

DECODER CROSS-CONNECTIONS

PANEL OFFICES

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1. GENERAL

1.01 This section describes the method of assigning decoder cross-connections in panel offices. It is intended for use in connection with changes required by the addition of new offices or by changes in treatment or routing of calls to existing offices. Information is included regarding the functions of the various cross-connections and the method of determining the proper assignments to be made to transmit to the senders the information required for the various codes.

1.02 This section is reissued to include cross-connection information for a new dialing plan arrangement which provides the interchangeable codes feature under prefix control.

1.03 Cross-connecting information for 3-digit translator frames is covered in the schematic drawings as follows:

- (a) 3-digit individual translator (3DIT), SD-96535-01
- (b) 3-digit common translator (3DCT) and route grouping frame (RG), SD-96530-01.

1.04 Each decoder has its individual cross-connecting equipment. The cross-connections for all decoders in a group should be identical or the decoder test frame will block when making the all codes test.

1.05 The decoders are arranged so that with the proper cross-connections:

- (a) Calls for any code which may be dialed by a customer or operator, or keyed by an operator, will be directed to the proper destination and the district selector will be set in the talking position required.
- (b) Calls on which dialing is not started within the allowed time will be routed to permanent signal holding trunks.
- (c) Calls for the special service operator may be routed to a single group of trunks for all customers or to different groups for different classes of customers.
- (d) Calls for the long distance operator may be routed to a single group of trunks for all customers or to different groups for different classes of customers.
- (e) If required, different classes of service may be given different treatment when dialing the same office code, extended area code, or foreign area code. In such cases, for a given code the decoder may provide one charge condition

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for one class of service and another charge condition for another class of service, or it may provide a substitute routing to the special service operator or reorder for a class of service not permitted dialing privileges to the code.

(f) When the charges for zone calls are registered by remote control over crossbar tandem trunks for one class of service and are controlled locally for another class of service, the special route relay or the zone reroute feature may be provided for routing the call for the local charge class.

(g) When coin class customers are permitted to dial calls to points outside the local charge zone, a routing via dial coin zone outgoing trunks is provided for coin classes.

(h) Calls on which a keypulsing operator keys digit 1 in error for the first digit will be treated as if 0 were keyed, and the operator will receive the reorder signal.

(i) Where the senders are equipped with the 1-1 prefix feature, calls to an extended area zone may be dialed directly by the customer using the 1-1 prefix. The operation of the H relays in the decoder is canceled and the call is routed through a tandem office.

(j) A feature is provided whereby extra charge calls dialed over PBX trunks arranged for toll diversion are diverted to the PBX operator.

(k) Some classes of customers will be able to dial station-to-station calls to points outside their local or extended area by use of foreign area codes (X0X or XIX).

(l) If required, the decoder may be arranged to send information to the subscriber sender causing it to engage an auxiliary sender for multifrequency (MF) outpulsing of 4, 5, 7, or 8 digits.

(m) DDD calls to adjacent numbering plan areas may be routed directly from the local office if 3-digit translators are provided.

(n) Only one route relay is required to route calls to either the A or B office of a common trunk group to a crossbar office if CPA and CPB punchings are provided.

(o) A peg count of an individual code point or a number of code points that have the same routing is possible if the feature is provided.

(p) To prevent a stuck sender condition on second trial decoder time-outs, the second trial indication is registered in the decoder and failures are routed to the busy trunks group or assistance operator, as required.

(q) The decoder is arranged to screen prefix 0 (special toll call) and route call to traffic service position (TSP) or traffic service/position system (TSPS).♦

(r) The decoder is arranged to screen prefix 1 (station-to-station toll call) and route call direct via CAMA or TSP tandem or via TSPS.

(s) ♦The decoder is arranged to recognize the following three digits after prefix 1 or 0 as an NPA code for 10-digit calls. The same three digits without the prefix 1 or 0 will be recognized as a central office code for a 7-digit call.♦

1.06 The decoder originating frame provides a maximum of 285 route relays, 20 service group relays, and 18 service relay common contacts. If additional route relays or service relay common contacts are required, a decoder supplementary frame is provided.

1.07 Supplementary frames may provide a maximum of either 300 additional route relays or 240 additional route relays, 18 additional service relay common contacts, and 20 zone reroute relays. A maximum of two supplementary frames may be provided.

1.08 For convenience in making assignments and cross-connections, the office codes are considered by groups, each group differing in the type of treatment accorded one or more classes of service.

1.09 The assignments, together with the associated data, should be entered on the proper form. Fig. 1, 2, and 3 show various typical forms which are used to record cross-connection information. This information should be corrected as required to agree with changes in cross-connections made from time to time as a result of changes in the routing of codes or other information.

DECODER CROSS-CONNECTIONS - ROUTE RELAY CHART										UNITS 1 AND 2		DIAL OFFICE		DATE 1-3-51								
ROUTE RELAY (R TERM)	CODE PT. OR CG TERM.	OFFICE CODE GROUP	E TERM. CONN.	TRANSMITTING RELAY CONNECTIONS						ROUTE RELAY (R TERM)	CODE PT. OR CG TERM.	OFFICE CODE GROUP	E OR ZE TERM. CONN.	TRANSMITTING RELAY CONNECTIONS								
				CL	CR	DB	DG	OB	OG					CL	CR	DB	DG	OB	OG			
R (SG) 1	VAG.CODE (SUB)	FOR CONNECTION OF SC TERMS TO SERVICE REL. INDIVIDUAL TERMS. SEE FIG. 6		4-S	9-S	1-S	0-S	6-P	3-P	76	476	5	03	0-S	1-P	3-P	5-P	9-P	4-S			
2	VAG.CODE (OPR)			4-S	9-S	1-S	0-S	5-P	3-P	77	477			0-S	4-P	0-P	3-P	6-P	0-S			
3	0			4-S	9-S	3-S	3-S	5-P	5-S	78	777,866			0-S	1-P	0-P	3-P	6-P	0-S			
4	0			4-S	9-S	0-S	0-S	7-P	0-P	79	278			3-S	1-S	3-P	5-P	2-S	3-S			
5	0			4-S	9-S	2-S	0-S	7-P	3-S	80	682			3-S	1-S	2-P	5-P	7-S	1-P			
6	0			4-S	9-S	2-S	0-S	7-P	0-P	81												
7	SUB.RT. TO OPR.			1-S	9-S	3-S	3-S	5-P	5-S	82												
8	SUB.RT. TO OPR.			1-S	9-S	0-S	0-S	7-P	0-P	83	283			10	06	0-S	1-S	1-P	7-P	8-P	3-S	
9	SUB.RT. TO OPR.			1-S	9-S	2-S	0-S	7-P	0-P	84	584					3-S	3-S	1-P	7-P	6-S	0-S	
10	LONG DIST.			4-S	9-S	4-S	8-S	5-P	5-S	85	587			5	03	0-S	2-S	2-P	7-P	9-P	0-P	
11	SUB.RT TO OPR.			1-S	9-S	2-S	0-S	7-P	3-S	86	264,684					0-S	0-P	0-P	3-P	7-P	4-S	
12	CZD SD C 15 $\frac{1}{2}$			2-S	4-S	1-S	5-P	6-P	0-P	87	784			5	03	0-S	4-P	3-P	5-P	5-P	4-S	
13	CZD SD D 15 $\frac{1}{2}$			2-S	4-S	1-S	5-P	1-P	0-P	88	585					3-S	6-S	2-P	3-P	0-S	3-S	
14	EA			2-S	4-S	1-P	0-P	7-P	0-S	89												
15	SUB.RT. TO OPR.			4-S	9-S	3-S	0-S	7-P	5-S	90	789						0-S	1-S	1-P	5-P	6-P	0-S
16	CG17			2-S	7-S	0-P	3-S	0-P	5-S	91	787			8	05	0-S	2-P	3-P	7-P	6-P	4-S	
17										92	288					0-S	2-P	3-P	7-P	7-P	2-P	
18										93	289						0-S	1-S	3-P	7-P	9-P	0-P
19										94												
20										95												
R 21	622,779	3	02	0-S	4-P	1-P	0-S	5-P	0-P	96	291,299	1	20	4-S	9-S	1-S	0-S	8-P	3-P			
22	423			3-S	7-S	4-P	6-S	0-S	5-S	97	292			4-S	9-S	1-S	0-S	9-P	2-P			
23	523			3-S	4-S	1-P	0-S	3-S	3-S	98	293			4-S	9-S	0-S	0-S	7-P	3-P			
24	624			0-S	2-P	1-P	3-P	8-P	2-P	99	294			4-S	9-S	2-S	0-S	7-P	3-P			
25	626			0-S	4-P	2-P	0-S	7-P	2-P	100												
26	628	3	02	3-S	5-S	4-P	0-P	7-S	1-P	101	CG1	10	06	2-S	4-S	1-P	0-P	2-S	0-S			
27	629			0-S	1-P	4-P	0-P	6-P	1-P	102	CG2			2-S	4-S	1-P	0-P	7-S	0-S			
28	275			3-S	4-S	1-P	0-S	8-S	0-S	103	CG3			2-S	4-S	1-P	0-P	7-P	0-S			
29	332			3-S	9-S	1-P	3-P	2-S	0-S	104	CG4			2-S	4-S	1-P	0-P	2-P	0-S			
30	433			0-S	7-P	3-P	5-P	7-P	0-S	105												
31								106	CG5	9	05	2-S	4-S	1-P	0-P	2-S	0-S					
32								107	CG6			2-S	4-S	1-P	0-P	7-S	0-S					
33								108	CG7			2-S	4-S	1-P	0-P	7-P	0-S					
34								109	CG8			2-S	4-S	1-P	0-P	2-P	0-S					
35								110														
264		5	03							535(ZR15)												
265												536(ZR16)	KNICK TAND	Z-2	2-S	4-S	1-P	0-P	7-P	0-S		
266	269					0-S	1-P	0-P	3-P	8-P	1-P	537(ZR17)	KNICK TAND	Z-2	2-S	4-S	1-P	0-P	2-P	0-S		
267	274					0-S	4-P	1-P	5-P	5-P	0-S	538(ZR18)										
268	374					3-S	1-S	1-P	5-P	8-S	0-S	539(ZR19)										
269	674					3-S	1-S	2-P	5-P	5-P	0-S	540(ZR20)										
270	475			0-S	1-S	1-P	5-P	6-P	1-P													

Fig. 2—Typical Route Relay Chart

DECODER CLASS OF SERVICE AND CHARGE CHART															
UNITS 1 & 2				OFFICE				DATE 11-8-50							
SERVICE RELAY COMMON TERM.	SERVICE RELAY COMMON TERMINAL CROSS-CONNECTED TO			SDR. LINK IND.	GRP. FT	1	1	1	1	2	2	2	2	3	
	CODE POINT FOR A SERVICE GROUP (O, LD, VC, RC, ETC.)	"E" TERM. OF ROUTE RELAYS IN OFFICE CODE GROUP NO.	"F" TERM. OF BL RELAY NO. (EARLY DECODERS)	CLASS OF SERVICE	FR	FLAT RATE UNIT 1	MESS. RATE UNIT 1	COIN PUB. UNIT 1	COIN SEMI-PUB. UNIT 1	FLAT RATE UNIT 2	MESS. RATE UNIT 2	COIN PUB. UNIT 2	COIN SEMI-PUB. UNIT 2	K.P. OPR.	
					FR	1	2	3	4	5	6	7	8	K	
C1	0		—	A1		SG3	SG3	SG3	SG4	SG5	SG3	SG3	SG6	SG2	SA
C2		3	—	A2		Z0	Z1	Z1	Z1	Z0	Z1	Z1	Z1	Z0	
C3		5	—	A3		Z1	Z1	Z1	Z1	Z2	Z1	SG9	SG9	Z0	
D1	LD			B1		SG10	SG10	SG10	SG10	SG10	SG10	SG10	SG10	SG2	
D2		4		B2		Z2	Z1	SG7	SG8	Z1	Z1	Z1	Z1	Z0	
D3	9			B3		SG1	SG1	SG1	SG1	SG1	SG1	SG1	SG1	SG2	
C4		6	—	A4		Z2	Z1	SG7	SG8	Z2	Z1	SG7	SG9	Z0	SB
C5		8	—	A5		Z1	Z1	Z1	Z1	Z2	Z2	SG7	SG9	Z0	
C6		10	—	A6		Z2	Z1	SG7	SG8	Z2	Z2	SG7	SG9	Z0	
D4		7		B4		Z2	Z2	SG7	SG8	Z2	Z2	SG7	SG9	Z0	
D5		9		B5		Z2	Z2	SG7	SG8	Z3	Z3	SG7	SG9	Z0	
D6	RC			B6		SG7	SG7	SG7	SG8	SG11	SG7	SG7	SG9	SG2	
C7		11	—	A7		SG7	Z2	SG12	SG12	SG11	ZR16	SG12	SG12	Z0	SC
C8		12	—	A8		SG7	Z2	SG13	SG13	SG11	ZR17	SG13	SG13	Z0	
C17	EA			A17		SG14	SG14	SG15	SG15	SG14	SG14	SG15	SG15	SG2	SF
C18	XOX or XIX			A18		SG16	SG16	SG15	SG15	SG16	SG16	SG15	SG15	SG2	
D17				B17											
D18				B18											

Fig. 3—Typical Decoder Class-of-Service and Charge Chart

1.10 Cross-connection work should be planned in order to avoid the possibility of delaying service. Since it is necessary to remove one or more decoders from service for a period of time to perform this work, the work should be coordinated with any related distributing frame cross-connection work and the subsequent tests.

2. METHOD

A. Assignment of Code Point Terminals

2.01 The decoder functions on a 3-digit basis and is arranged to handle calls for any office code from 200 through 999 or a total of 800 office codes. These code points appear on the H (hundreds code) terminal strips on the decoder frame and multiple to corresponding terminal strips on the supplementary frame, if provided. All code points, both working and vacant, must be cross-connected

at one point, on either the originating or supplementary frame, to provide a routing when dialed.

2.02 The originating frame code point cross-connecting field is shown in Fig. 4. As illustrated, code point terminals 200 through 599 are located below and terminals 600 through 999 above the code group terminals. To facilitate making cross-connections between the code point terminals and the R terminals, the route relays are multiplied to two R terminal strips. One of these terminals strips is associated with the lower code point terminal strip. The corresponding cross-connecting field on the supplementary frame is the same as shown in Fig. 4, except that (1) the route relay terminals are designated 301 through 600; (2) CG terminals are designated 1 to 17 and RC; and (3) terminals O, PS, A, and B do not appear.

