

# ORIGINATING MARKER AND 3-DIGIT TRANSLATOR CROSS-CONNECTIONS NO. 1 CROSSBAR OFFICES

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**1. GENERAL**

**1.01** This section describes the method of assigning originating marker and 3-digit translator cross connections and is intended for use in connection with changes necessitated by the addition of new offices or by the changes in the treatment or routing of calls to existing offices. Information is included in this section regarding the functions of the various cross connections and the method of

determining the proper assignments to be made to transmit to the sender the information required for the various codes, and to gain access to the trunk groups associated with these codes.

**1.02** This section is reissued:

- (a) To add cross-connection information for access codes "0" and "1".
- (b) To add cross-connection information for markers arranged to signal the subscriber sender to outpulse the directory number of the calling line to TSP.
- (c) To add cross-connection information for routing 0 operator calls to TSP.
- (d) To add cross-connection information for 7-digit MF outpulsing when the feature for reconstruction of recycled area codes is provided.
- (e) To add cross-connection information for operation with No. 101 ESS PBX stations requiring AIOD features.
- (f) To add cross-connection information for operation with interchangeable office and area codes.
- (g) To add cross-connection information for operation with prefix codes 01, 10, 11, and 00.
- (h) To add cross-connection information to provide 3- and 6-digit MF and 3-digit PCI routes, with 2-party ANI, for information code 411 calls.
- (i) To revise facsimilies of common bay, route relay bay, extended area bay, class-of-service frame, and access code unit cross-connection terminal strips.
- (j) To add facsimile of cross-connection terminal strips associated with the interchangeable code screening unit.

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- (k) To add cross-connection information for operation with dial tone first feature.

**1.03** ♦Cross-connecting information for originating marker frames is covered in this section and is also covered in the associated schematic drawings: SD-25016-01.♦

**1.04** Cross-connecting information for 3-digit translator frames is covered in this section and is also covered in the associated schematic drawings: the 3-digit individual translator (3 DIT), SD-96535-01, and the 3-digit common translator (3 DCT) and route grouping frame (RG), SD-96530-01.

**1.05** Each marker has its individual cross-connecting equipment. The cross connections for all markers in the same group should be identical except where overflow trunk subgroups are assigned to particular markers, where different classes of service in different markers are arranged for marker peg count registration or where special codes are used to spread originating traffic over several terminating units.

**1.06** Cross-connections which are determined by the size of the installation such as office junctor patterns are not included.

**1.07** The assignments of code, service relay, route relay, grouping relay, and other miscellaneous punchings should be entered on the proper form. These forms should show the information which is required for a record of the cross connections and the conditions upon which their assignment depends. These forms should be corrected as required to agree with cross-connection changes made.

## 2. APPARATUS

**2.01** For terminal strips equipped with notched terminals, refer to Section 216-712-801 for information on tools, materials, and methods of placing cross-connections.

**2.02** For terminal strips equipped with punched or wire-type terminals arranged for solderless wrapped connections, refer to Section 069-132-811 for information on tools and for methods of making and removing cross-connections. Refer to Section 069-133-801 for the method of placing straps and cross-connections.

**2.03** Wire, as required, of gauge and type specified for use with the type of terminal strips equipped. Colors used should be as specified in Section 216-712-801.

## 3. CROSS-CONNECTION FACILITIES

**3.01** 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 senders. The information is then translated and that which is pertinent to sender operation is returned. The marker also uses some of this information to locate a trunk and close a path from the district junctor to the selected trunk. It must also be flexible so that its action with respect to any set of information can be changed at any time on short notice. Flexibility is obtained by the provision of relays having their windings and contacts wired to punchings, which are arranged in convenient groups or fields on terminal strips where they may be interconnected.

**3.02** The originating marker frame consists of two bays for common equipment and one or more route relay bays. When the marker is arranged for extended area codes, the route relay bays for these codes are located at the left of the common bay and are numbered beginning with R8. A class-of-service frame has the relay equipment and cross-connecting fields for two markers and consequently they are not always adjacent to a particular marker. The lower half of one of the common bays and the lower half of the route relay and class-of-service bays are devoted to cross-connecting terminal strips. There are two types of terminal strips mounted on these bays, one having individual punchings such as the C terminal strip and the other common strips such as the CG terminal strip in Fig. 28. The individual type has from two to six rows of punchings, 80 per row. The strip type is divided into four parts, each with 20 rows of punchings. On this type the row number appears to the left and below the row. Facsimiles of cross-connecting fields on the common, route, extended area (R8) and the class-of-service frames are shown in Fig. 28, 29, 30, and 31, respectively. The first extended area bay R8 is illustrated in Fig. 30. The higher numbered extended area bays are similar to those used for local area codes with

a slight variation in the arrangement of the INTC-RC punchings. Facsimiles of cross-connecting fields on the 3 DIT, 3 DCT, and RG frames are shown in Fig. 32, 33, and 34, respectively. SD-25016-01, SD-96530-01, and SD-96535-01 provide cross references to facilitate the location of the subject matter associated with various punchings on the originating marker, 3 DCT, and 3 DIT or route grouping frame.

**3.03** When the office is arranged for 0 and 1 access codes, an access code unit is provided (Fig. 35). This unit may be mounted on a miscellaneous frame and consists of the AS0-AS3 (access screening) relays and the associated punchings for the AS 00-39 contacts and ASC 00-39 common contacts of the AS relays. Also, multiples of the following punchings appear on this frame: DRC, KP, NC, OT, RG, RRC, SC, TC, and Z (A-J) or MI(1-9), NCTD, OTA.

**3.04** When the office is arranged for interchangeable office and area codes, an interchangeable code screening unit is provided (Fig. 36). This unit may be mounted on a miscellaneous frame and consists of the ASB(0-7), ASC(0-7) screening relays and the associated punchings for the AS (40-99) contacts and ASC (40-99) common contacts of the ASB, ASC relays. Also, multiples of the following punchings appear on this frame: RRC, DRC, SC, R, TED, KP, NC, OT, TC, Z (A to J) or MI (1-9), NCTD, OTA.

#### 4. ASSIGNMENTS AND EQUIPMENT ARRANGEMENTS

##### A. Information Required for Assignments

**4.01** In order to determine the assignments of originating marker punchings and relays required for the establishment of a new code, for the rearrangement of trunks or for providing miscellaneous operating features of the marker, several items of information are required. These items are listed in Table A in the approximate relative order in which they should be considered. The related punching and relay assignments are provided with cross references to the paragraphs which deal with their assignment.

##### B. Provision of Route Relays

**4.02** The route relay bay except R8 is furnished with a maximum of 100 route relays. Bay

R8, when provided, is furnished with a maximum of 60 route relays. The route relays may be arranged in ground supply groups 1 to 5 depending on the number and types of original and alternate routes and the number of trunk subgroups comprising these routes.

**4.03** The number of route relays provided in a marker is dependent on the existing and proposed number and types of routes for the local office. In order to determine the number of route relays to provide or assign for a destination, it is necessary to know the number of trunks and the type of trunk routes required.

**4.04** The number of trunks and routes for a particular destination determines the number of route relays to be used as follows:

- (a) A maximum of 40 trunks arranged in one group—assign one route relay.
- (b) A maximum of 80 trunks arranged in two subgroups—assign one route relay. See 4.117(a), (b), and (c).
- (c) A maximum of 520 trunks arranged in 3 to 13 subgroups—assign two route relays. One route relay serves 2 to 12 subgroups known as individual subgroups. The other route relay in a higher numbered ground supply group serves one subgroup known as a common subgroup (see 4.123). Destinations having different charge conditions but having the same station delay and alternate route conditions which are served by the same manual tandem or panel sender tandem trunks, may be assigned to the same common subgroup route relay but to different individual subgroup route relays.
- (d) A maximum of 480 permanent signal or overflow trunks arranged in 2 to 12 subgroups—assign one route relay. These route relays must be located on the first route relay bay due to the cross-connection arrangement.
- (e) If there is an alternate route, the same conditions outlined in items (a), (b), and (c) apply for the alternate route.

**4.05** *Type of trunk route* affects the provision of route relays as outlined in the following paragraphs.

TABLE A  
INFORMATION REQUIRED FOR ASSIGNMENTS

ITEM NO.	INFORMATION REQUIRED	BSP PARA.	RELATED PUNCHING AND RELAYS ASSIGNED	BSP PARA.
1 -	<u>DESTINATION</u> - Central office designation or code.			
(A)	Code number.	4.32	C punching assigned to:	4.34
(B)	Route relay number - see items 2 and 3.	4.34	RC punching	4.66
(C)	Code group.	"	CG "	4.50
(D)	Discrimination by classes of service.	"	SC "	4.94
(E)	Route transfer.	"	RT "	4.181
(F)	Contact protection.	"	CP "	4.201
(G)	Extended area codes (EA).	4.202	RC "	4.73
(H)	Bridged codes.	4.37	PRC "	4.73
(I)	2-digit codes.	4.38		
(J)	2- and 3-digit codes.	4.39		
(K)	Vacant and restricted codes.	4.40		
(L)	No charge toll diversion.	4.76	CG 0 or 1 punching CG 2 "	4.51 4.52
(M)	Paired units - common trunk group.	4.73	R punching assigned to NCTD punching	4.76
2 -	<u>PROVISION OF ROUTE RELAYS ACCORDING TO THE SIZE AND TYPE OF TRUNK ROUTE</u> - Number of trunks and type of routing required.			
(A)	Number of route relays required according to the size of the trunk group.	4.04		
(B)	Number of route relays required according to the type of routing.			
(1)	Original Trunk Routes.			
(a)	Direct (Panel, Crossbar, No. 1 ESS, Information, and Ringer Test).	4.06		
(b)	Manual tandem.	4.07		
(c)	Office selector or crossbar tandem.	4.08		
(d)	Panel sender tandem.	4.09		
(e)	Dial coin zone trunks (via panel sender tandem).	4.10		
(2)	Alternate Trunk Routes.			
(a)	Panel sender tandem or manual tandem.	4.11		
(b)	Dial coin zone trunks (via panel sender tandem).	4.12		
(c)	Local office selector.	4.13		
(d)	Alternate route through selector or crossbar tandem compensating resistance control.	4.14		
(e)	Distant office selector tandem.	4.15		
(f)	Crossbar tandem.	4.16		
(3)	Special Routes.			
(a)	Overflow signal.	4.17		
(b)	Permanent signal.	4.18		
(c)	A switchboard.	4.19		
(d)	Zero operator.	4.20		
(e)	Traffic Service Position (TSP)	4.21		
(f)	Denied service operator.	4.21		
(g)	Long distance.	4.22		
(h)	Vacant code, DJ test, and repair clerk,	4.23		
			Items 2 and 3 determine the assignment of the route relay	4.28 and 4.29

TABLE A (Cont)

ITEM NO.	INFORMATION REQUIRED	BSP PARA.	RELATED PUNCHING AND RELAY ASSIGNED	BSP PARA.
3	<b>GROUND SUPPLY GROUP</b> - The number of the ground supply group in which the route relays must be assigned.		Ground supply routing	
	(A) General.	4.24	arrangements shown in	
	(B) Alternate routing.	4.26	Table E	
	(C) Multialternate routing.	4.27		
4	<b>CHARGE</b> - The charge (determined by local rates), transmission or routing condition to be imposed.		R punching	4.76
	(A) Class of service discrimination not required.		Z punching	4.97
	(B) " " " " " required.		SC and S punchings	4.94
	(C) Classes of service provided.		D, DA, and SW punchings	4.91
			INTC-RC punchings	4.104
5	<b>TRUNK ARRANGEMENT</b> - Location, numbering, and number of trunks.		ST punching	
	(A) Office frames on which trunks are located.		TL "	
	(B) Trunk level on which trunks are located.		GS "	4.108
	(C) The group start trunk.		CE "	
	(D) The group end trunk.			
	(E) The number of trunks.		SP punching	4.130
	(1) 1 to 40 original route trunks.	4.114		
	(2) 1 to 40 alternate " "	4.115		
	(3) 1 to 40 overflow or permanent signal trunks.	4.116		
	(4) 41 to 80 original route trunks.	4.119		
	(5) 41 to 80 alternate " "	4.120		
	(6) 41 to 80 overflow or permanent signal trunks.	4.121		
	(7) 81 to 120 original or alternate route trunks.	4.122	RA punching	4.134
	(8) 81 to 480 overflow or permanent signal trunks.	4.128	J-INTC "	4.137
	(9) 121 to 520 original or alternate route trunks.	4.125		
	(F) Overflow trunk arrangement.	4.129		
	(G) Trunk subgroup arrangements.		GC punching	4.117
	(1) 2 individual subgroups.	4.118	OP "	"
	(2) 3 " "	4.125	G "	4.125
	(3) 4 " "	4.125		
	(4) 6 or 12 individual subgroups.	4.125		
6	<b>CLASS OF CALL</b> - The sender class of call required.			
	(A) The type of central office equipment at the destination such as panel, crossbar, No. 1 ESS or step-by-step (via crossbar tandem).			
	(B) The type of trunks used such as panel sender or manual tandem.			
	(C) The type of routing such as direct or restricted operator, overflow, permanent signal, etc.		CL punching	4.140
	(D) Sender TW relay required to be operated for:			
	(1) Panel sender tandem trunks.			
	(2) Distant office selector trunks.			
	(3) Dial coin zone trunks.			
	(4) Crossbar tandem trunks.			
	(5) Reversed battery trunks.			
	(6) Automatic display call indicator trunks.			
	(7) Routes to operators trunks located on a distant office selector or crossbar tandem office link multiple.			
	(8) Routes to TSP			

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TABLE A (Cont)

ITEM NO.	INFORMATION REQUIRED	BSP PARA.
7 - <u>LOOP RESISTANCES</u> - Resistances of original and alternate direct or tandem routes.  (A) Resistance of direct trunks. (B) Resistance of tandem trunks. (C) Resistance from local or distant office selector or crossbar tandem to destination. (D) Similar resistances on alternate routes.		
8 - <u>COMPENSATING RESISTANCE</u> - Compensating resistance for original and alternate routes and the trunk guard relay required.  (A) Compensating resistance for direct trunk. (B) " " " tandem " (C) " " " trunk from local or distant office selector or crossbar tandem to destination. (D) MTG relay required for nonrepeater ground cutoff panel selectors.	CR punching	4.149
9 - <u>SECOND BRUSH</u> - Compensating resistance and trunk guard relay required for distant office selectors or crossbar tandem trunks used on alternate routes.  (A) Compensating resistance for alternate route tandem trunk. (B) Compensating resistance from alternate route tandem office to the destination. (C) Sender MTG relay required if a distant office selector alternate route trunk selects a nonrepeater ground cutoff panel selector to the destination.	SB punching  SB punchings are assigned on original route relays of routes having alternates via distant office selectors or crossbar tandem <u>when alternate route through selector or crossbar tandem compensating resistance control is provided</u>	4.152
10 - <u>OFFICE BRUSH</u> - Office brush selection and station delay required  (A) Office selector frame bank number or crossbar tandem OB code number. (B) Office selections not required. (C) Station delay requirements for: (1) Manual offices with (Delay) (a) Numbers over 9999 and party letters (A) (b) " " " no " " (B) (c) No " " " " " " (C) (d) " " " " with " " (D) (2) Panel offices (Delay C). (3) Crossbar offices. (a) Separate trunk groups (Delay C). (b) Two offices reached over common trunks: Office Unit A (Delay C). Office Unit B (High-five incoming group - Delay B). (4) Coin test cancellation on direct or tandem operators calls (Delay D).	OB punching	4.157

TABLE A(Cont)

ITEM NO.	INFORMATION REQUIRED	BSP PARA.	RELATED PUNCHING AND RELAYS ASSIGNED	BSP PARA.
11	<p><u>OFFICE GROUP</u> - Office group selection required or office selections not required. Overflow or permanent signal trunk arrangement.</p> <p>(A) Office selection group or crossbar tandem OG code number required.            (B) Office selections not required.            (C) Overflow or permanent signal trunks arranged in two subgroups.</p>		OG punching	4.163
12	<p><u>SECOND GROUP</u> - Crossbar tandem codes OB 5 to 9 required (high-five office brush selection) or OFF 9300 reroute required.</p> <p>(A) Office brush selection 0 to 4 required for office selectors.            (B) Office brush codes 0 to 4 or 5 to 9 required for crossbar tandem trunks.            (C) Calls to OFF 9300 require rerouting to a special group of trunks.            (D) Required on local or distant office selector and crossbar tandem route relays when the marker is arranged to prevent XT trouble indications on second or third trial calls.</p>		SG punching	4.167
13	<p><u>OVERFLOW AND PEG COUNT REGISTERS</u> - The overflow and peg count traffic registers required for the trunk group.</p> <p>(A) Overflow register number and associated overflow register equipment number.            (B) Peg count register number and associated peg count register equipment number.            (C) Peg count registration for trunk groups which require discrimination by classes of service.</p>		OF punching on OFPC terminal strip PC punching TR-OF and TR-J punching TR-PC and TR-J punching INTC-PC punching	4.173   4.174  4.175
14	<p><u>ORIGINATING SENDER LOAD CONTROL</u> - When provided originating sender load control affects the provision of overflow route relays which in turn affects the provision of local or distant office selector and crossbar tandem alternate route relays.</p>		OF punching on D terminal strip	4.179
15	<p><u>ROUTE TRANSFER AND TERMINATING SENDER LOAD CONTROL</u> - When provided, long distance calls to a decentralized A board may require transfer to a long distance board. When provided the local office code may be transferred from its regular trunks to an operator or to the overflow trunks.</p> <p>(A) Regular route required.            (B) Transferred route required.            (C) Terminating sender load control to be canceled on operators' classes.</p>		RT punching RTA punching RTB punching TOC punching	4.181
16	<p><u>MARKER PEG COUNT REGISTRATION BY CLASSES OF SERVICE</u> - When provided, permits marker calls to be recorded by classes of service and cancellation of the check by the marker for the message register lead continuity.</p> <p>(A) Message register test canceled with class of service peg count registration.            (B) Message register test canceled without class of service peg count registration.</p>	4.184  4.186	CSP, CPC, PMR, MR, RMR and LC1 punchings	4.184

TABLE A (Cont)

ITEM NO.	INFORMATION REQUIRED	BSP PARA.	RELATED PUNCHING AND RELAY ASSIGNED	BSP PARA.
17	<b>EXTENDED DIALING PRIVILEGES - COIN CLASS</b> - Provided when coin subscribers are to be given direct dialing privileges to destinations outside the local area via dial coin zone trunks through panel sender tandem.  (A) 10 or 30 cent destinations requiring C delay. (B) 10 or 30 " " " A " (C) 15 " " " C " (D) 15 " " " A " (E) 20 " " " C " (F) 20 " " " A " (G) 25 " " " C " (H) 25 " " " A "		RRC and RR punchings  CRR relays 0 to 7 assigned for conditions A, B, C, D, E, F, G, and H, respectively	4.188
18	<b>OFF 9300 REROUTE</b> - SEE ITEM 12	4.197		
19	<b>ACCESS CODE TREATMENT</b> - Provided to screen calls for required routing according to access code prefixed to regular code, or for no access code.		PD1 and AS- relays ACS, AS, ASC, ASW, NPD, RG, and PD1 punchings	4.224
20	<b>INTERCHANGEABLE OFFICE AND AREA CODE TREATMENT</b> Provided to screen codes which may be used as both an office and an area code.		R punchings AS (0-7) punchings ASC (40-99) punchings	4.228

**4.06 Original Routes via Direct Trunks:** Assign one or two route relays according to the size of the trunk group for each destination to be reached over a group of direct trunks such as panel, crossbar, No. 1 ESS, information, and ringer test. Zero operator, long distance, permanent signal, vacant code, and denied service routes may have the trunk groups segregated by classes of service and require one or two route relays for each group of trunks (Fig. 1 and 2). Some routes, such as repair service, may have a group of trunks for each originating central office designation and require a route relay for each group. When a marker is equipped with the preroute translation feature one or two route relays, according to the size of the trunk group, are required for both crossbar units reached over common direct trunks. When the preroute translation feature is not provided, one or two route relays, according to the size of the trunk group, are required for each of two crossbar units reached over common direct trunks. Original direct trunk routes may have alternate routes via distant (2-wire) or local (3-wire) office selectors, crossbar tandem, panel sender tandem or manual tandem.

**4.07 Original Routes via Manual Tandem:** Assign one route relay for a tandem trunk group of not more than two subgroups (80 trunks maximum) for all destinations, reached through the tandem point, requiring the same:

- (a) Zone charge
- (b) Station delay
- (c) Alternate or overflow route relay.

For a common subgroup of trunks assign one route relay for all destinations, reached through the tandem point, requiring the same:

- (a) Station delay.
- (b) Alternate or overflow route relay. All individual subgroup route relays arranged for different charge conditions may use the same common subgroup route relay if they all require the same station delay and alternate or overflow route relay. Alternate routes via panel sender or manual tandem may be provided.

**4.08 Original Routes via Local or Distant Office Selectors or Crossbar Tandem:**

Assign one or two route relays according to the size of the trunk group for each destination reached through the office selectors or the crossbar tandem office. Alternate routes via panel sender or manual tandem may be provided. Alternate routes via local or distant office selectors or crossbar tandem offices may also be provided except that one or two route relays, according to the size of the trunk group, are assigned for each destination to be reached via the alternate route.

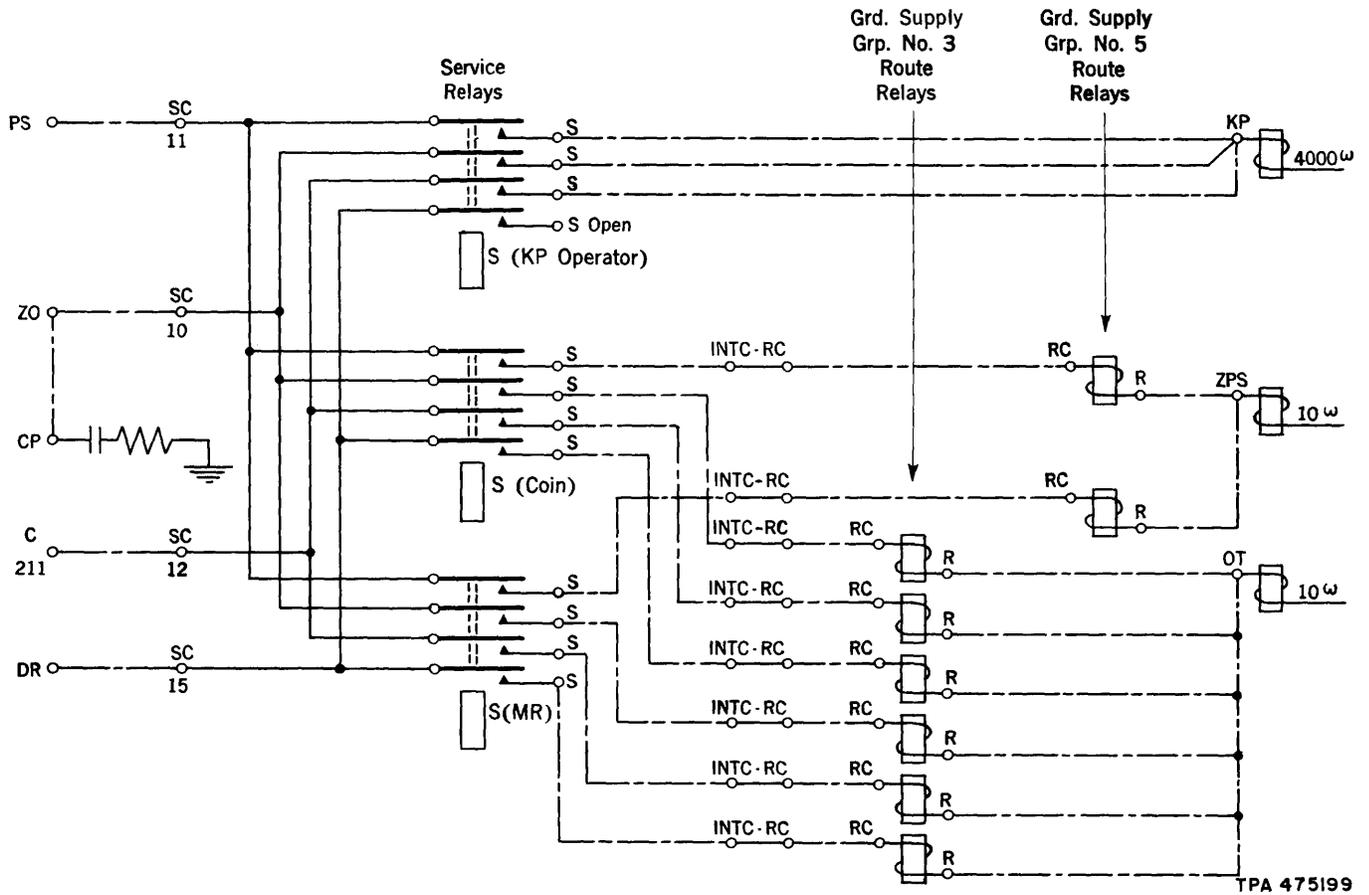


Fig. 1—Assignments for Special Codes—KP Operator Class of Service

**4.09 Original Routes via Panel Sender Tandem:**

For panel sender tandem routes that do not provide extended direct dialing privileges to coin class subscribers, assign route relays in accordance with the method outlined for original routes via manual tandem. Alternate routes via panel sender or manual tandem may be provided.

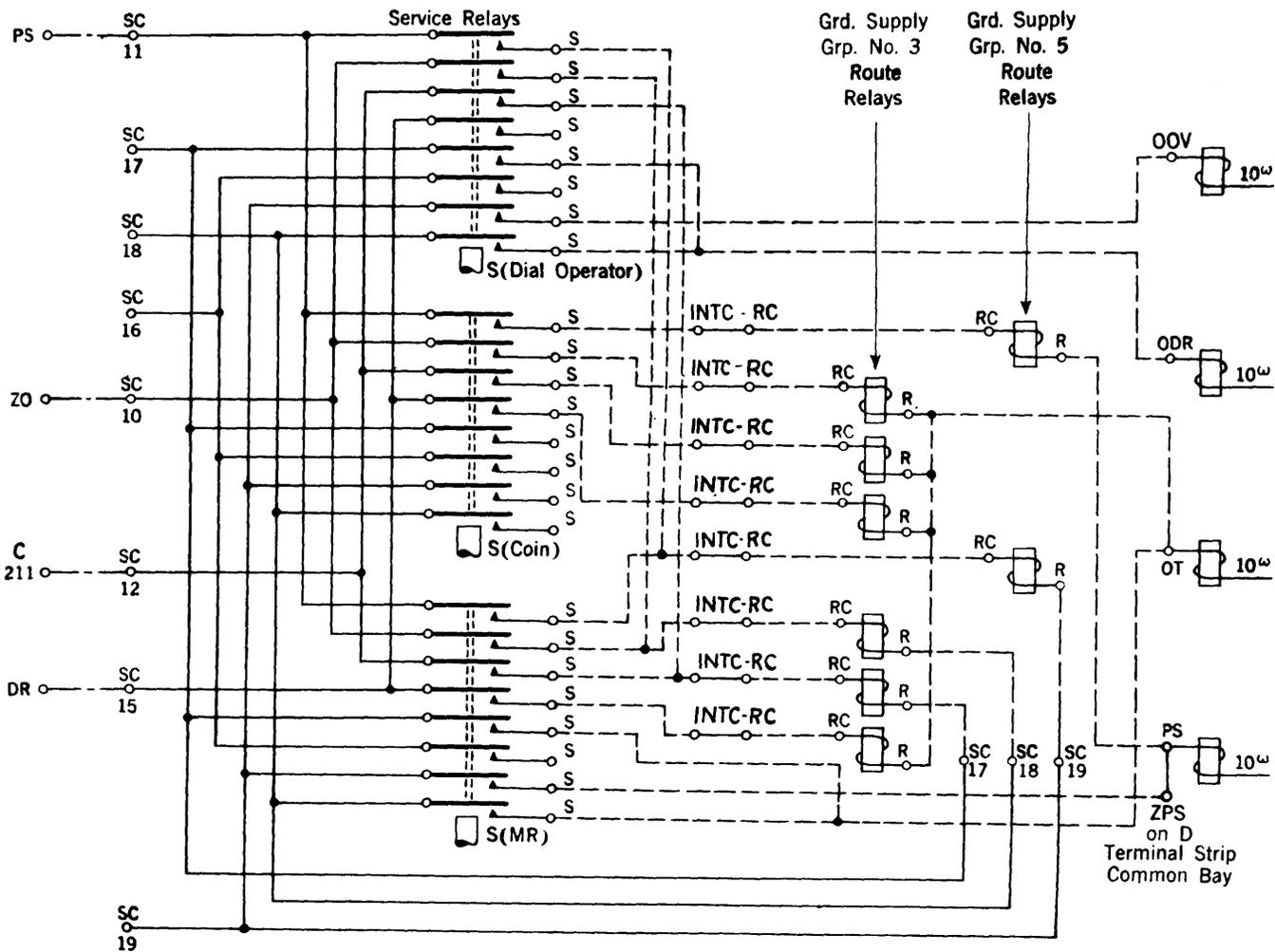
**4.10 Original Routes via Dial Coin Zone Trunks:**

Facilities can be provided to extend direct dialing privileges to certain coin class subscribers via dial coin zone trunks. These trunks can serve calls to zones where the charge is 10, 15, 20, and 25 cents, or when the local area charge is 10 cents, the option of 15, 20, 25, and 30 cents can be used. One trunk circuit has the ability to reach all destinations within the four zones (see 4.152). Assign one or two route relays according to the size of the trunk group for each zone used with the same station delay as shown on Table B. Destinations which require station delay B or D are assigned to the same code group as destinations which require delay A.

TABLE B

ZONE	STA. DEL.	ROUTE REL. REQ.	
		1 to 80 TRKS.	81 to 520 TRKS.
10 or 30 cents	A, B, D	1	2
15 cents	A, B, D	1	2
20 cents	A, B, D	1	2
25 cents	A, B, D	1	2
10 or 30 cents	C	1	2
15 cents	C	1	2
20 cents	C	1	2
25 cents	C	1	2
Total Route Relays Req.		8 or 16	

Alternate routes via dial coin zone trunks may be provided.



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Fig. 2—Assignment for Special Codes—Dial Operator Class of Service

**4.11 Alternate Routes via Panel Sender Tandem or Manual Tandem:** Assign one or two route relays according to the size of the trunk group for all destinations reached through the tandem office requiring the same:

- (a) Station delay and overflow route relay when multialternate routing is not employed.
- (b) Station delay and alternate or overflow route relay when multialternate routing is employed. (See 4.27.)

Subsequent alternate routes via panel sender or manual tandem offices may be provided when multialternate routing is employed.

**4.12 Alternate Routes via Dial Coin Zone Trunks:** Assign route relays on the same basis as for original routes via dial coin zone trunks.

**4.13 Alternate Routes via Local Office Selectors:**

(a) When one overflow route is provided [see 4.17(a)], one or two local office selector alternate route relays according to the size of the trunk group are assigned for each beyond office compensating resistance and trunk guard relay condition required as follows:

- (1) 900 ohms with TG relay
- (2) 600 ohms with TG relay
- (3) 300 ohms with TG relay
- (4) 0 ohms with TG relay
- (5) 900 ohms with MTG relay

(6) 600 ohms with MTG relay

(7) 300 ohms with MTG relay

(8) 0 ohms with MTG relay.

(b) When three overflow route relays are provided [see 4.17(b)], one or two local office selector alternate route relays according to the size of the trunk group are assigned for all destinations requiring the same:

(1) Beyond office compensating resistance and trunk guard relay.

(2) Overflow route relay.

The route relays are assigned on this basis as it is necessary to segregate the RA punchings of the local office selector alternate route relays for assignment to the proper overflow route relay.

(c) When multialternate routing is employed, the route relays are assigned for all destinations requiring the same:

(1) Beyond office compensating resistance and trunk guard relay.

(2) Alternate or overflow route relay.

Assignment on this basis segregates the RA punchings for assignment to the proper subsequent alternate route or overflow route relay. To illustrate the assignments, assume that five destinations have an alternate route through the office selector group with two subsequent alternate routes and with the conditions shown in Table C. Destination 1 requires a tandem 1 route relay arranged for delay C. Destination 2, although having a subsequent alternate route through the same tandem office requires a route relay arranged for delay A. Destination 3 requires a tandem 2 subsequent alternate route. Destination 4 requires a different trunk guard relay condition. Destination 5 requires a different beyond office compensating resistance. As each destination has a different requirement in at least one detail, a local office selector alternate route relay must be assigned for each destination.

**4.14 Alternate Route Through Selector or Crossbar Tandem Compensating Resistance**

**Control:** This feature employs the SB punchings of original route relays in ground supply 1 only, for providing the compensating resistance and trunk guard relay condition of an alternate route via distant office selectors or crossbar tandem. Local office drawings should be consulted to determine if the feature is provided, as it affects the provision of route relays for distant office selector and crossbar tandem alternate routes.

**4.15 Alternate Routes via Distant Office Selectors:**

(a) When the alternate route through selector or crossbar tandem compensating resistance control feature is not provided, assign the distant

TABLE C

DESTI- NATION NO.	LOCAL OFFICE SEL. ALT. ROUTE			ORIGINAL ROUTE	LOC. OFC. ALT. ROUTE RELAY	2ND ALTERNATE OFC. ROUTE RELAY	3RD ALTERNATE ROUTE RELAY	OVERFLOW ROUTE RELAY
	BEYOND OFFICE COMP.	TRUNK GUARD RELAY	STATION DELAY					
1	900	TG	C	020	050	TAN 1 070	TAN 3 090	001
2	900	TG	A	021	051	TAN 1 071	TAN 3 091	002
3	900	TG	C	022	052	TAN 2 080	TAN 3 090	001
4	900	MTG	C	023	053	TAN 2 080	TAN 3 090	001
5	600	TG	C	024	054	TAN 2 080	TAN 3 090	001

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(2-wire) office selector alternate route relays on the same basis as for alternate routes via local office selectors.

(b) When the alternate route through selector or crossbar tandem compensating resistance control feature is provided, known as multialternate routing (see 4.25) assign one or two route relays according to the size of the trunk group for all destinations requiring the same:

- (1) Overflow route relay when multialternate routing is not employed.
- (2) Subsequent alternate route or overflow route relay when multialternate routing is employed. As illustrated in 4.13(c), destinations 3, 4, and 5 may be assigned to the same distant office selector alternate route relay when the alternate route through selector or crossbar tandem compensating resistance control feature is provided.

### 4.16 *Alternate Routes via Crossbar Tandem*

(a) When the alternate route through selector or crossbar tandem compensating resistance control feature is not provided, assign one or two route relays according to the size of the trunk group for:

- (1) All full selector destinations requiring the same:
  - (a) Overflow route relay when multialternate routing is not employed.
  - (b) Subsequent alternate or overflow route relay when multialternate routing is employed.
- (2) All call indicator destinations requiring the same:
  - (a) Beyond office compensating resistance and overflow route relay when multialternate routing is not employed.
  - (b) Beyond office compensating resistance and subsequent alternate or overflow route relay when multialternate routing is employed.

The beyond office compensating resistance and the office selector compensating resistance are the same for all full selector destinations. The TG trunk guard relay is used for crossbar tandem trunks regardless of the final destination. All call indicator destinations requiring the same beyond office compensating resistance as the full selector routes have their original route relay RA punchings assigned to the same crossbar tandem alternate route relay RC punchings as the original route relays for full selector routes, provided they require the same subsequent alternate or overflow route relay. A typical illustration of assigning crossbar tandem alternate route relays is indicated in Table D. Having determined the allowed minimum and maximum beyond office compensating resistance it is found that two beyond office compensating resistances are required, namely, 600 ohms for all full selector destinations and call indicator destinations 1 to 4, and 0 ohms for call indicator destinations 5 and 6. When multialternate routing is not employed, a subsequent alternate route is not provided and the full selector and call indicator destinations 1 to 3 may be assigned to the same alternate route relay. If there was only one overflow route relay for all delay conditions, call indicator destination 4 could be assigned to this same route relay as destinations 1 to 3, but when a different overflow route relay is required, a different alternate route relay must be assigned in order to segregate the RA punchings. Destinations 5 and 6 are assigned to a different alternate route relay. When multialternate routing is employed all full selector destinations and call indicator destination 1 are assigned to one route relay. Destinations 2 and 3 require a different crossbar tandem alternate route relay because the subsequent alternate route relay is different. Destination 4 requires a different crossbar tandem alternate route relay because a different subsequent alternate route relay is required for the station delay condition of this destination. Destinations 5 and 6, having the same resistance and subsequent alternate route relay requirements are assigned to the same crossbar tandem alternate route relay. In the illustration it is assumed that all full selector destinations require the same subsequent alternate route which may not be the case in actual practice.

- (b) When the alternate route through selector or crossbar tandem compensating resistance control feature is provided, assign one or two route relays according to the size of the trunk group for all destinations requiring the same:

- (1) Overflow route relay when multialternate routing is not employed.
- (2) Subsequent alternate or overflow route relay when multialternate routing is employed.

**4.17 Overflow Signal Routes**

(a) Assign one overflow route relay, regardless of the size of the trunk group, when the district junctor supervisory relays are arranged to hold on dial pulses as they must be when originating or terminating sender load control is provided. The route relay should be arranged for direct operator class and to cancel coin test, if the senders make coin test. The provision of alternate and subsequent alternate route relays is not affected when one overflow route relay is assigned.

