

SIMULATED HEAVY TRAFFIC LOAD TEST NO. 1 CROSSBAR OFFICES

1. GENERAL

1.01 This section describes simulated heavy traffic load tests for application in new No. 1 crossbar offices prior to cutover. The tests are arranged to produce a high volume of dense traffic which presents extreme load conditions to the common equipment. The purpose of this test is to force the identification of trouble conditions and to keep the equipment exercised.

1.02 This is accomplished by placing a large number of simultaneous calls into the equipment. The calls, usually equal to the number of subscriber senders, are originated in such a manner that only part of the originating equipment is used in the first test. When all disclosed troubles have been cleared, the succeeding tests are permitted to include more equipment until the final stages employ the entire central office equipment. All troubles are cleared before proceeding to the next stage of testing.

1.03 The tests outlined are believed to be the minimum number which can be recommended in order to bring in transient or intermittent troubles. The tester may, however, in order to identify trouble conditions, elect to employ additional tests, employing make-busy features to direct or concentrate the traffic load. Early release of the calls before all calls have completed as far as dialed digits will permit, and tests repeated with minor variations, are some of the methods which have been used to disclose obscure sources of trouble. The methods and quantity of supplementary tests will be suggested by the types of troubles encountered.

1.04 A dial pulse repeater circuit, controlled by a dial or an automatic dialing circuit, is provided locally to send out pulses simultaneously over a large number of lines. Figs. 1 to 5, inclusive, illustrate in simplified form a method of obtaining this multiple pulsing.

1.05 Various codes and numbers are employed to direct calls to selected parts of the equipment. These calls are routed to their objective by normal random selection of paths and with only a limited concentration or steering by means of make-busy plugs.

1.06 The termination of calls in a test set is not required. Progress and trouble conditions are disclosed by corresponding lamps or alarms at the maintenance center.

1.07 The tests covered are:

- (A) Line Link and Subscriber Sender Link Controllers
- (B) Originating Senders
- (C) Originating Markers and Connectors
- (D) Office Frame Trunks
- (E) Terminating Sender Link Controllers
- (F) Terminating Senders
- (G) Terminating Markers and Connectors
- (H) Number Group Connectors
- (I) Through Calls

1.08 Tests (A) to (H) check specific features and portions of the equipment and can be performed at any time prior to cutover by coordinating these tests with other test activities to avoid interference. Test (I) places through calls on a volume basis to keep the equipment exercised prior to cutover. Test (I) should be conducted from the time of completion of installation tests until just before cutover to maintain continuous use of the equipment (subject to coordination with other activities) and to force the appearance of any remaining troubles.

1.09 Manual dialing of the test numbers is prescribed in Tests (A) to (H). Automatic dialing is prescribed for Test (I) because of the large amount of numbers to be dialed. However, the dialing arrangement is optional and either method can be used for any test. A timing circuit assures that all originating senders are attached before dialing is started by the automatic dialing circuit. When manual dialing is used this check may be made by observing that all sender group lamps are lighted steadily. This check is not necessary when performing tests covered by 4.01, 4.03 and 4.04.

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1.10 Unless otherwise specified, each individual test call (each set of calls started or directed to a specific code or number) shall be repeated at least five times. In all cases, after a trouble is detected and cleared, the test call which produced the trouble shall be repeated at least five times. When a trouble is detected but not found, the test call involved shall be repeated at least 25 times.

1.11 During the progress of these tests, all equipment alarms should be cared for promptly. Trouble indicator records should be maintained and cared for as in a working office. Stuck senders should be traced and cleared promptly.

1.12 Originating and terminating sender load alarms will occur during these tests because of the heavy traffic load. These alarms should be released immediately to permit observance of other alarms.

1.13 Tests on operator class trunk groups which terminate in another office, and interoffice trunk groups to working offices, should be made before trunks are connected to the terminating equipment in distant offices. Otherwise, the trunks should be opened temporarily to prevent interference to the terminating equipment.

2. APPARATUS

All Tests

2.01 One or more dial pulse repeater circuits, similar to Figs. 1 to 5, inclusive, equipped as required to care for the number of lines to be connected for simultaneous operation.

