

LINE INSULATION TEST FRAME EQUIPMENT DESIGN REQUIREMENTS NO. 1 CROSSBAR SYSTEM

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers the equipment design requirements for the framework, equipment, and circuits to be used in the engineering, manufacture, and installation of the line insulation test frame for the No. 1 crossbar system.

1.02 This section is reissued to incorporate previous appendix changes.

Capacity

1.03 The frame has the following capacities:

- (a) A single terminating marker group of 16 line choices.
- (b) Two marker groups totalling 20 line choices.

(c) Two marker groups of 16 line choices each. (In this case, the second group of line choice preference relays is located exterior to the frame on a relay rack bay.)

1.04 Other equipment associated with the line insulation test frame has capacities as follows:

- (a) Teletypewriter connector and distributor equipment - Five line insulation test frames in same building
- (b) Teletypewriter selection equipment including teletypewriter in local test center - Eight teletypewriter connector circuits in eight buildings serving a maximum of ten marker groups.

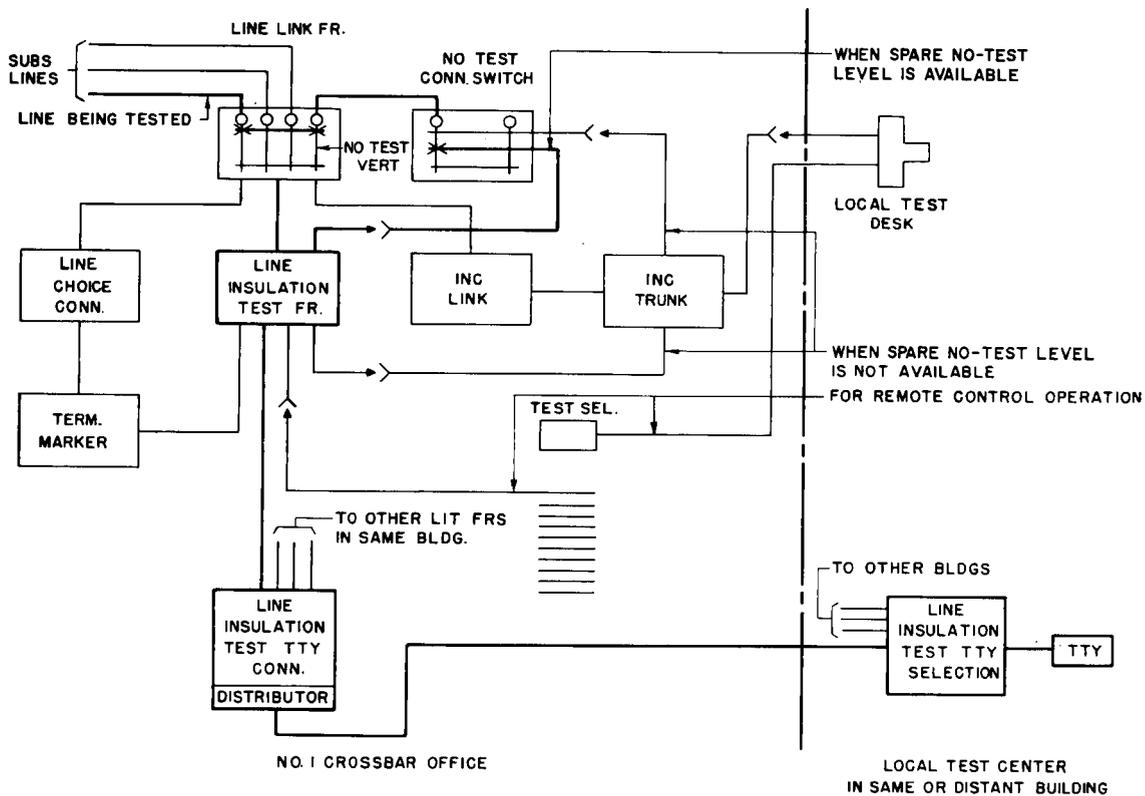


Fig. 1 - Schematic of Line Insulation Test Equipment

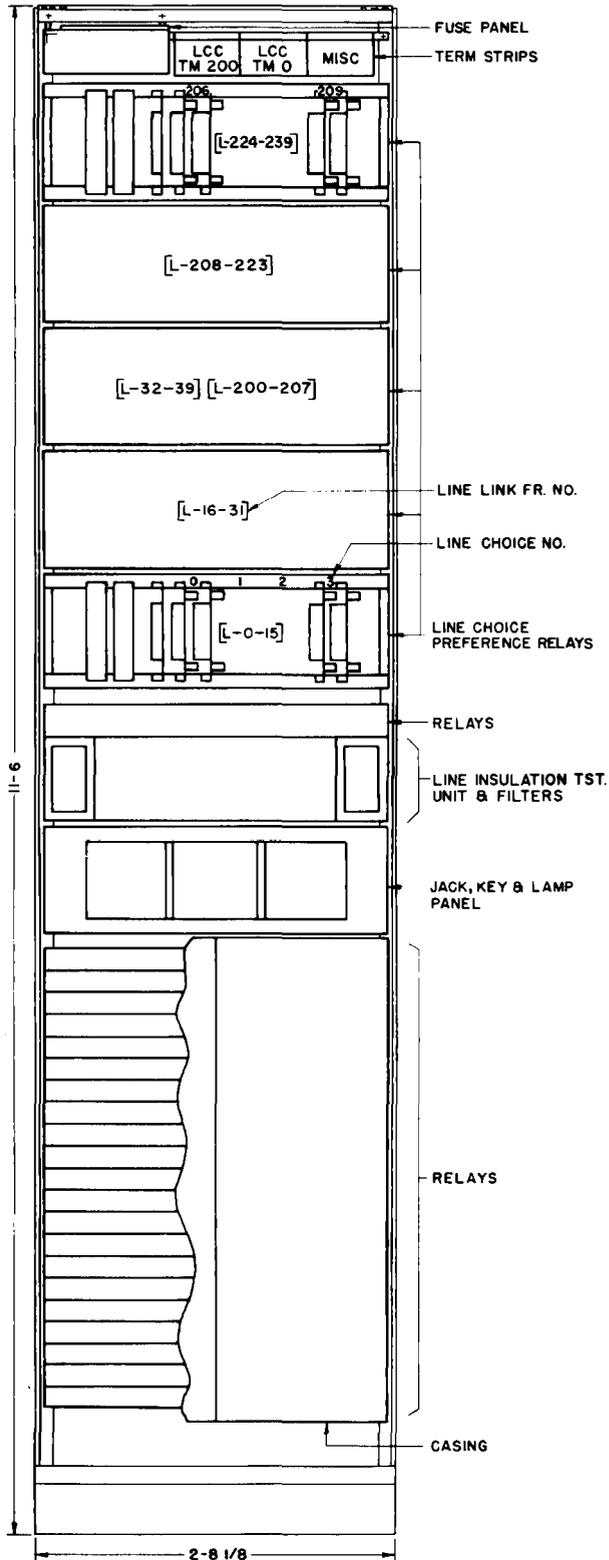


Fig. 2 - Line Insulation Test Frame

Description

1.05 The line insulation test frame is a bulb-angle-type structure 11 feet 6 inches high and 2 feet 8-1/8 inches long. Occupying the lower portion of the frame is a relay casing enclosing the control relays and related apparatus including four plant registers. Above the casing is the jack, key, and lamp panel, and above this are a test unit and filters which convert the dc line leakage to a proportional ac output and provide means for its accurate test measurement. A strip of mercury relays is located above the line insulation test unit. The upper portion of the frame is occupied by five mounting assemblies containing the line choice preference relays which provide access to the line link frames via line choice connectors. A fuse panel and three terminal strips appear at the top of the frame. The rear of the frame is enclosed with sheetmetal covers.

1.06 A frame local cable includes wiring to meet the following conditions:

- (a) A single terminating marker group of 16 line choices.
- (b) Two terminating marker groups totaling 20 line choices.
- (c) Two terminating marker groups of 16 line choices each; the line choice preference relays for the second marker group are on a supplementary unit located on a relay rack bay.

The marker groups referred to above may be arranged for single- or 2-office terminating traffic. Plan (a), as indicated above, provides wiring for testing lines in a single marker group of 16 line choices and 64 line link frames. Plans (b) and (c) include wiring for the transfer and line choice connector relays required when dealing with a second marker group, together with provision for a second line choice preference relay chain. Under plan (b), the wiring for the first preference chain extends over the lower four multicontact relay mounting assemblies and that for the second preference chain extends over the top three mounting assemblies. This means that the first marker group may include up to 16 line choices and the second marker group as many as 12 line choices, the total for both groups being limited to 20 line choices or 80 line link frames. With plan (c), the preference chain for the first marker group is on the test frame and that for the second marker group is on an auxiliary relay rack unit. This arrangement provides for the case where two marker groups exceed 20 line choices, such as 2-office terminating groups serving medium density traffic or single-office groups in high density areas. The auxiliary line choice preference relay unit furnished under plan C may be located near the line