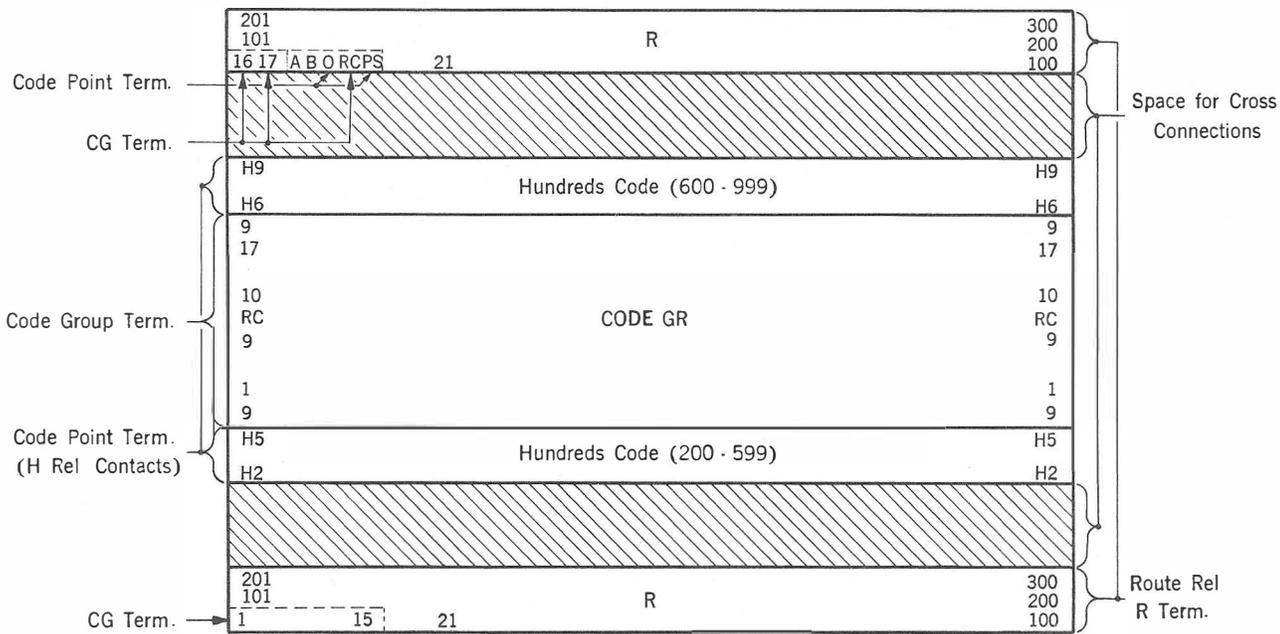


Fig. 4—Terminal Locations

Route Relay Terminals

2.03 Route relays (R terminals) are assigned to code points on the basis of the 12 items of information required by the sender. These items are the six major and six minor selections as shown in Fig. 2. The same relay can be used for any number of code points if there is no difference in any of these selections and the charge or substitute routing treatment is the same for all codes. A different route relay is required for each code point differing in any of these respects from some other code point (Fig. 5), except where provisions are made to use one route relay to route calls over a common trunk group to reach an A or B office in a No. 1 crossbar unit. In assigning route relays to code points, the requirements covered in 2.39 are controlling, but an effort should be made to assign them in such a manner that the cross-connections will be as nearly vertical as possible. As each assignment is made, it should be entered in the proper columns on a chart as illustrated in Fig. 1 and 2. R terminals 21 through 300 appear on the decoder frame and terminals 301 through 600, on the supplementary frame. These terminals are multiplied to the 3-digit individual translator or route grouping frame if provided.

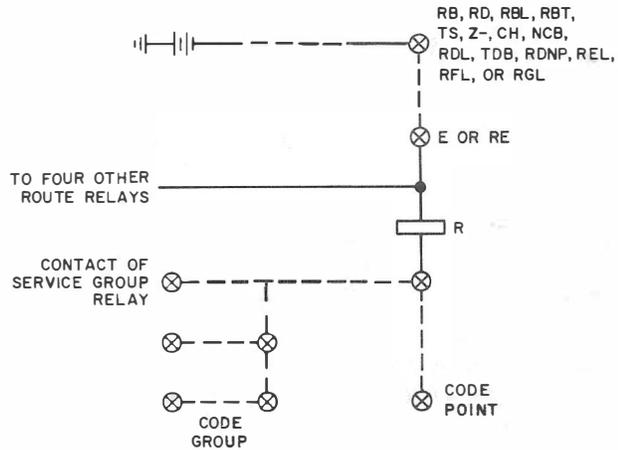


Fig. 5—Basic Cross-Connection to Operate Route Relays

Code Group Terminals

2.04 Code group terminals are used for vacant codes, restricted codes, and any other groups of codes which require identical treatment. These terminals are located in the CODE GR cross-connecting

fields on both the originating and supplementary frames. (See Fig. 4.) The terminals in each horizontal row are common. One row of terminals in the CODE GR field strip is assigned to each group of codes which require the transmission of the same combination of information to the senders. The terminals in the CODE GR field are also multiplied to correspondingly numbered CG terminals on the R terminal strips of the originating frame. The CG terminals are provided for cross-connection to the R terminals of the route relays assigned to the code groups. (See Fig. 5.) Since the CG terminals appear only on the originating frame, route relays 301 and higher should not ordinarily be assigned to code groups. If a congested condition on the originating frame makes it necessary to assign a route relay on the supplementary frame to a code group, the assigned route relay is cross-connected to a code point that is cross-connected to the assigned CODE GR terminal. CG terminals 15, 16, and 17 are also multiplied to the service relay terminal strips of the originating and supplementary frames. These CG terminals are provided for cross-connection to service relay contact terminals when SG relays are assigned to code groups. All assignments should be entered on a chart as shown in Fig. 1.

2.05 Vacant Codes: Code group number 9 is reserved for vacant codes. Three rows of terminals in the CODE GR field are provided for this purpose. All code points corresponding to vacant codes are cross-connected to these terminals.

2.06 Restricted Codes: All code points corresponding to codes which are in use in the numbering area, and to which operators and all classes of customers are denied keying or dialing privileges, should be assigned to the RC row of terminals of the CODE GR terminal strip.

Note: This does not include code points which are restricted only to certain classes of service and to which other classes have dialing privileges. Such code points should be assigned as required to provide the proper routings.

2.07 Other Codes: When a number of codes require identical treatment, all such code points should be cross-connected to the row of code group terminals (1 to 8 and 10 to 17) assigned for that routing.

Special Service Operator and Long Distance Codes

2.08 There are three methods of cross-connecting the special service operator and long distance code points. One of these methods uses route relays and the other two methods use service group relays.

2.09 *When only one routing serves all classes of service*, a route relay or a service group relay may be assigned to the associated code point. If a route relay is assigned, the cross-connections are as shown in Fig. 5. If a service group relay is assigned, the 0 or LD code point terminal shown in Fig. 6 is cross-connected to the assigned SG terminal. This routing may be over a single trunk group or over different trunk groups appearing on the same level in the district or office multiple. These assignments should be entered in the proper columns of a chart as in Fig. 1 and 2.

2.10 *When more than one routing is required* in order to route calls from different classes of service to different trunk groups located on more than one level of the district or office multiple, a common contact terminal (C_ or D_) of the service relays is assigned to the associated code point and the routings are obtained by means of service group relays assigned to the individual contacts of the several class-of-service relays. (See Fig. 7, A&M only, or Fig. 8.) In this case, no connection is made from the code point to a route relay. These assignments should be entered in the proper columns of a chart as in Fig. 1 and 3.

2.11 Code point 0 (special service operator) appears at two individual terminals designated 0. One of these is located on the upper R terminal strip as shown in Fig. 4 and is for use when a route relay is assigned to the code point.

2.12 The other 0 terminal is located above the ZR terminals as shown in Fig. 6 and is for use when a service relay common contact is assigned to this code point. The C1 terminal is usually assigned for this purpose.

Note: The 0 code points do not have appearances on the supplementary frame.

2.13 Code point 211 (long distance) appears in the H terminal strip for cross-connection in the usual manner to a route relay R terminal when

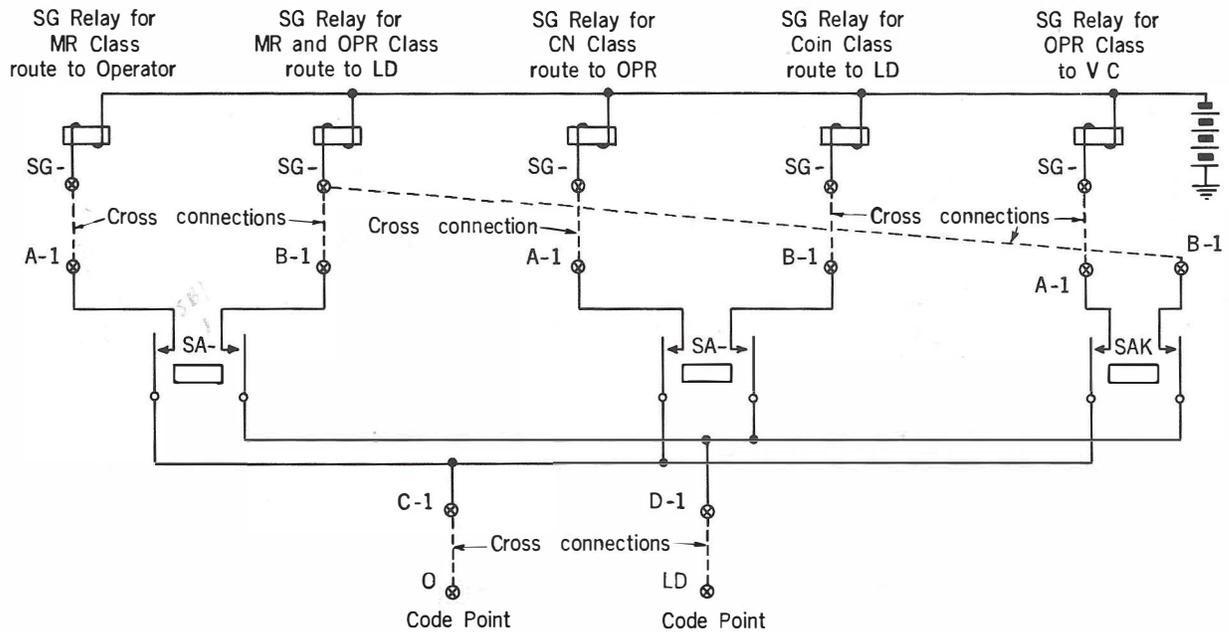


Fig. 7—Typical Cross-Connections for LD and O Code Points—Different Treatment for Different Classes of Service (A&M Only)

a route relay is assigned. A multiple appearance of code point 211, designated LD, is located above the ZR terminals as shown in Fig. 6 and is for use when a service relay common contact is assigned to this code point. The D1 terminal is usually assigned for this purpose.

Permanent Signal Code Point

2.14 *Code point PS* (permanent signal) appears only at the terminal designated PS located in the upper R terminal strip. A route relay is always assigned to this code point.

Note: The PS code point does not appear on the supplementary frame.

2.15 If a regular code is also provided for reaching the permanent signal trunks, the corresponding code point should also be assigned to the same route relay.

Extended Area Code Point

2.16 *Terminal EA* \blacklozenge , when provided, \blacklozenge has two appearances; one is located on the lower service relay terminal strip and the other is located just below the E terminals on the route relay winding terminal strip. (See Fig. 6.) It is provided

for extended area codes reached with the prefix 1-1.

2.17 *Terminal EA* may be assigned to a common route relay or cross-connected to a service relay common C₋ or D₋ terminal, with a service group relay connected to the associated service relay individual A₋ or B₋ terminal. (See Fig. 8.)

Common Trunk Group to Crossbar Offices (A and B)

2.18 To use a single route relay for both the A and B offices reached over a common trunk group to a crossbar unit, cross-connect a CPA₋ punching to the code point of office A and cross-connect the associated CPB₋ punching to the code point of office B. The code point for office A is also cross-connected to a route relay terminal. The cross-connections for the route relay contacts will agree with the information required for office A.

2.19 The CPA₋ and CPB₋ terminals appear on the CPA1 and 2 or CPB1 and 2 terminal strips. The terminal strips appear on the right hand side of the fuse panel on the originating frame and on the right side beneath the route relays of the supplementary frame. These terminals are also multiplied to the 3-digit individual translator

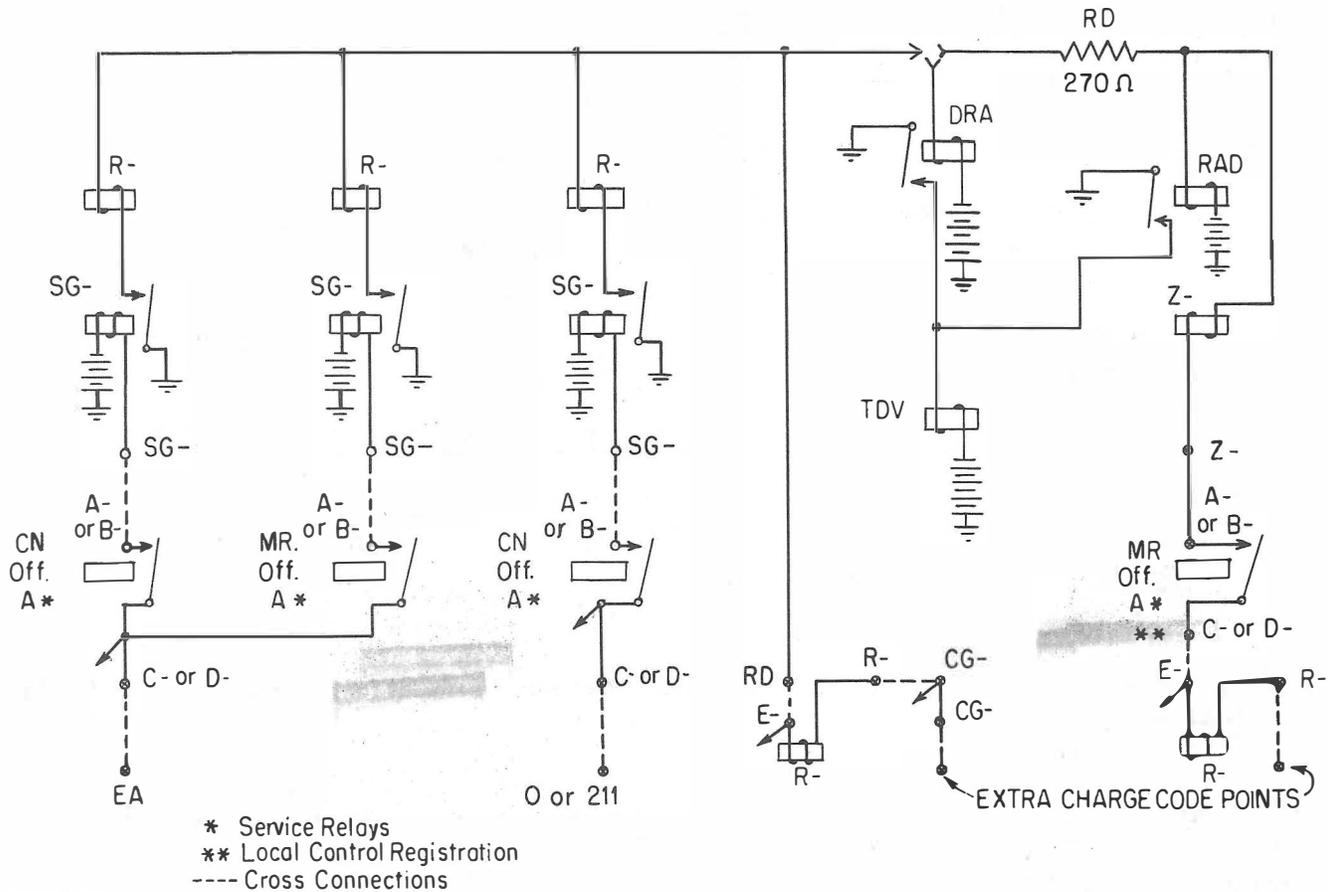


Fig. 8—Typical Cross-Connections for Extended Area Codes, Long Distance, and Extra Charge Calls Using PBX Diversion Feature

or route grouping frame if the code compression and sender recycle feature is provided.

