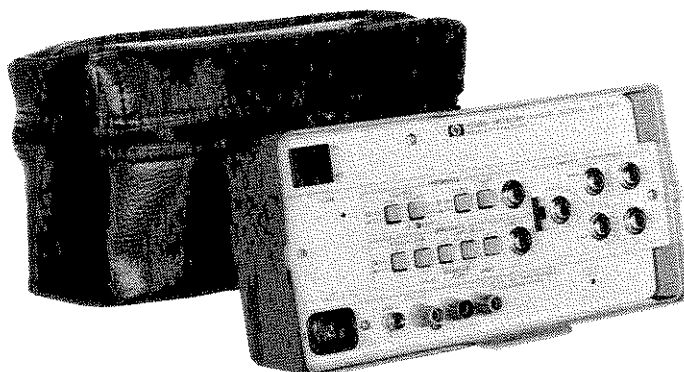




HEWLETT  
PACKARD

# 4938A

## NETWORK CIRCUIT ACCESS TEST SET



### Quick Reference Guide

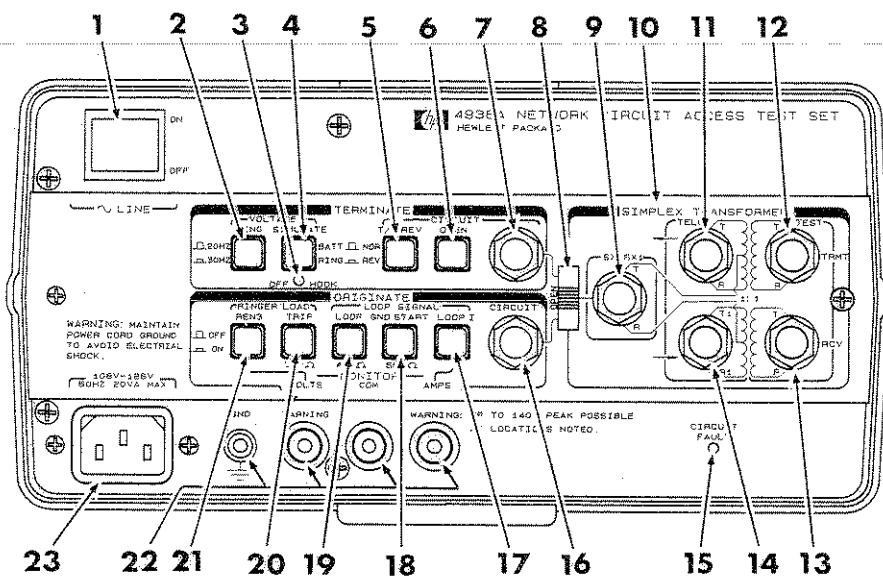
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4938A CONTROLS  
& INDICATORS

RING TESTING &  
LOOP SIMULATOR

4-WIRE  
SX ACCESS



1. **LINE switch:** Applies power to the instrument when in the ON position.
2. **RING:** Selects frequency of ringer voltage; Up is 20 Hz and Down is 30 Hz.
3. **OFF HOOK:** Indicates that a DC loop has been closed across the TERMINATE CIRCUIT Jack and that a current of at least 17 mA typically is flowing.
4. **SIMULATE:** Up is -48 volt battery simulator (-48 volts Tip to Ring); Down is 20 or 30 Hz ring voltage superimposed on -48 volts.
5. **T/R REV:** Tip/Ring Reverse; Up position the Tip and Ring are connected to the TERMINATE CIRCUIT Jack in normal polarity. Down position the Tip and Ring are connected to the TERMINATE CIRCUIT Jack in reverse polarity.
6. **OPEN:** Opens circuit; Up position the TERMINATE CIRCUIT Jack is connected. Down position the TERMINATE CIRCUIT Jack is disconnected.
7. **TERMINATE CIRCUIT jack:** Provides connection between the TERMINATE CIRCUIT functions and the circuit under test.
8. **Simplex Lead Patch Switch:** Provides an internal connection between either the TERMINATE or ORIGINATE functions and the SIMPLEX TRANSFORMER. The slide switch positions are:
  - Up position connects the TERMINATE functions to the SIMPLEX TRANSFORMER.
  - Middle position disconnects the SIMPLEX TRANSFORMER from both the TERMINATE and the ORIGINATE functions.
  - Down position connects the ORIGINATE function to the SIMPLEX TRANSFORMER.

