

**ORIGINATING MARKER FRAME
EQUIPMENT DESIGN REQUIREMENTS
NO. 1 CROSSBAR SYSTEM**

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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 originating marker frame in No. 1 crossbar offices.

1.02 This specification is reissued:

- (a) To provide information for offices required to operate with the Message Charging System.
- (b) To provide information for a modular-type fuse panel unit.

(c) To provide for the use of NO/1X codes as office codes through the use of prefix digits, where a "0" or "1" prefix indicates ten digits and no prefix indicates seven digits.

(d) To provide information to the customer of the correct use of prefix "1" when announcements are required.

(e) To provide information to route advance the "zero" type calls to a local cord operator when all TSPS trunks are busy and the office is equipped with TSPS trunks and ANI tip party services.

(f) To provide for a partial speed-up feature.

(g) To provide information which is required when office is to operate with the Centralized Status, Alarm and Control System (CSACS).

CAPACITY

1.03 The originating marker frame is arranged for the indicated maximum quantities of the following items.

Codes

3-digit codes (110-119 and 200-999): 810

3-digit codes on R8 bay for an adjacent foreign area (200-999) (A&M Only): 800

2-digit codes (20-99): 80

Prefix codes—(01,10): 2

Emergency Code—(00): 1

ZO—(special service operator): 1

PS—(permanent signal): 1

OF—(overflow): 1

Class-of-Subscriber Indications

From senders A: 1

From one group of subscriber senders without use of SGR lead: 12

From one group of subscriber senders with use of SGR lead: 24

From two groups of subscriber senders without use of SGR lead: 12

From two groups of subscriber senders with use of SGR lead: 24

Class-of-Service Relays

(1/2 287A) SC points 0-19: 25

(U type) SC points 20-24 (A&M Only): 25

Associated Frames

Class-of-service frame (serves two originating markers): 1

Class-of-service relays (1/2 287A) SC points 20-39: 50

District junctor and district link: 20

Office link: 20

Originating marker connector (30 connector circuits): 10

Originating sender test: 2

Originating trouble indicator: 1

Route Relays

Route relays per route relay bay except R8 bay: 100

Route relays in route relay R8 bay: 60

The number of route relay bays per originating marker frame is determined by the number of route relays required:

Outgoing Trunks

Outgoing trunks in originating marker test group (connected to at one time for test): 40

The number of outgoing trunk groups of 2 to 40 trunks each is limited only by the capacity of the office link frames:

Outgoing trunk groups of two or more subgroups (each subgroup 2-40 trunks):

Trunk groups of two first choice subgroups: 30

Trunk groups in addition to above of 2,3,4,6, or 12 first choice subgroups (any one size): 3

Trunk groups in addition to above of three first choice subgroups only: 3

Trunk groups in addition to above of four first choice subgroups only: 3

Any of the above first choice subgroups may be used with or without a common subgroup.

Miscellaneous Items

Zone charge of message billing index conditions: 10

Office junctor subgroups: 3 or (5 A&M Only)

DJO channels tested simultaneously: 20

Junctor patterns: 10 or (14 A&M Only)

Originating marker frames in one group: 8

Originating marker groups having common access to the same outgoing trunks: 2

Originating marker groups having common access with Panel System equipment to the same outgoing trunks: 1

Route transfer RT relays: 10

Set of transfer points per RT relay: 2

DESCRIPTION

1.04 *The originating marker* is a multibay single-sided frame which accommodates the equipment and wiring for one originating marker circuit. The equipment consists of mounting-plate-mounted apparatus, multicontact relays, and terminal strips. The framework, equipment, and wiring are furnished in two shop-wired assemblies, one for common equipment and one for route relay equipment.

General Operation of Originating Marker

1.05 When a call has progressed to the point where the office code has been dialed into the sender, the sender obtains access to an originating marker through an originating marker connector. The originating marker checks the integrity of all leads between the sender and itself and receives and records the code which has been dialed into the sender, the district frame number on which the district junctor involved in the call is located, the class of subscriber making the call, and other items of information, such as party charge, and whether alternate route, direct route, or overflow trunks are desired.

1.06 From the information received, the originating marker functions to transmit to the sender information which it will require to complete the call; obtains an outgoing trunk to the required destination if one is idle; chooses an idle DJ0 channel, if there is one, between the district junctor and the outgoing trunk; establishes this path from the district to the outgoing trunk over the district link, office junctor, and office link of the channel obtained; transmits charge and talking selection information to the district junctor and zone charge information, if required, to the zone register frame or the message billing index to the sender in the case of AMA operation. If any of the leads to the sender, district junctor, or zone register are open, shorted, or falsely grounded, or if there are double connections or false grounds on the path selected, or in case some lead in the originating marker is shorted or open in a way to block the circuit functions, the originating marker will connect to the originating trouble indicator to leave a record of the trouble. It then sends a trouble release signal to the sender so that the sender may release

and make another attempt to complete the call, usually with another marker.

1.07 The originating marker also functions to decode certain calls, such as those from a sender when it is being tested by the sender test circuit, without performing the marker functions of connecting to an outgoing trunk.

General Description of Originating Marker Frame

1.08 The originating marker frame, as illustrated in Fig. 1, consists of one 2-bay framework for common equipment and one or more single-bay frameworks for route relays. The frameworks are single-sided steel structures 11 feet 6 inches high. The 2-bay unit framework is 5 feet 3/4-inch long, consisting of a left bay 2 feet 8-1/8 inches long drilled on 1-inch centers for 30-1/2 by 2-inch mounting plates and a right bay 2 feet 2-5/8 inches long drilled for multicontact relay mounting units and cross-connecting terminal strips. The adjacent upright members of the two bays do not touch but are separated by a space of 2 inches. The single-bay structure for route relays is 2 feet 2-5/8 inches long, and the uprights are drilled for multicontact relay mounting units and cross-connecting terminal strips.

General Description of Originating Marker Frame—Fig. 2—Equipment

1.09 *Common Equipment Unit:* On the 2-bay common unit, facilities are provided for all equipment required for one originating marker, except the route relays and the cross-connection arrangements required for the route relays, the access code screening relays and some of their associated cross-connections, the translator relays for codes in an adjacent foreign area which requires 6-digit translation, and the peg count relays for codes which use a common route relay but require peg count registrations on an individual code-point basis.

(a) *The left bay*, from the front, accommodates all relays, other than multicontact relays, and the terminal strips for switchboard cable connections to the marker. The capacity of the bay is fifty-four 30-1/2 by 2-inch mounting plates, 18 plates under each of three set of front and rear relay casings. The terminal strips are in two horizontal rows at the top of the bay, four in each row. These terminal strips are of the

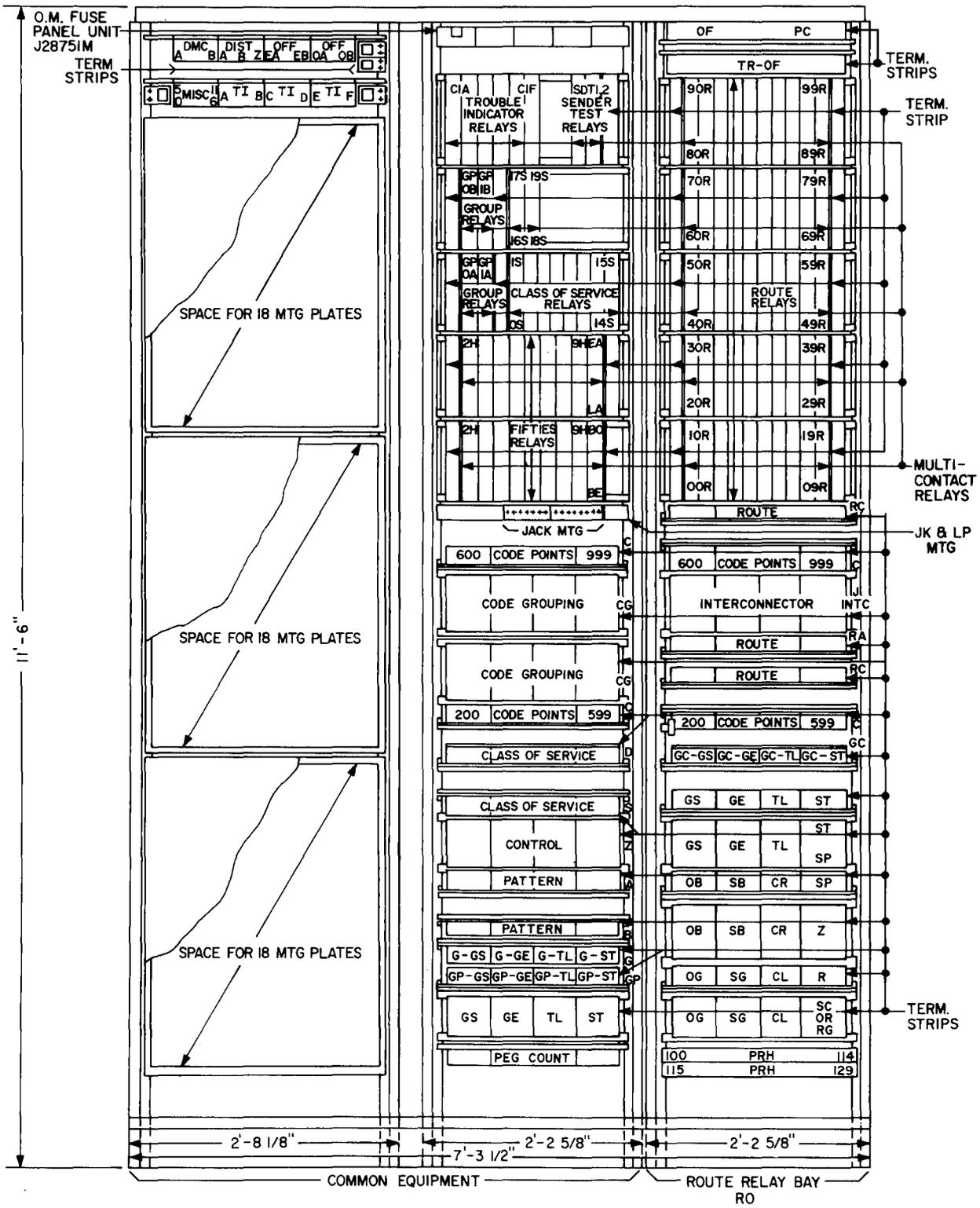


Fig. 1—Originating Marker Frame

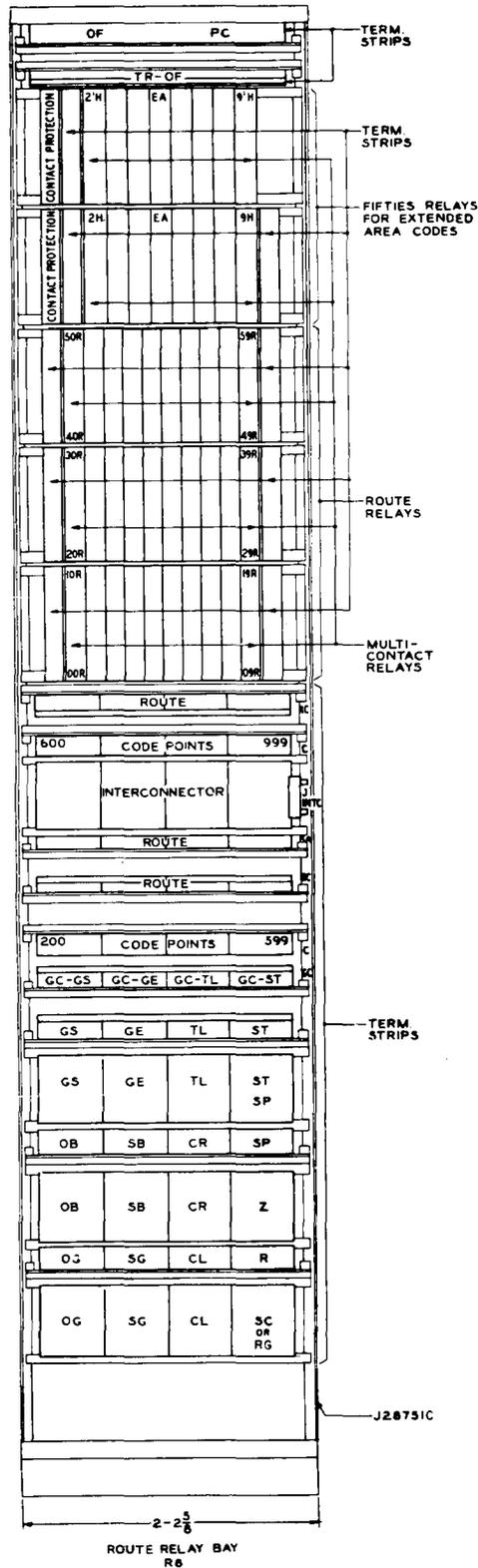


Fig. 2—Originating Marker Frame Route Relay Bay R8 For Use As a Foreign Area Translator with 6-Digit Translation or as an Access Code Translator

type in general use in the Crossbar System on which the local cable terminates on the rear with a relay type of skinner dress, and the switchboard cable terminates on the front with skinners run through a fanning strip.

(b) *The right bay* of the common unit from the top down has provisions for a fuse panel unit, on which are all fuses required by one originating marker; five multicontact relay mounting units accommodating all multicontact relays except the route relays and access code screening relays; a jack panel mounting for miscellaneous jacks, lamps, keys, and test terminals; and below this point, which is about 6 feet 4 inches from the floor, to a point about 1 foot 0 inch from the floor, are a number of decoder-type cross-connecting terminal strips in close alignment. All elements of the originating marker which require flexible interconnection, with the exception of those which require interconnection only to the route relay elements, are terminated on the wiring side of these terminal strips. On the equipment side, cross-connections are run in accordance with job requirements by means of single wire jumpers.

1.10 Route Relay Bay Unit: In top-down order, each route relay bay except R8 bay is arranged for two cross-connecting terminal strips used to associate each route relay with PC or OF registers on the traffic register rack; five multicontact relay mountings, each having a capacity of 20 route relays; and, below this point, about 6 feet 6 inches from the floor to about 1 foot 0 inch from the floor are a number of decoder-type cross-connecting terminal strips. Each element of each route relay which requires flexible connection is wired to the rear of some one or more of these terminal strips. Similarly, those elements of the common circuit to which the route relay elements must connect are wired to the rear of others of these terminal strips, either by means of multiple local cables between bays in the same lineup, or by means of the common unit local cable to the first route relay bay. The proper interconnections are made by means of single wire jumpers on the equipment side in accordance with job requirements. Sixteen translator relays for 800 code points occupy the top two multicontact relay mountings on the R8 bay instead of route relays.

