Model 1200

MUTUAL CONDUCTANCE TUBE TESTER

INSTRUCTION MANUAL

MERCURY
ELECTRONICS CORP.
manufacturers of quality electronic products

IMPORTANT NOTICE

Before attempting to remove panel be sure to remove the two screws on the under side of case. Unless these screws are removed, it will be impossible to remove panel.

When replacing panel be sure to replace the two screws on the under side of case. If the screws are not replaced, the instrument could be badly damaged in shipment or shock.

In the event this instrument is returned for repair without the panel properly secured, MERCURY will not be responsible for damage or breakage.

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Mercury Electronics Corp.

INTRODUCTION

The Mercury Model 1200 combines the deluxe features of Push-Button Dynamic Mutual Conductance Tube Testing with an accurate Battery and Transistor Test. All picture tubes are tested, including color picture tubes. The ease and speed provided by the exclusive push-button test, together with multiple-socket circuitry make this instrument tops in deluxe performance at an economy price.

The Model 1200 tests for shorts between any tube elements. Gas Content or Grid Leakage is shown on the 2-color GAS Scale of the large 6-inch meter, with a sensitivity of over 150 megohms. True dynamic mutual conductance of tubes is shown on the dual-range Gm scale of the meter; and emission quality of diodes, power tubes, etc. is shown on the 3-color Em scale. Automatic line-voltage compensation eliminates the need for a line-adjust control. Line isolation plus special design assures that wherever regular test procedure is followed, no shock hazard or damage to tube or instrument can occur.

Transistors are tested for large signal current gain, with test results shown directly on the BETA scale of the meter. No transistor chart is necessary. Batteries are tested under full load, with quality shown on the 3-color meter scale.

THE PANEL AND CONTROLS

The PUSH BUTTONS operate in corresponding pairs, button A on the top row corresponding to button 1 on the lower row, etc. The RELEASE at the left end of each row provides instant re-set. The first ten buttons to the right of the RELEASE represent corresponding tube pins*. The three buttons at the right of each row control the Grid, Heater return, and plate circuits, respectively. Automatic bias and plate voltage selection and an independent heater circuit, eliminate need for a Bias or Plate Voltage switch and for an open position, thus greatly simplifying test procedure at no sacrifice in accuracy.

The FUNCTION switch sets up the tube tests in proper sequence, switches in the Transistor and Battery Tester, and also serves as the POWER switch.

*Buttons A and 1 correspond to tube pin 1, buttons B and 2 correspond to tube pin 2, etc. Heater pins are independent of the buttons, and top cap connects to buttons J and 10. Pin 11 of Socket 5 is connected to the pin 1 circuit.

The SELECTOR knob provides 12 heater voltage settings, which cover all tubes in use today. The oversize power transformer assures adequate current to even the largest tube tested, without overheating.

The POWER jewel shows when the instrument is turned on, and the SHORTS jewel is used to detect inter-element shorts up to 1 megohm.

The modern 6-inch meter has a dual-range "Gm" scale which enables dynamic mutual conductance to be measured over a range of 0-5000 micromhos or 0-25,000 micromhos.

The 3-color "Em" scale measures dynamic cathode emission of tube types where no Gm test can be made, or where cathode emission is recommended as of more significance. This scale is also used to test picture tubes. A mark labeled DIODES O.K. provides a quality test of low output diodes. Battery quality is also shown on this same scale, which also shows FORWARD CURRENT of semi-conductor diodes such as crystal, germanium or silicon detector types.

The BETA scale is used for Transistor testing and covers the gain or Beta range of all popular transistor types in use today, including power transistors.

The 2-color "GAS" scale measures the tendency of a tube to have grid emission due to gas. This circuit has over 150 megohm sensitivity and is highly reliable as a means of catching faulty performance due to tube gassy condition. The "GAS" scale is also used to show transistor and diode LEAKAGE or reverse current.

The tube chart provides automatic guidance as to which test is to be made and which meter scale is to be read, for all tube types including gas regulators, battery tubes, special purpose, industrial, and foreign types. The test for all transistors and batteries is simplified, for speed and accuracy, and the meter scales are designed to provide quality readings with no transistor or battery charts necessary!

The Socket complement contains 13 sockets plus 7-and 9-pin straighteners. Included are the new 12-pin Compactron, 10-pin, Novar and Nuvistor sockets, making the Model 1200 completely up-to-date.

The TRANSISTOR and BATTERY test controls are grouped at the right side of the Model 1200 panel. The TRANS.-BAT. FUNCTION switch sets up the proper circuit according to which device is to be tested. The BATTERY VOLTAGE switch provides the proper full-load resistance at each setting, as specified by the battery manufacturer.

The LEAKAGE-GAIN slide switch is used in checking transistors and diodes for leakage and gain or forward current. A universal transistor socket is provided; or the color-coded jacks and test leads can be used for external tests. Two of the three test jacks are also used for battery test.