Code Points Arranged for Peg Count Preroute

2.20 If a peg count of an individual code point or a number of code points that have the same route information is required, the individual code point is cross-connected to an RP terminal. The associated PR terminal is cross-connected to a CG (code group) or R (route relay) terminal associated with the route.

2.21 The RP and PR terminals appear on the PC terminal strip on the decoder frame. The RP terminals are multiplied to the 3-digit translator or route grouping frame if the code compression and sender recycle feature is provided.

3-Digit Translator (Adjacent Numbering Plan Area) Codes

2.22 The compressed code indication registered in the decoder on CC relays determines which translator will be used to operate a route relay for sender translation. The CC relays, operated on a 2-out-of-5 basis, connect battery to CST₁ terminals.

2.23 The CST₁ terminal (Fig. 6) is cross-connected to:

- STS₁ terminal associated with a 3-digit translator connector to seize a 3-digit common translator for a particular adjacent foreign area.
- CCC terminal for access to the local translator.

(c) EA terminal when the CST_ terminal represents the compressed code for the foreign area which is served by the 1-1 prefix.

(d) IT terminal for access to the 3-digit individual translator for an adjacent foreign area.

(e) STR_ terminal for a single direct route via tandem to an adjacent foreign area, or for a vacant code or other routing for unused CC_ relay combinations (CST_ terminals). The associated ACR terminal is cross-connected to an R terminal for the routing required.

Note: If subscriber senders are arranged to indicate a 1-1 prefix directing code by means of the CC2 and CC7 leads, cross-connect the CST9 terminal to the STR_ terminal. Where CC2 and CC7 leads are used to indicate a legitimate compressed code, cross-connect the CST9 to STS_, STR_, or IT terminals as required.

(f) When desired, the CST0 terminal for the home area code may be cross-connected to terminal STR_ to route home area calls to intercept when the home area code is dialed in error.

Second Trial Indication Registered in Decoder

2.24 The second trial indication from the subscriber sender circuit is registered in the decoder to prevent a stuck sender condition on second trial decoder time-outs. The BR terminal is cross-connected to an R terminal to provide a routing to a busy trunk group, assistance operator, or as required. (See Fig. 6.)

Foreign Area Codes—Direct Distance Dialing—Decoders not Arranged for Interchangeable Codes Feature Under Prefix Control

2.25 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 customer 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. (See 2.47 for description of interchangeable codes feature under prefix control.) 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 follows.

(a) If the office is not equipped with the recycle feature, the subscriber sender will connect to an auxiliary sender for the registration of the additional digits dialed by the customer. It will also connect to a decoder 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 a CAMA routing.

(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 code registered in the 3-digit code compressor is wired as a compressed code, it will ground two CC_ leads toward the subscriber sender on a 2-out-of-5 basis. The subscriber sender will, in turn, ground two leads toward the decoder to register the foreign area compressed code which will control the choice of the 3-digit 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 in the same manner as in (a).

Note: When the decoder handles foreign area codes, it will be arranged to translate a 0 as a 0 for the second digit of a code; the code point effective corresponds to the code transmitted by the sender.

2.26 Foreign area code points routed through a CAMA tandem will usually be assigned to a code group terminal. The foreign area code group may be assigned to a common route relay, and if necessary, a routing may be provided for the restricted classes of service by cross-connecting an SG relay through the service relay contacts. Another method may be used by assigning one of the code group terminals (15, 16, or 17) located on the lower service relay terminal strip (Fig. 6) of the originating frame or on the upper service relay terminal strip of the supplementary frame. The code group assigned will be cross-connected to the service relay common (C_ or D_) terminals. The associated service relay individual (A_ or B_) terminals will be cross-connected to an SG relay for the CAMA routing and to different SG relays for the restricted routings. (See Fig. 9.)

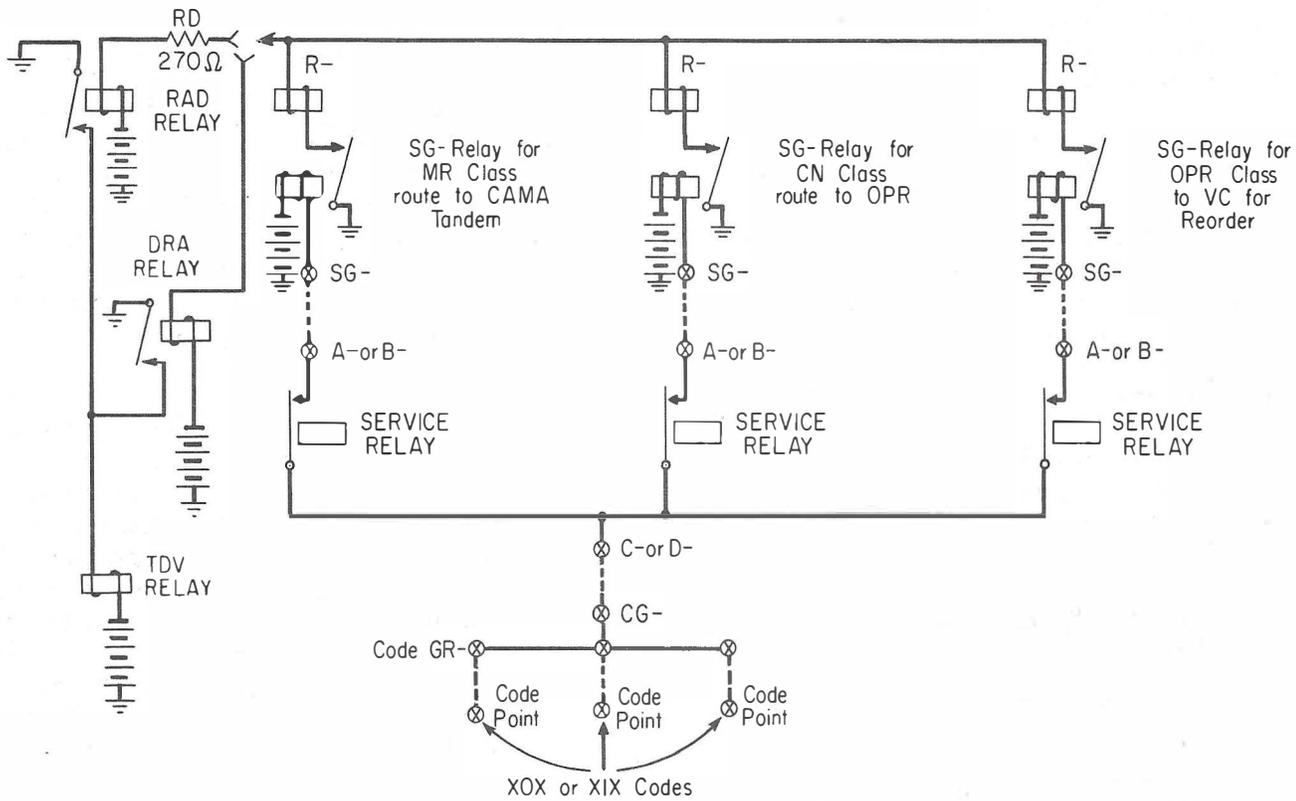


Fig. 9—Typical Cross-Connections for Foreign Area Codes Using PBX Diversion Feature—Different Treatment for Different Classes of Service

2.27 If necessary, when ten digits are dialed, the decoder (by means of class-of-call information) can notify the subscriber sender that the auxiliary sender should delete the foreign area code and outpulse (MF) only seven digits. On 7- or 8-digit calls, the subscriber sender (by means of the class-of-call information transmitted from the decoder) 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. The class-of-call

terminals to be used for the above calls are covered in 2.73 and Fig. 25.

Code Points Arranged for Route Transfer

2.28 If it is required to provide an alternate routing for certain codes, under control of a plug and jack at the trouble indicator frame, the code points requiring this treatment are cross-connected to T₁ terminals. The upper R terminal strip, shown in Fig. 4, is modified with an additional row of terminals when this or other features are provided. (See Fig. 10.)

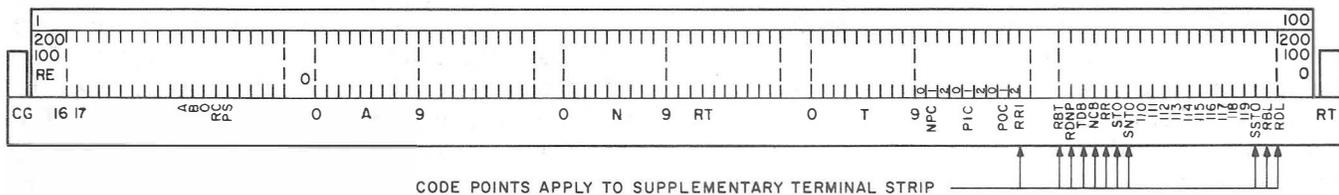


Fig. 10—Modified Upper R Terminal Strip (See 2.28 and 2.48)

2.29 If the route transfer (RT) relay is normal, the T₋ terminals are closed through to corresponding N₋ terminals. If the RT relay is operated, the T₋ terminals are transferred to corresponding A₋ terminals. The N₋ terminal should be cross-connected to the R₋ terminal of the route relay assigned to the normal route for the code; the A₋ terminal should be cross-connected to the R₋ terminal of the route relay assigned to the alternate route. (See Fig. 11.)

2.30 If a code requires one alternate route under certain conditions and a different alternate route under other conditions, this may be accomplished

under control of two RT₋ jacks at the trouble indicator. The code point is cross-connected to a T₋ terminal. The A₋ terminal associated with this T₋ terminal is cross-connected to the R₋ terminal of the route relay assigned to the first alternate route. The corresponding N₋ terminal is cross-connected to a T₋ terminal associated with a different RT₋ jack. The N₋ terminal corresponding to the second T₋ terminal is cross-connected to the R₋ terminal of the route relay assigned to the normal route. The A₋ terminal corresponding to the second T₋ terminal is cross-connected to the R₋ terminal of the route relay assigned to the second alternate route. (See Fig. 12.)

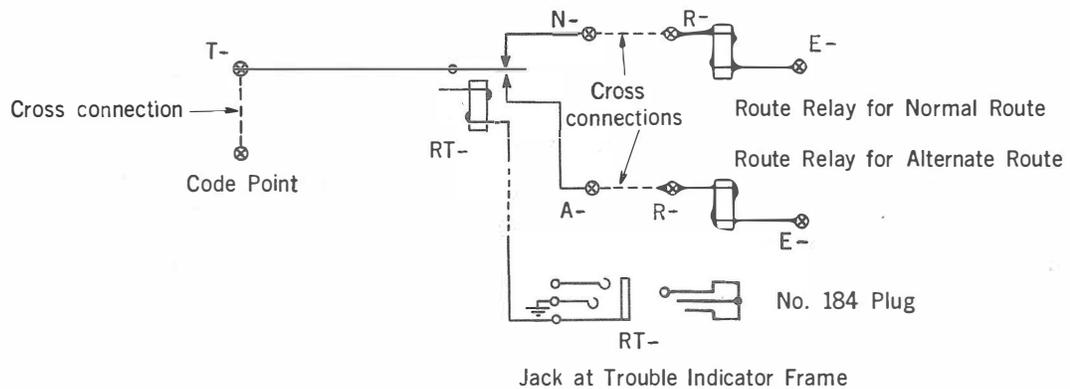


Fig. 11—Code Point With Normal Route and One Alternate Route

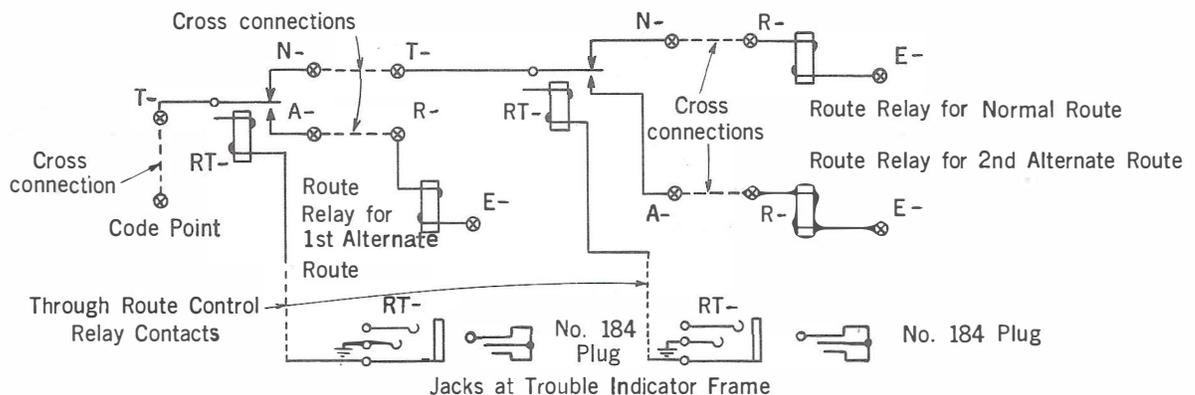


Fig. 12—Code Point With Normal Route and Two Alternate Routes

A and B Terminals

2.31 Terminals A and B which are located in the same row of punchings with the 0 and LD terminals in the ZR terminal strip (Fig. 6) are multiplied to the corresponding A and B terminals in the upper R terminal strip (Fig. 4). These terminals are provided for use where it is desired to provide separate routings for some code in the 600 through 999 series on a class-of-service basis. In such a case the code point terminal is assigned to the A or B terminal in the R terminal strip and the appearance of this terminal on the SA terminal strip is assigned to a common (C₋ or D₋) contact terminal of the service relays in a similar manner to the 0 and LD terminals. An example of the use of these terminals would be the case where it is necessary to direct calls to different repair service clerks on a class-of-service basis.

Note: These A and B terminals, the A₋ and B₋ terminals of the service relay contacts, have entirely separate functions.

B. Assignment of Code Group Terminals

2.32 There are two methods of assigning the vacant code and restricted code group

terminals. The method to be used is the same as that described in 2.08 through 2.10 for special service operator and long distance code point terminals, except that code group terminals instead of code point terminals are involved.

Vacant Codes

2.33 The code group terminals for vacant codes, CODE GR9, have two multiple appearances for cross-connecting. Terminal CG9, located on the lower R terminal strip (Fig. 4), is provided for use when the code group is to be cross-connected directly to a route relay. The cross-connections are as indicated in Fig. 5.

2.34 Terminal 9, located above the ZR terminals (Fig. 6), is for use when this code group is to be cross-connected to a service relay common (C₋ or D₋) terminal where more than one routing is to be provided for vacant codes. This is applicable when calls from keypulsing operators are to be routed to the keypulsing vacant code trunk group in order to set up a reorder signal. (See Fig. 13.)

Note: The terminal 9 appearance of this code group is not provided on the earlier installations of decoder equipment.