2.02 No. 322A Make-Busy Plugs as required.

2.03 No. 349A Make-Busy Plugs as required.

Tests (A) to (H)

2.04 One No. 1011G Dial Hand Test Set, equipped with a 2W38A Cord Assembly or equivalent. The 2W38A Cord Assembly consists of one W2CK Cord, one No. 471A Jack and one No. 310 Plug.

Test (D)

2.05 P3D Cords, as required, equipped with two No. 309 Plugs (3P3B).

Tests (H) and (I)

2.06 One No. 893 Cord equipped with two No. 360A Tools (1W13A) and two No. 419A Tools.

Test (I)

2.07 Four P3E Cords, or equivalent, equipped with two No. 310 Plugs (3P6F).

2.08 An Automatic Dialing Circuit capable of dialing four different numbers simultaneously. This feature can be obtained by the use of Western Electric load test set ITE-4081. When a suitable dialing circuit is not available, the calls can be dialed manually, using four dial hand test sets, such as listed in 2.04.

3. PREPARATION

All Tests

3.01 Assignment of test lines: Select a number of unassigned subscriber line circuits equal to the number of originating senders in the marker group to be tested. The test lines should be distributed evenly over all line link frames and all classes of service should be represented. At least one test line should appear on each line link frame.

3.02 Divide the selected lines into four groups. Coin lines or tip parties of 2-party line circuits should be arranged, as in 3.03, to provide 1000-ohm tip grounds to permit the proper indication to the originating senders. Distribute other lines evenly over the remaining groups.

3.03 At the main distributing frame, cross-connect the line circuits, as assigned in groups, to the proper dialing relay punchings associated with the dial pulse repeater circuit. Cross-connect the T punching of coin lines and tip parties to punchings associated with contacts of the (CN-) relays of the dial pulse repeating circuit.

3.04 Cross-connect the dialing group (DG-) relays of the dial pulse repeater circuit to B jacks to permit control of the circuit from remote points. Each group of lines should be connected to a different B jack, each of which has an appearance at the maintenance center, to permit simultaneous dialing of different numbers for the through tests in Test (I). For Tests (A) to (H), strap the tip, ring and sleeve leads of the B jacks used in multiple to permit control of all groups from one B jack. Also extend this multiple connection to the B jacks which have an appearance at the line link frames to permit control from this point. Remove the multiple connections from the B jack punchings when performing Test (I).

Figs. 1 to 5, (Incl.) - Dial Pulse Repeater Circuit

FIG. 1
DIALING GROUP RELAYS
1 (DG-) Relay for 4 Figs. 2
(DG-1)

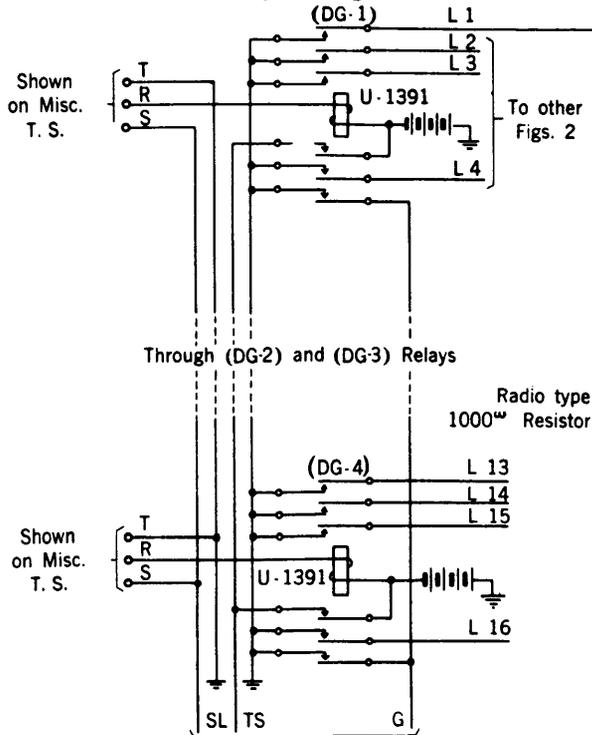
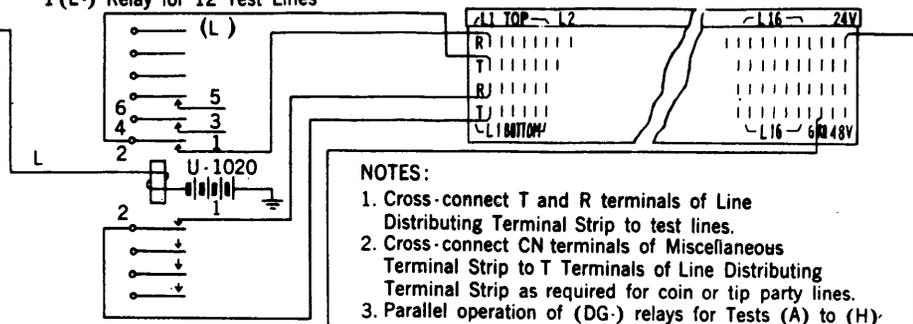


