

1A SIGNALING TEST SET AND SIGNALING TEST PANELS J68602CD (2CD) AND J68602CE (2CE) DESCRIPTION

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1. GENERAL

1.01 The section describes and gives the method of operation of the 1A signaling test set and the signaling test panels J68602CD and J68602CE used in toll terminal rooms for analyzing and checking the signaling paths of intertoll trunk, composite signaling or single frequency signaling facilities. The 1A signaling test set is portable whereas the test panels are mounted permanently in 23-inch or 19-inch toll testboard bays.

1.02 The test set and test panels use the same circuit arrangements. The test circuit is primarily intended for analyzing and sectionalizing troubles in the d-c dial pulse paths or supervisory paths of dial, multi-frequency pulsing, straightforward, call announcer, and similar type intertoll trunks. On intertoll trunks having E and M or F and M type signaling leads equipped with standard test or patching jacks, these test circuits can be used for monitoring on the d-c signaling path of a busy or idle trunk in order to determine whether the proper signals are being

received from or sent to the far end, to originate calls to the distant end or to the home drop on dial intertoll trunks, or to receive signals from both ends of the intertoll trunk. On intertoll trunks having composite signaling, the test circuits may also be connected to jacks at the equipment units to make operation tests in either direction but not for monitoring.

1.03 The test circuit provides a quick check of the intertoll trunk signaling system or the terminating trunk relay equipment since testing procedures are simple and can be made easily and quickly. The response of the signaling systems to test conditions is indicated by lamp signals and milliammeter readings. If trouble is indicated in the signaling equipment, other test equipment provided for central office maintenance will be used to conduct further tests to locate and clear the trouble.

2. DESCRIPTION OF CIRCUIT AND EQUIPMENT

(A) General

2.01 The signaling test facilities available in the 1A signaling test set or the signaling test panels provide means for testing the signaling paths of intertoll trunks having E and M or F and M leads for carrying the d-c signals between the signaling units and the intertoll trunk relay equipment. The M lead is used for transmitting signals from the drop equipment toward the line and the E or F lead is used for transmitting signals from the line toward the drop equipment. The various conditions such as on-hook or off-hook signals are controlled by a key for each direction and the received conditions for each direction are indicated by lamp signals. Current conditions in the signal lead transmitting toward the intertoll trunk are indicated by a milliammeter in the test circuit. A dial is provided for sending signals toward the line or drop. A separate meter is provided in the testing equipment for measuring the line current in the composited paths of the intertoll trunks.

2.02 The 1A test set is so designed that it can be used for making tests at the signaling unit bays by connecting the test set

directly into the maintenance jacks provided. It may also be connected to the patching jack of the signaling branch where circuit patching jacks are provided. The test set may be used at testboards not equipped with jacks in the signaling branch, by connecting the test set to test trunks to the signaling unit bays or the circuit patch bays for obtaining access to the signaling leads or the composite circuit test jacks.

2.03 The fixed panel testing equipment is intended for mounting in toll testboard bays where it can be used with the toll testboard position equipment for talking, monitoring, transmission testing, etc. When the test or patching jacks are located in the same bay with the signaling panel testing equipment, the circuit under test may be connected directly to this testing equipment without the use of trunks. When the patching jacks are located in the circuit patching bays, such as those provided in No. 4 type toll offices, test trunks are required between the testboard and the circuit patching jack bays. When no test jacks are provided in the testboard bays or

patching jacks in the circuit patching bay, test trunks are required between the testboard and the signaling unit bays.

2.04 The circuit information is contained on the SD and ED drawings listed below:

SD-95442-01 Circuit drawing of the LA
signaling test set

SD-56080-01 Circuit drawing of either signaling test panel

ED-92132-01 Equipment drawing of the 1A
signaling test set

ED-63092-01 Equipment drawing of the signaling test panel for 19" relay rack mounting

ED-63067-01 Equipment drawing of the signaling test panel for 23" relay rack mounting

(B) Circuit and Equipment Arrangements

2.05 A circuit schematic of the 1A signaling test set is shown in Fig. 1. The circuit of the signaling test panels is similar