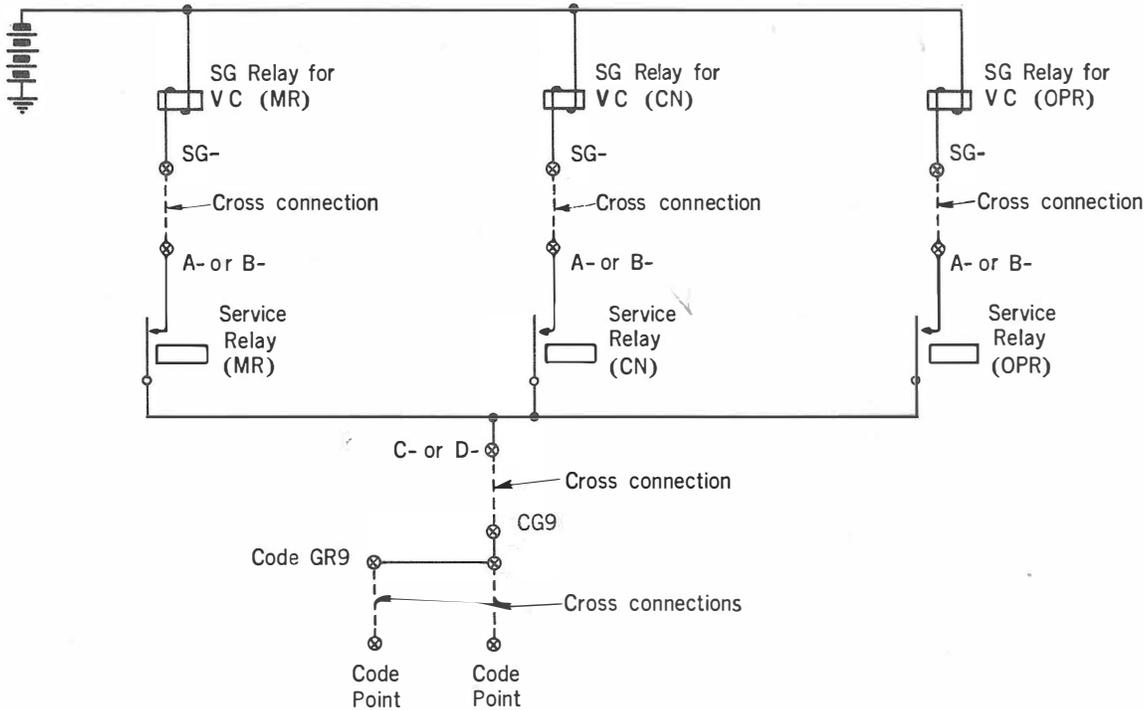


Fig. 13—Typical Cross-Connections for Vacant Code Points

Restricted Codes

2.35 The code group terminals for restricted codes, CODE GR RC, have two multiple appearances for cross-connecting. Terminal CG-RC, located on the upper R terminal strip (Fig. 4) is provided for use when the code group is to be cross-connected directly to a route relay. (See Fig. 5.)

2.36 The RC terminal, located above the ZR terminals (Fig. 6), is for use when this code group is to be cross-connected to a service relay common (C_ or D_) terminal in order to provide more than one routing for calls to restricted codes. The cross-connections in this case are similar to those shown in Fig. 7 for the LD and 0 code points.

Tandem and Miscellaneous Code Groups

2.37 Code groups 1 to 8 and 10 to 17 are assigned for groups of codes requiring identical treatment. Each of these code groups has a multiple appearance for cross-connection to the assigned route relay R terminal. These terminals are designated CG1 to CG8 and CG10 to CG17 and are located on the R terminal strips (Fig. 4). Terminals CG15, 16, and 17 will also have a multiple appearance on the lower service relay terminal strip (Fig. 6). They are provided for use when a code group is to be cross-connected to a service relay common (C_ or D_) terminal and the associated service relay individual (A_ or B_) terminals are cross-connected to SG relays to provide more than one routing for a group of codes.

Note: Terminals CG15, 16, and 17 also appear on the supplementary frame.

C. Assignment of E Terminals

2.38 The outer winding terminals of each group of five consecutive route relays are connected together and permanently wired to a corresponding numbered E terminal. The E terminals for route relays 21 to 300 are located on the lower service relay contact terminal strip on the originating frame (Fig. 6) and are multiplied to terminals on the upper service relay contact terminal strip on the supplementary frame (Fig. 14). The E terminals

for route relays 301 through 600 have two appearances on the lower service relay contact strip on the supplementary frame (Fig. 14). The E terminal of each working group of route relays must be assigned to one of the terminals RB, RD, TS, CH, Z_, RBT, RBL, NCB, RDL, TDB, RDNP, REL, RFL, RGL or to a service relay common contact (C_ or D_) terminal. This cross-connection provides for the proper charge condition or substitute routing.

2.39 Since all route relays in each group of five will receive identical treatment with respect to charge and substitute routing, all codes assigned to the respective route relays must require such treatment. All codes which require such identical treatment are said to be in the same **office code group**.

Note: An office code group consists of all codes for which each class of service requires identical treatment with respect to charge or substitute routing. Different classes of service may require the same or different treatment in this respect. When a coin class is to be routed by means of an SG relay to a dial coin zone outgoing trunk for completion via full selector tandem, the office code group is further restricted to codes requiring the sender to await the dialing of a fifth numerical digit or to codes not requiring the sender to wait.

2.40 *For each office code group in which all classes of service receive the same treatment* with respect to charge and talking selection, the route relay E terminals are assigned directly to terminals RB, RD, TS, CH, RBT, REL, RFL, RGL, RBL, NCB, TDB, RDL, RDNP, or Z0 through Z5, in accordance with the information in Table A. This connection, together with the connection of the DB terminal to the DB transmitting relay winding terminal, controls the talking selection and charge condition.

Note: Direct connection to the TS, CH, or Z1 through Z5 terminals can be made only when all senders are equipped with TS1 relays or the equivalent resistances. These relays are provided when three different talking selections are required.

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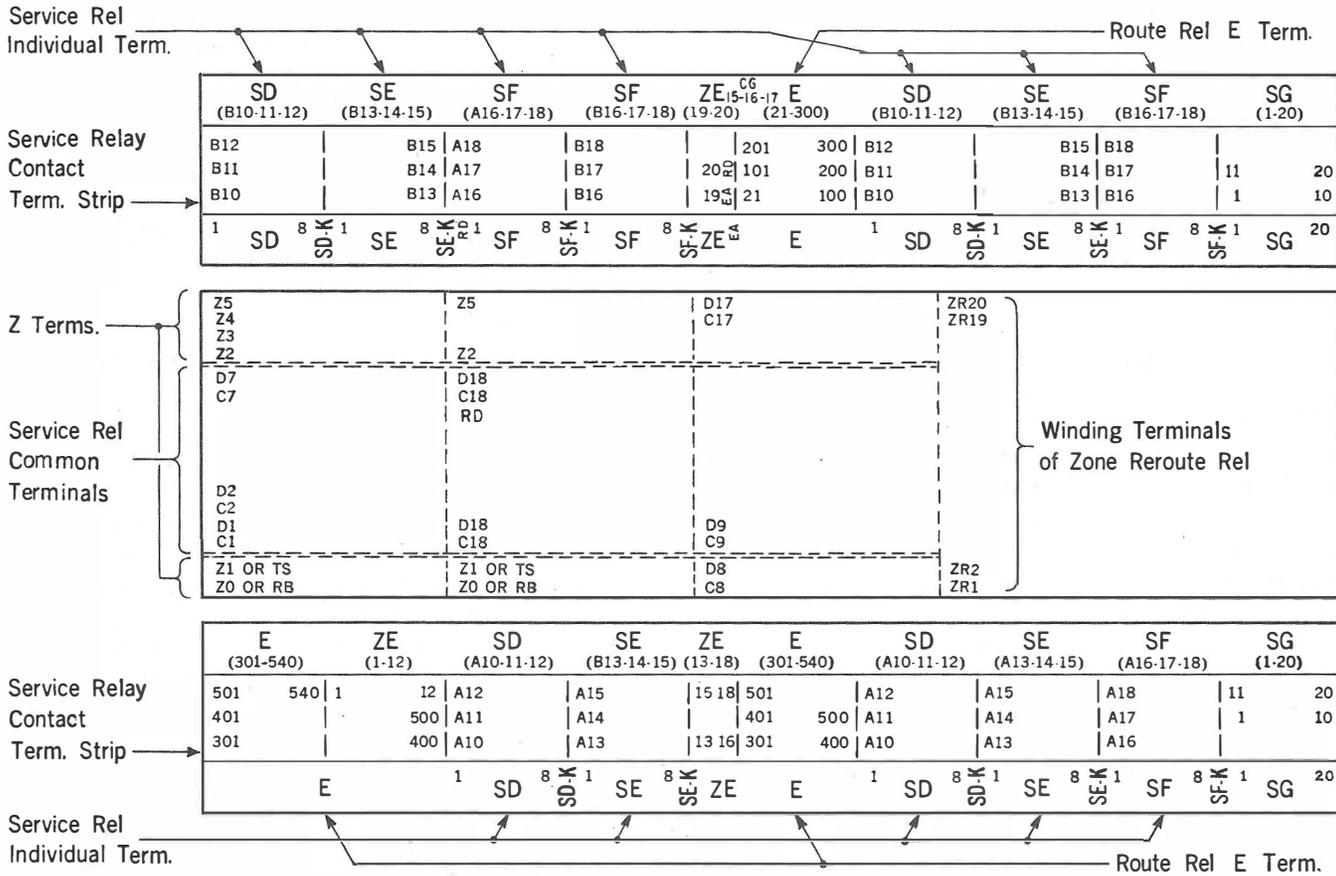


Fig. 14—Terminal Locations on Supplementary Frame

TABLE A
TALKING SELECTION AND CHARGE

CHARGE INDICATION	TALKING SELECTION	TERMINAL	NOTES
—	2 or 3	RBT, RBL, NCB, RDL, RDNP, TDB, Z0, RB, REL, RFL, RGL, or RD	1, 2, 6, 7
0 or Remote Control	0	RBT, RBL, NCB, RDL, RDNP, TDB, Z0, RB, REL, RFL, RGL, or RD	1 through 7
1	1	Z1 or TS	2, 3, 4, 6, 7
2	0	Z2 or CH	6, 7
3	1	Z3	6, 7
4	0	Z4	6, 7
5	1	Z5	6, 7

Note 1: Talking selection 2 or 3 is required for routes to operator-type trunks or to other trunks which require that the customer line be cut through directly to the trunk circuit (repeat coil-out). Such trunks are special service, long distance recording-completing, local test desk, dial and ringer test, dial coin zone outgoing trunks, etc. Either one, but not both, of these talking selections is available depending on the wiring of the associated senders. Talking selection 3 is required when the senders are not arranged to reverse the dialing tip and ring at the completion of dialing, and toll diversion is required. For routes to a CAMA tandem, with automatic number identification (ANI), talking selection 2 is required to set the district in the repeat coil-out position.

Note 2: For routes to operator-type trunks which do not require that the customer line be cut through to the trunk circuit, such as information and repair clerk, the talking selection may be either 0, 1, or 2, since the trunk circuits do not reverse the battery and consequently cannot cause a charge. Talking selection 3 cannot be used for this type of trunk. When the route is established by means of an SG relay and the senders are equipped with TS1 relays, talking selection 1 cannot be obtained.

Note 3: Senders not equipped with TS1 relays may be wired to provide either talking selection 0 or 1 when the RB, RD, or Z0 terminal is cross-connected.

TABLE A

TALKING SELECTION AND CHARGE (Cont)

Note 4: In some cases, district selectors may be arranged to charge in the first (0) talking position, or to advance automatically from the first to the second talking position when the Z0, RB, or RD terminal is cross-connected. For example, calls to zone 0, which are not charged to flat rate lines equipped with message registers but are charged to message rate lines, would require that the flat rate districts be set in the no charge (0) talking position and the message rate districts be set in the charge (1) talking position. If the flat and message rate lines are combined on a single decoder class-of-service relay, 0 talking selection must be made in both cases, and the message rate district selectors will be arranged to charge in the first talking position, or to advance automatically to the second talking position.

Note 5: For routes to operator identified CAMA tandems, the district should be in the no charge (0) talking position. (The charging facilities for CAMA routes will be at the CAMA tandem.) These routes may be established by means of an SG relay or a route relay with the Z0, RB, or RD terminal cross-connected. However, there are districts which may be arranged to charge in the no charge (0) talking position or advance automatically to charge (1) talking position when the Z0, RB, or RD terminal is cross-connected, or when an SG relay is used. In this case, where districts automatically advance to a charge position, operator identified CAMA trunks must be arranged not to return reverse battery and consequently not cause a false charge.

Note 6: In offices not arranged for interchangeable codes feature under prefix control, but where the prefix 0 and 1 screening feature is provided, the following terminals may be used as required:

- (a) Where prefix 0 or 1 must be dialed prior to foreign area code, use RD or RBT terminal. With this arrangement, the customer dials station-to-station and special toll calls direct in a foreign numbering plan area. If no prefix is dialed, the call routes to intercept.
- (b) Where prefix 1 is not needed for routing but screening is required, use RB, TS, CH, RDNP, or Z- terminal. This arrangement provides for the rerouting of a call where a prefix 0 or 1 is dialed. A prefix 0 will cause the call to reroute to a special nontoll operator. A prefix 1 will cause the call to route to intercept. If no prefix is dialed, the call completes through normal route provided.
- (c) Where prefix 0 or 1 screening is not required, use NCB or TDB terminal. With this arrangement the customer does not normally dial a prefix, but if prefix 0 or 1 is dialed, it will have no effect on routing of the call.
- (d) Where prefix 0 or 1 must be dialed by the customer prior to dialing the office code in the home numbering plan area, use RDL or RBL terminal. With this arrangement the customer dials station-to-station and special toll calls direct in his home numbering plan area. If no prefix is dialed, the call is routed to intercept.
- (e) If additional prefix screening is required, terminals REL, RFL, and RGL have been added.

Note 7: In offices arranged for interchangeable codes feature under prefix control, see 2.47 through 2.50.

2.41 For each office code group in which any class of service receives different treatment from any other in the preceding instances, the route relay E terminals are assigned to one of the service relay C₋ or D₋ terminals. One set of C₋ or D₋ terminals is assigned for each office code group requiring different treatment for any class. By proper cross-connection of the associated service relay A₋ or B₋ terminals, the decoder may provide different charge conditions or substitute routings as required for each class. (See Fig. 15.)

2.42 In some of the earlier installations, where BL (route block) relays are provided, a set of C₋ and D₋ terminals is required for each office code group. In this case, the route relay E terminal is cross-connected to one of the C₋ terminals. The correspondingly numbered D₋ terminal is cross-connected to the F₋ terminal of the BL relay assigned for the particular office code group. By proper cross-connection of the associated service relay A₋ terminals, the proper charge condition may be established or a substitute routing introduced. By proper cross-connection of the associated service relay B₋ terminals, the route relay contacts may be made effective for any class which is privileged to use the routing established by the route relay (Fig. 16).

