

## TESTING AND ADJUSTING PANEL (J68602W) FOR 20 AND 135 CYCLE RINGERS DESCRIPTION AND APPLICATION

### 1. GENERAL

1.01 This section describes the voltmeter type testing and adjusting panel per SD-63474-01 (J68602W) for 20 and 135 cycle ringers. A hand size portable control test set per J64704A is employed with this panel.

1.02 Issue 1 of this section was prepared to describe the test panel as it was furnished on a trial installation. Issue 2 was prepared to cover improvements in design.

1.03 It was reissued principally to cover the use of a varistor in the receiving circuit. Detailed reasons for reissue will be found at the end of the section.

1.04 This test panel provides improved facilities on a voltage basis and of the remote controlled type, for the maintenance of 20 and 135 cycle terminal and intermediate ringers and the 20 and 135 cycle relays of these circuits. It also may be used alone for the maintenance of the 135 cycle branch of 1000-135 cycle intermediate ringers and in conjunction with a 1000 cycle ringer test circuit for the maintenance of the 1000 cycle branch of 1000-135 cycle intermediate ringers. Means are provided to permit the voltmeter to be used for the measurement of miscellaneous a-c voltages.

1.05 Means are provided for establishing all test conditions, for application to the ringer, at the test panel. The circuit is of the low shunt type and it is not necessary to have a ringer connected to the test circuit when establishing these values.

