

LINE INSULATION TEST FRAME

EQUIPMENT DESIGN REQUIREMENTS

NO. 5 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 wiring to be used in the engineering, manufacture, and installation of the line insulation test frame for No. 5 crossbar system.

1.02 This specification is reissued:

- (a) To provide connections to the interface and control circuit when the office is arranged for Centralized Status, Alarm and Control System. This is in accordance with SD-25796-01, Issue 25D. J23650B, List 4 is added.
- (b) To arrange the LIT for directory number printout in accordance with SD-25796-01, Issue 25D. J23650AA, List 3; J23650AB, List 1, 2, and 3; and J23650A, List 5 are added.
- (c) To arrange the LIT for the detection and recording of skip resistor locations. This is in accordance with SD-25796-01, Issue 25D and adds J23650AA, List 1 and 2.

CAPACITY

1.03 The line insulation test frame provides facilities for testing subscriber lines and for making traffic count checks in one marker group.

DESCRIPTION

A. General Equipment Description

1.04 This is an 11-foot 6-inch high by 2-foot 2-1/16 inch wide sheet metal frame arranged for 23-inch mounting plates. It is equipped with a fuse panel, control panel, frame terminal strips, and various relay units as shown in Fig. 1. The

frame, local cable, miscellaneous frame circuit, and control panel equipment are included in J23650A. All of the other equipment units to be mounted on the frame are covered by separate J codes and shall be ordered as required in accordance with Table A. The frame local cable contains interunit wiring, battery and ground supply leads, wiring to the control panel, all optional wiring, and wiring between the units and the frame terminal strips. All of the units mounted on this frame are surface-wired and all connections to associated circuits are made through terminal strips at the top of the frame.

B. General Description of Operation (See Fig. 2)

1.05 The control circuit connects the test circuit successively to the subscriber lines, except for lines found busy and certain lines which, when tested, would produce false trouble records or cause interference with service. It causes line insulation resistance faults within a selected range, as indicated by the test circuit, to be recorded and identified as an equipment location or directory number by the trouble recorder or by a teletypewriter at a distant test center. (See 1.38 and 1.39.) Access to subscriber lines for testing is obtained through the line link frames using the line link connector multiple associated with one of the regular markers which is held busy during the testing period but is automatically restored to service if required by traffic. Facilities are provided for automatically starting the circuit by means of a time switch.

Detailed Description of Line Insulation Test Operation

1.06 The line link frame connector multiple used for test is wired from the line link frames to the marker by way of the test control circuit. The multiple of a dial tone marker may be used for this purpose. (See SD-25796-01, Note 302.) Upon the start of a test by local or remote control the marker whose multiple is intercepted is automatically made busy. Approximately 75 leads

A	B	C	MCE
MKR	LLC	X CONN	DMISC
			VG
J23650AA			
LINE CONC TIMER	J23650Z		
CS. TENS & UNIT IDENT	J23650Y		
TRK LK FR MULT CONN	J23650W		
TRAFFIC COUNT CONT	J23650V		
HOR GRP TIMER	J23650T		
N.T. CONN. CONT	J23650N		
MKR MULT CONN	J23650G		
TBL RCDR CONN	J23650S		
LINE FR SEL	J23650R		
VERT & HOR GRP SEL	J23650P		
VERT FILE PROG CONT	J23650M		
VERT FILE PROG	J23650L		
TBL RECORD CONT	J23650J		
MAINT TST CONT	J23650H		
25~,60~FILTER	J93017K		
LINE INS TST	J93017J		
KEY, LP & SW PAN.			
TST CONT	J23650K		
MKR CONT	J23650F		
TIMER	J23650X		
CHANNEL TST	J23650E		
L.L. FR CONT	J23650D		
TST REG	J23650C		
START REG	J23650B		
TRAFFIC COUNT	J23650U		
FUSE PAN.			
FA	LIT (0) ○		

Fig. 1—Line Insulation Test Frame Equipment

in this multiple which are required for testing are cut into the test control circuit for direct control of the line link frames.

1.07 The test control circuit is arranged to generate the equipment locations of line groups (five lines associated with a line link frame LG relay) in succession, and to connect to these groups by means of a multiple of the line link frame start leads and the HG and VGB leads of the frame multiple. When a group is connected, its five verticals are tested for busy and for the pass-by condition imposed on those which would cause interference as described later. An idle line link is selected and the first line to be tested is closed through the link and the no-test vertical to the test control circuit. While the test of this line is being made, the frame is held with the select magnet for the link operated. When the test on the first line is completed, its hold magnet is released and checked down, whereupon the hold magnet for the next line to be tested is operated. The no-test hold magnets on the line link frame and in the no-test connector remain operated between the tests of successive lines. This process continues, until the test has progressed through the group except that the line link frame is released while a record of a line trouble is being made. Also if a false indication of trouble is detected due to an off-hook condition occurring after the frame is seized or due to a plugged up line, the frame is momentarily released to prevent undue interference with service and such appearances of trouble are not recorded.

1.08 The test starts at the first line group (horizontal group 0, vertical group 0) of the first line link frame, and progresses to the corresponding line group of the next frame, etc. On successive cycles through the frames the vertical group count is increased until all lines in horizontal group 0 of all frames have been tested. The other horizontal groups are then tested in a similar manner. Provision is made on an optional basis for taking care of different sizes of line link frames in the same marker group.

1.09 The selection of line groups is rotated throughout the frames as mentioned above in order to prevent undue interference with traffic at any one frame, and to prevent heating of the frame connector relays.