1.11 Class-of-Service Frame: The class-of-service frame (Fig. 3) is a single bay structure 2

feet 2-5/8 inches long and the uprights are drilled for multicontact relay mounting units and cross-connecting terminal strips, plus one mounting plate for contact protection. This frame provides 20 additional SC points, 500 additional S points, and associated cross-connecting facilities for two originating markers. In top-down order, the class-of-service frame is arranged for three multicontact relay units on which are mounted twenty-six 40-contact multicontact relays designated SA 0-24. One-half of each of these relays is used as a class-of-service relay, 25 half-relays being required for each originating marker to provide for 20 additional SC points 20-39. This is similar to the arrangement on the originating marker frame where a similar set of relays provides for SC points 0-19 and 500 S points. Since SA 0-24 relays on this frame and S 0-24 relays on the originating marker have common controls, the SW leads of each SA relay are brought over to the originating marker frame for cross-connection to the D or DA punchings. Because all SC points have to be in a position to be cross-connected to 800 C or 37 CG punchings and a few other miscellaneous punchings, the SC points 20-39 have been multiplied to the originating marker common equipment bay and located so that they may be cross-connected to the other punchings just mentioned. Directly below the SA multicontact relays is a plate of capacitors which are used for contact protection for these relays. The rest of the frame is arranged for two sets of cross-connecting-type terminal strips which provide cross-connecting facilities for connecting SC punchings 20-39 to any of the R punchings from each route relay bay and for connecting the 500 additional S punchings to the various routing and charging punchings which are a multiple of those that appear on the common equipment bay of the originating marker frame.

1.12 The class-of-service frame should be located between its associated originating marker frames as shown on the floor plan data sheet listed herein. Where this frame is added to existing offices, however, this arrangement may not always be possible and it may be necessary to locate the class-of-service frames in separate lineups. When such an arrangement is necessary, they should be placed in two lineups similar to that shown for the originating marker frames on Floor Plan Data Section 9.1, Sheet 8; ie, the even-numbered frames should be in one lineup and the odd-numbered frames in the other.

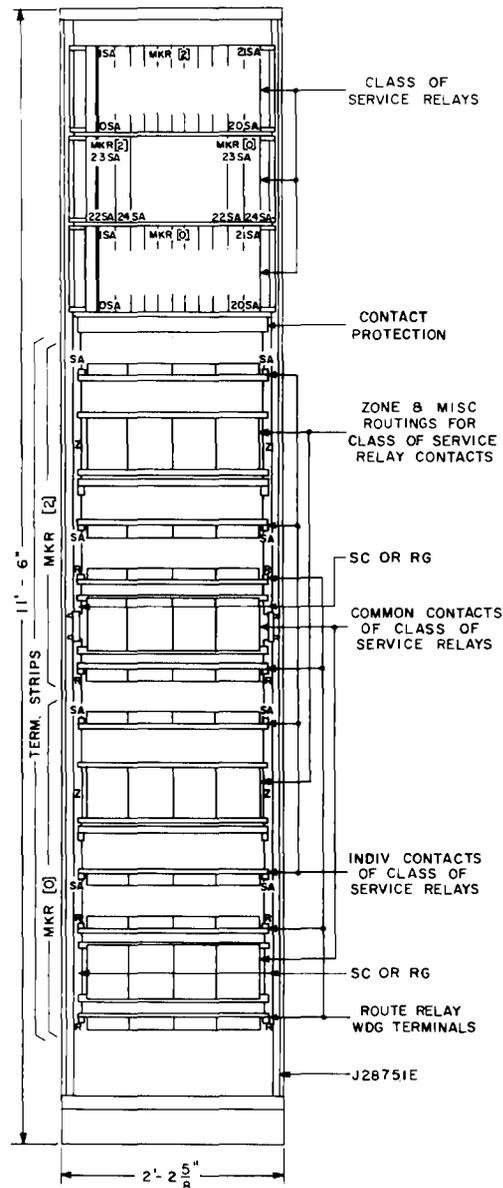


Fig. 3—Class-of-Service Frame for Use with Originating Marker Frame

1.13 Peg Count Unit: The peg count unit consists of one 2- by 23-inch mounting plate containing 20 peg count relays. The unit is mounted on a miscellaneous relay rack frame and each unit is associated with one marker per marker group. Up to four units are normally associated with one marker per marker group.

1.14 Access Code Unit: The access code unit (Fig. 4) consists of eight multicontact relays and eight terminal strips which form a cross-connection

field for the contacts of the relays. The unit is mounted on a miscellaneous relay rack frame and occupies the space of nine 2- by 23-inch or eleven 1-3/4 by 23-inch mounting plates. Each unit provides access code screening for two markers for the following conditions.

- (a) Prefix digit 1 dialed.
- (b) Prefix digit 0 dialed.
- (c) No prefix dialed.
- (d) Call originated by a keypulsing A sender.

1.15 Interchangeable Code Screening Unit:

The interchangeable code screening unit (Fig. 5) consists of 16 multicontact relays and 12 terminal strips which form a cross-connection field for the contacts of the relays. Each unit is associated with a particular marker and is mounted on a miscellaneous relay rack frame, occupying the space of fourteen 2- by 23-inch or sixteen 1-3/4 by 23-inch mounting plates. This unit provides access and interchangeable code screening for codes in the series 200-999 that are used as both office and area codes.

1.16 Interchangeable Code Control Unit: The interchangeable code control unit is mounted on a miscellaneous relay rack frame and consists of one 2- by 23-inch mounting plate containing nine relays, three resistors, and three terminal strips. Each unit is associated with a particular marker and provides the following:

- (a) Control for the interchangeable code screening unit relays.
- (b) Ten additional screening points for the access code unit.
- (c) A maximum of six additional diverted route relays.

1.17 Dynamic Overload Route Transfer Relay Unit:

The dynamic overload route transfer relay unit is arranged to mount on a miscellaneous relay rack frame and consists of three 2- by 23-inch mounting plates containing 28 relays and seven terminal strips. Each unit is associated with four markers and provides for ten route transfer signals per marker.

1.18 Dynamic Overload Peg Count Unit: The dynamic overload peg count unit is arranged to mount on a miscellaneous relay rack frame and consists of three 2- by 23-inch mounting plates containing eight relays, 32 molded component assemblies, and seven terminal strips. Each unit is associated with four markers.

1.19 Partial Speed Up Unit: The originating marker partial speed up unit provides for an approximate ten percent reduction of marker work time. It is used to modify originating markers in the field which were manufactured prior to SD-25016-01, Issue 102D. Later frames have the full speed up feature included in the basic frame. This single mounting plate unit is arranged to mount on the associated common bay.

Description of Cross-Connections, As Related to Originating Marker Operation

1.20 The originating marker must be able to perform its functions with precision for each of the many different sets of information that can be received from the sender, and it must also be flexible so that its action with respect to any set of information can be changed at any time. Flexibility is obtained by the provision of relays having their windings and contacts wired to terminal punchings which are arranged in convenient groups or fields on terminal strips where they may be interconnected. The following description is of a general nature only. It is intended that the supplementary information listed in this specification should be consulted for details of cross-connections and originating marker operation.

1.21 As a result of the operation of the relays which, in the originating marker, record the code received from the sender, ground is connected to one of the code point leads which are identified as C200-C999, ZO, PS, and OF. This ground is cross-connected to the winding of a route relay either directly C to RC or through contacts of the class-of-service relay C to SC and S to RC through INTC-RC which is operated in accordance with the class-of-service record received from the sender.

1.22 A number of the code points may require identical treatment, for example, unassigned or blank codes, restricted codes, and codes representing destinations reached through the same group of trunks on which the same zone charge

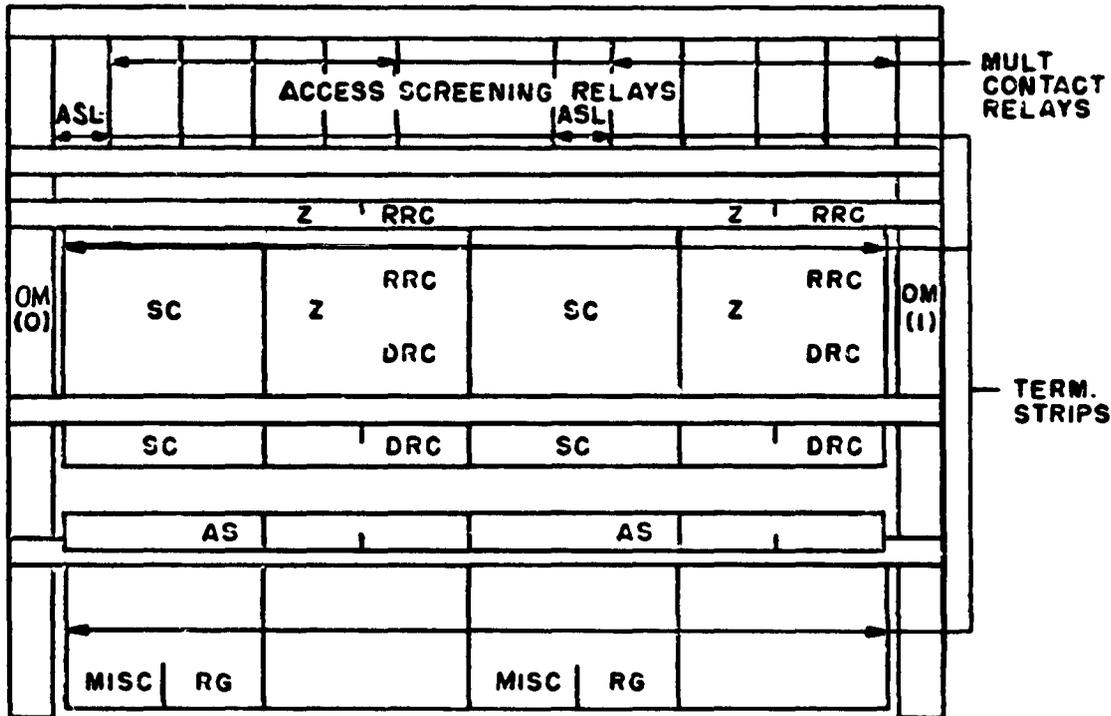


Fig. 4—Access Code Limit for Use with Originating Marker Frame

and stations delay conditions are required. Such code points can be grounded to a common point, C to CG, and cross-connected from there the same as any code point CG to RC or CG to SC, etc.

1.23 The route relay operates if the other side of its R winding is cross-connected to battery or to battery through a low-resistance relay, but will not operate to battery through a high resistance. The general purposes of this cross-connection is to set up the proper charge or talking condition for the call and to operate the route relay. The cross-connection may be direct R to Z or indirect under control of the class-of-service R to SC and S to Z relay. In the latter case, it is possible to

deny the route to any class since the route relay will not operate if connected in series with the high-resistance denied route DR relay, R to SC, S to DRC. The DR relay, when operated, places ground on a contact which may be cross-connected to operate the proper route relay through DR to SC or DR to RC through INTC-RC connections.

1.24 *The operation of the route relay* closes its 15 contacts, 14 of which are wired individually for each relay to terminal punchings.

- (a) Of the 14, five (OB, OG, SG, CL, and CR) are cross-connected, respectively, to primary and secondary windings of five groups of

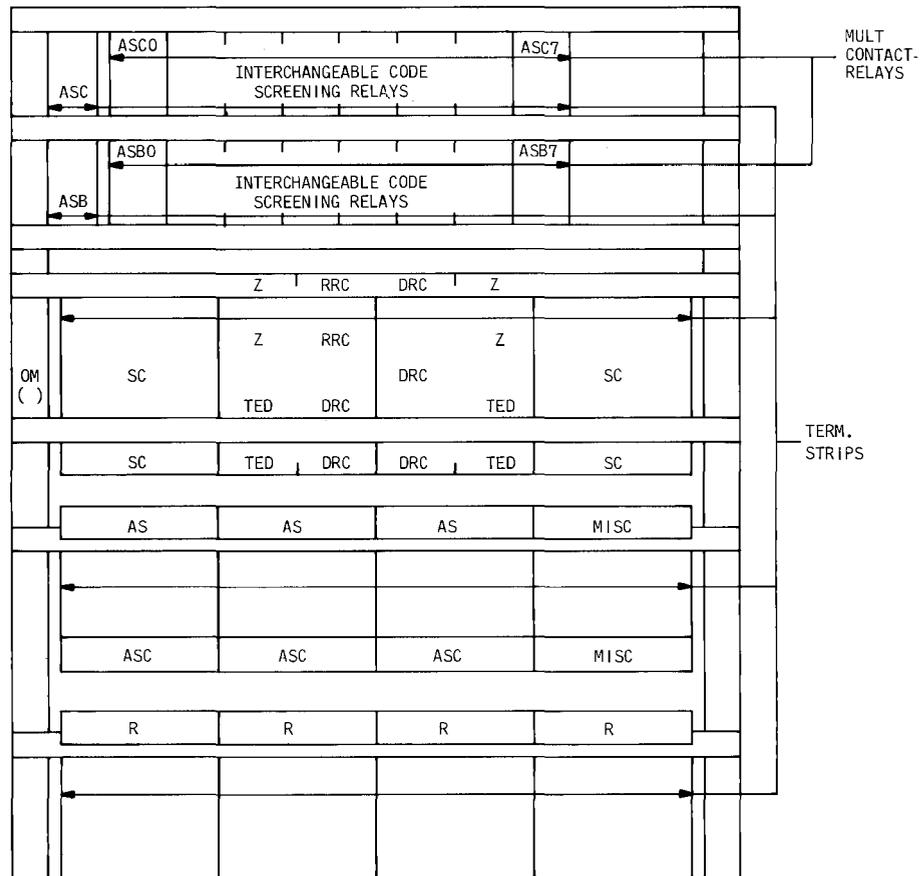


Fig. 5—Interchangeable Code Screening Unit for Use With Originating Marker Frame

transmitting relays similarly designated, the operation of which grounds leads back to the sender to operate relays which record the translation of the office code. The translation consists of two items of information from each group of relays which the sender requires to complete the call.