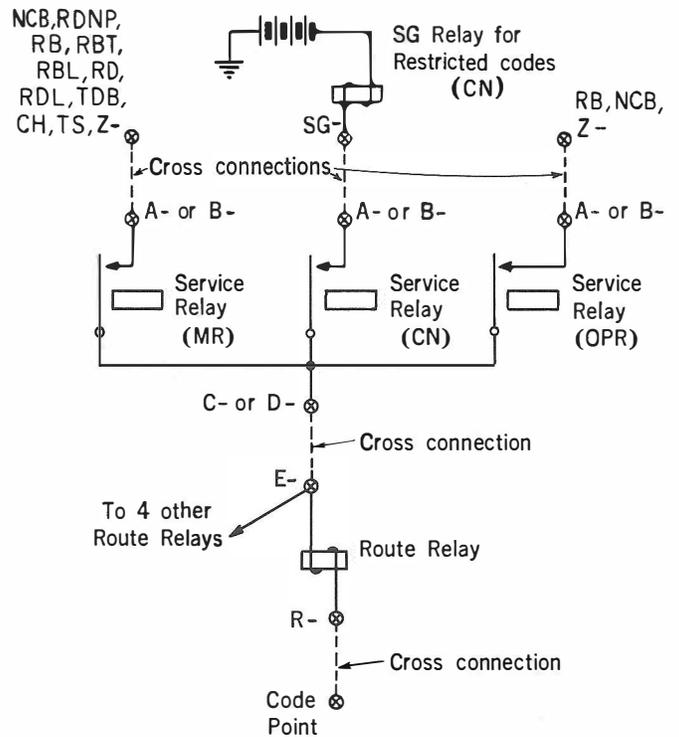


Fig. 15—Typical Cross-Connections for Routing Allowed to MR and OPR Class—Restricted to Coin Class

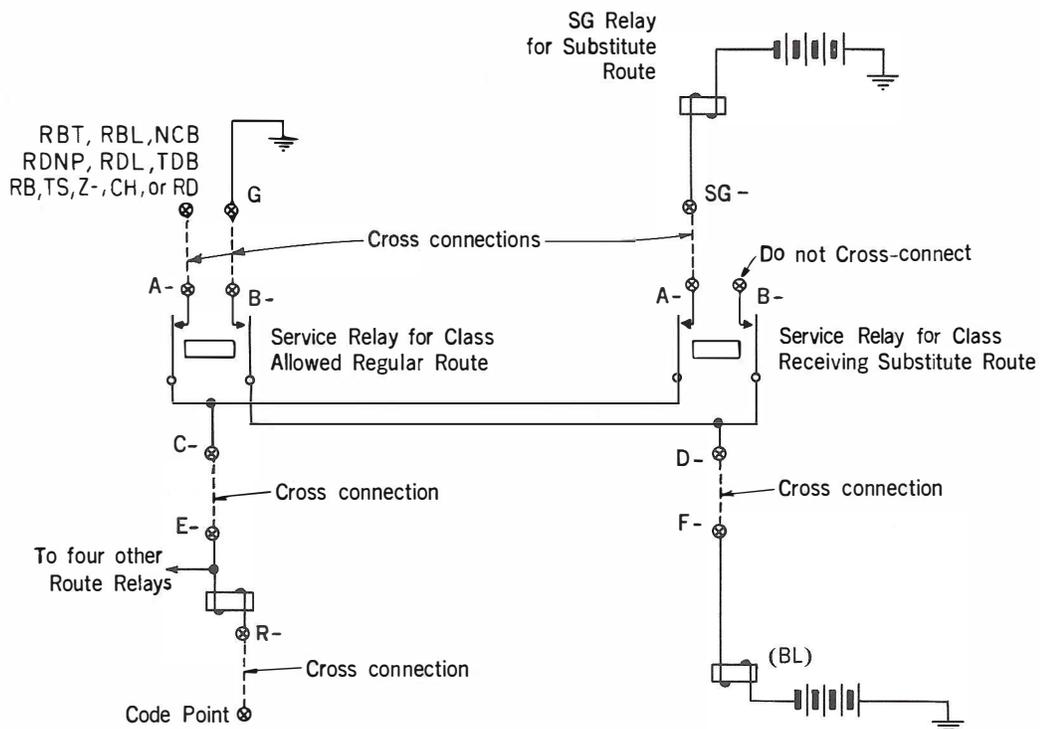


Fig. 16—Typical Code Point Cross-Connections for Regular and Substitute Routes

D. Assignment of Terminals for Prefix 0 and 1 Screening—Decoders not Arranged With Interchangeable Codes Feature Under Prefix Control

2.43 When arranged for prefix 0, 1, and no prefix screening, RB, RBT, RBL, NCB, RDNP, RD, RDL, TDB, SNT0, ST0, SST0, and RE terminals have been assigned to route customer calls as required. The upper and lower terminal strips (Fig. 4) have been modified with the additional terminals (Fig. 10).

2.44 Foreign area codes (direct distance dialing) consisting of prefix 1 or 0 plus ten digits may be dialed by the customer. In addition,

customers may dial prefix 1 or 0 plus seven digits for home area codes. Prefix 1 is used for station-to-station toll calls. Prefix 0 is used to route certain toll calls such as person-to-person, credit card, collect, etc.

2.45 *In offices equipped for prefix 0 or 1 screening and recycle feature (Fig. 17):*

- (a) If prefix 0 is dialed, the call will route to TSP.
- (b) If prefix 1 is dialed, the 3-digit translator will be cross-connected through the 3-digit translator connector.

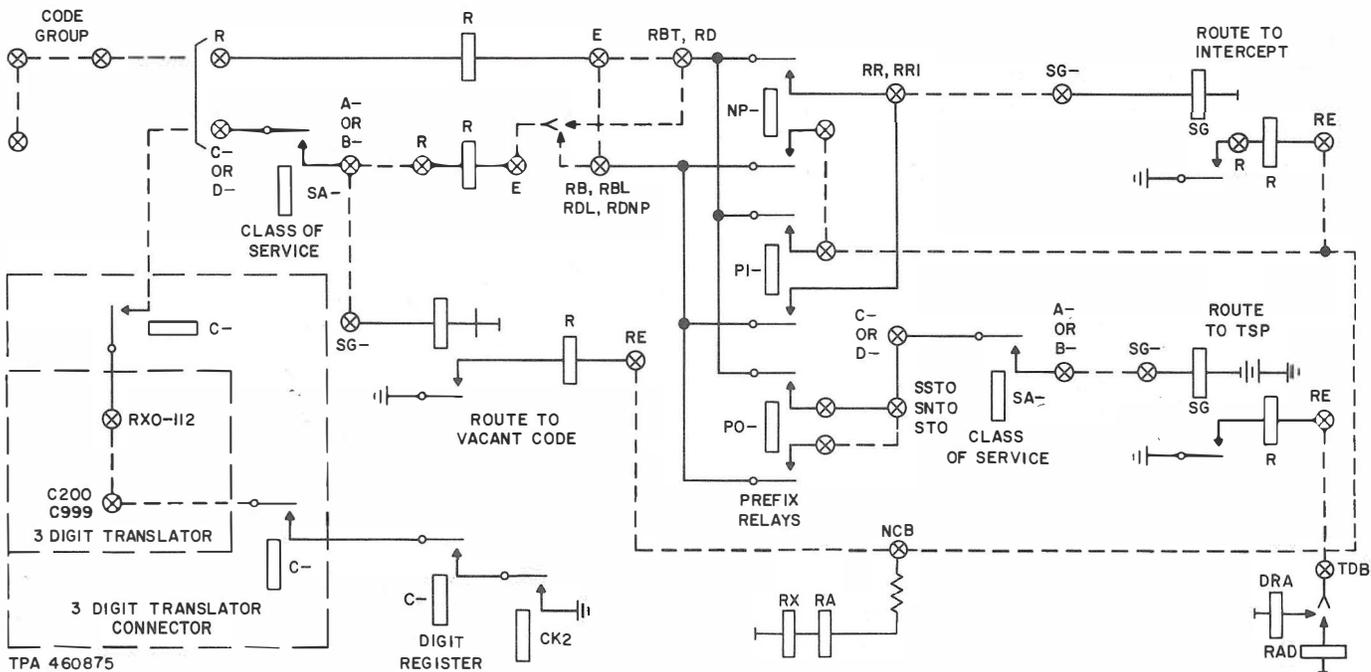


Fig. 17—Typical Cross-Connections for Prefix Screening and Sender Recycle Without Interchangeable Codes Under Prefix Control

2.46 Terminal punchings are cross-connected as follows:

- (a) For routes when prefix 1 screening and toll diversion of PBX traffic are not required, the RB terminals are assigned to the E terminal of a route relay (Fig. 18) directly or through a service group relay A₋ or B₋ terminals.
- (b) For 10-digit routes when prefix 1 screening is required and diversion of PBX restricted traffic is not required, the RBT terminals are assigned to the E terminal of a route relay (Fig. 19) directly or through a service group relay A₋ or B₋ terminals.
- (c) For routes when prefix 1 plus 7-digit screening is required and diversion of PBX restricted traffic is not required, the RBL terminals are assigned to the E terminal of a route relay (Fig. 20) directly or through a service group relay A₋ or B₋ terminals.
- (d) For routes when prefix 1 screening for talking charge indication 1 and diversion of

PBX restricted traffic are not required, the TS terminals are assigned to the E terminal of a route relay (Fig. 18) or through a service group relay A₋ or B₋ terminals to the route relay.

- (e) For routes when prefix 1 screening is not required for talking charge indication 2 and diversion of PBX restricted traffic is optional, the CH terminals are assigned to the E terminal of a route relay (Fig. 18) directly or through a service group relay A₋ or B₋ terminals.

- (f) For routes when prefix 1 screening is not required and diversion of PBX restricted traffic is optional, the Z₋ terminals are assigned to the E terminal of a route relay (Fig. 18) directly or through a service group relay A₋ or B₋ terminals.

- (g) For routes when prefix 0 or 1 screening and diversion of PBX restricted traffic are not required, the NCB terminals are assigned to the E terminal of a route relay (Fig. 5) directly or through a service group relay A₋ or B₋ terminals.

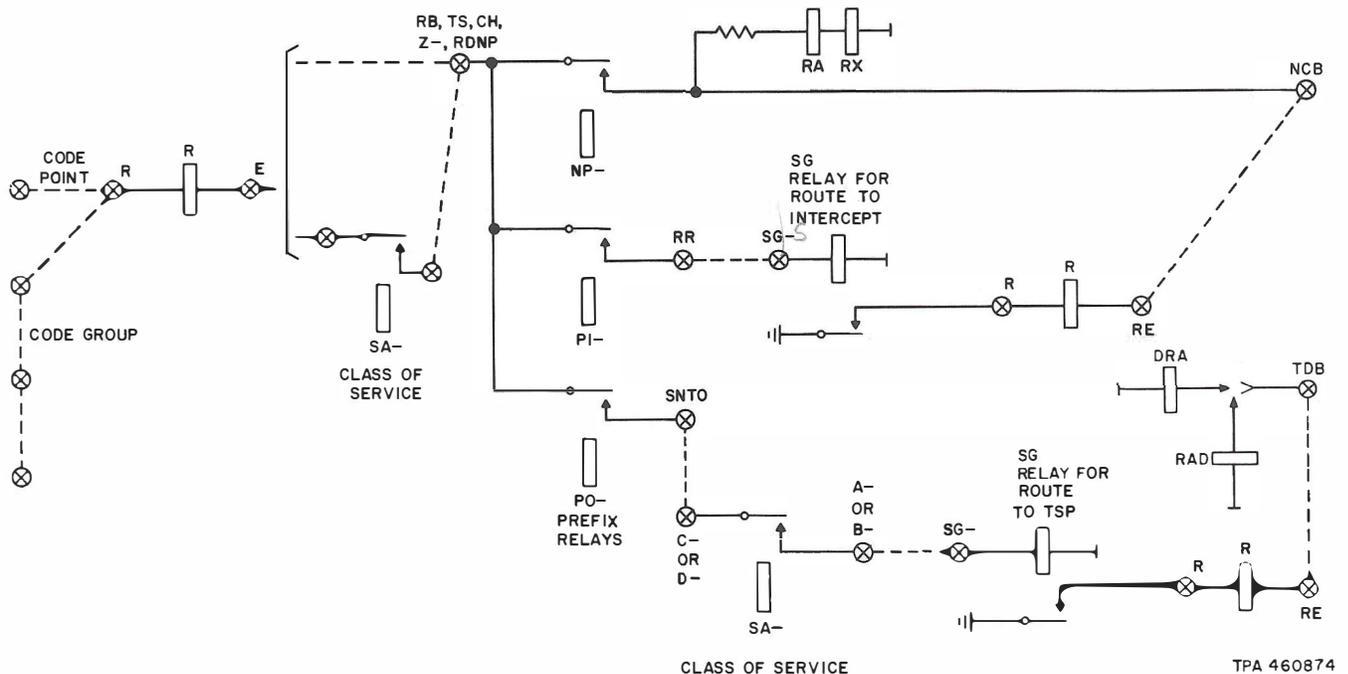
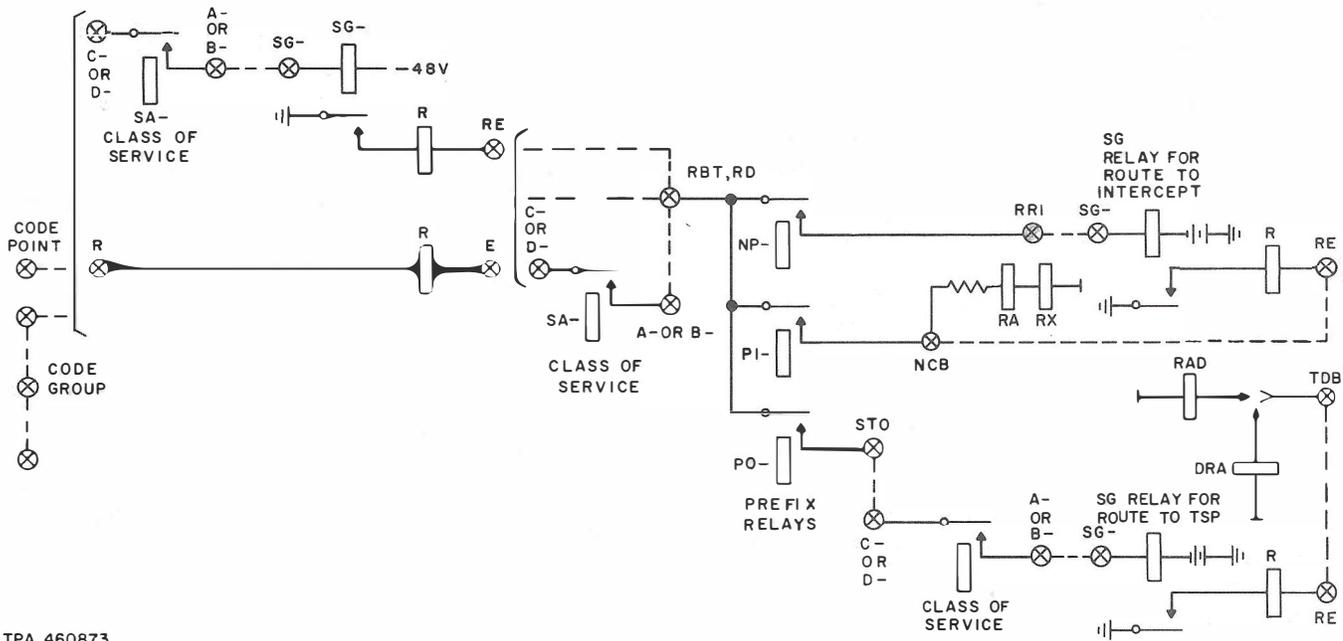