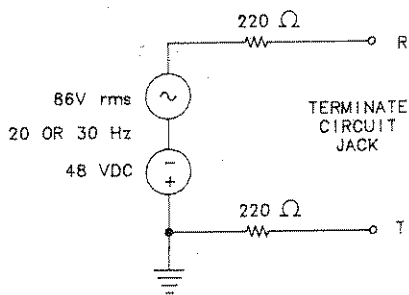
9. **SX/SX1 Jack:** Simplex lead SX is the Tip and lead SX1 is the Ring.
10. **SIMPLEX TRANSFORMER:** Provides 4 wire network access with Simplex leads, SX/SX1. The front panel graphics show the internal connections.
11. **TELCO Jack:** Output from transformer to telephone company circuits.
12. **TEST TRMT Jack:** Input to transformer from test equipment.
13. **TEST RCV Jack:** Output from transformer to test equipment.
14. **TELCO Jack:** Input to transformer from telephone company circuits.
15. **CIRCUIT FAULT LED:** Indicates that a circuit fault (a short or a high foreign voltage) exists on the circuit being tested. The internal protection circuit will automatically disconnect the instrument from the faulty circuit. The fault must be cleared before continuing with the testing.
16. **ORIGINATE CIRCUIT Jack:** Provides connection between the ORIGINATE CIRCUIT functions and the circuit under test.
17. **LOOP I:** Momentary switch that, when pressed, interrupts the Tip/Ring loop closure and places the MONITOR COM and AMPS binding posts in series with the loop for measuring loop current.
18. **GND START:** Momentary switch that, when pressed, grounds the ring through a load of 550 ohms.
19. **LOOP:** Push/push switch that, when pressed in, connects 430 ohms across the loop circuit.
20. **TRIP:** Push/push switch that, when pressed in, connects 330 ohms across the loop circuit.
21. **REN3:** Push/push switch that, when pressed in, applies a load to the circuit that is equivalent to the load of three ringers. The voltage can be measured across the VOLTS and COM binding post.
22. **Monitor Binding Posts.**
  - VOLTS: Access to monitor ring voltage from far end generator or to monitor dial tone after affecting loop closure.
  - COM: Common connection for voltage or current monitor.
  - AMPS: Access to monitor loop current.
  - GND: Chassis ground.
23. Connection for power cord.

4938A CONTROLS & INDICATORS RING TESTING & LOOP SIMULATOR 4-WIRE SX ACCESS

# TWO WIRE CIRCUIT TESTING

## RING TESTING

### Sending Ring Voltage



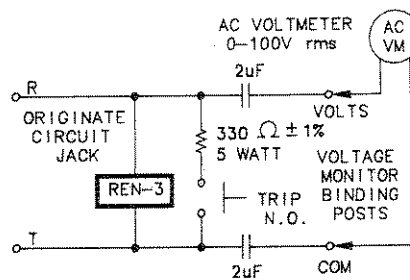
1. Connect the circuit under test to the Terminate Circuit Jack.
2. Select the Ring Voltage frequency, 20 or 30 Hz.
3. Press the SIMULATE push button to begin ringing.
  - Ring Voltage will be impressed on the circuit under test if that circuit is open for DC.

### CAUTION

The Terminate Circuit Jack has live Ring Voltage.

4. To restart the Ring, release the SIMULATE push button to the up position. Then, push the button to the down position.
  - Ringing will not restart if the DC loop is still closed.

### Terminating and Measuring Ring Voltage



1. Connect the circuit under test to the Originate Circuit Jack.
2. Press the REN3 push button.
  - This will terminate the circuit with Ring Equivalent Number 3 load.
  - The Voltage Monitor binding posts are also placed across the REN3 load.