The case is compact and lightweight, finished in smart gray leatherette. Included is a picture tube test cable, a full eight-foot line cord, color-coded test leads, tube chart and instruction manual.

TEST INSTRUCTIONS

PART I. TUBE TEST SECTION

Preliminary

Tests are generally made following clockwise sequence of the FUNCTION switch positions:

a) Initial set-up, as given on the tube chart, is made with the FUNCTION switch at "OFF" or at "TUBE SHORTS" position before inserting tube.

b) Push button operation:

Any button will stay down when depressed.
Additional buttons may be depressed at separate times without releasing buttons previously depressed.
All depressed buttons in one row are released at once by depressing the RELEASE, at the left end of the row.
To change a setting, hold down those buttons which you wish to remain down, and depress the RELEASE momentarily – any depressed buttons, which are not held, will rise.

c) Find the listing of the tube to be tested – check for any special instructions in "Notes" column of tube chart.
Normally, all tubes are first tested for inter-element shorts according to the instructions entitled "Test for Shorts".

d) After the SHORTS test, buttons should be changed to the proper settings for Gm or Em test before advancing the FUNCTION switch to "Gm-Em" position. When this switch is advanced to "Gm-Em", the meter automatically indicates the tube quality, using the scale which is designated in the tube chart.

e) After the test for Gm or Em, the buttons should be re-set for GAS test, if the tube chart calls for such a test. Then the FUNCTION switch can be advanced to "GAS-GRID LEAKAGE" position, and any gassy condition can be observed on the meter GAS scale.

f) Remove tube. Always release all buttons in both rows, and rotate FUNCTION switch back to "TUBE SHORTS" position before inserting next tube to be tested.

NOTE: If the above sequence is observed in making all tube tests, danger of damage to the meter will be avoided, which might occur if the FUNCTION switch is advanced to "Gm-Em" or to "GAS" position before buttons are properly set, or if the FUNCTION switch is inadvertently left at either of these positions at the start of the next test.

TEST FOR SHORTS

1. See that all buttons are up, unless otherwise directed in tube chart column entitled "NOTES". FUNCTION switch may be set at "OFF" or at "SHORTS" position.

2. Referring to tube chart, find listing of tube to be tested, and set SELECTOR and LOAD as indicated in first two columns.

3. Advance FUNCTION switch to "TUBE SHORTS" position (if it is not already there), insert tube in designated socket, and allow 10-second warm-up.

NOTE: A few tubes (such as 1AX2, etc.) require pre-setting of buttons before inserting in socket. Observe "NOTES" column for any special directions.

4. Observe SHORTS indicator lamp during the following procedure:

   a) Hold down the RELEASE for the upper row of buttons, marked A, B, C, etc., and one at a time, depress buttons A through J, holding each down only long enough to observe the SHORTS indicator.

   b) A steady indicator glow when any button is depressed means the tube is shorted, except where that particular button is listed in SHORTS column of tube chart, in which case a glow is O.K.

5. Interpretation of SHORTS test:

   a) Heater-to-Cathode (H-K) shorts:

      Heaters are wired independently. A heater-to-cathode short exists if a SHORTS indication is obtained when only one button, corresponding to cathode pin, is depressed.

   b) Identifying a short:

      When two elements in a tube are shorted to each other, a glow will occur at the depression of either button, and the glow will go out if both buttons are depressed at the same time.

   c) A short involving internally connected Tube Pins:

      Where internal tube connections give normal short indications, such as on buttons B and G for 6BC5 test, you can check for an actual short by holding down both buttons B and G at the same time.

6. If a tube is shorted, reject it without further test.

7. If a tube has no shorts, release all buttons in the upper row before proceeding to the next test.

NOTE: The buttons in the lower row are normally not used during the SHORTS test. Some exceptions will be found listed in the "NOTES" column. Refer to 1AX2, where buttons 2 and 8 in the lower row are depressed all during the SHORTS test, and should remain depressed until corresponding buttons B and H are depressed in preparation for the QUALITY test. (This is a protective measure for tubes with multiple heater connections.)

TEST FOR DYNAMIC MUTUAL CONDUCTANCE (Gm)

1. After completing SHORTS Test, refer to tube chart column entitled "Gm-Em" and to "Rated Gm" listing in "NOTES" column. If a value is listed under "Rated Gm", the tube will be tested for transconductance using the following procedure. If there is no listing in the "Rated Gm" column, the tube is to be tested for Dynamic Emission (Em), using the procedure of the next section, entitled "TEST FOR EMISSION (Em)".

2. Depress buttons in both rows, as directed in "Gm-Em" column of tube chart. (Make sure any unlisted buttons are released.)

3. Advance FUNCTION switch to "Gm-Em" position and observe meter Hi scale (0-25,000 range). Mutual conductance in micromhos should be within 20% of rated value as listed in column entitled "Rated Gm". If a double asterisk (**) appears next to Gm value listing, use meter Lo-Scale (0-5000 range).