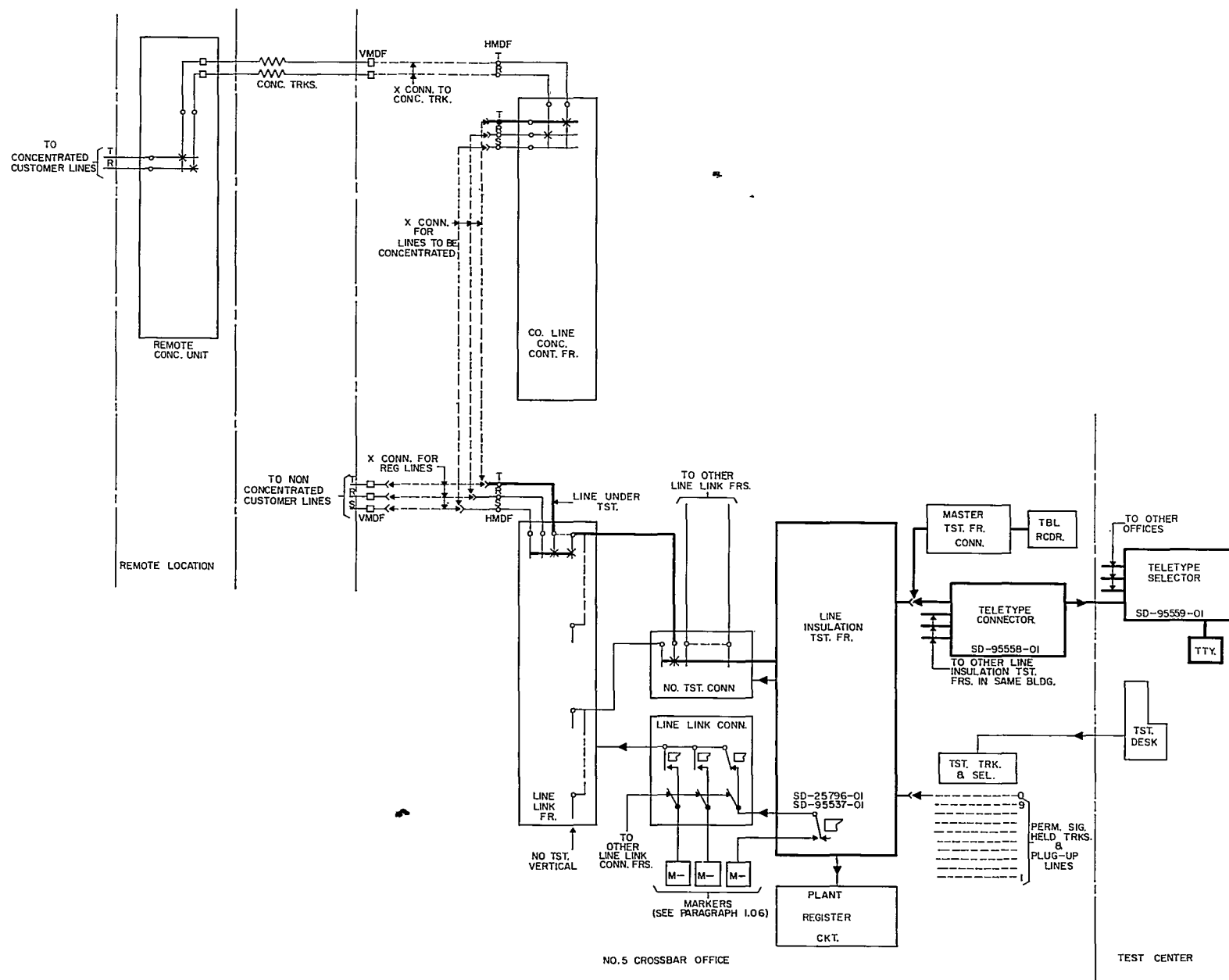


Fig. 2—Line Insulation Test Frame—Traffic Diagram

1.10 If a no-test junctor is found busy, the test will progress to the next frame. It is probable that only a few lines will be passed in this manner as upon reseizure of the frame on successive cycles the no-test call will ordinarily have been released, again making the junctor available. If a line link frame is made busy, it will be skipped.

1.11 The tests will be temporarily suspended and the marker restored to service if an all markers busy condition obtains for a short period.

1.12 The test circuit uses the same level on the no-test connector that is assigned to the master test control circuit. A lockout feature is provided and preference is accorded to the master test control circuit if it should require the use of this level.

1.13 The line link appearances of toll and certain other trunks must not be tested as this procedure would cause interference with service and with the tests. As previously mentioned, dial PBX lines, certain test lines, and blank number trunks are passed by as they would produce false records. The verticals associated with these circuits may be skipped in either of two ways as follows:

(a) For each such vertical, a pigtail resistance is connected between the 2T and RB1 (battery) terminal of the line relay. This does not interfere with marker operation. The test control circuit, however, tests for this battery as a signal to skip the vertical.

(b) Two PBX classes of service are provided for each case, one for manual PBX lines and the other for dial PBX lines. The marker accords the same treatment to these classes. The test control circuit, however, has access to the dial PBX class lead and skips the associated lines. Toll trunk terminations and all other verticals which are not to be tested are associated with the dial PBX class so that they may also be passed by.

1.14 Either or both of the above means may be provided. The first may be preferable in offices having only a few verticals which must be skipped, and the second in offices which have a large number of such verticals. It will be noted that the second arrangement requires the assignment of toll trunks, etc, to certain vertical files, which

is not efficient except for fairly large groups. However, the number of verticals so treated can be increased by the inclusion of information, intercept, and other trunk circuits which do not produce false trouble indications. Such circuits may be tested or skipped, as desired. The equipment location or the associated directory number of a line equipped with a skip resistor is recorded by the trouble recorder or by a teletypewriter at a distant or local test center.

1.15 Local control by means of keys is provided in all cases. One of nine keys is used to start the circuit in accordance with the desired combination of range and type of test. Remote control can be provided on an optional basis by means of the test trunk and selector circuit used to connect to permanent signal holding and plugging up lines. The 0 level on the selectors is used for LIT purposes. Terminals 1 to 9 of this level are used to start the test. Terminal 0 provides access to the control circuit for monitoring purposes and for restoring the LIT frame to normal. While monitoring, tone signals indicate whether the test is in progress or if it has stopped due to trouble. The tone signal connected to terminal 0 is also connected to the particular start terminal 1 to 9 used, to indicate that the circuit has responded to the start signal, and so that the type of test called for can be verified by dialing the terminal again. After one of these terminals has been dialed for the above purposes, the selector may be restored and used for its regular functions without affecting the status of the LIT circuit.

1.16 Lamps are provided for indicating circuit off-normal, type of test and range, temporary suspension of test, and trouble in the test circuit or frame circuits which would cause the test to stop. Such a trouble condition will also actuate the minor alarm which will be extended to a distant maintenance center when the alarms are transferred. An off-normal lamp at the MTF indicates to the maintenance force that no tests or maintenance work should be performed on the marker removed from service by the line insulation test frame, and that no test calls should be made which would unduly hold the no-test connector to the exclusion of this circuit. Four plant registers are provided to count the number of completed test cycles made under various test conditions.

1.17 One LIT frame is provided for each marker group. This will permit the lines associated

with two or more marker groups in one building to be tested at the same time. Each test frame is capable of testing approximately 12,000 lines per hour.