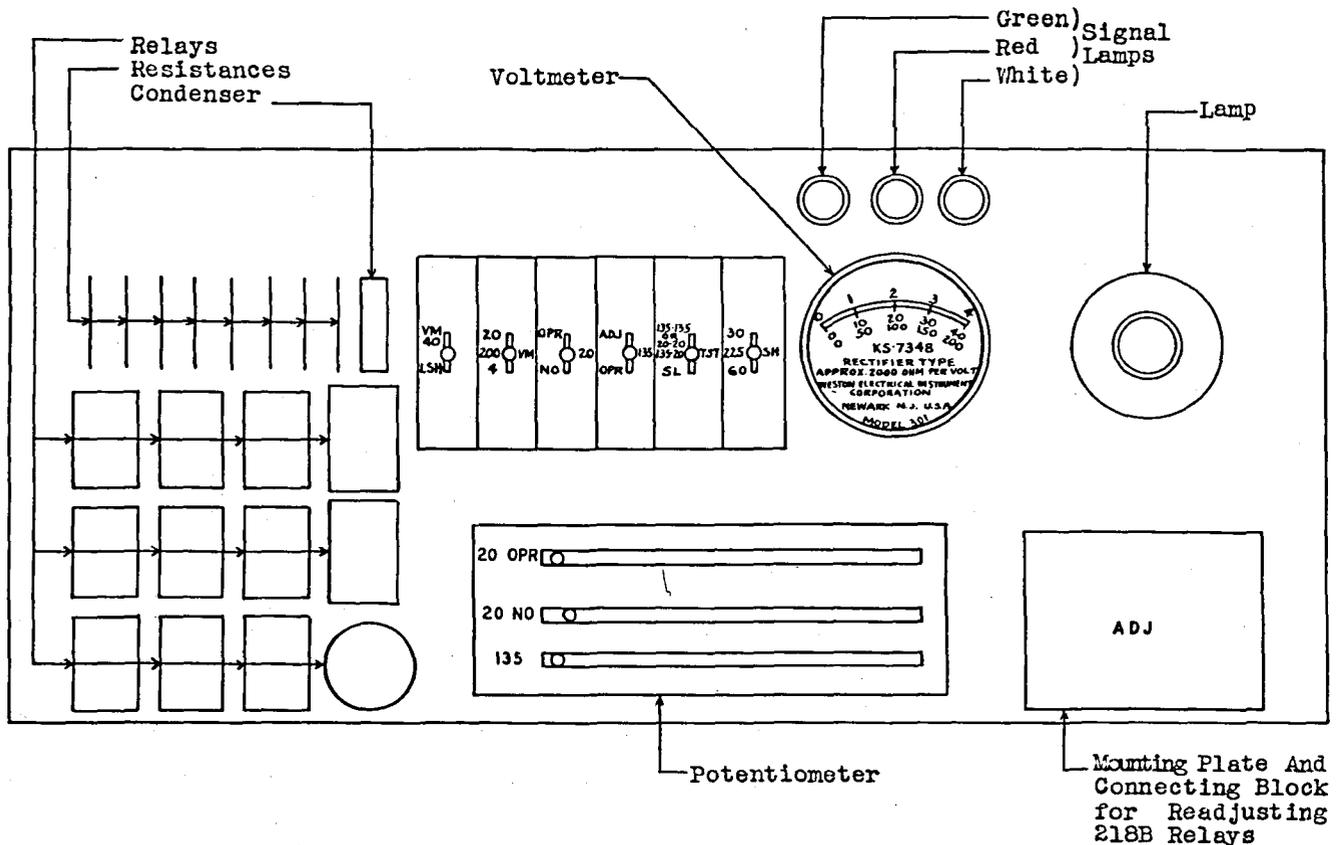


Fig. 1 - 20 and 135 Cycle Ringer Test Panel - J68602W

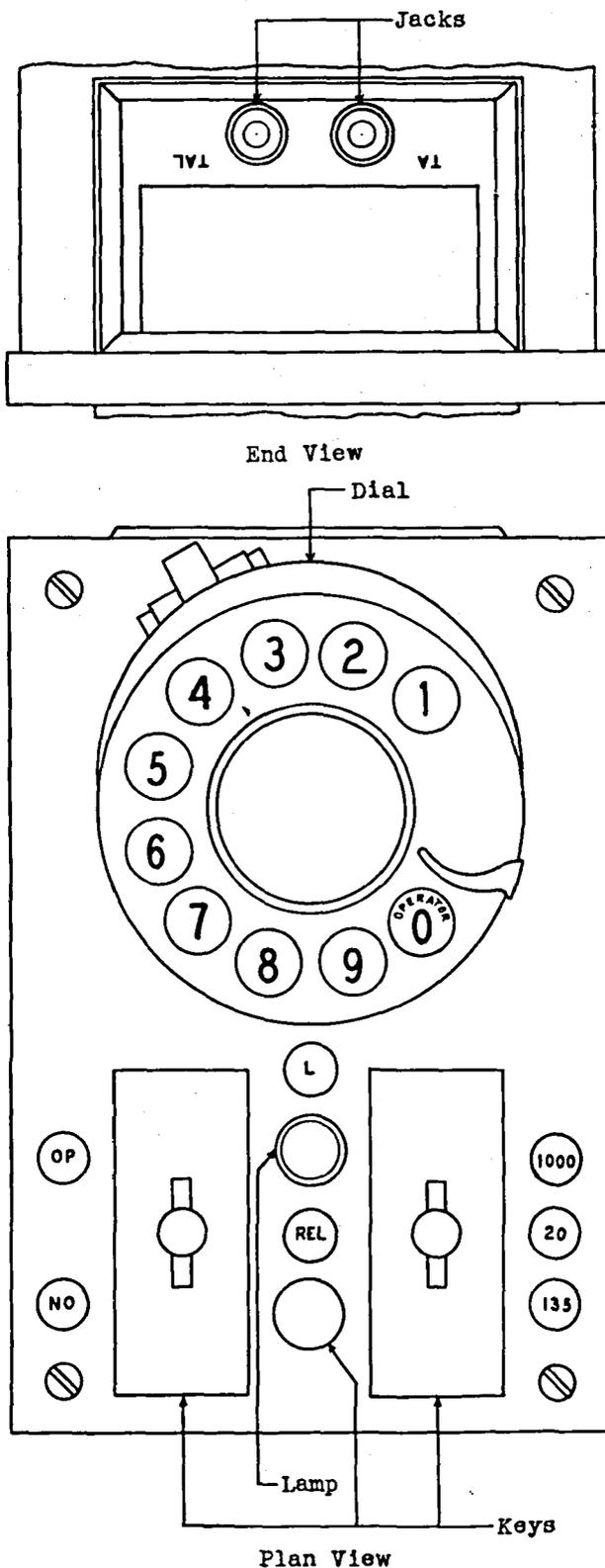


Fig. 2 - Control Test Set - J64704A

1.06 Means are provided for applying the test conditions to the ringers which are connected to the test panel either by direct patching or thru test trunks. The proper operation of the ringer is indicated by the lighting of lamps on the test panel or in the control set.

1.07 The test trunks (SD-63960-01) used with this panel have no attenuating networks and serve merely to extend the signaling circuit input and output leads to the test panel jack field. Trunks having attenuating networks are not satisfactory for use with this panel.

1.08 Arrangements have been made so that the test conditions can be controlled at the ringer bay by the use of a control set. Indication of the functioning of the ringer under these conditions is given by a lamp on the control set. This permits all ringer tests to be conveniently made by one man.

## 2. EQUIPMENT FEATURES

### Test Panel

2.01 The test panel, designated J68602W, is arranged for relay rack mounting and consists of the following main elements:

- A rectifier type a-c voltmeter.
- A three slide potentiometer.
- Three low resistance shunts.
- Keys for setting up and making tests.
- A connecting block for readjusting 218B relays.
- Three lamps for indicating the operation of ringers and relays.
- A lamp to provide illumination while readjusting 218B relays.

No jacks appear on the panel, the circuit being wired to the VM, LINE, DROP, TA and TAL jacks all of which are located in the test bay jack field. The test panel occupies 8-3/4 inches of vertical mounting space on the relay rack. The arrangement of equipment on this panel is shown in figure 1.

2.02 The AC voltmeter used in the test circuit is a Weston Model 301 rectifier type per KS-7348 having four scale ranges of 4, 20, 40 and 200 volts, the 200 volt scale being used for the 20 volt range. It has a rated accuracy of  $\pm 5$  per cent.

2.03 The potentiometer used in the test circuit has a rated resistance of 1750 ohms and is used to establish test and readjust voltage values. It is equipped with three slides which permit the simultaneous establishment of three voltage values, namely, two 20 cycle values and one 135 cycle value. This feature can be used to advantage in cases such as that of testing 135-20 cycle intermediate ringers when part of the ringers use a 10000 ohm resistance in series with the 196 type relay. In such a case the following voltage values are required:

**2.03 (Continued)**

(a) A 20 cycle test operate value for ringers using a 10000 ohm resistance in series with the 196 type relay.

(b) A 20 cycle test operate value for ringers not using a 10000 ohm resistance in series with the 196 type relay.

(c) A 135 cycle test operate value.

2.04 Three lamps on the test panel are provided to indicate the proper operation of the ringer. The red lamp lights to indicate that a ringer under test has operated and is applying its 20 cycle output to the test panel. The green lamp lights to indicate that 135 cycle current is being received at the test panel. The white lamp lights to indicate that ground is being applied to the sleeve circuit.