(b) Assign one route relay, regardless of the size of the trunk group, for each of the following conditions when the district junctor supervisory relays are not arranged to hold on dial pulses.

- (1) For destinations requiring no numerical digits (operator class calls).
- (2) For destinations requiring four numerical digits (station delay C offices).
- (3) For destinations requiring four numerical digits and a party letter or five numerical digits (station delay A, B, or D offices).

Condition 1 requires the route relay to be arranged for direct operator class with coin test canceled. Condition 2 requires the route relay to be arranged for restricted operator class with delay C, while condition 3 requires the same class but with delay D. The provision of alternate and subsequent alternate route relays is affected to the extent that separate route relays must be provided at least on the basis of the three conditions previously mentioned.

**4.18 Permanent Signal Routes:** Assign one route relay, regardless of the number of trunks, for each group of permanent signal trunks which may be segregated by coin, flat, PBX, etc, classes as required by local arrangement. No alternate route or common subgroup is provided.

**4.19 "A" Switchboard Routes**

(a) Assign one route relay per destination regardless of the size of the trunk group for manually selected keypulsing outgoing trunks direct to a distant office selector or crossbar tandem office. No alternate route relays are assigned as an alternate route is selected on a manual basis.

(b) For routes over "A" switchboard district junctor circuits, assign route relays for these trunk groups on the same basis as outlined for the routes used by subscribers. Codes may be used in common by subscribers and keypulsing or dialing "A" operators. However, the "A" operators may require codes for their exclusive use and for such codes assign the route relays on the same basis as for subscriber codes.

TABLE D

DESIGNATION NO.	CONDUCTOR LOOP RESISTANCE		BEYOND OFFICE COMP. RES. ALLOWED		ASSIG	SUBSEQUENT ALT. ROUTE		OVERFLOW	
	TO TAN.	TOTAL	MIN.	MAX.		OFC.	ROUTE RELAY	ROUTE RELAY	STA. DELAY
ALL F.S.	400	400	600	900	600	TAN 1	070	001	C
PCI 1	400	500	600	900	600	TAN 1	070	001	C
PCI 2	400	800	300	900	600	TAN 2	080	001	C
PCI 3	400	1500	0	900	600	TAN 2	080	001	C
PCI 4	400	1950	0	600	600	TAN 2	081	002	A
PCI 5	400	2200	0	300	0	TAN 1	073	002	D
PCI 6	400	2500	0	0	0	TAN 1	073	002	D

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(c) No route relays are provided for routes reached over manually selected keypulsing outgoing trunks to panel or crossbar incoming trunks, to panel sender tandem or to manual tandem.

(d) No route relays are assigned for destinations using manually selected direct dialing trunks from a dialing "A" switchboard to a crossbar tandem office.

**4.20 Zero Operator and TSP Routes:** Assign one or two route relays, according to the size of the trunk group, for each group of zero operator trunks. The number of groups may be determined by the type, such as coin or noncoin, or the class of service. There may also be a group of trunks for each originating central office for each class of service. The route relays are arranged to preclude awaiting the dialing of numerical digits (direct operator class). No alternate route relay is assigned. For TSP routes, assign one or two route relays, according to the size of the trunk group, for each of the following:

- (a) Noncoin 0 + 10-digit calls
- (b) Noncoin 0 + 7-digit calls
- (c) Noncoin 0 operator calls
- (d) Coin 0 or 1 + 10-digit calls
- (e) Coin 0 or 1 + 7-digit calls
- (f) Coin 0 operator calls.

**4.21 Denied Service Operator Routes:** Assign one or two route relays according to the size of the trunk group for each group of zero operator trunks to which denied service calls are directed. These route relays must be arranged to await dialing of all digits or party letters (restricted operator class and delay D). No alternate route relay is assigned.

**4.22 Long Distance Routes:** Assign one or two route relays, according to the size of the trunk group, for each type (coin or noncoin) of long distance trunk. No alternate route relay is assigned.

### 4.23 Other Routes

(a) **Vacant Code:** Assign one or two route relays, according to the size of the trunk group, for each type (coin or noncoin) of vacant code trunk. No alternate route relay is assigned.

(b) **District Junctor Test Code:** Assign one route relay for each test code. No alternate route relay is assigned.

(c) **Repair Service:** Assign one route relay for each group of repair service trunks. No alternate route relay is assigned.

(d) **AMA Line Verification Code:** Assign one route relay for each test code. No alternate route relay is assigned.

### C. Ground Supply Groups

**4.24** Route relays are arranged and permanently wired into five ground supply groups. The number in each ground supply is predetermined by the route requirements for the local office. The ground supply circuit furnishes ground to the armature contacts of the route relays except the ST contact which has battery on it. When all trunks available to a selected route relay are found busy, unless located in ground supply 5, the ground supply circuit functions to operate another route relay in a higher numbered ground supply, giving access to another subgroup of direct trunks, an alternate route or overflow, depending on the route requirements of the local office. Overflow and permanent signal trunk route relays are located in ground supply 5.

**4.25** Having determined the number of route relays required for the destination, it is necessary to determine the ground supply groups in which these route relays must be assigned. The arrangement and assignment of route relays in the ground supply groups are made according to two methods. Central offices using codes that have one or two routings employ the alternate routing method. Central offices in certain metropolitan areas having several tandem centers that may be utilized to provide various routings for the same destination, employ the multialternate routing method. Multialternate routing is obtained by using

a wiring option in the ground supply circuit that will make available the SB contact of route relays in ground supply 1. If the SB punching is used, it will provide the office selector and beyond office compensating resistance, and the proper trunk guard relay for an alternate route via tandem or 2-wire office selector tandem trunks. This reduces the number of route relays required for this type of routing. To accomplish this the feature that allows the marker to advance to the second subgroup of trunks when all trunks are busy in the first chosen subgroup (when using GP relays to divide a trunk group) is eliminated. The TWA or TWB punchings are used for this type of assignment. If GP relays are used in an alternate route trunk group only one subgroup can be tested.

#### **4.26 *Alternate Routing***

- (a) The route relays are designated for the purpose of this section as original, alternate, common original or common alternate. An original route relay is assigned for destinations having a single routing and is assigned for the first routing for destinations having an alternate route. An alternate route relay is assigned for the second routing. The term "common" designates the route relay of the original or alternate route that is assigned to the common subgroup of trunks (see 4.04).
- (b) Original routes may employ direct, office selector or tandem trunks. Alternate routes usually employ office selector or tandem trunks, but may employ another group of direct trunks if available. Original routes via office selectors or tandem may employ alternate routes via office selector or crossbar tandem only by assigning an alternate route relay for each original route. Original route relays should not be assigned in ground supply group 3 when the destination has an alternate route, as a second trial would not cause an alternate group of trunks to be seized.
- (c) The first division of Table E shows the arrangement of the route relays in the ground supply groups for alternate routing.

#### **4.27 *Multialternate Routing***

- (a) This arrangement differs from alternate routing by employing as many as four different routes for the same destination. Under present usage, a destination may be reached

successively over direct trunks, office selector or crossbar tandem trunks, panel sender tandem trunks and then trunks to another panel sender tandem center. Various combinations of one, two or three alternate routes may be employed as long as they conform to the restrictions imposed by the marker functions and achieve a satisfactory economy of the use of route relays. Route relays in ground supply group 3 should not be assigned as original route relays for destinations having an alternate route.

- (b) The route relays are designated for the purpose of this section as original, common original, alternate, common alternate, first alternate, common first alternate, second alternate, common second alternate and third alternate. The term "common" is used to indicate the route relay assigned to the common subgroup of trunks (see 4.04). The designations original and alternate have the same meaning as explained under alternate routing. When a destination has three routes, the first route is assigned to an original route relay, the second route to a first alternate route relay and the third route to a second alternate route relay. When a destination has a fourth route, the relay assigned to this route is known as a third alternate route relay. As the marker has only four ground supply groups available for completing calls to a destination (group 5 is used to reach overflow signal trunks), it is not possible to have a common third alternate route relay.
- (c) The second division of Table E shows the arrangement of the route relays in the ground supply groups for multialternate routing. While there are many other possible arrangements of route relays under multialternate routing, only those arrangements which appear most suitable from the standpoint of present usage and economy of route relays are shown in the table.

#### **D. *Assignment of Route Relays***

**4.28** Having determined both the number of route relays required for the destination (Part 4B) and the ground supply groups in which the route relays must appear (Part 4C), assign particular route relays in the proper ground supply groups. In the case of destinations requiring panel sender or manual tandem routings, check for an existing assignment that may satisfy the requirements of the new destination. A spare route relay is assigned

TABLE E

ARRANGEMENT OF ROUTE RELAYS IN GROUND SUPPLY GROUPS

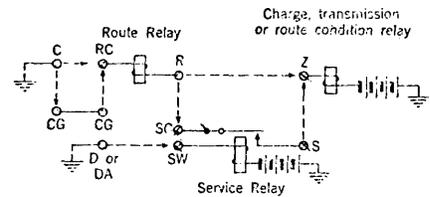
TYPE OF ROUTING	NO. OF ROUTES	COMMON SUBGROUP OF TRUNKS				GROUND SUPPLY GROUP NUMBER				
		REQUIRED FOR				1	2	3	4	5
		ORIG. ROUTE	ALT. ROUTE	1-ALT. ROUTE	2-ALT. ROUTE					
ALTERNATE ROUTING (SEE 4.15(a))	One	No	No	No	No			Original	Common Original	OVERFLOW AND PERMANENT SIGNAL ROUTE RELAYS
	One	Yes	No	No	No			Original		
	Two	No	No	No	No	Original	Common Original	Alternate		
	Two	Yes	No	No	No	Original		Alternate	Common Alternate Common Alternate	
	Two	No	Yes	No	No	Original	Common Original	Alternate		
Two	Yes	Yes	No	No	Original	Alternate				
MULTIALTERNATE ROUTING (SEE 4.15(b))	One	No	No	No	No			Original	Common Original	
	One	Yes	No	No	No			Original		
	Two	No	No	No	No	Original	Common Original	Alternate		
	Two	No	No	No	No	Original		Alternate	Alternate	
	Two	Yes	No	No	No	Original	Common Original	Alternate		
	Two	Yes	No	No	No	Original	Common Original	Alternate	Alternate	
	Two	No	Yes	No	No	Original	Alternate	Common Alternate		
	Two	No	Yes	No	No	Original	Alternate	Common Alternate		
	Two	Yes	Yes	No	No	Original	Common Original	Alternate	Common Alternate	
	Three	No	No	No	No	Original	First Alternate	First Alternate		Second Alternate
	Three	No	No	No	No	Original	First Alternate	Second Alternate		
	Three	No	No	No	No	Original	First Alternate	First Alternate	Second Alternate	
	Three	Yes	No	No	No	Original	Common Original	First Alternate		
	Three	No	No	Yes	No	Original	First Alternate	Common First Alternate	Second Alternate	
Three	No	No	No	Yes	Original	First Alternate	Second Alternate	Common Second Alternate		
Four	No	No	No	No	Original	First Alternate	Second Alternate	Third Alternate		

and a record made of the assignment if existing assignments do not satisfy the proposed arrangement. When the assignment of a spare route relay in any ground supply will bring the number of spare route relays in that ground supply below the minimum requirements for future assignments, the proper authorities should be notified through organization channels so that consideration can be given to the provision of additional route relays. When a route relay must be assigned in a ground supply group and there is no route relay available, temporary relief may be obtained by combining certain routings. If panel tandem or manual tandem route relays arranged for A, B, C, and D station delay are located in this ground supply, two spare route relays may be obtained by combining tandem delay requirements. After permission has been obtained from the proper authority, the route relay cross-connected for station delay A can be used to serve for the route relays cross-connected for station delay B and D when the former would have so served except for the difference in station delay.

**4.29** The common subgroup route relay and the alternate route relays are assigned in a manner similar to the original route relays, and a record made of the assignments. Before a spare common subgroup route relay is assigned, check the existing assigned relays to see if their assignments correspond in every detail with the proposed arrangements. The RA punching assignment (see 4.134) is then determined as it is dependent on the designation number of the original and alternate route relays serving a destination.

#### E. Assignment of Code Points

**4.30** In order for traffic to a particular central office to reach the proper group of trunks giving access to the desired destination, a route relay, assigned to this destination, must be operated in the originating marker. In some cases, as for code groups, the same route relay will be associated with several central office code points. The punching assignments in Part 4E provide for the operation of the route relay either through the service relay or direct to the proper charge or transmission relay. The pertinent assignments are shown in Fig. 3 but the other relative assignments for each punching are also covered in Part 4E.



**Fig. 3—Assignment Necessary to Operate a Route Relay**

#### C (Code Point) Punchings

**4.31** The C punchings represent the numerical codes which are dialed by the subscriber. The crossconnection from this punching will operate a route relay (R) which in turn provides information to the marker regarding the outgoing trunk location on the office frame. The marker is arranged for 800 C punchings numbered from 200 to 999 representing the home area codes. The marker may be arranged for an additional 800 C punchings if it is desirable to divide the home area into two parts, the local area and the extended area (extra charge call within the home area). Markers may be arranged for additional groups of 800 C punchings representing central office codes in foreign areas. If the marker is equipped for access code screening (prefix "0" and "1" dialing) C punchings for 3-digit codes 110 to 119 are also provided. If the marker is equipped for interchangeable office and area codes, the C punchings are cross-connected to RC punchings of the route relay associated with the office code (7-digit route). The R punching of the route relay is cross-connected to one of the ASC (40-99) terminals at the interchangeable code screening unit.

**4.32** A central office designation is assigned to a C punching on the basis of the numerical equivalent on the dial of the first two or three letters or the first two letters and the number of the designation. For example, the central office designated HILLTOP will be assigned to C punching 404 or 445 depending on whether the marker is arranged for 2-digit or 3-digit operation. In 2-digit operation, a zero is inserted between the numerical equivalent of the first and second letters. In the event that the office designation is HILLTOP 8, C punching 448 will be assigned.

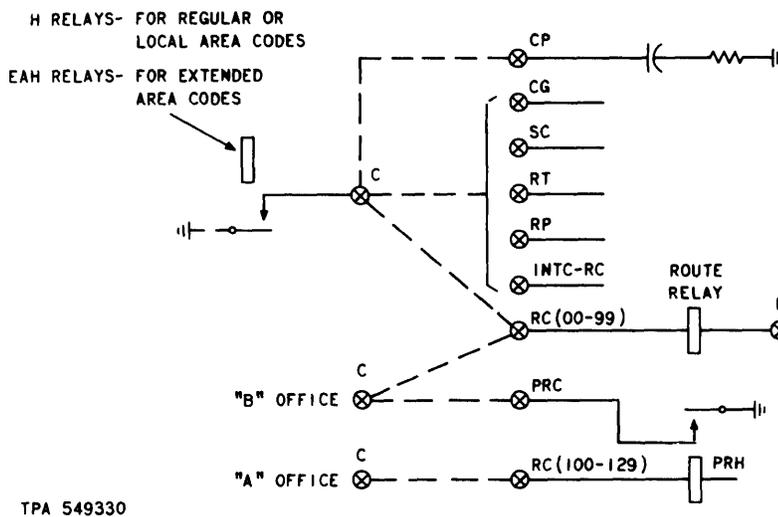
4.33 A code for a group of trunks terminating in a toll office, an information desk, a repair service desk, or testing equipment is assigned to a C punching on an arbitrary basis, for example, code 211 may represent long distance, code 411 may represent information, etc. The similarly numbered C punching is assigned to these codes.

4.34 C punching of marker (Fig. 4) is assigned to:

- (a) **RC punching** of the original route relay to be used for the code. The route relay assignment is explained in Part 4D.
- (b) **CG punching** when the code is to be given identical treatment in all respects to two or more other codes. Codes to panel sender and manual tandems usually require this assignment.
- (c) **SC punching** when the code is to be given different routing treatment for different classes of service. This assignment is necessary where special service operator trunks are assigned to handle only one class of service in offices having more than one class of service. It is also necessary where the long distance traffic must be routed to noncoin or coin type of trunk equipment depending upon the class of service and in other instances where class-of-service discrimination is required.
- (d) **RT punching** when it is necessary to transfer the traffic for a particular destination

from one trunk group to some other group. This assignment is used for transferring the local office traffic to the operator or to overflow when terminating sender load control is provided. It is also used for transferring traffic from a decentralized "A" board to a long distance board under control of a manually operated key.

- (e) (**A office code point**) **RC punching** of the preroute PRH relay when the high-five incoming group indication is required for the "B" office over a common trunk group and the use of a separate route relay for the "A" office indication is to be avoided (see 4.73 and 4.74).
- (f) (**B office code point**) **PRC punching** of the preroute PRH relay when the high-five incoming group indication is required for the "B" office over a common trunk group and the use of a separate route relay for the "A" office indication is to be avoided (see 4.73 and 4.74).
- (g) **CP punching** when the code represents one of the ten highest calling rate destinations. This punching provides contact protection for certain marker relay contacts and is assigned in addition to one of the other punchings described under (a) to (e).
- (h) **RP punching** of the preroute PC<sub>1</sub> relay when a peg count is desired of an individual code of a number of code points that have the same route information.



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Fig. 4—Assignment of C Punchings

**4.35** *C punching of 3 DIT* (see 1.03) is assigned to:

- (a) *RC punching* of the original route relay to be used for the code. These punchings are multiplied from the marker route relay bays. The route assignment is explained in Part 4D.
- (b) *CG punching* when the code is to be given identical treatment in all respects to two or more other codes. These punchings are multiplied within each translator individually.
- (c) *SC punching* when the code is to be given different routing treatment for different classes of service. These punchings are multiplied from the marker.
- (d) *RP punching* of the preroute PC<sub>1</sub> when a peg count is desired of an individual code of a number of code points that have the same route information. These punchings are multiplied from the marker.
- (e) *INTC-RC punching* when connection of C punching is required to various punchings on the marker common bay. These punchings are multiplied from the marker.

**4.36** *C punching of 3 DCT* (see 1.03) is assigned to:

- (a) *RX punching*, route control point. This cross connection is extended through the translator connector to the 3 DIT, if provided, or to the route grouping frame, which gives access to RC, SC, CG, RP and INTC-RC punchings.
- (b) *CG punching* when the code is to be given identical treatment in all respects to two or more other codes. These punchings are multiplied within each translator individually.

**4.37** *Bridged Codes*: Where two designations receive like treatment in all respects and it is not felt that they will constitute a code group at any future time, both C punchings are assigned to the same RC punching. This usually occurs in the case of theoretical offices. Assignment in this manner reserves the use of the CG punchings for code groups consisting of a minimum of three central office designations.

**4.38** *2-Digit Codes*: When the marker is arranged for 2-digit codes only 80 code point C punchings are available for assignment. They are 200 to 209, 300 to 309, etc. The unavailable code points 210 to 299, 310 to 399, etc, need not be assigned to the vacant code group.

**4.39** *2- and 3-Digit Codes*: When the senders are arranged to handle both 2- and 3-digit codes, the 2-digit codes are confined to a particular group of numbers as required. For example, 2-digit codes may be in the 20 to 29, 30 to 39, and 40 to 49 series while the 3-digit codes may be in the remaining 500, 600, 700, 800, and 900 series. In such an event, code points 200 to 209, 300 to 309, and 400 to 409 would be available as 2-digit codes while 500 to 999 would be available as 3-digit codes. The unavailable code points 210 to 299, 310 to 399, and 410 to 499 need not be assigned to the vacant code group.

#### **4.40** *Vacant and Restricted Codes*

- (a) The C punchings of vacant codes are assigned to CG punchings 0 and 1. Two code group punchings are provided in this case to eliminate having more than two wires connected to a punching. The only vacant codes not assigned are the unavailable codes mentioned in 4.38 and 4.39.
- (b) Codes that are restricted to all classes of service are assigned to CG punching 2.

#### **Long Distance Code Point Punching**

**4.41** For the purpose of this section C punching 211 is the code point punching used for completing calls to the long distance operator.

#### **4.42** *C punching 211 is assigned to:*

- (a) *An RC punching* when there is one group of long distance trunks and the marker does not serve an operator class. The R punching of the route relay is assigned to the OT punching.
- (b) *An SC punching* when the trunks are segregated by classes of service or an operator class is served. The associated S punchings of coin classes are assigned to an INTC-RC punching which is assigned to an RC punching of a route relay arranged to route the

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call to the coin type long distance trunks. The associated S punchings of noncoin classes are assigned to another INTC-RC punching which is assigned to the RC punching of a route relay arranged to route calls to the noncoin type long distance trunks. The R punchings of the route relays are assigned to an OT punching unless a dial operator class is provided. The associated S punching of the keypulse operator class is assigned to the KP punching. The associated S punching of a dial operator class is assigned to the INTC-RC punching used by another class. The R punching of the relay used by the dial operator and the other class is assigned to an SC punching. The associated S punchings are assigned as follows: dial operator class to ODR punching, other class to OT punching (see Fig. 3 and 4).

(c) **An RT punching** when it is necessary to transfer calls from a decentralized "A" board to a long distance operator (4.181).

**4.43** There are 800 C punchings located on the upper and lower C terminal strips on the common bay of each marker. The units digit designations appear below the punchings and the tens digit designations appear at the right and left side of the punchings. The punchings on the upper C terminal strip number from 600 to 999 and those on the lower C strip number from 200 to 599. Although there are six rows of punchings on the upper C terminal strip of the common bay, only the lower five rows are used as C punchings. There are 800 code points on each route relay bay. Punchings 600 to 999 are located on the upper C terminal strip and punchings 200 to 599 on the lower C terminal strip. The individual C punchings are multiplied from route relay bays R0 to R7 and to the C punchings on the common bay and comprise the regular or local area code points. Another set of 800 individual C punchings, associated with extended area codes, when provided, multiple from route relay bay R8 to higher numbered bays as provided (Fig. 28, 29, and 30).

### PS (Permanent Signal) Punching

**4.44** The PS punching represents the point which the marker grounds when it receives a permanent signal and provides means of routing a subscriber line to a permanent signal trunk when dialing is not started or completed in the time allowed.

**4.45** **PS punching** is located in the bottom row of punchings approximately in the center of the D terminal strip of the common bay. For earlier installations the PS punching is located on the top row of the S terminal strip on the common bay. PS punching is assigned to

- (a) INTC-RC punching. (See 4.104.)
- (b) SC punching. (See 4.96 and Fig. 3 and 4.)
- (c) CP punching. (See 4.201 and Fig. 3.)

### ZO (Zero Operator) Punchings

**4.46** The ZO punching provides a code point punching for dial zero special service operator calls.

**4.47** **ZO punching** is located in the approximate center of the bottom row of punchings on the D terminal strip of the common bay. For earlier installations it is located on the top row of the S terminal strip of the common bay. The ZO punching is assigned to:

- (a) **INTC-RC punching**. (See 4.104.)
- (b) **SC punching**. (See 4.96 and Fig. 3 and 4.)

### A12 Punching

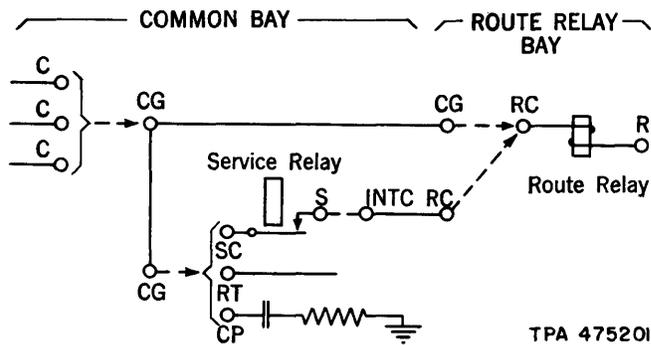
**4.48** † The A12 punching represents the point which the marker grounds when access codes are provided and a customer has dialed an access code as the first digit and one as the A digit (second digit dialed). Cross-connections to this punching provide means of routing such a call according to one of the following assignments:

- (a) RC punching to route the call without service or access screening.
- (b) SC punching to route the call according to service class.
- (c) ASC (00-39) punching to provide access screening.
- (d) KP punching to deny a route to KP operators.

**4.49** **A12 punching** is located in the bottom row of punchings on the D terminal strip of the common bay. †

**CG (Code Group) Punchings**

**4.50** The CG punchings provide connecting facilities for terminating several cross connections on a common point, such as associating several codes with a route relay. They are used to eliminate more than two C punchings being cross-connected to the same RC punching. (Fig. 5.)



**Fig. 5—Assignment of CG Punchings**

**4.51** *CG punching 0 or 1* of the marker is assigned to the vacant or blank code point C punchings. CG punchings 0 and 1 are common and are assigned to the RC punching of the proper route relay when there is one type of vacant code trunk and no dial or keypulse operator class. CG punchings 0 and 1 are assigned to an SC punching when two types of vacant code trunks (coin and noncoin) or a dial or keypulse operator class are provided. The associated S punching of the keypulse class is assigned to the KP punching. The associated S punchings of noncoin classes are assigned to an INTC-RC punching which is assigned to an RC punching of one route relay. The associated S punching of coin classes is assigned to another INTC-RC punching which is assigned to an RC punching of another route relay. If the trunks (coin or noncoin) are arranged with battery on the ring and the district junctors are not arranged to hold over dial pulses, the R and CL punchings of the route relay are assigned to the OT and CL6P punchings, respectively. These assignments are also made if the coin trunks are arranged with battery on the tip and the district junctors are arranged for coin disposal. If the trunks (coin or noncoin) are arranged for battery on the ring and the district junctors are arranged to hold over dial pulses the R and CL punchings of the route relay are assigned to the NC and CL6S punchings, respectively. These assignments are also made if the noncoin trunks are arranged for battery on

the tip and the district junctors are arranged to hold over dial pulses. When a dial operator class is provided in the marker, the R punchings must be assigned to an SC punching. The associated S punchings of nonoperator classes are assigned to the OT or NC punching for battery-on-the-ring or battery-on-the-tip trunks, respectively. The associated S punching of a dial operator class is assigned to the ODR punching.

**4.52** *CG punching 2* of the marker is assigned to the C punchings of codes restricted to all classes of service. The CG punching 2 is assigned to the RC punching of a route relay when there is only one group of zero operator trunks and no dial or keypulse operator classes. When the zero operator trunks are segregated by classes of service or a dial or keypulse operator class is provided, assign the CG punching 2 to an SC punching. The associated S punching of the keypulse operator class is assigned to the KP punching. The associated S punchings of all other classes are assigned to respective INTC-RC punchings which in turn are assigned to RC punchings of route relays arranged for restricted operator class (CL punching assigned to CL4S). The associated S punching of the dial operator class is assigned to the same INTC-RC punching as that used by any other class. The R punchings are assigned to the OT punching if a dial operator class is not provided. If it is provided, the R punching, associated with the route relay to which the dial operator class is assigned, is assigned to an SC punching. The associated S punching of the dial operator class is assigned to the ODR punching while the other class S punching is assigned to the OT punching.

**4.53** *CG punchings 3 to 36* of the marker are assigned to the C punchings of all code points requiring the same routing, charging and station delay arrangements. The CG punching is assigned to the RC punching of the proper route relay. The R punching is assigned to the proper charge punching on the Z strip of the route relay bay, when the same charge treatment is required for all classes, or to an SC punching when different charges are required for different classes of service. The associated S punchings are assigned to the proper charge punching of the Z strip on the common bay.

**4.54** *A CG punching* of the marker may be assigned to a CP punching to provide contact

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protection or to an RT punching to provide route transfer in the same manner as a C punching.

**4.55** When extended area codes (route relay bay R8) are provided, an independent set of CG punchings 0, 1, and 2 are furnished for these codes. The vacant and restricted codes are assigned in the same manner as explained in 4.51 and 4.52. If desired, the vacant and restricted code groups of local and extended area codes are assigned in the same manner as explained in 4.51 and 4.52. If desired, the vacant and restricted code groups of local and extended area codes may be combined by assigning the CG punchings 0, 1, and 2 on the D terminal strip of the common bay to the CG punchings 0, 1, and 2, respectively, on the CG terminal strip of the same bay. If other types of code groups are required, the extended area C punchings should be assigned to a J-INTC punching which in turn should be assigned to CG punchings 3 to 36 on bay R8. This punching is then assigned to the RC punching of a route relay.

**4.56** *The CG punching* of the marker is assigned to a PR punching to associate a peg count preroute relay with a code group when an individual peg count registration of a particular code point is required and a number of code points use the same routing.

**4.57** *The CG punchings* of the marker local area route relay bays appear on the common bay and multiple throughout the R0 to R7 route relay bays as equipped. CG punchings 0, 1, and 2 are located on the top three rows of the upper CG and on the bottom three rows of the lower CG terminal strips of the common bay, while CG punchings 3 to 19 are located on the lower CG and 20 to 36 on the upper CG terminal strips of the common bay. All the above punchings multiple to the top row on the RA terminal strip of the local area route relay bays as equipped. When extended area code points are provided, an independent set of CG punchings are supplied for these code points. CG punchings 0, 1, and 2 appear on the top row of the D terminal strip of the common bay and multiple to the bottom three rows of the upper RC and the top three rows of the GC terminal strips of route relay bay R8. These punchings are also multiplied to correspondingly designated punchings on the RA terminal strip of this and all higher numbered route relay bays. CG punchings 3 to 36 are located on the top row of punchings of the RA terminal strip of route

relay bay R8 and multiple to all higher numbered route relay bays.

**4.58** *CG punchings* of the 3-digit individual translator are numbered 0 to 19. The CG punchings of the 3-digit common translator or route grouping frame are numbered 0 to 11. The CG punchings on these frames are independent of each other and of the marker. Code points of the translator are cross-connected to CG punchings to treat two or more codes in an identical manner.

**4.59** *CG punching 0 or 1* of the 3-digit individual and common translators, and the route grouping frame is assigned to the vacant or blank code point C punchings.

**4.60** *CG punching of 3 DIT* (see 1.03) is assigned to:

- (a) *C punching* to treat two or more codes in an identical manner.
- (b) *RX punching* to associate a 3 DCT routing output with a code group.
- (c) *RC punching* to associate a code group with a route relay.
- (d) *SC punching* to give various routing treatments by class of service to a code group.
- (e) *INTC-RC punching* to provide contact protection for a code group or as required.

**4.61** *CG punching of 3 DCT* (see 1.03) is assigned to:

- (a) *C punching* to treat two or more codes in an identical manner.
- (b) *RX punching* to associate a routing output with a code group.

**4.62** *CG punching* of route grouping (RG) frame (see 1.03) is assigned to:

- (a) *RX punching* to treat two or more routing outputs in an identical manner.
- (b) *RC punching* to associate a code group with a route relay.

(c) **SC punching** to give various routing treatments by class of service to a code group.

(d) **INTC-RC punching** to provide contact protection to a code group or as required.

**4.63** Foreign area codes consist of three digits (X0X or X1X) and are used to dial destinations out of the local service area of an office. A subscriber placing a call to a foreign area is connected to a subscriber sender and first dials the foreign area code followed by the office code and directory number. The 0 or 1 in the second digit of the foreign area code is recognized by the subscriber sender as an indication that the call will be handled as in 4.64(a) or (b).

**4.64** (a) If the office is not equipped with the recycle feature, the subscriber sender will connect to an auxiliary sender for registration of the additional digits dialed by the subscriber. It will also connect to the marker circuit which will decode the foreign area code in the same manner as a 3-digit local call and return the information to the sender for the routing required. In non-AMA offices the foreign area code point will usually be connected to a code group which will route the calls via CAMA tandem where the calling number may be identified by the operator or by automatic number identification (ANI). In offices equipped with AMA, the foreign area code point may be connected to an individual R relay as required. For the necessary class of call and route auxiliary information for these types of routes see 4.142 to 4.146 and SD-25016-01. Where a KP operator or dial operator class of service is provided, it will be necessary to deny these classes access to the CAMA routes. This may be done by the use of the KP punching for the KP operator class or by the use of ODR punching for the operator dial class. Other classes of service (such as coin) denied 10-digit dialing privileges should be rerouted to an intercept trunk group or announcement. The auxiliary sender is not called in by the subscriber sender until after dialing the seventh digit. Therefore, the route relays assigned to deny foreign area calls should be arranged to preclude awaiting the dialing of the numerical digits (direct operator class) to prevent unnecessary attachment of an auxiliary sender. This class of call (direct operator class) should also be used on route relays assigned for 10-digit overflow, intersender timing announcement and vacant code.

**Note:** If the district junctor is set in normal "no charge" condition on any of these routes, the district junctor supervisory relays must be arranged to hold over dial pulses.

(b) If the office is equipped with the recycle feature, the subscriber sender will connect to a 3-digit code compressor circuit where it will register the foreign area code. If the foreign area code registered in the 3-digit code compressor is wired as a compressed code, it will ground two CC\_ leads towards the subscriber sender on a 2/5 basis. The subscriber sender will, in turn, ground two leads towards the marker to register the foreign area compressed code which will control the choice of translator circuit to be used. If the foreign area code is not wired as a compressed code, the 3-digit code compressor will return a signal to the subscriber sender which will cause it to connect to an auxiliary sender and the call will be handled as in (a).

#### **Codes Requiring MF Outpulsing of 4, 5, 7 or 8 Digits or PCI Outpulsing for ANI Routes**

**4.65** The marker may also be arranged to provide information to the subscriber sender, causing it to engage an auxiliary sender for MF outpulsing of four, five, seven or eight digits for ANI or non-ANI routes. If necessary when ten digits are dialed, the marker, by means of class of call information (route auxiliary), can notify the subscriber sender to delete the foreign area code, which will result in the MF outpulsing of only seven digits. On 7- or 8-digit calls, the subscriber sender, by means of the class of call information (route auxiliary) transmitted from the marker, will engage an auxiliary sender for MF outpulsing of seven or eight digits. Similarly, other classes of call may be provided for routes requiring the MF outpulsing of only four or five digits when seven digits are dialed. Also, class of call information is provided for PCI/ANI routes by the route auxiliary arrangement. For class of call and route auxiliary information on the foregoing types of routes see 4.142 through 4.146 and SD-25016-01.

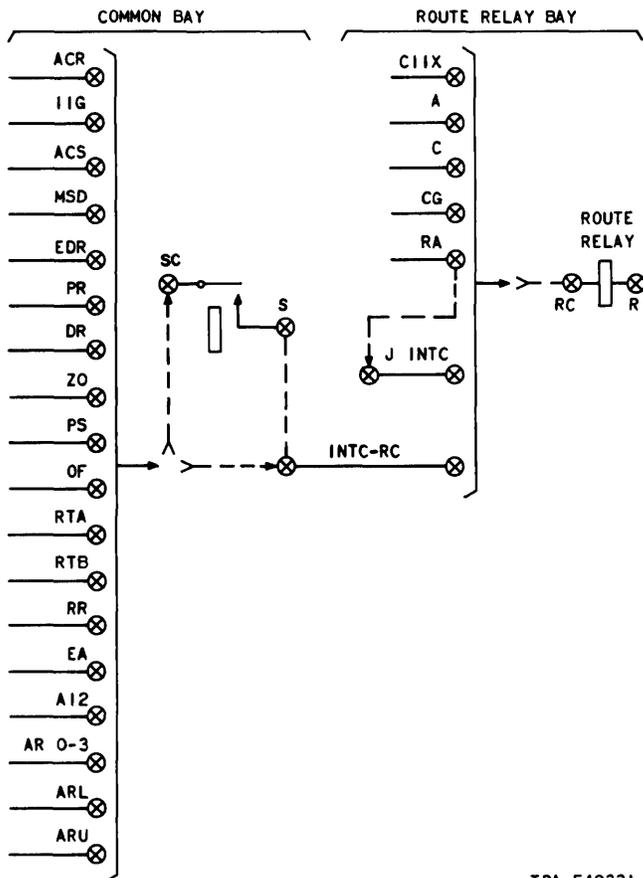
#### **RC (Route Relay) Punchings 00-99**

**4.66** The RC punchings represent the in-portion of the winding of similarly numbered route relays to which they are connected and provide means for connecting a particular route relay with a particular code or routing arrangement as

necessary. The punching appears only on the route relay bay where the route relay being used is located. A route relay is assigned for the code or routing as outlined in Part 4D.

**4.67 RC punching** of the marker (Fig. 6) is assigned to:

- (a) **C punching** to associate a route relay with a code point.
- (b) **CG punching** to associate a route relay with a code group.
- (c) **RA punching** of a route relay in a lower numbered ground supply. (See 4.134.)
- (d) **J-INTC punching**. (See 4.137.)
- (e) **CIIX punching** to associate a route relay with a 11X code.



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**Fig. 6—Assignment of RC Punching**

(f) **A punching** to associate a route relay with intersender timing feature punchings.

(g) **INTC-RC punching** on the route relay bay when it is necessary to associate the RC punching with a punching on the common bay. The similarly numbered INTC-RC punching is assigned to:

- (1) **S punching** when a different routing for different classes of service is required.
- (2) **DR punching** for providing a single route to the operator for all classes of service which are denied access to certain destinations because of charge or rate conditions.
- (3) **ZO punching** to associate a route relay with the zero operator code point requiring the same routing for all classes of service.
- (4) **PS punching** to associate a route relay with the permanent signal code point requiring the same routing for all classes of service.
- (5) **OF punching**, when provided, to associate a route relay with the originating sender load control code point requiring the same routing for all classes of service.
- (6) **RTA punching** to associate the normal or nontransferred route of a code point with a route relay. Assigned only when route transfer or terminating sender load control is provided.
- (7) **RTB punching** to associate the transferred route of a code point with a route relay arranged to provide access to the new destination.
- (8) **RR punching**, when provided, to associate a route relay with a CRR relay when coin traffic to destinations outside the local area are reached via dial coin zone trunks.
- (9) **EA punching** when all extended area codes are to be routed to a single code point.
- (10) **PR punching** to associate a route relay with a peg count preroute relay when

individual peg count registrations are required on code points which use the same route relay.