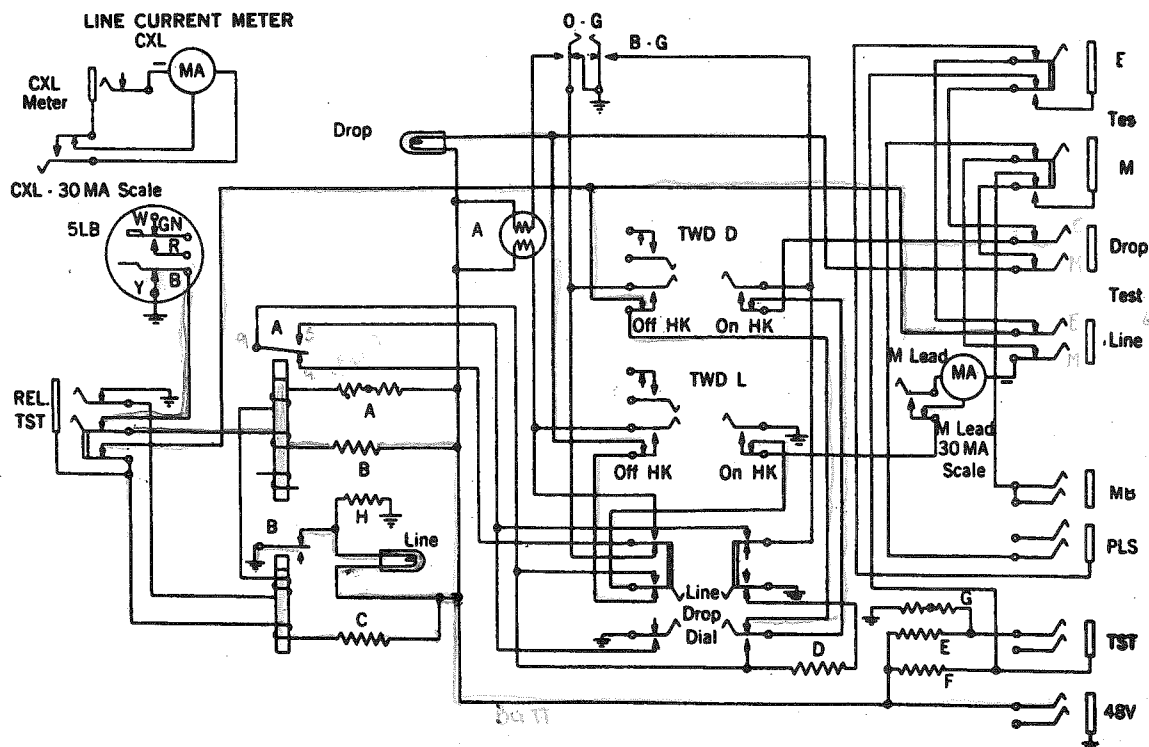


Fig. 1 - Schematic Circuit of LA Signaling Test Set

to that of the 1A set except for test jack arrangements. Fundamentally there is no difference in the circuit functions. The detailed description of the operation of the circuit is given in Part 3.

2.06 The 1A signaling test set is a small portable set enclosed in an aluminum housing. A face view of this test set is shown in Fig. 2. The test circuit terminates in jacks which are located on a panel with the meters, keys and lamps. These jacks provide a means for connecting the test set to the test or patching jacks of the signaling paths on circuits having E and M or F and M signaling leads, to the MB, PLS and TST testing jacks of the composite signaling units, and to the E and M jacks of the single frequency signaling units. A cover is provided to protect the equipment on the face of the panel when the set is not in use. The over-all dimensions of the set are approximately 14 in. long, 11 in. wide and 6 in. high. A ladder strap is provided for fastening the set to the side of a ladder when it is located on the steps of a ladder.

2.07 There are two signaling test panels; one is coded J68602CD for mounting on 23-inch standard relay racks and the other is

coded J68602CE for mounting on 19-inch racks. Figs. 3 and 4 show the face view of the two types of signaling test panels. The panels contain the meters, dial, key and lamps. The jacks for terminating the test circuit are located in the miscellaneous jack strip of the jack field of the relay rack bay. The panel for the 23-inch relay rack occupies a space of three mounting plates (5-7/32 inches high), and the panel for the 19-inch, four mounting plates (7 inches high).

3. TESTING COMPOSITE OR SINGLE FREQUENCY SIGNALING TRUNKS HAVING E AND M SIGNALING LEADS

3.01 In the following description it is assumed that the O-G, B-G key is operated to O-G to provide open and ground signals to the E lead toward the drop. The operation of this key to the B-G position is explained in Part 4 for installations using non-relay type pulse link circuits.

3.02 The lamp and meter indications are shown in Fig. 5 for a composite line and indicate the conditions at both the home office and the far end office. The meter readings given as small, medium, or large deflections to the right or left are for a medium length intertoll trunk without ground potential difference between the two offices.

