

CONCENTRATED LOAD TESTS

TERMINATING EQUIPMENT

CONTENTS

- | | |
|---|--|
| 1. GENERAL INFORMATION | 8. INCOMING LINK FRAMES |
| 2. TESTING EQUIPMENT | 9. TERMINATING MARKER CONNECTORS |
| 3. SETUP FOR TEST | 10. TERMINATING SENDER LINKS |
| 4. OPERATION OF TERMINATING LOAD TEST SET | 11. NUMBER GROUP CONNECTOR |
| 5. TERMINATING MARKERS | 12. INCOMING LINK-ADDITIONS |
| 6. LINE CHOICE CONNECTORS | 13. TERMINATING MARKER CONNECTOR-ADDITIONS |
| 7. LINE LINKS-COMBINED ORIGINATING AND
TERMINATING TRAFFIC | 14. TERMINATING SENDER LINK-ADDITIONS |
| | 15. NUMBER GROUP CONNECTOR - ADDITIONS |

1. GENERAL INFORMATION

1.01 Description of Test: The tests described in this section consist primarily of a series of tests in which a number of simultaneous calls are directed through the various units of the crossbar equipment in an attempt to simulate operating conditions in a working office. Simultaneous calls are to be construed to mean the simultaneous operation of the incoming trunk A relays or the dialing of a common last digit of the subscriber line numbers.

1.02 Sequence of Tests: The tests are so arranged that the line link frames may be turned over progressively as the tests are completed on each frame. These tests are divided into four groups as follows:

(a) Miscellaneous feature tests which involve the use of lines on various frames and should be completed before other terminating tests are made. These tests are covered in Paragraph 5.

(b) Line choice and combined originating and terminating tests on line link frames. These tests are made in a progressive order on the line choices and the frames in a line choice can be turned over after completion of these and certain originating load tests. These tests are covered in Paragraphs 6 and 7.

(c) Tests which require termination of lines in any one line choice. The last full line choice should be used for these tests to permit an earlier turnover of other line choices. The turnover of the last line choice will be delayed until after the completion of the tests in this group. These tests are covered in Paragraph 8.

(d) Tests which do not require line terminations and can be made at any time after the line link frames have been turned over. These tests are covered in Paragraphs 9, 10 and 11.

1.03 Test Call Charts: Call charts shall be prepared showing the line and trunks to be used for each test. These charts should show all necessary information, such as line number, line location, trunk number, test cord and jack, make busy and blocking notes etc.

1.04 Line Cross-Connections: The calls shall use the line assignments and features for the office at the time of turnover. Where the omission of cross-connections or features does not permit applying any of the requirements, such requirements are waived.

1.05 Lines Used For Tests: For tests other than to line link and line choice frames, assigned lines should be located on the highest numbered line link frames.

1.06 Trouble Indications

1.061 When conducting these tests it is imperative that the testers check all irregularities such as trouble indicator records, frame alarms and deviations from the normal operation of the equipment (for example buzzing relays or magnets) because the test equipment merely provides originating and terminating facilities and is not arranged to block on irregularities of operation involving second trials.

1.062 When tests are being conducted in more than one unit of equipment at the same time, special attention must be given to insure that trouble indications or alarms brought in by one test group do not mask trouble indications sought

by another group. In all cases the tests should be stopped until the trouble indicator record has been taken or the reason for the frame alarm ascertained.

1.063 The following are the principal manifestations of trouble:

- (1) Failure to complete.
- (2) False overflow routing.
- (3) Trouble indicator alarms and records.
- (4) Frame alarms.

1.064 It is advisable to record all trouble indications due to errors in operating the test equipment even though such troubles are discounted in the test analysis.

1.065 Traffic and trouble register readings of all registers associated with the equipment tested by the concentrated load tests should be recorded daily. The reason for excessive or insufficient registration should be determined and the trouble cleared.

1.066 At least twenty-five repeat tests without trouble shall be made in cases where the cause of the failure cannot be found. Where trouble is found, repeat tests shall be made to insure that the trouble has been cleared.

1.07 Circuit Changes: Circuit changes affecting the circuits to be tested shall be completed before the concentrated load tests are started. Any other tests being made during this interval shall be made in such a manner that they do not interfere with the concentrated load tests.

1.08 Supplementary Test: Time intervals for equipment covered by the concentrated load tests shall be construed as terminating with the start of these concentrated load tests instead of terminating at the time of turnover.

1.09 Additions: On additions the concentrated load test may be made on the various circuits as they are connected into the working equipment.

1.10 Channel Tests: On small installations, the channel tests listed in Section 213 may be combined with the tests in Paragraph 8.2 of this section.