2.05 The lamp in the flexible mounting on the test panel is provided to illuminate a 218B relay that has been placed in the readjust connecting block of the panel.

2.06 The VM and VM40 keys are non-locking lever type keys which have positions designated 4, 20, 40 and 200 and are provided to select the range of the voltmeter. These keys, when in their normal position, provide for the selection of the 200 volt scale.

2.07 The 135 key is a lever type key which is locking in the ADJ (adjust) position and non-locking in the OPR (operate) position. With the key in the OPR position, the 135 cycle supply is connected to the potentiometer so that 135 cycle voltage values may be established and applied to a connected signaling circuit. With the key in the ADJ position the 135 cycle supply is connected to the potentiometer and 135 cycle voltage values may be established and applied to a 218B relay in the ADJ connecting block.

2.08 The 20 key is a non-locking lever type key. With the key in the OPR (operate) position, the 20 cycle supply is connected to the potentiometer by means of the 20 OPR slider so that 20 cycle operate voltage values may be established and applied to a connected signaling circuit. With the key in the NO (non-operate) position the 20 cycle supply is connected to the potentiometer by means of the 20 NO slider so that 20 cycle non-operate voltage values may be established and applied to a connected signaling circuit.

2.09 The SH key is a locking lever type key and is used to select the proper shunt resistance for establishing 20 cycle voltage values.

2.10 The TST key is a locking lever type key and is used to connect the proper signal receiving equipment to the LINE and DROP

jacks of the test circuit for the test of the indicated types of ringers. This key in its SL (sleeve) position also lights the lamp above the ADJ connecting block.

**Control Test Set**

2.11 A control set designated J64704A is used when it is desired to make tests at the ringer bay. It can be patched to two control jacks which multiple along the ringer bays. The equipment consists essentially of jacks, keys, a dial and a lamp. The arrangement of this equipment is shown in figure 2. The approximate dimensions of this box are 6" x 4" x 4".

2.12 The dial on the control set is provided to permit tests of the time of response of both 20 and 135 cycle signal receiving circuits. Each number dialed provides a time interval of approximately as many tenths of a second as are indicated by the number. The dial while restoring to normal performs the same function as the OP NO key operated to the OP position.

2.13 The frequency key in the control set is a locking lever type key and is used with the OP NO key in the control set to perform the same function as the 135 key in the OPR position. With the frequency key in the 135 position, the operation of the OP NO key to the OP position has the same result as operating the 135 key to the OPR position.

2.14 The OP NO key in the control set is a non-locking lever type key. With the frequency key normal, the operation of the OP NO key to the OP (operate) or NO (non-operate) position has the same result as operating the 20 key on the test panel to the OPR or NO position respectively.

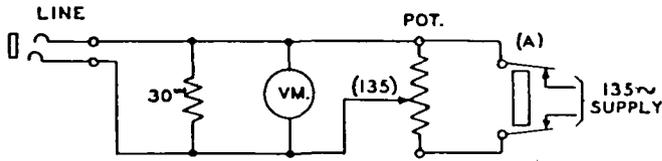
2.15 The REL (relay) key on the control set is a push button type key which controls the application of 20 cycle current at full office voltage attenuated by an 8C lamp, through the DROP jack, to the J type relays of terminal ringers.

2.16 The lamp on the control set lights to indicate that all functions of the ringer under test are satisfactory.

**Apparatus for Measuring A-C Voltages**

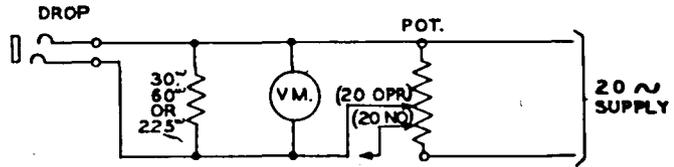
2.17 The voltmeter described in paragraph 2.02 may be used by means of the VM jack for measuring a-c voltages.

2.18 The LSH key is located on the panel. The VM jack is located in the jack field. The LSH key is a locking lever type key and is used to connect a 500 ohm resistance across the voltmeter terminals when measuring the 135 cycle received voltages of terminal ringers on non-repeated circuits. The 0-40 scale of the meter can not be used when the LSH key is operated.



135 Key to OPR - VM Key to 4

Fig. 3



SH Key as required -  
20 Key to OPR - VM Key as Required

Fig. 4

**3. CIRCUIT FEATURES**

3.01 Figures 3 to 12 show in simplified form the various circuit arrangements used when establishing the test and readjust conditions and when applying them to the ringer or relay under test.

Preparation

3.02 Figure 3 shows the test circuit arranged to set up the 135 cycle test voltage. With the circuit in this condition the proper values can be set up by adjusting the 135 slider of the potentiometer until the proper value is read on the meter.