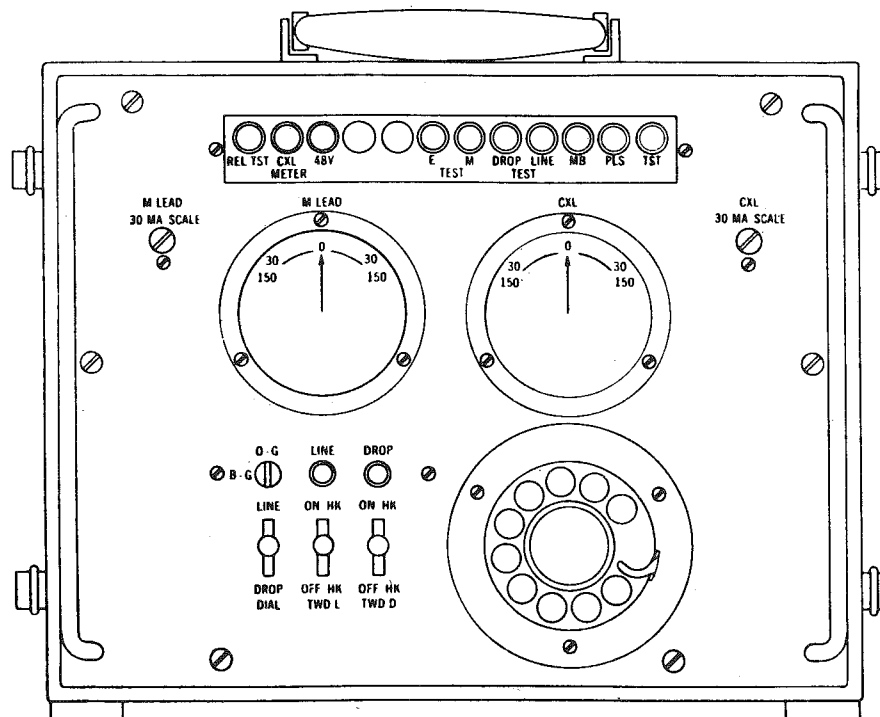


Fig. 2 - Face View of 1A Signaling Test Set

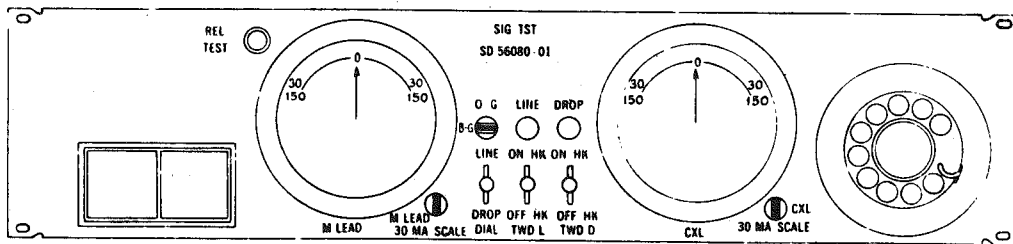


Fig. 3 - Face View of Signaling Panel (J68602CD) for 23-inch Relay Rack

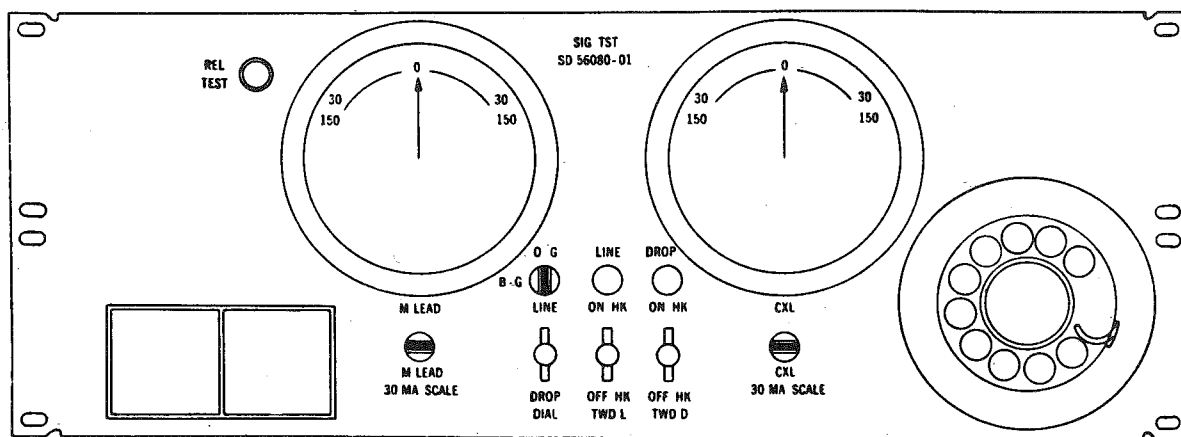


Fig. 4 - Face View of Signaling Panel (J68602CE) for 19-inch Rack

(A) Monitoring

3.03 It is only possible to monitor on composite or single frequency signaling circuits or systems using E and M or F and M signaling leads. The monitoring condition is shown in Fig. 6 for composite signaling circuits and in Fig. 7 for circuits using single frequency signaling equipment. It is not possible to monitor on composite circuits when connected to the MB, PLS, and TST jacks at the composite signaling equipment bays since connection to these jacks terminates the signaling paths. When it is desired to read current in the composite leg, the CXL meter is connected to the CXL jack or equivalent.