2. TESTING EQUIPMENT

2.1 Test Sets

Amt	Code	Description
1	ITE-4072	Terminating Load Test Set
*1	ITE-4082	Terminating Sender Link Test Set

*2.2 Cords for Use with ITE-4082

Amt	ITE	Lath	Cdrs	One End	Other End	With ITE
1	9598	12'	2	110 Plug	110 Plug	4023
10	9601	12'	3	310 Plug	310 Plug	4023

2.3 Cords for Use with ITE-4072

Amt	ITE	Lath	Cdrs	One End	Other End	With ITE
10	9600	6'	3	310 Plug	310 Plug	4072
20	9601	12'	3	310 Plug	310 Plug	4023
10	9637	12'	3	110 Plug	325A Plug	4072

2.4 Accessories

Amt	Code	Description	With ITE
As	349A or	Make Busy Plug	4023
Req'd	298A		
As	322A	Make Busy Plug	4023
Req'd			
As	325C or	Make Busy Plug	4023
Req'd	351C		
4	ITE-2331	Extension Jack Box	4023
	or		
	ITE-4087		4023

* Additions only

3. SETUP FOR TEST

3.1 Locate the terminating load test set ITE-4072 at the service observing jack panel. Using #14 AWG wire connect 48 volt battery and ground to the B and G terminals. Fuse the battery feeder with a 5 ampere fuse.

3.2 Using two test cables with 15 or more conductors connect jacks 1 to 5 of two extension jack boxes ITE-2331 located conveniently to the test set to two other ITE-2331 located at the incoming trunk frames. These cables should be of sufficient length and so located that connections can be made from the ITE-2331 to the trunk jacks on all frames.

3.3 Using ITE-9601 cords patch the two ITE-2331 to the jacks T1 to T10 of the test set. The ITE-2331 at the incoming frames are patched to trunks as specified for the various tests in Paragraphs 5 to 11.

3.4 For terminating line connections jacks L1 to L10 are patched with ITE-9601 cords to the TL jacks on the S.O.J.P. as illustrated in Figure 1 and specified in Paragraphs 5 to 11. The TL jacks are connected to line circuits by patching the associated TL jacks to line verticals as specified, using cords ITE-9637.

4. OPERATION OF THE TERMINATING LOAD TEST SET

4.1 General

4.11 The terminating load test set is arranged to originate test calls simultaneously over incoming trunks connected to jacks T1 to T10. Terminating circuits are associated with jacks L1 to L10 which may be patched to line circuits for terminating test calls. Figure 1 shows the method of connecting the test set to incoming trunks and lines.

4.12 When the ST key is operated a selections loop is closed to each incoming trunk connected to the T jacks. This causes the trunks to be seized and associated with terminating senders.

4.13 The revertive pulses for selections are controlled by the test circuit, the senders being pulsed simultaneously. The number of revertive pulses for each selection is controlled by plugs inserted in the ten groups of jacks on the test set keyshelf. The method of setting up the directory numbers is described in Paragraph 4.5.

4.14 When the selections are completed the test set closes a holding loop to each trunk, TC lamp lighted. The S lamp associated with each trunk lights when the trunk connects ground to the sleeve.

4.15 The marker sets up the calls to the line circuits. The L lamp associated with each line jack lights as the call is completed. When ringing current is connected to the line by the incoming trunk the associated R lamp lights.

4.16 If it is desired to trip the ringing, the associated T key is operated. The R lamp remains lighted and the P lamp of the trunk over which the call was directed to that line lights as the "answered call" signal.

4.2 Sender Tell Tale

4.21 If there is a selections failure which causes the sender to go to tell tale the P lamp associated with the trunk lights and the test is blocked with the progress lamp (IB, IG, FB, etc.) lighted.

4.3 Overflow

4.31 If an all paths busy is encountered the P lamps associated with the trunk over which the test call was originated will flash at 120 IPM.

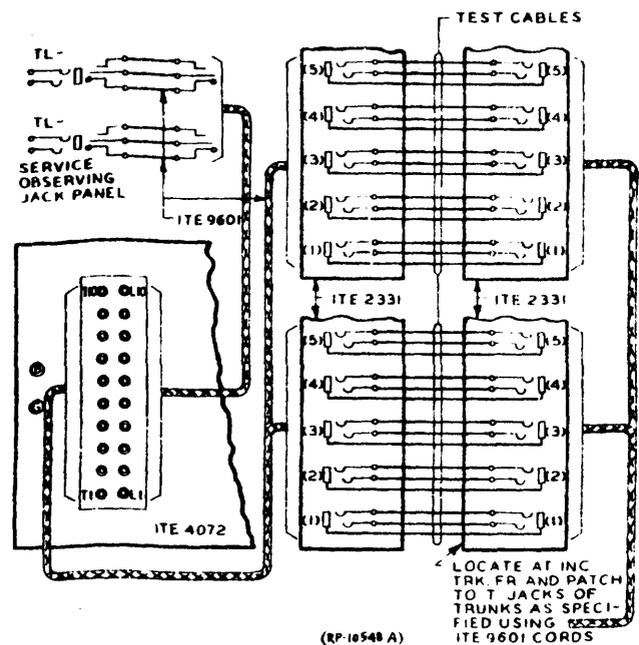


FIG. 1 SETUP FOR TEST

4.4 Line Busy

4.41 If a busy line is encountered the P lamp associated with the trunk over which the test call was originated will flash at 60 IPM.

4.5 Setting Up Directory Numbers

4.51 The terminating load test set is arranged to run down selections simultaneously on any number of senders up to ten. A different directory number may be registered in each sender, the same number in each or in any combination desired.

4.52 Ten independent selections circuits are provided and associated with trunk jacks T1 to T10. With each selections circuit there is a group of jacks designated (IB) 0-4, (IG) 0-3, (IG) 5-8, (FB) 0-4, (T) 0-9 and (U) 0-9, which control paths between the stepper (STP) and the counting relays. The directory number of the test call is set up by inserting a 32A plug in one of the jacks in each group as follows. Five plugs are required to set up each number.