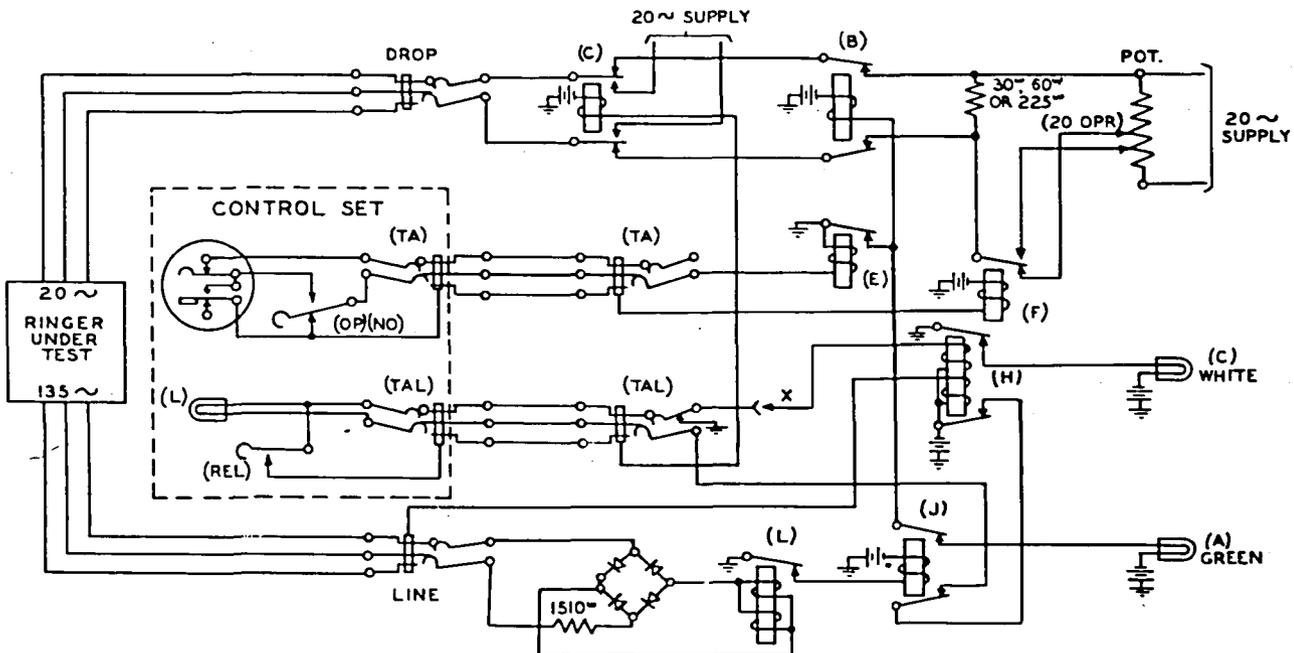
3.03 Figure 4 shows the test circuit arranged to set up the 20 cycle test operate or readjust operate voltage. With the circuit in this condition, the proper values can be set up by adjusting the 20 OPR slider of the potentiometer until the proper value is read on the meter.

3.04 When testing a 20-20 cycle ringer and a different voltage value is required for each side or when setting up readjust values for the relays, the second voltage required for the ringer or the readjust non-operate value of the relay should be set up by operating the 20 key to the NO position and adjusting the 20 NO slider of the potentiometer until the proper value is read on the meter. The circuit schematic will be the same as Figure 4 except that the 20 NO slider of the potentiometer will be connected to the shunt.

20 Cycle Side of 135-20 Cycle Ringers

3.05 Figure 5 shows the test circuit arranged to test the 20 cycle side of a 135-20 cycle ringer.

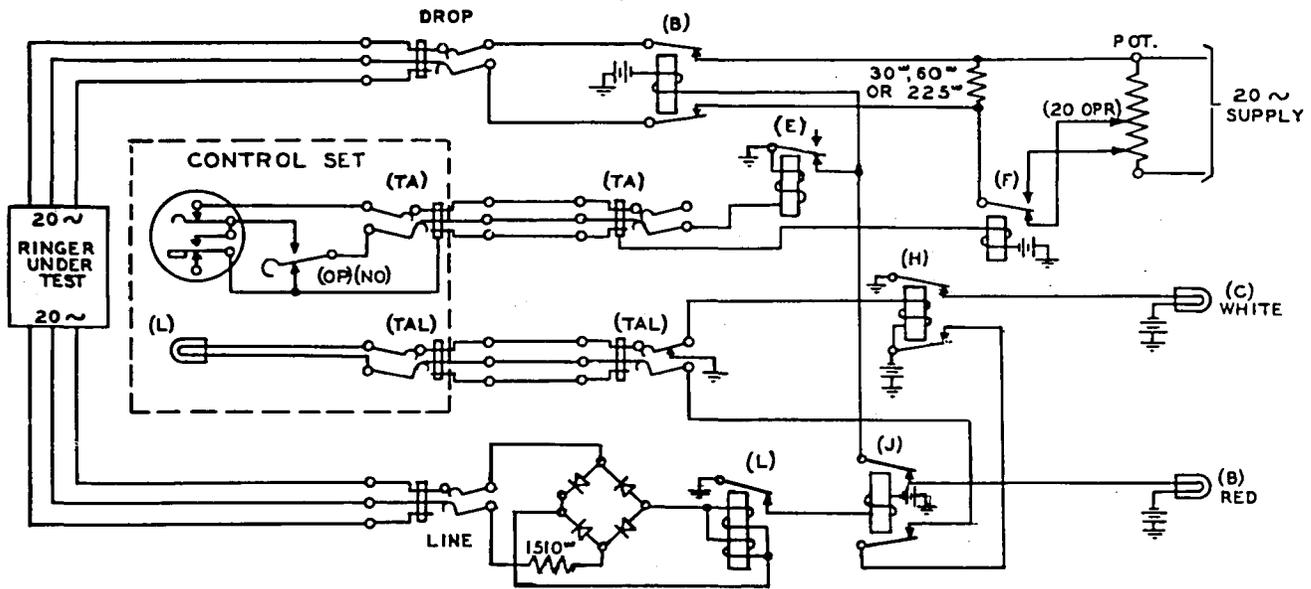
3.06 Terminal Ringers and Intermediate Ringers used with Four Wire Terminating Circuits: X wiring as shown in Figure 5 is not connected. 20 cycle current is sent out