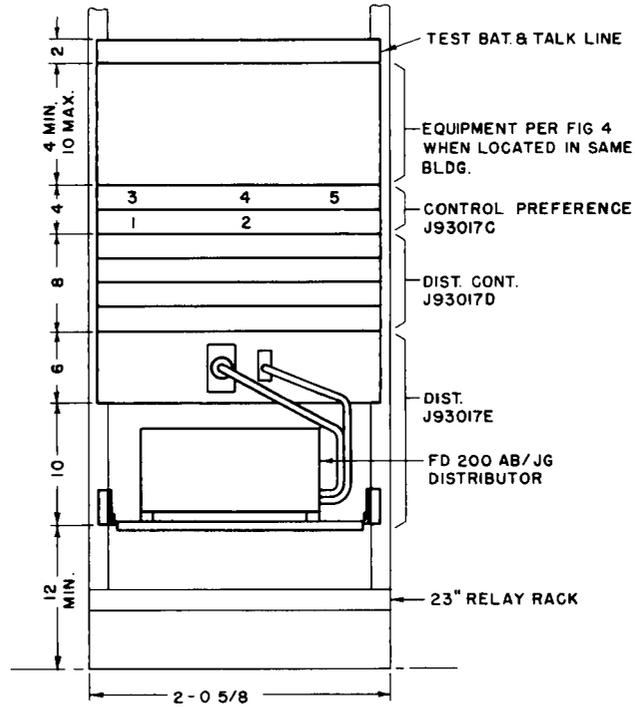


Fig. 3 - Teletypewriter Connector Equipment Per Building

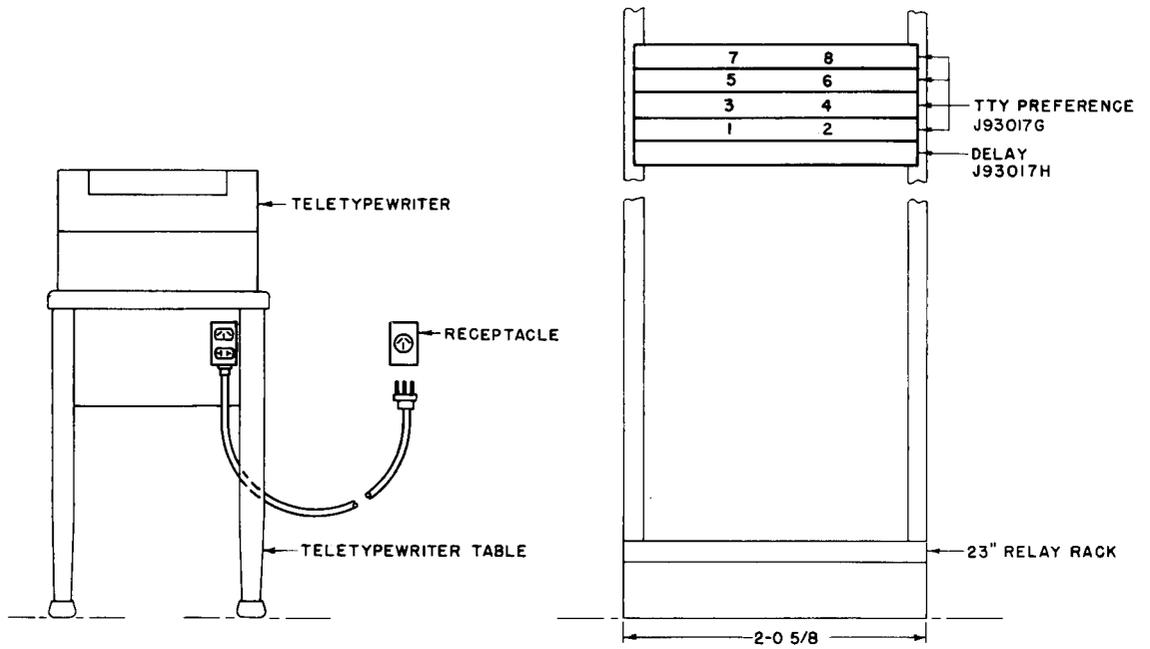


Fig. 4 - Teletypewriter Selection Equipment at Local Test Center

link frames for the second marker group when separated widely from the test frame, thus effecting cabling economies.

1.07 The auxiliary line choice preference relay unit comprises three 2- by 23-inch mounting plates, one to four multi-contact relay mounting assemblies, and chain wiring for 16 line choices. Because of the amount of cable from the line link frames, this equipment is located at the top of the relay rack bay, space being allowed for the ultimate number of line choices. The 48-volt battery is supplied from the fuse panel on the line insulation test frame, except where the auxiliary unit is on a different floor or widely separated from the test frame, when battery is obtained at a nearby miscellaneous fuse bay.

1.08 Existing line insulation test frames per J23651A may be modified to test lines associated with a second group of terminating markers by making the following changes in conformity with SD-25947-01, Issue 3-D and ED-26973-01.

(a) Remove filter unit per J93017K and replace adapters P30A549 with adapters P31A897 and P31A898. Transfer the filters from the filter unit to the new adapters following the arrangement shown on ED-26973-01, except that the line insulation test unit remains in its present position immediately below the bottom line choice preference relay mounting assembly.