IB Jack: Insert a plug into the jack corresponding to the incoming brush selection required for the directory number.

IG Jack: Insert a plug into the jack corresponding to the incoming group selection required for the directory number.

NOTE: Where multi-office discrimination is controlled by the incoming group selection use jacks IG (0-3) for office A and jacks IG (5-8) for office B.

FB Jack: Insert a plug into the jack corresponding to the final brush selection required for the directory number.

T Jack: Insert a plug into the jack corresponding to the tens digit.

U Jack: Insert a plug into the jack corresponding to the units digit.

Illustrations: For directory number 1234 insert plugs in IB-0, IG-2, FB-2, T-3 and U-4. Likewise for directory number 9678 insert plugs in IB-4, IG-3, FB-1, T-7 and U-8.

4.53 The following method may be used to convert the directory number into IB, IG, FB, FT and FU.

Given directory number 1234
divide the first numeral by 2:
1+2 0 IB
divide the remainder of the first and the second numeral by 5: 12+5 2 IG
The remainder is FB 2, FT 3 and FU 4

4.6 Less Than Ten Senders Registered

4.61 If connections are made to less than ten senders the C- keys must be operated which correspond to the T-jacks which are not connected to senders, or are not be used on this test. When the ST key is operated the set will attempt to check senders on all circuits for which the C or H keys are not operated and will block if there are not senders attached.

NOTE: When less than 10 senders are available, the terminating sender timing control circuit, which functions when all senders are busy, may cause interdigital timeout of the first seized sender while the test set is awaiting seizure of the remaining senders.

The timing control circuit should be blocked normal during the load test so that all available senders may be seized without interference.

4.7 Holding Connections

4.71 If it is desired to hold any connections in order to trace troubles while making tests on the remaining trunks operate the H keys corresponding to the trunks which are to be held.

4.8 Alarm

4.81 If it is desired to prevent automatic advance on time out when trouble is encountered, on automatic tests operate the ALM key. The TBL lamp will flash on trouble time out and interrupted ground will be connected to TBL binding post for operating an audible alarm.

4.9 Restoring Off-Normal Senders

4.91 If it is desired to restore off-normal senders operate the associated H keys.

5. TERMINATING MARKERS

5.1 Line Busy

NOTE: Connect the test set to the incoming trunks located on two frames and make busy the senders in such manner as to meet the conditions of Note 2 under Paragraph 8.

5.11 Make ten lines busy by inserting 325C MB plugs at the line verticals. Select the lines in two number groups and two line choices. Setup the directory numbers of these lines on jack groups #1 to #10.

5.12 Operate the ST key. The marker sets up the line busy condition in each trunk and the (P) 1-10 lamps flash at 60 IPM.

5.13 Make these tests ten times with the same connections. Remove 325C MB plugs.

5.2 All Channels Busy (See Note under Paragraph 5.1)

5.21 Leave the test set connected to the same incoming trunks and the line numbers set up as for test 5.1. Remove the busy condition from the lines. Make all channels busy by inserting 349A MB plugs into the MB jacks on the two incoming line frames.

5.22 Operate ST key. The overflow condition is setup on each of the five trunks and the (P) 1-10 lamps flash at 120 IPM.

5.23 Make ten tests with the same setup. Remove 349A MB plugs.

5.3 PBX Busy (See Note under Paragraph 5.1)

5.31 This test is to be made for each type of PBX arrangement (end of block hunting, jump hunting, allotted PBX, etc.) for which line assignments are provided in the office under test.

5.32 On the test set jack groups #1 to #10 setup the directory number of the PBX group used for test. Make busy all lines of the group. Connect the (L) 10 jack to the last line of the group.

5.33 Operate the ST key. The marker sets up the busy line condition in each of the trunks and lamps (P) 1-10 flash at 60 IPM.

5.34 Make the test ten times. On at least one of the tests remove the busy condition from the last line. On this test one call is completed to the (L) 10 jack. The P lamp will flash on nine of the trunks. Observe that the (R) 10 lamp lights during the ringing period and that when the (T) 10 key is operated the (R) 10 lamp remains lighted and the P lamp which failed to flash now lights steadily. Release the (T) 10 key.