SH Key as required - OP NO Key in Control Set to OP

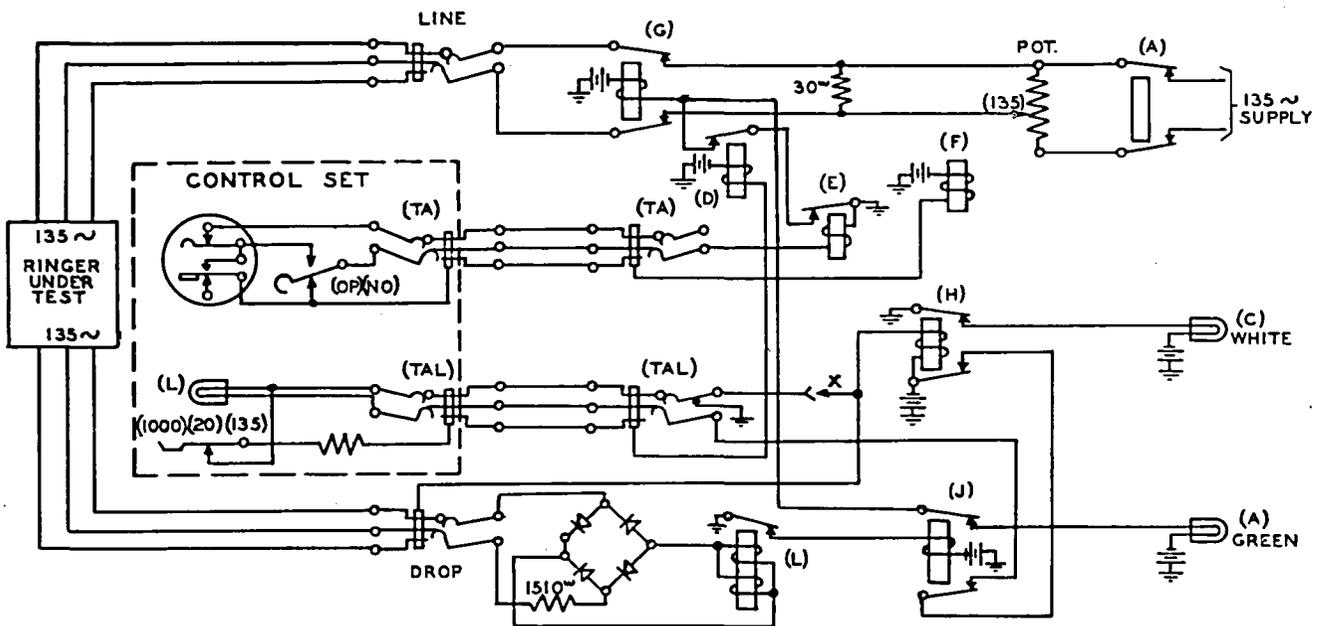
Fig. 5





SH Key as required - TST Key on Panel to 20-20 - OP NO Key in Control Set to OP

Fig. 7



TST Key on Panel to 135-135 - Frequency Key in Control Set to 135 - OP NO Key in Control Set to OP

Fig. 8

3.12 (Continued)

light to indicate that 20 cycle current has been returned by the ringer and the lamp in the control set will light to indicate the proper operation of the ringer. The other side of the ringer can be tested by reversing the patching cords.

135-135 Cycle Intermediate Ringers

3.13 Figure 8 shows the test circuit arranged to test 135-135 cycle ringers.

3.14 Ringers Used with Four Wire Terminating Circuits: X wiring as shown in Figure 8 is not connected. 135 cycle current is sent out through the LINE jack to one side of the ringer. When the ringer operates, the green lamp on the panel will light to indicate that 135 cycle current has been returned by the ringer. The white lamp on the panel will light indicating that ground has been placed on the sleeve. The lamp on the control set will light to indicate the proper operation of the ringer. The other side of the ringer can be tested by reversing the patching cords.

3.15 Ringers Used with 22 or 44 Type Repeaters: X wiring as shown in Figure 8 is connected and the white lamp on the panel will light when the control set is connected to the panel. 135 cycle current is sent out through the LINE jack to one side of the ringer. When the ringer operates,