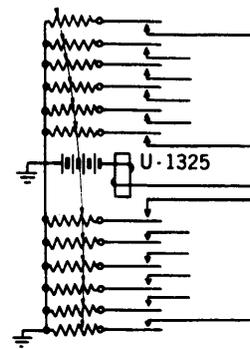
FIG. 2
LINE RELAY
1 (L-) Relay for 12 Test Lines



NOTES:

1. Cross-connect T and R terminals of Line Distributing Terminal Strip to test lines.
2. Cross-connect CN terminals of Miscellaneous Terminal Strip to T Terminals of Line Distributing Terminal Strip as required for coin or tip party lines.
3. Parallel operation of (DG-) relays for Tests (A) to (H) may be arranged by strapping B Jack Terminals at Miscellaneous Terminal Strip.

FIG. 4
STATION GROUND CCT.
1 Fig. 4 for 12 Coin or Tip Party Stas.



MISC. TERM. STRIP
35 Type T. S.

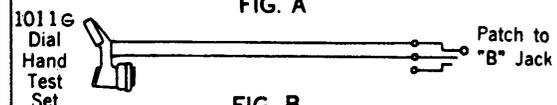
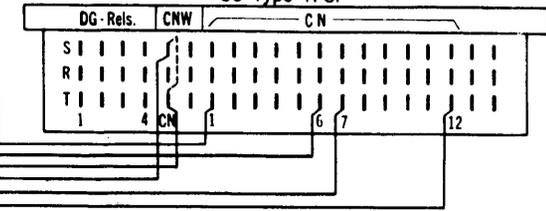


FIG. 3
TIMING CONTROL CCT.
1 Fig. 3 for 1 Fig. 1

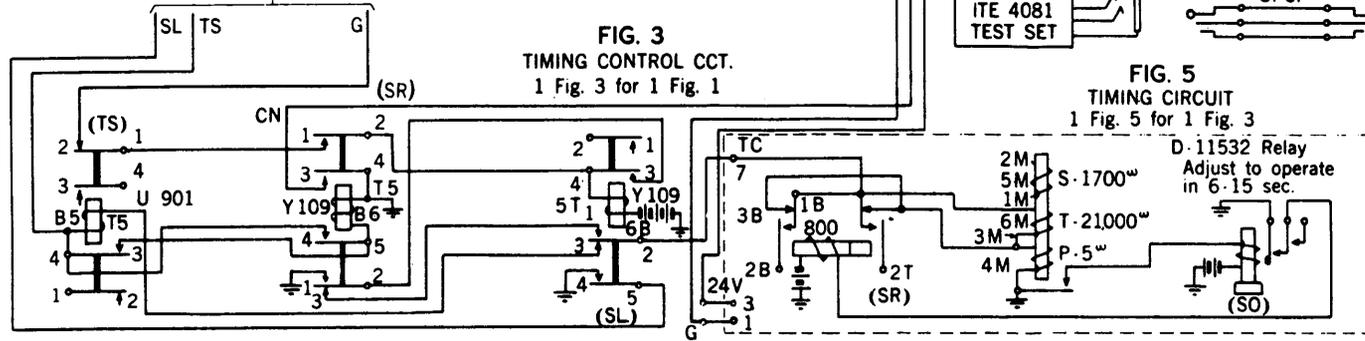
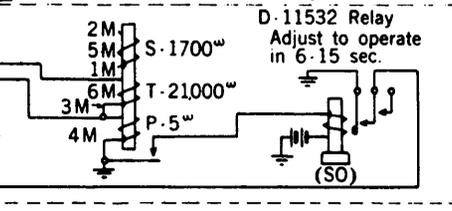


FIG. 5
TIMING CIRCUIT
1 Fig. 5 for 1 Fig. 3



3.05 Provide message register lead grounds for the test lines, where required to satisfy the originating marker, by connecting the M1 or M2 leads to ground at the distributing frame.