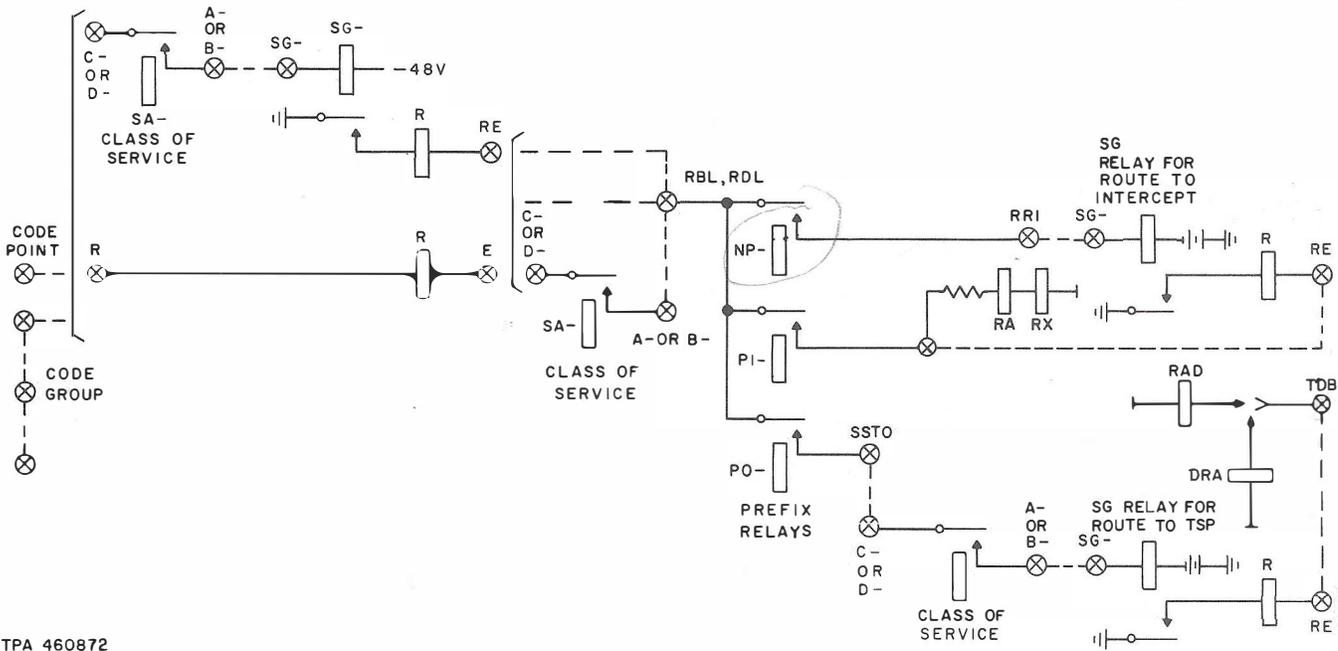
Fig. 18—Typical Cross-Connections for Nontoll Prefix Screening Without Interchangeable Codes Under Prefix Control

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Fig. 19—Typical Cross-Connections for 10-Digit Routing With Prefix Screening Without Interchangeable Codes Under Prefix Control



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Fig. 20—Typical Cross-Connections for 7-Digit Routing With Prefix Control Without Interchangeable Codes Under Prefix Control

- (h) For routes when prefix 1 plus 7-digit dialing and diversion of PBX restricted traffic are required, the RDL terminals are assigned to the E terminal of a route relay (Fig. 20) directly or through a service group relay A₋ to B₋ terminals.
- (i) For routes when prefix 1 plus 10-digit dialing and diversion of PBX restricted traffic are required, the RD terminals are assigned to the E terminal of a route relay (Fig. 19) directly or through a service group relay A₋ or B₋ terminals.
- (j) For routes when prefix 1 screening is not required and toll diversion of PBX traffic is required, the RDNP terminals are assigned to the E terminal of a route relay (Fig. 18) directly or through a service group relay A₋ or B₋ terminals.
- (k) For routes when prefix 0 or 1 screening is not required and diversion of PBX restricted traffic is required, the TDB terminals are assigned to the E terminal of a route relay (Fig. 5) directly or through a service group relay A₋ or B₋ terminals.

- (l) When toll route prefix 0 or 1 screening provides for a route to intercept, the RR or RR1 terminals (Fig. 19 and 20) are connected to a service group relay.
- (m) When prefix 0 screening is provided for nontoll and toll routes, the SNT0, ST0, and SST0 terminals (Fig. 18, 19, and 20) are connected to class-of-service relay contact terminals C₋ or D₋ or to SG₋ relay windings.
- (n) When prefix 0 or 1 and class-of-service screening are provided, the RE terminals of the service group route relays are connected to NCB terminals (Fig. 18, 19, and 20) or as required.
- (o) Special service code X11 and 0 operator cross-connections are arranged as shown in Fig. 21.
- (p) The prefix screening control feature is expanded to provide three additional screening points designated REL, RFL, and RGL that can be cross-connected. A typical cross-connection is shown in Fig. 22.

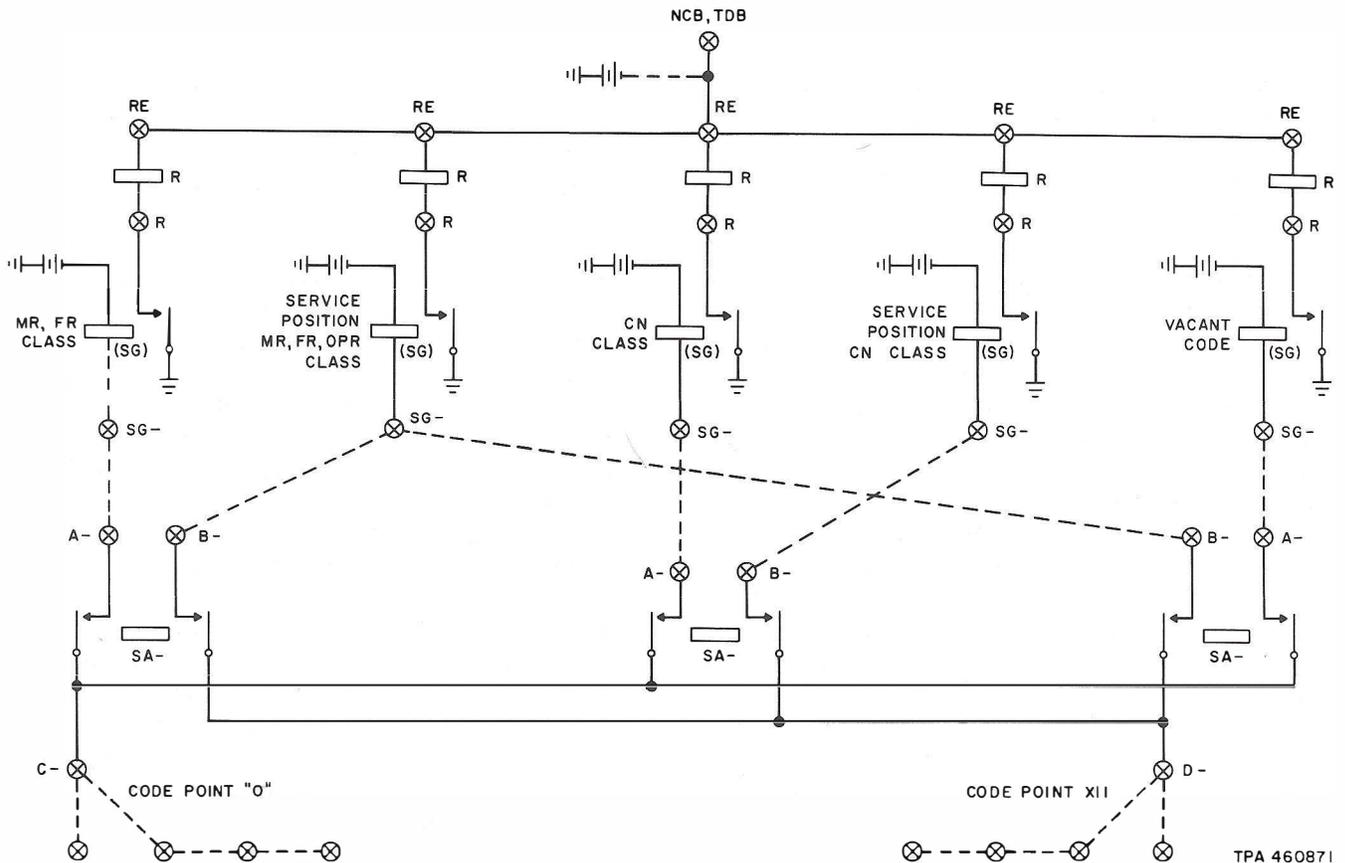


Fig. 21—Typical Cross-Connections for 0 Operator and Service Code

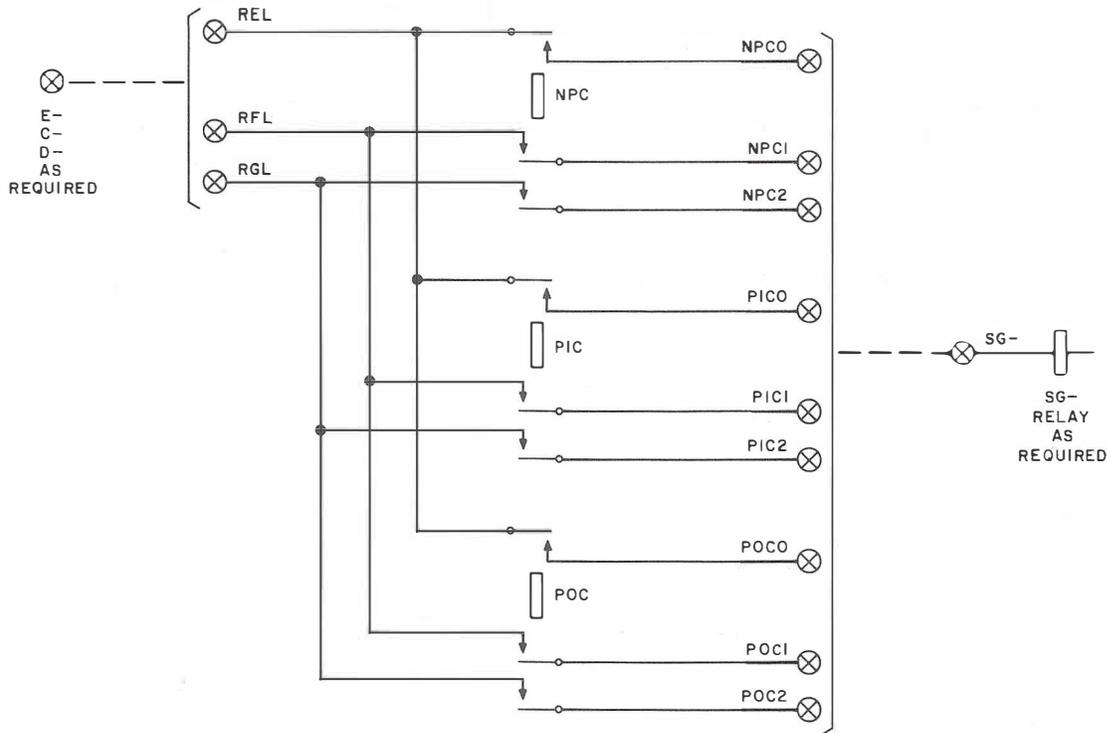


Fig. 22—Typical Cross-Connections for Additional Screening Control

E. Assignment of Terminals for Interchangeable Codes Feature Under Prefix Control

2.47 In offices where three-digit codes must be used interchangeably as central office and area codes, a new dialing plan arrangement may be made whereby the prefix 1 or 0 may be used to recognize the following three digits as an NPA code for 10-digit calls. The same three digits with no prefix digit will be recognized as a central office code for 7-digit calls. Where this feature is introduced, cross-connections may be placed as required in three distinct phases. These phases are based on the need to make all cross-connection changes and some of the circuit modification with decoders out of service, to make such changes on one decoder at a time, and to facilitate an orderly change. In Phase A, circuit modification is done, but the existing dialing plan with 0 and 1 prefix being used for 7- and 10-digit calls remains in effect. This allows the required circuit modification to be done at a convenient pace, since these changes can be made long before interchangeable codes are actually required. Prior to Phase B, customers must be instructed on the new dialing plan with all 10-digit calls requiring prefix 0 or 1. Cross-connection changes for Phase B are suggested

prior to the actual need for interchangeable codes. Phase C adds cross-connections for interchangeable codes at the time such codes are actually required. Phases B and C can be performed at the same time if necessary.

2.48 PHASE A: In phase A, when modifications of the decoder are completed, cross-connections are placed as shown in Fig. 23 or Fig. 26 and 27. These cross-connections permit duplication of the existing dialing plan, prefix 0 or 1 being used to route 7- and 10-digit calls to special operator or TSP. (See 2.43 through 2.45.) Fig. 23 applies in offices arranged for remote zone registration. Fig. 26 and 27 apply in offices arranged for combined remote and local zone registration.

2.49 PHASE B: In Phase B, cross-connections remain as placed in Phase A except for those shown in Fig. 24 or 28. Changing these cross-connections requires the use of the new dialing plan, prefix 1 or 0 being used to designate 10-digit calls. In this phase, no interchangeable codes are used. Fig. 24 applies to offices arranged for remote zone registration. Fig. 28 applies to offices arranged for combined remote and local zone registration.

2.50 PHASE C: In Phase C, additional cross-connections are placed as shown in Fig. 25 or 29. These cross-connections are for actual interchangeable codes. This feature allows NPA codes to be used as central office codes, and central office codes to be used as NPA codes. Fig. 25 applies to offices arranged for remote zone registration. Fig. 29 applies to offices arranged for combined remote and local zone registration. See pages 27-38 for Fig. 23-29.

2.51 When decoders arranged for remote zone registration have been modified for the new dialing plan, terminals NPA, ZOB, Z1B, TDB, NCB, and Z1A appear in the SG section of the cross-connection field in the originating frame and the supplementary frame. Terminals RHA-D, NPA_, NPB_, P1A_, P1B_, P0A_, P0B_, RR, RR1, and RR2 appear in the R terminal strip in the originating frame and the supplementary frame.