3.04 The test set or test panels may be used for monitoring on the signaling paths of circuits in service or being tested in order to determine whether the proper signals are being sent and received. The test man may also monitor at the same time on the intertoll trunk voice path with a suitable monitoring circuit. When it is necessary to monitor on an idle or

busy circuit, the DIAL, TWD L, and TWD D keys are left in their normal positions. This provides a continuous path for the M lead through the M LEAD meter with the DROP lamp bridged between the M lead and negative 48-volt battery, and a continuous path for the E lead with the winding of polar relay B bridged between the E lead and negative 48-volt battery.

3.05 The LINE lamp is permanently connected to the back contact of relay B. Ground on the E lead, such as a seizure signal from the far end, will operate relay B and open the LINE lamp circuit to extinguish the lamp. The DROP lamp is connected to 48 volts and lights when the drop is idle (on-hook) which is ground on the M lead. When the drop is seized (off-hook), the M lead receives battery from the trunk which extinguishes the DROP lamp. These lamps therefore function like cord lamps.

3.06 When monitoring, the set will not interfere with signals. The M LEAD meter will register the current in the M lead, and

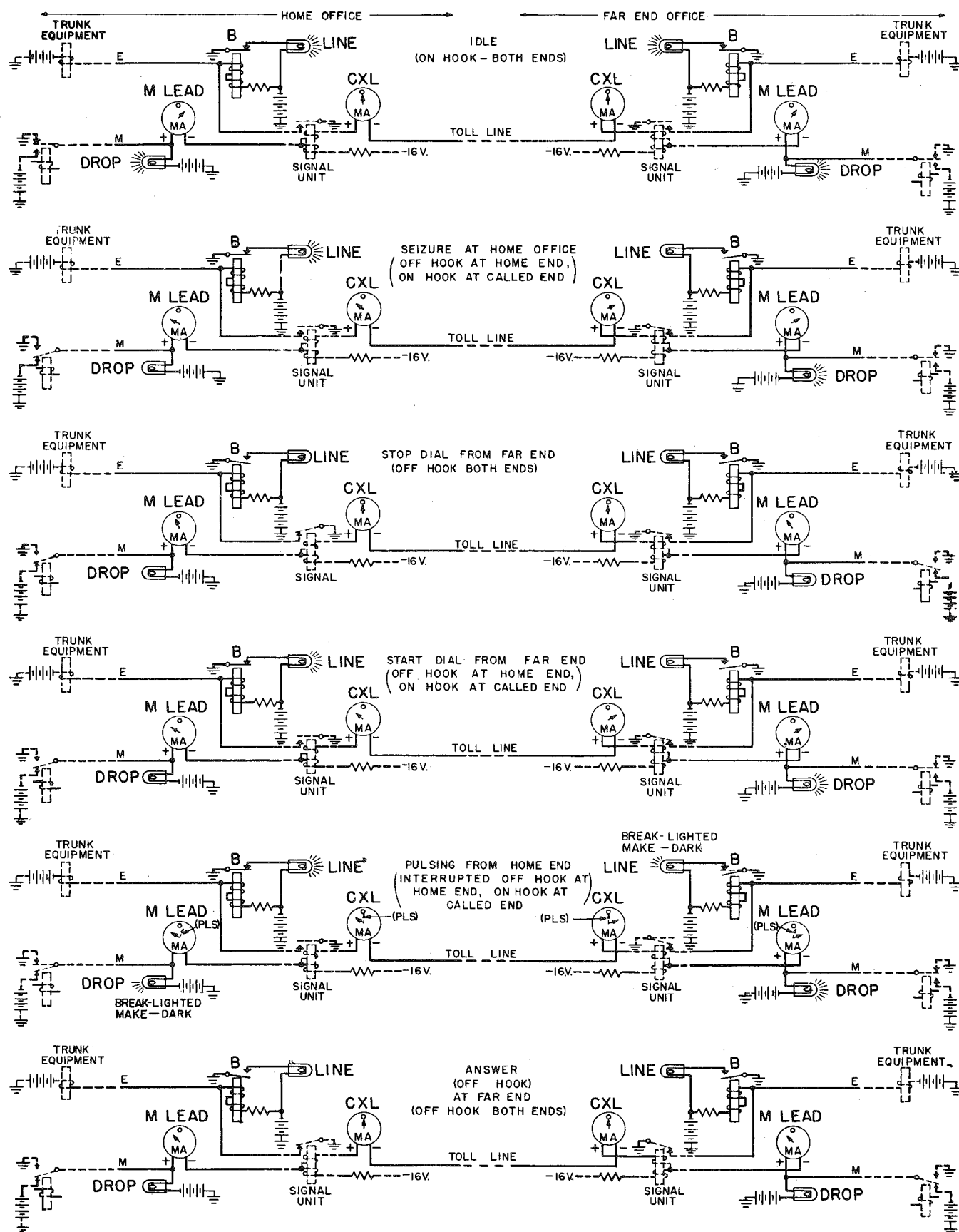


Fig. 5 - Monitoring on Intertoll Trunks - Typical Lamp Signals and Meter Readings in Signal and Supervisory Test Circuit

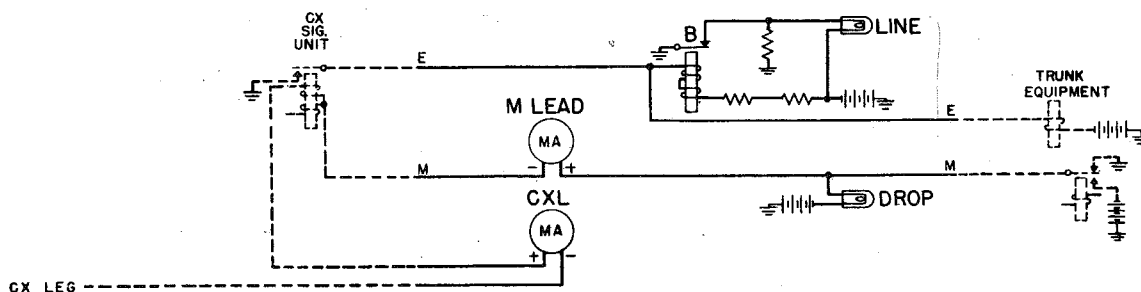


Fig. 6 - Monitoring on CX Signaling Circuits at Testboard - All Keys Normal

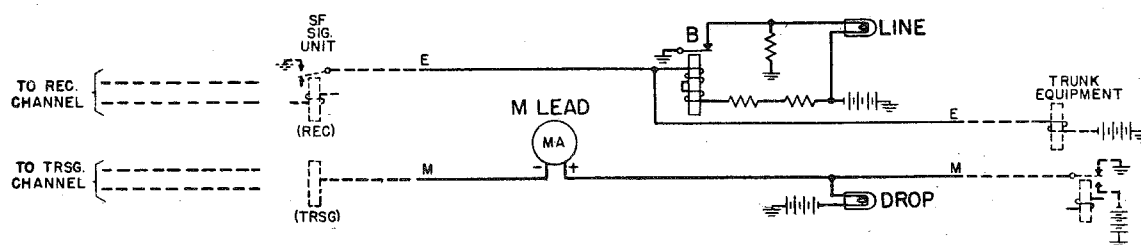


Fig. 7 - Monitoring on SF Signaling Circuits at Testboard or Signaling Unit Bays - All Keys Normal

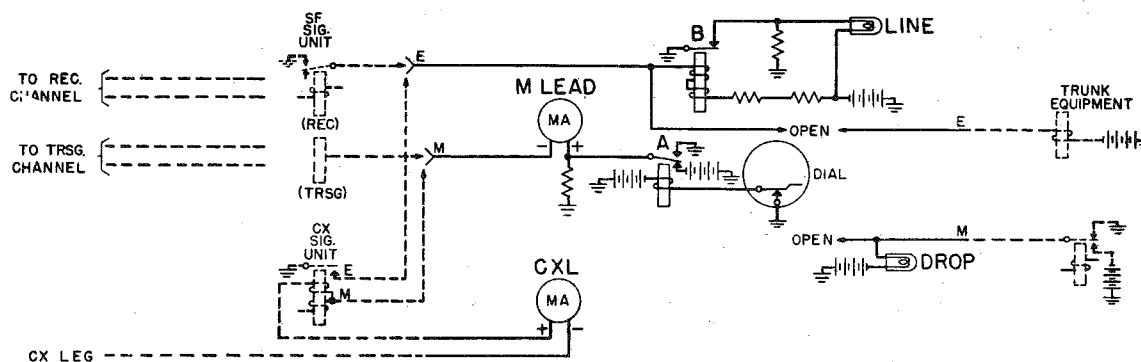


Fig. 8 - Testing Toward Line at Testboard and at Single Frequency Signaling Unit Bay - DIAL Key Operated to LINE, TWD D Key Operated to ON HK, TWD L Key Normal

the LINE lamp and DROP lamp will register on-hook or off-hook signals from the respective ends of the intertoll trunk. Dial pulses from the line operate the signaling unit receiving relay which in turn applies alternate open and ground to the E lead causing the LINE relay to follow the signals. The DROP lamp will follow dial pulses received from the drop equipment.