- (11) **11G punching** to associate a route relay with a 1-1 prefix single route code point.
- (12) **ACR punching** to associate a route relay with the compressed code that does not require 3-digit translation or to associate a route relay with the unused compressed codes (vacant code).
- (13) **AR0-3 punchings** to associate a route relay for an alternate route for codes normally routed via the 3-digit common translator.
- (14) **ARL punching** to associate a route relay for an alternate route for codes normally routed via the local area translator.
- (15) **ARU punching** to associate a route relay for an alternate route for codes normally routed via the extended area translator or 3-digit individual translator.
- (16) **ACS punching** to associate a route relay with a 01 or 10 prefix.
- (17) **MSD punching** to associate a route relay with a 0 or 1 following a compressed code to provide an announcement or overflow route.
- (18) **EDR punching** to associate a route relay for signaling the sender to time for extra digits.
- (19) **A12 punching** to associate a route relay with a 1 recorded in the A digit.†

**4.68** **The RC punchings** are located on the upper and lower RC terminal strips of the route relay bays. The numbers to the right and left designate the tens digit and the numbers under or over the punching designate the units digit of the RC punching and the associated route relay. The punchings number from 00 to 99 except on bay R8 where they number from 00 to 59, as only 60 route relays are equipped on this bay. The route relay bay number designates the hundreds number of the RC punching.

**4.69** **RC punching 00 to 99** of route grouping (RG) frame (see 1.03) associated with 3 DCT is assigned to:

- (a) **RX punching** to associate a route relay with a routing output.
- (b) **CG punching** to associate a route relay with a code group.

**4.70** **RC punching 00 to 99 of 3 DIT** (see 1.03) is assigned to:

- (a) **C punching** to associate a route relay with a code point.
- (b) **RX punching** to associate a route relay with a routing output for 3-digit common translators.
- (c) **CG punching** to associate a route relay with a code group.

**4.71** **RCX punching** (Special N.Y. Telephone Co.) of route grouping (RG) frame associated with 3 DCT (see 1.03) is assigned to RX punching to associate an auxiliary route relay with a routing output.

**4.72** **RCX punching** (Special N.Y. Telephone Co.) of 3 DIT (see 1.03) is assigned to:

- (a) **C punching** to associate an auxiliary route relay with a code point.
- (b) **RX punching** to associate an auxiliary route relay with a routing output for 3-digit common translators.

**PRC (Preroute Control) 100-129 Punchings and RC (Route Control) 100-129 Punchings**

**4.73** When one route relay is to serve both units of a paired office (office A and office B) the marker is equipped with one OBT relay and one PRH relay for each paired office so treated. Two punchings designated PRC and RC are provided for each PRH relay. The PRC and RC punchings appear on the RC terminal strips of the route relay bay. The RC punchings also appear on the route grouping frame or 3 DIT where subscriber sender recycle feature is provided (see 1.03).

4.74 On the local translator frame or 3 DIT frame the code point for office B is assigned to an RC00-99 punching associated with a route relay, as shown in Fig. 4. The code point for office A is assigned to an RC100-129 punching of the PRH relay. The PRC punching associated with the PRH relay is cross-connected to the C punching associated with office B. Where a route grouping frame is provided with a 3 DCT frame, the RC00-99 punching is cross-connected to the RX punching associated with the code point for office B and the RC100-129 associated with the PRH relay is cross-connected to the RX punching associated with the code point for office A. The PRC punching associated with the PRH relay is cross-connected to the RC punching of the R relay assigned to office B.

**R (Route Relay) Punchings**

4.75 The R punchings represent the outer or battery end of the route relay and provide a means for associating the route relay with the charge, transmission, or routing condition of the destination to which the route relay is assigned.

4.76 *R punching* (Fig. 7) is assigned to:

(a) *SC punching* when the charge or transmission condition is different for different classes of service or when it is required to reroute the call for certain classes of service to a different group of trunks (such as a deny operator routing or dial coin zone trunk routing). Check the existing SC punching assignments for one having the same associated S punching assignments as will be required for the proposed assignment.

(b) *NCTD punching* for classes requiring district junctors to be set in the normal "no charge" condition and to divert the call to the PBX operator where subscriber senders and PBX trunks are arranged for diversion of restricted PBX traffic. This punching is located above the TWB punching on the SP portion of the combined ST and SP terminal strip on the local area route relay bay. (Fig. 29.)

(c) *ZA to ZJ punchings* to provide the proper zone charge for the destination associated with the route relay when all classes are charged the same rate. If the marker is so arranged, routes cross-connected to the ZA to ZJ punchings will also invoke the PBX diversion feature.

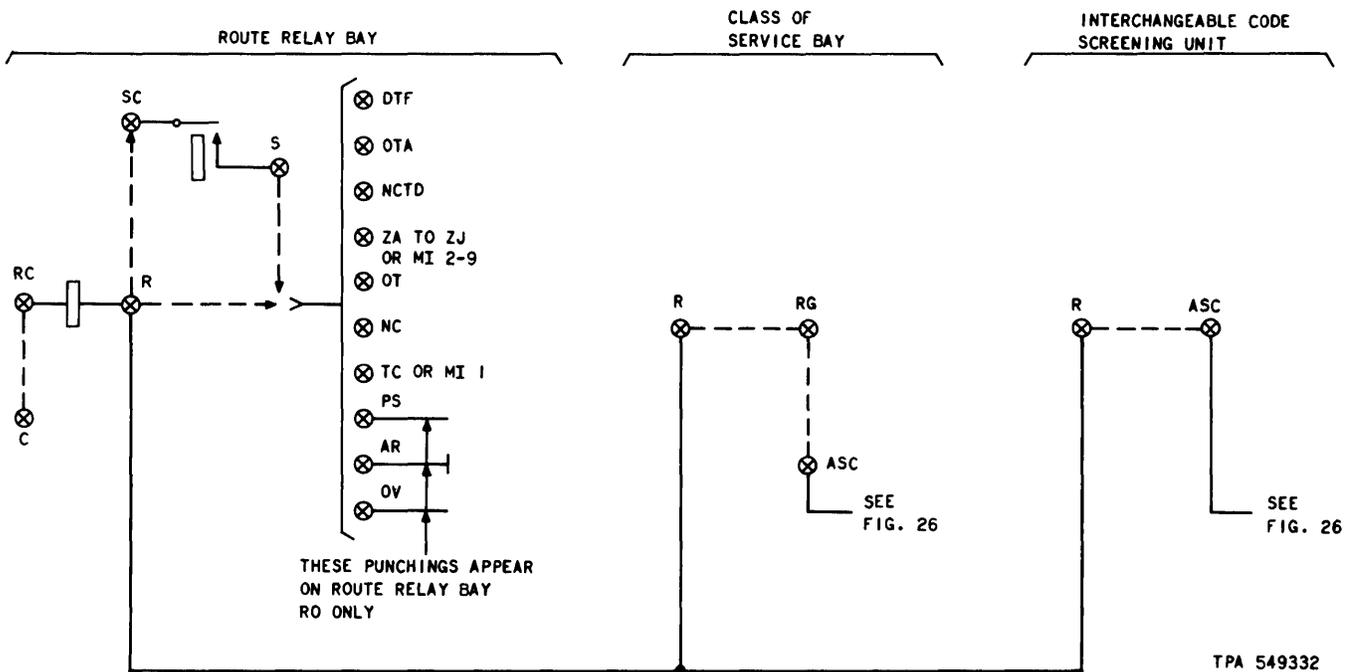


Fig. 7—Assignment of R Punching

- (d) **MI-1 to MI-9 punchings** to furnish billing and charging information to the AMA equipment in the form of a message index 1 to 9.
- (e) **OT punching** when all classes of service require operator transmission (repeat coil out) on calls to the destination associated with the route relay. (Required for MF and PCI-CAMA routes with ANI.)
- (f) **NC punching for:**
- (1) Talking "no charge" for all classes.
  - (2) Coin classes of service.
  - (3) Calls completed through keypulsing district junctors or dialing districts, operator class.
  - (4) Destinations using MF and PCI operator identified CAMA trunks.
- (g) **TC punching** for all classes requiring one message unit initial charge.
- (h) **PS punching** on the Z terminal strip for the route relays assigned to the permanent signal routing. This punching also multiples to the D terminal strip of the common bay and the Z terminal strip of the class of service bay where it is designated ZPS.
- (i) **AR punching** when the associated route relay represents an alternate route or a common subgroup original route relay.
- (j) **OV punching** for subscriber overflow and intersender timing announcement routes.
- (k) **OTA punching** for classes requiring district junctors to be set in the "operator transmission" condition for ANI routes and to divert the call to the PBX operator where subscriber senders and PBX lines are arranged for diversion of restricted PBX traffic. This punching is located above the CL7S punching on the CL terminal strip on the local area route relay bay. (Fig. 29.)
- (l) **RG punching** on the class of service bay for access code screening. The RG is an interconnect between the access code unit and the route relay bays. The other end of the RG interconnect is connected to the ASC punching.
- (m) **ASC punching** on the interchangeable code screening unit. These punchings numbered 40 to 99 are the common contacts of the screening relays.
- (n) **DTF punching** on the common bay to provide a special dial tone first announcement on markers arranged for dial tone first feature.♦
- 4.77 R punchings** are located on the right end of the bottom 5-point terminal strip on the route relay bay (Fig. 29). The punchings are numbered from 00 to 99 and correspond to the associated route relay. The route relay bay number determines the hundreds digit, the number on the right or left of the terminals determines the tens digit and the number below indicates the units digit. ♦R punchings are multiplied to the class of service bay and to the interchangeable code screening unit.♦
- RP and PR (Peg Count Preroute Relay) Punchings**
- 4.78** The RP and PR punchings are provided when individual peg count registrations are required on code points which use the same route relay.
- 4.79 The RP punching** of the marker is cross-connected to a C punching to associate a code with a code point preroute relay.
- 4.80 RP punching** of route grouping (RG) frame (see 1.03) is assigned to the RX punching to associate a 3 DCT routing output with a peg count preroute relay.
- 4.81 RP punching of 3 DIT** (see 1.03) is assigned to:
- (a) **C punching** to associate a code with a code point preroute relay.
  - (b) **RX punching** to associate a 3 DCT routing output with a code point peg count preroute relay.
- 4.82 The PR punching** of the marker is cross-connected to the CG punching associated with the code points that use the same routing.
- 4.83** The RP and PR punchings are located on the PC terminal strip on the common equipment bay of the marker. The RP punchings are multiplied to the 3 DIT or route grouping frame.

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**RX (Routing Output) Punchings of the 3 DCT and 3 DIT or Route Grouping Frame**

**4.84** The RX punchings are used when 6-digit translation (sender recycle) is provided, to associate punchings of the 3 DCT to punchings of the 3 DIT or route grouping frame.

**4.85** *RX punching of 3 DCT* (see 1.03) is assigned to:

- (a) *C punching* to associate a routing output with a code point.
- (b) *CG punching* to associate a routing output with a code group.

**4.86** *RX punching of 3 DIT* (see 1.03) is assigned to:

- (a) *RC punching* to associate a 3 DCT routing output directly with a route relay or preroute relay.
- (b) *CG punching* to associate a 3 DCT routing output with a code group.
- (c) *SC punching* to give a 3 DCT routing output various routing treatments for different classes of service.
- (d) *RP punching* to associate a 3 DCT routing output with a code point peg count preroute relay.
- (e) *INTC-RC punching* to associate a 3 DCT routing output with contact protection or as required.

**4.87** *RX punching* of route grouping (RG) frame (see 1.03) is assigned to:

- (a) *CG punching* to associate a routing output with a code group.
- (b) *RC punching* to associate a routing output directly with a route relay or preroute relay.
- (c) *RP punching* to associate a routing output with a code point peg count preroute relay.
- (d) *SC punching* to give a routing output various class-of-service treatments.

(e) *INTC-RC punching* to associate a routing output with contact protection or as required.

**D, DA and DG Calling Line Class-of-Service Punchings:**

**4.88** The D and DA punchings represent the calling line class of service that is registered in the sender and then forwarded to the marker. The DG punchings are used to differentiate between calls originated in the home area and those originated in the adjacent foreign area where markers are arranged to handle calls that originate in two numbering plan areas.

**4.89** *D punchings 0 to 15* are provided when the marker is arranged for two or more classes of service. The D8 punching is assigned to the keypulse operator class of service. The D punchings numbered 0, 7, and 15 are not assigned. Where two subscriber sender groups have access to a marker arranged for 13 classes of service, the D punchings 1 to 6 may be assigned to the classes of one group and D punchings 9 to 14 may be assigned to the classes for the other group. The D punching is not assigned when the marker is arranged for a single class of service.

**4.90** *DA punchings 1 to 6 and 9 to 14* are provided when the marker is arranged for more than 13 classes of service. Where two sender classes are given identical treatment in the marker (such as message and message party in some areas) the respective D or DA punchings are assigned to the same SW punching. By means of the D and DA punchings, the marker can be arranged to handle 28 class indications but can only discriminate among 25 classes of service due to the limitations of the class-of-service relays 0 to 24.

**4.91** *D or DA punching* (Fig. 8) representing a particular class of service is assigned to:

- (a) *SW punching* representing the service relay assigned to serve this class of service.
- (b) *TOC punching* when terminating sender overload control, if provided, is to be canceled. Operator classes require this assignment.
- (c) *TP punching*, when equipped, provides facilities for splitting one group of 2-party service, whereby the tip and ring parties on the same 2-party line may be given separate treatment for different rates or zones. See Fig. 8.

(d) **STP0, 3 and 6 punchings**, when equipped, provide facilities for splitting three more groups of 2-party services (Fig. 8).

(e) **DG punching** when markers are arranged to handle originating calls from two numbering plan areas (code compression and sender recycle feature provided).

(f) **DP punching** when an AMA office is arranged for 4-, 8-, or 10-party lines.

(g) **DI punching** when automatic identification of 101 ESS PBX stations is required in an AMA office. The associated DIS punchings are cross-connected to the assigned SW punchings.

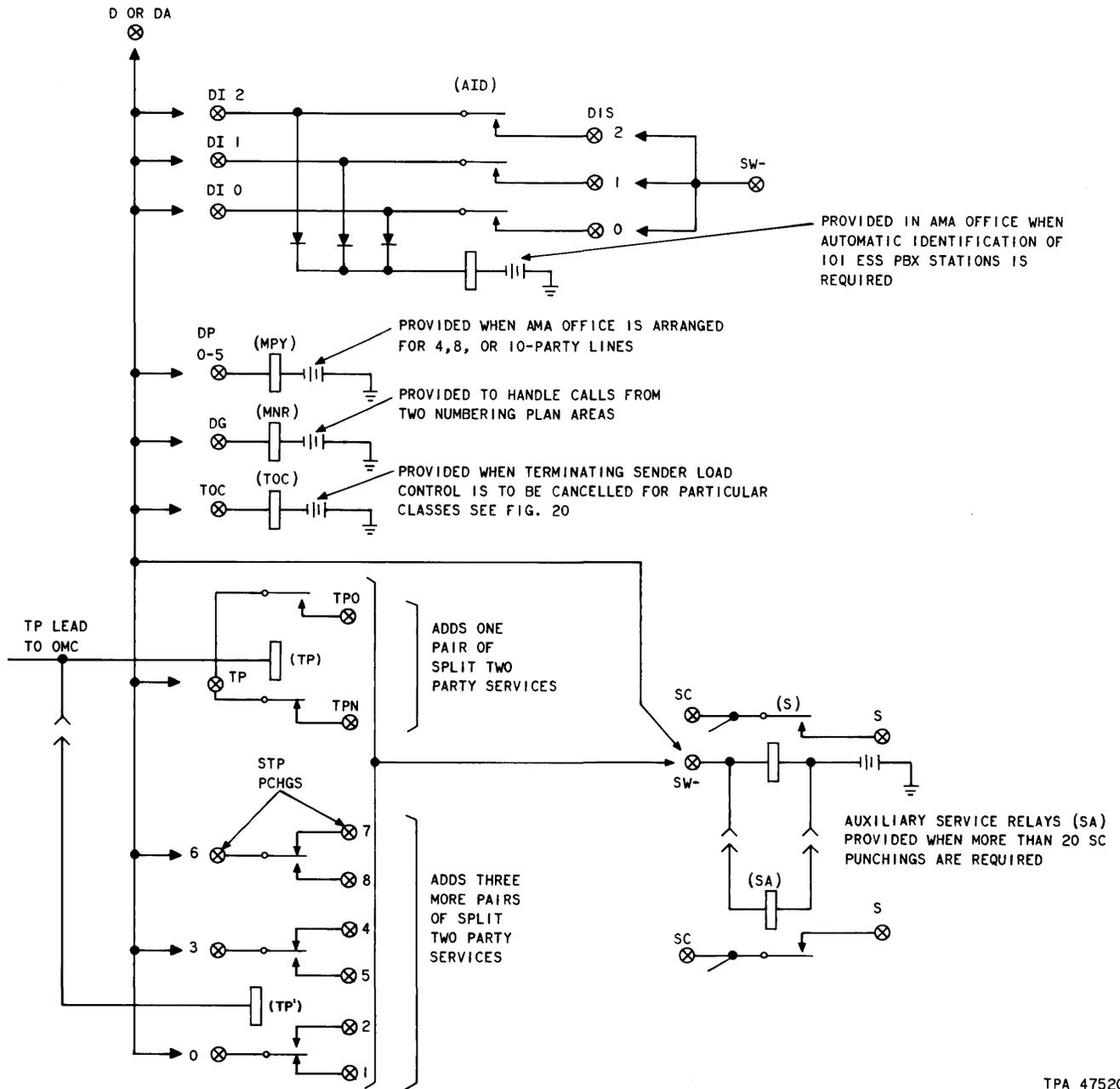


Fig. 8—D, DA to DG, SW, TOC, TP, STP, DP, and DI as Required

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**4.92 D or DA punchings** are located on the bottom row of the D terminal strip as shown in Fig. 28. The SW0 to 24 punchings appear on the two rows above the D punchings. On earlier installations the SW0 to 19 punchings appear on the row above the D punchings, while the SW20 to 24 punchings appear on the second row above the INTC-RC0 to 4 punchings. When provided, the TOC, TP, TPO, TPN, and STP0 to 8 punchings are located on the D terminal strip. The D and DA punchings also appear on the SD1 terminal strip on the marker frame where they may be cross-connected to the DG punchings, as required.

**F. Assignment of Class-of-Service Relay SC and S Punchings**

**4.93** The number of SC and S punchings available will vary for a particular office and is dependent upon the number of class-of-service relays installed to meet the local requirements. These relays are designated S and, if required, SA (service auxiliary) relays can be added. The S relay is one half of a multicontact relay and it has 20 pairs of contacts. The like numbered armature contacts of all S relays installed are multiplied and they terminate on punchings designated SC0 to 19. The 20 contact springs of each S relay terminate on individual punchings designated S0 to 19. If more than 20 SC punchings are required, SA relays are added and wired to like numbered S relays and

when they operate, it is in parallel. There are two types of SA relays used. One type is a 10-pair contact relay but only five pairs are used, due to the limitation of punching availability on earlier installations. When used (SD-25016-01, Fig. 34), provision is made for five more SC punchings 20 to 24 and five more individual S punchings 20 to 24 per relay. The other type of SA relay (SD-25016-01, Fig. 43) is similar to the S relays described except the punchings are designated SC20 to 39 and there are S punchings 0 to 19 for each relay installed. This equipment is mounted on a class-of-service frame. The maximum number of S and SA relays that can be provided is 25. SA relays increase the number of SC and S punchings but not the number of classes of service. A summary of the foregoing paragraph is found on Table F.

**SC (Service Relay—Common Contact) and S (Service Relay—Individual Contact) Punchings**

**4.94** The SC and S punchings are used to provide different treatment in charging, routing, and other conditions for different classes of service. When the marker is arranged for a single class of service, the SC and S punchings are not assigned. Each SC punching is related in number to a group of S punchings, each S punching associated with a different class-of-service relay as shown in Fig. 9. If an SC punching is assigned the correspondingly numbered S punching is assigned as required.

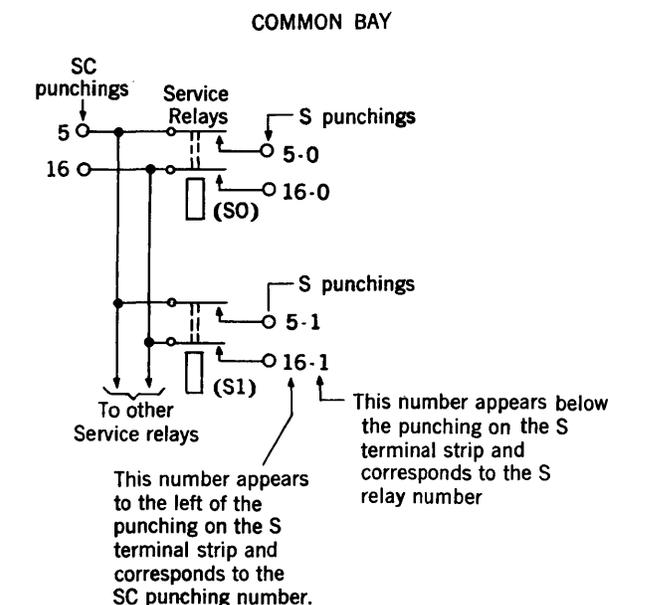
TABLE F

ARRANGEMENT OF S AND SC PUNCHINGS					
RELAY DESIG.	SD-25016-01 FIG. NO.	RELAY TYPE	SC PCHGS. AVAILABLE WITH TWO OR MORE RELAYS	S PCHGS. PER RELAY	S PCHGS. WITH MAX. OF 25 RELAYS INSTALLED
S	4	Multi Cont.	0 to 19	20	500*
SA	34**	U Type	20 to 24	5	125*
SA	43	Multi Cont.	20 to 39	20	500***

\* Located on common equipment bay. See Fig. 31 and SKA and SKB of Fig. 28.

\*\* Fig. 34 is rated "A&M Only" and is superseded by Fig. 43 on Issue 58D.

\*\*\* Located on class-of-service frame SA terminal strip.



ASSIGNMENT OF SC AND S PUNCHINGS (Typical Example)								
SC cross-conn. to ↓	SC Punching Number ↓	Service Relays Numbers and Class of Service					S punching Numbers and Associated Assignments	
		SO MR	S1 MR PTY	S2 FLAT	S3 FLAT PTY	S4 K.P. OPER		
R	5	5-0 TC	5-1 TC	5-2 ZA	5-3 ZA	5-4 NC		
R	16	16-0 ZA	16-1 ZA	16-2 ZB	16-3 ZB	16-4 NC		

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**Fig. 9—Association of SC and S Punching Numbers and Assignment Arrangements**

**4.95** It is suggested that the following numbering arrangement of S punchings be followed for record purposes. The S punching is designated first by the number corresponding to the SC punching, then a dash (—) and then the number corresponding to the S or SA (if more than 20 SC punchings are provided) relay number. As shown in Fig. 9, the S punching 16-1 is associated with SC punching 16 and S relay 1. With this arrangement of numbering the assignments, the preparation of work sheets and the identification of punchings will be facilitated.

**4.96 SC punching** (Fig. 10) is assigned to:

- (a) **R punching** when several routes have identical charges and treatment of their routes, relative to the calling line class of service.

- (b) **C punching** when the code is to be given different routings for different calling line classes of service. In this arrangement the route relays are placed between the S and charge or transmission punchings. (Fig. 4.)

- (c) **CG punching**. (See 4.51, 4.52 and 4.53.)

- (d) **ZO punching** when the special service trunks are segregated by classes of service or originating central office designations. The associated S punchings are assigned to INTC-RC punchings which in turn are assigned to RC punchings of route relays arranged to direct the traffic to the proper trunk group. The associated S punching for a keypulse operator class is assigned to the KP punching. The associated S punching of the dial operator class is assigned to the same INTC-RC punching used for another class. In this event the R punching of the route relay is not assigned to the OT but to another SC punching. The dial operator class S punching is assigned to the ODR punching while the S punching of the other class is assigned to the OT punchings. (Fig. 1 and 2.)

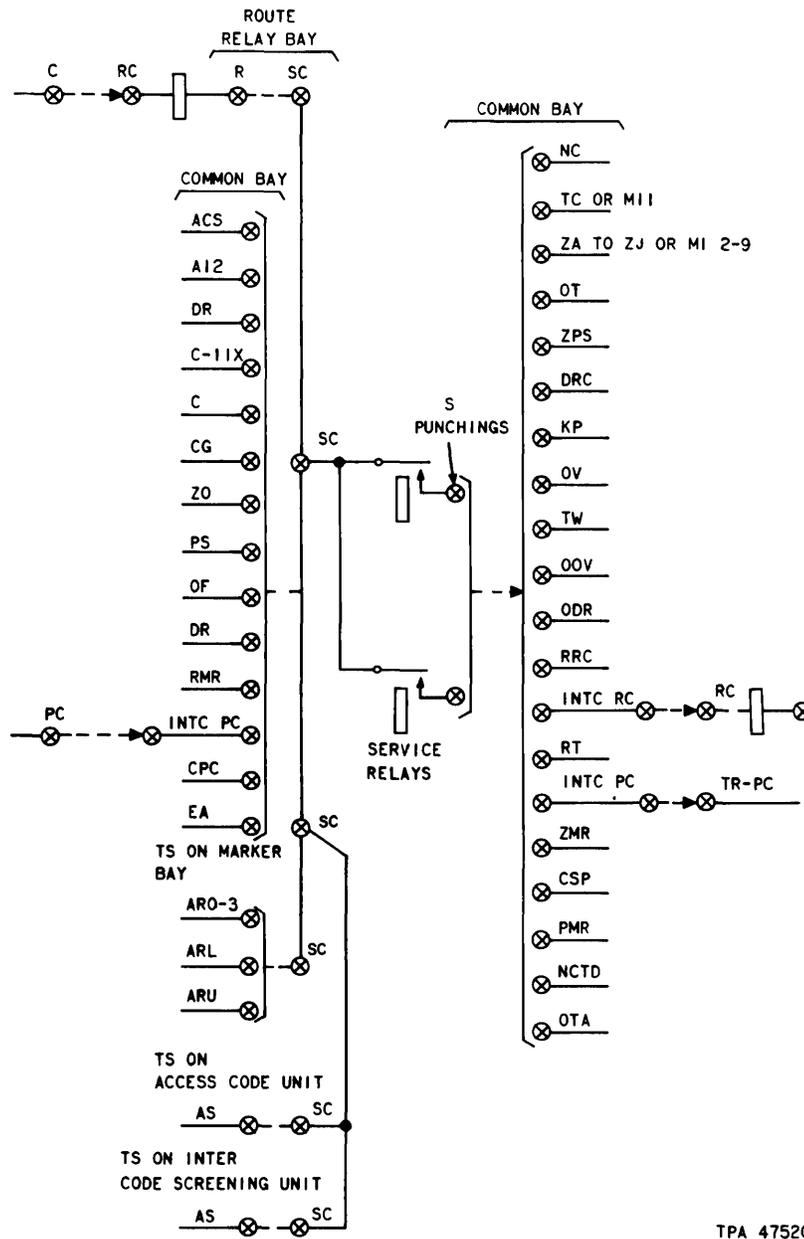
- (e) **PS punching** when there are two or more groups of trunks (coin, PBX, etc) or operator classes are served. The associated S punchings of the coin classes, noncoin classes and PBX classes are assigned to different INTC-RC punchings which in turn are assigned to the RC punchings of different route relays arranged to route the calls to the proper trunk group. The R punchings of these route relays are assigned to the PS punching on the Z terminal strip of the first route relay bay. (This PS punching multiples to ZPS terminal on the D terminal strip of the common bay and to the ZPS punching on the Z terminal strip of the class-of-service bay.) The associated keypulse operator class S punching is assigned to the KP punching on the Z strip. Dial operator class S punching is assigned to the INTC-RC punching of another class. The R punching of the route relay associated with this class is not assigned to the PS punching but instead to another SC punching. The associated S punching of the dial operator class is assigned to the OOV punching. The associated S punching of the other class is assigned to the ZPS punching on the D strip. (Fig. 1 and 2.) The PS punching provides means of routing a subscriber line to a permanent signal trunk when dialing is not

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started or completed in the sender after a predetermined time interval.

- (f) **OF punching.** (See 4.178)
- (g) **DR punching** (associated with DRC punching). (See Fig. 11 and 4.97g.)
- (h) **RMR punching** when the message register check by the marker is to be canceled for

classes of lines not equipped with message registers or grounded register (MR) leads. The associated S punchings of classes (such as coin or operator) on which the check is to be canceled are assigned to the ZMR punching. The associated S punchings of classes on which the check is not canceled are not assigned. When class-of-service peg count registration is provided, the associated S punchings are assigned to the CSP or PMR punching as outlined in 4.183 (Fig. 21.)



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Fig. 10—Assignment of SC and S Punching

- (i) **INTC-PC punching** when peg count registration of trunk groups by classes of service is required as outlined in 4.174.
- (j) **CPC punching** when provided for marker peg count registration by classes of service as outlined in 4.184.
- (k) **EA punching** when extended area codes are to be routed according to class of service. (See 4.202.)
- (l) **AR0-3 punchings** when class-of-service treatment is required for an alternate route for codes which are routed via the 3-digit common translator.

- (m) **ARL punching** when class-of-service treatment is required for an alternate route for codes which are routed via the local area translator.
- (n) **ARU punching** when class-of-service treatment is required for an alternate route for codes which are routed via the extended area translator or 3-digit individual translator.
- (o) **AS punching** when class-of-service treatment is required for access code or interchangeable code screening features. (See Fig. 26.)
- (p) **ACS punching** when class-of-service treatment is required for prefix codes 01 and 10. ♦

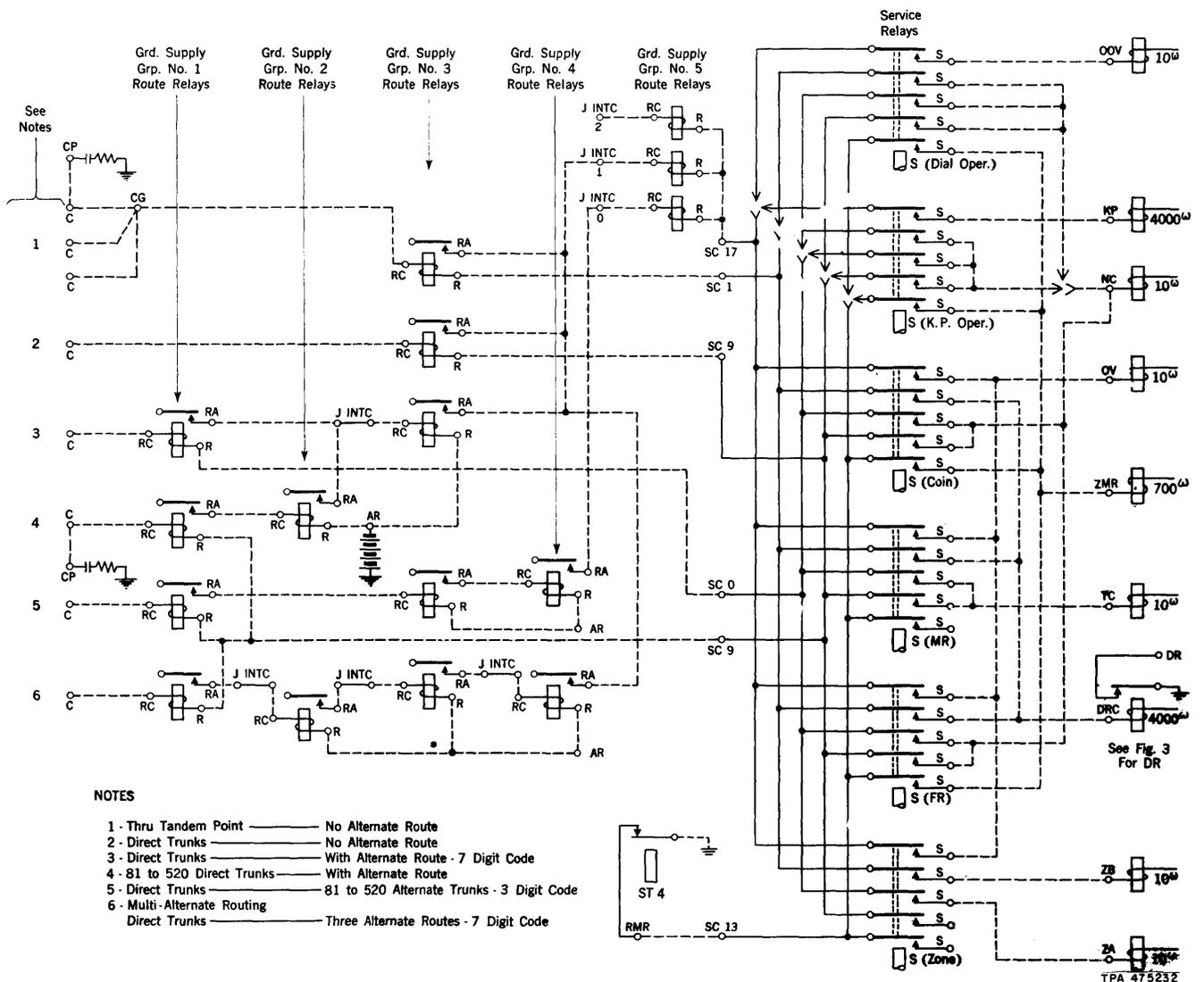


Fig. 11—Routes with Different Zone Treatment

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- (q) **A12 punching** when class-of-service treatment is required for a 1 recorded in the A digit.
- (r) **DR punching** to deny some classes access to a route.
- (s) **C11X punching** when class-of-service treatment is required for 11X codes.♦

**4.97 S punching** (Fig. 10) is assigned to:

(a) **NC (No Charge):** When used for destinations where the district junctor is set for normal no charge under the following conditions:

- (1) When 1-1 directing digits are used to route traffic to a crossbar tandem office arranged for CAMA.
- (2) All calls completed for coin classes of service whether "charge" or "no charge."
- (3) All calls completed through operator, keypulsing or dialing district junctors.
- (4) Overflow.
- (5) Vacant code trunks (noncoin battery on the tip, coin or noncoin battery on the ring) when district junctors are arranged to hold over dial pulses.
- (6) Repair service trunks.
- (7) Information trunks.
- (8) Commercial office trunks.
- (9) Talking no charge for all classes of service.
- (10) Destinations using MF and PCI operator identified CAMA trunks.

(b) **TC (Talking Charge):** To set the district junctor for charging one message unit with or without timing on local calls, depending on the local arrangement of the district junctors. (Not used when AMA is equipped.)

(c) **MI-1 to MI-9 (Message Index 1 to Message Index 9):**

- (1) When AMA is equipped, the MI-1 punching replaces the TC punching and MI-2 to

MI-9 replace the ZA to ZJ punchings. Charge conditions known as message indices must be set up, dependent on local rate conditions, for the destination associated with the route relay. The marker provides up to eight different message unit charge conditions, message indices 1 to 8, for various initial and overtime charges and other items affecting the charge or of interest to the accounting center. These are for bulk-billing on a message unit basis and may be recorded in detail on the AMA tape if desired. Message index 9 is provided for calls that appear in detail on the toll statement and are not based on message unit charges. Cross-connections from the route relay R punchings, either direct or through a class-of-service relay, to the MI-1 to MI-9 punchings on the Z terminal strip, determine the message index according to the charge for the area represented by the route relay.

(2) Calls that are bulk-billed in terms of message units and do not require detailed recording are entered on the AMA tape with a 2-line initial entry. Bulk-billed calls that require detailed recording and calls that appear in detail on the toll statement require a 4-line initial entry or a 5-line initial entry. Cross-connections are made on the B terminal strip of the common equipment bay (Fig. 28) from the MIL-1 to MIL-9 punchings, shown as MI on earlier installations, to the 2L or 4L punchings to have a 2-line, 4-line or 5-line entry associated with a particular message index. The 2L cross-connection will cause a 2-line initial entry to be recorded on the tape omitting the called subscriber number and area index. The 4L cross-connection will cause a 4-line or 5-line initial entry to be recorded on the tape giving the called subscriber number and area index.

(d) **ZA to ZJ (Zone A to Zone J):** To set the zone registration common control circuit in the position to make the proper charges on the subscriber register. If the marker is so arranged, routes cross-connected to the ZA or ZJ will also invoke the PBX diversion feature. (Not used when AMA is equipped.)

(e) **OT (Operator Talking or Transmission):** When used on certain types of operator calls, this assignment sets the district junctor circuit

with the tip and ring leads cut straight through for routes to:

- (1) Zero operator trunks.
- (2) Long distance trunks (2- or 3-digit codes).
- (3) Vacant code trunks (coin or noncoin battery on the ring) when district junctors are not arranged to hold over dial pulses or (coin battery on the tip) when the district junctors are arranged for coin disposal.
- (4) Dial and ring test trunks.
- (5) Coin box test trunks.
- (6) Dial coin zone trunks.
- (7) MF and PCI-CAMA trunks with ANI.