C. General Description of Traffic Count Operation

1.18 The line insulation test control circuit is arranged to make five types of traffic count. These are line link office count, frame count, and horizontal group count; and trunk link frame count and horizontal group count. In each case, the links are tested for a busy condition and the number found busy is recorded on traffic registers for engineering purposes.

1.19 Office count covers all of the line link frames in the marker group. The frame counts are made on ten line link frames or five trunk link frames at a time, and the horizontal group counts on one line link or trunk link frame.

1.20 Some of the circuit features used for line insulation testing, such as the means provided for obtaining access to line link frames and for testing links for a busy condition, are also used for traffic count. Other features, such as those involved directly in the testing of lines and in recording line insulation defects, are not required.

1.21 Control relays are provided which rearrange certain internal connections in the circuit, as required for the various types of traffic count. Manually operated switches are also provided for selecting the frames to be tested for the frame and horizontal group counts. The circuit is prepared for traffic count operation by setting these switches, if required, and by the operation of one of five keys at the test frame, corresponding to the type of count to be made. This causes the required control relays to operate.

1.22 The counting process may thereafter be started and stopped under control of a key at the traffic register rack. The results of the count are recorded by ten traffic registers as described in the following paragraphs. An additional register is used to record the number of completed test cycles. The time allowed for a cycle is 3 minutes, regardless of the number of frames involved. Ordinarily, several cycles will be made in one run. After completion of a run, the circuit is restored by means of the RN key at the frame.

1.23 Office count provides information which may be of use in the engineering of additions. The frame and horizontal group counts may be used for obtaining data for loading the line link and trunk link frames and the horizontal groups thereof.

Detailed Description of Traffic Count Operation

Line Link Office Count

1.24 For this type of count, the line insulation test control circuit connects to the sleeve leads of the ten line links associated with horizontal group 0 of the first line link frame, this connection being established through the line link frame connector multiple of the associated marker as for line insulation testing. These links are tested for a busy condition. The ten registers referred to above are in this case directly associated with the link-busy test relays and correspond to link positions 0 to 9 in the horizontal group. Registers associated with links found busy are operated simultaneously upon operation of the busy test relays.

1.25 The circuit then proceeds to horizontal group 0 of the second line link frame, tests the links, and causes registers corresponding to busy links to score as above. This process continues until horizontal group 0 of the last frame has been tested. On each frame seizure, the ten registers are operated in accordance with the busy conditions encountered.

1.26 In order to obtain the overall cycle time of 3 minutes for all horizontal groups of all frames, which is desirable as it approximates the holding time of a conversation, an 18-second timer is provided to mark the start times for successive horizontal groups. Ordinarily, considerably less than 18 seconds will be required to test through one horizontal group of all frames. During any remaining time, the associated marker is restored to service and the frame awaits the start signal for the next horizontal group.

1.27 The links of horizontal group 1 of all frames are tested as described above for those of horizontal group 0, and the remaining horizontal groups are tested in a similar manner, the test of each group being started 18 seconds after the start of the previous group. If, due to unusual conditions, more than 18 seconds should be required for one

horizontal group, the next one is started immediately and the total cycle time is increased accordingly.

1.28 Upon the completion of a cycle, the cycle register is operated. Additional cycles are made as long as the start key at the traffic register rack is left operated. Upon the release of this key, a cycle in progress will complete but no further operations take place.

1.29 The total link busies for the marker group are obtained by adding the scores on the ten registers. The CCSs for the marker group can be determined from this figure in conjunction with the number of cycles made.

Line Link Frame Count

1.30 This count is made on a group of ten (or less) line link frames, the frames to be tested being selected by a manually operated switch. The links of horizontal groups 0 to 9 of the ten frames are tested as described for line link office count, successive horizontal groups through these frames being started at 18-second intervals.

1.31 The ten registers in this case, however, are associated, respectively, with the frames under test (0 to 9, 10 to 19, etc). In testing each horizontal group of a frame, the register associated with that frame is scored a number of times equal to the number of links found busy. The registers therefore record the total number of busy links on a per frame basis. Additional cycles are controlled as described for line link office count.

Line Link Horizontal Group Count

1.32 In this case, only one line link frame is tested at a time, the selection of this frame being controlled by manually operated switches. The ten registers are associated, respectively, with the ten horizontal groups of the frame and record the total link-busy conditions per horizontal group. These groups are tested at 18-second intervals. Additional cycles are controlled as previously described.

Trunk Link Frame Count

1.33 This is similar to line link frame count. Only five frames are tested at a time, however, as there are twice as many links per frame. Both the left and right links of each

horizontal group are tested before the circuit proceeds to the next frame.

1.34 Registers 0 to 4 are associated, respectively, with frames 0 to 4 or 10 to 14, and registers 5 to 9 with frames 5 to 9 or 15 to 19.

1.35 Access to the trunk link frames is obtained by means of the trunk link frame connector multiple for the marker associated with the line insulation test control circuit.

Trunk Link Horizontal Group Count

1.36 This count is similar to line link horizontal group count. The left and right links of each horizontal group, however, are tested before the circuit proceeds to the next group.

Registration Test

1.37 A registration test feature is provided to check that the circuit functions properly in recognizing and counting busy links, and to assist in clearing trouble. The link-busy conditions are simulated by means of keys, and the results of the tests are recorded by a register at the test frame.

D. Teletypewriter Equipment

1.38 When a teletypewriter is used for recording troubles the following relay rack mounted equipment will be required in the local office: If two or more LIT frames are located in the same building provide equipment units per J93017C, control circuit preference unit; J93017D, distributor control unit; and J93017E distributor. If only one LIT frame is located in the building the J93017C unit will not be required since preference facilities will not be needed, and the J93017D unit can be arranged for connection to the LIT frame.

1.39 The following relay rack mounted equipment will be required in the test center: J93017H delay circuit unit, and J93017G preference circuit unit. A 28D40 teletypewriter cabinet and associated 28-type equipment will also be required. A typical relay rack layout of the above units is shown on ED-92576-().

E. Relay Rack Mounted Equipment

- (a) LIT-Directory Number Printout Unit.
Six-plate—2-inch mounting plates (J23650AB).

1.40 The following units of equipment associated with the line insulation test circuit are mounted on 23-inch miscellaneous relay racks.

SUBDIVISIONS OF EQUIPMENT AND DETAILED INDEX

WE J and ED drawings listed should be ordered by referring to the prefix and base number and requesting the highest suffix dash (-) number.

EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CIRCUIT DRAWING
J23650A	AT&TC Std	Line Insulation Test Frame	J23650A-()	SD-25796-01
J23650B	AT&TC Std	Start Register Unit	J23650B-()	SD-25796-01, Fig. 1, 23
J23650C	AT&TC Std	Test Register Unit	J23650C-()	SD-25796-01, Fig. 2
J23650D	AT&TC Std	Line Link Frame Controller Unit	J23650D-()	SD-25796-01, Fig. 3
J23650E	AT&TC Std	Channel Test Unit	J23650E-()	SD-25796-01, Fig. 3
J23650F	AT&TC Std	Marker Controller Unit	J23650F-()	SD-25796-01, Fig. 4
J23650G	AT&TC Std	Marker Multiple Connector Unit	J23650G-()	SD-25796-01, Fig. 5
J23650H	AT&TC Std	Maintenance Test Controller Unit.	J23650H-()	SD-25796-01, Fig. 6
J23650J	AT&TC Std	Trouble Record Controller Unit	J23650J-()	SD-25796-01, Fig. 7
J23650K	AT&TC Std	Test Controller Unit	J23650K-()	SD-25796-01, Fig. 8
J23650L	AT&TC Std	Vertical File Progress Unit	J23650L-()	SD-25796-01, Fig. 9
J23650M	AT&TC Std	Vertical File Progress Controller Unit	J23650M-()	SD-25796-01, Fig. 9
J23650N	AT&TC Std	No-test Connector Controller Unit	J23650N-()	SD-25796-01 Fig. 10 and D
J23650P	AT&TC Std	Vertical and Horizontal Group Selection Unit	J23650P-()	SD-25796-01, Fig. 11
J23650R	AT&TC Std	Line Frame Selection Unit	J23650R-()	SD-25796-01, Fig. 11

EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CIRCUIT DRAWING
J23650S	AT&TCo Std	Trouble Recorder Connector Unit	J23650S-()	SD-25796-01, Fig. 12 and 19
J23650T	AT&TCo Std	Horizontal Group Timer Unit	J23650T-()	SD-25796-01, Fig. 14
J23650U	AT&TCo Std	Traffic Count Register Unit	J23650U-()	SD-25796-01, Fig. 15
J23650V	AT&TCo Std	Traffic Count Controller Unit	J23650V-()	SD-25796-01, Fig. 16
J23650W	AT&TCo Std	Trunk Link Frame Multiple Connector Unit	J23650W-()	SD-25796-01, Fig. 17
J23650X	AT&TCo Std	Timer Unit	J23650X-()	SD-25796-01, Fig. 20
J23650Y	AT&TCo Std	Class-of-Service Tens & Units Ident Unit	J23650Y-()	SD-25796-01, Fig. 5
J23650Z	AT&TCo Std	Line Concentrator Timer Unit	J23650Z-()	SD-25796-01, Fig. 8
J23650AA	AT&TCo Std	Supl Mtce Tst Unit	J23650AA-()	SD-25796-01, Fig. 22, 25
J23650AB	AT&TCo Std	LIT-Dir No. Printout Unit	J23650AB-()	SD-25796-01, Fig. 24, 26, 27, 28
J93017J	AT&TCo Std	Line Ins Tst Unit	J93017J-()	SD-95537-01, Fig. 1
J93017K	AT&TCo Std	25-Cycle, 60-Cycle Filter Unit	J93017K-()	SD-95537-01, Fig. 2 SD-25793-01, Fig. 1

Circuit Schematic Index

CIRCUIT DRAWING	J23650 EQPT CODE
SD-25793-01	J93017K
SD-25796-01	J23650A thru Z
SD-95537-01	J93017J, K

2. SUPPLEMENTARY INFORMATION

819-000-000—No. 5 Crossbar System Index
800-600-000—List of General Equipment Requirements
Sections
J20155—819-022-150—Conductor Lengths Between
Frames and Units
J29259—819-005-150—General Outline—No. 5 Crossbar
System
J93017—801-205-152—Relay Rack Mounted Test
Equipment—Common Systems
Floor Plan Data—Section 11.1, Sheet 2

3. DRAWINGS

For additional drawings forming a part of this specification, see listings under Subdivisions of Equipment and Detailed Index.

Keysheet

SD-25760-01—No. 5 Crossbar System

Circuits

SD-25574-01—Miscellaneous Circuit for All Frames

SD-25793-01—Plant Register Circuit

SD-95537-01—Line Insulation Test Circuit

SD-95558-01—Teletypewriter Connector Circuit

SD-95559-01—Teletypewriter Selection Circuit

Framework

ED-26524-01—Sheet Metal Frame—Single Bay

ED-26560-01—Molded Frame Cover

ED-26564-01—Rear Covers and Stiles

ED-26565-01—Horizontal Baffles—Rear

ED-26566-01—Horizontal Baffles—Front

Equipment

ED-25889-01—Fuse Alarm Lamps and Test Posts

ED-26528-01—Appliance Outlets

ED-26892-01—Jack, Key, and Lamp Mounting Assembly

ED-26920-01—Fuse Panel Connections

ED-26981-01—Fuse Panel Assembly

ED-92538-01—Line Insulation Test Relay Rack Units (for Test Center)

ED-92576-01—Line Insulation Test Relay Rack and Teletypewriter Table Equipment

ED-92579-01—Line Insulation Test Relay Rack Units (for Local Office)

ED-94823-()—Component Assembly

Wiring and Cabling

ED-26548-10—Switchboard Cabling Details

ED-81404-01—Lighting Equipment and Commercial 110-125V, 60-cycle Ceiling Outlet

4. EQUIPMENT**J23650A—AT&T Co Std—Line Insulation Test Frame**

Equipment and Local Cable—J23650A-()

List 1—Framework, assembly, common equipment, and local cable for one line insulation test frame. (See Notes D and 5.07.)

	WIRE	EQUIP	NOTES
Local Cable	1	1	B,5.02
Misc Ckt, SD-25574-01:			
48V Fuse Ckt, Fig. 3	1	1	
48V Fuse Alm Ckt, Fig. 4	1	1	
Grd Fdr Ckt, Fig. 10	1	1	
48V Fr Tst Bat. Ckt, Fig. 13	1	1	
130V Fr Tst Bat. Ckt, Fig. 15	1	1	
Spare Jk Ckt, Fig. 16	1	1	
Fr Line Tel Jk Ckt, Fig. 17	1	1	
Remote Cont Jk Ckt, Fig. 19	1	1	
Line Ins Tst Cont Ckt, SD-25796-01:	1	1	C
Line Ins Test Ckt, SD-95537-01:			
Fig. 1	1	1	5.05
25-Cycle, 60-Cycle Filter Ckt, SD-95537-01:			
Fig. 2	1	1	
Plant Reg Ckt, SD-25793-01:			
Fig. 1	4	0	G

List 2—Key, lamp, and switch equipment, and resistors LB0 to LB9 per SD-25796-01, Fig. 16, and lamp equipment per SD-25796-01, Fig. 3 and 11, ZD option, required in addition to list 1 when traffic count feature is specified.