NOTE: If Gm reads a little more than 20% outside of rated value, the technician should use his judgement whether to replace the tube; extra-high Gm should do no harm; extra-low Gm means a sub-standard tube that might still be useful in a non-critical circuit.

TEST FOR EMISSION (Em)

1. Where no value is listed in the column entitled "Rated Gm", the tube will be tested for dynamic emission.

2. With FUNCTION switch still in "TUBE SHORTS" position, depress buttons in both rows as directed in column labeled "Gm-Em".

3. Advance FUNCTION switch to "Gm-Em" position and read tube quality on 3-color GOOD-WEAK-BAD scale entitled "EM". Diode quality is good if meter reads over the line entitled "DIODES O.K.". Diodes are identified on the tube chart by a single asterisk (*) next to the listing in the first column entitled "Tube".

4. If there is a listing in the column entitled "GAS", refer to the procedure of the next section, entitled "Test for Gas".

5. If there is no listing in the column entitled "Gas" the test is completed:
   a) Remove tube from socket.
   b) Release all buttons and set FUNCTION switch to "TUBE SHORTS".

TEST FOR GAS

1. A gas test should be made only where a listing is found in the Tube Chart column entitled "GAS". Where a listing is given, proceed as follows:

2. Release all buttons and advance FUNCTION switch to position entitled "GAS-GRID-LEAKAGE". (Meter should be on zero.)

3. Depress buttons in upper row as directed in "GAS" column of tube chart, and observe 2-color scale at bottom of meter dial, entitled "GAS":

   a) If tube is good there should be little or no meter movement. If meter reads anywhere in the green area at the left end of the scale, tube has some gassiness but is acceptable. If meter reads anywhere in red area, tube should be rejected as sub-standard.

   b) Grid leakage or conduction due to gas will cause the meter to start indicating at approximately 150 megohms. At 100 megohms, the needle will just enter the red zone entitled "BAD". (If a GAS test is accidentally made on a dead short, the meter needle will swing over to full scale and then fall back slightly).

4. Remove tube from socket, unless it is a multiple-section tube with more sections to be tested.

5. Set FUNCTION switch to "TUBE SHORTS" position, and release all buttons before starting test of next tube or tube section.

MULTIPLE SECTION TUBES

1. Multiple section tubes include any tube with more than one section in a single bulb. These tubes are listed in the tube chart separately for each section. For example, note listings of 4BC8, 5U4, 6AT6, etc., each of which is listed more than once.

2. Make a complete test of first section, then make a complete new test of each additional section as listed.

   a) Note that the test of different sections of the same tube may be quite different – one section may be tested for Gm, while another section is tested for Em, or as a diode, etc.

   b) A multiple section tube should be rejected unless all sections test in good condition.

PICTURE TUBE TEST

Preliminary

1. The Model 1200 includes a picture tube test cable with the exclusive "Multi-Head" which contains sockets for all black-and-white and color tubes, plus a color gun switch that allows separate tests for the red, green,and blue sections. (The setting of the color gun switch does not matter during test of black-and-white tubes.)

2. Picture tubes all have approximately the same emission characteristics, so no chart of settings is necessary.

TEST FOR SHORTS

1. With FUNCTION switch at "TUBE SHORTS" position,
   set SELECTOR at "D" for standard 6.3 volt heaters
   set SELECTOR at "C" for 4.7 volt heaters
   set SELECTOR at "B" for 2.68 volt heaters
   set SELECTOR at "E" for 8.4 volt heaters

NOTE: For the very few types which use other than the standard 6.3 volt heaters, refer to any of the manufacturer's CRT rating charts, available at all parts jobbers.

2. Insert Multi-Head octal plug into socket 4 of Model 1200 panel.

3. Connect proper socket on Multi-Head to CRT under test. CRT heater should light.

4. Test for shorts by the method outlined in section entitled "Test for Shorts", steps 4 and 5 on page 7.

5. If the picture tube has no shorts, test for Emission (Em) as follows:

   a) Set LOAD to 70.
   b) Depress buttons C, D, E, and 11.
   c) Advance FUNCTION switch to "Gm-Em" position and read CRT quality on 3-color scale labeled "Em".

6. Interpretation of CRT Quality Test.

   a) A picture tube can still have an acceptable raster even when emission is quite low.
   b) Any Quality reading above the "DIODES O.K." line means the tube is good. A picture tube in perfect condition should show a quality reading in the middle of the green zone, marked "GOOD".
   c) For readings below the "DIODES O.K." line, the CRT should be reactivated or replaced. To check on whether reactivation will help, proceed as follows:

      Advance the SELECTOR one position clockwise (from D to E, for example), and observe the meter action.