(f) **ZPS punching** on the D terminal strip.

This is one end of the winding termination of the PS relay. This assignment is necessary on the class-of-service relay S punching when the marker is arranged to serve operator classes. In the event that no operator class is served the R punching of the permanent signal route relay is assigned to the PS punching on the Z terminal strip of the route relay bay. (See Fig. 2.)

(g) **DRC punching** (associated with DR punching).

When it is necessary to deny some subscriber classes access to a destination to which other classes are allowed access or when it is necessary to deny all subscriber classes access to a route to which only an operator class is allowed access, this assignment is made. When all classes are denied access, the code point of the destination is assigned to the CG2 punching. The assignment of the DRC punching provides for rerouting the call to another point, usually a group of zero operator trunks, and therefore the associated DR punching must be assigned in a manner similar to a code point to route the traffic to the operator trunks used for a particular class of service. The DR punching is assigned to an INTC-RC punching which is assigned to an RC punching of a route relay when there is a single group of operator trunks for all classes. The DR punching is assigned to an SC punching when there are different groups of trunks for different classes of service. The associated S

punchings are assigned to INTC-RC punchings which in turn are assigned to the RC punchings or route relays assigned to route calls to the proper group of zero operator trunks. These route relays are not the same as those assigned to serve the ZO code point as the class of call for the rerouted call (restricted operator class of call) is different than for the dial zero call (direct operator call). (Fig. 1 and 11.)

(h) **KP punching** for denying keypulse operators access to routes such as overflow, permanent signal, LD, zero operator, dial and ring test trunks, coin box test trunk, vacant code trunks, and in some instances repair service trunks when the operator is assigned to a particular group of incoming lines or tie lines and must be denied access to the trunks. (Fig. 11.)

(i) **OV punching** for subscriber overflow and intersender timing announcement routes.

(j) **TW punching** for keypulse operator routes to 2-wire office selector or crossbar tandem offices via manually selected outgoing trunk equipment or for interchangeable office and area code class calls (Fig. 27). The TW relay operates in series with the route relay and it cancels the marking stage of the marker.

(k) **OOV punching**, when provided, for denying dial operators access to overflow or permanent signal routes. (Fig. 11 and 19.)

(l) **ODR punching**, when provided, for denying dial operators access to routes other than overflow or permanent signal. (Fig. 19.)

(m) **RRC 0 to 7 punchings**, when provided, for destinations outside the local charge area to which coin classes are allowed direct dialing privileges. (See 4.188.)

(n) **INTC-RC punching** when different routing treatment is accorded the various classes of service. (See 4.104.)

(o) **RT punching** when route transfer is used and different treatment is accorded the various classes of service. (See 4.181.)

(p) **INTC-PC punching** when peg count registration is required by class of service for a particular route. (See 4.175.)

- (q) **ZMR punching** as provided in 4.96(h). (Fig. 11.)
- (r) **CSP and PMR punchings as provided for in 4.184 (Fig. 21.)**
- (s) **NCTD punching** for classes requiring the district junctor to be set in the normal "no charge" condition and to provide PBX toll diversion for non-ANI routes. This punching is located on the Z terminal strip of the common equipment bay and also on the Z terminal strip of the class-of-service frame. (Fig. 28 and 31.)
- (t) **OTA punching** for classes requiring the district junctor to be set in the "operator transmission" and to provide PBX toll diversion for ANI routes. This punching is located on the Z terminal strip of the common equipment bay and also on the Z terminal strip of the class-of-service frame. (Fig. 28 and 31.)

**4.98** Table G shows typical examples of specific assignments of SC and S punchings. This table also shows the assignment of D, DA, and SW punchings. In order to hold the number of SC punchings assigned to a minimum, the existing assignments should be checked to determine if one of the SC punchings currently assigned will serve for the proposed assignment. All zones are not shown for extended coin dialing.

**4.99** **SC punchings 0 to 39** are located on the top row of punchings of the upper C terminal strip and multiple to the SC punchings on the four rows above the DA punchings on the D terminal strip. (Fig. 28.) These terminal strips are on the common bay of the originating marker. The SC punchings 0 to 19 multiple to similar punchings on the right end section of the bottom 20 point terminal strip of all route relay bays as shown in Fig. 29 and 30. Punchings SC20 to 39 multiple from the common bay to similar punchings on the SC terminal strip of the class-of-service frame. (Fig. 31.) The SC punchings 0 to 19 also multiple to the upper and lower RC terminal strips of route relay bay R8 and to the SC strip of R8 and higher numbered bays when extended area codes are provided. The arrangements of the SC punchings for earlier installations are shown as A&M in Fig. 28, 29, and 30. The SC punchings 0 to 39 multiple to terminal strip B in the access code unit and to terminal strip C in the interchangeable code screening unit when these units are provided.◆

**4.100** **When the marker is arranged for 2 to 25 classes of service and a maximum of 40 SC punchings**, S punchings 0 to 19 appear on the S and A terminal strips of the common bay. For each SC punching there is an S punching per class of service. The numbers on the left as shown in Fig. 28 correspond to the related SC0 to 19 punching numbers. The numbers below the punchings on the S terminal strip correspond to the S relay numbers. On the A terminal strip the numbers to the right correspond to the S relay number. The S0 to 19 punchings associated with SA relays 0 to 24 are located on the upper and lower SA terminal strips of the class-of-service frame, the numbers on the left side as shown in Fig. 31 correspond to the related SC20 to 39 punching numbers. The various arrangements of the S punchings for earlier installations are shown as A&M in Fig. 28.

**4.101** **SC punching of 3 DIT**(see 1.03) is assigned to:

- (a) **C punching** to give a code various class-of-service treatments.
- (b) **CG punching** to give a code group various class-of-service treatments.
- (c) **RX punching** to give a 3 DCT routing output various class-of-service treatments.

**4.102** **SC punching** of route grouping (RG) frame (see 1.03) is assigned to.

- (a) **RX punching** to give a routing output various class-of-service treatments.
- (b) **CG punching** to give a code group various class-of-service treatments.

**4.103** **SC punchings** are multiplied from the marker to the 3 DIT or the route grouping (RG) frame associated with the 3 DCT.

#### **INTC-RC (Interconnector RC) Punchings**

**4.104** The INTC-RC punchings used to connect RC punchings on the route relay bays, or 3 DIT or route grouping (RG) frame (see 1.03) where subscriber sender recycle feature is provided, to various punchings on the common bay.

TABLE G  
SERVICE RELAY PUNCHING ASSIGNMENTS

CENTRAL OFFICE DISIGNATION			UNIT 1							UNIT 2						
CLASS OF SERVICE			MR IND	MR 2PTY	FR IND	FR 2PTY	COIN	SEMI-COIN	KP OPER	DIAL OPER	MR IND	MR 2PTY	FR IND	FR 2PTY	COIN	SEMI-COIN
SENDER GROUP 0		D PCHG	1	2	3	4	5	6	8							
SENDER GROUP 100		DA PCHG								9	1	2	3	4	5	6
SERVICE RELAY (S & SA) NUMBER		SW PCHG	0	1	2	3	4	5	6	7	8	9	10	11	12	13
FUNCTION OF SC LEAD		SC TO PCHG	SC PCHG NO.													
Without Extended Dialing for Coin																
Zone A - Free Zone (FR only)	R	0	TC	TC	NC	NC	NC	NC	NC	NC	TC	TC	NC	NC	NC	NC
Zone B - 5 Zone	R	1	TC	TC	ZA	ZA	NC	NC	NC	NC	TC	TC	ZA	ZA	NC	NC
Zone C - 10 Zone	R	2	ZB	ZB	ZB	ZB	DRC	DRC	NC	NC	ZB	ZB	ZB	ZB	NC	NC
Zone D - 15 Zone	R	3	ZC	ZC	ZC	ZC	DRC	DRC	NC	NC	ZC	ZC	ZC	ZC	NC	NC
Without Extended Dialing for Coin																
Zone A - Free Zone - All Delays	R	0	TC	TC	NC	NC	NC	NC	NC	NC	TC	TC	NC	NC	NC	NC
Zone B - 5 " " "	R	1	TC	TC	ZA	ZA	NC	NC	NC	NC	TC	TC	ZA	ZA	NC	NC
Zone C - 10 " Delay C	R	2	ZB	ZB	ZB	ZB	RRC0	RRC0	NC	NC	ZB	ZB	ZB	ZB	RRC0	RRC0
Zone D - 10 " " A	R	3	ZB	ZB	ZB	ZB	RRC1	RRC1	NC	NC	ZB	ZB	ZB	ZB	RRC1	RRC1
Zone E - 15 " " C	R	4	ZC	ZC	ZC	ZC	RRC2	RRC2	NC	NC	ZC	ZC	ZC	ZC	RRC2	RRC2
Zone F - 15 " " A	R	5	ZC	ZC	ZC	ZC	RRC3	RRC3	NC	NC	ZC	ZC	ZC	ZC	RRC3	RRC3
Special Service Operator	ZO	6	0	1	2	3	4	5	KP	11	6	7	8	9	10	11
" " "	R	7x	-	-	-	-	-	-	-	ODR	-	-	-	-	-	OT
Long Distance Operator	211	8	12	12	12	12	13	13	KP	13	12	12	12	12	13	13
" " "	R	9*	-	-	-	-	OT	OT	-	ODR	-	-	-	-	OT	OT
Vacant Code - Coin & Non-coin Reversed Batt. Trks.	CG0,1	10	14	14	14	14	15	15	KP	15	14	14	14	14	15	15
" " "	R	11	-	-	-	-	OT	OT	-	ODR	-	-	-	-	OT	OT
Vacant Code - Non-rev. Batt.	R	12+	NC	NC	NC	NC	NC	NC	KP	ODR	NC	NC	NC	NC	NC	NC
Denied Route & Restricted Codes - All Classes	DR,R CG2	13	16	17	18	19	20	21	KP	27	22	23	24	25	26	27
" " "	R	14x	-	-	-	-	-	-	-	ODR	-	-	-	-	-	OT
Denied Routes - Except Oper.	R	15	DRC	DRC	DRC	DRC	DRC	DRC	NC	NC	DRC	DRC	DRC	DRC	DRC	DRC
Permanent Signal Route	PS	16	28	28	28	28	29	29	ZKP	29	28	28	28	28	29	29
" " "	R	17	-	-	-	-	ZPS	ZPS	-	OOV	-	-	-	-	ZPS	ZPS
Overflow Route	R	18	OV	OV	OV	OV	OV	OV	KP	OOV	OV	OV	OV	OV	OV	OV
" " "	R	19	-	-	-	-	ZMR	ZMR	ZMR	ZMR	-	-	-	-	ZMR	ZMR
No M.R. (Without Class of Service Peg Count)	RMR	19	-	-	-	-	ZMR	ZMR	ZMR	ZMR	-	-	-	-	ZMR	ZMR
Class of Service Peg Count (MR to ZMR Pchg.)	RMR CPC	20	CSP0	CSP1	CSP2	CSP3	PMR CSP6	PMR CSP9	PMR	PMR	CSP4	CSP5	CSP6	CSP7	PMR	PMR
" " "	R	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No Charge Routes Denied to Operators e.g. Repair Service	R	22+	NC	NC	NC	NC	NC	NC	KP	ODR	NC	NC	NC	NC	NC	NC
Key Pulse Operators Codes - 2-Wire Office Selector Routes	R	23	DRC	DRC	DRC	DRC	DRC	DRC	TW	ODR	DRC	DRC	DRC	DRC	DRC	DRC
K.P. or Dial Operator's Codes - via District Junctors	R	24	DRC	DRC	DRC	DRC	DRC	DRC	NC	NC	DRC	DRC	DRC	DRC	DRC	DRC

One SC punching may serve for punchings marked \* or + or x,  
Numbers in Class of Service columns indicate INTC-RC punchings.

4.105 *An INTC-RC punching* is assigned to one of the punchings on the common bay shown in Fig. 12 to provide means for associating it with an RC punching in a route relay bay, or 3 DIT or route grouping frame where provided. When extended area codes are provided, the INTC-RC punchings are assigned when it is necessary to associate a C punching on bay R8 with a CP punching on the common bay.

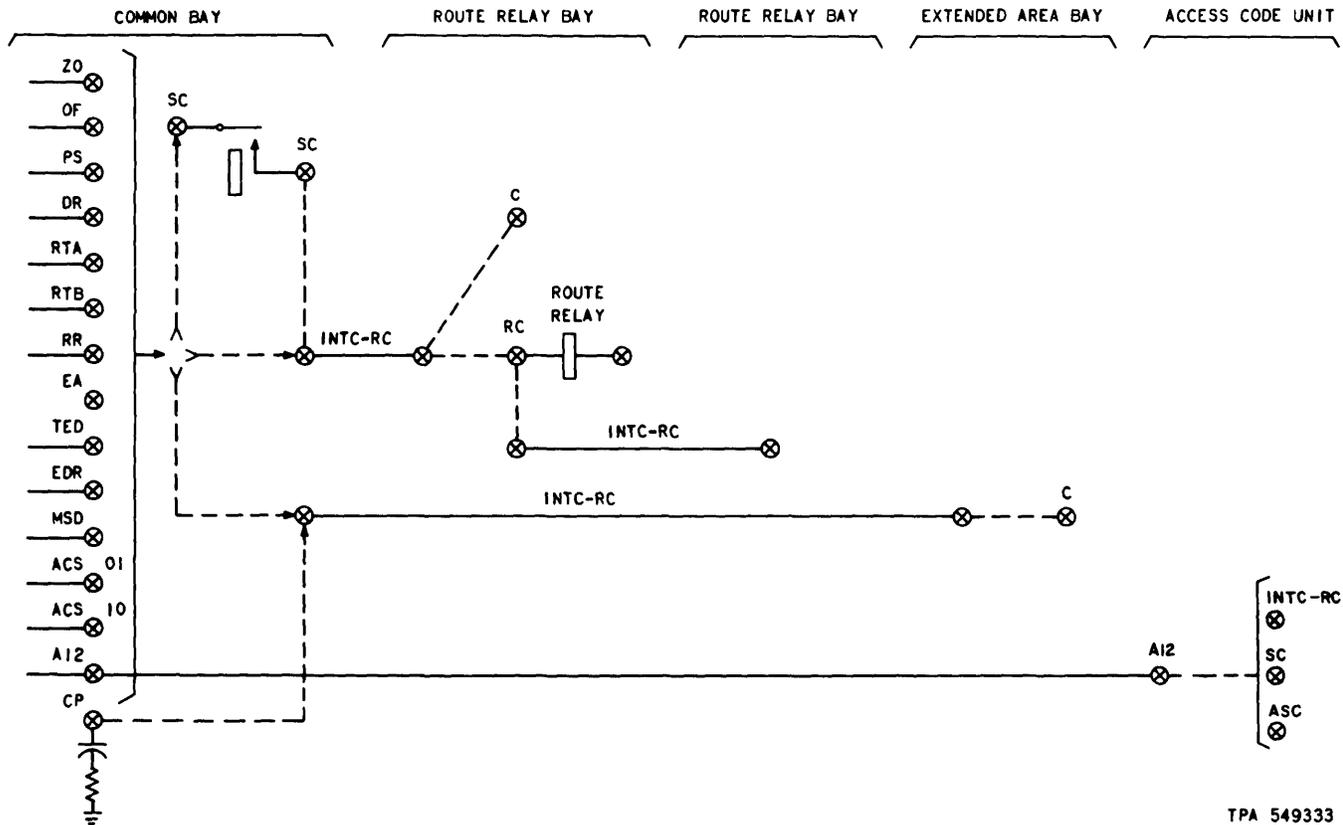
4.106 *The INTC-RC punchings 0 to 59* are located on the D terminal strip of the common bay as shown in Fig. 28. Punchings 0 to 29 appear on the bottom row of punchings, 30 to 39 appear above 20 to 29, 40 to 49 above 30 to 39, and 50 to 59 above 40 to 49. Punchings 0 to 19 multiple to the top row, right side of the RA terminal strip of the route relay bays. Punchings 20 to 59 multiple to the top row, middle of the lower RC terminal strip. When extended area codes are provided, punchings 0 to 19 and 40 to 59 multiple to the top row, middle section of the lower RC terminal strip on all extended area bays, while punchings 20 to 39 multiple to the top row,

right side of the RA terminal strip on all route relay bays. The numbers to the right and left indicate the tens digit and the numbers under the punching indicate the units digit. When subscriber sender recycle feature is provided, the 0 to 59 INTC-RC punchings are multiplied to the 3 DIT or route grouping frame.

**G. Assignment of Route Relay Contact Punchings**

**Assignment of Trunk Groups**

4.107 The outgoing trunks are located on the secondary switches of the office link frames. In order for the marker to gain access to the trunks, it is necessary to associate the trunk locations with the route relay assigned to the code of the office. This is accomplished by assigning the start, trunk level, group start, group end, special and route advance punchings of the route relay to the proper marker punchings depending on the amount, location, numerical designations, and type of trunks involved.



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Fig. 12—Assignment of INTC-RC Punching

**ST (Start), TL (Trunk Level), GS (Group Start), GE (Group End) Punchings**

**4.108** An ST punching associated with each route relay provides the means of associating the route relay with the office link frames on which the trunks are located. A TL punching associated with each route relay provides the means of associating the route relay with the horizontal levels on which the trunks are located. A GS punching associated with each route relay provides the means of associating the route relay with the secondary switch on which the first trunk in the group or subgroup is located. A GE punching associated with each route relay provides the means of associating the route relay with the secondary switch on which the last trunk in the group or subgroup is located.

**4.109** *The ST punchings* associated with the marker office frame relays 0 to 9 are numbered 0, 2, 4, etc, to 18. Punching 0 represents office link frames 0 to 1, punching 2 represents frames 2 and 3, etc, on which the trunks are located.

**4.110** *The TL punchings* associated with the marker trunk level relays 0 to 14 are numbered 0 to 14.

(a) When the secondary switch levels are not split, the association of the punchings and the 10 horizontal levels of the secondary switches of the office link frame 0 is as follows:

ASSIGN		WHEN TRUNKS APPEAR ON			
Punching	TL	0	Horizontal 0	and 1	Frame 0
"	"	2	"	2	" 3 " "
"	"	4	"	4	" 5 " "
"	"	6	"	6	" 7 " "
"	"	8	"	8	" 9 " "
"	"	10	"	0	" 1 " OE
"	"	11	"	2	" 3 " "
"	"	12	"	4	" 5 " "
"	"	13	"	6	" 7 " "
"	"	14	"	8	" 9 " "

Punchings 10, 11, 12, 13, and 14 are used where extension office frames are equipped. Punchings 1, 3, 5, 7, and 9 are not assigned.

(b) When the secondary switch levels are split, the association is as follows:

ASSIGN		WHEN TRUNKS APPEAR ON			
Punching	TL	0	Horizontal 0	left and	1 right
"	"	1	"	1	" " 0 "
"	"	2	"	2	" " 3 "
"	"	3	"	3	" " 2 "
"	"	4	"	4	" " 5 "
"	"	5	"	5	" " 4 "
"	"	6	"	6	" " 7 "
"	"	7	"	7	" " 6 "
"	"	8	"	8	" " 9 "
"	"	9	"	9	" " 8 "

Ordinarily, when secondary switch horizontals are split, office extension frames are not provided and in this case punchings 10 to 14 are not assigned.

(c) Office link frames are equipped to provide a maximum of 100 trunks on a nonsplit basis or 200 trunks on a split basis. When the ultimate expectation of an office is more than 10 office link frames, the levels are not split and extension frames are furnished which provide 100 additional trunks for each office link frame.

**4.111** *The GS punchings* associated with the marker TG relays ELO to 9 and ER0 to 9 are numbered 0, 2, 4, etc, to 38 and represent the first trunk of the group or subgroup. The "E" designates the even office link frame of the pair, the "L" or "R" designates the left or right side of the secondary switch, and the number designates the particular one of the ten secondary switches. The trunks of a group or subgroup are usually numbered to agree with the GS and GE punching numbers. For example, a group of trunks may be numbered from 20 to 23. The first trunk, number 20, determines that GS20 must be assigned which, according to the association shown on the lower GS terminal strip of Fig. 29, is also designated ER0 (even frame, right side of switch zero).

**4.112** *The GE punchings* associated with the marker TG relays OLO to 9 and OR0 to 9 are numbered from 1 to 39 and represent the last trunk of the group or subgroup. The "O" indicates the odd office link frame of the pair. Usually the number of the trunks coincides with the GE and GS numbers, and therefore, the last trunk number indicates the GE assignment. For example, if trunks 20 to 23 comprise a trunk group, trunk number 23 determines that the GE23 should be assigned. This, according to the association shown

in Fig. 29, shows that the trunk is located on the odd office frame, left side of switch number 1 (TG relay OL1). Trunk groups or subgroups must consist of an even number of trunks in groups of 2 to 40. If an odd number is required, an additional trunk position is added and made busy at the outgoing trunk make-busy jack. For example, if three trunks are required beginning with trunk 20, GS20 and GE23 are assigned. Trunk 21 or 22 is made busy.

**4.113** *The ST, TL, GS, and GE punchings* are located on two terminal strips of the route relay bays. The upper strip contains the punchings associated with the route relays. This strip is divided into four groups designated GS, GE, TL, and ST from left to right. Each group contains punchings numbered from 0 to 99 associated with route relays 0 to 99, respectively. The route relay bay number designates the hundreds digit of the punching. The numbers digit of the punching. The numbers on the left and right of the punchings indicate the tens digit while the numbers below

the punchings indicate the units digit. This arrangement is similar to the numbering scheme of the R punchings as shown in Fig. 29. The lower strip contains the GS, GE, TL, and ST punchings associated with the marker relays which multiple to all route relay bays and the common bay.

**4.114** If an original route trunk group contains 1 to 40 trunks, assign the ST, TL, GS, and GE punchings (Fig. 13) of the route relay to the proper ST, TL, GS, and GE punchings of the marker relays, depending on the location of the trunks. The SP punching of the same route relay is assigned to:

- (a) The OG5S punching if the original route has an alternate route via crossbar tandem, local (3-wire) or distant (2-wire) office selector trunks.
- (b) The SPB punching if there are other types of alternate or no alternate route trunks or when original and alternate routes are both via crossbar tandem.

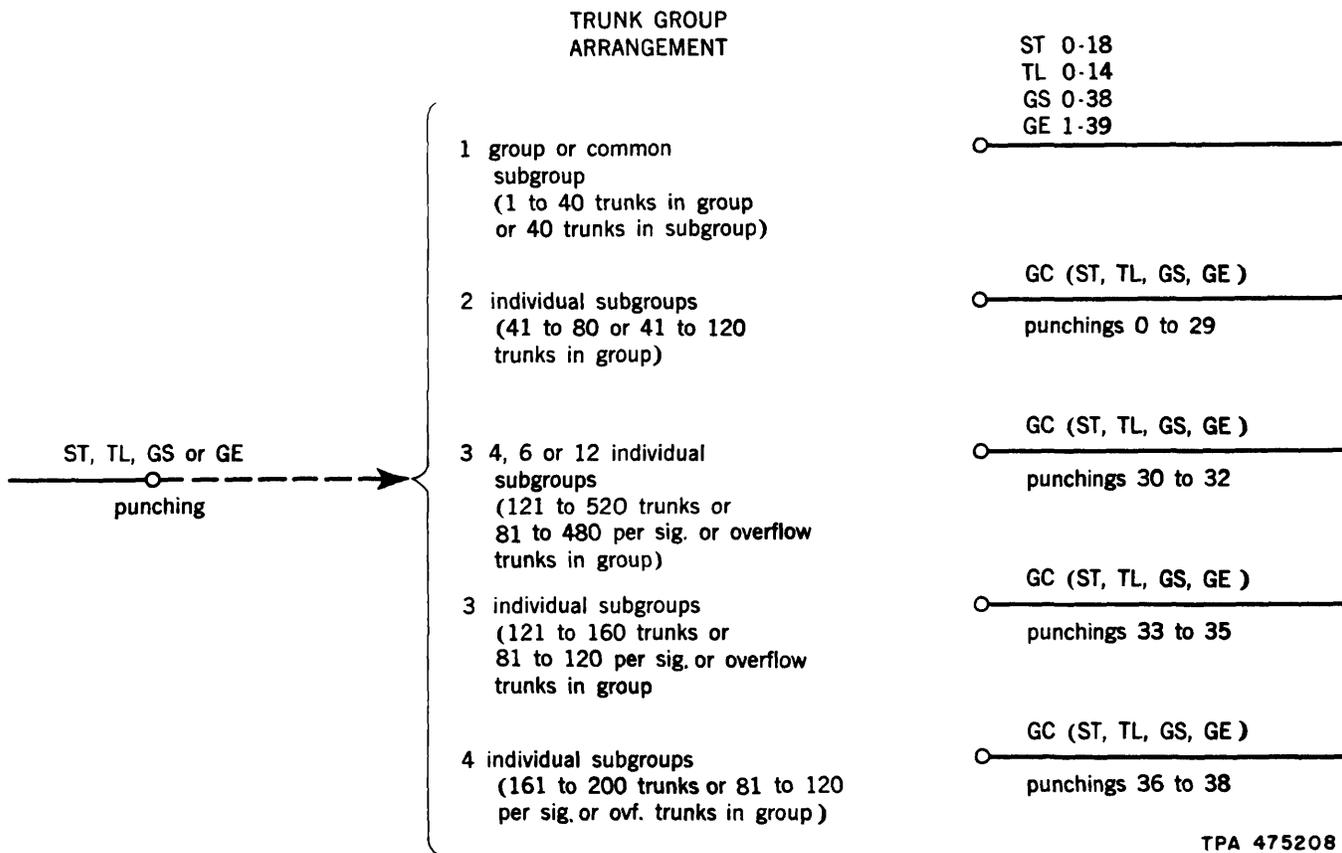


Fig. 13—Assignment for ST, TL, GS, and GE Punchings

The RA punching of the same route relay is assigned to the RC punching of the alternate route relay or to the J-INTC or RC punching representing the proper overflow route relay.

**4.115** If an alternate route trunk group contains 1 to 40 trunks, assign the ST, TL, GS, and GE punchings as in 4.114. Assign the SP punching to:

- (a) The TWB punching if the trunk group contains crossbar tandem or distant (2-wire) office selector trunks.
- (b) The TWD punching if the trunk group contains local (3-wire) office selector trunks.
- (c) The SPB punching if the trunk group contains other types of trunks.

The RA punching is assigned to the J-INTC or RC punching of the proper overflow route relay. For multialternate routing, the RA may be assigned to the RC punching of a subsequent alternate route relay.

**4.116** If an overflow or permanent signal trunk group contains 1 to 40 trunks, the ST, TL, GS, and GE punchings are assigned as in 4.114. The RA and SP punchings are not assigned.

**4.117 *Trunk Group Subgrouping:*** The marker can connect to a maximum of 40 trunks per trial in a pair of office frames. The number of trials that a marker will make to locate an idle trunk when the trunk group is subdivided will depend upon the type of subgrouping relay circuit used and whether the multialternate route feature is provided. There are two types of relay circuits that can be provided in the marker for subgrouping a trunk group. They are commonly identified as the GPs and Gs. In the following explanations of GP and G relays the presentation is based on a full complement of this equipment installed in the marker. Knowledge is required of the amount of equipment actually installed in a particular group of markers before making assignments.

- (a) The GP relays provide facilities to reach two subgroups of trunks (max. 80). The marker will generally select each subgroup alternately and if the trunks are found busy in the first tested subgroup, the marker will proceed

to test the other subgroup in an attempt to locate an idle trunk. If there are more than 80 but not more than 120 trunks in the group, a second route relay is used. If the trunks are found busy in the subgroup that was tested second, the marker will then test the subgroup that is controlled by the second route relay through the route advance (RA) feature. The GP relays when used alone permit the marker to scan 80 trunks or a maximum of 120 trunks per call if a second route relay is used for another subgroup. The foregoing is the manner of function when the multialternate route feature is not provided.

- (b) The SB contacts of route relays in ground supply 1 are equipped if the multialternate route feature is provided. If GP relays are used and TWA is connected to SP of the route relay, the marker will not advance to the other subgroup if all trunks are found busy in the subgroup that was tested first. Instead the route advance feature will function to operate the alternate route relay. However, if SPA, OG5P or TWC are used for a route, the function will be as stated in (a).

- (c) When a full complement of GP relays is installed in the marker, facilities are provided for subgrouping 30 trunk groups. The contact punchings of the route relay that are designated ST, TL, GS, and GE are cross-connected to GP relays on punchings designated GC-ST, GC-TL, GC-GS, and GC-GE and they are located on the route relay bay (Fig. 29). The GC punchings represent the common termination of the GP0A and GP1A armature contacts and are numbered 0 to 14 while the GP0B and GP1B number 15 to 29. The contacts of the GP relays terminate on GP punchings and the terminal blocks are designated GP which are located on the common equipment bay (Fig. 28). The GP0A and GP0B operate in parallel and so does the GP1A and GP1B alternately. Fig. 14 is a sketch to show the arrangement of the GP relays. The relationship of punchings 0 to 14 to GP0A and GP1A and punchings 15 to 29 to GP0B and GP1B are shown. Only the ST leads are shown for simplicity but there are three other punchings for a group, namely TL, GS, and GE. If route relay 80 and GP0A relays are operated (Fig. 14) the ST lead is steered to connect office frames 0 and 1. If GP1A were operated instead of GP0A, the ST lead would connect to office frames 4 and 5.

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4.118 When two individual subgroups are required, assign a spare GC (ST, TL, GS, and GE) punching number 0 to 29. If GC-ST punching 9 is assigned to an ST punching of a route relay, the GC-TL punching 9 is assigned to the TL punching and this arrangement is followed for the GC-GS and GC-GE punchings. The GC-ST, GC-TL, GC-GS, and GC-GE punchings 0 to 29 are associated with two sets of similarly designated and numbered GP punchings associated with subgroup 0 (first subgroup of trunks) and subgroup 1 (second subgroup of trunks). The similarly numbered GP-ST, GP-TL, GP-GS, and GP-GE punchings of subgroup 0 are assigned to the ST, TL, GS, and GE punchings, respectively, which represent the location of the first subgroup of trunks. (Fig. 14.) The GP-ST, etc, punchings of subgroup 1 are assigned to the ST, etc, punchings which represent the location of the second subgroup of trunks.

4.119 If an original route trunk group contains 41 to 80 trunks, the ST, TL, GS, and GE

punchings are respectively assigned to a spare GC-ST, GC-TL, GC-GS, and GC-GE punching number 0 to 29. The SP punching is assigned to:

- (a) The OG5P punching if the original route has an alternate route via crossbar tandem, local or distant office selector trunks.
- (b) The SPA punching if there are other types of alternate or no alternate route trunks.

The RA punching is assigned as in 4.135. The 41 to 80 trunks are approximately evenly divided into two subgroups and the marker tests both subgroups for an idle trunk. When multialternate routing is employed, it may be necessary to assign the SP punching to the OG5S or SPB punching to prevent the marker from testing more than four subgroups before testing for an overflow trunk. To illustrate, assume that a destination could be reached by one direct and three alternate routes, all containing 80

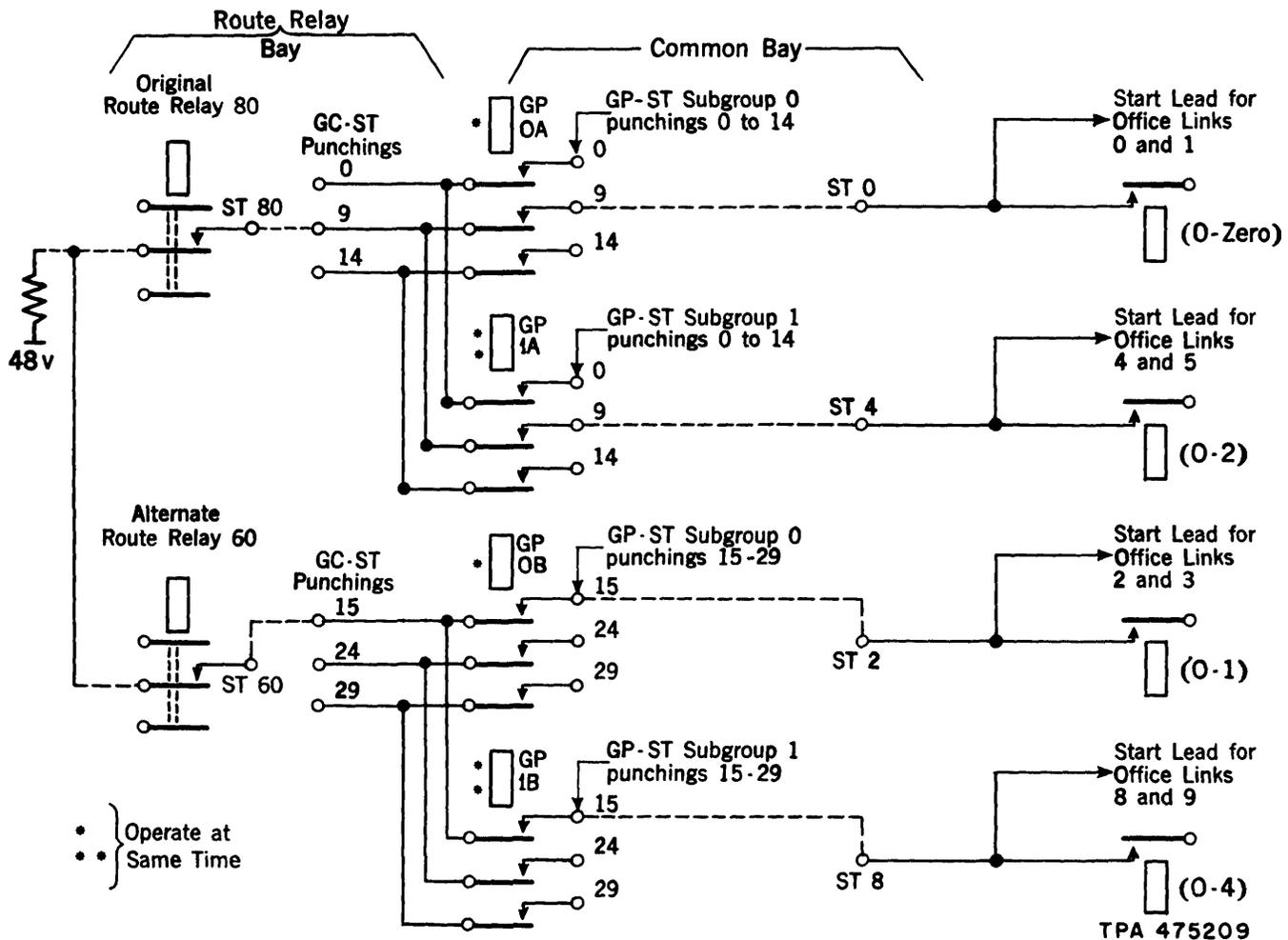


Fig. 14—Relationship of GC to GP Punching

trunks. If the marker was arranged to test each subgroup, it would test eight trunk subgroups in peak traffic before testing the overflow trunks. This excessive testing would affect marker holding time adversely.

**4.120** If an alternate route trunk group contains 41 to 80 trunks, the ST, TL, GS, and GE punchings are assigned as in 4.119. The SP punching is assigned to:

- (a) The TWA punching if the trunk group contains crossbar tandem or distant office selectors. When the multialternate route feature is provided [see 4.14 and 4.117(b)], the marker tests only one subgroup, otherwise it tests both subgroups.
- (b) The TWC punching if the trunk group contains local office selectors.
- (c) The SPA punching if the trunk group contains other types of trunks.

The 41 to 80 trunks are arranged into two approximately even subgroups and the marker tests both subgroups except where indicated.

**4.121** If an overflow or permanent signal trunk group contains 41 to 80 trunks, assign the ST, TL, GS, and GE punchings as in 4.119. The SP and RA punchings are not assigned. In order to test both subgroups, assign the OG punching of the route relay to the OG5P punching.

**4.122** If an original or alternate route trunk group contains 81 to 120 trunks, two route relays are assigned and the trunks are arranged in one common subgroup with two individual subgroups containing an approximately even number of trunks. The ST, TL, GS, and GE punchings are assigned as in 4.119 for the route relay serving the individual subgroups. The ST, TL, GS, and GE punchings of the common subgroup route relay, which appears in the next higher ground supply group than the individual subgroup route relay, are assigned as in 4.114. The SP punching of each route relay is assigned to OG5S or SPB for original routes or to the TWB, TWD, or SPB for alternate routes depending on the conditions listed in 4.114 and 4.115. The RA punching of the individual route relay is assigned to the J-INTC or RC punching representing the common subgroup route relay. The RA punching of the common subgroup route relay is assigned to the J-INTC or RC punching

representing the desired alternate route, subsequent alternate route or overflow route relay.

**4.123** *The GC- punchings* are located on the GC terminal strip of the route relay bay as shown in Fig. 29 and 30 and are multiplied to all route relay bays. The terminal strip is divided into four groups designated GC-GS, GC-GE, GC-TL, GC-ST from left to right. The punchings are numbered from 0 to 39 (punching 39 is spare) in each group. The numbers below the punchings indicate the units digit and the numbers to the left and right indicate the tens digit. GC- punchings 0 to 29 represent a maximum of 30 trunk groups arranged with two individual subgroups.