(b) Move mounting plate U including the 275- and 276-type relays from behind the relay casing to the space vacated by the filter unit.

(c) Locate the relays per Fig. D of the circuit on new mounting plates in the space vacated by the mercury relays. Locate the relays per circuit Figs. A and B for the second marker group and the AA and AB networks on mounting plate L. Locate the added fuses, keys, and lamps as shown on ED-26973-01.

(d) Terminate the switchboard cables for the second marker group directly on the relays and other apparatus as shown on circuit cross-connecting Fig. 57.

1.09 Other equipment required for the control and operation of the line insulation test frame is shown in Figs. 1, 3, and 4.

Operating Features

1.10 The line insulation test equipment is arranged to operate on an automatic basis to disclose defects in cable, cable terminals, drop wire, and inside wire which may eventually affect subscriber

service. The tests are controlled either by the local maintenance force or by remote control from a local test center located in the same or in a distant building. The test control circuit proceeds to test all lines, skipping busies and other lines which may produce false indications or service interference, and stops automatically when all lines have been tested or when the traffic load in the office requires the use of the equipment temporarily assigned for line insulation testing. When a line fails to meet a particular test condition, a record of the line number and test condition is made on a teletypewriter located at the test center.

1.11 The test frame obtains access to the line link frames through the multiple of one of the terminating markers to the line choice connectors. Marker No. 2 is usually assigned for this purpose although any marker other than the special markers 0 and 1 may be used. Access to the subscriber lines for insulation measurements is obtained through the no-test connectors, using a spare level or a no-test trunk horizontal when a level is not available for the exclusive use of the LIT frame. In the latter case, a level assigned to a trunk from the local test desk is used temporarily during the test.

1.12 In order to avoid possible interference with traffic on any one line link frame, the tests are rotated between the frames in a particular order. The test starts in line choice 0, line link group A, vertical group 0, horizontal group 0, lines 0 to 4. After these five lines in line choice 0 are tested, the test proceeds to the same group of lines in line choice 1, 2, 3, etc., then to line group B, C, and D. When the circuit has tested these lines in all choices and in all four line groups, the test proceeds to those lines in vertical group 1 and similarly through all remaining vertical groups. The horizontal group is then advanced to 1, 2, 3, etc. Lines 5 to 9 are then tested in a similar manner. Upon completing the tests in the first marker group, the frame advances automatically to the second marker group.

1.13 The speed of testing through all line link frames for all ranges of test is approximately 12,000 lines per hour. The circuit is arranged to suspend testing temporarily and to return the marker to service if an all-markers-busy condition occurs for a given interval. The test is automatically started again when at least one marker is idle for a similar interval. This feature requires that timing control circuit SD-25482-01 be furnished and that each terminating marker be equipped with Fig. AJ of SD-25283-01.

1.14 The LIT frame is arranged to make three kinds of tests and each test

may be made in one of three different resistance ranges. These tests are:

1. Short and ring ground to detect leaks between the tip and ring of a line and leaks from the ring to ground
2. Tip and ring ground to detect leaks to ground from either the tip or ring
3. Foreign potential test to detect leaks from either the tip or ring to battery

The resistance ranges and their limits are given below.

Range	Limits - Ohms
A	{ 0-80,000 - Option 0-160,000 - Normal 0-320,000 - Option
B	{ 0-320,000 - Option 0-640,000 - Normal 0-1.25 meg - Option
C	{ 0-1.25 meg - Option 0-2.5 meg - Normal 0-5.0 meg - Option
D	{ 0-2.5 meg - Option 0-5.0 meg - Normal 0-10.0 meg - Option

Ranges A, B, and C are used with tests (1) and (2), and ranges B, C, and D are used with test (3). Resistance values in the above table marked Normal are the ones generally used, but by means of cross connections at the RN terminal strips on the test frame these values may be halved or doubled as determined by the telephone company.

1.15 When a line is found in trouble on test (1) above, a retest is made in order to determine whether the failure was caused by a leak across the tip and ring, from ring to ground, or a combination of both conditions. When a failure occurs on test (2), a retest is made to determine whether it is a leak from tip to ground, from ring to ground, or a combination of these conditions. Foreign potential test (3) is made to detect leaks in cable and no retest is made of test failures.

