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CD-21277-01 Issue 22D Appendix 1AR Dwg Issue 44AR

PANEL SYSTEMS DECODER CIRCUIT FOR USE WITH THREE DIGIT SENDERS

CHANGES

B. CHANGES IN APPARATUS

CIRCUIT DESCRIPTION

- B.1 Added
 - (2TR) 280 BY Relay Fig. AK

Removed

(2TR) UA 49 Relay - Fig. AK

D. DESCRIPTION OF CHANGES

D.1 Sheet 0102:

- (a) Lead X, option "DZ", to Fig. AY or AZ is removed.

D.2 Sheet 0106:

- (a) Options "EA" and "EB" are added to options used table for sheet 0102.
- (b) Reference to Fig. AI is added to Note 191.

D.3 Sheet 0108:

 (a) On Fig. AD, lead 24 is added to sheet 0103, and leads 1, 2, and 3 are added to Fig. AQ.

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- (b) On Fig. AI, leads 2 and 3 are added .to Fig. AK.
- D.4 Sheet 0121:
 - (a) On Fig. AJ, leads 8 and 9 are added to the main figure, sheet 0102,
 - (b) On Fig. AK, lead 9 is added to the main figure, sheet 0102, and leads 2 and 3 are added to Fig. AI.

D.5 Sheet 0123:

- (a) On Fig. AQ, leads 1, 2, and 3 are added to Fig. AD.
- (b) On Fig. AQ, leads 1 and 2 are added to main figure, sheet 0102.

D.6 Sheet 0125:

- (a) On Fig. AY, lead X, option "DZ", to the main figure, sheet OlO2 is removed.
- (b) On Fig. AZ, lead X to the main figure and Fig. AQ is removed.

All other headings, no change.

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CIRCUIT DESCRIPTION

CD-21277-01 Issue 22-D Dwg. Issue 43-D

PANEL SYSTEMS DECODER CIRCUIT FOR USE WITH THREE DIGIT SENDERS

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 This circuit is changed to provide the feature for translating toll routes with prefix one and routes with prefix zero. (Prefix O/1 screening)

A.2 This circuit is changed to provide the feature for translating 11X Service Codes.

B. CHANGES IN APPARATUS

B.1 Added

Figure 26

LAl)	R1324 Relay
NPA) -	R575 Relay
NPB) -	R575 Relay
POA)	R575 Relay
POB)	R575 Relay
Pla)	R575 Relay
P1B)	R575 Relay
PF)	R1324 Relay
PF)	185A Network
LAI)	185A Network
NP)	186A Network
P1)	186A Network
PO)	186A Network

B.2. Added

Figure AX

B5A)	R1302 Relay
11A)	R575 Relay
11B)	R575 Relay
11)	186A Network

D. DESCRIPTION OF CIRCUIT CHANGES

Sheet 0102

D.Ol In main Figure, option "EL" is added for 11X codes and EK option is added to show previous wiring.

D.02 In main Figure, option EG is added for Prefix O/1 screening and option EF is added to show previous wiring.

Sheet 0103

D.03 In Figures A, B and I, option EG is added for Prefix O/1 screening and option EF is added to show previous wiring. Sheet 0104

D.04 In Figure 8, the R relay is removed to Figure AV and AW.

Sheet 0105

D.05 Contact protection networks information is added for Figure 26 and AX

Sheet 0106

D.06 Options EF, EG, EH, EI, EJ, EK and EL are added to the options used table.

Sheet 0107

D.07 In Figure AA, options EG, EH, EI and EJ are added for Prefix O/1 screening and option EF is added to show previous wiring.

D.08 In Figure AB, options EH, EI and EJ are added for Prefix O/1 screening and option EF is added to show previous wiring.

D.09 In Figure X and Y option EG is added for Prefix 0/1 screening.

Sheet 0108

- D.10 In Figure AE option EG is added for Prefix O/1 screening.
- D.11 Figures AV and AW are added for Prefix O/1 screening.