### CAUTION

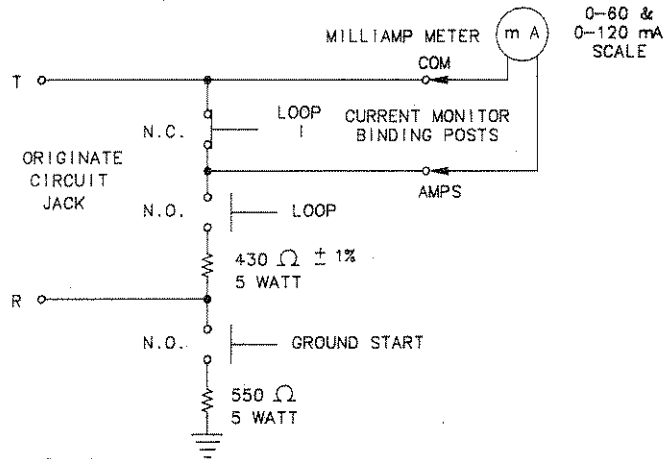
The Voltage Monitor may have live Ring Voltage.

3. Connect a Multimeter across the Voltage Monitor to measure Ring Voltage.

### Testing for Ring Trip

1. With the circuit under test terminated with REN3 and Ring Voltage present from the far end, press the TRIP push button to cause a Ring Trip closure.
2. If Ring Trip capability of the far end generator is operational, Ring Voltage monitored across the Voltage Monitor jacks should stop.

## LOOP SIMULATOR



0-60 &  
0-120 mA  
SCALE

### Loop Start—Originate

1. Connect the circuit under test to the Originate Circuit Jack.
2. Press the LOOP push button to cause a loop closure on the circuit.
3. The circuit may be monitored for dial tone by connecting a Tel Set across the line.
4. **Optional.** The loop circuit may be momentarily broken by pressing the LOOP I push button. The multimeter must not be connected to the Current Monitor binding posts.
4. The circuit may be monitored for dial tone by connecting a Tel Set across the line.
5. If the 4938A is not connected to the AC line, ground reference the unit by connecting a wire from the Ground Reference Binding Post to a suitable ground point.

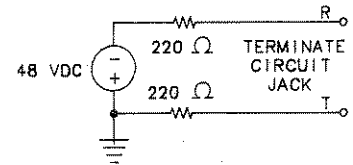
### Measuring Loop Current

1. Connect a Multimeter across the Loop Current Monitor binding posts.
2. Set the Multimeter for DC current, 100 mA range or equivalent.
3. With the LOOP push button pressed as above, press the LOOP I push button.
  - The Loop Current Monitor binding posts will be placed in series with the circuit while the LOOP I push button is held down.

### Ground Start—Originate

1. Connect the circuit under test to the Originate Circuit Jack.
2. Press the LOOP push button.
3. Press the GND START push button momentarily.
  - A ground will be placed on the Ring conductor of the Originate Circuit Jack through the margin test resistance.

### Battery Simulator



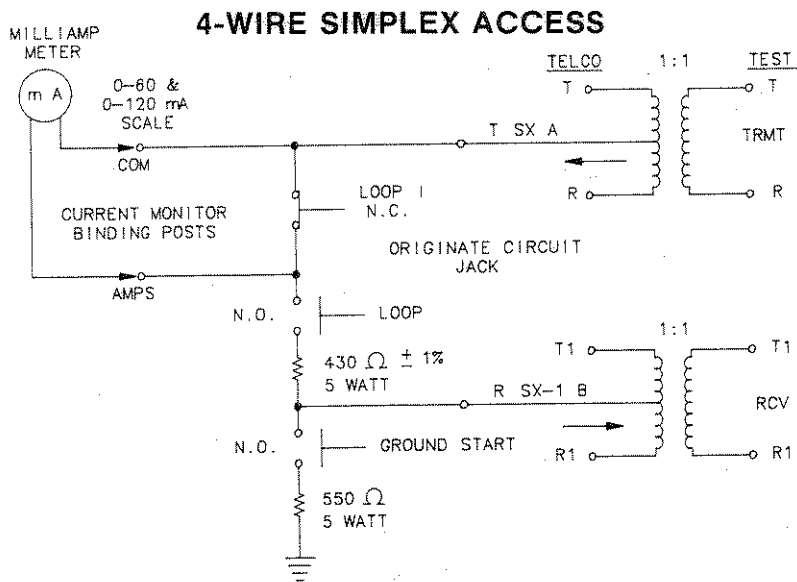
1. Connect circuit under test to the Terminate Circuit Jack.
2. With the SIMULATE button in the up position, -48 VDC will be applied to the Terminate Circuit Jack.
  - The OFF HOOK LED should be off until a DC loop is closed on the far end.
  - When a DC loop is closed on the circuit and the Loop Current is greater than 16 mA, the OFF HOOK LED will go on.
3. The Battery Simulator may be reversed by pressing the T/R REV switch.
4. The Battery Simulator may be removed from the circuit by pressing the OPEN switch.