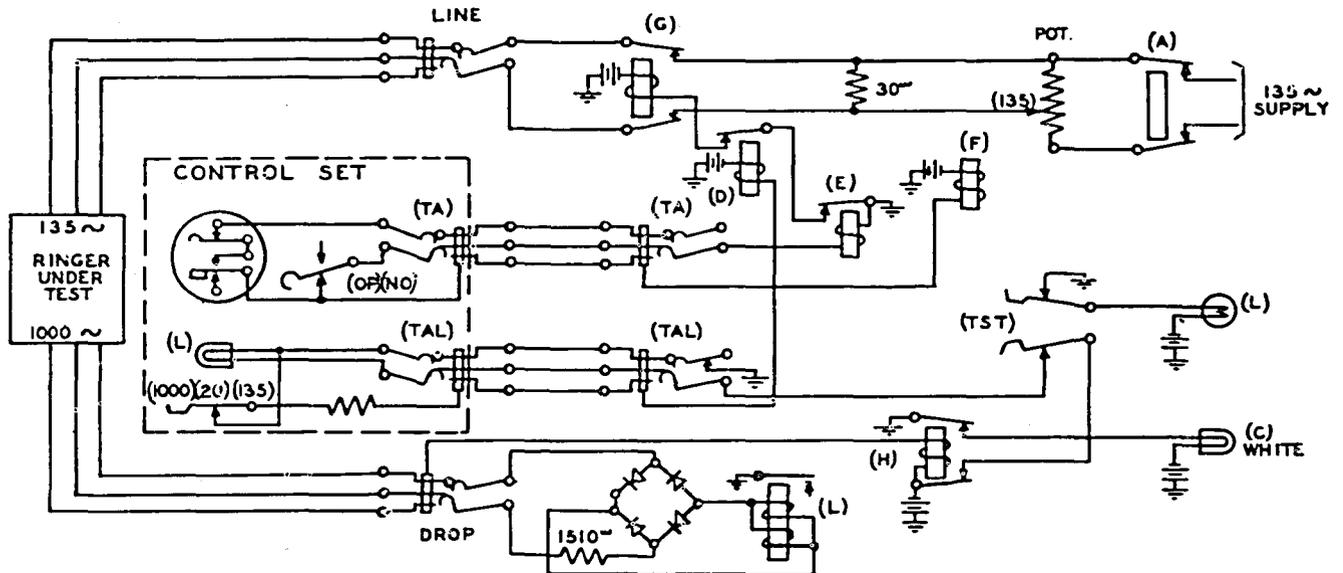
the green lamp on the panel will light to indicate that 135 cycle current has been returned by the ringer. The lamp on the control set will light to indicate the proper operation of the ringer. The other side of the ringer can be tested by reversing the patching cords.

135 Cycle side of 1000-135 Cycle Intermediate Ringer

3.16 Figure 9 shows the test circuit arranged to test the 135 cycle side of a 1000-135 cycle intermediate ringer. The operation of the TST key to SL causes the lamp above the ADJ connecting block to light but at this time the lamp serves no useful function. 135 cycle current is sent out through the LINE jack to the 135 cycle side of the ringer. When the ringer operates, the white lamp on the panel lights to indicate that ground has been returned by the ringer to the test circuit. The lamp in the control set will light to indicate the proper operation of the 135 cycle side of the ringer and indicates that ground has been applied to the sleeve circuit.

1000 Cycle side of 1000-135 Cycle Intermediate Ringer

3.17 Fig. 10 shows the test circuit arranged to receive 135 cycle current from a 1000-135 cycle intermediate ringer when 1000 cycle test current is applied to the ringer by means of a 1000 cycle test circuit. When



TST Key on Panel to SL - Frequency Key in Control Set to 135 - OP NO Key in Control Set to OP

Fig. 9

## 3.17 (Continued)

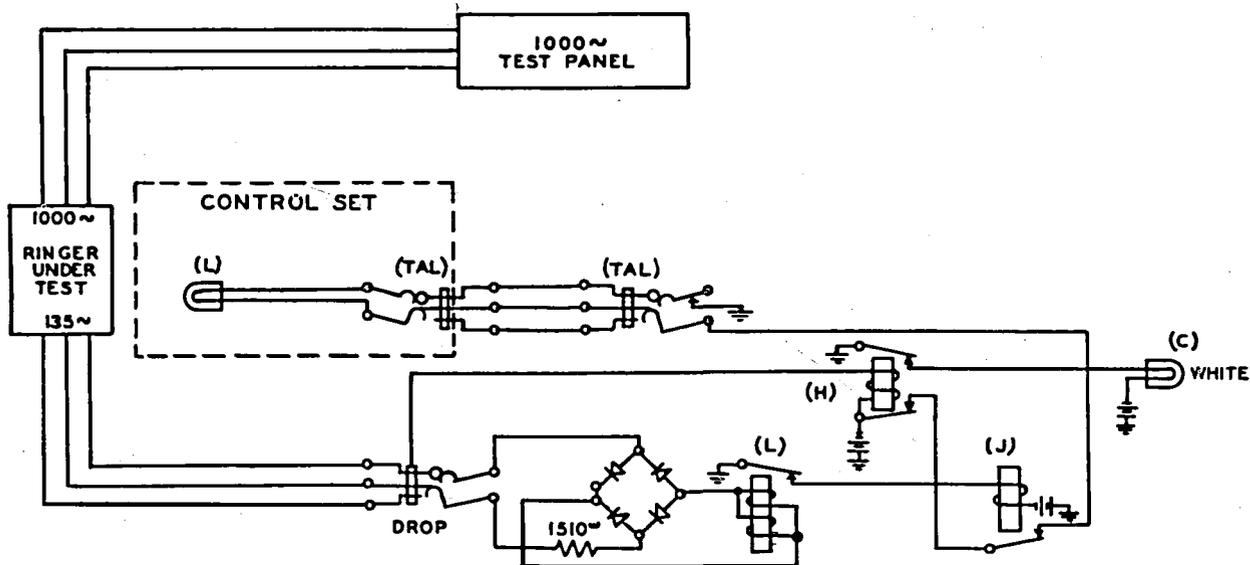
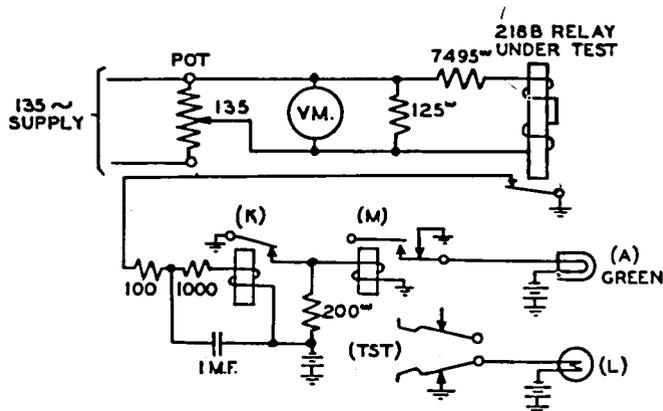