- OB—Office brush and stations delay
- OG—Office group and skip first office
- SG—Over-five office brush and OFF-9300
- CL—Class of call and 2-wire office
- CR—Compensating resistance and trunk test relay

(b) Four of the 14 contacts of the route relays (ST, TL, GS, and GE) are used in the

marking functions of the originating marker: the ST to associate the originating marker with a pair of office link frames, the TL to operate relays on the office link frames which will cut through test leads of 20 trunks from each frame into the trunk test relays of the marker, GS and GE to indicate in the 40 trunks on which one to start testing and on which one to end. If the trunks are not subgrouped, the cross-connections are: ST to start lead of the pair of office link frames on which the trunks are located; TL to the TL winding of the TL relay representing the office frame trunk level on which the trunks are assigned; GS to the GS winding of the trunk TG relay which corresponds to the first trunk available; and GE to the GE winding of the TG relay corresponding to the last trunk available.

(c) If the number of outgoing trunks available exceeds 40, the ST, TL, GS, and GE route relay cross-connections are not run direct as just

described because to do so would limit the use of one route relay to 40 or fewer outgoing trunks. Instead, contacts of grouping GP or G relays are interposed in the cross-connections (that is, ST to GC—ST and GP—ST or G—ST to ST) so that a definite set of information may be obtained for each trunk subgroup of 40 or less trunks. Regardless of the size of the outgoing trunk group, if it is subgrouped, the originating marker will test a maximum of two subgroups of each trunk group to which it has access on a particular call, except that only one subgroup is tested of a permanent signal or overflow trunk group subdivided into more than two subgroups. If there are more than two subgroups, the originating marker treats all but one as individual subgroups and one as a common subgroup and on any call will test one individual subgroup and, if necessary, the common subgroup. A control circuit and the circuit for grouping relays cause successive calls to be rotated through the several individual subgroups and alternated between the two subgroups of trunk groups of that size. For trunk groups of two subgroups, only one route relay is required. For trunk groups of three or more subgroups, one route relay is required for all of the individual subgroups and one route relay for the common subgroup. The latter relay operates, when needed, from the RA contact of the former and, of course, the ST, TL, GS, and GE points of the latter relay cross-connect directly rather than through the grouping relays.

(d) The RA contact of the route relay, if no trunk is found, is used to operate another route relay, if there is one, representing common subgroup trunks, alternate route trunks, or, if there are none of these, then a route relay representing overflow trunks. The RA point of an overflow or permanent signal route relay is not cross-connected. The J INTC terminal strip is provided on each route relay bay and wired so that the RA to RC cross-connection can be made between any two route relays even if they are on different route relay bays. This terminal strip also provides for grouping a large number of RA points to the RC points of the route relays representing overflow trunks.

(e) The SB contact of the route relay is not cross-connected unless the marker is arranged for alternate route compensating resistance control. When this feature is provided the SB and CR cross-connection fields are bridged and the SB

contacts are cross-connected to the windings of the CR transmitting relays. This method provided a means for reducing the number of route relays required for alternate routes, through office selector or crossbar tandem, by providing a beyond-office compensating resistance cross-connection for the alternate route by use of SB cross-connection on the original route relay.

(f) The SP contact of the route relay is used for two general purposes: first, to control the operation of the grouping relays when the trunk group consists of two subgroups so that the originating marker will test both subgroups when necessary, and second, to reduce the number of route relays required for certain alternate routes through office selectors by permitting the original route relay to provide the OB, OG, SG, and CL information to the sender for the alternate route.

(1) Cross-connections are SP to SPA, TWA, TWC, or OG5P for route relays representing trunk groups of two subgroups, and SP to SPB, TWB, TWD, or OG5S for relays for trunk groups not subgrouped, or trunk groups of three or more subgroups. The cross-connection is SP to SPA or SPB as above, except as follows: first, for an original route relay having a 2-wire alternate route SP to OG5P or OG5S, and for the alternate route relay SP to TWA or TWB for alternate routes through 2-wire office selectors, or SP to TWC or TWD for alternate routes through 3-wire office selectors, and second, for a route relay representing permanent signal or overflow trunks, the SP is not cross-connected, its OG point being cross-connected to OG5P or OG5S when the OG5 relay is equipped.

(g) The PC and OF contacts of the route relays are cross-connected to leads to registers on the traffic register rack to indicate the number of calls into each trunk group, PC, and the number of times all trunks are found busy, OF. Formerly, facilities were provided for cross-connecting 100 PC and OF contacts to 80 TR-PC and 80 TR-OF register leads and these cross-connections were made at the originating marker frame. In order to eliminate objectionable features involved in making these cross-connections at the marker frame and to provide 100 percent flexibility for the associated companies, the former arrangement has been rated A&M Only and

provision has been made whereby the 80 TR-PC and 80 TR-OF cross-connecting terminals have been increased to 100 each, so that 100 route relay PC and OF contacts may be connected to 100 PC and OF registers at the TRDF if so desired. With this arrangement, cross-connections between PC and TR-PC or TR-J and between OF to TR-OF or TR-J may be permanently installed at the marker frame on the initial installation and any subsequent rearrangement can be made at the traffic register distributing frame. In some cases, the PC contact may be cross-connected as outlined below.

- (1) To permit peg count registration on one or two trunk groups according to five or two classes of service, respectively, facilities are provided to permit the PC cross-connection to be made through the class-of-service relays. Six leads, referred to as PC (INTC-PC) 0-5 interconnector are run between the first relay bay and the marker common equipment unit; cross-connections are PC to INTC-PC, INTC-PC to SC, S to INTC-PC, and INTC-PC to TR-PC or TR-J. The usual use of the INTC-PC points will be to separate the district junctor test calls from the regular registrations.
 - (2) To obtain individual peg counts registrations on code points which use the same route relay, use arrangements described in 1.29.
 - (h) The TB contact of the route relay requires no cross-connection. The TB lead multiples to corresponding contacts of all route relays in one originating marker. When all trunks of one subgroup are busy, this lead functions to remove the ground supply of the route relay in use and places a ground on the RA point to operate the succeeding route relay as described in (d).
 - (i) Prior to Issue 64B of the originating marker circuit, SD-25016-01, a separate route relay was required for each of two offices served by common terminating equipment over a common trunk group. Under this condition, both route relays provided the same translation except that the relay for office B provided the "high five" incoming group signal by means of which the terminating and equipment distinguished between office A and office B. It was found that considerable economies could be gained by vacating the route relays previously used for office A routes and providing a comparatively inexpensive U-type relay which is used as preroute relay. The vacated route relays are then available for other usages. The RC winding terminal of preroute relays is cross-connected to the code point C punching for office A of the common trunk group. A PRC contact from this same relay is cross-connected to the RC punching of the regular route relay used for office B of the same trunk group.
- 1.25** *When an idle outgoing trunk is found,* the originating marker is required to complete a path from the district junctor in use by the call to the trunk over a district link, an office junctor, and an office link known as a DJO channel.
- (a) The district frame indication received by the originating marker from the sender results in the operation of a district frame lock DF relay correspondingly numbered. Through a contact of this relay, the office link frame on which a trunk has been chosen connects battery (from its SB lead) over a ST start lead to the district link frame. The office link circuit also causes the operation of an office frame O relay in the originating marker corresponding to the pair of office link frames involved in the call. With the district and office link circuits connected to the originating marker and an idle trunk selected, the number of district and office links that can be used is 10 or 20 depending upon whether the trunk is on a split or nonsplit level of the office frame. The number of office junctors that can be used varies from 10 if there are 10 office frames, to 50 if there are two for a split level trunk, and from 10 to 100, respectively, for a nonsplit level trunk.
 - (b) The originating marker is capable of testing a maximum of 20 DJO channels at one time to find an idle channel and, on a particular call, will make successive tests varying the J links when there are more than 20 available until an idle channel is found or all are found busy. The connecting into the marker of the proper J links requires cross-connections from the contacts of the office frame relay to the JC leads to the EA, EB, etc, and OA, OB, etc, to JC district frames.
 - (c) A ground on any one or more elements D, J, or O of a channel indicates its nonavailability for the call. If the J element is missing or if

it is connected into the marker but is assigned so that it cannot be used for the call, the originating marker applies a blanking ground to the channel. The D, J, and O links which can be used for trunks on a nonsplit level are connected into the channel testing relays. If the particular trunk is on a split level, the ten channels which cannot be used are blanked by local cable wiring and the operation of the SPL or SPR relay. Of the 20 channels in each test, those in which there is no J link available or in which the J link, although obtained cannot be used because of its assigned use, are blanked by means of cross-connections from contacts of the DF and O relays which operate pattern P relays or pattern P relays and pattern auxiliary PA relays. These cross-connections vary with the number of district and office frames in the installation and are completely covered in notes on the circuit schematic.

Load Control and Intersender Timing

1.26 As a protection against impairing the load-carrying capacity of the crossbar switching equipment under overload conditions, arrangements have been provided for the control of traffic overloads. These arrangements are referred to as originating sender load control and terminating sender load control, the latter being furnished on an optional basis. Load control and intersender timing are features whereby, in periods of overload on the subscriber or full-selector terminating sender groups, some of the calls will be automatically given a special routing by the originating marker during the overload period. This special routing may be to overflow, to an attendant, or to an announcement trunk.

- (a) The originating sender load control feature becomes effective when approximately 94 percent of the senders in a group are busy and cause the OF code point in the marker to be grounded. This punching may be cross-connected either to an overflow route relay, which causes the call to be set up to an overflow trunk, or to a route relay which will cause the call to be set up to a group of trunks to a manual A or toll switchboard for completion via trunks to the B board in the crossbar unit.
- (b) Terminating sender load control becomes effective when all of the terminating full-selector senders of a unit are busy. Under

this condition, a signal is transmitted to the originating marker over the corresponding TSB lead causing the operation of a route transfer relay which shifts the local code point from its original route relay to an overflow route relay.

Direct Distance Dialing and Use of the Auxiliary Sender

1.27 Figures AP and AQ permit the originating marker to route calls requiring the use of an auxiliary sender. The auxiliary sender enables the customer to dial ten digits when required and enables certain local area 7- or 8-digit calls to be MF pulsed forward. "Skip digit" features are also provided for both types of calls. Loop wiring per Fig. AP is provided when the use of the auxiliary sender is not required or when it is used only for 10-digit calls in which all ten digits are MF outputted.

Automatic Number Identification

1.28 Provision is also made in Fig. AP and AQ for the operation of the originating marker with Automatic Number Identification (ANI). A feature is also provided to forward tip party calling identification from this circuit to an ANI trunk. A feature is also included to check that calling party identification has been properly received by the ANI trunk.

Individual Code Point Peg Count

1.29 For code points assigned to the same route relay which require an individual peg count registration, a preroute relay (PC) is provided. Each code point C is cross-connected to a PC relay on the miscellaneous relay rack through PC terminal strip located on the OM frame. The PC relay operates a traffic register and also its associated route relay. The PR leads from the PC relays are cross-connected to the CG terminal strip on the OM frame through the PC terminal strip. The PR leads assigned to the same route relay are tied together on the PC terminal strip. The cross-connection from PC to CG is run through fanning rings mounted on the right side of the OM frame. Cross-connections from CG to the route relays are as shown in SD-25016-01, Fig. 3X.

Six-Digit Translation (sender recycle)

1.30 Figures 53, 54, 55, and 56 provide for modifying the originating marker for 6-digit translation. This type of translation is used when it is desired to reach an adjacent DDD area without the use of an auxiliary sender. After the area code has been registered in the sender, it is translated by means of a code compressor and, if it is one to be compressed, the A, B, and C registers in the sender are returned to normal and office code is then registered on these same registers. The sender grounds two of the CC0, 1, 2, 4, 7 leads to the marker to indicate the area code that was dialed. The marker uses the CC lead information to connect to a separate translator for the particular foreign area or operate a route relay if all calls to the foreign area are routed via a single tandem office trunk group. See 1.33 for a description of separate translators.

11X Service Codes, Access Codes for Extra Charge Calls, Emergency Code 00, and Prefix Codes 01, 10, and 11

1.31 Figures 58 through 61, 63, and 64 provide for modifying the originating marker for operation with access codes, emergency code 00, prefix codes 01 and 10, and 11X service codes or prefix code 11. The sender provides CC lead information to indicate the prefix or access code dialed.

- (a) The 11X service code or prefix 11 feature (Fig. 64) is only and always provided with the access code feature, and ten code points C 110-119 are provided for cross-connection to route relays.
- (b) Access digits 0 and 1 are used to provide separate routing for person-to-person calls and extra charge station-to-station calls in non-LAMA offices. This type of routing is used when a customer requests a collect, person-to-person, credit card, or a third number charge call. Station-to-station DDD calls will be handled in the normal manner. With the access code feature, route relay windings for codes which require access screening are cross-connected C to RC or C to CG and CG to RC, R to ASC, AS to Z or DRC, or AS to SC and S to Z or DRC. The R terminal of all route relays which require the same class-of-service or rate treatment and the same access code treatment are cross-connected

to one ASC terminal. Emergency code 00 is routed by using access code screening as described above. Prefix codes 01 and 10 do not require access code screening and are cross-connected to operate a route relay as required. Codes which do not require access code screening are cross-connected as described in 1.21 through 1.23.

Access Codes for Extra Charge Calls in Office With Local AMA

1.32 Figures 65, AT, and AU of SD-25016-01 are provided in addition to the figures listed in 1.31 to arrange markers with local AMA features for access codes for extra-charge calls. Figure 65 signals the subscriber sender to seize a transverter and to instruct the auxiliary sender to output the directory number of the calling line to the tandem office. Figure AT is required in offices with 4-, 8-, or 10-party lines and cancels seizure of a transverter on calls originated by multiparty lines.

Use of Translators for 6-Digit Translation or Access Code Separation

1.33 When 6-digit translation and/or access codes for extra-charge calls are provided, separate translators may be required for the foreign area codes which are recycled and/or for cross-connecting 800-code points to route relays for 0 prefix traffic. Three types of translators are available for the two uses.

- (a) The 3-digit common translator provides a maximum of 113 routes for 800-code points. These translators are provided in a maximum of four groups with two to four translators per group and are selected by the marker through a 3-digit translator connector. When a translator is used for 6-digit translation, it is selected by a cross-connection between the CST- and STS-terminals. Cross-connecting the ACT 7 terminal to the STS- terminal permits seizure of a translator for access code separation.
- (b) The 3-digit individual translator is connected to the marker through Fig. 54 and is selected by the marker through cross-connection of the CST- to IT terminals when the translator is used for 6-digit translation. When the translator is used for access code separation, the ACT 7 terminal is cross-connected to the IT terminal. This translator provides 800-code points access

to all route relays on the marker route relay bays 0-7. One 3-digit individual translator is required per marker.