2.52 When decoders arranged for combined remote and local zone registration have been modified for the new dialing plan, terminals RH1 through RH24 appear in the SG section of the cross-connection field in the originating frame. These terminals, as well as terminals RH25 through 34 and RH35 through 44, appear at the bottom of the decoder frame. Terminals RH1 through RH44 also appear in the R terminal strip in the supplementary frame. Terminals NPA_, NPB_, NPC_, P1A_, P1B_, P1C_, P0A_, P0B_, and P0C_ are located in the R terminal strip at the originating frame and may also appear near the bottom of the first supplementary frame. Terminals NPD 0-9, P1D 0-9, P0D 0-9, NPE 0-9, P1E 0-9, P0E 0-9, NPF 0-9, P1F 0-9, and P0F 0-9 are located in the terminal strips at the bottom of the decoder frame, and may also appear near the bottom of the first supplementary frame. Cross-connections from terminals located on terminal strips near the bottom of the decoder or supplementary frame are run through the wiring duct provided to facilitate the placing of such cross-connections.♦

F. Diversion of PBX Restricted Traffic

2.53 Where the PBX is so equipped, PBX outgoing extra charge or restricted calls may be diverted to the PBX operator. Operation of the decoder DRA or RAD relay from route and zone translations results in a ground on the TDV lead

to the sender, which directs the sender to reverse the tip and ring after completion of dialing. On PBX lines only, such reversal operates a polar relay in the trunk circuit to divert the call to the PBX operator.

2.54 Routes that require the diversion feature, when furnished, are cross-connected as follows (Fig. 8 and 9):

- (a) Route relay E terminals are cross-connected to the RD, RDL, TDB, or RDNP terminal (Fig. 6 and 10) directly or through the service relay A_ or B_ terminals instead of to the RB or Z0 terminal.
- (b) Zone reroute relay ZE terminals are cross-connected to the RD, RDL, TDB, or RDNP terminal (Fig. 6 and 10) instead of to the RB or Z0 terminal.
- (c) If the decoder is so arranged, routes cross-connected to the Z1, Z2, Z3, Z4, or Z5 terminal will invoke the diversion feature.
- (d) If the decoder is so arranged, routes using SG relays will invoke the diversion feature.
- (e) If the decoder is so arranged, cross-connection to the CH terminal will invoke the diversion feature.

Note: If decoders are not equipped as in 2.56 and 2.57, senders are wired for talking selection 3 so that 0 operator and long distance calls will be diverted to the PBX attendant. (Refer to Table A, Note 1.) On this class of service, the diversion signal to the PBX is the normal battery tip side and ground ring side condition of the 0 operator or long distance trunk.

G. Assignment of Service Relay Contacts

2.55 Service relays are associated with different classes of service to provide for the differences in treatment that must be provided by the decoder. A separate service relay is provided for each class of service that differs from any of the other classes of service in the type of treatment received on calls to office codes or in the routing to operator codes. The class of service associated with each

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service relay should be entered in the proper column of a chart as shown in Fig. 3.

Note 1: The service relay associated with a particular class depends upon the link indication and the wiring of the senders.

Note 2: If a separate service relay is provided for dialing of keypulsing A switchboard operators, arrangement is usually made to permit the completion by the operator class of all calls which may be completed by any class of customer except calls to special service operators and vacant codes. Provision may be made, however, to deny operators access to any route by providing a substitute routing for such calls to a keypulsing vacant code. If a separate service relay is not provided for dial operators, the operator class is served by the service relay assigned to the class of customers which has the most extensive dialing privileges. A separate service relay is always assigned to keypulsing operators. The K service relays (SAK, SBK, etc), when provided, are used for this purpose; otherwise, any of the other sets of numbered service relays may be assigned.

2.56 A maximum of nine classes of service may be provided for in the decoder. If six or less common contacts are required, SA1 through SA8 and SAK relays are provided, as required, depending on the number of different classes of service that must be recognized by the decoder. The SA₋ relays provide six service common contacts, C1 through C3 and D1 through D3. If additional common contacts are required, the respective SB₋ relays are provided to furnish six additional service common contacts, C4 through C6 and D4 through D6. Similarly, corresponding sets of SC₋, SD₋, SE₋, and SF₋ relays may be provided, each set furnishing six additional common contacts for a maximum of 36 contacts.

2.57 *The C₋ and D₋ terminals* are common to all service relays. Terminals C1 through C9 and D1 through D9 appear on rows of terminals in a cross-connecting field on the originating frame as shown in Fig. 6. They are also multiplied to an appearance in a cross-connecting field on the supplementary frame as shown in Fig. 14 and to the 3-digit individual translator or route grouping frame, if provided. Terminals C10 through C18 and D10 through D18 appear on rows of terminals in a cross-connecting field on the supplementary

frame as shown in Fig. 14 and on the 3-digit individual translator or route grouping frame, if provided.

2.58 *The A₋ and B₋ terminals* (A1 through A9 and B1 through B9) associated with the SA₋, SB₋, and SC₋ relays appear on the service relay contact terminal strip on the originating frame. (See Fig. 6.) The A₋ and B₋ terminals (A10 through A18 and B10 through B18) associated with SD₋, SE₋, and SF₋ relays appear on the service relay contact terminal strip on the supplementary frame. (See Fig. 14.)

2.59 For each class of service, the A₋ and B₋ terminal corresponding to the C₋ or D₋ terminal assigned to a particular service group or office code group is assigned for cross-connection.

2.60 For each class of service for which the call is to be completed over the routing supplied by the associated route relay, the A₋ or B₋ terminal is assigned to one of terminals RB, RD, TS, CH, or Z0 through Z5 according to the charge treatment required for that class as indicated in Table A.

Note: When BL (route block) relays are provided, the A₋ terminal will be assigned as just described and the corresponding B1 terminal assigned to a G (ground) terminal. (See Fig. 16.)

2.61 For each class of service for which a substitute routing is to be provided, the A₋ or B₋ terminal is assigned to either the SG terminal associated with the service group relay or the ZR terminal associated with the zone reroute relay assigned for that routing. The use of SG relays is covered in 2.63 through 2.66. The use of ZR relays is covered in 2.67 through 2.70.

Note: When BL (route block) relays are provided, the A₋ terminal will be assigned as just described. The associated B₋ terminal should not be cross-connected. (See Fig. 16.)

2.62 For each class of service when operator codes, vacant codes, and restricted code groups are cross-connected directly to C₋ or D₋ terminals (no route relays assigned), the associated A₋ or B₋ terminal corresponding to the C₋ or D₋ terminal used for the particular code or code group is assigned for cross-connection to the SG₋ terminal associated with the service group relay assigned for that routing. (See Fig. 7 and 13.)

H. Assignment of Service Group Relays

2.63 SG (service group) relays are assigned for cross-connection to the A₁ and B₁ terminals of service relays, or to the 0 and LD code point terminals, either to provide regular routing for the different classes of service or to provide substitute routings for certain classes of service, as described in subsequent paragraphs. The windings of the SG relays appear on rows of terminals designated SG which are located on the 20-point terminal strip shown in Fig. 6. These terminals are multiplied to terminals SG1 through SG20 on both the upper and lower service relay contact terminal strips on the supplementary frame as shown in Fig. 14. A like numbered route relay is permanently associated with each SG relay.

Note 1: SG relays cannot be used to provide routings requiring talking selection 1 when the associated senders are equipped with TS1 relays since the associated route relays operate to the equivalent of the RB or Z0 terminal, which does not cause the operation of the sender TS1 relay. If other talking selection or charge conditions are required, use the zone reroute (ZR) relays.

Note 2: In the earlier decoder installations, route relays were not associated with SG relays and the SG relays directly controlled the selections.

2.64 In those cases where two or more routings are required for operator codes or for vacant code and restricted code groups (no route relays assigned), SG relays are used to provide regular routings for the different classes of service. An SG relay must be assigned to provide for each such routing. The same SG relay can be used for different classes of service where the same routing is involved. (See Fig. 7.) The same SG relay cannot be used for routings to the special service operator (dial 0) and to the restricted code operator if a different class setting is required for restricted codes in order that the sender may be required to await the dialing of the numerical digits.

Note: Calls from keypulsing A switchboard operators to these codes or code groups are usually routed to the keypulsing vacant code trunk group (a group of terminals permanently made busy) in order to give a reorder signal. An SG relay is provided for this purpose.

2.65 When one or more classes of service dial an office code to which they are denied dialing privileges but which is accessible to some other class of service, it is necessary to cancel the normal routing and substitute a routing to the special service operator. Different substitute routings may be provided for different classes of service. An SG relay is required for each such routing to the special service operator. Although these routings may use the same trunk group provided for regular calls to the special service operator, different SG relays from those providing the regular routings must be assigned in order to transmit the proper class-of-call setting to the sender. In the usual case, the same SG relays assigned for the restricted code group can also be used for denied service. (See Fig. 15.)

2.66 When a coin class dials an office code that is outside the local charge zone and provision is made for completing these calls on a direct dialing basis, it is necessary to cancel the normal routing provided by the route relay and substitute a routing via a dial coin zone outgoing trunk. The dial coin zone trunk circuit places supervision of coin deposits under control of an operator. An SG relay is required for each combination of rate and station delay condition to be handled. In order to reduce the number of service group relays required, only two station delay conditions are recognized, that requiring the sender to wait for a possible fifth numerical digit and that not requiring the sender to wait.

I. Assignment of Zone Reroute Relays

2.67 ZR (zone reroute) relays are assigned for cross-connection to the A₁ and B₁ terminals of service relays to provide substitute routings for certain classes of service. Each ZR relay has an associated R relay and functions in a manner similar to an SG relay.

2.68 The ZR terminals are provided for connection to service relay A₁ or B₁ terminals and are located in the ZR terminal cross-connecting field on the supplementary frame. (See Fig. 14.) The terminals in this cross-connecting field are available for connection to service relay A10 through A18 or B10 through B18 terminals. The ZR terminals are also multiplied to the upper and lower service relay contact terminal strips on the originating frame. (See Fig. 6.) This makes them available for cross-connection to service relay contact A1 through A9 or B1 through B9 terminals.

2.69 A ZE terminal is provided for each ZR relay for cross-connection to the RB, RD, RBL, RBT, RDL, NCB, TDB, RDNP, TS, CH, REL, RFL, RGL, or Z_ terminal. Terminals ZE1 through ZE18 appear on the lower service relay contact terminal strip on the supplementary frame, and ZE19 and ZE20 terminals appear on the upper service relay contact terminal strip on the supplementary frame. (See Fig. 14.)

2.70 When codes are routed through crossbar tandem on remote control zone registration trunks for one class of customers and through another routing arranged for local zone registration for another class of customers, the code points are

wired to R terminals for the individual route relays assigned to the remote control routing through crossbar tandem. The E terminals of the route relays requiring the same charge treatment are strapped together and cross-connected to a service common contact C_ or D_ terminal. The associated A_ or B_ service relay contact terminals for classes of service receiving remote control zone registration treatment are cross-connected to terminal Z0. The associated A_ or B_ service relay contact terminals for classes receiving local zone registration treatment are connected to the ZR terminal of the ZR relay assigned for the local registration routing. The corresponding ZE terminal is cross-connected to the proper charge Z_ terminal. (See Fig. 30.)

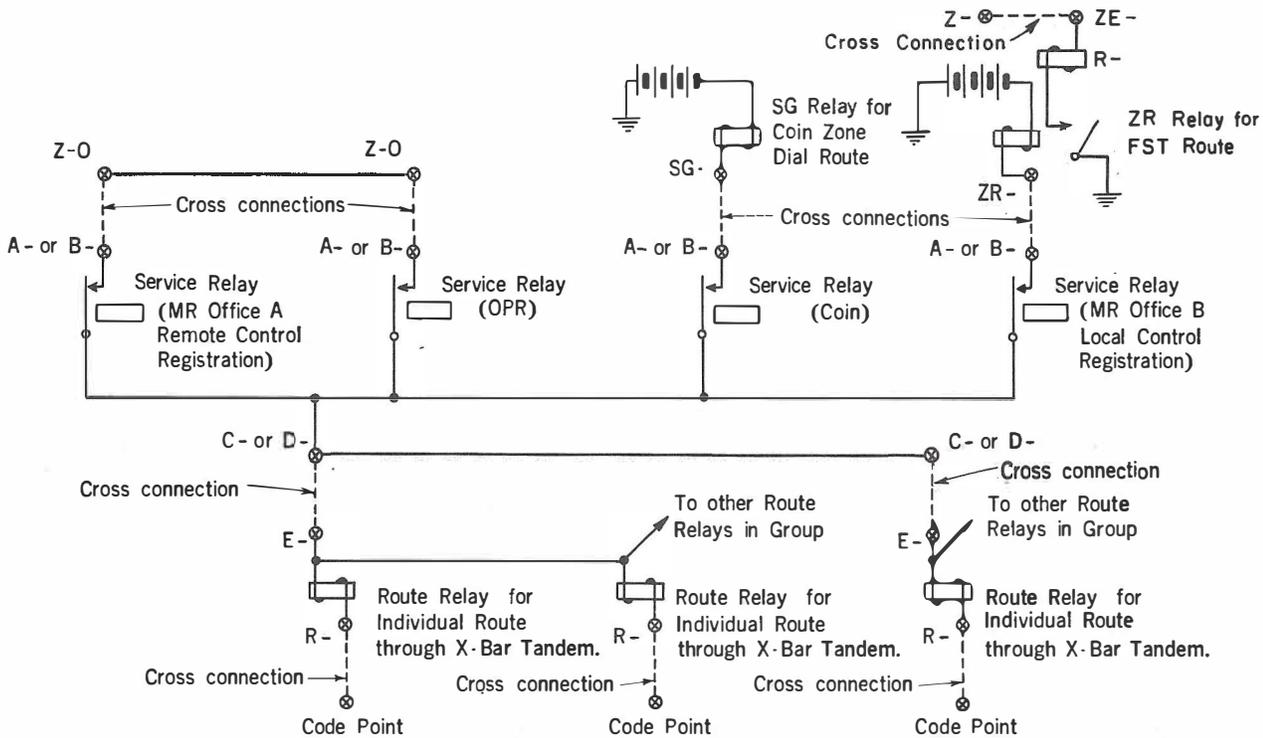


Fig 30—Typical Cross-Connections for Codes with Route Through Crossbar Tandem for Message Rate Class in Office A and Operator Class, Coin Zone Dial Route for Coin Class, and Route Through Full Selector Tandem for Message Rate Class in Office B

J. Assignment of Special Route Relays

2.71 Special individual route relays, usually route relays 291 through 300, may be provided when it is necessary to establish a substitute routing for certain classes of service. The special route relay functions in the same manner as the ZR relays.

2.72 The R terminals, located on the lower route relay terminal strip (Fig. 4), are provided for cross-connection to code point terminals. Cabled to the R terminals are BR terminals, located below the ZR terminals (Fig. 6), which are cross-connected to the service relay C₋ or D₋ terminals. The R terminals, located on the upper route relay terminal strip (Fig. 4), are provided for cross-connection to the service relay A₋ or B₋ terminals. The AE terminal is provided for cross-connection to the RB, RD, TS, CH, RBT, REL, RFL, RGL, RBL, NCB, RDNP, RDL, RDNP, or Z₋ terminal. The R, RB, and AE terminals are provided for each special route relay.

2.73 When a route is provided through crossbar tandem with remote zone registration for one class of customers and another route with local zone registration for another class of customers, the code point is cross-connected to a special R terminal on the lower route relay terminal strip. The BR terminal is cross-connected to a service relay C₋ or D₋ terminal. The associated A₋ or B₋ service relay terminal for the class of service receiving local control zone registration treatment is cross-connected to the special R terminal on the upper route relay terminal strip. The AE terminal is cross-connected to the required Z₋ terminal. The A₋ or B₋ service relay terminal for the class of service receiving remote control zone registration treatment will be assigned to a regular route relay and cross-connected to its associated R terminal. The E terminal of the regular route relay will be cross-connected to the Z₀ terminal. Restricted classes of service can have their associated A₋ or B₋ service relay terminals cross-connected to an SG terminal. (See Fig. 31.)