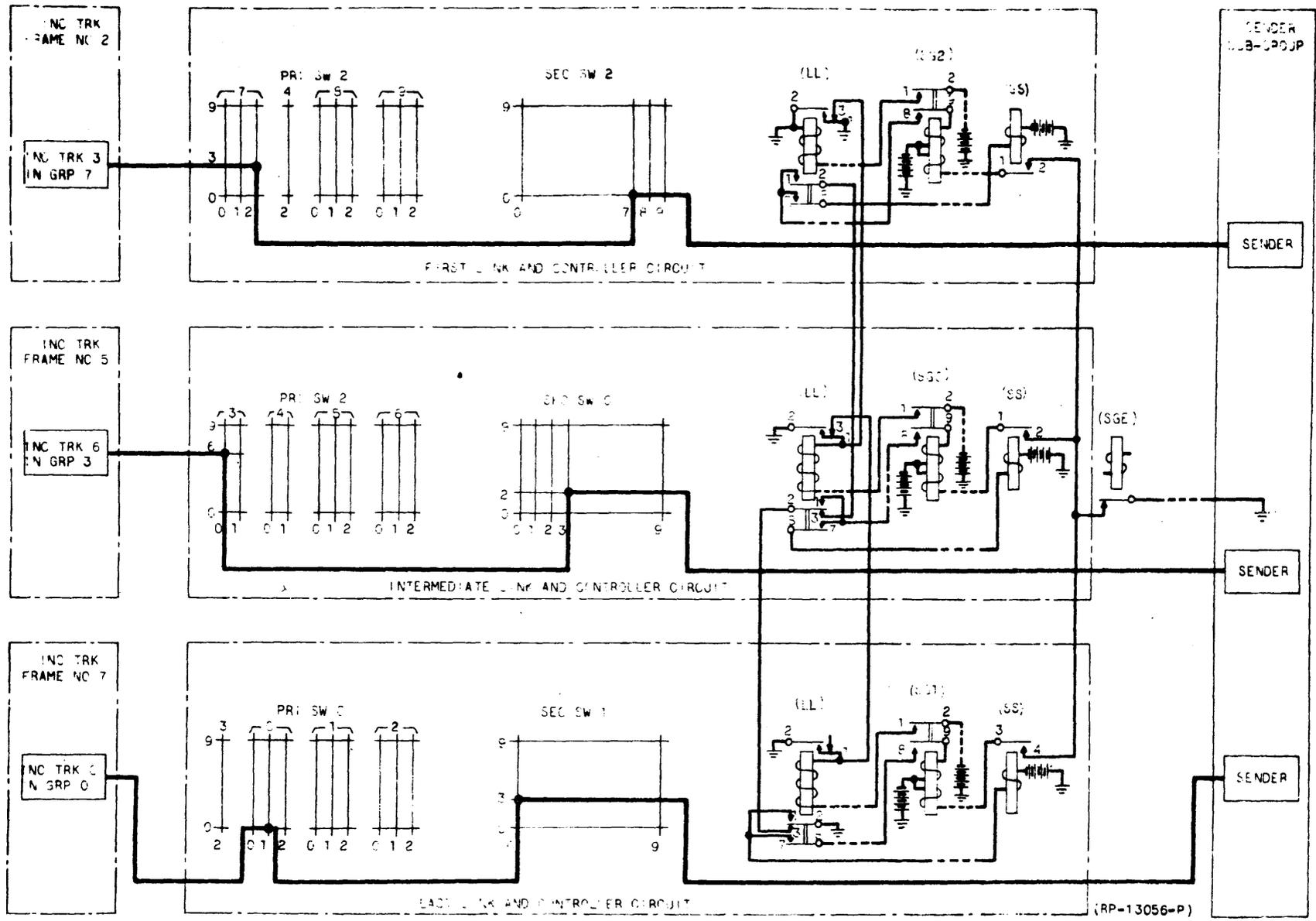


FIG. 2 LOCKOUT OF SENDERS (LL RELAY CHAIN)

5.4 Local Intercept (See Note under Paragraph 5.1)

5.41 Make busy the number group in which the local intercepting trunks appear. This is done by inserting a 349A MB plug in the TMB jack at the number group connector frame.

5.42 On the #1 to #10 groups of jacks on the test set, setup an unassigned directory number in a number group other than that in which the local intercept trunks appear.

5.43 Operate the ST key. The overflow condition is set up on each trunk and the (P) 1-10 lamps flash at 120 IPM.

5.44 Make ten tests with the foregoing setup. Remove 349A MB plugs.

5.5 PBX Retest

NOTE: This test requires connections to five incoming trunks when testing markers in groups of five or six trunks. (When testing six markers see Note 1 under Paragraph 8. These trunks may be located on one or more frames but the conditions specified per Note 2 under Paragraph 8 must be met so that all markers are seized simultaneously.

5.51 When selecting lines for this test, five (see note) lines of a PBX group are required which appear in a line choice or choices other than that in which the directory line appears. Also since the PBX retest feature of the marker makes busy every fourth line test position of the twenty block it is necessary to select five lines in line test positions which will not be made busy on retest after selecting the directory number. For example, if the line test position of the directory number is 0, positions 4, 8, 12 and 16 will be made busy on PBX retest. If a PBX group of sufficient size is not available select a group with as many lines as possible meeting the foregoing conditions.

NOTE: When testing six markers select six instead of five lines in the PBX.

5.52 On the #1 to #5 or #1 to #6 groups of jacks on the test set, setup the directory number of the PBX. Operate the C keys (6-9) or (7-9) as required.

5.53 Connect the L (1-5) or L (1-6) jacks of the test set to five or six lines of the PBX other than the first, fifth, ninth, thirteenth, etc. Connect the L 10 jack to the first line of the PBX. If there are less than five or six lines, in addition to the directory number and those made busy on retest, connect as many jacks as there are available lines. Make busy all lines in the PBX group except those which are connected to the test set or those which will be made busy on retest.

NOTE: If there are less than the specified number of lines available the tests should be made with the same number of markers at a time as there are lines in addition to the directory number used in the test. The number of lamps lighted will be changed accordingly. Repeat to use all markers.