**4.124** *GP (ST, TL, GS, and GE) punchings* on the common equipment bay (Fig. 28) 0 to 14, subgroup 0, are associated with the GP0A relay as shown in Fig. 14. GP punchings 0 to 14, subgroup 1, are associated with the GP1A relay. GP punchings 15 to 29, subgroup 0, are associated with the GPOB relay and GP punchings 15 through 29, subgroup 1, are associated with the GP1B relay. The GP punchings (ST, TL, GS, and GE) appear on the GP terminal strip of the common bay. The subgroup number (0 or 1) is bracketed below the punchings. The tens digit of the GP punching appears to the left for subgroup 0 and to the right of the punchings for subgroup 1. The units digit appears below the punchings. The GP strip is divided into four groups, the GP-ST, GP-TL, GP-GS, and GP-GE appearing in separate groups as shown in Fig. 28.

**4.125** *G Relays:* The marker has facilities for providing a maximum of three sets of G relays for trunk subgrouping. When equipped they are designated G0A to G11A, G0B to G11B, and G0C to G11C. The marker operates all like numbered G relays on a call and on the following call it will operate the next higher numbered Gs. This continues for each call until the G11s operate and then on the next call the G0s are operated and the cycle starts again. The marker function relative to the G relays is that only the subgroup that is tested on a call will be checked for an idle trunk. If all trunks are busy in a tested subgroup the marker will advance to overflow or to a common subgroup if provided, which would require another route relay. The marker will scan 40 trunks when there is no common subgroup and 80 if there is a common subgroup. Each set of G relays provides facilities for subgrouping three trunk groups. The

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three sets of G relays, if installed, will facilitate trunk subgrouping as shown in Fig. 15 and Table H. Fig. 15 is a schematic that shows optional cross connections from the ST, TL, GS, and GE punchings of a route relay to any one of the three sets of G relay GC punchings. The outlet portion of the G relays terminates on G punchings on the common equipment bay which can be cross-connected to the proper punchings of the marker for selecting the trunk subgroup. The RA punching of the original route relay can be cross-connected to RC of the overflow route relay or to another route relay. The ST, TL, GS, and GE punchings of the second route relay are cross-connected directly to the proper punchings of the marker for selecting a common subgroup.

**4.126** *The GC punchings 30 to 32* represent maximum of three trunk groups arranged with 3, 4, 6, or 12 individual trunk subgroups. GC punchings 33-35 represent a maximum of three trunk groups arranged with three individual subgroups. GC punchings 36-38 represent a maximum of three trunk groups arranged with four individual subgroups.

**4.127** *The G punchings* are located on the G terminal strip of the common bay. The strip is divided into four groups designated G-GS, G-GE, G-TL, G-ST from left to right as shown in Fig. 28. Each group is further divided into three separate groups of punchings. The numbers 0, 1, and 2 on the left are the associated individual subgroup designations for GC punchings 30, 31, and 32. The numbers 0 to 11 appear above the punchings and represent the 12 subgroups associated with the G0A to G11A relays. This arrangement allows for a maximum of three trunk groups divided into 2, 3, 4, 6, or 12 individual subgroups. The punchings in the middle group as shown in Fig. 28 are designated by a 3 bracketed below 0, 1, and 2. The designation 3 in the bracket represents the associated GC33 punching. The 0, 1, and 2 represent the three subgroups associated with the G0B to G2B relays. The contacts of each of the G0B to G2B relays are multiplied to the contacts of every third relay of the remainder of the G3B to G11B relays as shown in Fig. 15. The middle row of punchings represents the associated GC34 punching and the top row designated by a bracketed 5 represents the associated GC35 punching. This arrangement provides for a maximum of three trunk groups arranged with three individual subgroups. The punchings in the right group (as

shown in Fig. 28) are numbered 6, 7, and 8 on the right which correspond respectively to the associated GC36, 37, and 38 punchings. The designations 0, 1, 2, and 3 above the punchings represent the four individual subgroups into which a maximum of three trunk groups can be arranged by means of the G0C to G3C relays. The individual contacts of the remaining G4C to G11C relays are multiplied as shown in Fig. 15.

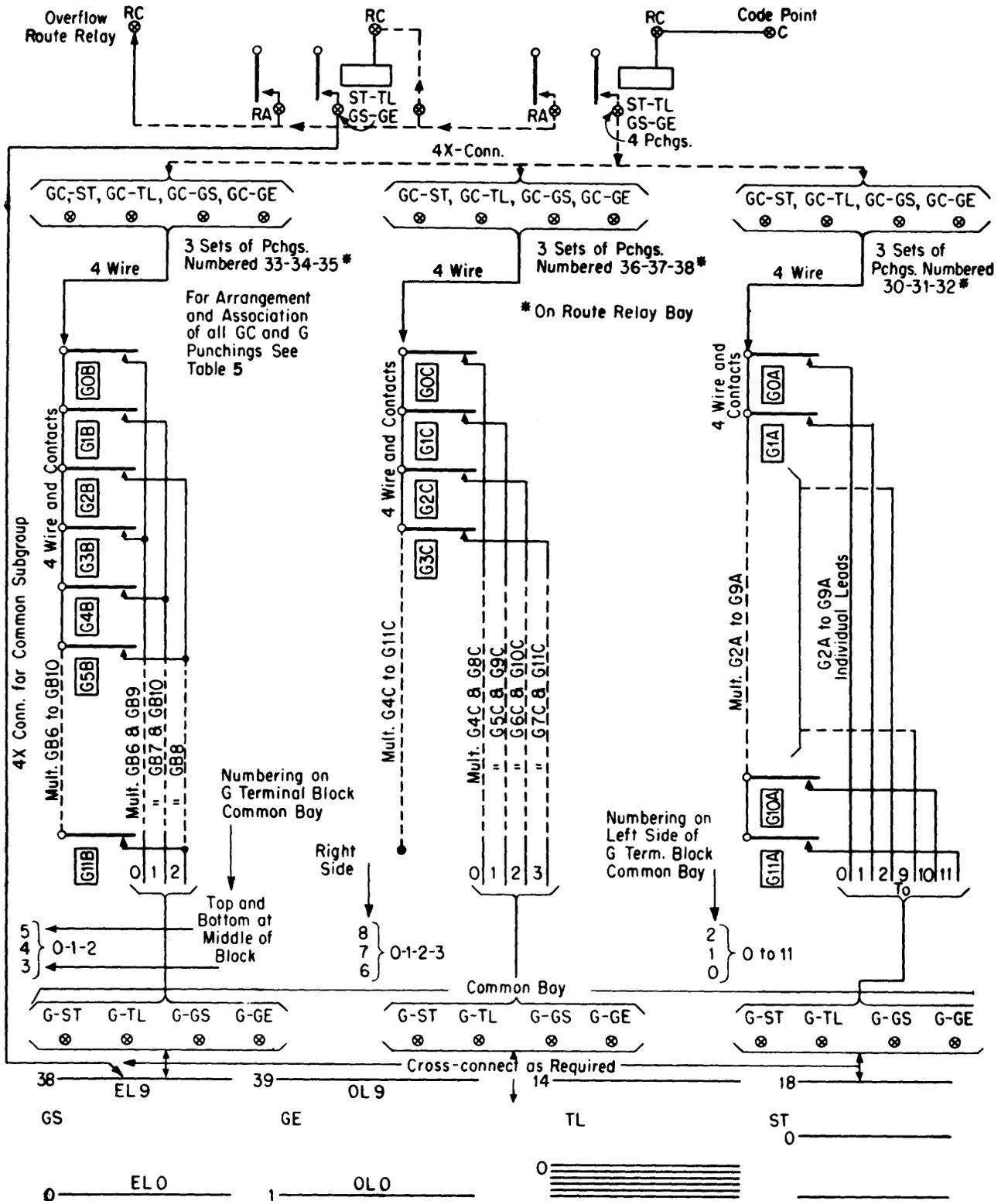
**4.128** If an overflow or permanent signal trunk group contains 81 to 480 trunks, the assignment depends on the number of subgroups and in any case only one route relay is assigned. Assign ST, TL, GS, and GE punchings in accordance with Table H.

**4.129** *Overflow trunks* are arranged so that any marker will have ready access to them without being locked out of the office frame by another marker. A trunk group is assigned for each marker and the groups are located on different pairs of office link frames. If there are more markers than pairs of office link frames, the excess markers are arranged to have access to as many overflow trunks as possible by assigning the ST, TL, GS, and GE punchings to the GC punchings 0 to 38 as required. To illustrate, assume six markers must have access to 150 overflow trunks to be located on five pairs of office frames. A trunk group of 30 trunks is assigned to each pair of office frames. Each of five markers is assigned to a different trunk group, the last marker is assigned to four of the five groups by assigning the ST, etc, punchings to the GC-ST, etc, punchings 36 to 38 if the G relays are provided, otherwise the GC-ST, etc, punchings 30 to 32.

### SP (Special) Punching

**4.130** The SP punching provides means of indicating to the marker:

- (a) Whether or not both individual trunk subgroups of a trunk group composed of two subgroups are to be tested for an idle trunk.
- (b) That office selections are not required on original routes having alternate routes via office selector or crossbar tandem trunks.
- (c) That the office selections for office selector and crossbar tandem alternate route trunks are to be obtained from the original route relay.



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Fig. 15—Numbering of Punchings for Various Trunk Group Assignments

TABLE H  
TRUNK SUBGROUP RELAY PUNCHINGS

RELATIONSHIP OF PUNCHINGS GC-ST, GC-TL, GC-GS AND GC-GE TO G RELAYS AND TO G-ST, G-TL, G-GS AND G-GE PUNCHING NUMBERING				FACILITIES PROVIDED		
RELAY DESIGNATION	GC PUNCHINGS ON ROUTE RELAY BAY	THIS NUMBER STENCILED ON G TERM. BLOCKS OF COMMON EQUIP. BAY	TRUNK SUBGROUP PUNCHING NUMBERS ON G TERM. BLOCK OF COMMON EQUIP. BAY. G-ST, G-TL, G-GS AND G-GE	TRUNK GROUPS SERVED	NUMBER OF TRUNK SUBGROUPS THAT CAN BE SERVED	AMOUNT OF TRUNKS IN TRUNK GROUP
G0A to G11A	30	0	0 to 11	3	2, 3, 4, 6, 12	80, 120,
	31	1	0 to 11	See Notes	2, 3, 4, 6, 12	160, 240,
	32	2	0 to 11	1 and 2	2, 3, 4, 6, 12	480
G0A to G11B	33	3	0 - 1 - 2	3	3	120
	34	4	0 - 1 - 2	See Note	3	
	35	5	0 - 1 - 2	2	3	
G0A to G11C	36	6	0 - 1 - 2 - 3	3	4	160
	37	7	0 - 1 - 2 - 3	See Note	4	
	38	8	0 - 1 - 2 - 3	2	4	

Note 1: Three trunk groups can be subgrouped in various combinations by proper strapping of the G punchings on the G terminal strip.

Note 2: An additional 40 trunks in a common subgroup by using another route relay.

4.131 **An SP punching** (Fig. 16) associated with the route relay is assigned, according to the subgroup testing arrangement desired, as outlined in (a) and (b):

(a) The OG5P, TWA, TWC, or SPA punching is assigned when both subgroups of a trunk group arranged in two individual subgroups are to be tested for an idle trunk. The particular punching assigned is further determined by the trunk group routing as follows:

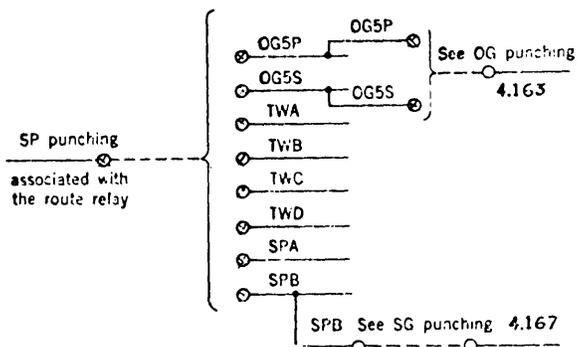


Fig. 16—Assignment of SP Punching

(1) **OG5P**: On original route relays for original direct routes having alternate routes via revertive pulse crossbar tandem of office selectors.

(2) **TWA**: On alternate route relays for alternate routes via revertive pulse crossbar tandem and distant 2-wire office selectors. The TWA punching does not permit testing both subgroups where the multialternate route feature is provided.

(3) **TWC**: On alternate route relays for alternate routes via local 3-wire office selectors.

(4) **SPA:** All other types of original and alternate route relays. This also includes cases where both original and alternate routes are via crossbar tandem.

(b) The OG5S, TWB, TWD, or SPB punching is assigned when only one subgroup is to be tested when a trunk group is comprised of two subgroups or when trunk groups are arranged in one group or 3 to 12 individual subgroups. The particular punching assigned is further determined by the trunk group routing as follows:

- (1) **OG5S:** Same as OG5P
- (2) **TWB:** Same as TWA
- (3) **TWD:** Same as TWC
- (4) **SPB:** Same as SPA.

The SP punchings of route relays in ground supply 5 are not assigned. Instead, the OG punching of group 5 route relays is assigned to the OG5P punching for subgroup testing arrangement A or to the OG5S for arrangement B.

**4.132** When multialternate routing is employed, note 4.119 for restrictions on using subgroup testing arrangement A to prevent excessive marker holding time.

**4.133** *The SP punchings* associated with the route relays are located on the right end of the second 5-point terminal strip from the bottom of the route relay bay. The punchings are numbered from 0 to 99, corresponding to the associated route relay. The SP punchings cross-connect to the SPA, SPB, TWA, TWB, TWC, TWD, OG5S, and OG5P punchings on the SP portion of the combined ST and SP terminal strip located above the route relay SP punchings. The SPA, SPB, TWA, etc, punchings multiple to all route relay bays. The SPB punching also multiples to the lower SG terminal strip of all route relay bays as covered in 4.168.

**RA (Route Advance) Punchings**

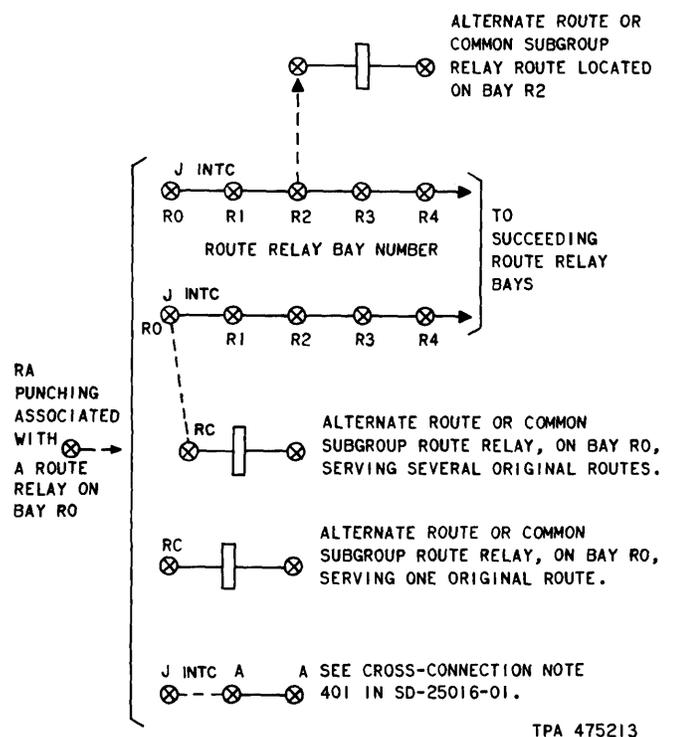
**4.134** The RA punchings provide a means of:

(a) Associating an individual subgroup route relay with its common subgroup route relay RC punching when the trunk group is divided into 3 to 13 subgroups arranged with 2 to 12 individual subgroups and a common subgroup.

- (b) Associating a common subgroup route relay with an alternate route relay.
- (c) Associating an original route relay with an alternate route relay.
- (d) Associating an alternate route relay with an overflow or announcement route relay.
- (e) Associating an alternate route relay with a subsequent alternate route relay when multialternate routing is employed.
- (f) Associating an original route relay with an overflow or announcement route relay.

This association of relays is from a lower ground supply group to a higher ground supply group as shown in Table E.

**4.135** *The RA punching* (Fig. 17), associated with the route relay, is assigned to:



**Fig. 17—Assignment of RA Punching**

(a) *The RC punching* of the route relay in a higher ground supply associated with the common subgroup or alternate route relay located in the same bay and serving only one destination.

- (b) **A J-INTC punching** when the common subgroup or alternate route relay desired in the higher ground supply group is on a different route relay bay than the bay on which the RA punching appears.
- (c) **A J-INTC punching** when a common subgroup or alternate route relay is on the same bay but serves several destinations or RA points.
- (d) **J-INTC punching 0, 1, or 2** (designated OF0, 1, and 2) for overflow routes. (See 4.210).

In conditions (b), (c), and (d) the J-INTC punching is in turn assigned to the RC punching of the route relay associated with the common subgroup, alternate route, or overflow route.

**4.136 The RA punchings** are located on the RA terminal strip of the route relay bays as shown in Fig. 29 and 30. Each RA punching is associated with a route relay of the same number. The route relay bay number determines the hundreds digit, the number to the right and left of the punching determines the tens digit, and the number below the punching determines the units digit. Punchings 00 to 79 appear on the bottom row of punchings and punchings 80 to 99 appear on the top row and left side of the RA terminal strip.

#### J-INTC (J-Interconnector) Punchings

**4.137** The J-INTC punchings provide means of connecting several RA punchings in various route relay bays to a common RC punching of a route relay located in any bay.

**4.138** When a J-INTC punching is assigned to the RA punching of a route relay, the connected RC punching must be associated with a route relay in a higher ground supply group. The route relay in the higher ground supply group represents the desired common subgroup, alternate route, or overflow condition. The OF punchings 0, 1, and 2 are assigned for 3-digit, 7-digit, and 8-digit overflow calls, respectively. When extended area codes are required, the J-INTC punchings on bay R8 are assigned as extended area code groups as outlined in 4.55.

**4.139** The J-INTC punchings are located on the J-INTC terminal strip of the route relay

bays. The J-INTC punchings of OF0, 1, and 2 multiple to both regular and extended area route relay bays. Punchings 3 to 34 multiple from bay R0 to R7. When extended area codes are provided, a second set of J-INTC punchings multiple from bay R8 to R15. It will be noted that in Fig. 29, punchings 3 to 14 are stenciled A, B, C, and D. The straps, represented by dotted lines in Fig. 29 between A and B, B and C, and C and D may be cut when more than 35 J-INTC punchings are required. By cutting the straps, a maximum of 71 J-INTC punchings are obtained. The punchings are then designated 3A to 14A, 3B to 14B, 3C to 14C, and 3D to 14D.

#### Class of Call Information—Class of Call Punchings (CL) and Route Auxiliary Punchings (RA)

**4.140** The CL and RA punchings provide means of indicating the class of completion. Class of completion is governed by the method of sender outpulsing required, such as multifrequency (MF), call indicator (CI), straightforward (OPR), or revertive pulse (RP). Revertive pulsing may be used to complete calls to panel, crossbar, or No. 1 ESS offices. The RA punching provides means of controlling the number of digits outpulsed by the sender and the method of outpulsing.

**4.141** The CL punching of the route relay is assigned to either:

- (a) The P or S punching of one of the CL0 through CL7 relays.
- (b) One of the RA1 through RA10 punchings depending on the number of digits outpulsed, method of outpulsing, and whether the office is arranged for ANI or non-ANI traffic as shown on cross-connection note 403 in SD-25016-01.

**4.142** The CL punching of a route relay used for revertive pulsing and non-ANI PCI pulsing is assigned to the P or S punching of one of the CL0 to CL7 relays according to the class of call and whether or not the TW relay in the sender should be operated as covered herein and in cross-connection note 403 on SD-25016-01. The sender TW relay must be operated under the following conditions:

- (1) When there is a panel sender tandem district selector, a distant 2-wire office selector, dial coin zone trunks, or crossbar tandem trunks (excluding O-RC via crossbar tandem) in the route.

- (2) For operator class of call on which the trunk normally has reversed battery during trunk test such as permanent signal and battery-on-the-ring vacant code trunks.
- (3) When the call is routed to a trunk group in which any of the trunks connect to automatic display call indicator equipment.
- (4) For calls from KPA operators to other operators reached through operators trunks directly connected to a panel system distant office multiple, or a crossbar tandem office link multiple.
- (5) For zero operator trunks when any of the associated trunks are connected to the auxiliary multi-line service observing circuit.

CLASS OF CALL	SENDER TW RELAY OPERATED	ASSIGN CL PUNCHING
OPR Tandem	No	5S
	Yes	5P
***OPR Direct Official code, vacant code, special service, permanent signal, TSP, 3-digit overflow route, 3-digit and 10-digit IT announcement routes, 10-digit restricted calls, 10-digit overflow routes and 10-digit vacant code	No	6S
	Yes	6P
Panel Sender Tandem (2 Stage)	Yes	7P

**4.143 The CL punching assignments** for RP and PCI/non-ANI routes (includes operator, overflow, vacant code, etc) are as follows:

CLASS OF CALL	SENDER TW RELAY OPERATED	ASSIGN CL PUNCHING
Direct Panel	No	0S
	Yes	0P
Crossbar Direct, No. 1ESS, and to Crossbar Tandem (Non-PCI and Non-O-RC)	No	1S
	Yes	1P
*Panel Call Indicator — Key Listening	No	2S
	Yes	2P
*Automatic Display Call Indicator	Yes	2P
Manual (PCI) Tandem Panel Sender Tandem or Panel Call Indicator into Crossbar Tandem PCI Operator Identified CAMA (X-Bar Tandem)	No	3S
	Yes	3P
**O-RC Restricted code routed to the operator, 7- and 8-digit overflow routes, 7- and 8-digit IT announcement routes, and 7-digit announcement trunks that terminate in a local amplifier or announcement machine.	No	4S

\* Direct or through a revertive pulse tandem.

\*\* When the district supervisory relays have been arranged to guard against release during dialing, 7- and 8-digit overflow calls should be routed on a 3-digit basis. When this is desired, assign the CL punching of the overflow route relay to the CL6 punching as indicated for OPR direct class.

\*\*\* This class is required for 10-digit restricted routes, 10-digit overflow routes and 10-digit vacant code routes in order to prevent attachment of an auxiliary sender. If any of these routes requires the setting of the district junctor in normal "no charge" condition, the district junctor supervisory relays must be arranged to hold over dial pulses.

**4.144** The CL punching of a route relay used for non-ANI MF pulsing and 0-operator routes to TSP is assigned as shown on cross-connection note 403 in SD-25016-01 and as follows:

CLASS OF CALL	CL PCHG OF ROUTE RELAY CROSS-CONNECTED TO PCHG
10 DGT (MF) — 10 digits dialed, 10 digits MF outputted	CL3S Note 1
10 DGT-SKP 3 (MF) — 10 digits dialed, first 3 digits deleted, 7 digits MF outputted	RA1 Note 2

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CLASS OF CALL	CL PCHG OF ROUTE RELAY CROSS-CONNECTED TO PCHG
7 or 8 DGT (MF) — 7 or 8 digits dialed, 7 or 8 digits MF out- pulsed	RA2 Note 2
7 DGT-SKP 2 (MF) — 7 digits dialed, first 2 digits deleted, 5 digits MF outpulsed	RA3 Note 2
7 DGT-SKP 3 (MF) — 7 digits dialed, first 3 digits deleted, 4 digits MF outpulsed	RA4 Note 2
3 or 6 DGT (MF) — 411 calls 3 or 6 digits dialed, 3 or 6 digits MF outpulsed	RA2 Note 2
1 DGT — 0 - OPR routes to TSP	CL6P

**Note 1:** Assignment to CL3S punching transmits a PCI tandem indication to the subscriber sender when an auxiliary sender is required for MF outpulsing.

**Note 2:** When any one of the RA1 through RA4 punchings is used, one cross-connection per marker is required from the CLA punching to the CL3S punching.

**4.145** The CL punching of a route relay used for MF, PCI, or 0-operator to TSP pulsing with ANI is assigned as shown on cross-connection note 4.03 in SD-25016-01 and as follows:

CLASS OF CALL	CL PCHG OF ROUTE RELAY CROSS-CONNECTED TO PCHG
* 10 DGT (MF) — 10 digits dialed, and 10 digits MF outpulsed	RA5 Note 1
10 DGT-SKP 3 (MF) — 10 digits dialed, first 3 digits deleted, 7 digits MF out- pulsed	RA1 Note 1

CLASS OF CALL	CL PCHG OF ROUTE RELAY CROSS-CONNECTED TO PCHG
** 7 or 8 DGT (MF) — 7 or 8 digits dialed, 7 or 8 digits MF out- pulsed	RA7 Note 1
10 DGT-SKP 3 (MF) — 10 digits dialed, first 3 digits deleted, 7 digits MF out- pulsed for recon- structed area codes.	RA9 Note 1
6 DGT (MF) 411 calls 6 digits dialed, 6 digits outpulsed	RA5 Note 1
6 DGT-SKP 3 (MF) 411 calls, 6 digits dialed area code re- cycled, 3 digits out- pulsed	RA9 Note 1
3 or 6 DGT (MF) 411 calls, 3 or 6 digits dialed, 3 or 6 digits outpulsed	RA7 Note 1
7 DGT (PCI) 7 or 8 digits dialed, 8 digits PCI out- pulsed	RA6 Note 2
1 DGT—OPR Routes to TSP 1 digit dialed, no digits outpulsed by sender	RA8 Note 3

3 or 6 DGT (PCI) 411 3 or 6 digits dialed, 8 digits outpulsed	RA10 Note 4
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\* Includes Noncoin 0 + 10 digit calls and Coin 0 or 1 + 10 digit calls to TSP

\*\* Includes Noncoin 0 + 7 digit calls and Coin 0 or 1 + 7 digit calls to TSP

**Note 1:** When any one of the RA1, RA5, RA7, or RA9 punchings is utilized, one cross-connection per marker is required from the CLA punching to the CL3S punching.

**Note 2:** When the RA6 punching is utilized, one cross-connection per marker is required from the CLB punching to the CL3P punching.

**Note 3:** When the RA8 punching is utilized, one cross-connection per marker is required from the CLC punching to the CL6P punching.

**Note 4:** When the RA10 punching is utilized, one cross-connector per marker is required from the CLD punching to the CL5P punching. ◀

**4.146** The RA1 to RA4 punchings, the CLA, CLB, and CLC punchings are located below the SPB punching, and the CLD, RA5 to RA10 punchings are located above the SGP punching on the SG terminal strip of the local route relay bays. The RA1 to RA10 punchings correspond to the windings of the marker RA1 to 10 relays. (Fig. 29.)

**4.147** As explained in 4.158, coin test may be canceled for operator direct and operator tandem classes by using station delay D. The CL punching is not assigned on office selector or crossbar tandem alternate route relays when the associated SP punching is assigned to the TWA, TWB, TWC, or TWD punching.

**4.148** *The CL punching* associated with the route relay contacts are located on the right center section of the bottom 5-point terminal strip on the route relay bay as shown in Fig. 29. The punchings are numbered from 0 to 99 and correspond in number to the route relay with which they are associated. The CL punchings, representing the marker class relays, appear below the CL punchings of the route relays on a 20-point type terminal strip. The punchings on this strip are designated P0 to 7 and S0 to 7 and correspond to the primary and secondary windings of the marker CL0 to 7 relays.

#### **CR (Compensating Resistance) and SB (Second Brush) Punchings**

**4.149** The CR punchings provide the office selector and trunk compensating resistance and the proper trunk guard relay necessary for the routing.

When the multialternate route feature is provided, the SB punchings of original route relays provide the office selector and trunk compensating resistance and the proper trunk guard relay for an alternate route via crossbar tandem or 2-wire office selector tandem trunks. In earlier installations the SB punchings provided the office brush selection for a second 2-wire office selector.

**4.150** *The CR punching* of the route relay is assigned to the P or S punching of one of the CR0 to 9 relays according to the office selector and trunk compensating resistance and the trunk guard relay required. In order to determine the compensating resistance, refer to the section covering the use of compensating resistance. Applying the loop resistances specified for the destination, determine the required compensating resistance. Using the figure obtained, consult cross-connection note 403 in SD-25016-01 for the proper punching assignment. Where office selections are not required, the office compensating resistance should be 900 ohms.

**4.151** *The CR punching* is not assigned on alternate route relays for 2-wire office selectors or crossbar tandem trunks when the multialternate route feature is provided. (See 4.14.)

**4.152** When the multialternate route feature is provided, the CR0 to 9 relays are connected to the SB0Sto 9S and SP0P to 9P punchings formerly used for the SB0 to 9 relays. The SP punching, of original route relays which have alternate routes via distant (2-wire) offices selectors or crossbar tandem trunks, is assigned to the P or S punching designated SB0 to 9 according to the office selector and trunk compensating resistance required as indicated in cross-connection note 403 in SD-25016-01. The section covering use of compensating resistance should be used to determine the proper compensating resistance for the particular loop resistances specified. The SB punchings of other types of route relays are not assigned.

**4.153** *The SB punching* is assigned only when the multialternate route feature is provided.

**4.154** *The CR or SB punching* of the route relay is assigned to P punchings designated CR0 to 9 when it is desired to introduce the use of the CR5 and MTG relays in the sender. The MTG relay is required when trunk groups containing panel 3-wire local or one or more ground cutoff nonrepeating incoming selectors, regardless of the loop resistance. The MTG relay should be used on other panel class routings when the conductor loop resistance plus any compensating resistance is 1300 ohms or less. For all other routings, the TG relay should be used.

**4.155** The CR and SB punchings associated with the route relays are located in adjacent groups in the center of the next to bottom 5-point terminal strip on the route relay bays as shown in Fig. 29 and 30. The punchings are numbered from 0 to 99 and correspond in number to the route relay with which they are associated. The CR and SB punchings representing the marker compensating resistance relays appear below the CR and SB punchings of the route relays on a 20-point type terminal strip. The punchings on this strip are designated S0 to 9 and P0 to 9 and correspond to the secondary and primary windings of the marker CR0 to 9 relays.

**4.156** When the subscriber sender is used with the auxiliary sender for MF routes, office selections are not required and compensating resistance 900-600 should be used with the TG relay.

#### **OB (Office Brush) Punchings**

**4.157** The 0B punchings provide means of indicating the office brush selection and the SD, SD1 combinations used to cause sender timing for receipt of an eighth digit. The SD, SD1 combinations are not required to cause sender timing in wire-spring sender SD-27810 but are used to provide supplementary class information as follows:

- (a) *Station Delay A*: Ten digit MF call.
- (b) *Station Delay B*: Revertive pulse call to a B office completed over a common group of trunks to two crossbar offices.

(c) *Station Delay D*: Interchangeable office and area codes. Sender times for extra digits.

(d) *Station Delay C*: All other classes.

**4.158** *The OB punching* of the route relay is assigned to the P or S punching of one of the OB0 to 9 relays depending on the bank number of the office selector multiple on which the trunks are located or the office brush code required for crossbar tandem routes and on the station delay condition or supplementary class information required as indicated in cross-connection-note 403 in SD-25016-01. The station delay is dependent on whether the sender should or should not be delayed to await the dialing of a subsequent station digit or party letter and the classifications are as follows:

(a) *Station Delay A*: Delays all calls and is required for:

- (1) Jack-per-line manual offices having both number over 9999 and party letters.
- (2) Any manual office reached through panel sender tandem via dial coin zone trunks except offices having party letters in the series 1000 through 1099. These offices may not be routed via dial coin zone trunks.
- (3) Routes requiring the use of an auxiliary sender for MF outpulsing where the subscriber senders are arranged to delay for stations digit.

(b) *Station Delay B*: Delays only calls beginning with 10 and is required for:

- (1) Jack-per-station manual offices having numbers over 9999 but without party letters.
- (2) Office B unit of a crossbar office reached via a group of trunks common to two crossbar units (five pulses added to incoming group selection).

(c) *Station Delay C*: Does not delay calls and is required for:

- (1) Jack-per-station manual offices without numbers over 9999 or party letters.

- (2) Office A unit of a crossbar office reached via a group of trunks common to two crossbar units.
  - (3) Other types of dial offices and for operator class calls.
  - (4) Routes requiring the use of an auxiliary sender for MF outpulsing where the subscriber senders are arranged for no stations delay (7-digit operation).
- (d) **Station Delay D:** Delays all calls and is required for:
- (1) Jack-per-line manual offices having party letters but without numbers over 9999.
  - (2) Routes that require that the coin test be canceled such as official codes through tandem, permanent signal, zero operator, originating sender load control code, or overflow. (CL punching must be assigned to CL5 or CL6 punching.) (See 4.147.)
  - (3) Restricted operator denied route and 8-digit overflow and 8-digit intersender timing announcement routes.

**4.159** When office brush codes 5 to 9 (high-five office brush) are required for crossbar tandem routings, the associated SG punching is also assigned as outlined in 4.168.

**4.160** *The OB punching* is not assigned on office selector or crossbar tandem alternate route relays when the associated SP punching is assigned to the TWA, TWB, TWC, or TWD punchings.

**4.161** When the office selections are not required, the OB punching is assigned to the P or S punching of the OB0 or OB5 relays depending on the station delay, or supplementary class information required.♦

**4.162** The OB punchings associated with the route relay contacts are located adjacent to the SB punchings on the bottom 5-point terminal strip of the route relay bay, as shown in Fig. 29. The punchings are numbered from 0 to 99 and correspond in number to the route relay with which they are associated. The OB punchings, representing the marker office brush relays, appear below the OB punchings of the route relays on a 20-point type

terminal strip. The punchings on this strip are designated P0 to 9 and S0 to 9 and correspond to the primary and secondary windings of the marker OB0 to 9 relays.

### OG (Office Group) Punchings

**4.163** The OG punchings provide means of indicating the office group selection for routes via office selectors and the OG code for routes via crossbar tandem or for indicating that office selections are not required for other types of routes.

**4.164** *The OG punching* of the route relay is assigned to the P or S punching of one of the OG0 to 4 relays as indicated in cross-connection note 403 in SD-25016-01, depending on the group number within the bank of the office selector multiple on which the trunks are located or the office group code required for crossbar tandem routes. The OG punching is assigned to the OG5S punching when office selections are not required and the associated SP punching of the route relay is assigned to the SPB punching. The OG punching is assigned to the OG5P punching when office selections are to be skipped and the associated SP punching is assigned to the SPA punching. The OG punching of an overflow or permanent signal route relay arranged for two subgroups of trunks is assigned to the OG5P punching when both subgroups are to be tested for an idle trunk. ♦The OG punching of a route relay for TSP trunk groups is assigned to the ODN punching in LAMA offices. The associated ODG punching is assigned to the OG5S punching.♦

**4.165** The OG punching is not assigned on office selector or crossbar tandem alternate route relays when the associated SP punching is assigned to the TWA, TWB, TWC, or TWD punchings.

**4.166** *The OG punchings* associated with the route relay contacts are located on the left end of the bottom 5-point terminal strip of the route relay bay as shown in Fig. 29. The punchings are numbered from 0 to 99 and correspond in number to the route relay with which they are associated. The OG punchings, representing the marker office group relays, appear below in OG punching of the route relays on a 20-point type terminal strip. The punchings on this strip are designated P0 to 5 and S0 to 5 and correspond to the primary and secondary windings of the marker OG0 to 5 relays.

**SG (Second Group) Punchings**

**4.167** The SG punchings provide means of indicating whether or not office brush codes 5 to 9 (high-five office brush) are required on crossbar tandem routings and whether or not calls to Official 9300 (OFF 9300 reroute, see 4.197) are to be routed to a special group of trunks. When the marker is arranged for the dial tone first feature, the punchings provide means to signal the sender to cancel coin test. In earlier installations the SG punchings provided means of indicating the office group selection for a second distant (2-wire) office selector.

**4.168** *The SG punching* of the route relay is assigned to the P or S punching of the marker SG0 or SG1 relays as indicated in cross-connection note 403 in SD-25016-01 depending on whether or not office brush code 5 to 9 is required, whether or not OFF 9300 is to be routed to a trunk group other than that used by any other OFF number series, or whether or not coin test is to be cancelled by the sender.

**4.169** *The SG punching* is not assigned in installations where none of the following features are provided:

- (a) Office brush above five.
- (b) OFF 9300 reroute.
- (c) XT trouble indications on second or third trials prevented.
- (d) Dial tone first.

**4.170** *The SG punchings* associated with the route relay contacts are located adjacent to the OG punchings on the bottom 5-point terminal strip of the route relay bay. The punchings are numbered from 0 to 99 and correspond in number to the route relay with which they are associated. The SG punchings, representing the marker SG relays and the SPB punching, appear below the SG punchings of the route relays on a 20-point type terminal strip. The punchings on the strip are designated P0 and 1 and S0 and 1 and SPB corresponding to the primary and secondary windings of the SG0 and 1 relays and the SPB punching which is a multiple of the SPB punching on the SP terminal strip.