Test (I)

3.06 Prepare, in advance, a make-busy program that provides for the periodic changing of make-busy plugs during the progress of the through tests in Test (I). The following method should be used:

(a) Make busy about 20 per cent of the district junctor group by placing No. 349A make-busy plugs in the (MB) jacks at the subscriber sender link frame secondary bays. Rearrange the make-busy plugs at intervals to provide variation in the traffic pattern. Use care in assigning the make-busy plug positions to avoid isolating a line link frame.

(b) Originating channels: Place No. 349A make-busy plugs in district link frame secondary switch (MB) jacks and change periodically. The number of channels to be made busy will depend on the number of test calls and the amount of equipment installed. Allow sufficient channels to permit completion of all calls.

(c) Terminating channels: Place No. 349A make-busy plugs in incoming link secondary switch (MB) jacks and change periodically. The number of channels to be made busy will depend on the number of test calls and the amount of equipment installed. Allow sufficient channels to permit completion of all calls.

(d) Markers: Place No. 322A make-busy plugs in originating and terminating marker (DB) jacks at their respective trouble indicator frames, so as to make markers busy in various combinations. Change plugs frequently.

(e) Complete blocking of equipment: To prove the ability of the equipment to recover and continue to complete calls after a complete equipment tie-up, place make-busy plugs at intervals in a group of equipment, such as all senders, all markers, all coin supervisory link circuits, a few terminating sender link controllers, etc., completely removing the equipment from service, and then releasing it after about 30 seconds.

(f) Controller exercise feature: Periodically place No. 349A make-busy plugs in controller (EA), (EB) and (MB) jacks. Emergency controllers and emergency preference chain circuits on every frame should be placed in service at intervals.

4. METHOD

(A) Line Link and Subscriber Sender Link Controllers

4.01 Plug the 1011G hand test set into a B jack at a line link frame and start all calls to dial tone. Observe that no equipment alarms occur.

4.02 Plug the hand test set into a B jack at the maintenance center. Start all calls to dial tone and check that all originating senders are connected by observing that all sender group lamps light and remain steady. Investigate any condition which causes a lamp to flicker or retire. Release the lines within 20 seconds to prevent permanent signal time-out.

4.03 Make busy all originating sender groups. Plug the hand test set into a B jack at a line link frame. Start all calls and observe that the dial tone delay circuits cause all controllers to recycle.

4.04 With all originating sender groups busy, dial various digits into the controllers. Observe that no alarms occur.

4.05 Note and record the readings on the false start registers. With all senders available, plug the hand test set into a B jack at the maintenance center and start all calls to dial tone. Investigate any condition which causes a false start register to score. Repeat 25 times and change the traffic pattern for each five repeat tests by making busy approximately 20 per cent of the district groups in different combinations to force the use of as many links and junctors as possible.

(B) Originating Senders

4.06 Plug the hand test set into a B jack at the maintenance center. Start all calls to dial tone and hold for approximately 40 seconds to cause all calls to be routed to permanent signal trunks. The trouble indicator will be summoned to leave a record of all permanent signal trunks busy and the PS lamps on the district frames will light if there are insufficient trunks to care for the volume of calls. Hold the lines for approximately 60 seconds longer and investigate any stuck sender signals.

4.07 Start all calls and dial two digits of a three digit code. Hold for approximately 40 seconds and note that all calls are routed to permanent signal.

4.08 Start all calls and dial an office code and two digits of the telephone number. Hold for 40 seconds. Observe that the PD meter (if provided) indicates the approximate number of senders timing for partial dial and observe that the PD register scores and that the SS register does not score.