Sheet 0115

D.12 Circuit requirements are added for Figures 26, AV, AW, AX, AY and AZ.

Sheet 0119

D.13 In Figure U, Figure AM information is added to bracket L.

Sheet 0120

D.14 In main Figure, DZ option is added to agree with Western Electric Company manufacturing information.

Sheet 0121

D.15 In Figure AM, option EK is added to show prior wiring and Figure U information is added to bracket K.

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She	et 0123	20. TIME ALARM
D.]	16 In Figure AQ, option EG and leads to	21. GROUNDED RELEASE LEAD
Pre	efix 0/1 screening.	22. PERMANENTLY OPERATED (R) OR (SG) RELAY
She	eet 0124	23. FALSELY GROUNDED "DB" LEAD
D.1	7 Figures 26 and BA are added for Prefix 0/1 screening.	24. CUT OFF RELAYS FOR TESTING
D.1	8 Notes 235 to 240 are added.	25. PEG COUNT AND TRAFFIC USAGE RECORDER
She	et 0125	26. CONNECTION TO DECODER TESTING CIRCUIT
D.1	9 Figures AV and AZ are added for	27. ROUTE TRANSFER
	Prefix 0/1 screening.	28. 10 AND 15 CENT COIN CALLS
D.2	O Figure AX is added for llX Service	29. SPECIAL ROUTE RELAYS
She	et 0126	30. DIVERSION OF RESTRICTED PBX TRAFFIC ON EXTRA CHARGE CALLS
D.2	1 CAD's 17 and 18 are added for Figures 26 and AX.	1. PURPOSE OF CIRCUIT
TND	EX	1.1 This decoder circuit is for use in a panel office in connection with coin
۵ ۱ <u>.</u> '	PURPOSE OF CIRCUIT	and noncoin subscriber senders, keypulsing "A" switchboard senders and local tandem
2.	WORKING LIMITS	Its purpose is to decode the first three
3.	FUNCTIONS	code, and then to set the sender for
4.	CONNECTING CIRCUITS	selecting the outgoing trunk group and properly completing its functions in
5.	SEIZURE OF DECODER	accordance with the class of call and the character of the outgoing trunk.
6.	RECEIVING INFORMATION FROM SENDER	1.2 The decoder is also arranged to oper-
7.	RECORDING CLASS OF SERVICE	for code compression and recycle operation.
8.	TRANSLATING OFFICE CODE AS RECEIVED TO A SINGLE INDICATION	lator circuits used to decode 3 digit trans- office codes for adjacent foreign areas.
9.	PROVISION OF ROUTE RELAYS	2. WORKING LIMITS
10.	VACANT CODES	2.1 None.
11.	OPERATING A ROUTE RELAY AND ROUTE BLOCK RELAY	3, FUNCTIONS
12.	SERVICE GROUP RELAYS - FIG. 4	3.01 A sender at the time when it has registered the office code, seizes
13,	OPERATING A ROUTE RELAY AND SERIES RELAY	an idle decoder out of a common group through a decoder connector, waiting if necessary until the connector and a decoder
14.	SERVICE GROUP RELAYS - FIG. 8	2 00 The decider reading from the shuder
15.	TOLL ROUTE PREFIX CONTROL	the record of office code and
16.	TRANSMITTING INFORMATION TO SENDER	and returns to the sender full information
17.	REGULAR RELEASE OF SENDER	ior selecting a group of trunks and complet- ing all its functions as required by the reoute corresponding to the operated route

- 18. TIME MEASURE
- 19. TROUBLE RELEASE AND CONNECTION TO TROUBLE INDICATOR

relay.

3.03 The decoder is arranged for decoding three digit local area office codes and also for special service operation calls and permanent signals. By a system of cross-connections in each decoder the information furnished to the senders for each and every code is flexible and may be changed at will.