1.16 When a line is found in trouble, the information is extended through the teletypewriter connector and distributor equipment common to the local building over interoffice trunks to the teletypewriter selection equipment in the local test center where it is recorded in code on a teletypewriter page printer. A typical recording is as follows:

5-312-1432-36

The digits recorded from left to right indicate the following:

- 5 - Marker group identity (0 to 9)
- 3 - Kind of test (1 to 9)
 - 1 - Result of first test (0, 1, 2) } 0 = Low
1 = Medium
 - 2 - Result of retest (0, 1, 2, 3) } 2 = High
3 = OK
- 1 - Line Choice Tens (0, 1)
- 4 - Line Choice Units (0 to 9)
- 3 - Quarter choice (0,1,2,3) 0=A, 1=B, 2=C, 3=D
- 2 - Column (0 to 6)
- 3 - Horizontal Group (0 to 9)
- 6 - Vertical file (0 to 9)

1.17 The tests may be started by operating keys on the test frame, namely, a key per marker group, one key for each of the nine types of tests (S1 to S9), and one key RN for restoring the test circuit to normal before the completion of the test cycle. The tests may also be started from the local test desk by dialing the proper level followed by the number of the test to be made over the test trunk which terminates in the test selector circuit in the office being tested. A further arrangement provides for starting the frame automatically at a predetermined time through the use of a synchronous motor-driven time switch. The test circuit may be temporarily stopped, when necessary, by the operation of the TS key on the test frame and restarted at the point where the tests were interrupted by the operation of the RTS key. This stop feature cannot be controlled from the local test desk.

1.18 The starting of the test control circuit energizes the line insulation test circuit which, after a short warmup period, proceeds to measure the insulation resistance of the lines in the order previously mentioned, and in accordance with the test conditions set up in the control circuit. The principal element in line insulation test circuit is a coil structure called a magnetor in which a portion of the dc current flowing through the line leak resistances produces a proportionate ac output. This is fed to an amplifier-detector whose output is connected to the control grid of three gas-filled tubes. One, two, or all three of these tubes will break down to indicate a high, medium, or low band failure. If the insulation of the line is above the top limit of the range in which the test is being made, none of the tubes will fire indicating an OK line, and the control circuit proceeds to the next line in the established rotation.

1.19 Keys and lamps are provided on the test frame to control various test and trouble conditions and to indicate tests in progress and test results. Registers are provided in the lower relay casing to count the number and type of test cycles completed.

1.20 If there is more than one test frame in the building, they are connected to the preference chain of the teletypewriter connector (SD-95558-01), and while a record is being made by one test frame, all other test frames are locked out. This connector circuit, which is mounted on a miscellaneous relay rack and is common to the building, also contains the teletype transmitter distributor for sending the teletype code to be recorded at the local test center. At the local test center is a teletypewriter selection circuit (SD-95559-01), including the teletypewriter which is arranged to serve test frames in more than one building (see paragraph 5.04).

1.21 The translation of the trouble record, which is in terms of line equipment location to subscriber number, is obtained from the office line records at the local test center.

Teletypewriter Equipment

1.22 The following relay rack mounted equipment, as shown in Fig. 3, is required in the local office:

- J93017C - Control Ckt Preference Unit (when two or more LIT frames are furnished in same building)
- J93017D - Distributor Control Unit
- J93017E - Distributor Unit

1.23 The following relay rack mounted equipment as shown in Fig. 4, is required at the local test center:

- J93017G - Teletypewriter Preference Unit (for each two LIT frames)
- J93017H - Delay Unit

1.24 When the local test center is in the same building with the LIT frames, the above units may be grouped on the same relay rack bay as shown in Fig. 3.

1.25 A 15-type teletypewriter (walnut grain finish) is required at the local test center. This is equipped with a line relay and associated rectifier when receiving from more than one location or from a single location that exceeds the allowable cable working limits. When the teletypewriter is receiving from a single location within allowable working limits, the line relay and rectifier are not required. The two conditions, covered by Figs. 5 and 6 of SD-95559-01, comprise the following equipment.

Without Line Relay

15C TTY Base
15U Typing Unit
15D Motor Unit
15G TTY Gears
15C Cover
15E Coverplate
TP72484 Relay
7055 Hubbell Cap
347A Plug
347B Plug
M3AY Cord
Two M2CN Cords

With Line Relay

15D TTY Base
15U Typing Unit
15D Motor Unit
15G TTY Gears
15C Cover
15E Coverplate
TP72484 Relay
255A Relay
KS-5663, L7 Rectifier
7055 Hubbell Cap
7092 Hubbell Cap
7091 Hubbell Conn. Body
347A Plug
347B Plug
303A Jack (black)
M3AY Cord
Two M2CN Cords
Two M2DG Cords

Existing 15C teletypewriter bases may be converted to the 15D base by adding "TP91786 Set of Parts."

1.26 The teletypewriter is mounted on a 15P walnut finished wood teletypewriter table covered by J70040 and ED-70287-01. It is ordered as "15P TTY Table less Paper Box Assembly." The table includes a shelf for rectifier, 115-volt receptacles, also connecting blocks, jack mounting, and one line jack (red) for the line and motor control leads. A second jack (black) is ordered separately and is mounted and wired by the installer. Existing teletypewriter tables per ED-92537-01, GRP1, may be modified to include a shelf for the rectifier by ordering material per ED-92537-01, G2 and installing it locally. A suitable receptacle (Hubbell 7214) for the 115-volt 60-cycle supply to the teletypewriter is furnished by the telephone company and located near the teletypewriter table.