(c) The R8 bay (A&M Only) was formerly used as a translator for 800-code points in an adjacent foreign area and was selected when the marker received a 1-1 prefix signal from the sender. The R8 bay may be reused as a translator for 6-digit translation or for access code separation in offices where it is presently installed. Connection to the marker is made through Fig. 53 or 54. The R8 bay is selected through cross-connections as described for the 3-digit individual translator and provides a maximum of 60 route relays. One R8 bay is required per marker.

Use of the R8 bay precludes using the 3-digit individual translator with the same marker and vice versa since both connect to the marker through the same connector relay. If the R8 bay is used as a translator for 6-digit translation or access code separation and additional markers are installed in the unit, additional R8 bays are also required. It is not permissible to have R8 bays associated with some markers and 3-digit individual translators with other markers in the same marker group. The 3-digit individual translators or R8 bays may be used in combination with 3-digit common translators to meet different traffic requirements, for example:

3DCT GRP0—6-digit translator area 212

3DCT GRP1—Access code translator

R8 bay or 3DIT—6-digit translator area 516

Automatic Identification of Outward Dialing From No. 101 ESS PBX Stations in Office With Local AMA

1.34 In offices equipped with AMA features, Fig. 70 of SD-25016-01 provides a signal to

the subscriber sender when automatic identification of outward dialing is required for PBX stations served by No. 101 ESS group control equipment.

Interchangeable Office and Area Codes

1.35 When one or more codes in the series 200-999 is used as both an office code and a numbering plan area code the originating marker is provided with Fig. 71 through 75. With this feature, if the marker cannot determine whether the ABC code registered is an office or an area code it instructs the sender to time for extra digits after the units digit is registered and releases the sender without advancing to the marking stage. When the sender determines whether only seven or more than seven digits will be dialed it reseizes the marker and, using combinations of the CC 2/5 leads, indicates whether the call is a 7-, 10-, 0+7-, or 0+10-digit calls.

1.36 Interchangeable office and area codes are cross-connected similar to codes requiring access screening as described in 1.31. The code point C is cross-connected to terminal RC of the route relay associated with the office code (7-digit route). The R terminal of the route relay is cross-connected to one of the ASC 40-99 terminals on the Interchangeable Code Screening Unit. The AS- terminals of the screening relays are cross-connected to route the call via the 7-digit route relay or, using Diverted Route (DR) relays, to reroute the call to the 10-digit route, to a 0+7- or 10-digit route to a TSP tandem, to denied attendant, vacant code or announcement route, or to instruct the sender to time for extra digits.

SUBDIVISIONS OF EQUIPMENT AND DETAILED INDEX

WE J drawings should be ordered by referring to the prefix and base number and requesting the current dash (—) number.

EQUIPMENT CODE	RATING OF UNIT	TITLE	EQUIPMENT DRAWING	CIRCUIT DRAWING	CKT PER UNIT	MTG PLATES PER UNIT
J28751A	AT&TCo Std	Originating Marker Frame Equipment— Common Bay	J28751A-()	SD-25016-01		
J28751B	AT&TCo Std	Originating Marker Frame Route Relay Bay Unit	J28751B-()	SD-25016-01		
J28751C	A&M Only	Originating Marker Frame Route Relay Bay R8 Unit	J28751C-()	SD-25016-01		
J28751E	AT&TCo Std	Class-of-Service Frame Equipment	J28751E-()	SD-25016-01		
J28751F	AT&TCo Std	Originating Marker Peg Count Unit Equipment	J28751F-()	SD-25016-01	1	1
J28751G	AT&TCo Std	Originating Marker— Access Code Unit	J28751G-()	SD-25016-01	2	9
J28751H	AT&TCo Std	Originating Marker Interchangeable Code Control Unit	J28751H-()	SD-25016-01	1	1
J28751J	AT&TCo Std	Originating Marker Interchangeable Code Screening Unit	J28751J-()	SD-25016-01	1	14
J28751K	AT&TCo Std	Originating Marker Dynamic Overload Route Transfer Relay Unit	J28751K-()	SD-25016-01	4	3
J28751L	AT&TCo Std	Originating Marker Dynamic Overload Peg Count Unit	J28751L-()	SD-25016-01	4	3
J28751M	AT&TCo Std	Originating Marker Fuse Panel Unit	J28751M-()	SD-25054-01	1	1
J28751N	A&M Only	Originating Marker Partial Speed-Up Unit	J28751N-()	SD-25016-01	1	1

2. SUPPLEMENTARY INFORMATION

316-000-000—No. 1 Crossbar System Index
Floor Plan Data, Section 9.1—Sheets 8 and 41

3. DRAWINGS

WE J drawings should be ordered by referring to the prefix and base number and requesting the current dash (—) number.

Keysheet

SD-25000-01—No. 1 Crossbar System

Circuits

SD-25016-01—Originating Marker Circuit
SD-25054-01—Miscellaneous Circuit

Equipment

J28751A-()—Originating Marker Frame Equipment—Common Bay
J28751B-()—Originating Marker Frame Route Relay Bay Unit
J28751C-()—Originating Marker Frame Route Relay Bay R8 Unit
J28751E-()—Class-of-Service Frame Equipment
J28751F-()—Originating Marker Peg Count Unit Equipment
J28751G-()—Originating Marker—Access Code Unit
J28751H-()—Originating Marker—Interchangeable Code Control Unit
J28751J-()—Originating Marker—Interchangeable Code Screening Unit
J28751K-()—Originating Marker Dynamic Overload Route Transfer Relay Unit
J28751L-()—Originating Marker Dynamic Overload Peg Count Unit

J28751M-()—Originating Marker Fuse Panel Unit
J28751N-()—Originating Marker Partial Speed-Up Unit

Framework

ED-25020-01—Miscellaneous Mounting Details and Cable Brackets
ED-25021-53—Jack, Key, and Lamp Panel
ED-25022-01—Multicontact Relay Mounting Unit
ED-25224-30—Framework Assembly
ED-90978-57—Relay Casing
ED-90978-58—Relay Casing

Wiring and Cabling

ED-25130-10—Schematics of Marker Multiple Cabling to Frame Connectors
ED-25161-10—Originating Marker Frame Switchboard Cabling Details
ED-25223-10—Originating Marker Frame Local Cable
ED-25346-16—Method of Running Power
ED-25346-15—Feeders
ED-26826-10—Class-of-Service Frame Local Cable
ED-26827-10—Class-of-Service Frame Switchboard Cabling Details

4. EQUIPMENT***J28751A—AT&T Co Std—Originating Marker Frame Equipment—Common Bay***

Equipment—J28751A-()

Local Cable—ED-25223-10

List 1—Framework, assembly, wiring, and equipment for one originating marker common equipment unit.

	WIRE	EQUIP	NOTES		WIRE	EQUIP	NOTES
Framework Assembly, ED-25224-30, G1: Jack, Key, and Lamp Panel, ED-25021-53: Items 1 and 10		1	BT	Grouping Relay Cir- cuit for Trunk Groups of Two First-Choice Subgroups, Fig. 5	4	0	A,I
Multicontact Relay Mounting Unit, ED-25022-01: Item 6		1		Ground Supply Relay Circuit: Fig. 6, AC Wiring	1	1	K,BK
Item 10		2	A	Fig. 6, AD Wiring	3	3	K
Filler Detail, ED-25020-01: Item 35		1		Control and Timing Relay Circuit, Fig. 8, D,BA,GQ and MQ Options, Also Fig. AH or AI, Less AH, AL,AQ,AR,CX,FL, FL,FM,FN,HC, and LC Apparatus			
Relay Casing, ED-90978-57, G3018: Front Only		6					
Relay Casing, ED-90978-58, G3018: Rear Only		3			1	1	C,M, N,AB, AE,BL
Miscellaneous Circuit SD-25054-01: Fig. 2, 5, 6, 8, 9, 10, 12, and 13 (FA relay FL Resistor, and AL Lamp Only)		3		Grouping Relay Circuit for Trunk Groups of Two, Three, Four, Six, or Twelve First- Choice Subgroups, Fig. 9			
Fig. 13, less FA relay, FL Resistor, and AL Lamp	1	1	AH	Grouping Relay Circuit for Trunk Groups of Three First-Choice Subgroups, Fig. 9A	12	0	J
Originating Marker Cir- cuit, SD-25016-01: Code Receiving and Checking Circuit, Fig. 1, Less E, F, AG, FC, FD, and H Apparatus	1	0		Grouping Relay Circuit for Trunk Groups of Four First-Choice Subgroups, Fig. 9B	12	0	J
Tens Relay Circuit, Fig. 2	1	1	C,BK,BM	Office Frame Relay Circuit, Fig. 10	12	0	J
Fifties Relay Circuit, Fig. 3, Less E and AW Apparatus and Strapping of E and Wiring and Strap- ping of AW Appa- ratus	5	0	C	Junctor Connector Lead and Junctor Control Relay Circuit, Fig. 11 and 19 Each	10	0	T,U,AU
Class-of-Service Relay Circuit, Fig. 4, Less A and H Apparatus	16	8	C,Z,AF	District Frame Locking Relay Cir- cuit, Fig. 12	1	0	AC, AD
				Trunk and Channel Control Circuit Fig. 13, HS Apparatus and GN Wiring Less GN Appa- ratus, Fig. 13A or 13B, and 28, 69 and H Wiring Less X, AO, and CA Apparatus.	20	0	U,V
	0	0	B,D,E,F, AA,AL		1	1	P,Q,AT

	WIRE	EQUIP	NOTES		WIRE	EQUIP	NOTES
Transmitting Relay Circuit, Fig. 14, HK, HM, and S Apparatus and Wiring for HM Apparatus, Less N and AU Wiring and Apparatus	1	1	O,AG,AM,BK	Originating Marker Test Connector Relay Circuit, Fig. 26 and AO	1	1	AT
Channel Testing Relay Circuit, Fig. 15	20	20		Originating, Marker Busy Circuit, Fig. 27, Less CBS Relay	1	1	Y
Circuit for Distributing Successive Calls to Different Subgroups of Outgoing Trunk, Fig. 16	1	0	G,H	Route Transfer Control Circuit, Fig. 30	2	0	AK
Circuit for Distributing Successive Calls over Different Subgroups of Junctors, Fig. 17 and 38, Less AJ and AK Apparatus	1	1	R,S,AR	Route Transfer Relay Circuit, Fig. 33, G and H Wiring, Relays RT 0-4	5	0	B,AK
Pattern Relay Circuit, Fig. 18	14	0	W	Route Transfer Relay Circuit, Fig. 33, G Wiring, Relays RT 5-9	5	0	AK
Trunk Test Relay Circuit, Fig. 20, X and Y Options, Less X Apparatus	10	10	P	Class-of-Service Auxiliary Relay Circuit Fig. 34 (A&M Only)	0	0	AL,AO
Circuit for LC Leads, Fig. 20A	1	1		Terminating Overload Control Relay Circuit, Fig. 35	1	0	B
Pattern Auxiliary Relay Circuit, Fig. 21	5	0	W	Class-of-Service Peg-Count Relay Circuit, Fig. 36	1	0	AD
Trouble Indication Connector Relay Circuit, Fig. 22	1	1		Coin Class Reroute Relay Circuit, Fig. 37	8	0	AQ
Sender Test Connector Relay Circuit, Fig. 23	2	1	X,BK	Cross Cut-Off Relay Circuit, Fig. 40	1	0	N,AN
Contact Protection Circuit, Fig. 24	5	5		Zone Registration Relay Circuit, Fig. 41	1	0	N
Ground Supply Relay Circuit for Overflow and Permanent Signaling Routes, Fig. 25	1	1	L	Start Auxiliary Circuit, Fig. 57	1	1	
				Circuit for 11X Service Code Translation or for Operation with Prefix Code 11, Fig. 64	1	0	BC
				Improved Trouble Indication at OTI, Fig. 68, and KO and KU Options	1	1	
				Class-of-Service Leads Circuit,			

	WIRE	EQUIP	NOTES	
Fig. A and AV, Universally Wired Channel Locking Relay Circuit, Fig. F	1	0	AJ	<i>List 5</i> —Equipment per SD-25016-01, Fig. 42, and associated options, required in addition to list 1 when a maximum of four pairs of split 2-party classes of service is required.
Miscellaneous Control Relays and Capacitor- Timed Time-Out Cir- cuit, Fig. K,Z, and AC Circuit to Delay Clo- sure of Trouble-De- tecting Relays, Fig. M	1	1		<i>List 7</i> —Wiring and equipment per SD-25016-01, Fig. AM, and GV option, required in addition to list 1 to arrange the marker to work with senders that are arranged for toll diversion feature to provide toll diversion of PBX originated calls on a zone and route basis when the PBX lines to the central office are equipped with a diverting circuit.
Circuit for Over-Five Office Brush When OFF-9300 Feature is Not Required, Fig. N	1	1		<i>List 8</i> —Wiring and equipment per SD-25016-01, Fig. 46, and FK wiring, required in addition to list 1 for one office A translation relay circuit when one or more preroute relays per SD-25016-01, Fig. 47 are equipped per J28751B, List 6.
Circuit for Over-Five Office Brush When OFF-9300 Is Required, Fig. O	1	0	AN	<i>List 9</i> —Wiring and equipment per SD-25016-01, Fig. AQ, and IK option and wiring only for HE, HF, HG, HH, HI, HJ, and IN options, required in addition to list 1 for MF outpulsing.
Check Lead Cross- Connecting Relay Circuit Arranged to Improve TI Record, Fig. Q	1	0	AN	<i>List 10</i> —Equipment per SD-25016-01, HE option (RA1—relay) required in addition to list 9. (See Note BS.)
OMC Traffic Lockout, All-Markers-Busy Alarm and OM Busy Circuit, Fig. S	1	1		<i>List 11</i> —Equipment per SD-25016-01, HF option (RA2—relay) required in addition to list 9. (See Note BS.)
Permanent Signal Auxiliary Relay Circuit, Fig. T	1	1		<i>List 12</i> —Equipment per SD-25016-01, HG option (RA3—relay) required in addition to list 9. (See Note BS.)
Circuit per Fig. U Relay Circuit for Use With Subscriber Senders Arranged for Operator Dialing, Fig. V	1	0	AE	<i>List 13</i> —Equipment per SD-25016-01, HH option (RA4—relay) required in addition to list 9. (See Note BS.)
				<i>List 14</i> —Equipment per SD-25016-01, HI option (7DG—relay) required in addition to list 9. (See Note BS.)
				<i>List 15</i> —Equipment per SD-25016-01, HJ option (SKP—relay), required in addition to list 9. (See Note BS.)
				<i>List 16</i> —Wiring and equipment per SD-25016-01, Fig. 48, required in addition to list 1 to arrange marker for use with the traffic usage recorder circuit. (See Note AU.)
				<i>List 17</i> —Wiring per SD-25016-01, HO, HP, HU, and HY options, required in addition to list 9 to provide for operation with ANI.
<i>List 2</i> —Wiring only per SD-25016-01, Fig. 39, 40, and BA, and all options, required in addition to list 1 for AMA operation. (See Notes N and AN.)				<i>List 18</i> —Equipment per SD-25016-01, HO option (RA5—relay), required in addition to list 17. (See Note BS.)
<i>List 3</i> —Equipment per SD-25016-01, Fig. 39, 40, and BA, and all options, required in addition to list 1 for AMA operation. (See Notes N and AN.)				<i>List 19</i> —Equipment per SD-25016-01, HU option (RA7—relay), required in addition to list 17. (See Note BS.)