3.04 In offices which serve more than one class of subscriber the decoder receives from the sender a record of the class of the calling subscriber. All calls for unused codes are routed to an operator or a vacant code trunk. Calls for zones free to some subscribers but not to others are routed as dialed, are routed to an operator according to the class of subscliber, or are routed as dialed but the sender set for no charge, single charge or multiple charge as required. In cases where calls to the special service or long distance operator are routed over separate trunk groups which require different sender settings, depending upon the class of the calling subscriber, the decoder makes the proper distinction and sets the sender accordingly.

3.05 When the decoder has transmitted its information to the sender, it sends

a release signal to the sender which releases the connection through the decoder connector; the decoder returns to normal as soon as released by the connector.

All the leads by which the decoder 3.06 receives information as to the code and the class of subscriber are tested on each call, and if any one is open or falsely grounded the connection is not allowed to proceed. The leads by which the decoder transmits information to the sender are also tested, and if any one or more of these which are employed on the call is open or grounded or if any one which is not employed is grounded the connection is not allowed to proceed. Any open, cross or ground in the decoder will also block operation. In any of these cases the decoder after an interval of one or two seconds (as measured by a timing circuit) sends a release signal to the sender over a trouble release lead, thus causing the sender to release the decoder and make a second trial; the sender usually obtaining a different decoder on the second trial.

3.07 Before sending a trouble release signal, the decoder is connected with a trouble indicator circuit (provided the latter is disengatged) and a record is taken of the decoder and sender involved and of certain conditions in the decoder.

3.08 If the decoder is not promptly released after sending a trouble release signal it will actuate an alarm. A permanently grounded release or trouble release or decoder busy lead or a permanently operated route relay also actuate the alarm. 3.09 Provisions are made to open certain connections in the decoder while the decoder test circuit is testing the decoder, and to open other connections while testing connectors.

3.10 Provisions are made to allow the use of codes with zero for the second and third digit, either by "A" operators alone, or by both operators and subscribers.

3.11 Means are provided for operating a peg count register once for every ten operations of the decoder "DG" apparatus or once per operation of the decoder "DH" apparatus.

3.12 Means are provided for connecting the decoder to the decoder test circuit.

3.13 To provide for diverting restricted PBX traffic on extra charge calls by signaling the subscribers sender to reverse the dialing tip and ring at dialing completion.

3.14 Means are provided for connecting the decoder to the timing control circuit for all decoders busy alarm.

3.15 Means are provided for connecting the decoder to the traffic usage recorder circuit.

3.16 The decoder is arranged to operate with a 3 digit individual translator which provides 800 route indications and with a 3 digit common translator which provides a nominal 100 route indications.

3.17 When a subscriber sender recycled call is handled and a 3 digit translator is not available, to timeout in approximately 1 to 2 seconds and summon the trouble indicator in order to obtain a trouble record. The sender is given a trouble release signal through the decoder connector and makes a second trial, usually with another decoder.

3.18 Means are provided to activate a start indication to the 3 digit translator connector for seizure of a 3 digit common translator for decoding the office code of an adjacent foreign area.

3.19 Means are provided to operate the proper route relay for the foreign area from the office code translation obtained from a 3 digit translator.

3.20 Means are provided to register a trouble indication if more than two-out-of-five compressed code register relays are operated or if a compressed code register relay is falsely operated.

3.21 Means are provided for controlling a direct tandem route to an adjacent foreign area and for controlling a route for unused compressed codes,

3.22 Means are provided for registration of a second trial indication from the subscriber sender to prevent a stuck sender condition on second trial timeouts.

3.23 Means are provided for the operation of a peg count pre-route relay when it is required to obtain a peg count of the traffic offered by each one of a number of

individual code points to a common route.

Means are provided for operating a 3.24 peg count register for each recycled call handled by the decoder.

4_ CONNECTING CIRCUITS

When this circuit is listed on a keysheet the information thereon shall be followed.