List 3—A&M Only—Wiring required in addition to list 1 when the LIT frame is to function in a marker group with any line link frames arranged for:

(a) 30 classes of service on a 1-out-of-30 basis, or

(b) 20 classes of service and 20 rate treatments. (See Notes E and F and 5.09 and 5.10.)

	WIRE	EQUIP	NOTES
LIT Cont Ckt, SD-25796-01: Fig. 5, 9, & F			
XC Opt Only	1	0	
Fig. 5 ZM & ZO Opt Only	1	0	

List 4—A&M Only—Wiring required in addition to list 1 when the LIT frame is to function in a marker group with any line link frames arranged for 60 classes of service on a 1-out-of-30 basis. (See Notes E and F and 5.09 and 5.10.)

	WIRE	EQUIP	NOTES
LIT Cont Ckt, SD-25796-01: Fig. 5, 9, & F			
XC Opt Only	1	0	
Fig. 5 ZP Opt Only	1	0	

List 5—Local cable required in addition to list 1 when directory number printout is specified per SD-25796-01, Fig. 25.

Notes

A. In addition there are options involving wiring only as follows.

1. Wiring options as specified in Note 102 of SD-25796-01.
2. A&M Only—XB wiring of SD-25796-01, Fig. 5 and 9, and ZM, ZO wiring of Fig. 5 are required when a LIT frame is modified to function in a marker group with any line link frame arranged for 30 classes of service on a 1-out-of-30 basis, or 20 classes of service and 20 rate treatments. (See Note E and 5.09 and 5.10.)
3. A&M Only—XB wiring of SD-25796-01, Fig. 5 and 9 and ZP wiring of Fig. 5 are required when a LIT frame is modified to function in a marker group with any line link frame arranged for 60 classes of service on a 1-out-of-30 basis. (See Note E and 5.09 and 5.10.)

4. A&M Only—The following wiring options shall be specified in accordance with note 109 of SD-25796-01; A, B, D, H, J, K, M, N, P, Q, R and S.

B. The local cable for this frame shall contain the following wiring.

1. Interunit wiring, battery, and ground supply leads, wiring to the key, lamp, and switch panel, wiring looped at unequipped apparatus positions, and wiring between the units and the frame terminal strips for all units listed in Table A, including list 1 of this J code.

C. All nonoptional lamps, key, and rotary switches of Fig. 1 to 4 and 6 to 10 and the 145-type resistors associated with the rotary switches LR, LT, and CAL of Fig. 6, and key and lamp of Fig. 22 of SD-25796-01, are included in list 1.

D. All units to be mounted on this frame shall be provided as required in accordance with Table A.

E. A&M Only—List 3 and list 4 are to be applied only to LIT frames equipped with SD-25796-01, Fig. F. Notes A.2 and A.3 are to be applied only to LIT frames equipped with SD-25796-01, Fig. E.

F. A&M Only—The wiring in lists 3 and 4 may be sewn into the frame local cable, when required.

G. Plant registers are furnished per J93017K-(), List 2.

J23650B—AT&T Co Std—Start Register Unit

Equipment—J23650B-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 1, less options, for one start register unit.

List 2—Equipment per SD-25796-01, Fig. 1, Z option, required in addition to list 1 when remote control is specified.

List 3—Equipment and wiring per SD-25796-01, Fig. 1, ZD option, required in addition to list 1 when traffic count feature is specified.

List 4—Equipment and wiring per SD-25796-01,

Fig. 23 required in addition to list 1 when interface and control circuit for Centralized Status, Alarm and Control System (CSACS) is specified.

J23650C—AT&TCo Std—Test Register Unit

Equipment—J23650C-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 2, for one test register unit.

J23650D—AT&TCo Std—Line Link Frame Controller Unit

Equipment—J23650D-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 3, less options, for one line link frame controller unit.

List 2—Equipment per SD-25796-01, Fig. 3, W option, required in addition to list 1 when the number of vertical groups is not uniform for all line link frames.

List 3—Equipment and wiring per SD-25796-01, Fig. 3, ZD option, required in addition to list 1 when traffic count feature is specified.

J23650E—AT&TCo Std—Channel Test Unit

Equipment—J23650E-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 3, for one channel test unit.

List 2—Equipment and wiring per SD-25796-01, Fig. 3, ZD option, required in addition to list 1 when traffic count feature is specified.

J23650F—AT&TCo Std—Marker Controller Unit

Equipment—J23650F-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 4 for one marker controller unit.

List 2—Equipment and wiring per SD-25796-01, Fig. 4, ZD option, required in addition to list 1 when traffic count feature is specified.

J23650G—AT&TCo Std—Marker Multiple Connector Unit

Equipment—J23650G-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 5 for one marker multiple connector unit.

List 2—Equipment and wiring per SD-25796-01, Fig. 5, ZD option, required in addition to list 1 when traffic count feature is specified.

J23650H—AT&TCo Std—Maintenance Test Controller Unit

Equipment—J23650H-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 6 for one maintenance test controller unit.

J23650J—AT&TCo Std—Trouble Record Controller Unit

Equipment—J23650J-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 7 for one trouble record controller unit.

List 2—A&M Only—Wiring and apparatus per SD-25796-01, part of XC option (EG resistor only) required in addition to list 1 when a LIT frame equipped with Fig. F is to function in a marker group with any line link frame arranged for 30 or 60 classes of service or 20 classes of service and 20 rate treatments. (See 5.09 and 5.10.)

List 3—A&M Only—Apparatus per SD-25796-01, part of XB option (EG resistor LP and EG3 relay only) required in addition to list 1 when LIT frame equipped with Fig. E is to function in a marker group with any line link frame arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments. (See 5.09 and 5.10.)

J23650K—AT&TCo Std—Test Controller Unit

Equipment—J23650K-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 8, less options, for one test controller unit.

List 2—Equipment per SD-25796-01, Fig. 8, ZA option, required in addition to list 1 when any lines are arranged for message register operation.

List 3—Equipment and wiring per SD-25796-01, Fig. 8, ZD option, required in addition to list 1 when traffic counter feature is specified.