**Traffic Register Punchings**

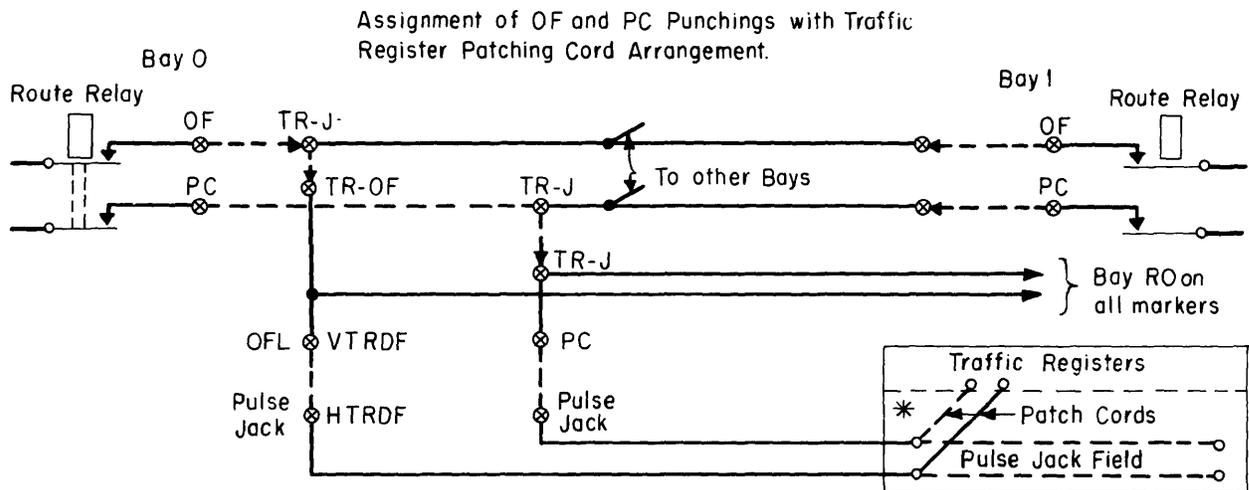
**4.171** These punchings are designated as OF (overflow), PC (peg count), TR-OF (traffic register overflow), TR-PC (traffic register peg count), TR-J (traffic register J-interconnector) and INTC-PC (interconnector peg count).

**4.172** *PC and OF punchings* associated with 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). On earlier installations, facilities were provided for cross-connecting 100 PC and OF contacts to 80 TR-PC and 80 TR-OF register leads. The cross connections were made at the originating marker frame. This arrangement has been rated "A&M Only", and provision has been made whereby the 80 TR-PC and 80 TR-OF cross-connecting terminal strips have been increased to 100 each, so that 100 route relay contacts PC and OF may be cross-connected to a like number of pulse jacks on the horizontal side of the TRDF. These in turn are extended to the assigned traffic register by means of patching cords at the patch jack field. 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. Any subsequent rearrangement can be made either at the TRDF or at the patch jack field. (Fig. 18.)

**4.173** *TR-J punchings* are used to provide cross connections from the route relays on different route relay bays to the same TR-OF or TR-PC punching.

**4.174** *INTC-PC punchings 0 to 5* are used to permit peg count register discrimination on one trunk group by a maximum of five classes of service or on two trunk groups by a maximum of two classes of service. The INTC-PC is assigned to an SC punching. The associated S punching of the desired classes are assigned to other INTC-PC punchings. These INTC-PC punchings are assigned to the TR-PC or TR-J punchings associated with the desired peg count register. The INTC-PC punchings are normally used to separate the district junctor test calls from the regular registrations.

**4.175** *10D punchings* are used to provide cross-connections used to count the 10-digit calls handled by a marker.



\* The Patching Cords in the Traffic Register Cabinet serve primarily to extend the Operating Leads of the registers to the TRDF for cross-connecting to the assigned circuits, however, if desired, the Patching Cords may be used for changing Register Assignments within a cabinet and to a limited extent between cabinets.

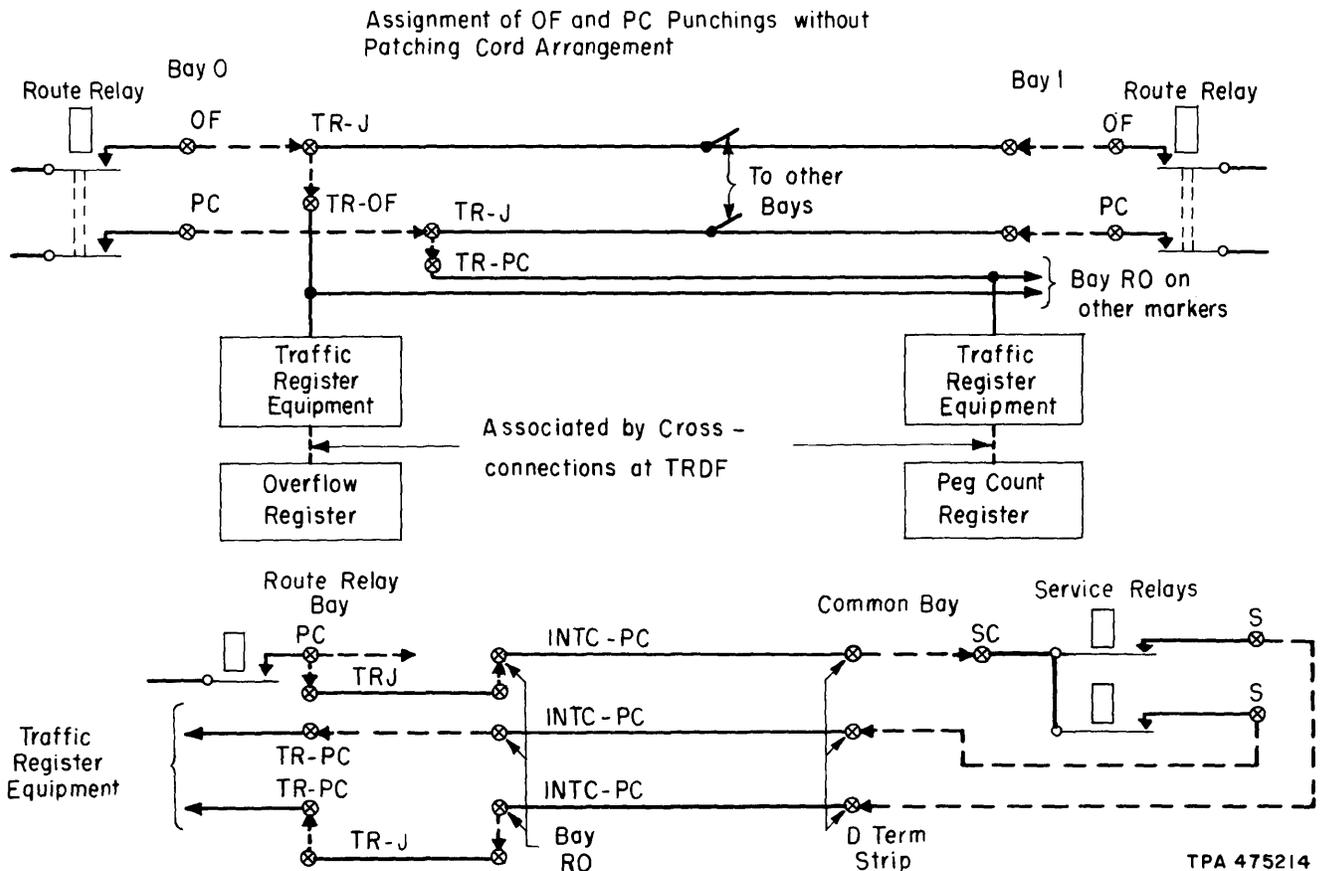


Fig. 18—Assignment of "OF" and "PC" Punchings

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**4.176** *The OF and PC punchings* associated with the route relay contacts are located on the OFPC terminal strip at the top of the route relay bay, and both the PC and the OF are numbered from 0 to 99, corresponding to the associated route relay number. The route relay bay determines the hundreds number of the punching, the number to the left or right of the punchings indicates the tens digit while the number below the punching indicates the units digit. The INTC-PC punchings are numbered from 0 to 5 and appear on the top row of punchings on the OFPC terminal strip of route relay bay RO as shown in Fig. 29. The TR-OF and TR-PC punchings are located on the TR terminal strip at the top of each route relay bay. The punchings are numbered from 0 to 99 and appear on the lower two rows of punchings with the TR-OF punchings on the left side of the strip and the TR-PC on the right side as shown in Fig. 29. The TR-OF and TR-PC punchings multiple to the same route relay bay number on all markers and cable to the vertical side of the TRDF. The TR-J punchings appear on the top row of punchings on the TR terminal strip and number from 0 to 39, as indicated in Fig. 29. The TR-J punchings are multiplied to all other route relay bays of the same marker frame.

#### TB (Trunk Busy) Punchings

**4.177** Two TB punchings are used to connect the TB lead of all route relays in the same bay to adjacent bays and to the marker TB relay in the common bay. These punchings do not require assignment and appear on the top row of punchings on the RA terminal strip of each route relay bay. They are cross-connected by means of bare wire straps.

#### H. Miscellaneous Assignments

##### Originating Sender Load Control Punching

**4.178** The OF (overflow) punching provides means for the senders to indicate to the marker that a sender overload exists and that the call should be routed to overflow or to an operator. The OF punching is located in the approximate center of the bottom row of punchings on the D terminal strip.

**4.179** *The OF punching (Fig. 19)* is assigned to:

- (a) *The CP punching* to provide contact protection.
- (b) *The SC punching* to route originating sender overload calls to different groups of zero operator trunks, segregated by classes of service. The SC punching may be the same as that used for zero operator calls. The associated S punchings of subscriber classes are assigned to the respective INTC-RC punchings used for zero operator route relays. In the event that the senders are arranged to provide cancellation of overload control on coin classes, the OF punching assignment is ineffective on calls from these classes. If an SC punching other than that used for zero operator is assigned, the coin and keypulse operator class S punchings are not assigned. Assign SC punching 15 to the OF punching when possible to facilitate cross-connection work.
- (c) *An INTRC-RC punching* when calls are to be routed to overflow. The INTC-RC punching is assigned to the RC or the J-INTC punching associated with the 3-digit overflow route relay.

#### Route Transfer and Terminating Sender Load Control Punchings

**4.180** The RT (route transfer), RTA, and RTB punchings provide means of transferring the code point from one route relay to another and thereby effect a transfer in the routing of the destination when signaled to do so. This feature is used to transfer traffic for terminating sender load control, or from a decentralized "A" switchboard to long distance or from one official PBX to another.

**4.181** *An RT punching (Fig. 20)* is assigned to the C punching representing the code to be transferred (local office code point for terminating sender load control or 211 for long distance). The correspondingly numbered RTA punching is assigned to an INTC-RC punching which in turn is assigned to the RC punching of a route relay arranged for the normal or nontransferred route. The correspondingly numbered RTB punching is assigned to an INTC-RC punching which in turn is assigned to the RC punching of a route relay arranged for the transferred route. On terminating sender load control the transferred route may be to overflow or operator as desired. For classes on which terminating sender load control is canceled, assign the D or DA punching to the TOC punching.

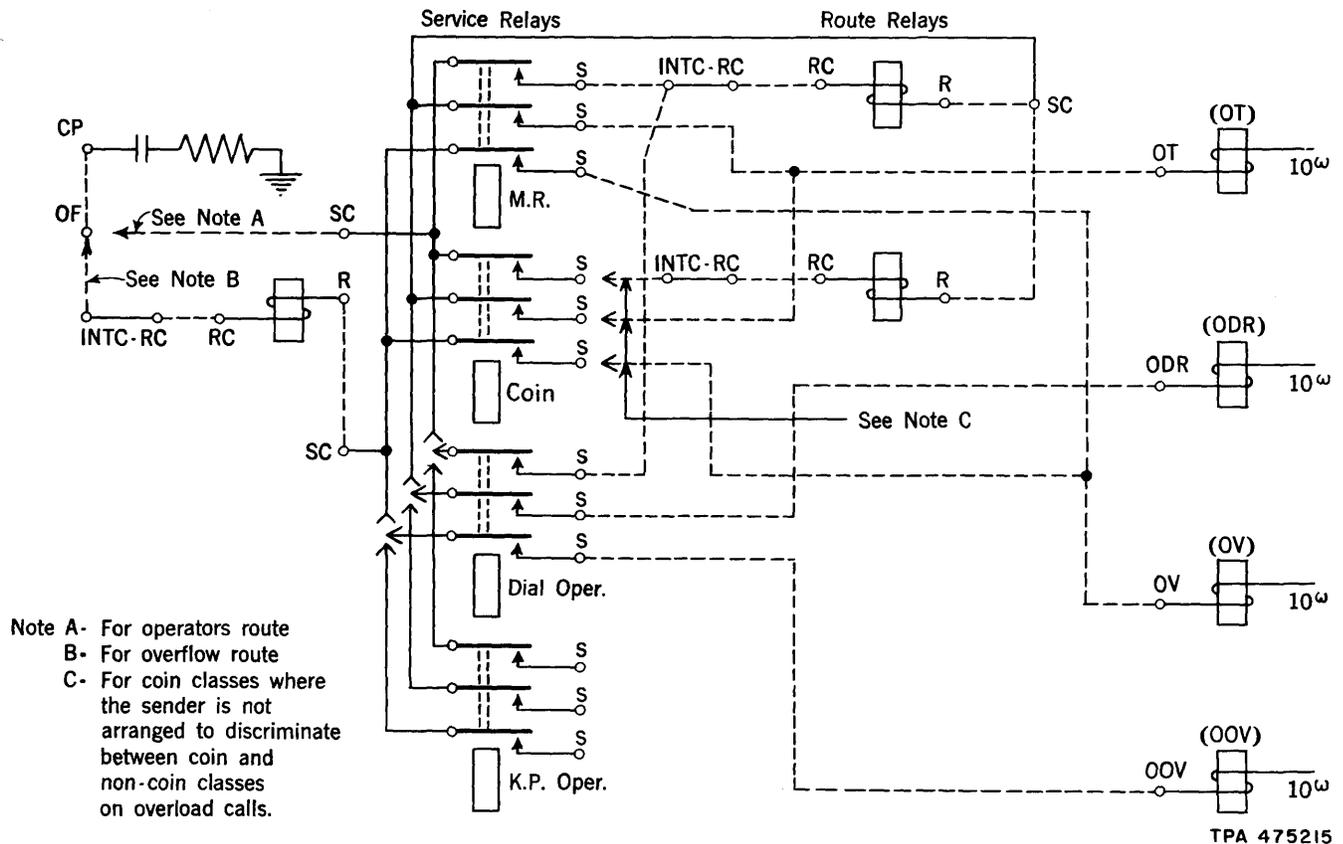


Fig. 19—Assignment for Originating Sender Load Control

4.182 The RT0 to 19 punchings, when provided, are located in the top row on the upper C terminal strip of the common bay and multiple to the second and third rows of punchings on the D terminal strip of the common bay. (Fig. 28.) The associated RTA and RTB punchings appear on the right end of the D terminal strip as follows:

RTB 10 to 19—fourth row

RTA 10 to 19—third row

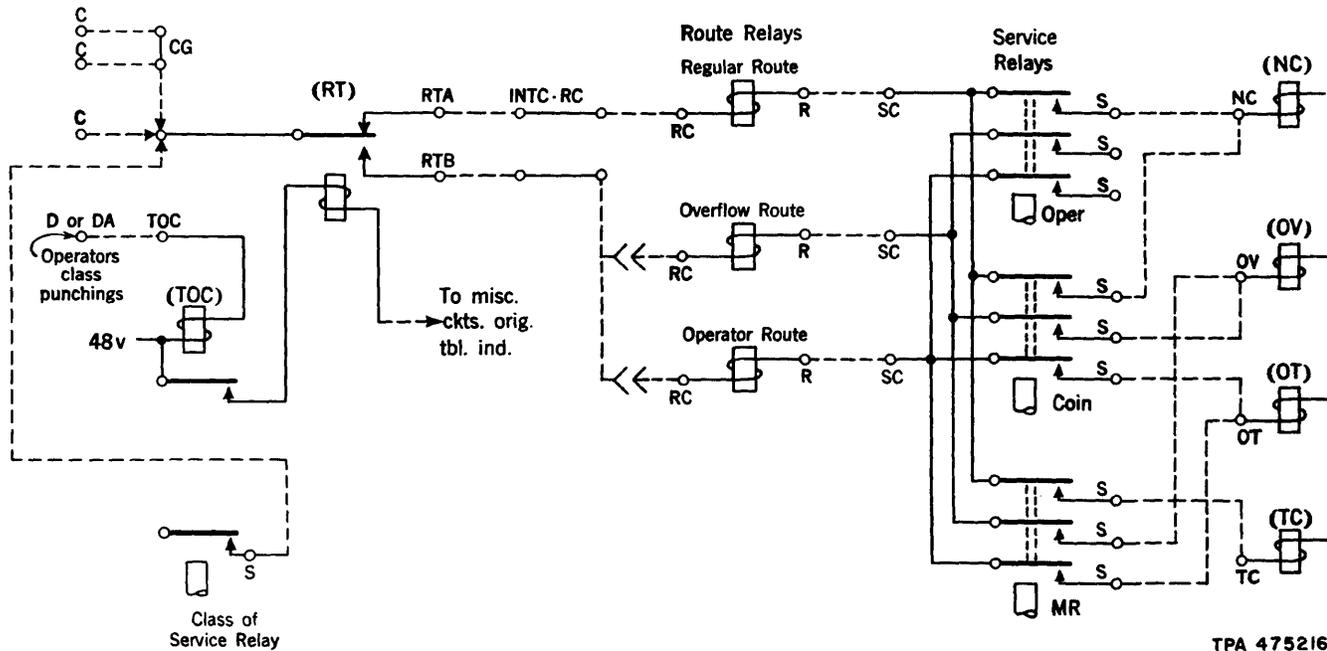
RTB 0 to 9—second row

RTA 0 to 9—bottom row

The tens digit appears to the right of the punchings while the units digit appears under the bottom row of punchings. In earlier installations only 10 RT, RTA, and RTB punchings were furnished and were located in the same positions as now occupied by the RT0-9, RTA0-9, and RTB0-9 punchings. In installations previous to these, the RT, RTA, and RTB punchings were not furnished.

#### Class-of-Service Peg Count Punchings

4.183 The CSP (class-of-service peg count), CPC (cancel peg count), PMR (P message register), MR (message register), RMR (remove message register test on coin and KP calls), and LC1 (locking control) punchings provide means of indicating the number of calls handled by particular classes of service in a marker. When the class-of-service peg count feature is provided, the CPC punching (Fig. 21) is assigned to an SC punching. The associated S punchings of classes not equipped with message registers nor with ground on the line message register terminals are assigned to the CSP0 to 9 punchings. The associated S punchings of classes equipped with message registers or grounded MR leads are not assigned. The RMR punching is assigned to another SC punching. The associated S punchings of classes not equipped with registers or grounded MR leads are assigned to the PMR punching. The associated S punchings of classes equipped with registers or grounded MR leads are assigned to the CSP0 to 9 punchings. The MR punching is assigned to the ZMR punching.



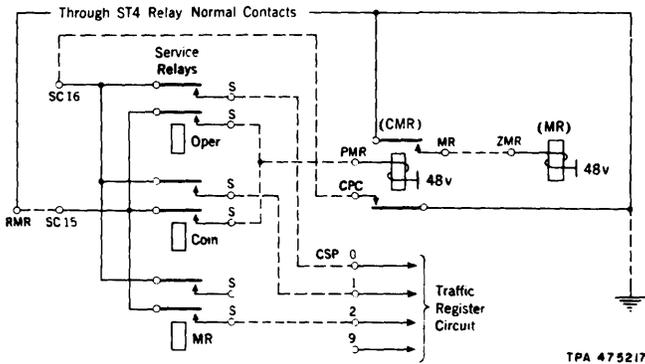
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Fig. 20—Assignment for Route Transfer—Terminating Sender Load Control

The 10 equipments, associated with the CSP0 to 9 punchings of each marker, must be assigned to the proper traffic registers and cross-connected at the traffic register distributing frame.

**4.185** When the class-of-service feature is not furnished and the marker is not arranged for AMA, assign the RMR punching to an SC punching. Assign the associated S punchings of classes not equipped with message registers nor arranged with ground on the line message register terminals to the ZMR punching. The associated S punchings of other classes are not assigned. When the class-of-service peg count feature is not furnished and the marker is arranged for AMA, none of the cross connections described in 4.183 and 4.184 are required.

**4.186** *The RMR punching* is located in the bottom row of punchings on the left side of the D terminal strip of the common bay. In earlier installations it was located on the top row of the S terminal strip. When provided, the CPC, PMR, CSP0 to 9, and LC1 punchings are located in the top row of punchings on the D terminal strip of the common bay. The MR punching appears approximately in the center of the top row of punchings on the A terminal strip of the common bay. The ZMR punching is located on the Z terminal strip of the common bay.



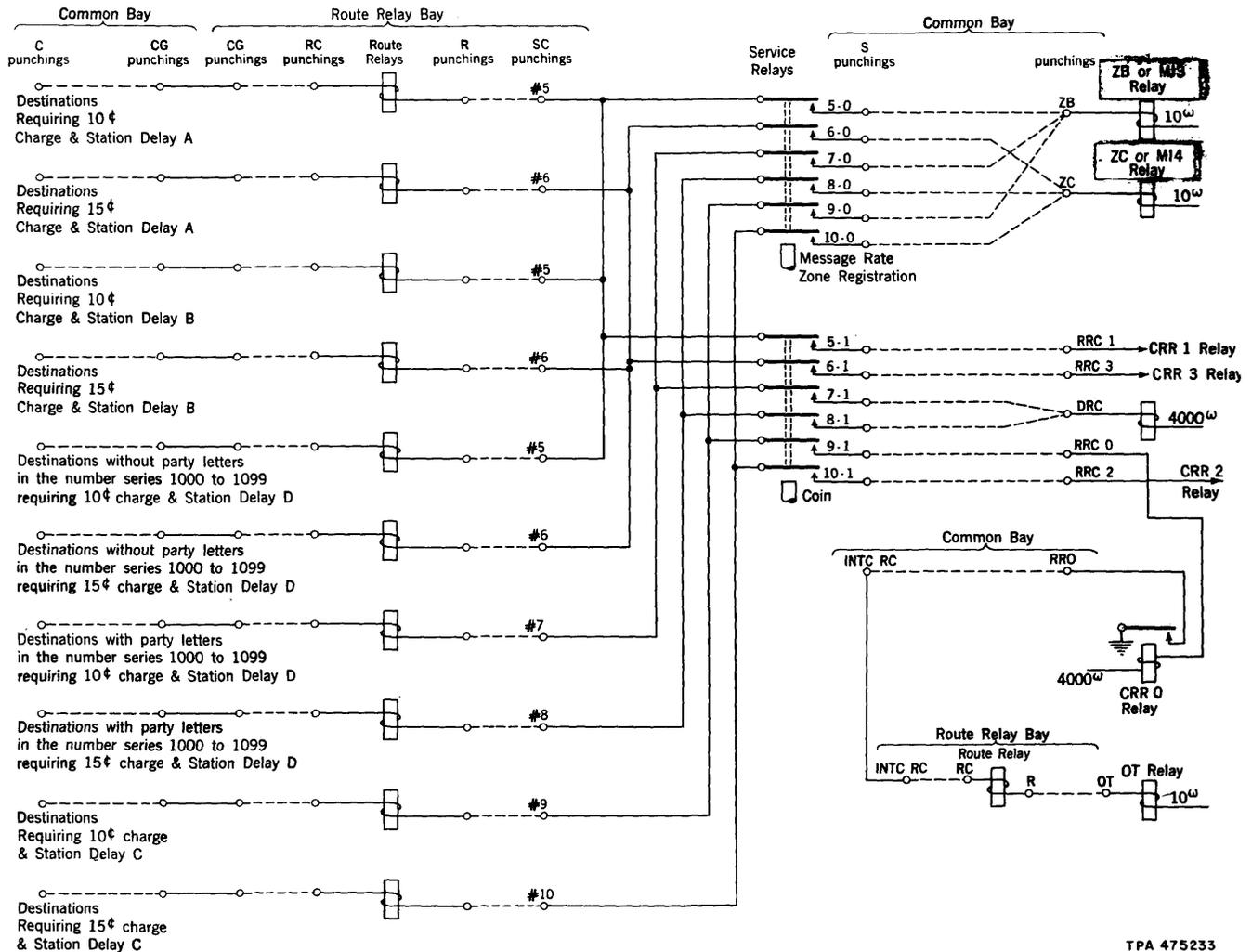
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Fig. 21—Assignment for Class-of-Service Peg Count Registration

**4.184** When the class-of-service peg count feature is provided and the marker is arranged for AMA, the RMR punching is assigned to an SC punching. The associated S punchings are assigned to CSP0 to CSP9 punchings. As only 10 CSP punchings are provided, only 10 classes may be assigned at a time. By rotating assignments, all classes may be covered over a period of time. Different classes in different markers may be assigned at the same time, each marker having its own set of CSP0 to 9 punchings. The LC1 punching is a cable terminal and is not assigned.

**4.187 RRC (Reroute Coin) and RR (Route Relay) Punchings:** When dialing privileges to points outside of the local area are extended to coin box lines that can give a monitor operator an audible signal when coins are deposited, it will require from 1 to 8 CRR relays in the marker and the use of dial coin zone trunk circuits. If installed, there are a maximum of eight relays which are designated CRR0 to 7. The windings terminate on RRC punchings 0 to 7 and the single contact of each relay on RR punchings 0 to 7. (Fig. 22.) The RRC punchings are cross-connected to the S punchings of the coin class-of-service relays that have the extended dialing privilege. RRC punchings multiple to appearances in the access code and interchangeable code screening units when these units are provided. At these units, the RRC punchings are assigned to AS punchings as

required. When an extended area code is dialed from a coin line the regular route relay will not operate but the CRR will and in turn will operate a route relay that will direct the call to a trunk that is connected to the proper charge indicating portion of a dial coin zone trunk. One dial coin zone trunk circuit has four different charge indicating circuits which form the inward portion of the dial coin zone trunk. Consequently, the four different appearances are located in the same pair of office frames to prevent the simultaneous selection of the same trunk by two markers. The four appearances represent zones with charges of 10, 15, 20, and 25 cents or where the local area charge is 10 cents, 15, 20, 25 and 30 cents. The outward portion of dial coin zone trunks is not routed through a tandem panel office selector or crossbar tandem office either in the route to or outgoing



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Fig. 22—Assignment to Provide Extended Dialing for Coin Classes

from sender tandem, because the circuits might time out while waiting for the operator to respond to the initial coin lamp signal or for the subscriber to make the initial required deposit. The R punchings of route relays of codes that route through panel sender tandem via dial coin zone trunks and require the same charge and station delay are assigned to the same SC punching as shown in Table I.

**TABLE I**  
**SC PUNCHING ASSIGNMENTS FOR**  
**DIAL COIN ZONE TRUNKS**

CHARGE	STA. DEL.	RRC RELAY
10 or 30 cents	C	0
10 or 30 cents	A, B, D	1
15 cents	C	2
15 cents	A, B, D	3
20 cents	C	4
20 cents	A, B, D	5
25 cents	C	6
25 cents	A, B, D	7

**4.188** Each associated RRO to 7 punching is assigned to an INTC-RC punching which is assigned to the RC punching of a route relay arranged to route the calls to the proper appearance of the dial coin zone trunks on the office link multiple and arranged with either station delay A or C. The R punching of the route relay is assigned to the OT punching on the Z terminal strip.

**4.189** The dial coin zone trunks are connected to four separate appearances on the office link frames as follows:

1st appearance 10 cents or 30 cents charge rate.

2nd appearance 15 cents charge rate.

3rd appearance 20 cents charge rate.

4th appearance 25 cents charge rate.

The four appearances must be on the same pair of office link frames, requiring the same ST punching assignment.

**4.190** When a common subgroup is required, the four appearances of this subgroup should be on the same pair of frames. A common subgroup route relay must be assigned for each charge and delay condition for the coin traffic but for the noncoin traffic a common subgroup route relay must be assigned only for each delay condition. When an alternate route through another sender tandem point is provided, the route relays are assigned as for the common subgroup, that is, eight relays for coin traffic and four for noncoin traffic. The reason for assigning in this manner is that for noncoin traffic the charge condition is determined from the original route relay while for coin traffic the charge is determined by the trunk appearance on the office link frame.

**4.191** If 41 to 80 dial coin zone trunks are provided, the four charge appearances of the same subgroup must be located on the same pair of office link frames.

**4.192** The OB punchings of the coin class route relays requiring station delay A, B, or D are assigned to provide delay A. Code points of manual offices having D delay and arranged with party letters in the number series 1000 to 1099 may not be assigned for routing via dial coin zone trunks.

**4.193** When provided, the RRCO to 7 punchings are located in the top row and the associated RRO to 7 punchings are located in the second from the top row, right side of the D terminal strip on the common bay as shown in Fig. 28. On earlier installations both RRC and the RR punchings were located in the top row. ♦RRC punchings may also appear on Z terminal strip at the class of service bay, B terminal strip at the access code unit, and C terminal strip at the interchangeable code screening unit.♦

**4.194** *Dial coin zone trunks* may now also be routed on a PCI basis through a crossbar tandem and handled the same as if they were routed through a panel sender tandem.

**4.195** *The RRC (Reroute Coin), RR (Reroute Relay) punchings* and the associated relays, which were originally provided for rerouting coin traffic over dial coin zone trunks, may also be used to provide a reroute of any kind for other classes of service.

**OFF 9300 Reroute**

**4.196** When it is desired to reroute calls for OFF 9300 to a separate group of trunks other than that used for OFF 9100 for example, two route relays must be assigned. The route relay for the OFF 9100 trunks is assigned in ground supply group 1 and it is arranged to route the calls to the 9100 trunk group.

**4.197** *SG punching*, outlined in 4.168, is assigned to:

- (a) *The SG0P punching* for calls that do not require five additional pulses in office brush selection.
- (b) *SG1P punching* for calls that require five additional pulses in office brush selection.

*The RA punching* is assigned to the RC punching of a second route relay assigned in ground supply group 3 and arranged to route to the 9300 trunk group. On this route relay, the SG punching is assigned to:

- (c) *The SG0S punching* for calls that do not require five additional pulses in office brush selection.
- (d) *The SG1S punching* for calls that require five additional pulses in office brush selection.

**4.198** When the high-five office brush feature is not provided, the SG punching of the first route relay is assigned to the SG1P punching and the SG punching of the second route relay is not assigned.

**4.199** *AR Punching*: This is a 48-volt nonresistant battery, connected to the R punching of a route relay that represents an alternate route or a common subgroup original route relay. (Fig. 11.)

**4.200** *CP (Contact Protection) Punchings*: These punchings provide contact protection for certain marker relay contacts and when cross-connected, they are associated with the highest calling rate code or code groups.

**4.201** *EA punching* is furnished when the marker is arranged to work with senders that are equipped to register extended area codes, having prefix one-one, where all such codes are to be

served by a single code point for a common routing through CAMA tandem. The EA punching is located on the top row of punchings of the D terminal strip as shown in Fig. 28.

**4.202** *The EA punching* is assigned to:

- (a) INTC-RC punching. [See 4.67(e).]
- (b) SC punching. [See 4.96(k).]

**4.203** *Additional GC punchings*, designated 0 A to 59A and located on the route relay bay GC terminal strip have been provided. They are intended as bunching points. These punchings are used where a number of route relays require connection to the same trunk group, such as where ten codes are routed on a full tandem basis through crossbar tandem and each route relay requires different OB, OG, etc, information. In a case like this, GC-GS punchings 0A to 9A can be strapped together on the wiring side and the individual route relays GC-GS terminals cross-connected to the strapped punchings. Then a single lead is run from the GS-GS punching to the assigned GS terminal of the marker or to the required GC-GS terminal in case a grouping relay is used. The GC-GE, GC-TL, and the GC-ST punchings are treated in a like manner.

**Channel Preference Punchings**

**4.204** To distribute the wear of the apparatus on the district and office link frames, it is desirable to change the channel preference during the life of the office. For the proper distribution of calls it is necessary to have the same assignments on all marker frames in the same marker group.

**4.205** The assignments are made according to the channel desired as indicated in Table J.

**4.206** Punchings IN, A, R OT, and 1 to 8 are located in the bottom row of the B terminal strip of the common bay.

**Office Junctor Pattern Punchings**

**4.207** The assignments for the office junctor pattern punchings on terminal strips A and B are determined by the size of the installation and are not covered in this section.

TABLE J

CHANNEL PREFERENCE ASSIGNMENTS							
ORDER OF ASSIGNMENTS	CHANNEL IN PREFERRED TO	AND	ASSIGN PUNCHINGS			AND	OT TO
			A TO	R TO			
Initially	0 Left	1	2 to 3	4	5	6 to 7	8
1st change	2 Right	3	4 to 5	6	7	8 to 1	2
2nd change	5 Left	5	6 to 7	8	1	2 to 3	4
3rd change	7 Right	7	8 to 1	2	3	4 to 5	6

#### Intersender Timing Announcement and Nonannouncement Punchings

**4.208** *The AC1 to 3, AN1 to 3 and the NA1 to 3 punchings* associated with the AN relay and the A-punchings are provided to enable calls which are normally routed to an overflow trunk to be routed to an announcement trunk during periods of intersender timing or when controlled by a key from the originating trouble indicator. (See cross-connection note 401 in SD-25016-01.) The AN relay, when normal, will provide the necessary overflow route and when operated will transfer the call to an announcement route. The announcement route relays should be handled in the same manner as the overflow route relays. A 3-digit, 7-digit and 8-digit announcement route relay should be provided in cases where the district junctor supervisory relays are not arranged to hold over dial pulses and the juncctors are set in normal "no charge" condition on these routes. All 10-digit calls routed to overflow or announcement should be assigned to a 3-digit overflow and a 3-digit announcement route relay. If the district junctor is set in normal "no charge" condition on these routes, the supervisory relays must be arranged to hold over dial pulses. The punchings provided for this are as follows:

(a) *The A (Interconnector Announcement) punchings* provide means of connecting RA and RC punchings of the route relay bays to various punching on the common bay for the intersender timing announcement feature. The A0 to A8 are located on the lower RC terminal strip of the local and extended area route relay bays. These A0 to A8 punchings are multiplied to

the B terminal strip of the common bay and are designated as A1 to A9 punchings. (Fig. 28, 29, and 30).

(b) *The AC1, 2 and 3 (Announcement Cut-in) punchings* provide access to either an overflow route relay or an announcement route relay. They are located on the B terminal strip of the common bay. (Fig. 28.)

(c) *The NA1, 2 and 3 (Nonannouncement) punchings* are assigned to the RC punchings of the overflow route relays. The NA1, 2 and 3 punchings are located on the B terminal strip of the common bay. (Fig. 28.)

(d) *The AN1, 2 and 3 (Announcement) punchings* are assigned to the RC punchings of the announcement route relays. The AN1, 2 and 3 punchings are located on the B terminal strip of the common bay. (Fig. 28.)

**4.209** *The RA punchings* of route relays requiring transfer from an overflow route to an announcement route may be cross-connected directly to A0, 1 or 2 punchings, or cross connected to J-INTC punchings designated OF0, 1 or 2, as required, in the various route relay bays. The J-INTC OF0, 1 or 2 punchings, if used, are then cross-connected to A0, 1 or 2 punchings in the route relay bays. The multiple A punching in the common bay, designated A1, 2 or 3 punching, would be cross-connected to AC1, 2 or 3 punching. The correspondingly numbered NA1, 2 or 3 punching in the common bay is assigned to an A7, 8 or 9 punching which is multiplied to the route relay bay and designated as A6, 7 or 8 punching and assigned to the RC punching of a route relay arranged for

overflow trunks. The correspondingly numbered AN1, 2 or 3 punching in the common bay is assigned to an A4, 5 or 6 punching which is multiplied to the route relay bay and designated as A3, 4 or 5 punching. The A3, 4 or 5 punching is assigned to the RC punching of a route relay arranged for announcement trunk.

**4.210** The RA punchings of the overflow and announcement route relays (see cross-connection-note 402 in SD-25016-01) are cross-connected to operate a register, to record the number of calls where the sender requests a routing to overflow or announcement as follows.

(a) The RA punchings of the overflow route relays are assigned to A10 punching which in turn is cross-connected to the AN10 (Intersender Timing Overflow) punching to score a peg count register when one of the overflow route relays operates. The AN10 punching is located on the B terminal strip of the common bay. (Fig. 28.)

(b) The RA punchings of the announcement route relays are assigned to A9 punching which in turn is cross-connected to the AN9 (Intersender Timing Announcement) punching to score a peg count register when one of the announcement route relays operates. The AN9 punching is located on the B terminal strip of the common bay. (Fig. 28.)

### 3-Digit Translator Punchings (Subscriber Sender Recycle and Code Compression Provided)

**4.211** *CST punching* is assigned to:

(a) *STS punching* to associate a compressed code indication with a translator connector start lead to select a 3 DCT for the particular adjacent foreign area.

(b) *STR punching* to provide a single direct route via tandem to an adjacent foreign area that does not require a 3-digit translation or to provide a vacant code routing for unused compressed codes.

(c) *IT punching* to associate a compressed code with the extended area translator or 3 DIT for individual translations of office codes.

**4.212** *AR0-3 punchings* are assigned to:

(a) *RC punching* to associate an R relay in the local area translator for an alternate route for codes normally routed via the 3-digit common translator.

(b) *SC punching*, when the alternate route for codes normally routed via the 3-digit common translator requires class-of-service treatment.

(c) *CP punching*, when contact protection for certain marker relay contacts is required.

**4.213** *ARL punching* is assigned to:

(a) *RC punching* to associate an R relay for an alternate route for codes which are associated with compressed code 0 and are normally routed via the local area translator.

(b) *SC punching*, when the alternate route for codes which are associated with compressed code 0, and are normally routed via the local area translator, requires class-of-service treatment.

(c) *CP punching*, when contact protection for certain marker relay contacts is required.