This circuit will function with the following type circuits:

SD-21193-01	-	Subscriber Sender
SD-21839-01		Subscriber Sender
SD-21382-01	-	Keypulsing Sender
SD-21841-01	***	Local Sender
SD-21967-01		Dec. Conn. Ckt.
SD-21187-02		Dec. Conn. Ckt.
SD-21188-01	•	Dec. Tst. Ckt.
SD-21197-01		Tbl. Ind. Ckt.
SD-21249-01		Misc. Ckt Dec. Fr.
SD-21250-01	-	Misc. Ckt Dec. Test Fr.
SD-21251-01		Misc. Ckt Tbl. Ind. Fr.
SD-21252-01	-	Misc. Ckt Dec. Conn. Fr.
SD-21537-01	•••	Misc. Reg. Ckt.
SD-25482-01	***	Timing Control Ckt.
SD-95738-01		Traffic Usage Recorder
SD-96529-01	-	3 Digit Translator Connector
SD-96530-01		3 Digit Common Translator
SD-96535-01	***	3 Digit Individual Translator

DESCRIPTION OF OPERATION

SEIZURE OF DECODER 5.

When a sender has registered the 5.1 three digits of the office code, or has registered zero for the first digit, or as soon as the sender recognizes the existance of a permanent signal condition, it calls upon the decoder connector for a decoder. The decoders are furnished in a common group, and as soon as any decoder and the decoder connector which that sender uses are idle, the connector and the decoder are seized for the temporary use of the sender, which is connected to the decoder over a number of leads.

Start relay (ST) operates as soon as 5.2 the decoder is seized, and holds until the decoder is released, by means of lead ST. This lead is not cut through to the sender, but is local between the decoder and the connector. This relay controls the time measure circuit of the decoder.

6. RECEIVING INFORMATION FROM SENDER

6.1 After the leads are cut through to the sender, the decoder receives a record of the compressed code, the office code and an indication as to whether the sender is a subscriber or an operator's sender; and if a subscriber sender a record of the class of subscriber making This information is recorded on the call. the call. This information is recorded on relays (CCO), (CCl), (CC2), (CC4), (CC7), (A1), (A2), (A4), (A5), (PS), (PS1) LT apparatus, (B1), (B2), (B4), (B5), (C1), (C2), (C4), (C5), and (Z) LT apparatus for the office code, and as many as required of relays (C1), (D2), (D3), (D3A) and (KS), depending on the classes of subscribers being served and whether operators also are being served and whether operators also are served.

6,11 The decoder receives a record of whether a prefix one, a prefix zero or no prefix is recorded in the subscriber sender. Information is recorded on LAL and PF relays in Figure 26.

Relays Operated Leads Grounded No Prefix LAL LA Prefix One PF \mathbf{PF} Prefix Zero LA1 and PF LA and PF

If the decoder fails for any reason 6.2 to function properly on a first trial its time measure circuit will cause it to notify the sender to release it and make a second trial, for which it usually obtains a different decoder. On a first trial all the recording leads are checked and in case any one of them is open or is falsely grounded, the call is blocked and a second trial is forced. On a second trial this check is not made in case Fig. C is furnished, but it is made in case Fig. D is furnished.

6.3 First Trial Fig. C

6.31 All the recording relays are operated

provided none of their leads are The leads running to operate relays open. or 206 type registers in the sender are grounded by make contacts on those relays, and those running to nonoperated relays or 206 type registers are grounded by break contacts, the latter ground being supplied by the decoder over lead CK1. When the sender has no relay or 206 type registers corresponding to one of these decoder recording relay the corresponding lead is permanently connected in the sender to the CK1 lead so that the decoder will be satisfied on the check by having all of its recording relays operated.

6.32 When all the decoder recording relays are operated, they close a chain to operate relay (CK1) which locks, the ground for operating and locking it being furnished by the decoder connector over lead CK3.