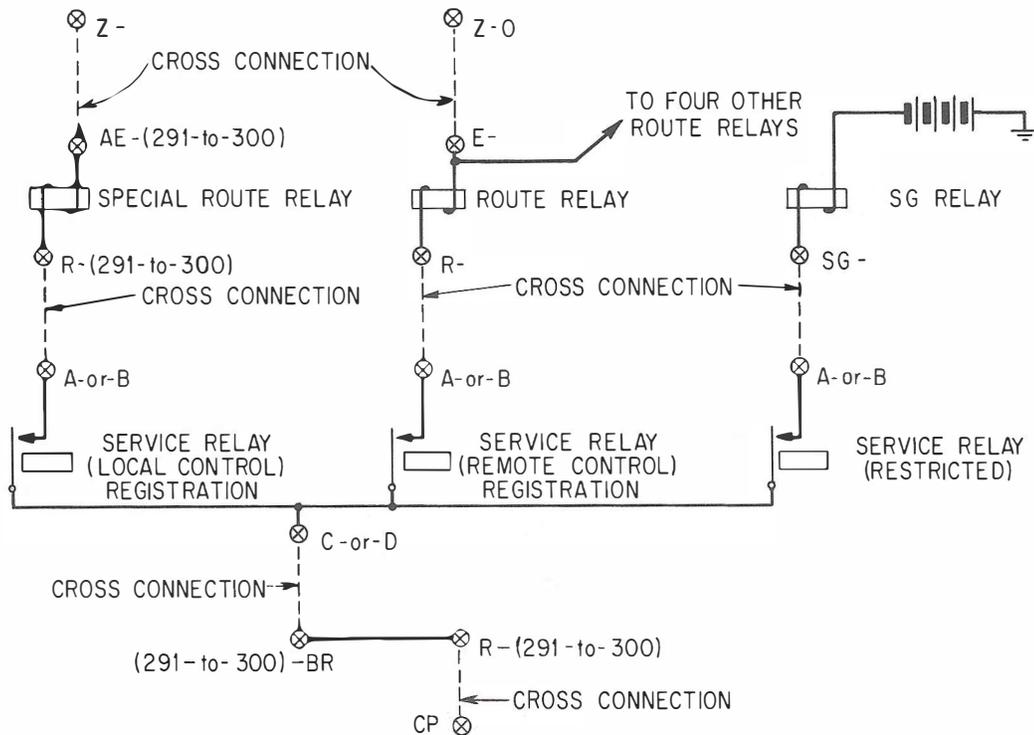


Fig. 31—Typical Cross-Connections for Routes Using Local and Remote Control Registration and a Route for Restricted Classes if a Special Route Relay is Provided

K. Assignment of Route Relay Contacts to Transmitting Relay Windings

2.74 Each route relay has six make contacts which are wired to terminals designated CL, CR, DB, DG, OB, and OG, respectively. These terminals are located on separate 3-point terminal strips and are individual to each route relay. A typical arrangement of these terminals is shown in Fig. 32 which covers the CR terminals. The operation of the route relay grounds each of the associated terminals.

Note 1: In early installations where route relays are not associated with SG relays, the SG relays are arranged to ground their associated terminals.

Note 2: In some earlier installations, the six traveling springs of each set of five route relays are multiplied and connected to six terminals designated H, J, K, L, M, and N. For all such route relay sets assigned to offices in an office code group not restricted to any class of service, these terminals are cross-connected to G terminals. For those assigned to office codes in an office code group which is restricted to certain classes of service, these terminals are cross-connected to like lettered terminals of the BL relay associated with the office code group.

2.75 There are six groups of transmitting relays controlled by the contacts of the route relays, each of the six contacts controlling one group. These provide the six major and six minor items of information required by the sender on each call. Each relay in the transmitting group has two windings, a primary and secondary. These windings are wired to the P and S rows of punchings, respectively, on the corresponding 12- or 20-point terminal strip shown in Fig. 32.

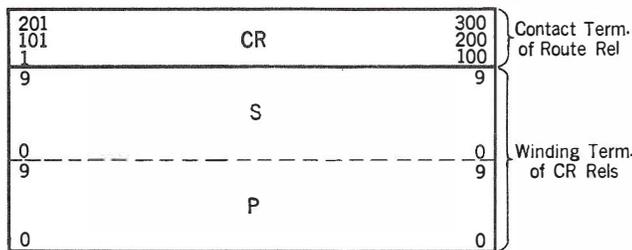


Fig. 32—Typical Terminal Location

2.76 The assignment of route relay contacts CL, CR, DB, DG, OB, and OG to relays in the corresponding transmitting relay groups is determined by the information to be sent to the sender. This assignment should be made in accordance with the requirements in 2.72 through 2.87. These are summarized in the decoder translation chart (Fig. 33).

2.77 As the assignment for each combination of major and minor selection for each route relay is completed, these data should be entered in the proper columns of a chart as shown in Fig. 2.

CL Terminal

2.78 When decoder is not arranged to provide Direct Distance Dialing routings or when decoder is arranged to provide a Direct Distance Dialing routing with only 10-digit MF outpulsing, the CL terminal of each route relay is assigned to the P or S terminal of one of the CL0 through CL9 relays according to the class of call and whether the preliminary coin test is to be canceled. If no coin senders are served by the decoder, the S terminal should be assigned in all cases. The classes of calls which are shown abbreviated in Fig. 33 are as follows:

FS ♦ Full selector classes. Used for rever-
sive pulsing routes to panel, crossbar,
ESS offices or step-by-step offices routed
via crossbar tandem. ♦

O-RC Operator restricted code class. Sender
awaits numerical digits. Substitute
routing to special service for restricted
or denied codes, calls to vacant code
intercepting trunks, and announcement
trunks when the sender is to be re-
quired to await completion of dialing.

PCIT Panel call indicator tandem class.

FST Full selector (panel sender) tandem
class.

PCI Panel call indicator direct class.

10 DGT 10 digits dialed, 10 digits MF outpulsed.

OPR Operator direct class. Sender does not await numerical digits. Special service and 3-digit operators; 3-digit test codes; permanent signal; calls to vacant code tone trunks; calls to vacant code intercepting trunks when sender is not to be required to await completion of dialing. Substitute routing to special service for restricted classes of service dialing 10-digit foreign area codes; 10-digit foreign area code calls routed to vacant code tone or intercepting trunks to prevent the attachment of an auxiliary sender.

OPR-T Operator tandem class. Sender does not await numerical digits. Three-digit operator codes routed via panel call indicator tandem or panel sender tandem.

The preceding classes also apply in any case where the calls are routed through crossbar tandem.

2.79 When decoder is arranged to provide Direct Distance Dialing routings with 4-, 5-, 7-, 8- and 10-digit MF outpulsing, the cancel coin test (CCT) feature is not provided and the CL-P terminals are made available as additional CL-S terminals for the MF classes of call. (See Fig. 34.) The additional classes of call which are shown abbreviated in Fig. 33 are as follows:

- 7 DGT 7 digits dialed, 7 digits MF outpulsed or 8 digits dialed, 8 digits MF outpulsed.
- 7 DGT-SKP 2 7 digits dialed, first 2 digits deleted, 5 digits MF outpulsed.
- 7 DGT-SKP 3 7 digits dialed, first 3 digits deleted, 4 digits MF outpulsed.
- 10 DGT-SKP 3 10 digits dialed, first 3 digits deleted, 7 digits MF outpulsed.

200		300	CONTACT TERM. OF ROUTE REL
100	CL	200	
1		100	
5		5	WINDING TERM. OF CL REL
4		4	
2	S	2	
0		0	
9		9	
8	S	8	
6		6	

Fig. 34—Typical Terminal Location

2.80 When the auxiliary senders are equipped with features for reconstruction of recycled area codes, the CL terminals are cross-connected as indicated in Table B.

TABLE B

NUMBER OF DIGITS		RECONSTRUCTION OF AREA CODE	CROSS-CONNECT CL
DIALED	OUTPULSED		
10	10	Yes	CL6S (7DG)
10	7	No	CL8S (7DG-SK3)
	4	No	CL7S (7DG-SK2)
10	7	No	CL8S (7DG-SK3)
	5	No	CL7S (7DG-SK2)
10	5	No	CL7S (7DG-SK2)
	4	No	CL8S (7DG-SK3)

CR Terminal

2.81 The CR terminal of each route relay is assigned to the P or S terminal of one of the CR0 to CR9 relays according to the sender compensating resistance required and the trunk guard (TG or MTG) relay to be used. The method of determining the compensating resistance required for office selections and selections beyond office is covered in the section on use of compensating resistance.

2.82 Sender compensating resistance, 900 for office selections and 600 for selections beyond, is required between the subscriber sender and auxiliary sender on MF routes.

2.83 The MTG relay is used on all panel, crossbar, ESS, and full selector crossbar tandem trunk groups where the loop resistance, including any compensating resistance, is 1300 ohms or less except on routes requiring PCI or MF outpulsing.

2.84 The TG relay is used on all panel, crossbar and ESS trunk groups where the loop resistance is over 1300 ohms and on all other type trunk groups regardless of loop resistance.

DB Terminal

2.85 The DB terminal of each route relay is assigned to the P or S terminal of one of the DB0 to DB4 relays according to the district brush and talking selections required. The relation of the various talking selections with respect to operator class calls and charge conditions is covered in Table A.

2.86 The DB terminal of a route relay providing a routing to be used only for calls from keypulsing operators over manually selected outgoing trunks to crossbar tandem or to office selector tandem is assigned as follows:

- (a) To the S terminal of the DB5 relay if the skip district selections indication (operate the sender ND relay) is to be provided by the decoder.
- (b) To the S terminal of the DB0 relay if the skip district selections indication is provided by the selected trunk.

2.87 The DB terminal of a route relay that provides a routing for customer dialed calls through crossbar tandem or office selector tandem and is also used for routing calls from keypulsing operators over manually selected trunks is assigned as covered in 2.85.

DG Terminal

2.88 The DG terminal of each route relay is assigned to the P or S terminal of one of DG0 to DG9 relays according to the district group selection required and whether or not the sender TW relay is to be operated. On skip district calls, the district group selection should be considered to be 0.

2.89 The sender TW relay should be operated whenever the route is one which requires the sender to add time before indicating a stuck sender or to transmit call indicator pulses before releasing when the call is abandoned while awaiting assignment. These routes are: (1) distant (2-wire) office selectors, (2) crossbar tandem trunks, (3) panel sender tandem district selectors, (4) automatic display call indicator trunks, and (5) dial coin zone outgoing trunks to panel sender tandem. The sender TW relay is not operated on routes requiring an auxiliary sender.

OB Terminal

2.90 The OB terminal of each route relay is assigned to the P or S terminal of one of the OB0 to OB9 relays according to the office brush selection and station delay required. When office selections are not required, the OB terminal is usually assigned to the P or S terminal of the OB0 or OB5 relay depending on the station delay.

Sender Control of Auxiliary Sender

2.91 The station delay setting of the sender determines whether the sender should await the dialing of a digit on the station register and, if a digit is dialed, the order in which the digits will be outpulsed over a trunk or into an auxiliary sender. In addition, on calls to crossbar offices, it also determines whether five additional reverive pulses shall be required for incoming group selection as an office indication. These are required to indicate that the theoretical designation is being called if (1) the trunk group is used for calls to both A and B offices of a combined terminating unit to cause office B to be selected, or (2) the trunk group is used for calls to both the physical and theoretical designations and rate discrimination is required. The station delay symbols and their application are as follows:

- A** (1) Calls to manual offices having both numbers over 9999 and station letters.
- (2) Calls to manual offices outside the local zone charge area having numbers over 9999 or station letters, or both, and the decoder is arranged to complete such calls via dial coin zone trunks to panel sender tandem. In this case, only one service group relay is provided for calls requiring the sender to await a fifth numerical digit, combining routes which would otherwise require station delays A, B, and D.

Note: With station delay A, station letters must not be assigned to line numbers beginning with 10.

- B** (1) Calls to manual offices having numbers above 9999 but no station letters.
- C** (1) Calls to manual offices having neither numbers over 9999 nor station letters.
- (2) Calls to panel offices.

- (3) Calls to crossbar offices, except to office B or theoretical designation of a combined crossbar terminating office using a common incoming trunk group.
 - (4) Calls to ESS offices.
 - (5) Call to step-by-step offices.
 - (6) Calls to 0- and 3-digit operators, permanent signal, vacant code tone trunks, and all other OPR class calls.
 - (7) Calls to vacant code intercepting trunk and restricted service operator when the sender is not to be required to await completion of dialing.
 - (8) Calls requiring an auxiliary sender for MF outpulsing where no more than seven digits will be dialed.
- D**
- (1) Calls to manual offices having station letters but no numbers over 9999.
 - (2) Calls to office B or the theoretical designation of a combined crossbar terminating unit using common incoming trunks when the sender is arranged to transmit high-five incoming group selection. If the call is routed via crossbar tandem, the tandem sender must be arranged to receive high-five incoming group selection as an office indication.
 - (3) Calls to vacant code intercepting trunks and restricted service operators when the sender is to be required to await dialing of possible fifth numerical digit.

- (4) Calls requiring an auxiliary sender for MF outpulsing where ten digits are dialed.
- (5) Calls requiring an auxiliary sender for MF outpulsing where eight digits may be dialed (manual offices, routed through an MF tandem, which may have station letters, numbers over 9999, or both).

Note: With station delay D, station letters may be assigned to line numbers beginning with 10, except in areas where keypulsing operators complete calls to such offices via manually selected keypulsing outgoing trunks to panel sender tandem. In that case, the decoder is not used and the sender treats all calls as if station delay A were used.

Decoder Control of Auxiliary Sender

2.92 If an office is equipped for any code to be treated as an area code, the station delay symbols and their application are as indicated in Table C.

OG Terminals

2.93 The OG terminal of each route relay is assigned to the P or S terminal of one of the OG relays in accordance with the office group selection required. If the decoder is arranged for high-five office brush selection, the OG assignment also determines if the office brush selection shall be increased by five. For skip office calls, the S terminal of the OG5 relay is assigned when the decoder is not arranged for high-five office brush; otherwise, the S terminal of the SO relay is assigned.

**TABLE C
DECODER CONTROL OF AUXILIARY SENDER**

STATION DELAY		OFFICE MANUAL	STEP-BY-STEP, PANEL, CROSSBAR OR ESS LOCAL OFFICES	OPERATOR, 1- AND 3-DIGIT PERMANENT SIGNAL ON 3-DIGIT VACANT CODE	MULTI-FREQUENCY TANDEM
DESIG-NATION	INDI-CATION				
B	SD				Expect 10 digits; call auxiliary sender
C	SD SD1	No number over 9999; no party letters	7 digits dialed	None, 1, 3, 7, or 10 digits dialed	When 7 digits dialed, decoder operates 7DG relay
D	SD1		High 5 incoming group, B office (crossbar)		