- List 20**—Equipment per SD-25016-01, HV option (PT1, PT2, PT3, PTK—relay), required in addition to list 17. (See Note BS.)
- List 21**—Equipment per SD-25016-01, HP option (RA6—relay), required in addition to list 17. (See Note BS.)
- List 22**—Equipment and wiring per SD-25016-01, Fig. 49, with IE and IG wiring only, required in addition to list 1 to provide for intersender timing with announcement. (See Notes AV and AX.)
- List 23**—Wiring and equipment per SD-25016-01, Fig. 50, HW and BF options in Fig. 1, and HW option in Fig. 13, 17, and J or K, required in addition to list 1 for recording the number of calls that are routed to overflow due to failure to match on second trial.
- List 24**—Wiring and equipment per SD-25016-01, Fig. AQ, and HT option, required in addition to lists 9 and 17 for the ANI feature or list 9 and/or 7 and 37 for the AMA with access code feature when diversion of restricted PBX traffic on extra-charge calls is required.
- List 25**—Equipment required in addition to list 1 for individual peg counts on code points which use the same route relay. (See Note AY.)
- List 26**—Wiring and equipment per SD-25016-01, Fig. 54, BF and JD options, required in addition to list 1 to arrange the marker for 6-digit translation when either or both 3-digit common or individual translators are required. (See Notes AZ and BN.)
- List 27**—Wiring and equipment per SD-25016-01, Fig. 53, BF and JD options, required in addition to list 1 to arrange the marker for 6-digit translation when Fig. 29, IA apparatus, and R8 bay are equipped and a 3-digit common translator is required.
- List 28**—Wiring and equipment per SD-25016-01, Fig. 56 required in addition to list 26 or 27 for markers arranged for 6-digit translation for compressed codes which require routing to a single tandem office, to vacant code, or to overflow. (See Note BB.)
- List 29**—Wiring and equipment per SD-25016-01, Fig. AS required in addition to list 26 or 27 for markers arranged for 6-digit translation to provide for handling originating traffic from two numbering plan areas. (See Note BN.)
- List 30**—Wiring and equipment per SD-25016-01, Fig. 52 and JB and MK options required in addition to list 1 when the marker is required to provide separate peg count registrations for TOUCH-TONE® and rotary-dialed originating calls.
- List 31**—Wiring and equipment per SD-25016-01, Fig. 8, JI option, required in addition to list 1 when the office is arranged for 2-party flat rate service and tip party identification is required for ANI.
- List 32**—Wiring and equipment per SD-25016-01, Fig. 55, and JO option, required in addition to list 26 or 27 when recycle feature is provided without the access code feature. (See Notes AZ and BA.)
- List 33**—Wiring and equipment per SD-25016-01, Fig. 59, 60, and 61 and equipment per Fig. 64 required in addition to list 1 when the access code feature is provided without the recycle feature and more than one translator may be required for the access code feature. (See Note BJ.)
- List 34**—Wiring and equipment per SD-25016-01, Fig. 55, 60, and 61 and equipment per Fig. 64, and JP and JT options, required in addition to list 1 when both the access code feature and the recycle feature are provided and more than one translator may be required for the access code feature. (See Notes AZ, BA, BI, and BJ.)
- List 37**—Wiring and equipment per SD-25016-01, Fig. 65, and KB option, required in addition to list 3 and list 33 or 34 to arrange the marker for both local AMA and access code features. (See Note BD.)
- List 38**—Wiring and equipment per SD-25016-01, Fig. AT required in addition to list 37 when 4-, 8-, or 10-party line service is provided. (See Note BE.)
- List 39**—Wiring and equipment per SD-25016-01, Fig. 67, and KP option, required in addition to list 1 when the feature for testing the peg count and overflow registers of an outgoing group from the OTI is required.
- List 40**—Equipment per SD-25016-01, KY option (RA8—relay) required in addition to list 17. (See Note BF and BS.)
- List 41**—Equipment per SD-25016-01, LH option (RA9—relay) required in addition to list 17. (See Note BS.)
- List 42**—Wiring and equipment per SD-25016-01, Fig. 70, and LB option, required in addition to lists 2 and 3 to arrange the marker

for operation with No. 101 ESS PBX stations requiring automatic identification of outward dialing. (See Note BH.)

- List 43**—Wiring and equipment per SD-25016-01, Fig. 71, required in addition to list 33 or 34 when one or more of the codes in series 200-999 is both an office and an area code.
- List 44**—Wiring and equipment per SD-25016-01, Fig. 63, and LQ option, required in addition to list 33 when the office is arranged for prefix codes 01 and 10 and the access code feature is provided without the recycle feature. (See Note BJ.)
- List 45**—Equipment per SD-25016-01, LO option (RA10-relay) required in addition to list 17. (See Note BS.)
- List 48**—Wiring and equipment per SD-25016-01, Fig. AZ, required in addition to list 1 to provide for the detection of a "0" or "1" following the compressed area code. (See Note BQ.)
- List 49**—Wiring and equipment per SD-25016-01, Fig. 82 and JF and MO options required in addition to list 1 when marker is required to provide separate peg count registrations for TOUCH-TONE and rotary-dialed 10-digit foreign area calls.
- List 50**—Equipment per SD-25016-01, Fig. O (omit Fig. N) required in addition to list 1 when over five office brush and "Off-9300" features are required for the coin service improvements (dial-tone-first) feature.
- List 53**—Apparatus required in addition to list 51 when office link extension frames are required per SD-25016-01, NL option.
- List 54**—Apparatus required in addition to list 1 when dynamic overload control feature is required per SD-25016-01, MW option.
- List 55**—Wiring and equipment per SD-25016-01, NV option, required in addition to list 1 to provide announcements for failure to execute correct dialing procedure for the use of the prefix 1 when NO/1X office codes are used.
- List 56**—Wiring and equipment per SD-25016-01, NW option, required in addition to list 1 when provisions are not made to provide announcements for failure to execute correct dialing procedure for the use of prefix 1 when NO/1X office codes are used.
- List 57**—AT&TCo Special—Wiring and equipment required in addition to list 1 when office

is required to operate with the Message Charging System in accordance with SD-25016-01, QB option (omit QA option).

- List 58**—Wiring and equipment per SD-25016-01, QE option, required in addition to list 1 when office is to operate with the Centralized Status, Alarm and Control System (CSACS).

Notes

- A. One additional multicontact relay mounting unit ED-25022-01, Item 6 is required in list 1 when E apparatus is specified, and one additional unit ED-25022-01, Item 6 is required in list 1 when grouping GP OB and GP IB relays of Fig. 5 are equipped.
- B. When it is required to cancel the terminating sender load control feature on calls from A attendants, equip Fig. 35, provide H apparatus in Fig. 4, and connect H wiring in those Fig. 33 used for terminating load control; otherwise, omit Fig. 35, provide A apparatus in Fig. 4, and connect G wiring in all Fig. 33.
- C. The D, E, F, AG, FC, FD, and AL apparatus shall be equipped in list 1 as follows: D apparatus when 2-party service is specified in non-AMA office; FC and FD apparatus when split 2-party service is specified in the office; E apparatus when the marker is to be arranged for 3-digit office codes; F apparatus when the marker must register district frame numbers 10 to 19; AG apparatus when the marker has access to any trunk group subdivided into exactly two subgroups; and AL apparatus when the originating marker is to be used in conjunction with A switchboard senders. Provide HC apparatus when the originating marker is associated with district junctors that are equipped with wire spring relays. (See Note BL.)
- D. One class-of-service relay circuit shall be equipped in list 1 for each class of subscriber served by the associated senders and one for the keypulsing attendant class when keypulsing is provided. However, when only one class of subscriber and no keypulsing attendant class is furnished in an office, no class-of-service relays are required.
- E. The strapping for class-of-service S 0-15 relays shall be included in list 1 in all cases. The

- strapping for S 16-25 relays shall be furnished when more than 16 S relays are required.
- F. The windings of the class-of-service relays are wired to SW punchings 0-24 from which cross-connections can be run to D and DA punchings of the D register relays. This arrangement permits the S relays to be equipped in numerical order and provides facilities for equalizing wear.
- G. The AE apparatus shall be equipped in list 1 when the marker is required to test outgoing trunk groups of two or more subgroups.
- H. The AF apparatus shall be equipped in list 1 when the marker is required to test outgoing trunk groups of three or more individual subgroups with or without an additional common subgroup.
- I. Two grouping relay circuits corresponding to GP OA and GP IA relays of Fig. 5 shall be equipped in list 1 when the marker is to have access to a maximum of 15 trunk groups of two first choice subgroups each. If the number of these trunk groups exceeds 15, two additional grouping relay circuits corresponding to GP OB and GP IB relays shall be equipped.
- J. Equipment for grouping relay circuits Fig. 9, 9A, and 9B shall be equipped in list 1 as follows:
1. twelve Fig. 9 when the marker is to have access to any trunk group 2, 3, 4, 6, or 12 individual subgroups with or without a common subgroup or of two individual subgroups with or without a common subgroup if the capacity of the GP relay Fig. 5 is exceeded,
 2. twelve Fig. 9A when the capacity of the Fig. 9 in J.1 is exceeded and access is required to trunk groups of three individual subgroups with or without a common subgroup, and
 3. twelve Fig. 9B when the capacity of the Fig. 9 is exceeded and access is required to trunk groups of four individual subgroups with or without a common subgroup.
- K. The leads from the first Fig. 6 to 7 shall be extended in the local cable to the position of the terminal strip adjacent to the R 40 relay of the first route relay bay. The leads from the second, third, and fourth Fig. 6 shall be extended similarly to the position of the terminal strip adjacent to the R 30, R 20, and R 10 relays, respectively.
- L. The leads from Fig. 25 to 7 shall be extended in the local cable to the position of the terminal strip adjacent to the R 00 relay of the first route relay bay.
- M. The AH apparatus shall be equipped in list 1 when the marker is to have access to build-out office link frames.
- N. When the marker is required to function with automatic message accounting, provide FJ and CX apparatus per Fig. 8; GZ wiring per Fig. AO; Fig. 39, 40, and BA with GZ wiring, and Fig. AI if AL option is used. Equip MI1 to MI9 and MIA to MIJ relays in accordance with the message index conditions (MI1 to MI9) specified by the telephone company, and locate them in correspondingly numbered positions on the mounting plate on the marker frame. Wiring for AMA per list 2 shall be included in the frame local cable list 1. For message register operation, provide options as called for in Circuit Note 181 and furnish ZA and ZA1 to ZJ and ZJ1 relays in Fig. 41 and BM, one pair for each zone change condition specified by the telephone company. These relays shall be equipped in the order A to J.
- O. The N apparatus and its wiring for the second office selection feature is Mfr Disc.
- P. Options X, AO, IV, and LY are required when the marker is to have access to outgoing trunks used in common with Panel System equipment; otherwise, Y option and CA apparatus shall be equipped.
- Q. When two groups of markers have access to a common group of outgoing trunks, IV and LY options shall be equipped in the first marker group and IW and LX options in the second marker group. Provide IV and LY options when none of the outgoing trunks to which the marker is to have access are associated with two marker groups or with panel equipment.

- R. The AJ and AK apparatus shall be equipped in list 1 when the number of office link frames for which the office junctor distribution is arranged is 2, 4, 6, or 8. (See Note AR.)
- S. The W and Z wiring in Fig. 17 consists of cross-connections between terminal strip punchings.
- T. One office frame relay per Fig. 10 shall be equipped in list 1 for each two office link frames for which the office junctor distribution is arranged in the installation. Relay 0 0 serves office link frames 0 and 1, relay 0 1 serves frames 2, and 3, etc.
- U. Office frame relays 0 0 to 0 3 require all wiring shown in Fig. 10. However, for relays 0 4 to 0 9, the EB, EC, ED, OB, OC, and OD leads are not required and shall not be wired. Relays DF 0 to DF 7 require all wiring shown in Fig. 12; however, for relays DF 8 to DF 19, EE, OE, EEP, and OEP leads are not required and shall not be wired.
- V. One district frame lock relay per Fig. 12 shall be equipped in list 1 for each district link frame for which the office junctor distribution is arranged. The relays shall be equipped in the order 0 up to agree with the district link frame numbers.
- W. Equipment for junctor patterns per Fig. 18 and 21 shall be furnished in list 1 to agree with the office junctor distribution as follows. (See Note AR.)

NUMBER OF FRAMES FOR WHICH JUNCTOR DISTRIBUTION IS ARRANGED	EQUIP	
	FIG. 18	FIG. 21
2, 4, or 10	0	0
6 or 20	2	0
8	8	2
12 thru 18	10	5

- X. The second sender test connector relay, Fig. 23, shall be equipped in list 1 when two sender test frames require access to the marker.
- Y. The CBR relay of the originating marker busy circuit, Fig. 27, shall be equipped to provide busy leads for the connectors on OMC 0 to

OMC 3 frames. The CBS relay shall be equipped to provide busy leads for OMC 4 to OMC 7 frames. Busy leads for connectors on OMC 8 and OMC 9 frames are obtained from the CBT relay of Fig. S.