(B) Testing Toward Line

3.07 When it is desired to test toward the line or to call the far end of the intertoll trunk, the test circuit may be connected

to the LINE SIG. and DROP SIG. jacks in the testboard or circuit patch bay, or the E and M jacks at the single frequency unit bays or the PLS jack at the composite signaling unit bays. When the test circuit is connected to the PLS jack, either directly or by means of a test trunk, connections to the drop equipment are opened. The detail circuit operation is given in Paragraphs 3.08 to 3.11 inclusive. See Fig. 8 for the test circuit arrangements.

3.08 To test toward the line or to call the far end of the intertoll trunk, the DIAL key is operated to LINE. The operation of the

DIAL key to LINE leaves the connection of the E lead from the line to relay B and to the drop equipment unchanged. During this test, the TWD D key should be operated to ON HK to avoid calling in senders when an off-hook signal is received over the line, (unless) it is necessary to hold established switch connections on the drop side in which case the TWD D key is operated to OFF HK. The LINE lamp remains lighted until ground is applied to the E lead by an off-hook signal received over the line by the signaling unit. An answer or off-hook signal back from the line causes the signaling unit to place ground on the E lead and the LINE lamp is extinguished. The lamp will follow the operation of the signaling unit receiving relay caused by pulses or signals being received from the far end.

3.09 The operation of the DIAL key to LINE connects the M lead from the signaling unit through the M LEAD meter to the armature of the polar relay A. The meter will indicate the current in the M lead. Ground from the contact of the dial is connected to the 2-7 windings of relay A which operates and closes the armature to the No. 4 contact. The operation of the dial removes ground from relay A causing it to operate to the No. 5 contact, thus removing battery from and applying ground to the M lead during the break periods transmitted by the dial. This provides the means for sending dial pulses to the far end. The TWD L key may be operated to send on-hook or off-hook signals towards the line. When operated to ON HK, ground is placed on the M lead toward the line and when operated to OFF HK, battery is placed on the M lead toward the line.

3.10 After the DIAL key has been operated to LINE and before dialing, to set up a call over the line, the TWD L key should be operated to ON HK momentarily and then restored so that any switches, which are off normal will be restored and, in cases where a sender is required, a sender will be seized which has not been partially timed out.

3.11 For intertoll trunks using composite signaling, it is desirable to measure the current in the composite leg at the same time that the current in the M lead is measured.

If jacks are provided in the composite legs, the current in these legs may be measured by connecting the CXL milliammeter into the TGL, CX or equivalent (S1T, S1R, S2T or S2R) jack of the composite leg.

3.12 When the test circuit is connected to the PLS jack, the tests toward the line are the same as those described in Paragraphs 3.08 to 3.11 inclusive, except that the E and M leads to the drop equipment are not terminated. Therefore, no indication is received on the M lead from the drop and no off-hook signal may be sent toward the drop. See Fig. 9 for the test circuit arrangements.

(C) Testing Toward Drop

3.13 When it is desired to test toward the drop or to call the home end of the intertoll trunk, the test circuit may be connected to the LINE SIG. and DROP SIG. jacks in the testboard, the E and M jacks at the single frequency unit bays, or the MB and TST jacks at the composite signaling unit bays. When the test circuit is connected to the MB and TST jacks, either directly or by means of a test trunk, connections to the line are opened.

3.14 Testing toward the drop may be accomplished by using the LINE SIG. and DROP SIG. jacks at the testboard and the E and M jacks at the single frequency signaling unit bay. The detailed circuit operation is given in Paragraphs 3.15, 3.16 and 3.17. See Fig. 10 for the test circuit arrangements.

3.15 To test toward the drop or to call the home end of the intertoll trunk the DIAL key is operated to DROP. The operation of the DIAL key to DROP connects the E lead from the drop equipment to the armature of the polar relay A. Ground from the contacts of the dial is connected to the 2-7 winding of relay A which operates and closes the armature to the No. 4 contact, which is connected to ground through the O-G and B-G key. The operation of relay A provides the means for sending dial pulses into the drop.