      If tube can be reactivated, needle will climb above the "DIODES O.K." line. These tubes should be used with a permanent "brightener" for the balance of their useful life.

      If advancing the SELECTOR fails to improve the QUALITY reading, the CRT should be replaced, since its useful life is at an end, or very nearly so.

      Return SELECTOR to its proper setting before proceeding to test for GAS.

      Release all buttons.

TEST FOR GAS

1. Advance FUNCTION switch to "GAS-GRID LEAKAGE" position.

2. Depress button E in top row and read CRT GAS content on 2-color GAS scale, exactly as described in section entitled "TEST FOR GAS", step 3a, on page 9 .

3. A gassy picture tube should be replaced, since it gives a very poor picture even if emission is good.

COLOR PICTURE TUBES

1. A color CRT can be tested like three black-and-white picture tubes.

2. Set COLOR GUN switch to RED, and test the color tube exactly like a black-and-white tube, as outlined in preceding section.

3. After test of RED section, advance COLOR GUN switch to GREEN, and repeat entire test. Then repeat again with switch at BLUE position.

4. A color picture tube should be replaced unless all three sections are good.

PART II.
TRANSISTOR, DIODE & BATTERY TEST SECTION

Preliminary

1. The shaded portion of the Model 1200 panel is used when testing transistors, batteries, or diodes.

   To operate this section, plug the Model 1200 into the power line and set the FUNCTION switch on the main panel to the position marked "TUBE SHORTS TRANSISTOR-BAT. TEST". Make sure all push buttons are released.

2. Insert the test leads into the three test jacks, making sure that the test lead colors match the colors of the jacks. Do not allow the clips to short against each other or to touch the panel.

3. The Transistor test employed in the Model 1200 requires no transistor chart.* Low-power transistors are tested for GAIN and for LEAKAGE. Power transistors and diodes are tested for forward-to-reverse current ratio. Batteries are tested for output under rated load.

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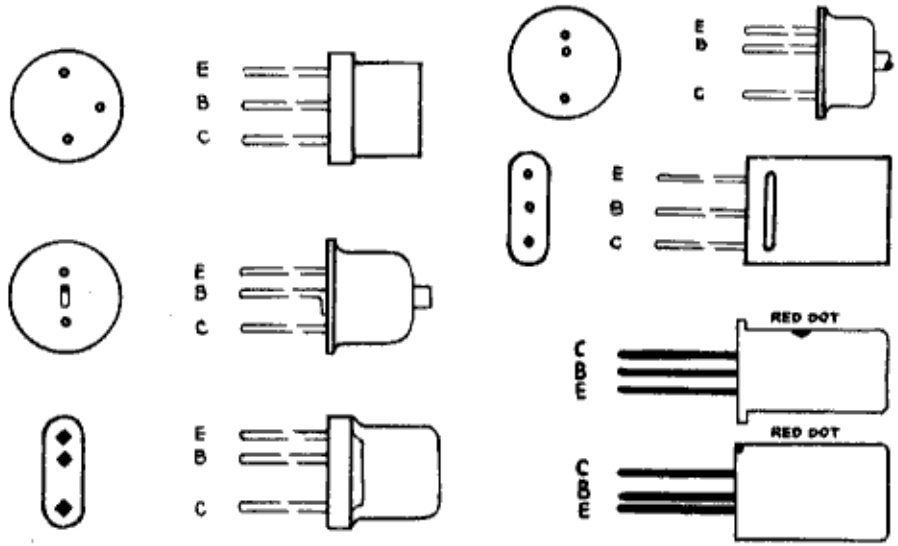
* A handbook of transistor ratings, such as is published by most transistor manufacturers, may be useful, but is not necessary when testing with the Model 1200.

TEST FOR LOW-POWER TRANSISTORS

1. Base diagrams:



2. Set TRANS-BAT. FUNCTION switch to PNP or NPN according to the polarity of the transistor. BATTERY VOLTAGE switch is not used for this test.

   a) Most popular types are PNP.

   b) If a transistor is accidentally tested with the switch at the wrong polarity, test results will be reversed, but no damage will be done.

3. Set slide switch to GAIN (lower position).

4. Insert the transistor in the universal panel socket, which automatically makes the right pin connections, or use the clip leads as follows:

   a) Clip the RED test lead to the COLLECTOR.

   b) Clip the YELLOW test lead to the EMITTER.

   c) Clip the BLACK test lead to the BASE.

NOTE: For TETRODE transistors, connect Base 1. to Base 2., and proceed with test, the same as for general purpose types.

d) Read Beta (transistor GAIN) on meter scale marked "BETA". Low-power types will have typical values from 20 to 100. If Beta reading falls in this range or higher, transistor has good GAIN. Even if Beta reads very low or you get no reading at all, continue with the next test step.