- Z. Included in list 1 shall be two 209B terminal strips, designated CG, wired per SD-25016-01, Fig. 3Y, with wiring extended in local cable to positions of CG 0-36 terminals on XTS RA on the route relay bay.
- AA. Included in the local cable for list 1 shall be wiring per SD-25016-01, Fig. 4Y, consisting of 60 INTC-RC 0-59 leads for terminals on XTS D to position of corresponding terminals on XTS RA and XTS RC lower on the first route relay bay.
- AB. The DB and TM interrupters shall be located on the office interrupter frame.
- AC. The JC 0-9 relays of Fig. 19 shall be equipped in all cases. The JC 10-19 relays shall be equipped as required in accordance with the number of JC leads required for the size of installation for which the office junctor distribution is arranged. The leads to 2B and 3B contacts shall be looped at the position of unequipped or unused JC relays.
- AD. The F ground lead shall be run to the CK5 relay of Fig. 1 after being run to the JC relays of Fig. 19.
- AE. Equip Fig. V and BA when the marker is arranged to function with subscriber senders arranged for attendant dialing. Equip Fig. U and BA when Fig. V is not equipped. Equip Fig. AH or AI when keypulsing A operators have direct trunks to crossbar tandem or district and office selectors, and use common route relays. Furnish Fig. AI when the marker functions with the Automatic Message Accounting System; otherwise, furnish Fig. AH. (See Note BL.)
- AF. The AW option is furnished in J28751C.
- AG. The 2-step PCI class-of-call AU apparatus is rated Mfr Disc. (See Note BN.)
- AH. The two MISC and TBS fuses required for the figures of SD-25054-01 shall be located

on the 48-volt fuse panel of the fuse bay. The MISC and TBS ground leads shall be connected to ground terminals on the frame fuse panel.

- AI. Included in the local cable for list 1 shall be wiring for six leads, INTC-PC 0-5 from XTS D to the position of corresponding terminals on XTS OF-PC of the first route relay bay as shown in SD-25016-01, CAD 27 and the local cable drawing. No. 20-gauge-type F wire shall be used for these leads.
- AJ. Figure AV shall be equipped in list 1 when the SGR lead from the sender is used for class-of-service indications to the marker; otherwise, Fig. A shall be equipped.
- AK. The first four route transfer RT relays 0-3 are used for terminating sender load control feature. The fifth RT4 relay may be used for terminating sender load control and for transferring traffic under control of an RT key at the switchboard. Any one of RT relays 4-9 may be used for transfer of traffic under control of the Route Transfer Control Circuit, SD-25473-01. When any of the above features are ordered by the telephone company, CK4A relay per Fig. 30 shall be equipped. Route transfer RT 5-9 relays and route transfer control CK4B relay per Fig. 30 shall be used for transferring traffic under control of RT keys at the switchboard and shall be equipped only when RT4 relay is not available for this use or when more than one RT key per marker is required at the switchboard. The RT keys per Fig. 31 of SD-25016-01 or per Fig. 5 of SD-56048-01 for the No. 3C or 3CL switchboard are furnished on the basis of one per marker per route transfer relay. The keys are located in the cable-turning section of the A switchboards or in the face of the 3C- or 3CL-type switchboard. Where the Route Transfer Control Circuit, SD-25473-01, is used with the RT4 transfer relay, the RT key per Fig. 1 of SD-56048-01 is used and furnished per group of originating markers or per two groups of originating markers. It is located in the face of the No. 3C or 3CL switchboard.
- AL. Wiring for the contacts and windings of S 0-15 relays shall be included in the local cable for list 1 in all cases. Supplementary wiring

for contacts and windings of additional class-of-service S 16-24 relays shall be included either in the local cable for list 1 or in supplementary forms superimposed on the frame local cable and containing wiring as follows:

1. Wiring to contacts and windings of S 16-19 relays when more than 16 class-of-service relays are required.
 2. Wiring to contacts and windings of class-of-service S 20-24 relays when more than 20 class-of-service relays are required.
 3. When markers are added to marker groups where the existing markers are arranged per J28751A, Fig. 17A and 20A, the added markers shall be so arranged.
 4. Class-of-Service Auxiliary Relay Circuit, SD-25016-01, Fig. 34 is rated A&M Only and wiring and equipment for this figure shall be furnished, only when required, on markers that are added to marker groups where the existing markers are equipped with these relays. On this basis, one Fig. 34 shall be equipped for each equipped Fig. 4. The SA relays have a capacity of ten additional SC points (SC20-SC29); however, because of terminal strip space limitations facilities are available for only five additional SC points (SC20-SC24) as shown in cross-connection Fig. 34. Where any of the zone charge ZI and ZJ relays per Fig. 41 are ordered and the marker is equipped with auxiliary class-of-service relays per Fig. 34, recommendations should be obtained from the Bell Telephone Laboratories, Incorporated, for the relocation of punchings for the SC21 and SC22 leads which are now located, when required, in place of the ZI and ZJ terminals on the route relay bay, so that they may be cross-connected to the R winding of route relays.
- AM. The S apparatus shall be equipped in list 1 when alternate routes through 3-wire office selectors are required.
- AN. When OFF-9300 feature and over-five-office brush-indication or coin service improvements (dial-tone-first) features are required and the marker is arranged for message register

- operation, Fig. O with FI option shall be furnished. When these features are required and the marker is arranged to function with the Automatic Message Accounting System, Fig. 40 and Fig. O with FJ wiring shall be furnished. When the over-five-brush-indication feature only is required for markers that are arranged for either message register operation or automatic message accounting, Fig. N shall be furnished.
- AO. Except as noted in Note AL, when facilities are ordered for more than 20 SC points provided by Fig. 4, one Fig. 43 shall be equipped for each equipped Fig. 4 as outlined in J28751E.
- AP. Equip Fig. 36 when it is desired to provide marker peg count on a class-of-service basis.
- AQ. To provide for routine 10-, 15-, 20-, and 25-cent calls from coin lines through crossbar tandem using 7-digit PCI outputting or through sender tandem, equip CRR relays of Fig. 37 as follows: one each for 10-, 15-, 20-, and 25-cent calls without station delay. In those areas, arranged for an initial 10-cent charge, the CRR relays used for 10-cent calls from coin lines may be used for 30-cent calls if desired. The CRR relays 0-7 shall be equipped in 0 up order. This arrangement may be used in a similar pattern for other than coin lines as may be required.
- AR. Where new markers are being furnished for existing offices of the 2-2 to 8-8 district office frame size and will be required to operate with the old Mfr Disc. office junctor distributions per ED-25016-01, Fig. 1, 2, 3, or 4, these markers shall be equipped with junctor pattern relays and associated wiring and cross-connections in accordance with Note 120 of SD-25016-01 to conform with existing markers. In this case, wiring per Fig. 38 shall not be connected.
- AS. The multiple of the A, B, and TEL jacks per SD-25054-01, Fig. 2, 6, and 9 shall be extended only to route relay bays that are not located in the same lineup as the associated marker frame when requested by the telephone company.
- AT. The GN and GX options with Fig. 69 and AO shall be equipped when verification of "group start" and "group end" of a group of trunks is required. The operation of the GSE key in conjunction with other keys in the trouble indicator frame will ground the GSE lead and operate the GSE relay in the marker which results in the operation of two K relays corresponding to the operated GS- and GE- relay. Option HB shall be connected when diversion of restricted PBX traffic is required.
- AU. Provide II wiring per Fig. 10 when the marker is arranged for use with the traffic usage recorder circuit.
- AV. When the office is arranged for intersender timing:
1. Provide list 22 and cross-connect the AC terminal to the RA terminal of route relay in other than ground supply five as required.
 2. When provision is required for operation of the PC register of the overflow and announcement trunk groups, the RA terminals of the overflow route relay and the RA terminals of the announcement route relays in ground supply five shall be multiplied as required.
- AW. Provide IF option when the office is not arranged for intersender timing and provision is required to prevent the false operation of the PC register of the overflow trunk group on calls from lines which have been denied service by opening the line message register lead.
- AX. Remove sender load equipment (BV option) when intersender timing is required. (See Note BM.)
- AY. The equipment consists of PC terminal strip mounted on the bottom of the right bay of the common equipment frame and a bar with seven fanning rings mounted on the right side of the right bay for use in cross-connections from PC terminal strip to other terminal strips on the frame.
- AZ. When a marker is equipped with Fig. 44 or 29 and IB apparatus, these figures should be rewired in accordance with Fig. 54 and 55 and GR wiring. If an R8 bay is used instead

- of a 3-digit individual translator, IY wiring of Fig. 54 should be furnished. Additional wiring must be added between the contacts of TNO relay and the RC2 terminal strip.
- BA. When a marker is equipped with Fig. 29, IA apparatus, this figure should be rewired in accordance with Fig. 53 and 55. Additional wiring must be added between the contacts of the TNO relay and RC2 terminal strip.
- BB. A maximum of two list 28 may be provided per marker.
- BC. There shall be included in the local cable for list 1 wiring per SD-25016-01, CAD 18 consisting of ten leads, C 110-119, from terminals on X terminal strip D to the position of corresponding terminals of X terminal strip RC lower on the first route relay bay.
- BD. The KC wiring and apparatus shall be provided in list 37 when any of the subscriber senders associated with the marker are not equipped for first office selections.
- BE. Wiring of the D0-7, 9-15 and DA-1-6, 9-14 punchings of CAD 10 shall be included in list 38 when list 29 is not specified.
- BF. Provide KZ option in Fig. AQ in markers which are wired per option KH.
- BH. The LF option shall be provided in list 42 when the marker is arranged for both local AMA and access code features.
- BI. Provide LQ option in list 34 when operation with prefix codes 01 and 10 is required.
- BJ. When operation with prefix codes 01 and 10 is required provide LR option if the marker is arranged for 6-digit translation per list 26 or 27. Otherwise provide LS option.
- BK. Provide CG wiring when the marker is arranged for alternate route compensating resistance control.
- BL. When the marker is arranged for operation with interchangeable office and area codes provide LC option or AI option if AL option is not furnished. (See Notes C and AE.)
- BM. Provide BV option when senders per SD-27810-01 are served by the marker.
- BN. J28751A-() includes AR apparatus in list 26, and when list 29 is provided AR apparatus is omitted. Provide MA wiring when Fig. AR is provided and MB wiring when Fig. AS is provided.
- BP. When any marker in a group is equipped with IR wiring all markers in the group should be equipped with IR wiring in order to insure consistent TUR indications.
- BQ. When list 48 is not provided, wiring per SD-25016-01, Fig. AY should be furnished.
- BR. Provide Fig. 81 and MI option for the Service Results Plan.
- BS. List 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 40, 41, and 45 shall be ordered as specified by the telephone company in accordance with SD-25016-01, Note 199 and/or 266.
- BT. All lists include the associated after-date Standard figures and options. Feature options are wired in associated local cable and connected as required.
- BU. Option NU is provided when:
1. An office uses subscriber sender recycle or access codes.
 2. Marker serves originating traffic from two numbering plan areas.
 3. One area has a dialing plan which uses NO/1X codes as office codes.
 4. A "0" or "1" prefix to indicate ten digits and no prefix to indicate seven digits.
- Otherwise option MU is provided.
- J28751B—AT&T Co Std—Originating Marker
Frame Route Relay Bay Unit***
- Equipment—J28751B-()
- Local Cable—ED-25223-10

List 1—Framework, assembly, wiring, and common equipment for one route relay bay for 100 route relays (less the route relays.)

	WIRE	EQUIP	NOTES
Framework, ED-25224-30, G2		1	
Miscellaneous Circuit, SD-25054-01: Fig. 10 & 12	1	1	B,C
Originating Marker Circuit, SD-25016-01: Route Relay Circuit, Fig. 7, Less R Relays & Strapping	100	0	A,H, I
Route Advance Interconnectors, Fig. 78	1	0	F
Alternate Route Compensating Resistance Control Circuit, Fig. AW	0	0	K
Terminal Strip BN5A Designated C, With 400 Wires, One Per Terminal Extending in Sewed Form to the Corresponding Terminal Position in the Preceding Bay	2	2	B
Terminal Strip 209B		4	F,G
Terminal Strip BN2A Designated GC		1	F

List 2—Framework, wiring, and equipment required in addition to list 1 to equip one route relay bay with 20 route relays.

	WIRE	EQUIP	NOTES
Multicontact Relay Mounting Unit, ED-25022-01: Item 5		1	
Originating Marker Route Relay Circuit, SD-25016-01: Fig. 7	20	20	C,J

List 3—Framework, wiring, and equipment required in addition to list 1 to equip one route relay bay with ten route relays.

Multicontact Relay Mounting Unit, ED-25022-01:

	WIRE	EQUIP	NOTES
Item 5		1	
Originating Marker Route Relay Circuit, SD-25016-01: Fig. 7	10	10	D,E, J

List 4—Equipment per SD-25016-01, Fig. 7 for ten route relay circuits in addition to list 3. (See Note E.)

List 5—Wiring and common equipment required in addition to list 1 to arrange one route relay bay in one originating marker for the preroute relay translation circuit when the "high five" incoming group feature is required for office A and office B routings over common trunk groups and the use of a separate route relay for office A is to be avoided.

	WIRE	EQUIP	NOTES
Mounting Plate and Two Terminal Strips per ED-25221-01: Fig. 5		1	
Originating Marker Circuit SD-25016-01: Fig. 47	15	0	

List 6—Equipment per SD-25016-01, Fig. 47 required in addition to lists 1 and 5 to equip one preroute relay translation circuit (PRH relay) when the "high five" incoming group feature is required for office A and office B routings over common trunk groups and the use of a separate route relay for office A is to be avoided.

List 7—Terminal strip DOC required in addition to list 1 for operation with dynamic overload control feature.

Notes

- A. The R route relays and strappings are furnished in lists 2, 3, and 4.
- B. The C110-119, C200-999, GC-GS00-38, GC-GE00-38, GC-ST00-38, CG00-36, INTC-RC0-19, TF, RF, 48V, HRG, GRD, and TB leads must be

terminated in the notches of the terminals on the route relay bay on which they are equipped.