4.09 Make busy all terminating senders in a terminating marker group. Dial the code of an office in this group and any four numerical digits. Observe that all senders time out after 50 seconds by observing that all stuck sender lamps light. Observe that the SC meter (if provided) indicates the approximate number of senders timing for completion and observe that the SS register scores and that the PD register does not score.

4.10 When timed release senders are provided, repeat 4.09 with the sender make-busy frame CTR keys pushed in. Check the ability of all senders to time out and release. Investigate any stuck sender lamp that lights.

(C) Originating Markers and Connectors

4.11 Make busy all originating markers by placing No. 322A plugs in (DB) jacks at OTI. Plug the hand test set into a B jack at the maintenance center and dial the local office code. Observe that all originating marker connectors time out due to the waiting senders.

4.12 With all originating markers busy, dial the local office code. Release one originating marker and observe that only one call is served in each marker connector in turn until all waiting connectors have been served one call. Also observe that this process is repeated until all calls have been handled by the marker. Check this feature by observing the marker connector progress lamps at the originating trouble indicator. Repeat, using each marker in turn.

4.13 With all originating markers available, dial various local and operator class codes and observe any delays or erratic operation of the markers as shown by the district and office frame progress lamps at the originating trouble indicator. Continue the tests with markers made busy one at a time and in various combinations of two or more made busy to provide variation in the order of serving calls on the various frames.

(D) Office Frame Trunks

4.14 During the progress of the office frame tests, make busy on the frames under test a number of channels that will permit the concentration of calls in as few primary switches as is necessary to fully load the trunk group under test. Make the channels busy by inserting No. 349A make-busy plugs in the office frame primary switch (PMB) jacks and rearrange the plugs as the tests progress to provide equal usage of all district and office frame channel components.

4.15 Local trunks: Plug the hand test set into a B jack at the maintenance center. Start all calls and dial the local office code and a test number. If the trunk group called is larger than the number of lines used for tests, make busy sufficient trunks to fully load the remaining trunks in the group and repeat as necessary to place calls to all trunks. Continue the tests, calling all other local office trunk groups.

4.16 Operator class trunks: Dial operator class codes as required to place calls to all operator class trunks. If the trunk group called is larger than the number of lines used for test, make busy sufficient trunks to fully load the remaining trunks in the group and repeat as necessary to place calls to all trunks. Continue the tests, calling all other operator class trunk groups.

4.17 Full selector and PCI interoffice trunks: By means of patching cords (see 2.05), at the OGT jack bay, connect the trunks of a full selector or PCI trunk group to any permanent signal trunks. This will satisfy trunk test and provide a reverse battery condition to release the senders. Make busy all alternate route trunks to prevent connection to these trunks on second trial by the senders. If the number of trunks in the group under test is greater than the number of available permanent signal trunks, make busy the excess trunks and repeat the test as necessary to test all trunks in the group. Dial the code of the office selected for test and any four digits. Continue the tests by dialing the office codes of all other trunk groups, connecting the trunks to be tested to permanent signal trunks as required.

(E) Terminating Sender Link Controllers

4.18 Plug the hand test set into a B jack at the maintenance center and dial the local office code and a test number. Observe that the terminating sender link controllers

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handle all calls without equipment alarms. Repeat, dialing office codes and test numbers for other terminating groups of the new installation.

4.19 Repeat these codes and test numbers and observe that all sender group lamps light at the terminating trouble indicator frame. Also observe the operation of the sender selection lamps at the terminating trouble indicator frame for any apparent delay in establishing a sender connection.

(F) Terminating Senders

4.20 Plug the hand test set into a B jack at the maintenance center and dial all except the last digit of a telephone number in a terminating group. Observe that the senders time out and are reselected by other waiting calls, as indicated by the sender selection lamps at the terminating trouble indicator frame. Repeat for other terminating groups.

(G) Terminating Markers and Connectors

4.21 Make busy all terminating markers by placing No. 322A plugs in (DB) jacks at TTI. Plug the hand test set into a B jack at the maintenance center and dial the local office code and a test number. Observe that all terminating marker connectors time out due to the waiting senders. Repeat for other terminating groups.

4.22 With all terminating markers busy, dial the local office code and a test number. Release one terminating marker and observe that only one call is served in each marker connector in turn until all waiting connectors have been served one call and that this process is repeated until all calls have been handled by the marker. Check this feature by observing the progress lamps at the terminating trouble indicator. Repeat, using each other marker in turn. Repeat for other terminating groups.