J23650L—AT&TCo Std—Vertical File Progress Unit

Equipment—J23650L-()

List 2—Equipment and wiring per SD-25796-01, Fig. 9, ZD option, required in addition to list 1 or 3 when traffic count feature is specified.

List 3—Assembly, wiring, and equipment per SD-25796-01, Fig. 9 and F for one vertical file progress unit.

J23650M—AT&TCo Std—Vertical File Progress Controller Unit

Equipment—J23650M-()

List 2—Equipment per SD-25796-01, Fig. 9, U option, required in addition to list 1 or 4 when line link verticals which are to be passed by are identified by resistance battery connected to the V lead at the line relay.

List 4—Assembly, wiring, and equipment per SD-25796-01, Fig. 9 and F, less options, for one vertical file progress unit.

List 7—A&M Only—Apparatus per SD-25796-01, part of XC option (LBT 1 to LBT 4 diodes only), required in addition to list 4 when the LIT frame is to function in a marker group with any line link frame arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments. (See 5.09 and 5.10.)

List 8—A&M Only—Apparatus per SD-25796-01 part of XB option (V0 to V4 resistors only) required in addition to lists 1 and 3 when the LIT frame is to function in a marker group with any line link frames arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments. (See 5.09 and 5.10 and Note A.)

Note

A. When this unit is modified for the addition of list 8, list 3 is also required.

J23650N—AT&TCo Std—No-test Connector Controller Unit

Equipment—J23650N-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 10 and D for one no-test connector controller unit.

J23650P—AT&TCo Std—Vertical and Horizontal Group Selection Unit

Equipment—J23650P-()

List 2—Equipment per SD-25796-01, Fig. 11, X option, required in addition to list 1 or 7 when line insulation trouble records are teletyped to a distant test center.

List 3—A&M Only—Equipment per SD-25796-01, Fig. 11, D option, required in addition to list 1 when the maximum number of vertical groups in any line link frame is 8, 10, or 12.

List 4—A&M Only—Equipment per SD-25796-01, Fig. 11, B option, required in addition to list 1 when the maximum number of vertical groups in any line link frame is 10 or 12.

List 5—A&M Only—Equipment per SD-25796-01, Fig. 11, A option, required in addition to list 1 when the maximum number of vertical groups in any line link frame is 12.

List 6—Equipment and wiring per SD-25796-01, Fig. 11, ZD option, required in addition to list 1 or 7 when traffic count feature is specified.

List 7—Assembly, wiring, and equipment per SD-25796-01, Fig. 11, less X and ZD options, for one vertical and horizontal group selection unit.

J23650R—AT&TCo Std—Line Frame Selection Unit

Equipment—J23650R-()

List 2—A&M Only—Equipment per SD-25796-01, Fig. 11, S option, required in addition to list 1 when the number of line link frames with which this circuit operates is 5 to 60.

List 3—A&M Only—Equipment per SD-25796-01, Fig. 11, R option, required in addition to list 1 when the number of line link frames with which this circuit operates is 6 to 60.

List 4—A&M Only—Equipment per SD-25796-01, Fig. 11, Q option, required in addition to list 1 when the number of line link frames with which this circuit operates is 7 to 60.

List 5—A&M Only—Equipment per SD-25796-01, Fig. 11, P option, required in addition to list 1 when the number of line link frames with which this circuit operates is 8 to 60.

List 6—A&M Only—Equipment per SD-25796-01, Fig. 11, N option, required in addition to list 1 when the number of line link frames with which this circuit operates is 9 to 60.

List 7—A&M Only—Equipment per SD-25796-01, Fig. 11, M option, required in addition to list 1 when the number of line link frames with which this circuit operates is 10 to 60.

List 8—A&M Only—Equipment per SD-25796-01, Fig. 11, K and ZD options, less FTO relay and network, required in addition to list 1 when the number of line link frames with which this circuit operates is 11 to 60.

List 9—A&M Only—Equipment per SD-25796-01, Fig. 11, J option, required in addition to list 1 when the number of line link frames with which this circuit operates is 21 to 60.

List 10—A&M Only—Equipment per SD-25796-01, Fig. 11, H option, required in addition to list 1 when the number of line link frames with which this circuit operates is 31 to 60.

List 11—Equipment per SD-25796-01, Fig. 11, F and G options, required in addition to list 1 or 16 when the number of line link frames with which this circuit operates is 41 to 60.

List 14—Equipment and wiring per SD-25796-01, Fig. 11, ZD option less FTO relay, and network, required in addition to list 1 or 16 when the traffic count feature is specified.

List 15—A&M Only—Equipment and wiring per SD-25796-01, Fig. 11, K and ZD options, FTO relay and network only, required in addition to list 1 when the number of line link frames with which this circuit operates is 11 to 60 and/or when the traffic count feature is specified.

List 16—Assembly, wiring, and equipment per

SD-25796-01, Fig. 11, less F, G, and ZD options, for one line frame selection unit.

Notes

A. Reserved.

B. On additions to jobs manufactured in accordance with SD-25796-01, Issue 9D or earlier where the number of trunk link frames exceeds the number of line link frames, specify lists 2, 3, 4, 5, 6, 7, 8, and 9 on the basis of trunk link frames instead of the number of line link frames as shown in the above lists.

J23650S—AT&T Co Std—Trouble Recorder Connector Unit

Equipment—J23650S()

List 2—A&M Only—Equipment and wiring per SD-25796-01, Fig. 19 required in addition to list 4 when the marker group is arranged for 31 through 60 classes of service.

List 3—Equipment and wiring per SD-25796-01, Fig. 12 required in addition to list 4 when trouble records are to be recorded on master test frame trouble recorder.

List 4—Assembly, wiring, and equipment per SD-25796-01, Fig. 12, less optional wiring and equipment for one trouble recorder connector unit.

J23650T—AT&T Co Std—Horizontal Group Timer Unit

Equipment—J23650T()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 14 for one horizontal group timer unit when traffic count feature is specified.

J23650U—AT&T Co Std—Traffic Count Register Unit

Equipment—J23650U()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 15 for one traffic count register unit when traffic count feature is specified.

J23650V—AT&TCo Std—Traffic Count Controller Unit

Equipment—J23650V-()

List 2—A&M Only—Equipment and wiring per SD-25796-01, Fig. 16, ZF option, required in addition to list 1 when the number of trunk link frames with which this circuit operates (for traffic count feature) is 11 to 20.

List 3—Assembly, wiring, and equipment per SD-25796-01, Fig. 16 for one traffic count controller unit when traffic count feature is specified.

