303 and StatiKtester.

1. Insert Multiplex Sockets in the 26, 27 and 24 sockets.

2. Insert tube to be tested in proper socket.

3. Insert plug on right end of Multiplex in Screen Grid Jack of tester. If tester is not equipped with Screen Grid Jack, insert plug in Screen Grid hole of 47 or 38 socket.

4. Follow regular instructions as to filament voltage, plate voltage and potentiometer setting. The 12A5 tube is tested with a 6.3 Volt Filament.

5. In testing the tubes 53, 6Y5 and 6Z5, plate Milliammeter will read as soon as the tube is inserted in the Multiplex. This is reading of one plate only. Press button marked "Press for No. 2 Plate" for other plate.

6. All Rectifier tubes should read 39 to 42 Milliamperes per plate, with plate switch in 180 volt position.

7. To obtain reading on the 1A6 tube, press button located at right hand end of Multiplex.

# CUT OFF POINT

The "CUT OFF POINT" or value of grid bias required to reduce the plate current of R F or detector tubes to .2 milliamperes or less can be easily found with all series of Hickok 4C-47 Tube Testers and StatiKtester. The grid voltages around the potentiometer are as follows:

| Potentiometer Settings | Grid Volts |
|---|---|
| 0 | 0 |
| 10 | 3.2 volts |
| 20 | 7.5 " |
| 30 | 11.6 " |
| 40 | 16.1 " |
| 50 | 20. " |
| 60 | 24.5 " |
| 70 | 28.5 " |
| 80 | 33. " |
| 90 | 36.75 " |

Note: The above values are subject to a 5% plus or minus variation.

To determine the "CUT OFF POINT" , first proceed in the usual manner as when testing for mutual conductance and plate current. Rotate the potentiometer to the right until the plate current is reduced to .2. milliamperes ( disregard the reading of mutual conductance meter). The correct potentiometer settings for R F amplifier and detector tubes are as follows:

| Tube Type | Approx. CUT OFF Grid Volts | Potentiometer Setting |
|---|---|---|
| 24 | 10-12 | 29 |
| 27 | 28-30 | 70 |
| 29 | 13 | 39 |
| 35 | 30-35 | 80 |
| 36 | 10 | 32 |
| 51 | 18-20 | 45 |
| 57 | 7-8 | 21 |
| 58 | 30-35 | 80 |
| 37 | 25 | 72 |
| 39 | 30 | 90 |
| 56 | 17 | 48 |
| 64 | 13 | 37 |
| 65 | 30 | 90 |
| 67 | 27 | 78 |
| 69 | 15 | 41 |
| 70 | 12 | 32 |
| 78 | 26 | 70 |
| 90 | 33 | 90 |
| 92 | 33 | 90 |
| 606 | 9.5 | 28 |
| 6D6 | 24 | 64 |
| 486 | 10 | 30 90 volts on plate |