(H) Number Group Connectors

4.23 Plug the hand test set into a B jack at the maintenance center and dial the local code and a test number in the first number group. (A terminal without cross-connections may be used if no test number is available.) Transfer the emergency preference chain circuit by operating the emergency chain transfer key at the number group connector frame and repeat the calls. Repeat these tests on all number groups.

4.24 The test covered in this paragraph may be omitted if Test (I) is to be made. Dial the local office code and a cross-connected subscriber number located on the first 20-block relay in the first number group. Repeat the test, dialing the code and a number in the second 20-block relay, and continue until calls have been placed to all 20-block relays. Repeat for other number groups. Use different units digits on successive calls to provide for use of all NC and NF leads in each number group.

Caution: To prevent interference to subscriber lines the procedure outlined in 4.25 and 4.26 should be followed.

(I) Through Calls

4.25 To prevent operation of the line hold magnet, insulate 3B contact of the GLH relay in all terminating markers.

4.26 To permit regular release of the marker without operating the line hold magnet, by means of the No. 893 cord (see 2.06), connect 3B contact of the GLH relay to 7B contact of the GLHL relay in all terminating markers.

4.27 Block non-operated the XS2 relay in half of the terminating markers in each terminating group to permit the appearance of crosses that would not be detected when markers are operating under heavy traffic conditions.

4.28 Prepare the maintenance center B jack circuits to permit separate control of the four groups of lines, by removing the temporary multiple connections. (See 3.04.)

4.29 All numbers (0000 to 9999) are to be called in making the through calls. Since the test lines are divided into four groups, a different series of numbers can be called on each group of test lines. Numbers to be called by each group are as follows:

Group 1	0000 to 2499
Group 2	2500 to 4999
Group 3	5000 to 7499
Group 4	7500 to 9999

The four numbers called at one time should each have different tens and units digits. Numbers should be changed by changing the thousands digit (and other digits as required), to provide for continuous use of all number groups.

4.30 When the terminating equipment includes more than one 10,000 line unit, the originating markers should be arranged to cause the four numbers to be distributed equally to all terminating units. This permits the same numbers to be called simultaneously in all units, thus increasing the amount of numbers called with no increase in number changes on the test set. The following method should be used: Select a vacant code and disconnect the associated code point in each originating marker. In the first marker, temporarily connect this code point to the route relay associated with one of the local terminating units. In the second marker, connect this code point to a different local terminating unit route relay and continue until each marker has the selected vacant code point connected to one of the local unit routes. This vacant code is then used as the office code for all calls to provide an approximately equal distribution of the calls to all local terminating units.

4.31 By means of patching cords at the maintenance center (see 2.07), connect the four B jacks associated with the four groups of lines, to the automatic dialing circuit. Set up four numbers as prescribed in 4.29. Prepare the dialing circuit to dial the local terminating unit code, or the selected vacant code (see 4.30), on the four groups. Start all calls and hold until all have been completed as indicated by the progress lamps at the originating and terminating trouble indicators. Release the lines and repeat the calls to the same numbers. Change the thousands digits and make two calls to these numbers. Continue

this process, changing the thousands digits, and other digits as required, until two sets of calls have been placed to each number.

Note: Where an automatic dialing circuit is not available, manual dialing of numbers for this test can be provided by means of four hand test sets similar to 2.04. These hand test sets are plugged into the B jacks at the maintenance center and numbers are dialed simultaneously, following the pattern outlined above.

4.32 During the progress of these tests, place make-busy plugs and use emergency transfer features in accordance with the make-busy program prescribed in 3.06.

4.33 When the through calls have been completed, remove the insulation from 3B contact of the GLH relays, remove the temporary connections between contacts of the GLH and GLHL relays, and remove the block from the XS2 relays in the terminating markers. (See 4.25 to 4.27.) Remove the temporary cross-connections in the originating markers and restore the vacant code cross-connections to the proper punching. (See 4.30.) Remove line circuit cross-connections placed in accordance with 3.03 and 3.05.

5. REPORTS

5.01 The required record of these tests should be entered on the proper forms.