- C. In general, each route relay bay except the last of each originating marker will be fully equipped with 100 route relays. On all fully equipped bays, five relay units per list 2 shall be furnished.
- D. In general, not more than one route relay unit with ten relays equipped per list 3 will be required for a partially equipped route relay bay, and then only if the number of route relays specified is not an even multiple of 20.
- E. In list 3, the multicontact relay terminal strip is in position 1 and the multicontact relays in positions 2 to 6 of the mounting unit. The relays are strapped to the terminal strip and the straps are extended in multiple duct sleeving to a support in position 12. If equipment is added in the field in this unit, it is intended that at one time the relays of list 4 shall be added in positions 7 to 11 and a terminal strip added in place of the support in position 12. The multiple duct sleeving is removed during the change and the result in the end is a unit which is the same as list 2.
- F. The first route relay R0 bay of each originating marker and route relay R8 bay per J28751C differ from other route relay bays in the manner in which certain wiring is furnished. For R8 bay, refer to J28751C. The first route relay R0 bay differs only in that it does not require any wiring of its own other than that obtained in the bay local cable and the sewed forms to the terminal strips designated C. Wiring to the common unit equipment which, in the case of R0 bay is obtained from extended arms of the common unit local cable, is obtained on other relay bays except R8 bay, in local cable forms to the preceding bay. These local cable forms which shall be furnished for each route relay bay except R0 and R8 bays are as follows.
1. One sewed form (local cable E) from the BN2A terminal strip GC with 160 wires, one per terminal, extending to positions of corresponding terminals on preceding bay.
 2. One sewed form (local cable F) with 100 wires from CG00-36, C110-119, INTC-RC00-59, TF, RF, 48V, G, and TB terminals on cross-connecting RA and lower RC terminal strips extending to positions of corresponding terminals on the preceding bay. (See Note H.)
 3. Three sewed forms (local cable D), one from each of the 209B terminal strips except XTS J-INTC, each with 80 wires, one per strip punchings, extending to the position of corresponding strip punchings in the preceding bay. (See Note G.)
 4. One sewed form (local cable G) with 35 wires from 0-34 on XTS J-INTC extending to positions of corresponding terminals on the preceding bay. When facilities are ordered for more than 35 J-INTC points, an additional 36 wires shall be added to this form from A, B, and C 3-14 as shown in CAD 27 of SD-25016-01.
- G. A complete multiple is provided of the 80 strip punchings of each terminal trip served by a local cable D to reduce the number of different forms and to permit future use of spare punchings.
- H. The leads to the RA cross-connecting terminal strip must be soldered to the notches of the terminal punchings. (See Note B.) On other than the first route relay bay of each originating marker, the arm containing the RA leads and the coincident horizontal form containing CG and INTC-RC leads shall be superimposed in the shop. Similarly, but in the field, the arm to the RA terminal strip on the first route relay bay, and the arm of the common unit local cable containing the CG and INTC-RC leads shall be superimposed.
- I. The TB lead of Fig. 7 multiples to all route relays in one bay and terminates in the notch of the right TB punchings on XTS RA. The multiple of the TB lead to the preceding bay terminates in the notch of the left TB punching, and the multiple lead from the succeeding bay connects in the hole of the same punching. The two punchings shall be strapped together on the equipment side.
- J. The wiring to be furnished as part of this list shall consist only of the bare wire strapping

on the multicontact relays. The local cable wiring is furnished in list 1.

- K. Furnish wiring per SD-25016-01, Fig. AW, in route relay bay R0 only, to provide a multiple between XTS CR and XTS SB when the feature for alternate route compensating resistance control is required.

J28751C—A&M Only—Originating Marker Frame Route Relay Bay R8 Unit

Equipment—J28751C-()

Local Cable—ED-25223-10

- List 1**—Framework, assembly, wiring, and common equipment for route relay bay R8 unit, for 60 route relays, and fifties translator relays, for codes having a prefix of 11, or for use as a foreign area translator with 6-digit translation, or for use as an access code translator (less route relays).

	WIRE	EQUIP	NOTES
Framework, ED-25224-30, G4:		1	
Multicontact Relay Mounting Unit, ED-25022-01: Item 6		2	
Miscellaneous Circuit, SD-25054-01: Fig. 10 and 12	1	1	
Originating Marker Circuit, SD-25016-01: Fifties Relay Circuit, Fig. 3, AW Apparatus and Wiring for AW Apparatus Only	16	16	B,C
Route Relay Circuit, Fig. 7, Less R Relays and Strapping	60	0	A
Route Advance Interconnectors, Fig. 79	1	0	C
Terminal Strips: 207B		1	C
209B		4	C

- List 2**—Terminal strip DOC required in addition to list 1 for operation with dynamic overload control feature.

Notes

- A. The route R relays and strappings are furnished as required in accordance with J28751B, Lists 2, 3, and 4.
- B. The wiring required to connect AW apparatus with equipment on the originating marker common unit, J28751A, is part of the installation wiring for this bay as shown in the circuit cross-connection figures.
- C. There shall be included in the local cable for list 1 the leads shown in the circuit cross-connection figures from cross-connecting terminal strips on R8 bay to cross-connecting terminal strips on the common equipment unit, J28751A, and route relay R0 bay. A list of the leads involved is contained in the equipment explanation for the local cable drawing.
- D. Wiring and equipment for the preroute relay translation circuit per SD-25016-01, Fig. 47 shall be furnished as required in accordance with J28751B, Lists 5 and 6.

J28751E—AT&T Co Std—Class-of-Service Frame Equipment

Equipment—J28751E-()

Local Cable—ED-26827-10

- List 1**—Framework, assembly, wiring, and common equipment for one class-of-service frame arranged for 20 additional SC points for use with two originating marker frames (less equipment for the second marker). (See Note A.)

	WIRE	EQUIP	NOTES	
Framework ED-25224-30, G8:		1		for use with second equipped marker associated class-of-service frame.
Multicontact Relay Mount- ing Unit, ED-25022-01:				
Item 5		1		Originating Marker Circuit
Cross-Connecting Terminal Strips, J28751E-()		1		SD-25016-01: Fig. 43
Originating Marker Circuit SD-25016-01: Fig. 43	50	0	A,B	0
Miscellaneous Circuit, SD-25054-01: Fig. 2, 6, 9, 10 & 12 Each	1	1		

List 2—Framework, assembly, wiring, and equipment required in addition to list 1 when 22 SA, 23 SA, and 24 SA class-of-service auxiliary relays are equipped for use with first equipped marker associated with class-of-service frame.

	WIRE	EQUIP	NOTES
Multicontact Relay Mount- ing Unit, ED-25022-01:			
Item 5		1	
Originating Marker Circuit, SD-25016-01: Fig. 43	6	0	A,C

List 3—Framework, assembly, wiring, and equipment required in addition to list 1 to arrange class-of-service frame for use with second originating marker frame.

	WIRE	EQUIP	NOTES
Multicontact Relay Mount- ing Unit, ED-25022-01:			
Item 5		1	
Cross-Connecting Terminal Strips J28751E-()		1	
Originating Marker Circuits, SD-25016-01: Fig. 43	22	0	A,D

List 4—Equipment only required in addition to lists 1, 2, and 3 when 22 SA, 23 SA, or 24 SA class-of-service relays are required

Originating Marker Circuit
SD-25016-01:
Fig. 43

Notes

- The class-of-service frame is required when facilities are ordered for more than the 20S points provided by SD-25016-01, Fig. 4. One SD-25016-01, Fig. 43 shall be equipped for each equipped Fig. 4. This frame is arranged to serve two originating marker frames as required.
- The bare wiring for 0 SA to 21 SA multicontact relays for the first equipped marker associated with the class-of-service frame shall be included as part of list 1.
- The wiring to be furnished as part of list 2 consists only of the bare strapping for 22 SA, 23 SA, and 24 SA multicontact relays for both markers associated with the class-of-service frame.
- The wiring to be furnished as part of list 3 consists only of the bare strapping for 0 SA to 21 SA multicontact relays for the second equipped marker associated with the class-of-service frame.

J28751F—AT&T Co Std—Originating Marker Peg Count Unit Equipment

Equipment—J28751F-()

List 1—Assembly, wiring, and equipment for one peg count unit for 20 peg count indications per SD-25016-01, ten Fig. 51.

Notes

- Reserved.
- Up to four peg count units are normally associated with one originating marker per marker group. These units are to be mounted on miscellaneous relay racks and cabled to the

marker for cross-connection as shown in CAD figures.

J28751G—AT&TCo Std—Originating Marker—Access Code Unit

Equipment—J28751G-()

List 1—Assembly, wiring, and equipment per SD-25016-01, Fig. 58 and 83 for one originating marker access code unit arranged for operation with two marker frames.

List 2—Wiring and equipment required in addition to list 1 when no sender recycle circuits are associated with this marker group per SD-25016-01, MT option.

Note

A. Each 2-marker unit requires nine 2- by 23-inch or eleven 1-3/4 by 23-inch mounting-plate spaces on a miscellaneous relay rack frame.

J28751H—AT&TCo Std—Originating Marker Interchangeable Code Control Unit

Equipment—J28751H-()

List 1—Assembly, wiring, and equipment for one surface-wired originating marker interchangeable code control unit per SD-25016-01, four Fig. 72, and one Fig. 73, required for resolving code conflicts when office codes do not require a prefix digit 1 for routing and area codes require a prefix digit 1 for routing. (See Notes A, B, C, and F.)

List 2—Wiring and equipment per SD-25016-01, one Fig. 73, required in addition to list 1 when one or more office codes require the prefix digit 1 for routing. (See Note D.)

List 3—Wiring and equipment per SD-25016-01, one Fig. 75, required in addition to list 1 when an additional pair of DR relays is required. (See Note E.)

Notes

A. List 1 shall include terminal strips A, B, C of CAD 23 and all individual and multiple wiring of Fig. 72.

B. Ten additional contacts for 0 and 1 prefix screening may be obtained by providing a

switchboard cable between this unit and the J28751G access code unit terminals ASC 30-39 and AS 30-39.

C. List 1 provides ASA relays 4 and 5.

D. List 2 provides ASA relays 6 and 7.

E. A maximum of three list 3 may be provided per originating marker.

F. Furnish one unit per originating marker.

J28751J—AT&TCo Std—Originating Marker Interchangeable Code Screening Unit

Equipment—J28751J-()

List 1—Assembly, wiring, and equipment for one originating marker interchangeable code screening unit required for resolving code conflicts when one or more of the codes in the series 200 to 999 is both an office and an area code. One unit required per marker.

	WIRE	EQUIP	NOTES
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Terminal Strips:

251H (designated A)		4	
251G (designated B)		4	
256B (designated C)		4	

List 2—Wiring and equipment required in addition to list 1 to equip one interchangeable code screening unit with screening relays.

	WIRE	EQUIP	NOTES
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Originating Marker Circuit, SD-25016-01:

Fig. 74			
(ASC contacts 40 to 69)	8	4	A,B
BY6A Terminal Strip (designated ASB)	1	1	B

List 3—Wiring and equipment required in addition to list 1 and 2 to equip one interchangeable code screening unit with 30 additional screening contacts.

	WIRE	EQUIP	NOTES
Originating Marker Circuit, SD-25016-01: Fig. 74			
(ASC contacts 70 to 99)	8	4	C,D
BY6A Terminal Strip (designated ASC)	1	1	D

List 4—Equipment required in addition to list 2 or 3 when the office is equipped with keypulsing A senders. (See Notes E and H.)

List 5—Equipment required in addition to list 2 or 3 when a separate translator (3DCT, 3DIT, or R8 bay) is *not* used for routing 0 prefix traffic. (See Notes F and H.)

List 6—Equipment required in addition to list 2 or 3 when one or more office codes require the prefix digit 1 for routing. (See Notes G and H.)

Notes

- A. Provides relays ASB 0, 1, 4, and 5.
- B. List 2 shall include the bare wire multiple of relays ASB 0-7 and the local cable between terminal strip B and terminal strip ASB and the individual contacts of relays ASB 0-7.
- C. Provides relays ASC 0, 1, 4, and 5.
- D. List 3 shall include the bare wire multiple of relays ASC 0-7 and the local cable between terminal strip B and terminal strip ASC and the individual contacts of relays ASC 0-7.
- E. Provides relays ASB 3 or ASC 3.
- F. Provides relays ASB 2 and ASC 2.
- G. Provides relays ASB 6 and 7 of ASC 6 and 7.
- H. Maximum of two lists per unit.

J28751K—AT&TCo Std—Originating Marker Dynamic Overload Route Transfer Relay Unit

Equipment—J28751K-()

List 1—Assembly, wiring, and equipment for one originating marker dynamic overload route transfer relay unit arranged for four markers and ten route transfer signals per marker and equipped for two marker and four route transfer signals per marker per SD-25016-01, Fig. 84 [2] and Fig. 85 [4].

List 2—Wiring and apparatus required in addition to list 1 for each marker for each additional pair of route transfer signals per SD-25016-01, Fig. 85.

List 3—Wiring and apparatus required in addition to list 1 or 2 for the sixth, eleventh, or sixteenth route transfer signal required for the first or second marker or for the first, sixth, eleventh, and sixteenth signal required for the third or fourth marker per SD-25016-01, Fig. 84.

Notes

- A. Reserved.
- B. The preferred location for this miscellaneous relay rack mounted unit is on the same bay with the other dynamic overload equipment.

J28751L—AT&TCo—Originating Marker Dynamic Overload Peg Count Unit

Equipment—J28751L-()

List 1—Assembly, wiring, and equipment for one originating marker dynamic overload peg count unit arranged to serve four originating markers and equipped for two originating markers per SD-25016-01, Fig. 86 [2].

List 2—Wiring and apparatus required in addition to list 1 for each additional originating marker to be served by this unit per SD-25016-01, Fig. 86.

Notes

- A. Reserved.
- B. The preferred location for this miscellaneous relay rack mounted unit is on the same bay with the other dynamic overload equipment.

J28751M—AT&TCo Std—Originating Marker Fuse Panel Unit

Equipment—J28751M-()

List 1—Assembly, wiring, and equipment, per SD-25054-01, Fig. 13, less FA relay, FL resistor, and AL lamp, for one originating marker fuse panel unit.

J28751N—A&M Only—Originating Marker Partial Speed Up Unit

Equipment—J28751N-()

List 1—Assembly, wiring, and equipment for one originating marker partial speed up unit per SD-25016-01, Fig. BH, BP, CA, and NA option. (See Note A.)

List 2—Apparatus required in addition to list 1 when originating marker tests outgoing trunks or groups of trunks used in common with panel selectors per SD-25016-01, Fig. 13A, NA option only.

Note

A. This surface wired unit is intended for the field modification of originating markers made prior to SD-25016-01, Issue 102D only.

5. GENERAL NOTES

Equipment

5.01 The multicontact relay mountings on the common equipment unit, the route relay bay unit, and the class-of-service frame have been treated as equipment items. It is considered desirable to mount the relays on the auxiliary framework and to strap them wherever possible as a separate assembly.

5.02 The filler details for closing the space between front and rear relay casings are specified as an equipment item because they cannot readily be furnished as part of a casing group or a framework group.

5.03 No designation cards are required for the originating marker frame. As indicated on the frame equipment drawing, the route relays on each route relay bay are numbered 00 to 99 and, one each originating marker, the first route relay bay is designated R0 and the second R1, etc. By combining the bay number and the relay number, each route relay is identified. On an originating marker frame equipped with 400 route relays, their numbers are therefore R000 to R399. The frame

designation DM0, DM1, etc, is stamped on the common equipment unit, and on the second, fourth, etc, route relay bays.