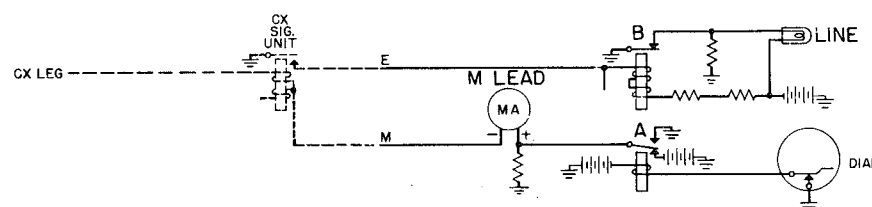


Fig. 9 - Testing Toward Line at Composite Signaling Unit Bay - DIAL Key Operated to LINE, TWD L and TWD D Keys Normal

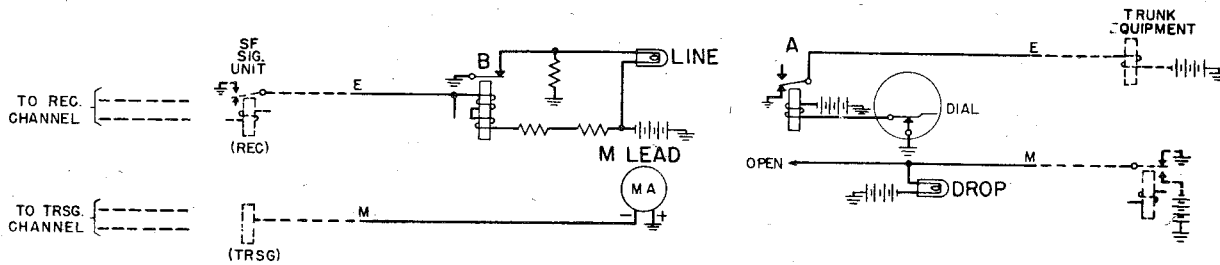


Fig. 10 - Testing Toward Drop at Testboard and at Single Frequency Unit Bay -
DIAL Key Operated to DROP, TWD L Key Operated to ON HK, TWD D Key Normal

3.16 The operation of the DIAL key to DROP keeps the M lead from the drop connected through the M LEAD meter to the signaling unit. Since the DROP lamp is connected to the M lead from the drop equipment, supervisory or pulsing signals from the drop are registered directly on the DROP lamp. These signals are also transmitted toward the line unless the TWD L key is operated. When an off-hook signal is sent from the drop, battery is applied to the M lead in the drop and the DROP lamp will be extinguished and when an on-hook signal is sent, ground is applied to the M lead and the DROP lamp will be lighted.

3.17 Operation of the TWD L key terminates the M lead toward the line in battery or ground depending on whether the TWD L key is operated to OFF HK or ON HK respectively. The M lead from the drop equipment remains terminated through the DROP lamp. When testing toward the drop, the TWD L key should be operated to ON HK to place ground on the M lead toward the line and thus avoid calling in senders at the distant office when an off-hook signal is received from the drop. However, if it is desired to hold established switch connections on the line side, the TWD L key should be operated to OFF HK.

3.18 Testing toward the drop may be accomplished by using the MB and TST jacks at the composite signaling unit bay. Detailed circuit operation is given in Paragraphs 3.19 and 3.20. See Fig. 11 for the test circuit arrangements.

3.19 When the test circuit is connected to the MB and TST jacks at the composite signaling unit bay, the tests toward the drop are the same as those described in Paragraphs 3.15, 3.16 and 3.17 except as noted below. The dial pulses are transmitted to the neutralizing winding of the CX relay of the intertoll trunk from contacts of polar relay A. Pulses from the dial cause the CX relay to repeat the

pulses into the drop equipment over the E lead. Signals on the M lead from the drop equipment are connected through the CX relay line and balancing windings connected parallel opposing and thence to the DROP lamp of the test set. The DROP lamp will follow signals from the drop equipment over the M lead.

3.20 To set up a call to the drop, the DIAL key should be operated to DROP and before dialing the TWD D key should be operated to ON HK momentarily and then restored so that any switches which are off-normal will be restored; also in cases where a sender is required, a sender will be seized which has not been partially timed out.