**4.214** *ARU punching* is assigned to:

(a) *RC punching* to associate an R relay in the local area translator for an alternate route for codes normally routed via the extended area translator or 3-digit individual translator.

(b) *SC punching*, when the alternate route for codes normally routed via the extended area translator or 3-digit individual translator requires class-of-service treatment.

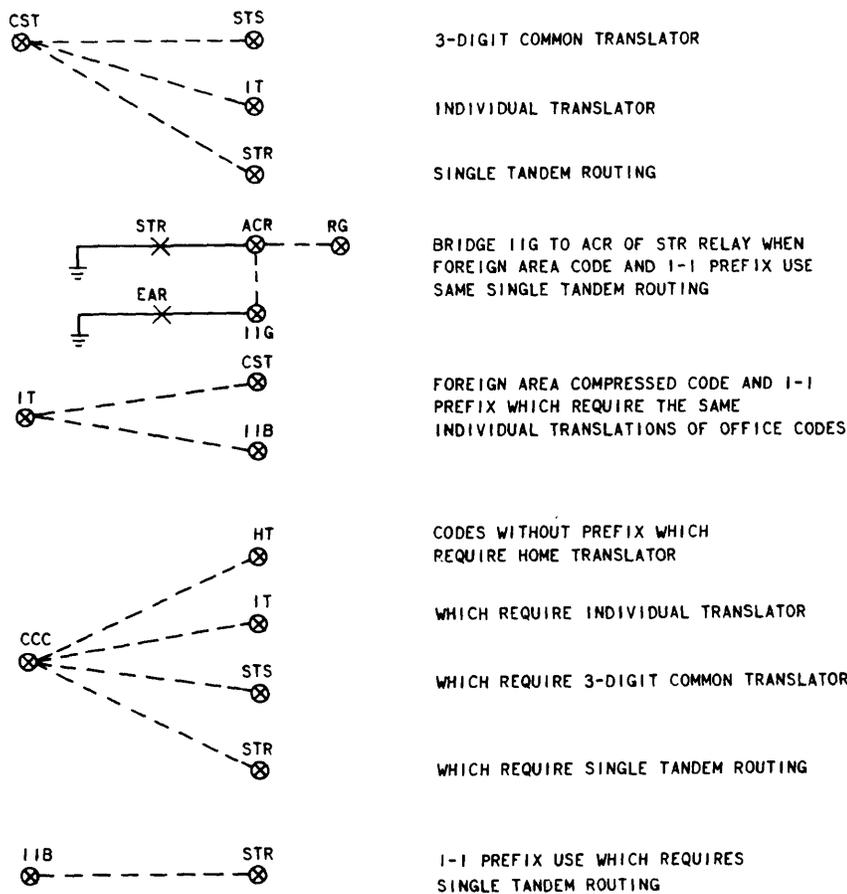
(c) *CP punching*, when contact protection for certain marker relay contacts is required.

**4.215** *CCC punching* is assigned to: (Fig. 23)

(a) HT punching when it is required to route codes associated with a canceled code compressor (no prefix) call via the home translator.

(b) IT punching when required to route these calls via an individual translator.

(c) STS punching when required to route these calls via the 3-digit common translator.



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Fig. 23—Cross-Connections Required for Compressed Codes, Codes Without Prefix, 1-1 Prefix Code Points (Battery or Ground) to 3-Digit Common, Individual or Local Area Translator or for Single Tandem Route

(d) STR punching when required to route these calls via a single tandem routing. ♦

4.216 **11G punching** is cross-connected to RC punching for 1-1 prefix single tandem route or unassigned code, or to the ACR punching when the foreign area code for the extended area is compressed and wired to a single tandem route relay (STR).

4.217 **11B punching** is cross-connected to:

(a) IT punching to associate the 1-1 prefix codes requiring individual code points with the extended area translator or 3 DIT.

4.218 **STR punchings** are used to provide a single tandem routing for a foreign area code or to provide a vacant code routing for unused CST\_ punchings. The STR punching is cross-connected to the CST\_ punching for the foreign area code

or to unused CST\_ punchings to operate an STR relay which grounds the ACR punching. ♦The STR punching may also be cross-connected to the CCC or 11B terminals for routes to an adjacent foreign area that does not require individual code points. ♦

4.219 **ACR punchings** are provided to associate an STR relay with a route relay for a compressed code that requires a single tandem routing. Where the foreign area compressed code and the 1-1 prefix use the same routing, the ACR punching may be cross-connected to the 11G punching. (Fig. 23.)

4.220 ♦**IT punching** is provided to associate the 3 DIT or extended area translator with the following punchings when translation for individual codes is required:

- (a) CST punchings for foreign area compressed codes
- (b) 11B punching for 11 prefix
- (c) CCC punching for canceled code compressor calls
- (d) ACT punchings for access code translation.♦

**4.221** *The CST, CCC, STS, 11B, 11 and 11G punchings* appear on the SD terminal strip at the top of the marker bay. The AR, STR, and ACR punchings appear on the SD2 terminal strip at the top of the marker frame.

**Note:** The cross-connections ARU, ARL, AR0-3, ACR1-2 shall be run as loose wiring between T.S. (SD2) on the left bay to T.S. (D) on the right-hand bay of the common equipment frame. Cross-connections shall be on the rear of the frame and tied to the frame local cable except at T.S. (D) where cross-connection shall be brought to the front of the frame through the fanning strip; existing punchings on T.S. (D) shall be used, and assigned according to the job conditions.

**Prefix Digits "0" and "1" Access Code Punchings**

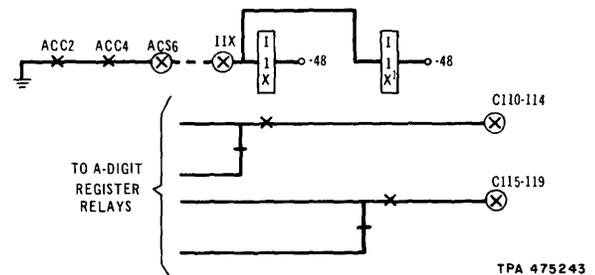
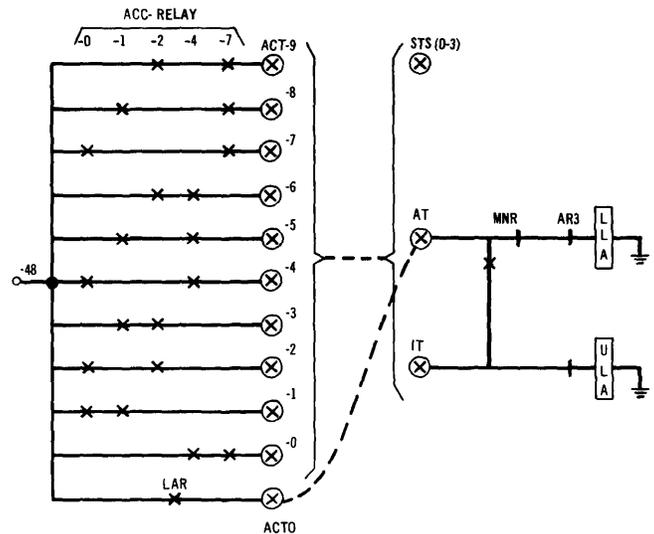
**4.222** For markers arranged to provide separate routing for person-to-person and extra charge station-to-station calls, access code screening relays and associated punchings are provided.

**4.223** On the marker common bay, terminal strip A, there are appearances of the ACS (6, 7, 8, 9, 0), ASW (0-3), NPD, and PD1 punchings. On terminal strip B are the ACT (0-9), AT, and 11X punchings, together with multiples of IT, STS, DRC, KP, NC, OT, RRC, SC, TC, and Z (A-J) punchings. On terminal strip D are the code points C110-C119, and these are multiplied to the RC terminal strip of route relay bay 0. The ASC punchings (00-39, common to all AS relays) and AS punchings (00-39, one set for each AS relay) appear on the ASL and the A terminal strip, respectively, of the access code unit.

**4.224** ACS (7, 8, 9, 0) punchings are assigned to ASW-punchings to operate an AS (access screening) relay as required. The ACS6 punching is assigned to 11X to operate the 11X and 11X' relays. The operation of relays 11X and 11X' connects C110-C119 to the code receiving relays.

**4.225** ACT0 punching should be connected to AT punching when apparatus Fig. 55 and 62 are provided. ACT (0-9) punchings are assigned as shown in Fig. 24 to:

- (a) AT when required to connect alternate area translator.
- (b) IT when required to connect extended area translator or 3-digit individual translator.
- (c) STS when required to connect 3-digit common translator.



**Fig. 24—11X Codes and Access Code and Translator Start**

**4.226** ♦ASC (00-39) punchings are assigned to RG, Z0, A12, or C punchings as required for access code treatment. RG punching is used for connection to an R (route relay). Z0 punching is used for zero operator calls. A12 punching is used for cases when a customer dials an access code (first digit) and then dials a one (second digit).

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When the C punching is assigned, the route series relay must be high resistance.

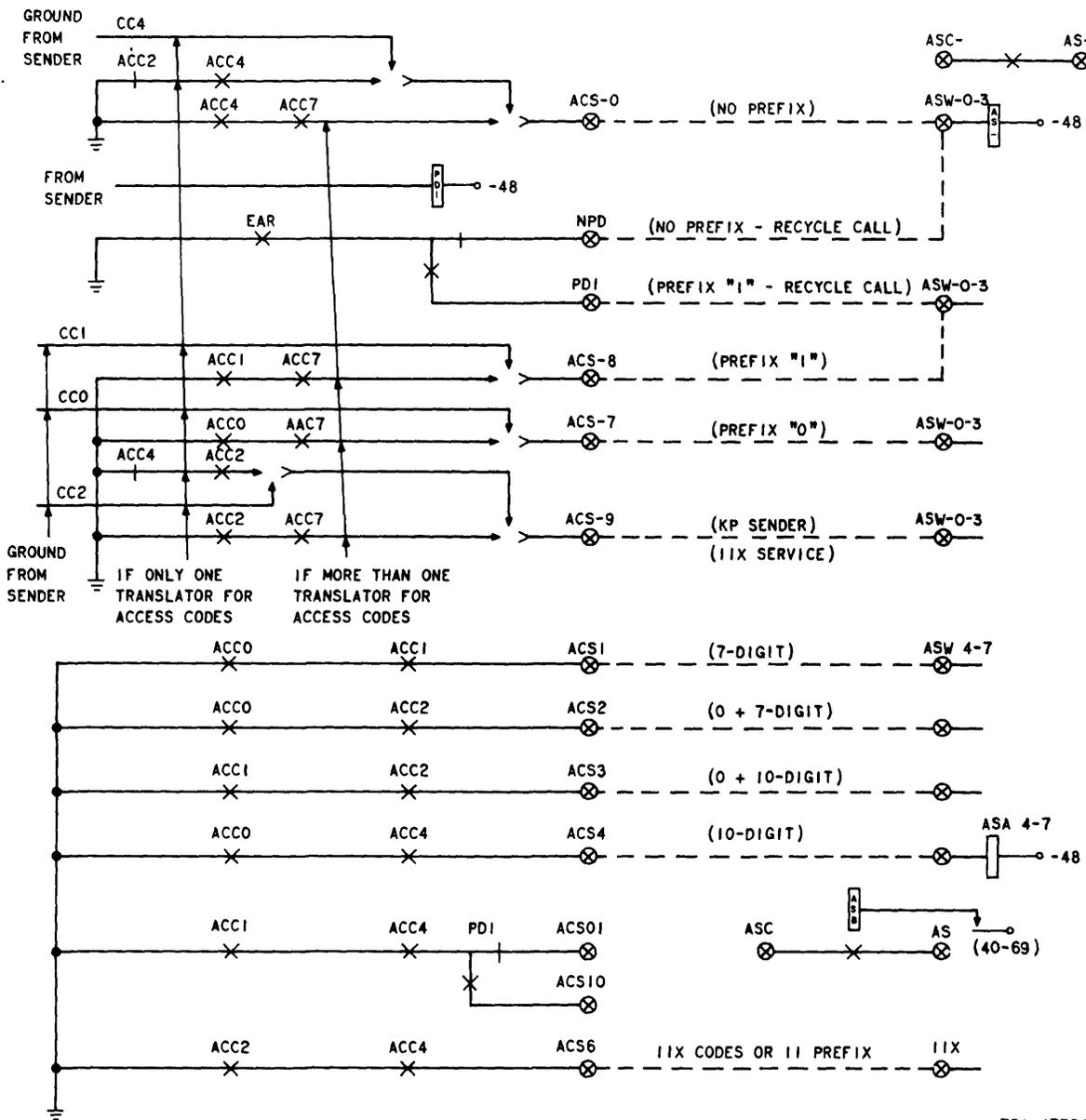
**4.227** AS (00-39) punchings are used for access code screening and are assigned to:

- (a) SC when the associated destination code is to be given different routing according to the originating class-of-service.
- (b) DRC or RRC to divert the call to operator, or to other route, as required for access code.

(c) KP, NC, OT, TC, Z (A-J) as required. See 4.97.

**4.228** ASW (0-3) punchings are assigned as shown in Fig. 25 to:

- (a) ACS7 for calls prefixed with access code 0.
- (b) ACS8 for calls prefixed with access code 1, if sender recycle is not required.
- (c) ACS9 for calls originating from keypulse operator.



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**Fig. 25—Access and Interchangeable Code Screening**

- (d) ACS0 for calls not requiring access code prefix and sender recycle is not required.
- (e) NPD for calls not requiring access code but sender recycle is required.
- (f) PD1 for calls prefixed with access code 1 and sender recycle is required.

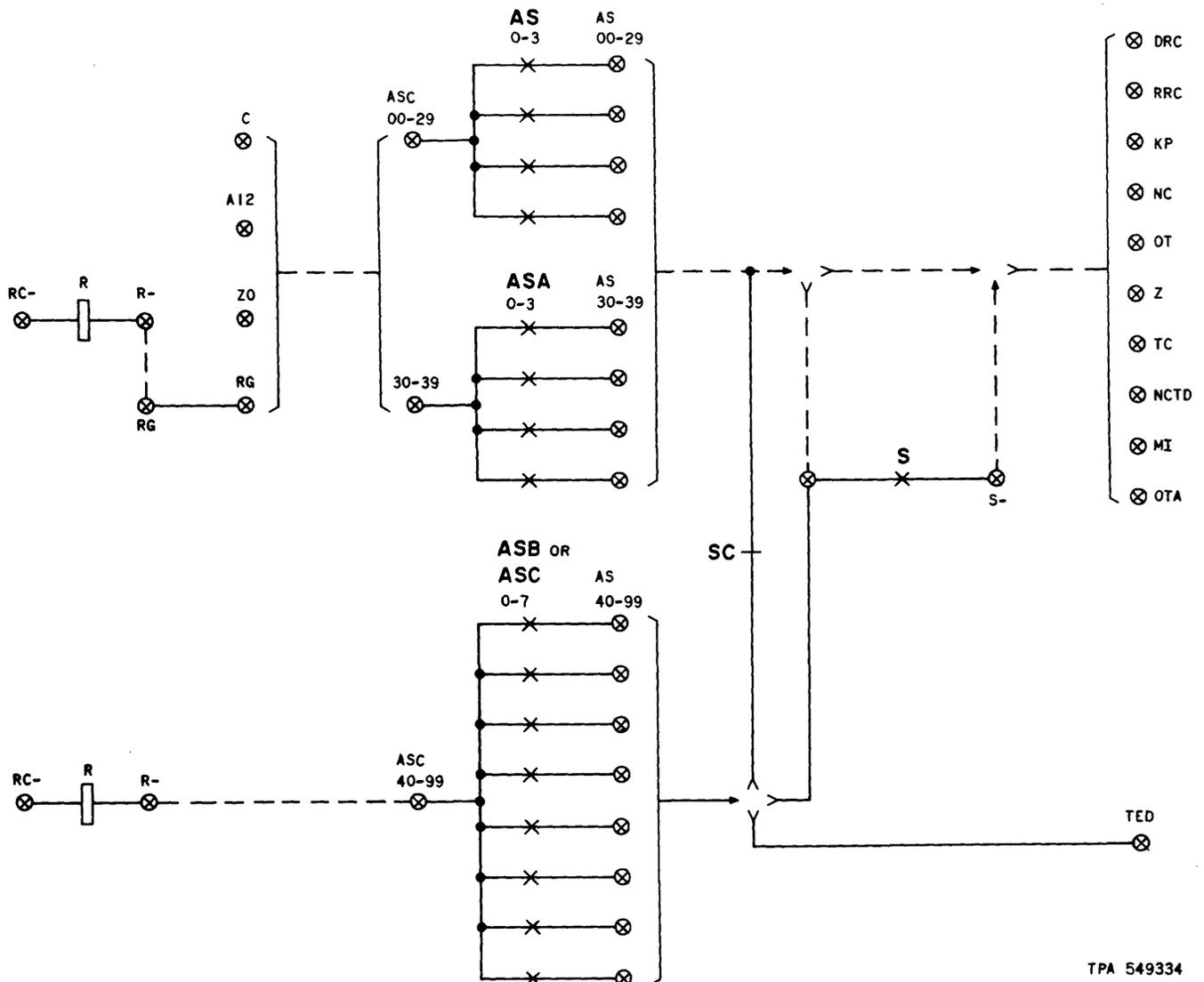
prefix codes 01 or 10 is required. These cross-connections provide connections to special routes as required.

**Interchangeable Code Screening Punchings**

**4.229** C (110-119) punchings are assigned to an RC or SC punching as determined locally. Access to the C (110-119) punching is provided by a cross-connection between ACS-6 and 11X punchings. (Fig. 24)

**4.231** For marker operation when one or more codes in the series 200-999 is used as both an office and an NPA code, access screening punchings AS (40-99) and associated punchings ASC (40-99) are provided. AS punchings are connected to individual contacts of screening relays ASB (0-7) and ASC (0-7). ASC punchings are connected to common contacts of these screening relays. (Fig. 26)

**4.230** ACS (01 or 10) punchings are assigned to RC or SC punchings when operation with



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**Fig. 26—Access and Interchangeable Code Screen**

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**4.232** ASC (40-99) punchings are assigned to R (route relay) punchings as required for interchangeable office and area code treatment.

**4.233** AS (40-99) punchings are used for interchangeable office and area code screening and are assigned to:

- (a) SC when the associated destination code is to be given different routing according to the originating class of service.
- (b) DRC or RRC to divert the call to operator or to other route as required for access code.
- (c) KP, NC, OT, Z, TC, NCTD, MI, or OTA as required. See paragraph 4.97.
- (d) TED when both office and area codes require the prefix digit one for routing or both are rerouted to tandem offices with TSP by the prefix 0.

**4.234** When punching TED is assigned, the associated EDR punching is cross-connected as shown in Fig. 27 to operate a route relay in ground supply three. The cross-connections for this route relay would be:

- |            |                                       |
|------------|---------------------------------------|
| R to TW    | CR to CR0S                            |
| OB to OB0P | SG to SG0S                            |
| OG to OG0S | SP to SPB                             |
| CL to CL0S | RA to J-INTC for overflow route relay |

**4.235** ASW (4-7) punchings are assigned to ACS (1-4) punchings as required for control of screening and translation of access and interchangeable codes.

**4.236** ACS (1-4) punchings are assigned to ASW (4-7) punchings to operate an ASA (4-7) relay as required. ASA-relays provide second seizure interchangeable code screening points.

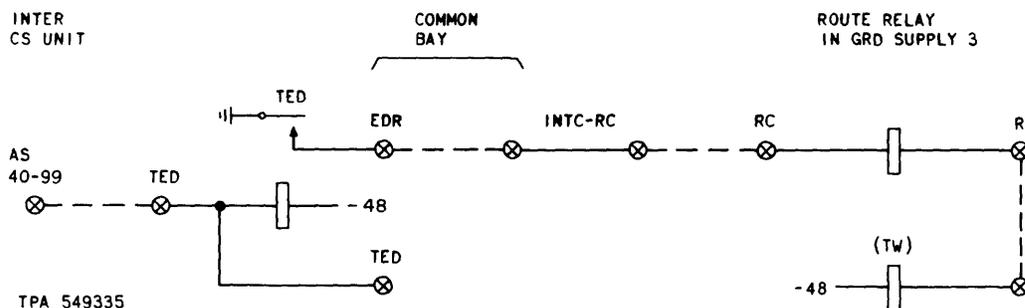
**4.237** DTF punching is used when the marker is arranged for coin service improvement (dial-tone-first). The DTF punching is cross-connected to a route relay in ground supply 3 for a special dial-tone-first announcement. The route relay is wired for operator direct class and no talking charge.

**5. METHOD**

**5.01** Before performing any work, remove the marker from service by inserting a make-busy plug into the DB jack at the originating trouble indicator frame. The code involved in the change should be tested in the marker by means of the originating trouble indicator before the marker is returned to service.

**5.02** Care should be exercised in planning and performing all cross-connection operations to avoid service interruptions. When soldering connections on the ST terminals, avoid crossing punchings in order to prevent originating trouble indications and office link frame CH alarms.

**5.03** When cross-connecting new route relays, place the code point to route relay winding



**Fig. 27—TED, EDR Cross-Connections**

jumper after all other work is done. This permits returning the marker to service promptly in the event of an emergency. Route relays may be prewired and tested with the proper code when the change is to be effective at a later date. However, the old arrangement should be restored and tested before replacing the marker in service. When testing with the originating trouble indicator frame, employ odd and even district frame numbers, all classes of service, and all ground supply groups. After a change is effective and all markers have been replaced in service, test all senders in a period of light traffic using the code involved in the change.

**5.04** When a new trunk group is added or existing trunk groups are rearranged, a trunk loading test should be made during a period of light traffic. This is made by originating calls through a single marker to each trunk in the group or subgroup. At the completion of each test, the trunk is made busy after it has been determined that the working trunks are being seized in order from either end of the group. After all trunks in the original direct route are busy, a call is made to check for stepping

to the alternate route, if provided, or to the overflow trunk group. The other markers are then tested one at a time on the all-trunk-busy condition. The group-start and group-end trunks are restored to service and the other markers are checked to determine that these trunks are seized. The trunks are then restored to service. This procedure tests the markers, traffic registers, and trunks and will reveal cross-connection or assignment errors which are not revealed by OGT or trouble indicator tests.

**5.05** It is important that on the completion of any change, one call through each marker should be made to the verification operator so that the office designation may be verified.

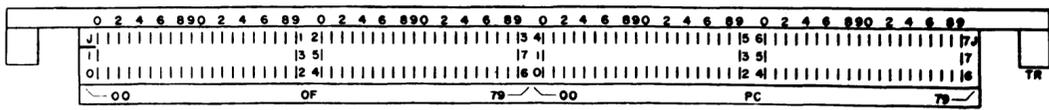
**5.06** The method of running cross connections and placing straps on the originating marker frame is covered in Section 216-712-801.

## **6. RECORDS**

**6.01** Any required record of changes in cross connections should be entered on the proper form.

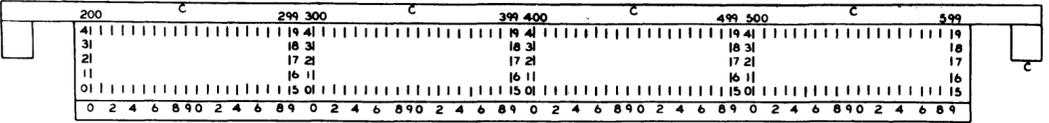
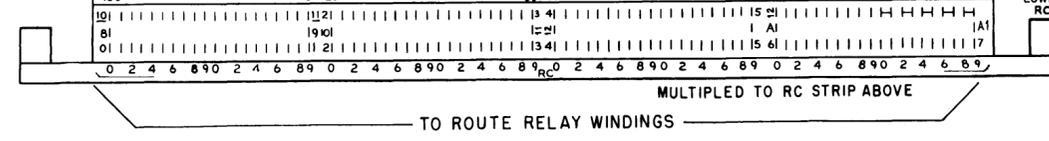
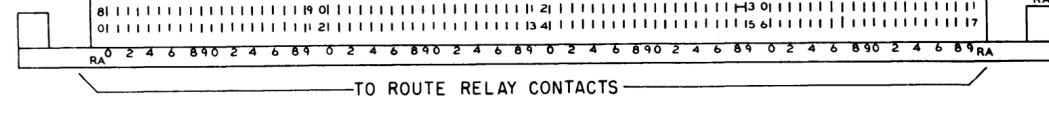
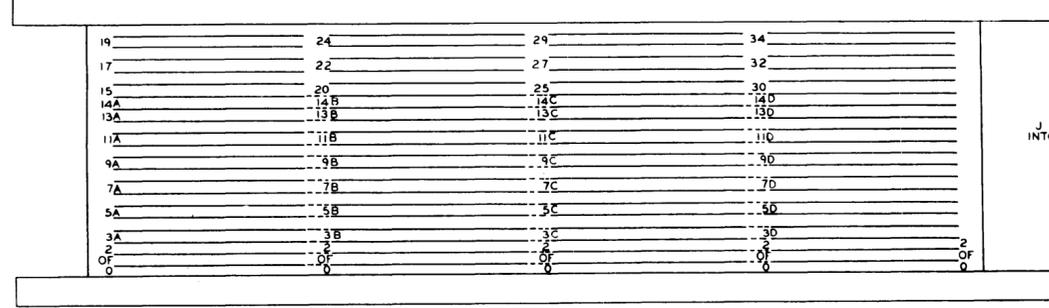
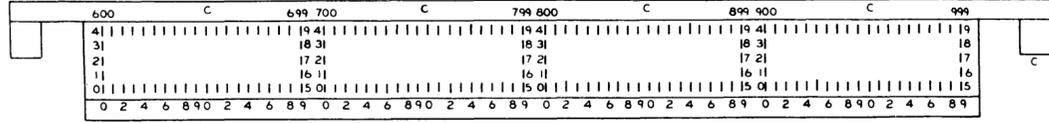
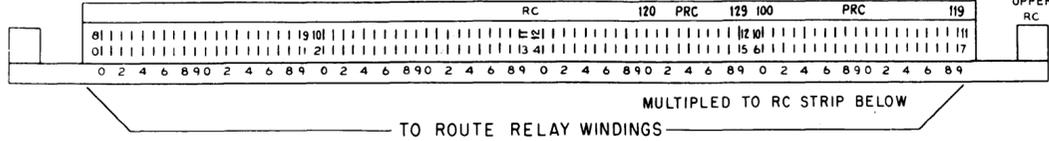
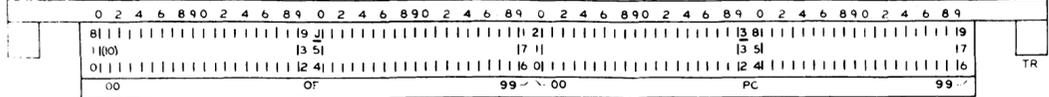
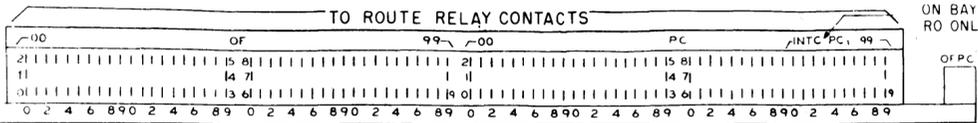
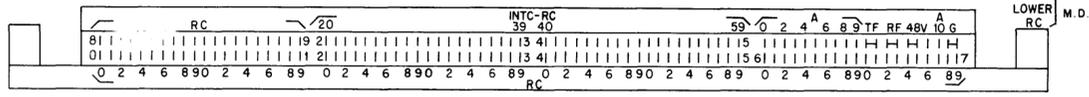






XTS ON ROUTE RELAY BAY  
(SEE NOTE)  
A & M ONLY  
SK.C

PRIOR TO ISSUE 26D, THE ARRANGEMENT ON THE XTS "TR" ON REGULAR ROUTE RELAY BAY WAS AS SHOWN ON SK "c"



GC 0 TO 29 OF GP  
RELAYS ASSOCIATED WITH  
GP-0's 0 TO 29 AND GP-1's  
0 TO 29 ON GP STRIP ON  
COMMON BAY

GC 30 TO 38  
ASSOCIATED WITH  
ROWS 0 TO 8 OF G. TERM. STRIP  
ON COMMON BAY

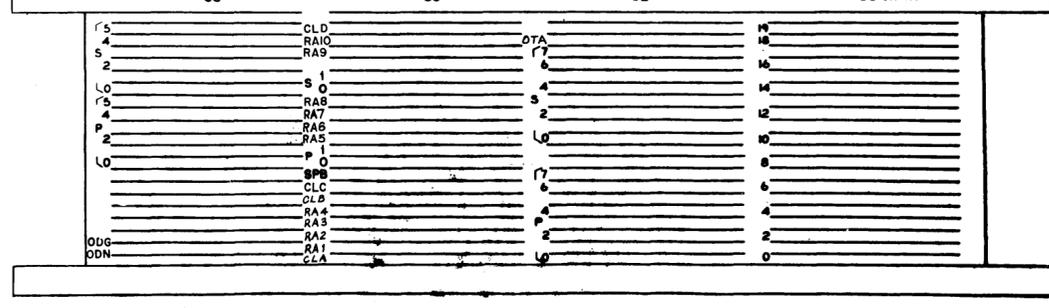
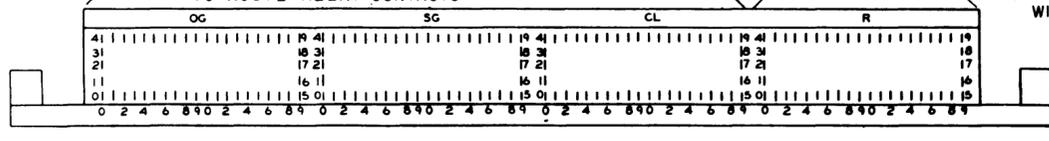
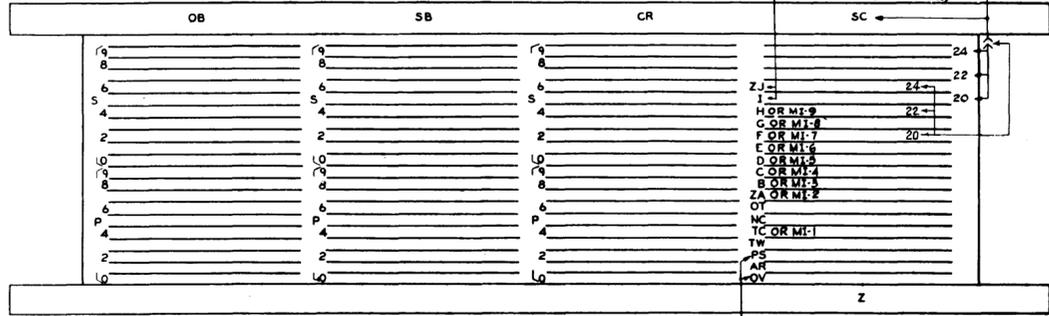
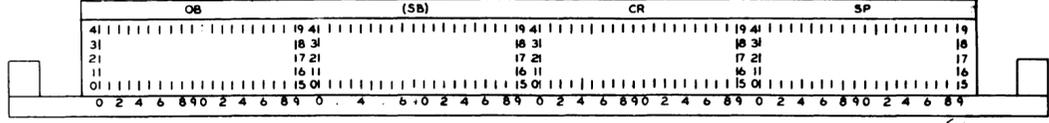
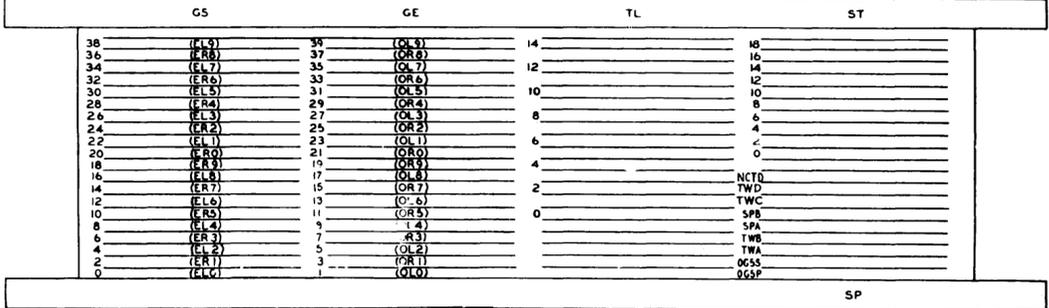
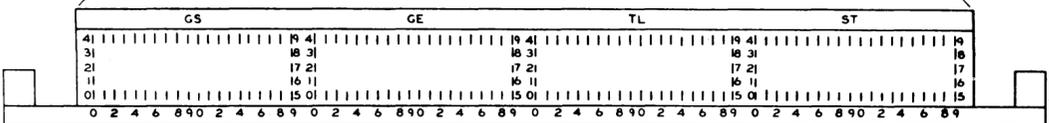
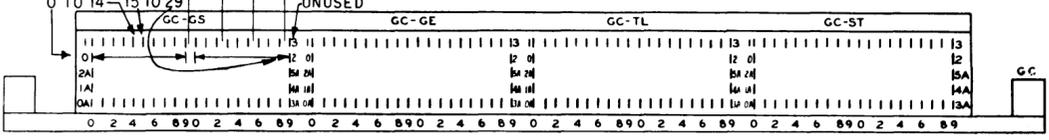
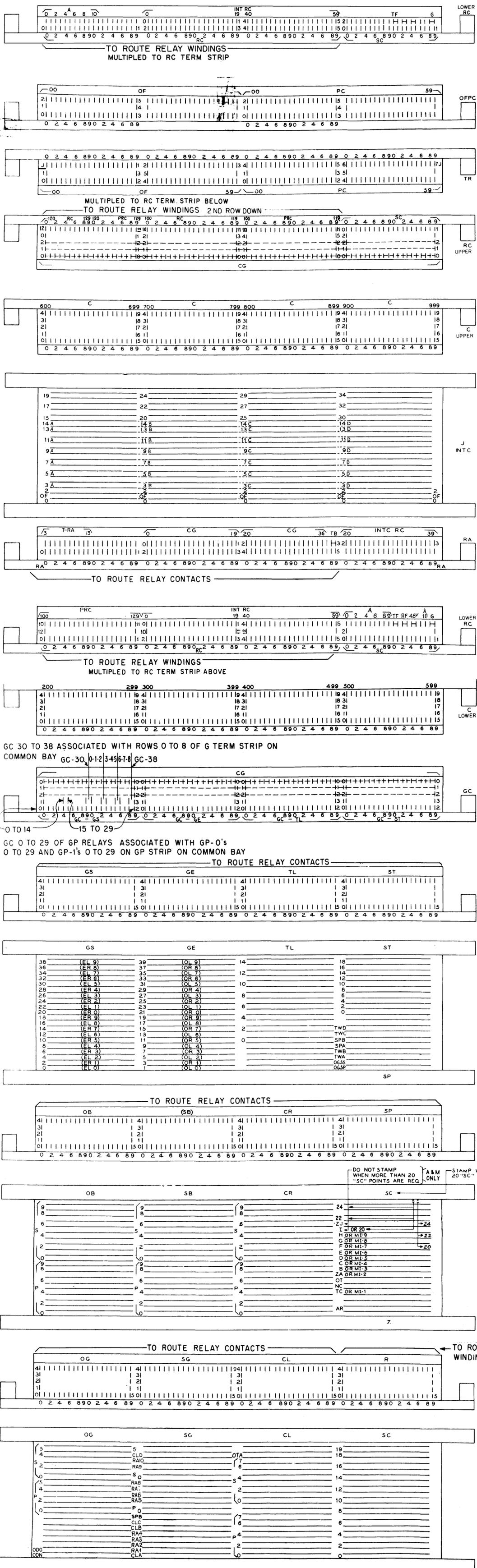


Fig. 29—Route Relay Bay



ROUTE RELAY BAY R8

THE EQUIPMENT FOR ROUTE RELAY BAY R8 IS REQUIRED FOR BAY R8 ONLY. FOR ALL OTHER ROUTE RELAY BAYS THE EQUIPMENT IS AS SHOWN ABOVE THE HEADING "ROUTE RELAY BAY." FIG. 24

ON ROUTE RELAY BAY R9 OR HIGHER THE INTC-RC PUNCHINGS 0-19 ON XTS (RA) SHALL HAVE NUMBERS 20-39 AND INTC-RC PUNCHINGS 20-39 ON LOWER XTS (RC) SHALL HAVE NUMBERS 0-19 TO AGREE WITH BAY 8