5. Set slide switch to LEAKAGE (upper position).

   a) Observe 2-color GAS scale (also marked TRANSISTOR-DIODE LEAKAGE).

   b) . A perfect transistor will show little or no meter reading.
   . A good transistor will read in green zone marked "O.K."
   . A leaky transistor will read in red zone marked "BAD".

6. Results of Test for Low-Power Transistors:

   a) If GAIN and LEAKAGE both checked O.K., transistor is GOOD.

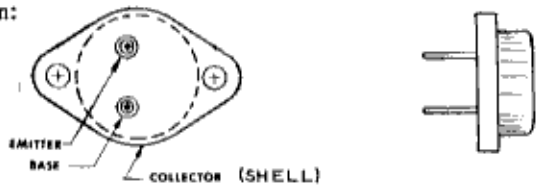
   b) A transistor with good GAIN but high LEAKAGE should be replaced.

   c) A transistor with no LEAKAGE but with very low GAIN may work in some circuits, but should usually be replaced.

   d) If you get a reading of very low GAIN and very high LEAKAGE, your polarity may be wrong: reverse the setting from PNP to NPN (or from NPN to PNP) and repeat the entire test, doing steps 3, 4, and 5, above.

TEST FOR POWER TRANSISTORS

1. Base diagram:



2. Set TRANS.-BAT. FUNCTION switch to PNP. BATTERY VOLTAGE switch, Slide switch, and black lead are not used for this test.

3. Clip RED test lead to the shell (Collector Terminal), and clip YELLOW test lead to the Emitter Terminal.

   a) Note meter reading, using BETA scale as a reference number only.

   b) Change polarity switch to NPN and note second reading.

   c) The ratio of the higher reading to the smaller reading is the forward-to-reverse current ratio, and should be 2-to-1 or higher. (The higher

the transistor power, the lower this ratio will be – 10 watt transistors may show a ratio as low as 1.5-to-1.)

4. Change the YELLOW test lead over to the BASE terminal.

   a) Take readings, using the Beta scale, at PNP and at NPN switch positions.

   b) Forward-to-reverse current ratio should be 3-to-1 or higher.

5. Change the RED test lead over to the EMITTER terminal.

   a) Take readings, using the BETA scale, at PNP and at NPN switch positions.

   b) Forward-to-reverse current ratio should be 3-to-1 or higher.

6. Results of Test for Power Transistors:

   a) If all forward-to-reverse current ratios are within satisfactory limits, the power transistor is GOOD.

   b) If any one of the three tests showed too low a difference between forward and reverse currents, the transistor is leaky and may work in some circuits, but should generally be replaced.

   c) If forward and reverse currents are the same, the transistor is SHORTED.

   d) If no meter reading can be observed for forward or reverse current, the transistor is OPEN.

TEST FOR CRYSTAL (LOW POWER) DIODES

1. Set TRANS.-BAT. FUNCTION switch to PNP. BATTERY VOLTAGE switch, Slide switch, and black lead are not used for this test.

2. Clip RED test lead to diode cathode (pos. end).
   Clip YELLOW test lead to diode anode (neg. end).

   a) Observe forward current on 3-color Em scale (also marked DIODE FORWARD CURRENT).

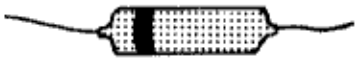
   b) Meter should read over the line marked DIODES O.K.

3. Change polarity by switching to NPN.

   a) Observe leakage current on 2-color GAS scale (also marked DIODE LEAKAGE).

   b) Meter should read little or nothing.

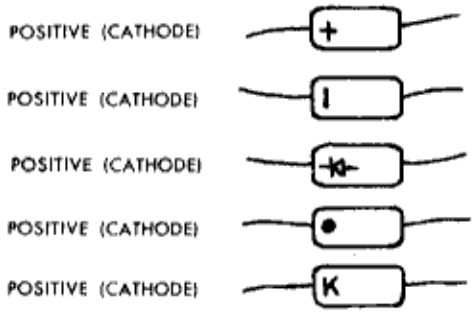
DIODE PIN CONNECTIONS:



GENERAL APPEARANCE
(Positive end indicated by the stripe)

NOTE: In a diode it is merely necessary to identify which end is positive

ALTERNATE METHODS OF INDICATING THE POSITIVE END



4. Results of Test for Crystal Diodes:

   a) If diode forward current is over the DIODES O.K. line on the Em scale, and leakage current is in the green (O.K.) zone of the GAS scale, diode is GOOD.

   b). A diode with good forward current but high leakage should be replaced.

   c) If forward and leakage currents are equal, the diode is SHORTED.

   d) If there is no meter reading for either forward or leakage, the diode is OPEN.

5. Using the Model 1200 to Find Diode Polarity.

   a) Set TRANS.-BAT. FUNCTION switch to PNP. BATTERY VOLTAGE switch, SLIDE switch, and black test lead are not used.

   b) Connect RED test lead to one end of diode.