Fig. 10

the ringer operates, the white lamp on the 20-135 cycle test panel will light to indicate that ground has been furnished by the ringer to the test circuit. The lamp in the control set will light to indicate the proper operation of the ringer.

Readjust 218B Relays

3.18 Figure 11 shows the test circuit arranged to readjust a 218B relay placed in the ADJ connecting block on the panel.



TST Key to SL - 135 Key to ADJ

Fig. 11

The operation of the TST key to SL lights the lamp above the connecting block to illuminate the relay. 135 cycle current is applied to the winding of the relay and when the relay contacts make, the green lamp on the panel will light.

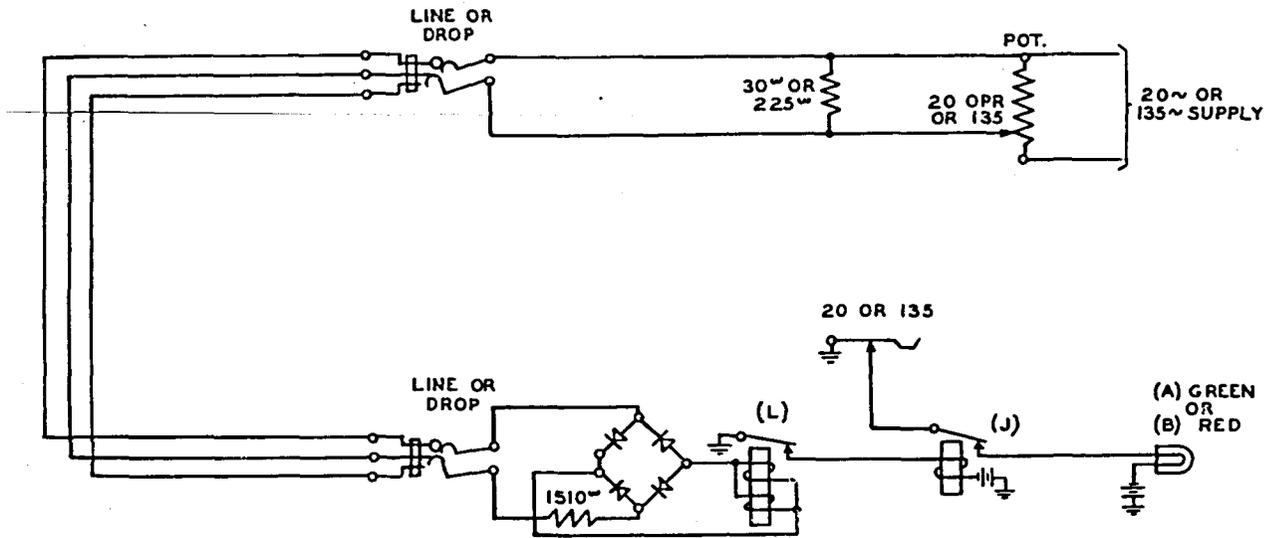
Check of Test Circuit

3.19 The test circuit may be checked by patching a three conductor cord between the LINE and DROP jacks and by arranging the circuit as shown in Fig. 12. When the circuit is arranged for a 20 cycle test, the red lamp will light to indicate the proper operation and when arranged for a 135 cycle test the green lamp will light to indicate the proper operation.

Miscellaneous A-C Voltage Measurements

3.20 Fig. 13 shows the method of measuring the 20 and 135 cycle received or transmitted voltages of terminal ringers and of intermediate ringers used with four wire terminating circuits. The voltmeter on the test panel is patched to the ringer by means of test trunks and patching cords. When measuring 135 cycle received or transmitted voltages on non-repeated circuits the LSH key will be operated to connect a 500 ohm resistance across the voltmeter terminals. The VM40 key can not be used in such cases.

3.21 Figure 14 shows the method of measuring the 20 and 135 cycle received or transmitted voltages of intermediate ringers used with repeaters. The voltmeter on the test panel is patched to the repeater jacks by means of test trunks and patching cords.