4938A CONTROLS  
& INDICATORS

RING TESTING &  
LOOP SIMULATOR

4-WIRE  
SX ACCESS

# FOUR WIRE CIRCUIT TESTING



## 4-Wire Loop Start—Originate

1. Move the Simplex Lead Patch Switch to the down position.
2. Connect the 4 wire circuit under test to T/R and T1/R1 on the Telco side of the Simplex Transformer.
3. Press the LOOP pushbutton to cause a loop closure on SX/SX1.
4. **Optional.** The loop circuit may be momentarily broken by pressing the LOOP I push button.

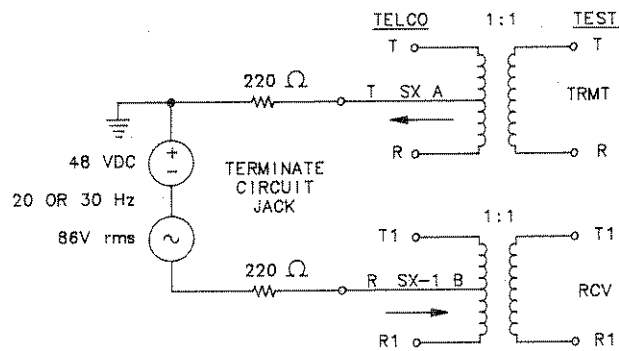
## Measuring Loop Current Across SX/SX1

1. Move the Simplex Lead Patch Switch to the down position.
2. Connect the 4 wire circuit under test to T/R and T1/R1 on the Telco side of the Simplex Transformer.
3. Connect a Multimeter across the Loop Current Monitor jacks.

4. Set the Multimeter for DC current, 100 mA range or equivalent.
5. With the LOOP push button pressed as above, press the LOOP I push button.
  - The Loop Current Monitor jacks will be placed in series with the circuit.
6. Note that if a Tel Set is used to monitor dial tone through the Voltage Monitor binding posts, the dial tone will be interrupted while the LOOP I switch is held down.

## 4-Wire Ground Start—Originate

1. Move the Simplex Lead Patch Switch to the down position.
2. Connect the 4 wire circuit under test to T/R and T1/R1 on the Telco side of the Simplex Transformer.
3. Press the LOOP push button.
4. Press the GND START push button momentarily.
  - A ground will be placed on the Ring conductor or SX1 lead of the SX/SX1 jack through the margin test resistance.



### Ring Simulation on 4-Wire Circuits

1. Move the Simplex Lead Patch Switch to the up position.
2. Follow the procedures for Ring Simulation described for 2 wire circuits via the Terminate Circuit Jack.

### Battery Simulation on 4-Wire Circuits

1. Move the Simplex Lead Patch Switch to the up position.
2. With the SIMULATE button in the up position, -48 VDC will be applied to the SX/SX1 jack.
  - The OFF HOOK LED will be off until a DC loop is closed on the far end.
  - When a DC loop is closed on the circuit and the Loop Current is greater than 16 mA, the OFF HOOK LED will go on.
3. The Battery Simulator may be reversed by pressing the T/R REV switch.
4. The Battery Simulator may be removed from the circuit by pressing the OPEN switch.

### Other 4-Wire Access

1. 4 wire access using signaling not available in the 4938A may be accomplished by connecting the source of external signaling to the SX/SX1 jack:
2. Be sure to move the Simplex Lead Patch Switch to the Open (middle) position to disconnect the Terminate or Originate functions from the Simplex Leads.

### 4-Wire Transmission Testing

1. Connect the 4 wire circuit under test to T/R and T1/R1 on the Telco side of the Simplex Transformer.
2. Connect the Transmission Impairment Measuring Set to TRMT and RCV on the Test side of the Simplex Transformer.
3. Follow the procedures for 4 wire access to use signaling functions internal to the 4938A or to patch in functions from an external source.
4. Perform the necessary Transmission Tests.

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4-WIRE  
SX ACCESS