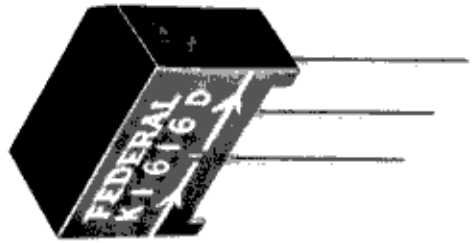
   c) Connect YELLOW test lead to other end of diode.

   d) If meter reads diode forward current (over the DIODES O.K. line on 3-color Em scale) RED lead is connected to cathode.

   e) If meter reads diode leakage (little or no meter reading) YELLOW lead is connected to cathode.

TEST FOR DUO-DIODES

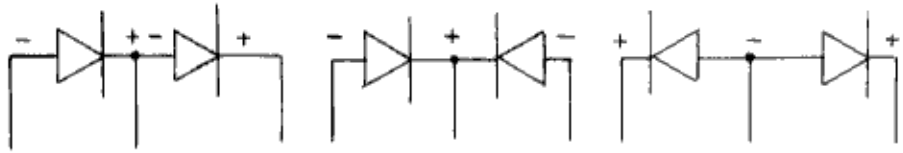
1. Duo-Diode Types:



Selenium Type
Popular in TV Horizontal
A.F.C. Circuits

Copper Oxide Type
Used as Meter Rectifier

2. Circuits of duo-diodes:



3. A duo-diode can be tested exactly like two separate diodes:

   a) Using center pin and one end pin of the duo-diode, perform the test procedure of steps 1 through 4 of the preceding section entitled "Test for Crystal (low-power) Diodes".

   b) Repeat the same test, using center pin and the other end pin.

   c) Unless both diode sections are good, the duo-diode should be replaced. (Meter rectifier types will show a higher leakage than crystal types, but forward-to-reverse current ratio should be 15-to-1 or better.)

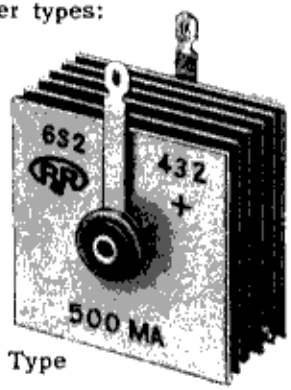
4. To identify the internal circuit of an unmarked duo-diode, follow the test procedure of step 5, above:

   a) Identify anode and cathode of each section, and test duo-diode quality at the same time.

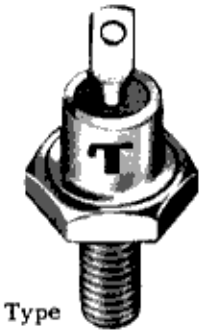
   b) The circuit will be one of the three illustrated above.

TEST FOR POWER RECTIFIER

1. Power types:



Selenium Type



Silicon Type

2. Set TRANS.-BAT. FUNCTION switch to PNP. BATTERY VOLTAGE switch, slide switch, and black lead are not used.

3. Connect RED test lead to pos. terminal of rectifier.

4. Connect YELLOW test lead to neg. terminal of rectifier.

   a) Observe forward current reading of rectifier, on Beta scale of meter.

5. Change switch setting to NPN.

   a) Observe reverse current reading of rectifier, on BETA scale.

6. Results of Test for Power Rectifier:

   a) 500 ma. selenium types such as are used in TV power supplies will have a forward-to-reverse current ratio of 5-to-1 or better.

   b) Small radio-type selenium rectifiers will have forward-to-reverse current ratios of 10-to-1 or better.

   c) Silicon power rectifiers and top-hat power types will show good ratios of 10-to-1 or better.

   d) Large, low-voltage selenium types, such as 20 amp. types used in auto battery chargers, will normally show a low forward-to-reverse current ratio of 2-to-1 or 3-to-1.

7. To identify polarity of an unmarked rectifier, follow the procedure of step 5 in previous section entitled "Test for Crystal (low power) Diodes".

TEST FOR BATTERY

Preliminary

The Model 1200 battery test circuit provides full load for the twelve popular battery types used today in transistor and portable radios, intercoms, flashlights, industrial test and control equipment, signal devices, etc.

TEST PROCEDURE

1. Set TRANS.-BAT. FUNCTION switch to BAT. position.

2. Set BATTERY VOLTAGE switch to the voltage rating of battery under test. Slide switch and black test lead are not used.

3. Connect RED test lead to the battery positive (+) terminal.

4. Connect the YELLOW test lead to the battery negative (−) terminal.

5. Observe battery quality on 3-color Em scale, also marked "TUBES-BATTERIES-DIODE FORWARD CURRENT".

6. Results of Test for Battery:

   a) Battery is good if meter reads in green area marked GOOD.

   b) Battery is low if meter reads in yellow area marked WEAK. Replacement will probably be required in a very short time.

   c) If meter reads in red zone marked BAD, battery should be replaced.