20 Cycle Test - TST Key to 20-20 - 20 Key to OPR  
 135 Cycle Test - TST Key to 135-135 - 135 Key to OPR

Fig. 12

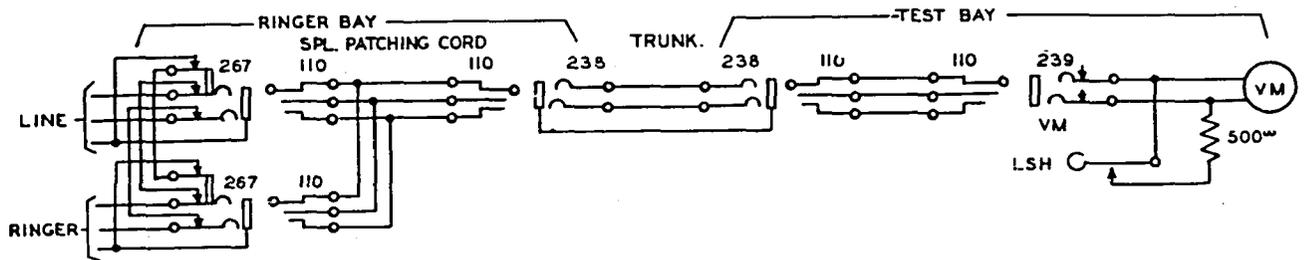


Fig. 13

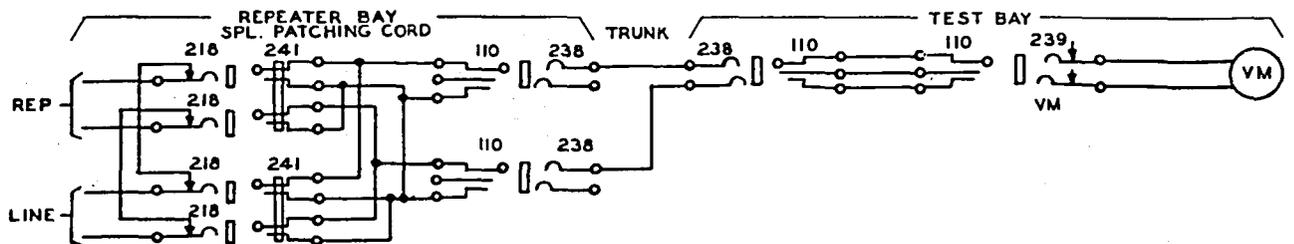


Fig. 14

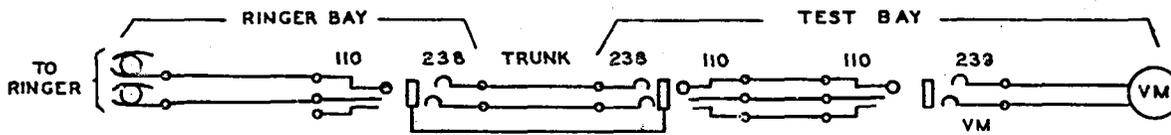


Fig. 15

3.22 Figure 15 shows the method of measuring the 20 cycle received or transmitted voltages of 20-20 cycle relaying ringers. The voltmeter on the test panel is patched to the ringer by means of test trunks and patching cords. A cord equipped with test clips on one end is used for connecting to the ringer at the points where voltage is to be measured.

#### 4. OPERATING FEATURES

4.01 Before making any tests or readjustments, the test or readjust values should be set up on the panel using the proper potentiometer sliders and the voltmeter.

4.02 When testing the 20 cycle side of a ringer, the DROP jack of the test circuit is connected to the 20 cycle side and the LINE jack of the test circuit is connected to the other side.

4.03 When testing the 135 cycle side of a ringer, the LINE jack of the test circuit is connected to the 135 cycle side and the DROP jack of the test circuit is connected to the other side.

4.04 To adjust the 20 cycle relays in the ringer circuits, connections are made in the same manner as when testing. The correct AC voltage is set up by means of keys on the panel, the meter and the sliders on the potentiometer. The voltage is applied to the relay through the operation of keys on the control set or on the panel. The dial on the control set may be used in place of the OP NO key.

4.05 When testing a 20-20 cycle ringer and a different voltage value is required for each side, the higher shunt value of the two specified, should be used for both voltage settings.

4.06 Where it is necessary to readjust the 135 cycle 218B relay, the relay must be removed from its circuit and placed in the 26B connecting block on the panel.

4.07 The voltmeter on the test panel is arranged so that it can be used for measurements of a-c signaling and other

voltages by bridging the voltmeter on the circuit to be measured.

#### REASONS FOR REISSUE

1. To change paragraph 1.04 to omit reference to 1000-20 cycle ringers and to add a reference to the 1000 cycle branch of 1000-135 cycle ringers. Paragraph 1.04 was formerly paragraph 1.02.
2. To remove reference to test trunks per SD-62193-02.
3. To change Figure 1 to agree with changes in design.
4. To remove reference to the LSH key in paragraph 2.01
5. To revise paragraph 2.02 to cover the four scale ranges of the voltmeter.
6. To cover the VM40 key in paragraph 2.06.
7. To change paragraph 2.15 to remove reference to "the J type relay on the test panel".
8. To remove reference to the LSH key in paragraph 2.17.
9. To change paragraph 2.18 to describe the LSH key as a locking lever type key located on the panel. Also to add the last sentence.
10. To change figures 5, 6, 7, 8 and 9 to show a varistor in the receiving circuit and other changes in accordance with new design.
11. To change paragraph 3.12 to refer to 20-20 cycle relaying ringer.
12. To change paragraph 3.15 to cover ringers used with 44 type repeaters.
13. To change paragraph 3.16 to cover a test of the 135 cycle side of a 1000-135 cycle intermediate ringer.
14. To remove old paragraph 3.17 and to add new paragraph 3.17 to cover a test of the 1000 cycle side of a 1000-135 cycle intermediate ringer.
15. To add a new figure 10.

16. To change figure 11 in accordance with new design.
17. To remove old paragraphs 3.19 and 3.20 and the associated figures.
18. To add a new paragraph 3.19 and a new figure 12.
19. To change paragraphs 3.20 and 3.21 to cover both received and transmitted voltages. These were formerly paragraphs 3.21 and 3.22.
20. To add new paragraph 3.22 and a new figure 15.