Remote Control

1.27 When remote control from the local test desk is specified, the line insulation test frame is assigned a level for each marker group on test selectors per SD-25767-01 and J99235H, which also are used to provide access to permanent signal-holding trunks and plugging-up lines.

Floor Plan Arrangements

1.28 The line insulation test frame should preferably be located in the maintenance center serving the associated marker groups.

1.29 Where a location at the maintenance center is not feasible, the line insulation test frame may be placed near the associated line link frames as determined by the telephone company. This location shortens the major cable runs and should prove satisfactory from an operating standpoint, since the frame is automatic in operation.

Subdivisions of Equipment

J23651B (AT&TCo Std) - Line Insulation Test Frame
 J23651C (AT&TCo Std) - Auxiliary Line Choice Preference Relay Unit

2. SUPPLEMENTARY INFORMATION

816-000-000 - No. 1 Crossbar System Index
 J23051 (816-024-150) - Miscellaneous Frame Equipment - Crossbar System No. 1 (No Test Connector)
 J27450 (816-429-150) - Line Link Frame - No. 1 Crossbar System
 J27851 (816-300-150) - Line Choice Connector Frame and Line Junctor Connector Frame - No. 1 Crossbar System
 J28650 (816-702-150) - Regular, Auxiliary, and Supplementary Incoming Trunk Frames for Use With 160-trunk Capacity Incoming Link Frames - Crossbar System No. 1
 J28853 (816-351-150) - Terminating Marker Frame - No. 1 Crossbar System
 J93017 - Relay Rack Mounted Test Equipment - Common Systems
 J95002 - Local Test Desk No. 14 - Common Systems
 J99235 - Equipment Units - Relay Rack Mounted - Common Systems
 Floor Plan Data - Section 9.3, Sheet 19

3. DRAWINGS

Key Sheet

SD-25000-01 - No. 1 Crossbar System

Framework

ED-26758-01 - Rear Enclosures
 ED-91722-01 - Jack, Key, and Lamp Panel
 ED-92744-01 - Frame Assemblies - Angle Type

Equipment

ED-26973-01 - Line Insulation Test Frame - Assembly, Equipment, and Local Cable
 ED-26974-01 - Auxiliary Line Choice Preference Relay Unit
 ED-92576-01 - Line Insulation Test - Relay Rack and Teletypewriter Equipment

Cabling

ED-26821-10 - Switchboard Cabling Details

4. EQUIPMENT

J23651B (AT&TCo Std) - Line Insulation Test Frame

Assembly, Equipment, and Local Cable - ED-26973-01

List 1 - Framework, assembly, local cable, and common equipment for one line insulation test frame arranged for testing lines in 16 line choices in one terminating marker group (see notes A and B)

Wire Equip

Line Insulation Test Cont Ckt, SD-25947-01:
 Figs. 1 less "A" App, 8, 9
 10, 11, 12, 13, & C 1 1
 First Line Choice Pref, Fig. 2 1
 Inter Line Choice Pref, Fig. 3 14
 Last Line Choice Pref, Fig. 4 1
 First Column Pref, Fig. 5 1 1
 Inter Column Pref, Fig. 6 5 1
 Last Column Pref, Fig. 7 1 1
 Maintenance Test Cont, Fig. 14 1 1
 First Quarter Choice, Fig. 15 1 1
 Inter Quarter Choice, Fig. 16 2 2
 Last Quarter Choice, Fig. 17 1 1
 Alarm, Fig. 18 1 1
 No Tst Rels, Fig. A, 1st M Grp 1
 No Tst Rels, Fig. B, 1st M Grp 1
 Time Sw Start, Figs. F and G 1
 Misc Ckt, SD-25955-01,
 Figs. 1, 2, 3, & 4 1 1
 Line Insulation Test Ckt,
 SD-95537-01 1 1

List 2 - Supplementary wiring and terminal strip required in addition to list 1 to arrange frame for testing lines in a second terminating marker group - maximum of 20 lines choices in both marker groups (see note B)

Wire

Line Insulation Test Cont Ckt, SD-25947-01:
 Trns & LC Conn Rels, Fig. D 1
 No Tst Rels, Figs. A&B, 2nd M Grp 1
 First LC Rel, Fig. 2 1
 Inter LC Rel, Fig. 3 10
 Last LC Rel, Fig. 4 1

List 3 - Supplementary wiring and terminal strip required in addition to list 1 to arrange frame for testing lines in a second terminating marker group of 16 line choices - LC and LLA --- LLD relays for second marker group located on miscellaneous relay rack (see note B)