6.33 The operation of relay (CK1) breaks ground from lead CK1. This releases all the recording relays connected to nonoperated relays or 206 type registers in the sender, leaving only those operated which correspond to those operated in the sender. However, if any one of the leads connected to nonoperated relays or 206 type registers in the sender is falsely grounded, the ground will back up in the sender into the CK1 lead, and none of the decoder recording relays will release.

6.34 When any recording relay releases, it breaks the chain which operated relay (CK1). This permits relay (CK2) to operate in series with the (CK1) relay, connecting ground to the contacts of the recording relays. The decoder proceeds with its functions in accodance with the combinations of A, B, C and D recording relays which remain operated.

6.35 When the decoder is connected to translator type sender which has been modified for use with a decoder and either the (PS1) or (Z) relays are operated, the A-, B-, and C- register relays will not be operated. In order to close the check leads to (CK1) and (CK2) relays, contacts on the (PS1) or (Z) relay, whichever is operated, short circuits the chain circuits through the register relays. This will advance the decoder as though all relays had been operated. This also applies to Fig. D.

6.4 Second Trial, Fig. C

6.41 Relay (CK2) is operated at once from the sender over lead CK2. This breaks ground from the CK1 lead without waiting for all the recording relays to operate, and connects ground to their contacts without waiting for some of them to release, thus eliminating the check.

6.5 First or Second Trial, Fig. D

6.51 All the recording relays are operated provided none of their leads are open. The leads running to operated relays or 206 type registers in the sender are grounded by make contacts on those relays or 206 type registers, and those running to nonoperated relays or 206 type registers are grounded by break contacts, the latter ground being supplied by the decoder over leads CK1 and CK2. When the sender has no relay or 206 type registers corresponding to any of these decoder recording relays the corresponding lead is permanently connected in the sender to the CK1 or CK2 lead so that the decoder will be satisfied on the check by having all of its recording relay operated.

6.52 When all the decoder recording relays are operated, they close two chains to operate relays (CK1) and (CK2), which lock, the ground for operating and locking them being furnished by the decoder connector over lead CK3. When the (CK1) and (CK2) have both operated, relay (CK3) operates and locks over the "CK3" lead to ground in the decoder connector.

6.53 The operation of relay (CK3) breaks the locking path for (CK1) and (CK2), leaving them held only by the chains through the contacts of the recording It also breaks ground from leads relays. CK1 and CK2, which releases all the recording relays connected to nonoperated relays or 206 type registers in the sender, leaving only those operated which correspond to operated relays or 206 type registers in the sender. However, if any one of the leads connected to nonoperated relays or 206 type registers in the sender is falsely grounded, the ground will back up in the sender into the CK1 or CK2 lead, and none of the decoder recording relays in that chain will release.

6.54 When at least one recording relay in each chain releases, the chains are broken and relays (CK1) and (CK2) release. But a false ground preventing the release of any relay in one chain will prevent the release of both (CK1) and (CK2)

6.55 The release of relays (CK1) and (CK2), (CK3) remaining locked up, connects ground to the contacts of the recording relays "AB" wiring. When "AC" wiring and Fig. 10 is provided it also operates relay (RC) Fig. 10 which connects ground over lead "RCG" to the (PS) and (A-) recording relays. The decoder proceeds with its functions in accordance with the combinations of A-, B-, C- and D- recording relays which remain operated,

6.6 Second Trial Timeout

6.61 Fig. AJ

If the decoder fails for any reason to function properly on a second trial, the time measure circuit will function to give a trouble release signal to the sender. A trouble release on a second trial causes stuck sender condition.

6.62 Fig. AK

When the registration from the sender to the decoder is checked, relay (CK4) operates to transfer the "TRL" lead from the (GR) relay to the (2TR) relay. If the decoder is seized on a second trial basis, the sender places a yoltage divider network on the "TRL" lead. The (2TR) relay operates to this voltage divider. The (2TR) relay operates relay (2TRA) which locks. If a timeout occurs on the second trial, relay (TM2) of the time measure circuit operates to ground the "BR" terminal of Fig. AK.

to provide a routing to the busy trunk group, assistance operator, or as required. The decoder transmits the routing information and then a release signal to the subscriber sender.