4. TESTING TRUNKS ARRANGED FOR NON-RELAY TYPE PULSE LINK CIRCUITS

4.01 When using the test circuit on an intertoll trunk at intermediate points where the signaling circuit is connected to a non-relay pulse link circuit, it will be necessary to operate the O-G, B-G key to the B-G position. Signaling circuits connected to non-relay

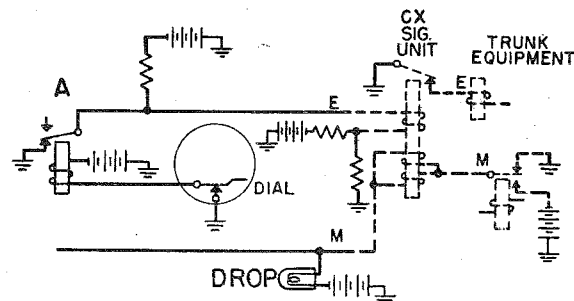


Fig. 11 - Testing Toward Drop at Composite Signaling Unit Bay - DIAL Key Operated to DROP, TWD L and TWD D Keys Normal

pulse links provide battery and ground instead of open and ground from the contacts of the CX relay in the signaling unit over the F lead of the auxiliary pulse link circuit. It is, therefore, necessary to connect the circuit under test in series with a test jack circuit shown in Fig. 12 which provides these conditions.

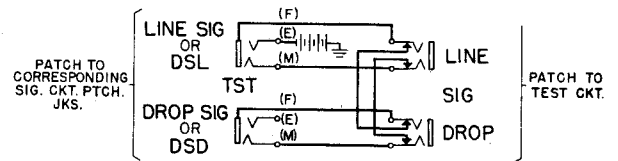


Fig. 12 - Test Jack Circuit for Use When Non-Relay Type Pulse Link Circuits Are Used

4.02 The operation of the test circuit is the same as covered in Parts 3(A), 3(B) and 3(C) except that the LINE lamp will light on off-hook signals and will be extinguished on on-hook signals. Monitoring on these circuits

is shown schematically in Fig. 13. Testing toward the line is shown in Fig. 14 and testing toward the drop in Fig. 15.

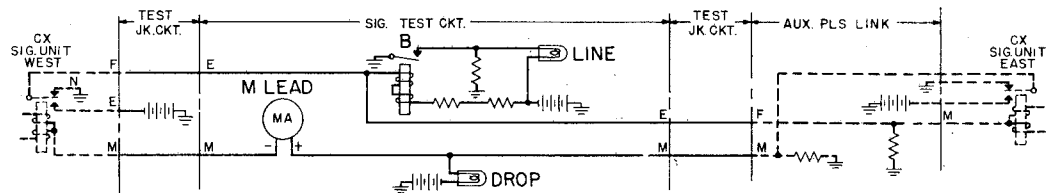


Fig. 13 - Monitoring on Signaling Circuits Connected to Non-Relay Pulse Link Circuits - All Keys Normal

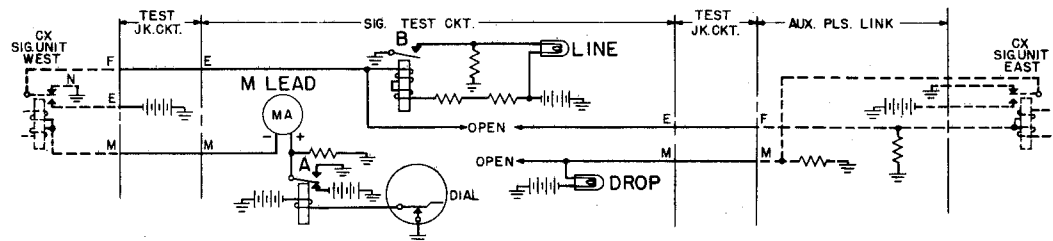


Fig. 14 - Testing Toward Line on Signaling Circuits Connected to Non-Relay Pulse Link Circuits - DIAL Key Operated to LINE, O-G, B-G Key Operated to B-G, TWD D Key Operated to ON HK, TWD L Key Normal

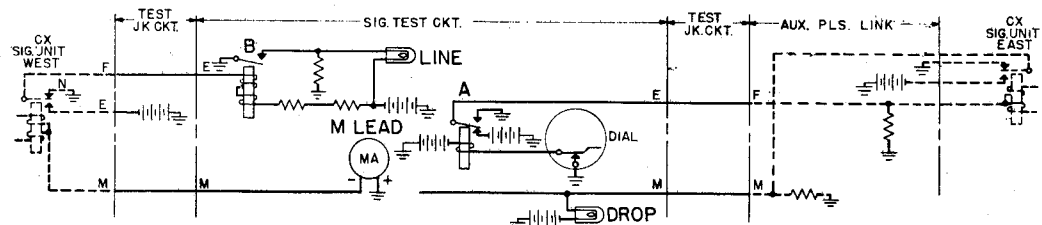


Fig. 15 - Testing Toward Drop on Signaling Circuits Connected to Non-Relay Pulse Link Circuits - DIAL Key Operated to DROP, O-G, B-G Key Operated to B-G, TWD L Key Operated to ON HK, TWD D Key Normal