PART III SERVICE NOTES

1. The calibration controls of your Model 1200 are factory-set, and should not require further adjustment. If these controls are tampered with, your instrument will require factory re-calibration.

2. The POWER indicator, part no. B_3, is one of a pair of type 44 lamp bulbs which regulate the mutual conductance circuit. Should either bulb become burned out, it must be replaced at once or the Gm test circuit will not operate.

3. Your Model 1200 is designed for years of trouble-free service. Like all fine equipment, this instrument runs cool, and may safely be left on all day. It can be damaged only by mis-use: Take care to observe that all controls are correctly set before testing any device.

MODEL 1200 PARTS LIST

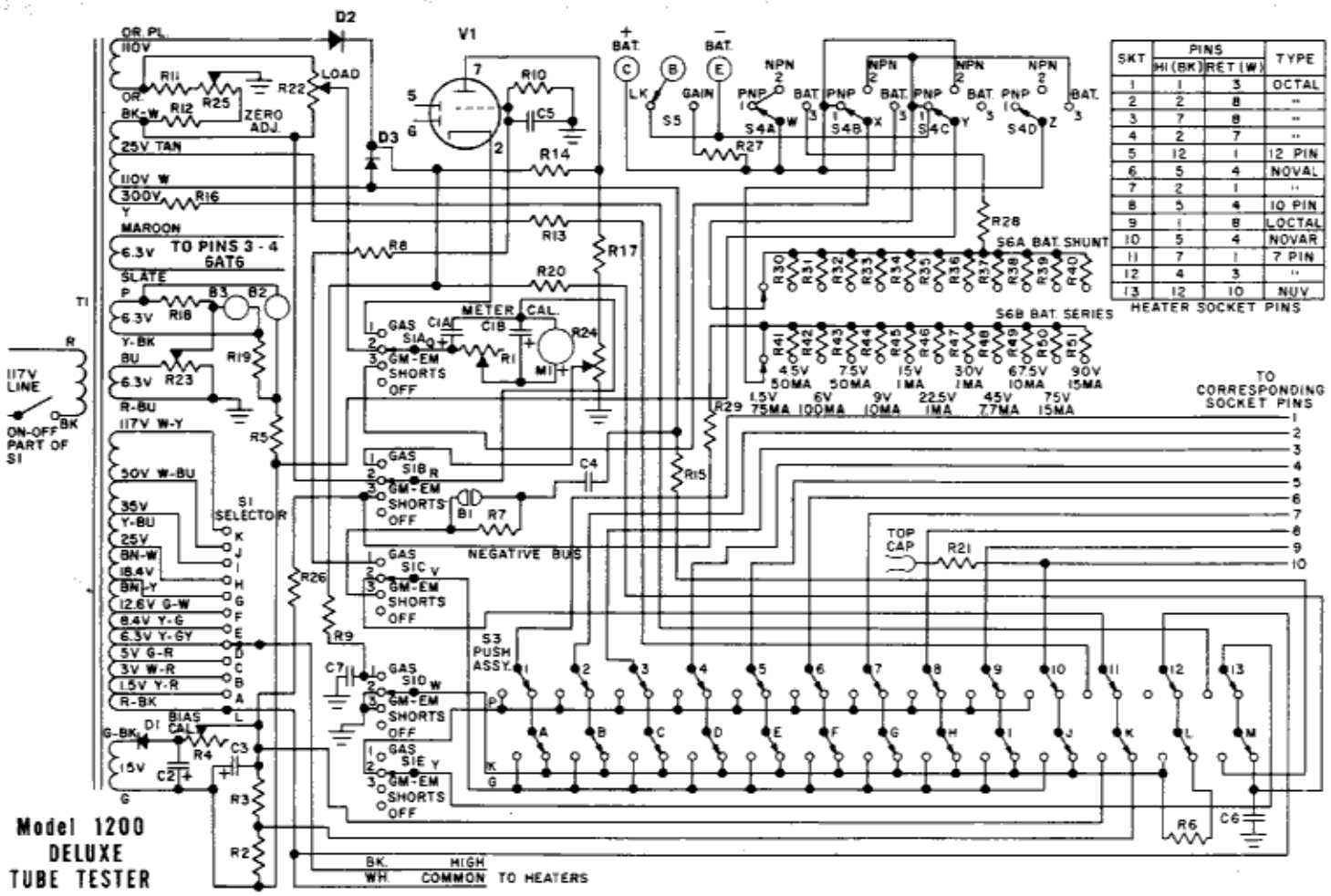
Item No.	Description
R-1	100 Ohm Meter Cal. Pot.
R-2	220 Ohm 1% ½ Watt Resistor
R-3	560 Ohm 1% ½ Watt Resistor
R-4	5K Ohm Bias Cal. Pot.
R-5	10K Ohm 10% ½ Watt Resistor
R-6	47K Ohm 10% ½ Watt Resistor
R-7	820K Ohm 10% ½ Watt Resistor
R-8	4.7M Ohm 10% ½ Watt Resistor
R-9	6.8M Ohm 10% ½ Watt Resistor
R-10	22M Ohm 10% ½ Watt Resistor
R-11	100 Ohm 10% 1 Watt Resistor
R-12	100 Ohm 10% 1 Watt Resistor
R-13	1K Ohm 10% 1 Watt Resistor
R-14	3.9K Ohm 10% 1 Watt Resistor
R-15	4.7K Ohm 10% 1 Watt Resistor
R-16	15K Ohm 10% 1 Watt Resistor
R-17	10K Ohm 10% 1 Watt Resistor
R-18	18 Ohm 10% 5 Watt Resistor
R-19	18 Ohm 10% 5 Watt Resistor
R-20	270 Ohm 10% 5 Watt Resistor
R-21	270 Ohm 10% 5 Watt Resistor
R-22	1K Ohm LOAD CONTROL
R-23	100 Ohm Grid Cal. Pot.
R-24	1K Ohm GAS Cal. Pot.