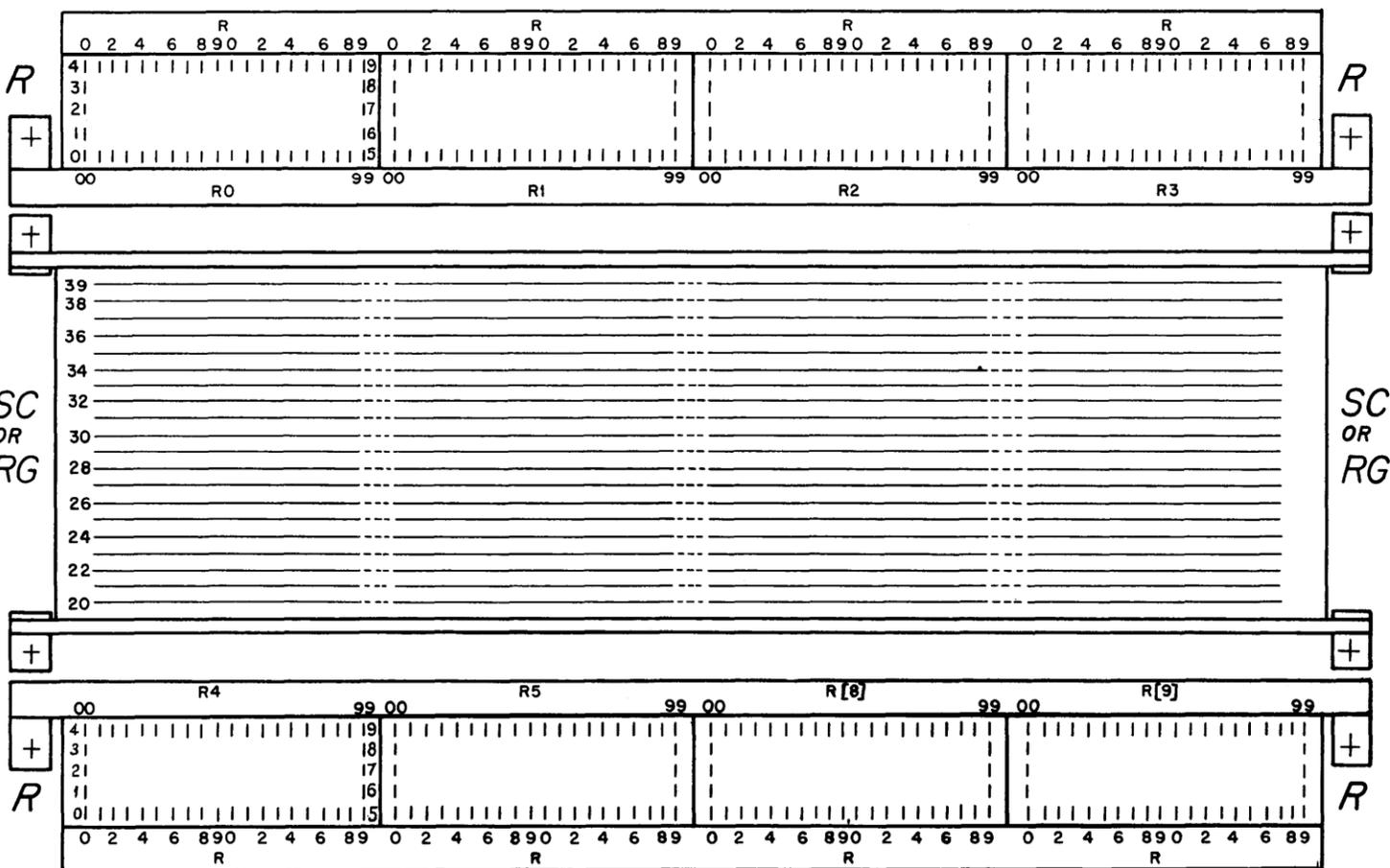
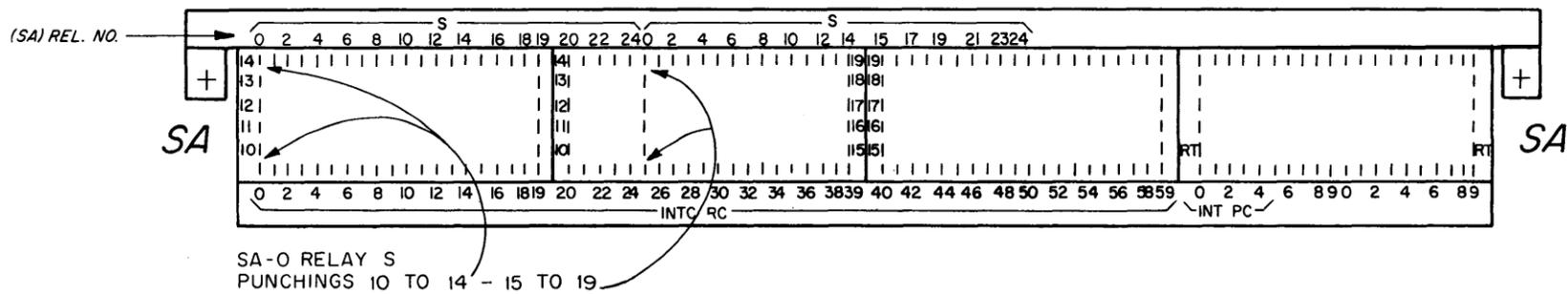
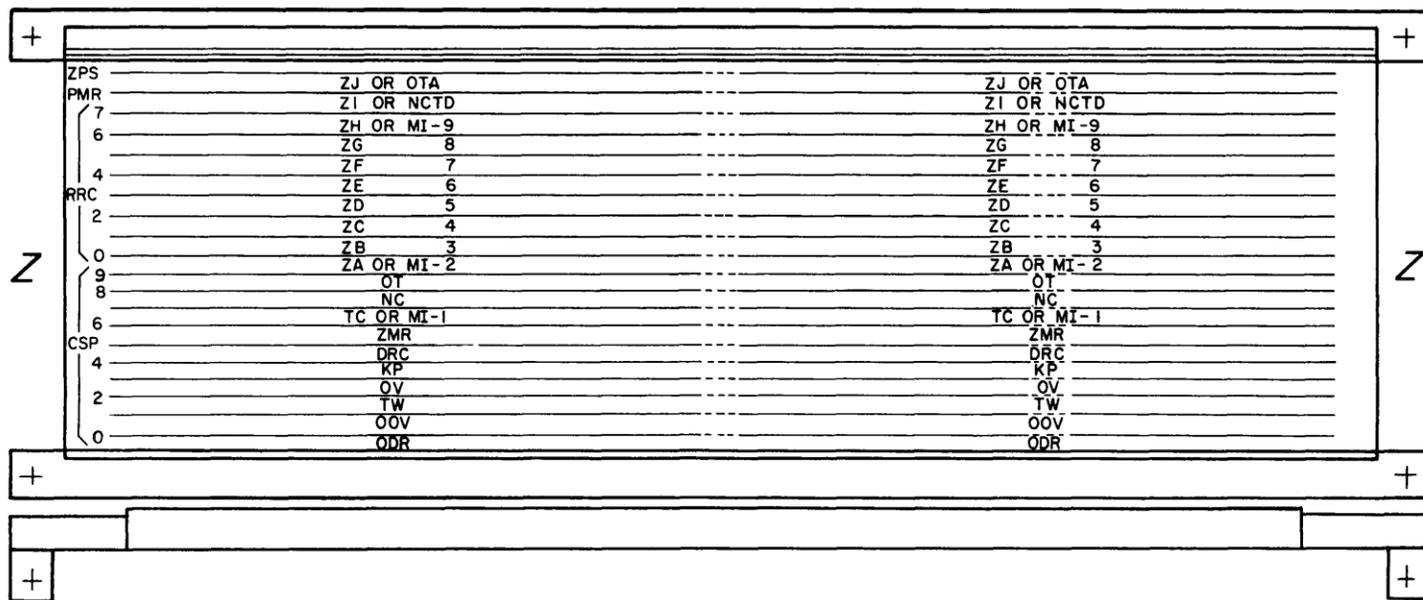
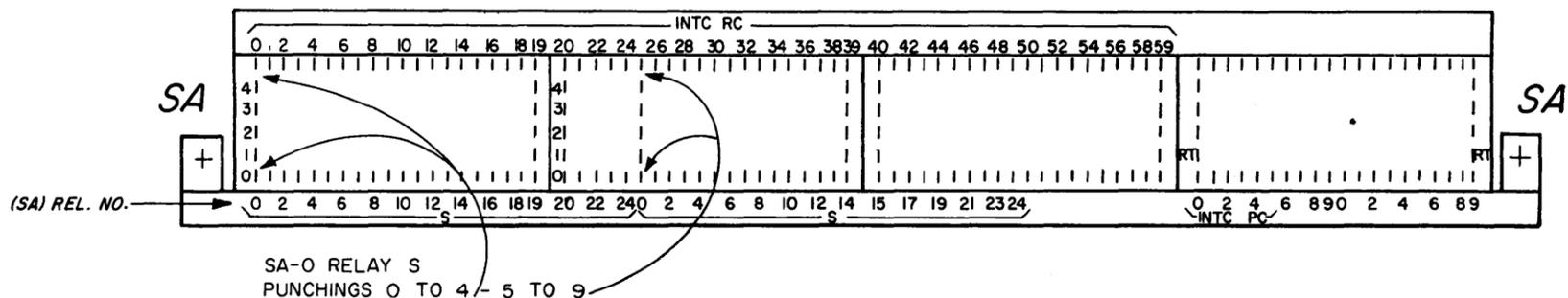


Fig. 31—Cross-Connecting Facilities for One Originating Marker Class-of-Service Frames

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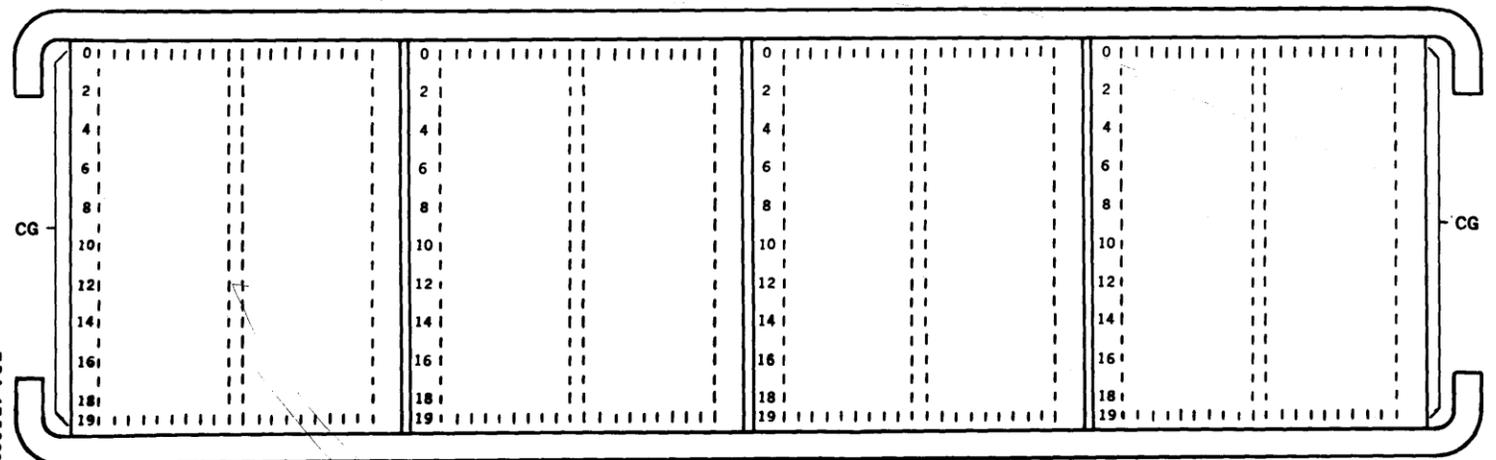
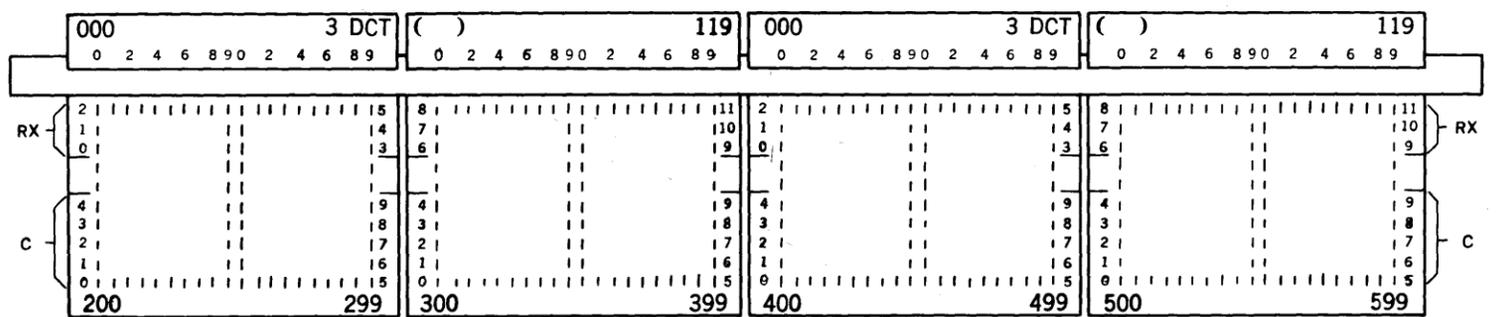
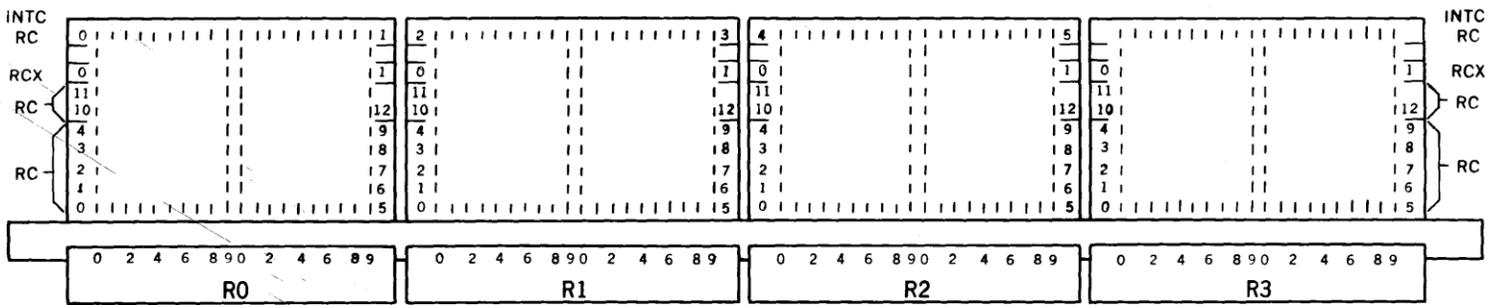
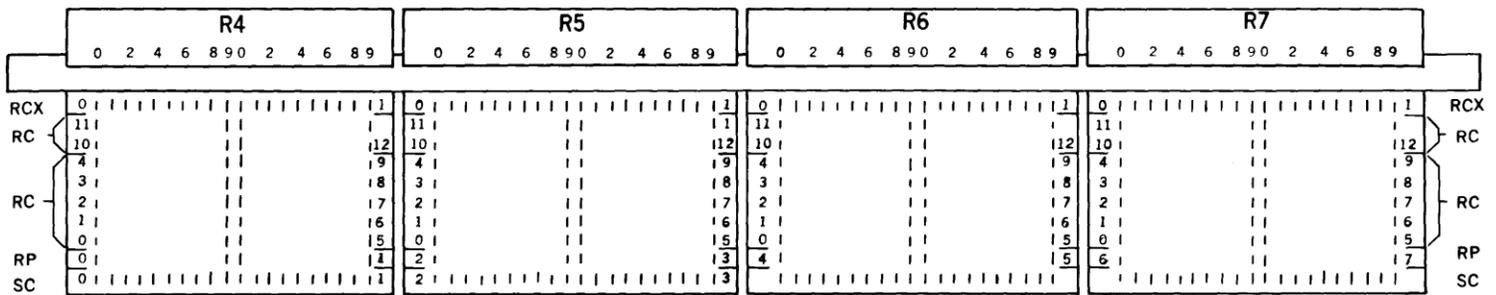
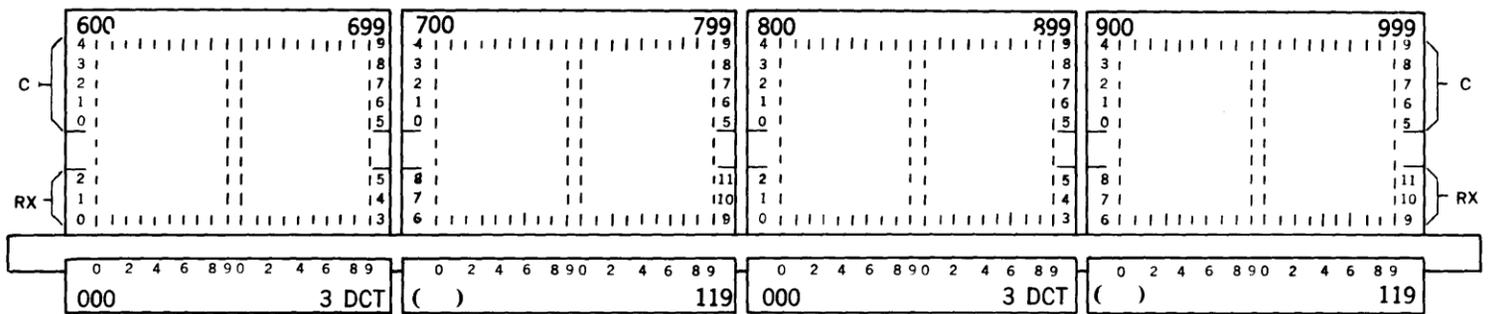
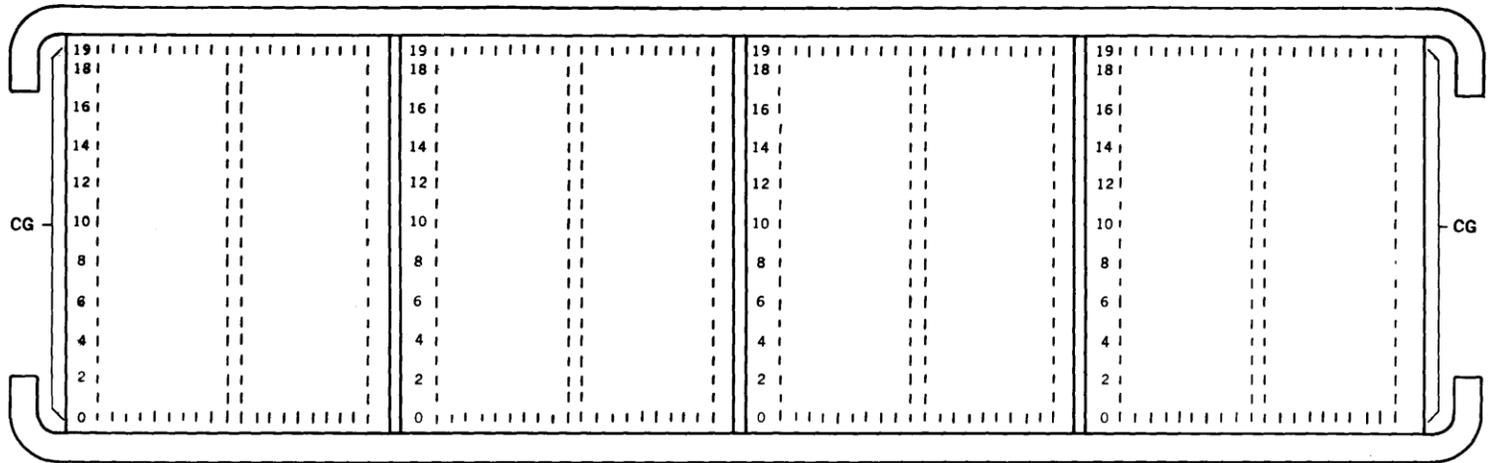


Fig. 32—3-Digit Individual Translator (3 DIT)

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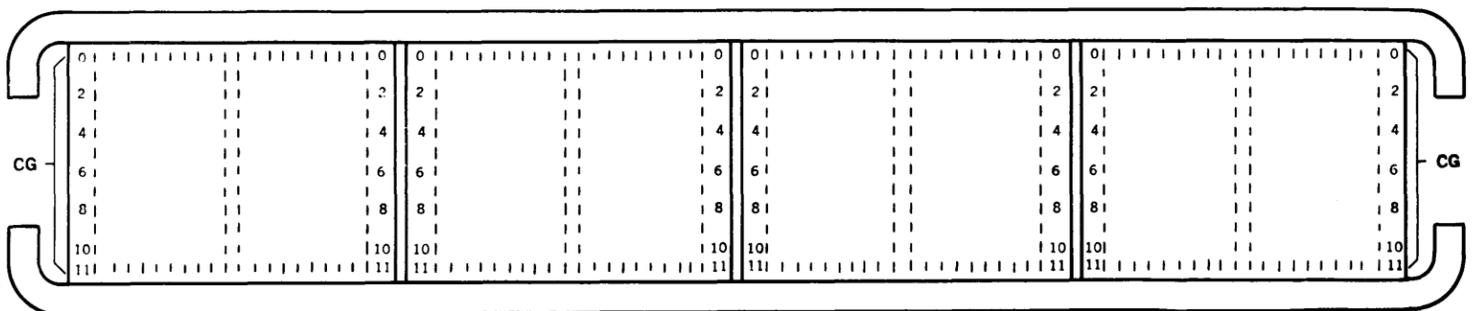
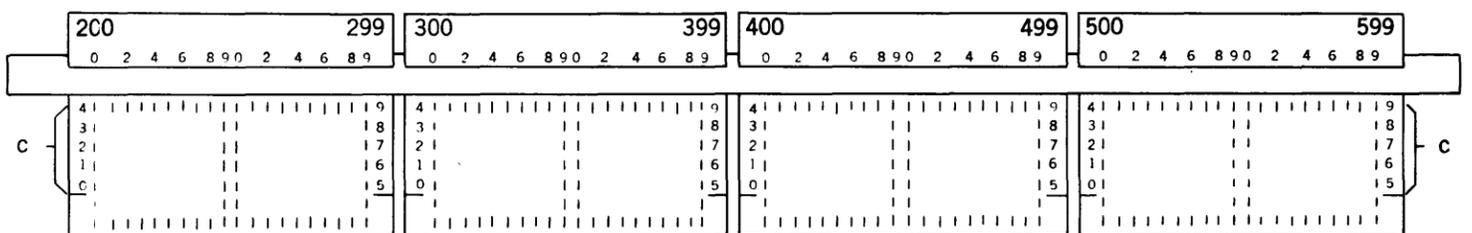
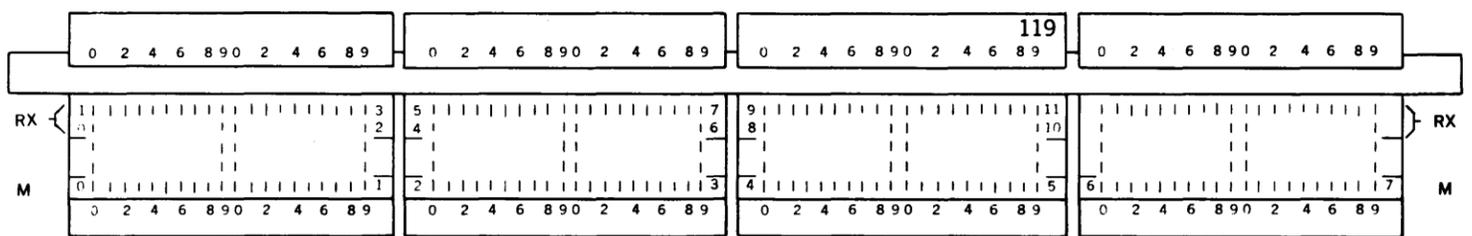
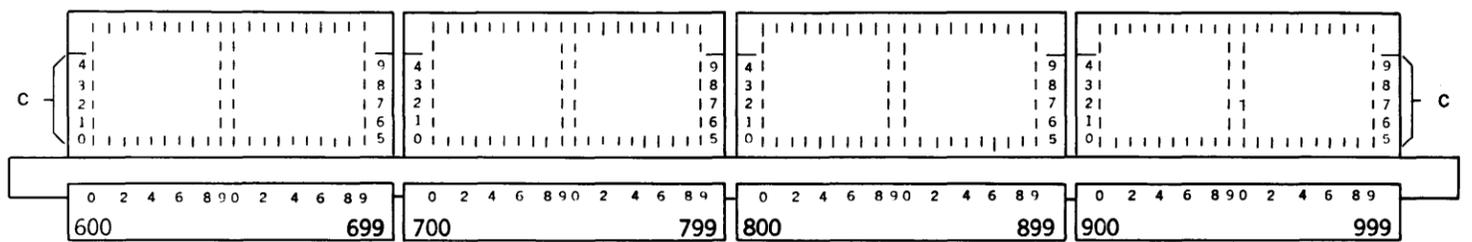
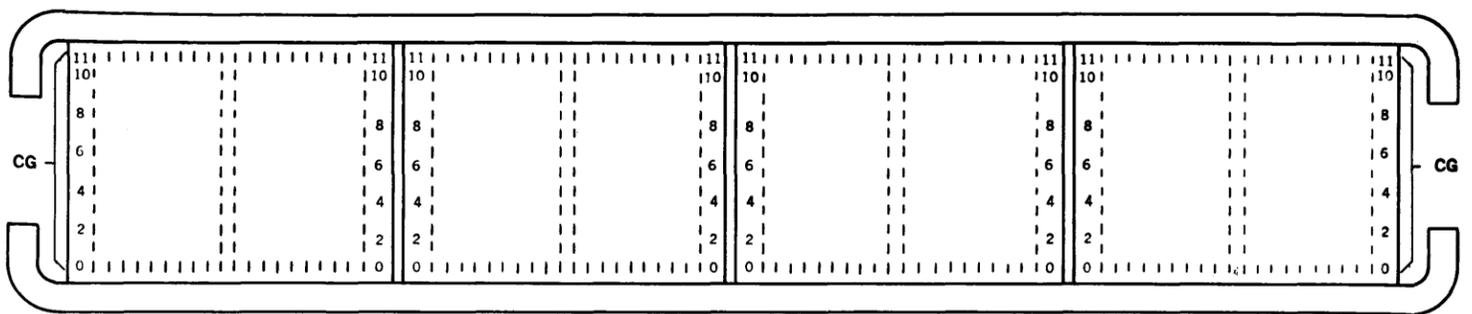
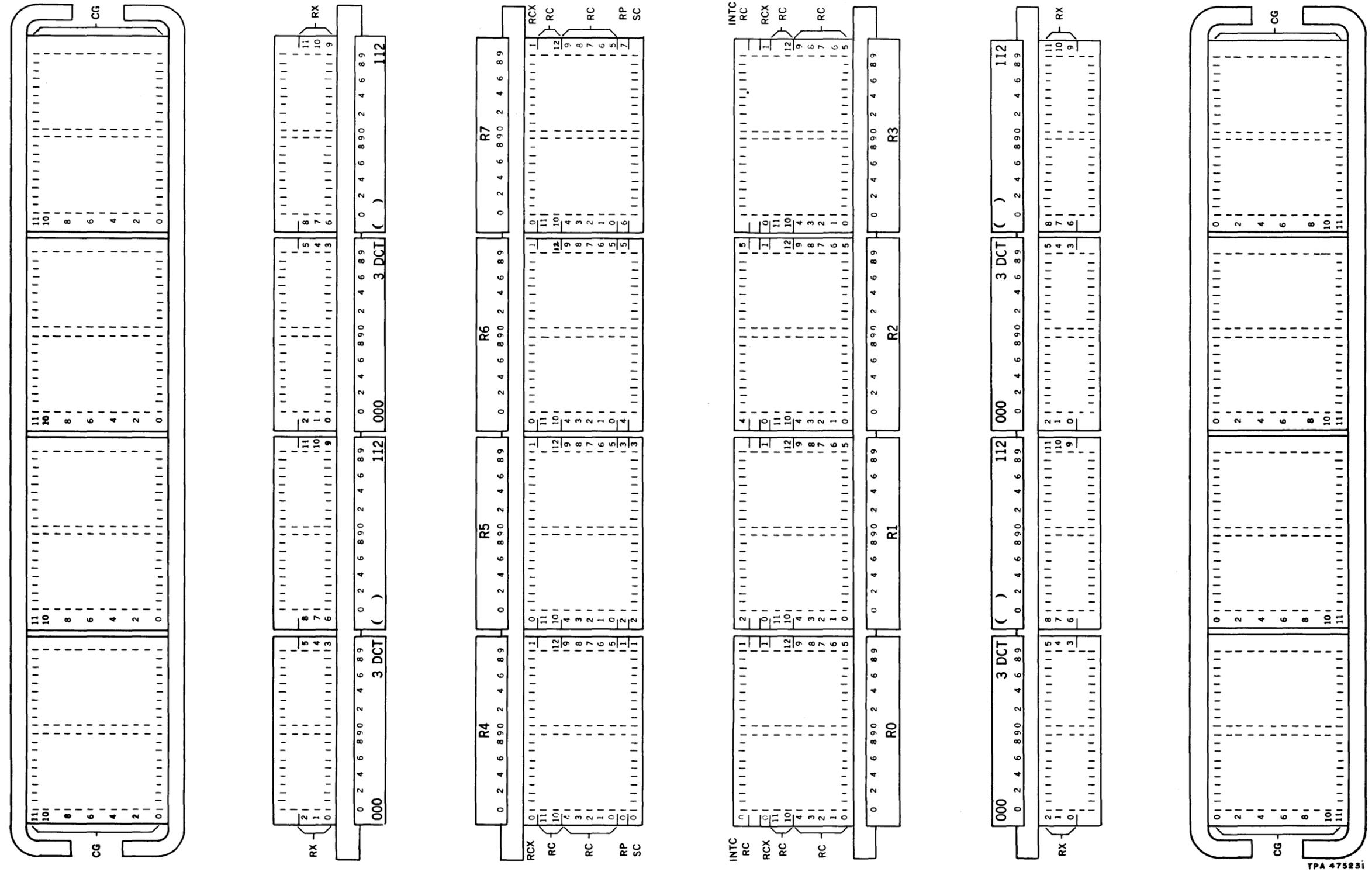


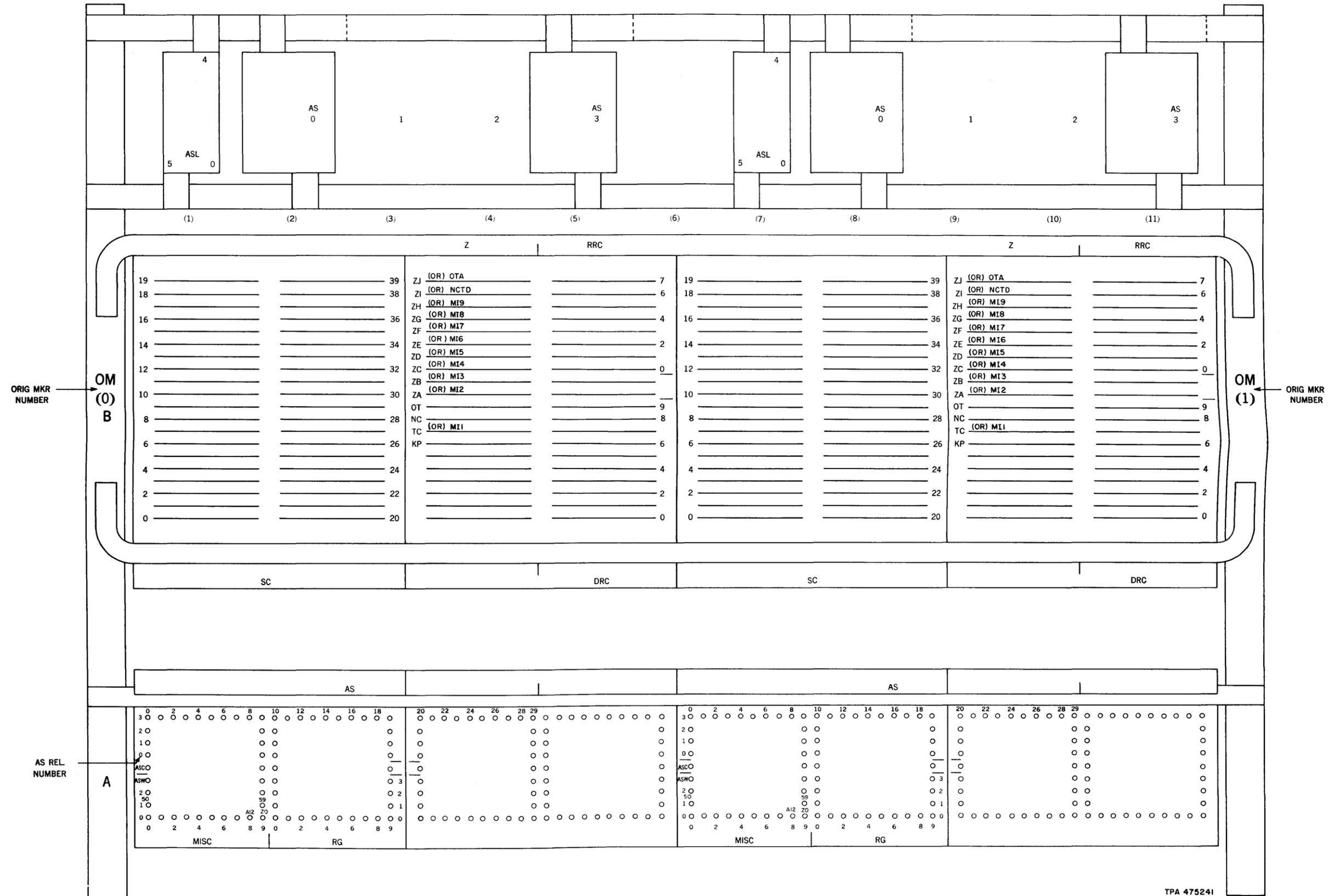
Fig. 33—3-Digit Common Translator (3-DCT)

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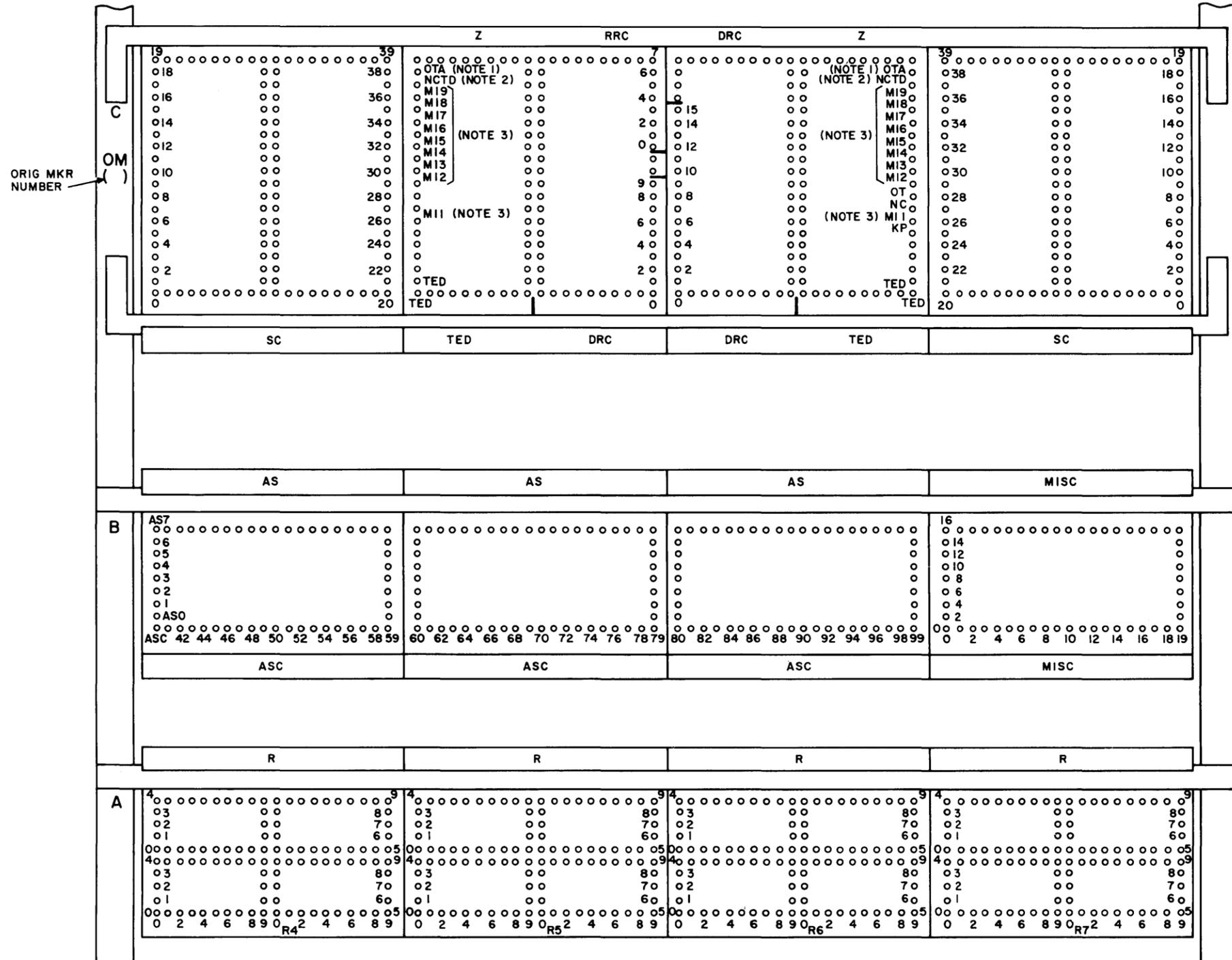
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Fig. 34—Route Grouping Frame (RG)



TPA 475241

Fig. 35—Access Code Unit



- NOTES:  
 1. DIVERSION OF RESTRICTED TRAFFIC OR AMA FEATURE REQUIRED.  
 2. DIVERSION OF RESTRICTED TRAFFIC REQUIRED.  
 3. OFFICE ARRANGED FOR AMA.

TPA 549336

Fig. 36—Interchangeable Code Screening Unit