7. RECORDING CLASS OF SERVICE

The circuit is designed to accommodate 7.1 a maximum of nine classes of service, where calls for certain codes are routed differently or charged differently on account of zone service or because certain classes have special routes to the special service operator or the long distance operator. One of these nine classes may be used exclusively for "A" operator's class.

According to the class of service 7.2 the sender grounds any combination of leads D1, D2, and D3, or none, a total of eight combinations, or it grounds the KS lead for the operator's class. Grounding lead Dl operates relay (Dl), lead D2 oper-ates relay (D2), lead D3 operates relay (D3) or (D3A) or both if they are both furnished and grounding lead KS operates relay (KS). When relay (CK2) releases, one of relays (SA1) to (SA8) operates according to which (D) relays remain operated, or (SAK) operates if relay (KS) remains operated. If the number of restricted zones requires additional contacts, other relays are furnished, operating in parallel with (SA1) to (SA8) and (SAK) respectively.

If less than nine classes are re-7.3 quired to be distinguished, only those (D), (KS) and (SA-) relays are required which correspond to the class indications from the senders. The classes furnished are not necessarily the lowest numbered ones, but those determined by the sender indications. If there is no necessity for distinguishing between classes, none of the (D), (KS), and (SA-) relays are required.

The several combinations of leads grounded by the senders the (D) and 7.4 (KS) relays necessarily furnished and operated, and the (SA-) relays operated, are shown in the following table.

T k

The KS lead and (KS) relay are pro-7.5 vided primarily to distinguish between requirements of service for operators and service for subscribers. This lead may also be used to provide for a 9th class of service when required for operator senders. Fig. G provides a translation of 0 as 6 for subscribers and O as O for operators senders, in the B and C digits. When either or both digits are treated the same for all senders approriate loops are provided.

When a 9th class of service is also required Fig. H is used to function with Fig. 9 using the (SAK) relay and also relay (SBK) if required. When only the ninth class is required (B and C digits being uniformly translated) Fig. J is used and loops equivalent to "se" and "ad" are and loops equivalent to the and all are shown in compliance with standard practice (leads 7-6 and 1-3). There is no circuit reason why leads 3-2 and 5-6 equivalent to loops "aa" and "ac" cannot be used. If only one digit is nonuniform, that digit is changed by the (KS) relay and the uniform digit is looped as required.

When Fig. H is provided and not a 9th class, loop "ah" (leads 4-11) provides normal class, with B and C digit as re-quired. When O is translated as O for operator senders, 100 more codes are avail-able than when 0 is translated as 6.

8. TRANSLATING OFFICE CODE AS RECEIVED TO A SINGLE INDICATION

8.1 Relays (A1), (A2), (A4) and (A5) are operated from the A registers in the sender according to the first digit dialed, relays (B1), (B2), (B4), (B5), and (B5') if provided, from the B register according to the second digit, and relays (C1), (C2), (C4) and (C5) from the C magister the the second the first digit register according to the third digit. Relay (PS) is operated in case the sender registers a permanent signal. Relay (PS1) will be operated for a permanent signal and relay (Z) for dial "O" operator code in the case of translator type sender which have been modified for use with decoders.

Leads Grounded	Relays Operated	2 	S Relays Operated		Class
None	None		SA1 to SF1		1
DI	Dl	14.1	SA2 to SF2		2
D2	D2	÷	SA3 to SF3		3
D1 & D2	D1 & D2		SA4 to SF4		4
D3	D3		SA5 to SF5	÷.,	5
D1 & D3	DI & D3		SAG to SFG		ā
D2 & D3	D2 & D3A		SA7 to SF7		7 .
D1. D2 & D3	D1. D2 & D3A	· · · · ·	SA8 to SF8		8
KS	KS	1	SAK to SFK		Operator

8.11 When zero is recorded as the A digit, or when a permanent signal is reworded, no (H) relay operates, but one of the terminals "O" or "PS" will be grounded. In the case of the translator type senders which have been modified for use with a decoder relay (PS1) will be operated for a permanent signal and ground terminal "PS", but when relay (Z) is operated no A register relays will be operated and terminal "O" will be grounded directly.