J23650W—AT&TCo Std—Trunk Link Frame Multiple Connector Unit

Equipment—J23650W-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 17 for one trunk link frame multiple connector unit when traffic count feature is specified.

J23650X—AT&TCo Std—Timer Unit

Equipment—J23650X-()

List 1—Assembly, wiring, and equipment per SD-25796-01, part of Fig. 20 (timer only) for one timer unit.

J23650Y—AT&TCo Std—Class-of-Service Tens and Units Identification Unit

Equipment—J23650Y-()

List 2—Assembly, wiring, and equipment per SD-25796-01, Fig. 5, YQ and XI options only, for one class-of-service tens and units identification unit.

J23650Z—AT&TCo Std—Line Concentrator Timer Unit

Equipment—J23650Z-()

List 1—Assembly, wiring, and equipment per SD-25796-01, Fig. 8, YV option only, for one line concentrator timer unit.

Note

A. In addition, there are options involving wiring only as follows.

1. When YV option per SD-25796-01 is used, ZJ option must also be provided.

J23650AA—AT&TCo Std—Supplementary Maintenance Test Unit

Equipment—J23650AA-()

List 1—Assembly, wiring, and equipment for one supplementary maintenance test unit required when any of the following lists are provided.

List 2—Wiring and equipment per SD-25796-01, Fig. 22 less key and lamp required in addition to list 1 when skip resistors recording feature is specified.

List 3—Wiring and equipment per SD-25796-01, Fig. 25 when directory number printout feature is specified.

J23650AB—AT&TCo Std—Line Insulation Test Directory Number Printout Unit

Equipment—J23650AB-()

List 1—Assembly, wiring, and equipment for one line insulation test directory number printout unit per SD-25796-01, Fig. 24 and one timer per SD-94820-01, Fig. 2.

List 2—Equipment and wiring per SD-25796-01, Fig. 28 required in addition to list 1 when office is arranged for LAMA-ANI or ANI only operations.

List 3—Equipment and wiring per SD-25796-01, Fig. 26 and 27 required in addition to list 1 when office is arranged for LAMA only operation.

Notes

A. In addition there are options involving wiring only as specified in Note 102 of SD-25796-01.

B. This six-plate unit is mounted on the miscellaneous relay rack frame.

5. GENERAL NOTES**Wiring**

5.01 All J-coded relay units covered by this specification shall be surface-wired.

5.02 For the gauge and insulation of wire to be used in the manufacture of the frame and units herein, see ED-27042-01.

5.03 The following cross connections shall be made by the installation force in accordance with information furnished by the telephone company at the time of installation.

(a) On terminal strip "X CONN" cross connections shall be provided in accordance with:

(1) SD-25796-01, Note 304 to connect RN punchings in accordance with the limits assigned for the A, B, C, and D ranges respectively.

(2) A&M Only—SD-25796-01, Note 305 to connect SKP to CS punchings corresponding to the class or classes of service that identify line link verticals to be passed.

(3) SD-25796-01, Note 306 to connect CP punchings for line link selection preference corresponding to marker channel preference.

(4) SD-25796-01, Note 307 to connect FU to FT punchings for line link frame test progress.

(5) SD-25796-01, Note 307.1 to connect FU to TFT punchings for trunk link frame test progress when traffic count feature is specified.

(6) SD-25796-01, Note 310 to connect SKT and one D0-D5 punchings to CS punchings when line link verticals to be passed are identified by class of service and the marker group is arranged for 100 classes of service and 20 rate treatments. Related information for the SKU and two D0-D5 punchings is covered in Note 2 (a).

(7) A&M Only—SD-25796-01, Note 312 to connect SKP to CS punchings when line link verticals to be passed by are identified

by class of service and the marker group is arranged for 20 classes of service and 20 rate treatments.

(b) On unit A terminal strip, cross connections shall be provided in accordance with:

(1) SD-25796-01, Note 310 to connect SKU to two D0-D5 punchings when line link verticals to be passed are identified by class of service and the marker group is arranged for 100 classes of service and 20 rate treatments.

Cabling

5.04 The codes of the switchboard cables and loose wires ordinarily used in cabling to this frame are shown on ED-26548-10.

5.05 The 115-volt power supply cable per Fig. 53 and Note 201, SD-95537-01 shall be provided as shown in Fig. F, J23650A-(). It shall be connected per ED-81404-01 to 115-volt, 60-cycle power supply which is fused separately from lighting or convenience outlets. The cable length shall be engineered on a job basis.

5.06 Conductor length of the line link connector multiple cable from the marker frame through the line insulation test frame and to the line link connector frame shall not exceed the limits stipulated in J20155, Fig. 1D.

5.07 When a line insulation test frame is added to an existing office not arranged for centralized fusing, the RT lamp per SD-25796-01, Fig. 13 and all miscellaneous fused other than TBS shall be located on the PRTD frames.

Equipment

5.08 All designation strips for the key, lamp, and switch panel shall be furnished completely designated.

5.09 A&M Only—Subsequent to Issue 18D of SD-25796-01, when an LIT frame is to function in a marker group with any line link frames arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments, T, ZM, ZO, ZP, and XB or XC options are required as indicated in the various lists and notes of this specification. These options

are also required when an LIT frame is to function in the above marker groups when any line link frame is also arranged for class of service on a hold magnet basis within a vertical file.

5.10 A&M Only—When a LIT frame previously arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments is to be modified for class of service on a hold magnet basis within a vertical file, options in accordance with 5.09 must be provided and the following options must be removed.

- (a) LIT frames equipped with SD-25796-01, Fig. E—YW option of Fig. E, YX option of Fig. 5, 9 and E, YP option of Fig. 5 and 9.
- (b) LIT frames equipped with SD-25796-01, Fig. F—YR, YX option of Fig. 5, 9 and F, YP option of Fig. 5 and 9.

List of A&M Only and Mfr Disc. Equipment

The following equipment has been replaced as indicated. Where A&M Only items appear, the issue numbers shown are those of the issue in which the rating was first applied.