5.54 Operate the ST key. Calls are completed to jack L10 and four or five of jacks (L) 1-6. Lamps L10 and four or five of lamps (L) 1-6 light.

5.55 Make busy the channels to the line link frame in which the directory number appears by inserting 349A MB plugs into the (SS) 0 to 9 jacks on the line link frame.

5.56 Operate the ST key. Since the channels to the frame in which the first line appears have been made busy, the markers set up new connections to the other lines connected to the test set. Lamps (L) 1-5 or (L) 1-6 light indicating the proper functioning of the markers. Observe that the L10 lamp does not light.

5.57 Make the test per 5.56 ten times. Remove 349A MB plugs.

6. LINE CHOICE CONNECTORS (See Notes 1 and 2 under Paragraph 8)

6.1 Line Choice Busy

6.11 On the test set jacks setup ten numbers appearing in the first line choice, but with each appearing in a different number group.

6.12 Using ITE-9601 cords connect the test set to ten FS trunks located on more than one frame and so distributed as to meet the conditions of Note 1 under Paragraph 8. Make at least one of the tests in 6.2 with the emergency marker preference circuit on the line choice frame. Also make at least one test with 322A plugs in the XT jacks associated with the markers.

NOTE: It is not necessary to make connections to lines for this test.

6.13 Insert a 349A MB plug into the TMB jack of the first line choice.

6.14 Operate the ST key. The overflow condition is setup on the ten trunks and lamps (P) 1-10 flash at 120 IPM.

6.15 Make these tests five times without changing the setup. Remove 349A MB plugs.

6.2 Line Choice Idle

NOTE: It is not necessary to shift trunk connections to use all channels. (Also see Note following Paragraph 8.23)

6.21 Using ITE-9601 cords connect the jacks L1 to L10 to ten lines in the first line choice. Distribute the lines over all line link frames of the line choice. Set these same line numbers on the #1 to #10 groups of jacks.

6.22 Make the following tests with as many secondary switches available on each line link frame as there are lines of each frame connected to the test set. Make busy the remaining switches by inserting 349A MB plugs into the SS jacks.

6.23 Operate the ST key. The test calls are completed to the lines connected to jacks L1 to L10.

6.24 Transfer the 349A MB plugs as required and repeat the tests a sufficient number of times to complete a test through each secondary switch on each line link frame. Under any condition make the test at least five times.

6.3 Repeat tests 6.1 and 6.2 on each line choice. Remove 349A MB plugs.

7. LINE LINKS - COMBINED ORIGINATING AND TERMINATING TRAFFIC (See Notes 1 and 2 under Paragraph 8)

7.1 Using ITE-9601 cords connect jacks T1 to T5 to five FS incoming trunks on two or more incoming trunk frames.

7.2 Connect jacks L1 to L5 to five assigned lines in two or more number groups and appearing on one line link frame. Select lines in different horizontal groups.

7.3 Connect jacks L6 to L10 to five lines to be used for originating calls in horizontal groups other than those used for terminating.

7.4 On jack groups #1 to #5 set up the directory numbers of the lines connected to jacks L1 to L5 respectively.

7.5 Operate keys C6 to C10. Operate the ST key. Calls will be directed to the lines connected to jacks L1 to L5. Observe when the first line sleeve lamp lights, any lamp L(1-5), and immediately operate key LS. L(1-5) and L(6-10) will light alternately although two terminating calls may be served if the LS key is not operated quickly enough.

NOTE: Perform the operations of 7.6 and 7.7 on coin first line groups only.

7.6 Insert 322A MB plugs into all CCT jacks (at terminating trouble indicator) associated with terminating markers being used for test. Insert a 322A MB plug into CCN jack at the terminating trouble indicator to cancel the continuity test. Leave keys C6 to C10 operated on the test set. Operate keys T1 to T5 to simulate receiver off the hook on lines L1 to L5.

7.7 Operate ST key. Calls will be directed to the lines L1 to L5 and the marker upon finding the "receiver off hook - no coin deposited" condition will setup busy back on each trunk. Lamps P1 to P5 will flash at the all paths busy rate.

7.8 Repeat the tests of Paragraphs 7.1 to 7.7 five times on each line link frame. Use the mate controller for at least two of the tests. Use the emergency controller unit when there is no mate frame.

8. INCOMING LINK FRAMES

NOTE 1: During each series of tests all markers require access to the same equipment (incoming frame, line choice or number group) at some stage of completing the calls. Therefore, if more than six markers are used at a time it is probable that the marker holding time of some of the markers will exceed the time out interval before all calls have been served. If there are six markers installed, it may be possible to conduct the tests using all markers without encountering the time out condition. However, if there are more than six markers the tests should be made with all except the first five made busy and repeated with all except the last five made busy.

NOTE 2: The tests outlined in Paragraphs 5 to 8 require connection to ten FS incoming trunks. All markers used in each series of test must be seized as near simultaneously as possible. Therefore, senders should be made busy as required so that ten are selected which are associated with as many marker connectors as possible. In any case the ten senders should appear in as many different connectors as there are markers used in the test and each connector having a different marker as its first choice.

8.1 All Markers Testing for Access to Same Incoming Frame

8.11 Using ITE-9601 cords patch the #1 to #5 jacks of the two ITE-2331 jack boxes to ten FS incoming trunks on one frame, using at least one trunk in each FS group.