Wire

Line Insulation Test Cont Ckt, SD-25947-01:
 Trns & LC Conn Rels, Fig. D 1
 No Tst Rels, Figs. A&B, 2nd M Grp 1

List 4 - Apparatus per SD-25947-01, Fig. D, less "A" apparatus and Fig. C required in addition to lists 1 and 2 or lists 1 and 3 to equip frame for testing lines in a second marker group

List 5 - Mounting assembly and common equipment per SD-25947-01, Fig. 2, 3, or 4 required in addition to list 1 for 16 line link frames in four line choices (see note C)

- List 6 - Apparatus per SD-25947-01, Fig. 2, 3, or 4 (LC relay only) required in addition to list 5 to equip for one line choice (see note D)
- List 7 - Apparatus per SD-25947-01, Fig. 2, 3, or 4 (LLA and LLB relays and networks) required in addition to list 5 to equip for line link frames A and B (see note D)
- List 8 - Apparatus per SD-25947-01, Fig. 2, 3, or 4 (LLC and LLD relays and networks) required in addition to list 5 to equip for line link frames C and D (see note D)
- List 9 - Apparatus per SD-25947-01, Fig. A required in addition to list 1 when a spare no-test level is not available in the first marker group (see note E)
- List 10 - Apparatus per SD-25947-01, Fig. B required in addition to list 1 when a spare no-test level is available in the first marker group (see note E)
- List 11 - Apparatus per SD-25947-01, Fig. A required in addition to lists 2 or 3 when a spare no-test level is not available in the second marker group (see note E)
- List 12 - Apparatus per SD-25947-01, Fig. B required in addition to lists 2 or 3 when a spare no-test level is available in the second marker group (see note E)
- List 13 - Apparatus per SD-25947-01, Fig. 1 "A" apparatus required in addition to list 1 to equip for remote-control operation in first marker group (see note F)
- List 14 - Apparatus per SD-25947-01, Fig. D, "A" apparatus, required in addition to lists 1 and 2 or lists 1 and 3 to equip for remote control in second marker group (see note F)
- List 15 - Apparatus per SD-25947-01, Fig. F required in addition to list 1 for time switch start (see note M)
- List 16 - Apparatus per SD-25947-01, Fig. G required in addition to list 15 when the line insulation test frame is equipped with a time switch (see note M)
- List 17 - Apparatus per SD-25947-01, Fig. 13, "ZP" option only, required in addition to list 1 to provide additional time to connect the line insulation test control circuit to line concentrators for line testing.

Notes

- A. Wiring shall be provided for all options and connected, as required, for each job. Chain leads shall be looped at the positions of unequipped relays as indicated on the circuit drawing.
- B. List 1 covers the basic frame with wiring for testing lines in a single marker group of 64 line link frames and 16 line choices. Lists 2 and 3 cover additional wiring required to arrange the frame to test lines in two marker groups. With list 2, the line choice preference relays for the second marker group are located on the line insulation test frame. With list 3, these relays are located exterior to the frame on a relay rack bay. The line choice preference relays for list 1 are assigned to the lower four mounting assemblies to LC positions 0 to 15; those for list 2 are assigned to the top three mounting assemblies to LC positions 8 to 19. Accordingly, a single or first terminating marker group may include up to 64 line link frames and 16 line choices, and the second marker group per list 2 may have a maximum of 48 line link frames and 12 line choices. However, the total for both marker groups is limited to 80 line link frames and 20 line choices. With list 3, where the line choice preference relays for the second marker group are mounted exterior to the test frame, a total of 64 line link frames and 16 line choices may be served in each marker group.
- C. List 5 covers mounting assembly, mounting plates, terminal strip, and bare-wire strapping for 16 line link frames in four line choices. When this list occupies the 2nd, 3rd, or 4th position on the frame, a vertical multiple local cable between terminal strips on adjacent units shall be furnished.
- D. Lists 6, 7, and 8 provide the LC and LLA --- LLD relays and the LLA --- LLD networks for each equipped line choice and for each half choice of line link frames.
- E. List 9, 10, 11, or 12 is furnished per marker group depending on whether a spare no-test level is or is not available.
- F. Lists 13 and 14 are furnished when remote-control operation is specified.
- G. The LT, LR, and CAL switches and associated resistors per SD-25947-01, Fig. 14 are mounted on and furnished as a part of switch panel P-33A450 located in the jack, key, and lamp panel of the line insulation test frame.