8.12 The relays for each digit are operated in the following code, the numbers of the relays adding up to the number dialed:

Number	Relays
Dialed	Operated
0 1 2 3 4 5 6 7 8 9	None 1 2 1-2 4 5 1-5 2-5 1-2-5 1-2-5 4-5

8.2 Translation by "Hundreds Relays" -Fig. AL and EA Option

8.21 The first digit of a 3-digit code is some number from 2 to 9. As soon as relay (CK1) releases, one of the hundreds relays whose magnets are designated (HA2) and (HB2) to (HA9) and (HB9) operates as controlled by the (A1), (A2), (A4), and (A5) relays.

8.22 The second digit of a 3-digit code which can be dialed by a subscriber is some number from 0 to 9. When the (CK2) relay releases, one of the pairs of "tens" relays (TAO)-(TBO) to (TA9)-(TB9) operates as controlled by relays (B1), (B2), (B4) and (B5). In case the subscriber dials zero in mistake for letter 0, when Fig. G or H is used the (TA6) and (TB6) relays may be operated the same as if 6 had been dialed; or by alternative wiring the (TAO) and (TBO) relays may be operated.

8.23 The third digit of a 3-digit code which can be dialed by a subscriber is some number from 0 to 9. When the (CK2) relay releases, some one of the ten make contacts of all of the pairs of "tens" relays is grounded, as controlled by the (C1), (C2), (C4) and (C5) relays. If zero is dialed in mistake for letter 0, the number 6 contact may be grounded to make correction, or not. 8.3 Translation by "Fifties Relays" -Fig. AM and EB Option

8.31 The first digit of a 3-digit code is some number from 2 to 9. As soon as relay (CK1) releases, one-half of one of the hundreds relays, whose magnets are designated (HA2) to (HA9) and (HB2) to (HB9) operates as controlled by the (A1), (A2), (A4), (A5), (B5) and (B5') relays.

8.32 The second digit of a 3-digit code which can be dialed by a subscriber is some number from 0 to 9. When the (CK2) relay releases, one of the pairs of "tens" relays (TAO)-(TBO) to (TA4)-(TB4) operates as controlled by relays (B1), (B2), and (B4).

8.33 The third digit of a 3-digit code which can be dialed by a subscriber is some number from 0 to 9. When the (CK2) relays releases, some one of the ten make contacts of all of the pairs of "tens" relays is grounded, as controlled by the (C1), (C2), (C4), and (C5) relays.

8.4 Operator Dialed Code

The second and third digit of a 3digit code which can be dialed by an "A" operator is some number from 0 to 9. In this case the decoder is associated with a sender which connects a ground to the "KS" lead operating the(KS) relay thereby enabling the "A" operator to employ zero for the second and third digits in cases where the zero would otherwise be translated as six. When zero is employed in this manner the (TAO) and (TBO) relays are operated rather than the (TA6) and (TB6) relays.

8.5 The result of operating one (H) relay and one pair of (T) relays, and of grounding one contact on all the pairs of the latter, is to ground one of 800 terminals connected to the contacts of the (H) relays. These terminals represent all 3-digit codes, and together with the terminals "O" and "PS" represent 802 separate indications for any registration the decoder can receive from a sender. One and only one of these terminals will be grounded for each call.

8.6 Decoders Arranged for Operation with 3-Digit Translators. Figs. AM and AQ with DZ and EB Options

8.61 If a signal is received on the "LA" lead relay (LA) operates to indicate connection to the local area translator.
The (LTC) translator connector of Fig. AP or the (LTC1) and (LTC2) relays of Fig.
AN operate to connect the decoder local area translator for the decoding function.