8.12 Using ITE-9601 cords as described in Paragraph 3.4, connect the L jacks of the terminating load test set to ten line circuits each appearing in a different number group. If there are less than ten number groups distribute the lines over all groups.

8.13 Set up the directory numbers on the jacks as described in Paragraph 4.5.

8.14 Operate the ST key. Calls are completed to the ten lines. Lamps L1 to L10 light as the calls are terminated.

8.15 Make ten tests with the same test connections. Make at least two of the tests using the emergency marker preference circuit.

8.16 Make the tests for each incoming link frame. The same line circuits may be used for all tests.

8.2 Test Calls Using All Incoming Link Secondary Switches

8.21 Using ITE-9601 cords, connect set "T" jacks to ten FS incoming trunks on one frame, using at least one trunk in each FS group.

8.22 Using ITE-9601 cords connect jacks L1 to L10 to ten assigned lines in one line choice, five in each half choice, and set up the directory numbers on the test set jacks.

8.23 Make busy the #5 to #9 secondary switches on the incoming link frame by inserting 349A plugs into the MB jacks.

NOTE 1: If there are more than ten incoming frames there may not be ten channels available due to some being made busy by the pattern arrangement. When this condition is encountered leave available sufficient switches to provide channels for all calls.

NOTE 2: In making these test calls observe that all incoming link secondary switches are used in completing the calls. If any of the incoming link secondary switches are not used, make such additional test calls as may be necessary (with the already used secondary switches made busy as required) to insure that calls are completed through the balance.

8.24 Operate the ST key. Calls are completed to the lines L1 to L10. Make three tests with this setup and then make three tests using secondary switches #5 to #9, moving 349A plugs as required.

8.25 Make tests 8.21 to 8.24 from each incoming frame.

8.3 Markers Testing for Access to Several Incoming Frames (See Notes 1 and 2 under Paragraph 8)

8.31 The lines used for terminating the tests outlined in Paragraph 8.1 may also be used for these tests.

8.32 Using ITE-9601 cords patch the ten T jacks of the test circuit to full selector trunks appearing on ten different incoming frames. If there are less than ten frames use at least one trunk on each frame.

8.33 Operate the ST key. The tests are completed to the ten test lines. Make at least one of the tests using the emergency marker preference circuit.

8.34 If there are more than ten incoming link frames, move the connections and make additional tests so that each frame is used for at least five tests.

9. TERMINATING MARKER CONNECTORS

9.1 Lockout of Senders

9.11 Make busy all senders except the ones served by the marker connector under test. Where possible busy the senders by subgroups.

9.12 Using ITE-9601 cords connect the L jacks to as many assigned lines located in two or more number groups as there are senders served by the marker connector under test. Set up the directory numbers on the associated groups of jacks.

9.13 Using ITE-9601 cords connect the T jacks to as many incoming trunks as there are senders in the group and having access to the senders served by the marker connector under test. Operate the C keys corresponding to the T jacks which are not connected to trunks.

9.14 Operate the ST key. A call is completed to each of the test lines and the corresponding L lamp lights.

9.15 Make the foregoing test ten times on each marker connector.

9.2 Lockout of Markers

9.21 Make busy all FS terminating senders except ten. If there are ten or more marker connectors have one sender in each connector. If there are less than ten connectors have at least one sender in each.

9.22 Make all markers busy except the first circuit.

9.23 Connect jacks L1 to L10 to ten assigned lines in two or more number groups and set up the directory numbers on the corresponding jack groups.

9.24 Connect the T jacks to ten FS incoming trunks having access to the available senders. Release any operated C keys.

9.25 Operate ST key. Calls are completed to the ten test lines. Lamps L1 to L10 light.

9.26 Repeat the test ten times using each marker.

9.27 If there are more than ten marker connectors repeat the tests with the remaining connectors.

10. TERMINATING SENDER LINKS (See Figure 2)

10.1 Lockout of Senders (LL Relay Chain)

10.11 At the TTI frame make all terminating sender subgroups busy except one. In this test the LL relay chain associated with each sender subgroup

is tested by placing one call at the same time through each terminating sender link frame appearance of the sender subgroup.

10.12 At a number of incoming frames equivalent to the number of terminating sender link secondary switch appearances of the sender subgroup to be tested select a FS trunk. Connect the FS trunk from each incoming frame to jacks T(1-10) as required on the ITE-4072 test set.

10.13 Operate the C keys corresponding to the T jacks which are not connected to trunks. Insert 322A MB plugs into jacks IB, IG, FB, T and U as required, for the overflow test line number. The directory number is set up on the jacks associated with each trunk used in the test.

10.14 Operate the ST key. Observe that lamps S(1-10) light and lamps P(1-10) flash at the rate of 120 IPM (Overflow Signal).

NOTE: The frames may or may not be served in the same order as they appear in the lockout chain depending upon the variations in operating time of relays in the controller circuits.

10.15 Make the tests at least twice on each sender subgroup on each terminating sender link frame.

10.16 During these tests make busy controllers as required so that the mate controller is used at least once. Where there is an odd number of frames use the emergency controller at least once.

10.17 Repeat the test at least twice on each sender subgroup to which the incoming frames have access before shifting the cords to other incoming frames.