- H. The interrupters per SD-25947-01, Fig. 18 are mounted on the office interrupter frame.
- J. The jacks and test posts per SD-25955-01, Figs. 1, 2, 3, and 4 are mounted in the jack, key, and lamp panel of the line insulation test frame.
- K. The line insulation test circuit SD-95537-01, less the ac interference filters, is assembled on a 23-inch panel per J93017J. This is mounted on the frame by means of adapters which are drilled to accommodate the interference filters.
- L. Armored cable KS-5497-01 for the 115-volt, 60-cycle power supply for the line insulation test unit J93017J is fastened to the cable brackets on the frame and is terminated in a connector attached to a bracket on the test unit. The cable leads are run direct to the apparatus terminals as indicated on SD-95537-01.
- M. List 15 covers the apparatus, less time switch, required on frames arranged for automatic start at a predetermined time. List 16 covers the time switch which is mounted on the frame in the rear of the line insulation test unit. (See ED-26973-01, Fig. W and SD-25947-01, Fig. 65.) The circuit is arranged so that a single time switch may be used to control the starting of two line insulation test frames in addition to the one on which the switch is mounted, all in the same building. Each frame is equipped with list 15 and the frame on which the switch is mounted is equipped with list 16.
- N. Certain classes of subscriber lines cause false indications and are arranged so that they will be skipped by the test frame. This is done by adding a 3300-ohm resistance across the line relay as covered by SD-25553-01, "YL" option. The application of these resistances is determined by the telephone company.

- List 2 - Mounting assembly and common equipment per SD-25947-01, Figs. 2, 3, and 4 (LLA --- LLD relays only) required in addition to list 1 for 16 line link frames in 4 line choices (see note C)
- List 3 - Mounting plate required in addition to list 1 for the first eight or last eight LC relays (see note D)
- List 4 - Apparatus per SD-25947-01, Fig. 2, 3, or 4 (LC relay only) required in addition to lists 1 and 3 to equip for one line choice (see note D)
- List 5 - Apparatus per SD-25947-01, Fig. 2, 3, or 4 (LLA & LLB relays and networks) required in addition to list 2 to equip for line link frames A and B (see note D)
- List 6 - Apparatus per SD-25947-01, Fig. 2, 3, or 4 (LLC & LLD relays and networks) required in addition to list 2 to equip for line link frames C and D (see note D)

Notes

- A. This auxiliary unit contains the line choice preference relays for a second terminating marker group of 64 line link frames in 16 line choices. It comprises three mounting plates for the LC relays and the LLA --- LLD networks, one to four mounting assemblies for the LLA --- LLD relays, and a local cable containing wiring as follows:
 - (1) Chain leads through the LC relays
 - (2) SC2-SC6 and 0-9 (LCT and LCU) leads to contacts of LLA --- LLD relays
 - (3) LLA --- LLD relay magnet leads
 - (4) Battery and ground supply
- B. List 1 includes one mounting plate, No. 224A terminal strip, and local cable for 64 line link frames in 16 line choices.
- C. List 2 covers mounting assembly, terminal strip, and bare-wire strapping for 16 line link frames in 4 line choices. When this list occupies the 2nd, 3rd, or 4th position on the relay rack bay, a vertical multiple local cable between terminal strips on adjacent units shall be furnished.
- D. Lists 3, 4, 5, and 6 provide the LC and LLA --- LLD relays and the LLA --- LLD networks for each line choice and for each half choice of line link frames.

J23651C (AT&TCo Std) - Auxiliary Line Choice Preference Relay Unit

Assembly, Equipment, and Local Cable - ED-26974-01

List 1 - Framework, assembly, wiring, and common equipment for one auxiliary line choice preference relay unit for a second terminating marker group of 16 line choices (see notes A and B)

Wire

Line Insulation Test Control Ckt, SD-25947-01:	
First Line Choice Pref, Fig. 2	1
Inter Line Choice Pref, Fig. 3	14
Last Line Choice Pref, Fig. 4	1

5. GENERAL NOTES

5.01 The 115-volt power supply for the line insulation test unit J93017J shall be provided as shown on ED-26973-01, Fig. 1, and preferably shall be obtained from the ac service cabinet for telephone equipment. Connection to the battery-operated emergency ac power plant is not required.

5.02 All local cable wiring shall be No. 24 gauge, type "C" except battery and ground leads which shall be No. 22 gauge, type "C."

5.03 Cross connections on the two "RN" terminal strips located with the cabinet-enclosed relays at the bottom of the frame shall be made in accordance with SD-25947-01, Note 302 for ranges A, B, C,

and D, as determined by the telephone company at the time of installation, using black No. 22 gauge, type "K" wire.

5.04 The teletypewriter equipment may require the use of wave shaping sets per J70013 as provided for on SD-95558-01. Information pertaining to the application of these sets to telegraph loops is contained in BSFs AB84.025, AB84.026, and P30.620.

List of "A&M Only" and "Mfr. Disc." Equipment

5.05 The following equipment has been replaced as indicated:

<u>Equipment</u>	<u>Rating</u>	<u>Covered in Iss</u>	<u>Replacing Equipment</u>
J23651A	Mfr. Disc.	1	J23651B

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