EQUIPMENT	RATING	DETAILS	
		LAST SHOWN IN ISSUE	REPLACING EQUIPMENT
J23650L,L1	Mfr Disc.	2	J23650L,L3
J23650M,L1	Mfr Disc.	2	J23650M,L4
L3	Mfr Disc.	2	—
L5	Mfr Disc.	2	J23650M,L7
L6	Mfr Disc.	2	—
J23650P,L1	Mfr Disc.	1	J23650P,L7
L3 thru L5	A&M Only	2	—
J23650R,L1	Mfr Disc.	1	J23650R,L16
L2 thru L10	A&M Only	2	—
L12	Mfr Disc.	1	J23650R,L11
L13	Mfr Disc.	1	—
L15	A&M Only	2	—
J23650S,L1	Mfr Disc.	2	J23650S,L4
L2	A&M Only	2	—
J23650V,L1	Mfr Disc.	1	J23650V,L3
L2	A&M Only	2	—
J23650Y,L1	Mfr Disc.	3	J23650Y,L2

TABLE A
LIT FRAME J23650A

UNITS SHALL BE EQUIPPED AND CONNECTED IN THE POSITIONS SPECIFIED IN THIS TABLE.					
UNIT			QUANTITY TO BE PROVIDED		DESCRIPTION OF FEATURE OR OPTION
POS NO.	J CODE	LIST NO.	ALWAYS	FOR OPTION INDICATED	
4	J23650B	L1	1		Start register unit
		L2		1	When remote control is specified
		L3		1	When traffic count feature is specified
		L4		1	When interface and control circuit for Centralized Status, Alarm and Control System (CSACS) is specified
7	J23650C	L1	1		Test Register unit
10	J23650D	L1	1		Line link frame controller unit
		L2		1	When the number of vertical groups is not uniform for all line link frames
		L3		1	When traffic count feature is specified
13	J23650E	L1	1		Channel test unit
		L2		1	When traffic count feature is specified
18	J23650F	L1	1		Marker controller unit
		L2		1	When traffic count feature is specified
49	J23650G	L1	1		Marker multiple connector unit
		L2		1	When traffic count feature is specified
34	J23650H	L1	1		Maintenance test controller unit
35	J23650J	L1	1		Trouble record controller unit
		L2		1	(A&M Only) When line link frame is arranged for 30 or 60 classes of service or 20 classes of service and 20 rate treatments
		L3		1	(A&M Only) When line link frame is arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments
20	J23650K	L1	1		Test controller unit
		L2		1	When any lines are arranged for message register operation
		L3		1	When traffic count feature is specified
36	J23650L	L2		1	When traffic count feature is specified
		L3	1		Vertical file progress unit

TABLE A
LIT FRAME J23650A (Cont)

UNITS SHALL BE EQUIPPED AND CONNECTED IN THE POSITIONS SPECIFIED IN THIS TABLE.					
UNIT			QUANTITY TO BE PROVIDED		DESCRIPTION OF FEATURE OR OPTION
POS NO.	J CODE	LIST NO.	ALWAYS	FOR OPTION INDICATED	
38	J23650M	L2		1	When line link verticals which are to be passed by are identified by resistance battery connected to the V lead at the line relay
		L4	1		Vertical file progress controller unit
		L7		1	(A&M Only) When line link frame is arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments
		L8		1	(A&M Only) When line link frame is arranged for 30 or 60 classes of service on a 1-out-of-30 basis or 20 classes of service and 20 rate treatments
51	J23650N	L1	1		No-test connector controller unit
42	J23650P	L2		1	When line insulation trouble records are teletyped to a distant test center
		L3		1	(A&M Only) When the maximum number of vertical groups in any line link frame is 8, 10, or 12
		L4		1	(A&M Only) When the maximum number of vertical groups in any line link frame is 10 or 12
		L5		1	(A&M Only) When the maximum number of vertical groups in any line link frame is 12
		L6		1	When traffic count feature is specified
		L7	1		Vertical and horizontal group selection unit
45	J23650R	L2		1	(A&M Only) When the number of line link frames with which this circuit operates is 5 to 60
		L3		1	(A&M Only) When the number of line link frames with which this circuit operates is 6 to 60
		L4		1	(A&M Only) When the number of line link frames with which this circuit operates is 7 to 60

TABLE A
LIT FRAME J23650A (Cont)

UNITS SHALL BE EQUIPPED AND CONNECTED IN THE POSITIONS SPECIFIED IN THIS TABLE.					
UNIT			QUANTITY TO BE PROVIDED		DESCRIPTION OF FEATURE OR OPTION
POS NO.	J CODE	LIST NO.	ALWAYS	FOR OPTION INDICATED	
		L5		1	(A&M Only) When the number of line link frames with which this circuit operates is 8 to 60
		L6		1	(A&M Only) When the number of line link frames with which this circuit operates is 9 to 60
		L7		1	(A&M Only) When the number of line link frames with which this circuit operates is 10 to 60
		L8		1	(A&M Only) When the number of line link frames with which this circuit operates is 11 to 60
		L9		1	(A&M Only) When the number of line link frames with which this circuit operates is 21 to 60
		L10		1	(A&M Only) When the number of line link frames with which this circuit operates is 31 to 60
		L11		1	When the number of line link frames with which this circuit operates is 41 to 60
		L14		1	When traffic count feature is specified
		L15		1	(A&M Only) When the number of line link frames with which this circuit operates is 11 to 60 and/or when the traffic count feature is specified
		L16	1		Line frame selection unit
48	J23650S	L2		1	(A&M Only) When marker group is arranged for 31 through 60 classes of service
		L3		1	When trouble records are to be recorded on MTF trouble recorder
		L4		1	Trouble recorder connector unit
52	J23650T	L1		1	When traffic count feature is specified
2	J23650U	L1		1	When traffic count feature is specified

TABLE A
LIST FRAME J23650A (Cont)

UNITS SHALL BE EQUIPPED AND CONNECTED IN THE POSITIONS SPECIFIED IN THIS TABLE.					
UNIT			QUANTITY TO BE PROVIDED		DESCRIPTION OF FEATURE OR OPTION
POS NO.	J CODE	LIST NO.	ALWAYS	FOR OPTION INDICATED	
53	J23650V	L2		1	(A&M Only) When the number of trunk link frames with which this circuit operates (for traffic count features) is 11 to 20
		L3		1	When traffic count feature is specified
54	J23650W	L1		1	When traffic count feature is specified
17	J23650X	L1	1		Timer unit
55	J23650Y	L2		1	When marker group is arranged for 100 classes of service and 20 rate treatments
56	J23650Z	L1		1	When line concentrator circuit is provided
57	J23650AA	L1		1	When any of the following lists are provided
		L2		1	When skip resistor recording is specified
		L3		1	When directory number printout is specified
28	J93017J	L1	1		Line insulation test unit
32	J93017K	L1	1		25-cycle, 60-cycle filter unit
		L2	1		Plant registers

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