10.2 Sender Subgroup Selection

10.21 Connect jacks T1, T2 and T3 of ITE-4072 to three trunks of an FS incoming trunk group. Insert 322A-MB plugs into jacks IB, IG, FB, FT and FU as required, for the OVERFLOW test line number of the unit under test. Operate TEST SET keys C4 to C10 and ST. Observe that test set lamps S1 to S3 light, lamps P1 to P3 flash at the rate of 120 IPM (Overflow Signal) and that the three available sender subgroups each serve one of the three calls. The operated secondary hold magnets of the terminating sender link indicate the sender subgroups used. Restore key ST.

NOTE: The test may be repeated automatically by operating test set key AST.

10.22 Repeat the test on the same trunk group.

10.23 Perform the tests described in Paragraphs 10.21 and 10.22 on each FS trunk group.

11. NUMBER GROUP CONNECTORS (See Notes 1 and 2 under Paragraph 8)

11.1 Using ITE-9601 cords connect the test set to ten FS trunks located on more than one frame and so distributed as to meet the conditions of Note 1 under Paragraph 8.

11.2 For this test it will not be necessary to have terminating lines connected to the test set.

11.3 On the test set jacks set up ten assigned numbers appearing in the first number group. Select numbers appearing in as many different hundred blocks as possible (excluding HB-24); any five different twenty blocks (TBO-4); and each line in a different position (0-19) of the twenty block. At the line choice connector frame, insert 349A MB plug into the TMB jacks of the line choices in which the selected lines appear.

11.4 Operate the ST key. Since the line choice is busy the overflow condition should be set up on each trunk. The (P) 1 to 10 lamps flash at 120 IPM.

11.5 Make this test five times on each number group connector. After the first two tests change the numbers so that the remaining ten line test positions of the twenty block are used. On at least two of the tests use the emergency marker preference circuit. Also make at least one test with a 322A MB plug in the XT jack associated with each marker. Remove 349A and 322A MB plugs.

CONCENTRATED LOAD TESTS ON ADDITIONS

NOTE 1: The concentrated load test for additions should be made, with the permission of the telephone company, during the light load period to avoid the interference of regular traffic.

NOTE 2: If traffic conditions are such as to prohibit making these tests in a specified period as is done on a new installation it will be satisfactory to perform the tests as convenient after consultation with the telephone company.

NOTE 3: It is recommended that work sheets be prepared in advance to determine what apparatus is made busy, what trunks should be used, what lines should be picked, etc. so that the full time of the light load period may be used testing.

12. INCOMING LINK FRAMES (ADDITIONS)

NOTE 1: During each series of tests all markers require access to the same equipment (incoming frame line choice or number group) at some stage of completing the calls. Therefore, if more than six markers are used at a time it is probable that the marker holding time of some of the markers will exceed the time out interval before all calls have been served. If there are six markers installed it may be possible to conduct the tests using all markers without encountering the time out condition. However, if there are more than six markers the tests should be made with all except the first five made busy and repeated with all except the last five made busy.

NOTE 2: The tests outlined in Paragraphs 12. and 15 require connection to ten FS incoming trunks. All markers used in each series of test must be seized as near simultaneously as possible. Therefore, senders should be made busy as required so that ten are selected which are associated with as many marker connectors as possible. In any case the ten senders should appear in as many different connectors as there are markers used in the test and each connector having a different marker as its first choice.

12.1 All Markers Testing for Access to Same Incoming Frame

12.11 Using ITE-9601 cords patch jacks FS (0-9) of ITE-4082 to ten FS incoming trunks on one frame, using at least one trunk in each FS group.

12.12 Operate the test set RL key to restore set to normal. Operate the ST key. The FT (0-9) lamps light. As soon as the trunks are connected to senders as evidenced by the operated secondary sender link hold magnets dial IB, IG, FB, FT and FU as required for the OVERFLOW test line number.

12.13 At the TTI frame verify that the available markers are seized simultaneously and all serve calls from the frame under test. Observe that the test set lamps FS (0-9) light and FT (0-9) flash at the rate of 120 IPM.

12.14 Make ten tests with the same test connections. Make at least two of the tests using the emergency marker preference circuit.

12.15 Make the tests for each incoming link frame.

12.2 Test Calls Using All Incoming Link Secondary Switches

12.21 Using ITE-9601 cords patch jacks FS (0-9) of ITE-4082 to ten FS incoming trunks on one frame, using at least one trunk in each FS group.

12.22 A PBX group of ten lines is used, build it up if necessary, for termination of these calls.

12.23 Cancel continuity test by inserting 322A MB plugs in the PBX jack and CCT jacks of available markers at the TTI frame.

12.24 Make busy secondary switches 5-9 on the incoming link frame by inserting 349A MB plugs into the MB jacks.

NOTE: There may not be ten channels available due to some being made busy by the pattern arrangement. When this condition is encountered leave available sufficient switches to provide channels for all calls.

12.25 Operate the test set RL key to restore set to normal. Operate the ST key. The FT (0-9) lamps light. As soon as the trunks are all connected to senders as evidenced by the operated secondary sender link hold magnets dial IB, IG, FB, FT and FU associated with the directory number of the PBX group being used for test. Lamps FS (0-9) light and FT (0-9) remain in lighted.