Item No.	Description
R-25	40 Ohm Zero Cal. Pot
R-26	6.2K Ohm 5% ½ Watt Resistor
R-27	1.2M Ohm 10% ½ Watt Resistor
R-28	22 Ohm 10% 2 Watt Resistor
R-29	1.8K Ohm 10% ½ Watt Resistor
R-30	68 Ohm 10% ½ Watt Resistor
R-31	39 Ohm 10% 1 Watt Resistor
R-32	120 Ohm 10% ½ Watt Resistor
R-33	1K Ohm 10% ½ Watt Resistor
R-34	47K Ohm 10% ½ Watt Resistor
R-35	68K Ohm 10% ½ Watt Resistor
R-36	68K Ohm 10% ½ Watt Resistor
R-37	6.8K Ohm 10% ½ Watt Resistor
R-38	7.5K Ohm 5% 1 Watt Resistor
R-39	5.6K Ohm 10% 2 Watt Resistor
R-40	6.8K Ohm 10% 2 Watt Resistor
R-41	3.9K Ohm 10% ½ Watt Resistor
R-42	5.6K Ohm 10% ½ Watt Resistor
R-43	8.2K Ohm 10% ½ Watt Resistor
R-44	10K Ohm 10% ½ Watt Resistor
R-45	18K Ohm 5% ½ Watt Resistor
R-46	27K Ohm 10% ½ Watt Resistor
R-47	39K Ohm 10% ½ Watt Resistor

Cont. on following page

MODEL 1200 PARTS LIST — CONT.

Item No.	Description
R-48	56K Ohm 10% ½ Watt Resistor
R-49	82K Ohm 5% ½ Watt Resistor
R-50	100K Ohm 10% ½ Watt Resistor
R-51	120K Ohm 10% ½ Watt Resistor
C-1	2 x 200 mfd 10V Electrolytic Condenser
C-2	100 mfd 25V Electrolytic Condenser
C-3	100 mfd 25V Electrolytic Condenser
C-4	.01 mfd 600V By Pass Condenser
C-5	.01 mfd 600V By Pass Condenser
C-6	.01 mfd 600V By Pass Condenser
C-7	.05 mfd 600V By Pass Condenser
V-1	6AT6 Tube
D-1	1Y4 Rectifier
D-2	Bridge Rectifier
D-3	Bridge Rectifier
T-1	Power Transformer
B-1	NE-51 Neon Lamp
B-2	#44 Lamp
B-3	#44 Lamp
M-1	0-1 MA. Meter
S-1	5-Pole 4-Pos. Rotary FUNCTION Switch
S-2	1-Pole 12-Pos. Rotary SELECTOR Switch
S-3	28 Push Button Switch Assembly
S-4	4-Pole 3-Pos. TRANS.-BAT. FUNCTION Switch
S-5	DPDT LEAKAGE-GAIN Slide Switch
S-6	2-Pole 12-Pos. BATTERY VOLTAGE Switch



SKT	PINS HI (BK)	PINS RET (W)	TYPE
1	1	3	OCTAL
2	2	8	"
3	7	8	"
4	2	7	"
5	12	1	12 PIN
6	5	4	NOVAL
7	2	1	"
8	5	4	10 PIN
9	1	8	LOCTAL
10	5	4	NOVAR
11	7	1	7 PIN
12	4	3	"
13	12	10	NUV

IMPORTANT NOTICE

Before attempting to remove panel be sure to remove the two screws on the under side of case. Unless these screws are removed, it will be impossible to remove panel.

When replacing panel be sure to replace the two screws on the under side of case. If the screws are not replaced, the instrument could be badly damaged in shipment or shock.

In the event this instrument is returned for repair without the panel properly secured, MERCURY will not be responsible for damage or breakage.