5.04 A considerable portion of the many designations required for the equipment of each originating marker may be stamped before the equipment is mounted on the frame. In this connection, the designations required for a unit of 20 route relays become the same as for every other unit of 20 if the tens digit of the relay number is omitted.

5.05 Test terminals for 48-volt, HRG, and GRD are provided on the jack panel mounting of the 2-bay common unit and on a panel mounted on the upright of each route relay bay and class-of-service frame.

5.06 Originating marker frames are arranged to permit growth in the number of route relay bays in a left-to-right direction facing the apparatus side for bays mounting route relays for ABC codes and, to permit growth in a right-to-left direction, beginning with R8 bay for route relays for ABC codes in adjacent foreign areas. Space shall be reserved for the ultimate number of route relay bays. When space is reserved for future route relay bays, each originating marker frame shall be furnished with end guards where such space occurs.

5.07 A minimum of three originating marker frames shall be equipped in any installation.

Summary of Factors Governing Provisions of Route Relay

5.08 In a particular installation, the number of route relays furnished on the originating marker frame is specified by the telephone company. The number required depends on several factors which are summarized in this section. The detailed requirements should be obtained from the originating marker circuit information.

(a) Sizes of trunk groups are:

- (1) one R relay per trunk group of 40 or less trunks, or of two subgroups of 40 or less each, and
- (2) two R relays per trunk group of three or more subgroups of 40 or less each.

- (b) For original routes direct or through office selectors, provide R relays [as in (a)] for each destination to be reached.
- (c) For original or alternate routes through full selector or manual tandem, provide R relays [as in (a)] for each office reached through the tandem point except that, for original routes, all offices which require the same zone charge and stations delay conditions can use the same route relay or relays and, for alternate routes, all offices which require the same stations delay conditions can use the same relay or relays.
- (d) For alternate routes through office selectors, provide R relay [as in (a)] for each destination reached through the office selector except that all destinations requiring, in the sender, the same beyond office compensating resistance and trunk guard relay can use the same relay or relays.
- (e) For permanent signal trunk groups, provide one R relay for each class of trunks provided.
- (f) For overflow signal trunk groups, provide one R relay for each of the following conditions:
- (1) destinations requiring no numerical digits,
 - (2) destinations requiring four numerical digits, and
 - (3) destinations requiring five numerical digits or a party letter.
- (g) For trunk groups direct to 2-wire office selectors from keypulsing A switchboards, provide one R relay for each 2-wire office for each destination reached through the 2-wire office.
- (h) For trunk groups to denied service attendant, provide R relays [as in (a)] for each class of trunks provided.

WIRING

Gauge of Wire

5.09 Number 20 gauge bare-tinned wire shall be used for all strapping between terminals of the multicontact relays and terminals of associated terminal strips.

5.10 Number 24 gauge-type BU wire shall be used for all leads in local cables except battery and ground leads which shall be No. 20 gauge-type AM wire and the leads in the ground supply forms made up by the installation force which shall be No. 22 gauge-type BU wire.

5.11 Number 24 gauge bare-tinned wire shall be used for the strapping required on the strip-type cross-connecting terminal strips. Where strapping is required, it is indicated on the circuit cross-connections and on the cross-connecting terminal strip equipment drawing.

Cross-Connections

5.12 Complete requirements for cross-connections for the originating marker frame, including among other things, size of wire, color of insulation, and description of terminal strip arrangements are covered on the cross-connecting terminal strip equipment drawing and its associated equipment explanation.

5.13 The cross-connections required on the originating marker are in two categories: first, those which are set by the size of the installation (that is, that can be determined from the job order) and second, those which depend upon information furnished by the telephone company at the time of installation. There may be some advantage, particularly in the case of junctor patterns, in running the cross-connections under the first category in the shop. The equipment design is such, however, that these cross-connections may be placed in the shop or in the field.

CABLING

Local Cables

5.14 It is intended that the hole in the terminal on the wiring side of the cross-connecting terminal strips shall be kept free of solder in those cases where a wire is connected in the notch, the

object being to permit the use of the hole for another wire which cannot be connected until some later time. When two leads are to connect to the same terminal but at different times, the first lead to be connected should terminate in the notch of the terminal and the hole of the terminal should be kept open for the second lead.

5.15 *Shop Local Cable:* Eight different shop-formed local cables are required for the originating marker frame. On the local cable drawing, these forms are identified by the letters: A for the 2-bay common unit local cable; B for the route relay bay local cable (except R8 bay); C for the horizontal form of 400 wires between cross-connecting terminal strips designated C on adjacent bays, two being required on each route relay bay (except R8 bay); D for the horizontal form of 80 wires between adjacent cross-connecting terminal strips of the strip punching type, four being required on each route relay bay other than R0 and R8 bays of each originating marker; E for the horizontal form of 160 wires between adjacent cross-connecting terminal strips designated GC; and F for the horizontal form between adjacent cross-connecting terminal strips designated RA. One each of forms E, F, and G is required for each route relay bay other than R0 and R8 bays of each originating marker frame. The eight H cable is the local cable for R8 bay and includes in addition to the bay wiring the necessary wiring to interconnect the cross-connecting terminal strips of the bay and those on the common equipment unit or R0 bay. The local cables shall contain wiring for all options shown on the circuit schematics and the wiring shall be connected as required to meet individual job specifications.

5.16 When it becomes necessary to add route relay bays to the originating markers and there is no more space available in the same lineup as the common equipment bays, the added bays may be located in a separate nonadjacent lineup. In this case, switchboard cables shall be used in place of C, D, E, F, and G local cables between the last equipped bay adjacent to the common equipment bays and the first equipped bay of the new lineup. The C, D, E, F, and G local cables shall continue to be run between other adjacent bays of each lineup. (See 5.21.)

5.17 *Local Cable Supports:* Vertical bars having an insulating finish are provided to which the main vertical forms of local cables A and B

may be tied. Vertical bars are also furnished to support the local cable arms of cable A inside the relay casings. No other supports are provided for any of the horizontal arms or cables. It is intended that the local cables C, D, E, and F and the installer-wired forms and certain horizontal arms of local cable A shall be tied when necessary to the supports for local cable B at the points where they pass under local cable B.

5.18 *Installer-Wired Local Cable for Ground Supply to Route Relays:* In addition to the shop local cables, small installer-wired forms are required between terminal strips of the various route relay units to multiple together all route relays which are in the same ground supply group. The segregation of route relays into definite ground supply groups will be specified by the telephone company before cutover, probably at the same time that cross-connecting information is furnished for the originating markers. The circuit requirements for assigning route relays to a specific ground supply group of the five available are fully covered in the circuit description. From an equipment standpoint, the installer-wired forms provide the flexibility required to obtain the grouping of route relays; however, the assignment of route relays into ground supply groups, and the running of the connecting leads must conform to the plan outlined in the following:

(a) ***Assignment and Installer Wiring of Route Relays Into Ground Supply Groups:***

Ground supply groups 1 and 2 contain all route relays representing destinations which have alternate routes; group 1 contains those relays representing first choice (individual subgroup) and only choice trunks and group 2 contains the relays for second choice (common subgroup) trunks. Ground supply groups 3 and 4 contain all route relays representing destinations having no alternate routes and all route relays representing the alternate routes; group 3 contains the relays for first choice (individual subgroup) and only choice trunks and group 4 contains the relays for second choice (common subgroup) trunks. Ground supply group 5 contains all route relays representing overflow and permanent signal trunks.

(b) The five sets of leads for the five ground supply groups originate in the common unit equipment and are extended in shop wiring as indicated on the local cable drawing, each set

to a definite route relay terminal strip position on the first route relay bay. Each route relay is a half of a 30-contact multicontact relay; therefore, each mounting unit of 20 route relay is ten such multicontact relays strapped together and to two 30-contact multicontact relay terminal strips, one at each end. The assignment of the first route relays of each ground supply group is fixed therefore by the position to which the ground supply leads are run.

(c) Ground supply group 5 contains relays representing only permanent signal overflow routes. The leads for this group are run to the terminal strip associated with the first ten route relays on the bay, since it is expected that the number of relays in this group will always be less than ten. The leads for ground supply groups 1 to 4 are run to the terminal strips associated with ten relays as follows: group 4, R 10 to R 19; group 3, R 20 to R 29; group 2, R 30 to R 39; and group 1, R 40 to R 49. Of course, if in an installation, no relays are required in a particular ground supply group, that set of leads need not be connected and the relays may be used temporarily in some other group to be released for their planned group if it is ever required.

(d) It is apparent that installer wiring is required to continue the sets of leads for ground supply groups 1 to 4 to other route relays on the same bay, and to route relay on the adjacent bay, and, in the event R8 bay is furnished, from R0 bay to the route relays of R8 bay. The terminal strips on the side of the bay nearer the common equipment unit should be used primarily to multiple relays on the same bay and on R0 bay to extend the ground supply leads to R8 bay. The terminal strips on the side of the bay away from the common equipment unit should be used primarily to extend the multiple to the succeeding bay. Such an arrangement, however, requires that relays be assigned in multiples of ten which might in some cases result in waste of relay capacity. It is recommended that relays be assigned to a ground supply group in multiples of ten whenever possible.

(e) In those cases where worthwhile economy is obtained, route relays may be assigned to the nearest five by cutting the multiple strapping in the middle of the strip of ten,

leaving five relays strapped to the left terminal strip and five to the right. An exception may be made in the case of the relays in the fifth ground supply group if there is any advantage in using the relays not required in the ultimate fifth group for some other ground supply group. Should it be required at some future time to splice this cut in the horizontal multiple strapping, it shall be accomplished by using an installer-wired form between terminal strips as required.

(f) The installer wiring for the ground supply group leads should be planned so that not more than two wires are connected to the same terminal.

(g) If relays are required in a particular ground supply group on any bay, and the leads for this group are not available on a terminal strip on the right side of the preceding bay, the leads may be wired to a left side terminal strip of the preceding bay and superimposed on a local cable arm of the route relays.

(h) Route relays should never be assigned to a particular ground supply on any bay if the ground supply is not represented on the preceding bay. Route relays on the preceding bay should be reassigned in such a case to the desired ground supply group.

(i) ***Assignment of Route Relays and Running of Ground Supply Forms to Facilitate Future Change to Alternate Routing:*** When an office does not initially, but will in the ultimate, employ alternate routing (route relays in ground supply groups 1 and 2), it is desirable nevertheless to assign the route relays in the different mounting units and to arrange the interconnecting ground supply local forms in such a way as to provide for the later use of alternate routing with a minimum change in the ground supply forms and without the necessity of reassigning the route relays. This can be accomplished to some extent by care in the assignment of relays initially and by the proper planning of the ground supply forms.

(j) In the matter of assignment, only those route relays representing routes which will never have an alternate should be assigned in groups 3 and 4 in the positions which are fixed as the first to be used for these groups on the first route relay bay. In the positions fixed as the

first to be used for ground supply groups 1 and 2, only those route relays representing destinations which will ultimately have alternate routing should be assigned. A similar segregation should be made in assigning route relays in sets of ten or five in other positions.

(k) The following relates to the planning of the ground supply forms to facilitate a later change to alternate routing. The ground supply leads for groups 1 and 2 will be left disconnected initially at the position of their fixed terminal strips. If possible, no other leads should be fastened to these terminal strips at that time so that the leads for groups 1 and 2 may be connected easily when required. The strips of relays which in the ultimate will be in groups 1 and 2 should be multiplied as though they already were in these groups and the relays known to be in groups 3 and 4 in the ultimate should be multiplied. The multiple, initially, also should interconnect the relays in group 3 with those that will be in group 1, and group 4 with those that will be in group 2, ultimately. The interconnection should be made in such a way that by cutting the form in one place and by connecting the group 1 ground supply leads to their fixed terminal strip, the proper relays can be changed quickly from group 3 to group 1 without rearranging the ground supply forms or changing the assignment of relays. The same description should be applied to the change of relays of groups 4 into groups 2 and 4 in the ultimate.

(l) **Installer Wiring for Route Relay R8 Bay:**

When R8 bay is equipped, in addition to the ground supply leads, mentioned in (d), it is necessary to interconnect the fifties translator H relays and EA and LA relays on the common equipment unit with the fifties translator EAH relays of R8 bay in installer-formed local cable. It is probable that this wiring and ground supply leads can be run in the same form. The leads involved are shown in the circuit cross-connection figures and are listed in the equipment explanation for the local cable drawing. (See 5.21.)

Switchboard Cabling

5.19 *The schematic of cable runs* from the originating marker frame to district link, office link, and originating marker connector frames is shown on the marker multiple schematic drawing.

ED-25130-10, which shall be followed in running these cables.

5.20 Some of the switchboard cables from each originating marker frame are run to the DPTS or SDPTS of other associated frames, the leads involved being continued from these points to the associated frames in switchboard power cables in accordance with switchboard power cabling drawings for the frames.

5.21 When it is necessary to add route relay bays to originating markers and no more space is available in the normal location at the right of the common equipment bays, the additional route relay bays for each marker may be located in a separate lineup which, in general, should grow from left to right. With this arrangement, switchboard cables designated XC1 to XC4, XD1 and XD2, XE, XF, XG, and XGS shall be used in place of local cables C, D, E, F, G, and GS (ground supply), referred to in 5.15 and 5.17. These cables shall be run down the rear of the right upright (looking at apparatus side) of the last equipped route relay bay in the lineup to adjacent to the common equipment bays, and down the rear of the right upright of the first equipped route relay bay of the nonadjacent lineup.

Switchboard Power Cabling

5.22 Switchboard power cable containing the miscellaneous wiring from the DPTS shall be run on top of the cable rack for each row of frames in accordance with the switchboard power cabling drawing. At each frame the leads shall be looped at the miscellaneous terminal strips and connected as required.

List of A&M Only and Mfr Disc Equipment

EQUIPMENT	RATING	DETAILS LAST SHOWN IN ISSUE	REPLACING EQUIPMENT
J28751A,L4,	Mfr Disc.	10	—
L6,	Mfr Disc.	7	—
L35,	Mfr Disc.	8	J28751A,L33
L36,	Mfr Disc.	8	J28751A,L34
L46 & L47	Mfr Disc.	9	—
L51 & L52	Mfr Disc.	11	—
J28751C	A&M Only	8	—
J28751D	Mfr Disc.	3	—

The above listed 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.

Bell Telephone Laboratories, Incorporated

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