12.26 Observe that all incoming link secondary switches are used in completing the calls. If any of the incoming link secondary switches are not used make such additional test calls as may be necessary (with the already used secondary switches made busy as required) to insure that calls are completed through the balance.

12.27 Make three tests with this setup and then make three tests using secondary switches 5-9 moving 349A MB plugs as required.

12.28 Make tests per Paragraphs 12.21 to 12.27 of each incoming link frame. Remove temporary cross-connections.

13. Terminating Marker Connectors (Additions)**13.1 Lockout of Senders**

13.11 Make busy all senders except the ones served by the marker connector under test. Where possible busy the senders by subgroups.

13.12 Using ITE-9601 cords patch jacks FS (0-9) of ITE-4082 to as many incoming trunks as there are senders in the group and having access to the senders served by the marker connector under test.

13.13 Operate the test set RL key to restore set to normal. Operate the ST key. The FT (0-9) lamps, as equipped, light. As soon as the trunks are connected to senders as evidenced by the operated secondary sender link hold magnets dial IB, IG, FB, FT and FU as required for the BUSY LINE test line

number. Lamps FS(0-9) and FT(0-9), as equipped, light and flash at 60 IPM respectively.

13.14 Make the foregoing test ten times on each marker connector.

13.2 Lockout of Markers

13.21 Make busy all FS terminating senders except ten. If there are ten or more marker connectors have one sender in each connector. If there are less than ten connectors have at least one sender in each.

13.22 Make all markers busy except the first circuit.

13.23 Using ITE-9601 cords patch jacks FS (0-9) of ITE-4082 to ten FS trunks having access to the available senders.

13.24 Operate the test set RL key to restore set to normal. Operate the ST key. Lamps FT(0-9) light. As soon as the trunks are all connected to senders as evidenced by the operated secondary sender link hold magnets dial IB, IG, FB, FT and FU as required for the BUSY LINE test line number. Test set lamps FS (0-9) and FT(0-9) light and flash at 60 IPM respectively.

14. Terminating Sender Links (Additions) (See Figure 2)

14.1 Lockout of Senders (LL Relay Chain)

14.11 At the TTI frame make all terminating sender subgroups busy except one. In this test, the LL relay chain associated with each sender subgroup is tested by placing one call at the same time through each terminating sender link frame appearance of the sender subgroup.

14.12 At the incoming frame patch the PWR jack of ITE-4082 to the frame A jack using an ITE-9598 cord (do not substitute). At a number of incoming frames equivalent to the number of terminating sender link secondary switch appearances of the sender subgroup to be tested, connect one FS trunk from each incoming frame to FS jacks 0 to 9, as required, on the ITE-4082 test set.

14.13 Operate the test set RL key to restore set to normal. Operate the ST key, the FT lamp should light on those circuits which are connected. Check that trunks are connected to senders by observing the operated secondary sender link hold magnets. The FT lamps may become brighter. Operate the RL key to restore circuits to normal.

NOTE: The frames may or may not be served in the same order as they appear in the lockout chain depending upon the variations in operating time of relays in the controller circuits.

14.14 Repeat the test at least twice on each sender subgroup to which the incoming frames have access before shifting the cords to another set of incoming frames.

14.15 Make the tests at least twice on each sender subgroup on each terminating sender link frame.

14.16 During these tests make busy controllers as required so that the mate controller is used at least once. When there is an odd number of frames use the emergency controller at least once.

14.2 Sender Subgroup Selection

14.21 Connect jacks FS(0-2) of ITE-4082 to three trunks of an FS incoming trunk group. Operate the test set RL key to restore set to normal. Operate ST key. FT(0-2) lamps light. As soon as the three trunks are connected to senders as evidenced by the operated secondary sender link hold magnets dial IB, IG, FB, FT and FU of the OVERFLOW test line. Observe that test set lamps FS (0-2) light and FT (0-2) flash at the rate of 120 IPM and that the three available sender subgroups each serve one of the three calls. The operated secondary hold magnets of the terminating sender link indicate the sender subgroups used. Operate the RL key to restore circuits to normal.

14.22 Repeat the test on the same trunk group.

14.23 Perform the tests described in Paragraphs 14.21 and 14.22 on each FS trunk group.

15. NUMBER GROUP CONNECTORS (ADDITIONS) (See Notes 1 and 2 under Paragraph 12)

15.1 Using ITE-9601 cords patch jacks FS(0-9) of ITE-4082 to ten FS incoming trunks located on more than one frame and so distributed as to meet the conditions of Note 1 under Paragraph 12.

15.2 Using 325C MB plugs inserted at the line vertical, make busy twenty lines in the same number group. Select numbers appearing in as many different hundred blocks as possible (excluding HB 24); any five different twenty blocks (TB 0-4); and each line in a different position (0-19) of the twenty block.

15.3 Operate the test set RL key to restore set to normal. Operate the ST key. Lamps FT (0-9) light. As soon as the trunks are all connected to senders as evidenced by the operated secondary sender link hold magnets dial IB, IG, FB, FT and FU associated with the line in position 0 of the twenty block. Lamps FS (0-9) light and FT (0-9) flash at 60 IPM.

15.4 Make this test to each of the twenty lines made busy in each number group connector. On at least two of the tests use the emergency marker preference circuit. Remove the make busy plugs.

R. E. RAHMES

Engineer of Installation