8.62 If the subscriber sender compressed the area code and recycled its "A",
"B", and "C" digit registers, two out of the five "CC-" leads are grounded to register the compressed code digit in the decoder circuit. The operation of the (CC-) relays control the choice of which translator is to be used to decode the 3-digit office code.

8.63 Fig. AQ contains the compressed code register relays and the 3 digit translator selector control. Figs. AN and AP are the translator connector relays for the local area translator in the decoder or for the 3-digit individual translator.

8.64 The compressed code indication is registered on the (CC-) relays in the decoder by the subscriber sender through the decoder connector. The (CC-) relays are operated on a two-out-of-five basis to:

 (a) Operate the (LTC) relay in Fig. AP or (ITCl) and (LTC2) relays in Fig. AN for using the local area translator if the compressed code indicated the home area.

(b) Operate the (ITC) relay in Fig. AP or (ITCl) and (ITC2) relays in Fig. AN for using the 3-digit individual translator if the compressed code indicated an adjacent foreign area requiring more than a nominal 100 routes.

(c) Activate one of the "STS-" terminals to place start battery on one of the start leads to the 3 digit translator connector for the seizure of a 3-digit common translator for the particular adjacent foreign area.

8.65 When the (CK1) and (CK2) relays release, one of the "UO" to "U9", one of the "TNO" to "TN4", and one of the "H2" to "H9" or "H2:" to "H9:" leads to the selected 3 digit translator are grounded as controlled by the (A-), (B-), and (C-) code register relays. The code point is grounded and the proper route relay is operated to handle the completion of the call. The 3 digit translator circuits are similar in operation to the local area translator presently used in the decoder. When the decoder connector releases to break down the connection between the subscriber sender and the decoder, the operated translation relays, the (CC-) relays, and the route relay release.

8.66 The (STR-) relay in Fig. AR is furnished:

(a) To provide a routing for unused (CC-) relay combinations. The unused
"CST-" terminals in Fig. AQ are connected to the "STR-" terminal of Fig. AR. The "ACR-" terminal is connected to provide a vacant code or other routing. (b) To provide a single direct route via tansem to an adjacent foreign area.
The "STR-" terminal of Fig. AR is connected to the proper "CST-" or "EA" terminal of Fig. AQ for routing to an adjacent foreign area that does not require individual code points.

8.67 Operation with 3 digit translators without Prefix Zero and/or Prefix One toll route screening

When Prefix Zero and/or One toll route screening is provided, Fig. AZ replaces Fig. AY.

Relay (LA) operates when the (CC-) relays are normal, a contact on relay (LA) passes the check ground forward to operate the Fifties relays of Fig. AM. Relay (LA) also operates the local area translator connector relays of Fig. AP or AN.

8.7 1-1 Prefix Extended Area Codes

When Prefix One toll routes are provided, the 1-1 Prefix, extended area code routes are removed and either a recycled compressed area code or a ten-digit routing is used.

8.71 Fig. Z and CF Option

When senders register extended area codes having the prefix 1-1 the sender will ground the "EA" lead. For codes other than those having the prefix 1-1 the sender will ground the "LA" lead. The respective (EA) or (LA) relay of Fig. Z will operate but both relays are not operated together. With (LA) relay normal and (EA) relay operated, the code point "EA" will be grounded and the circuit for operating the (H) relays is opened. However if the (PS), (PS1), or (Z) relays are operated, the "EA" terminal is not effective. The "EA" code point is cross-connected to a common route relay, either directly or by way of the service common terminals "C" or "D", with the route relay connected to the assigned "A" or "B"

With the (LA) relay operated and the (EA) relay normal the circuit is closed for the operation of the hundreds code point relays (H).

If both (LA) and (EA) relays are operated the (X) relay is operated. Option CF provides access to the trouble indicator and to the test connector for the "LA" and "EA" leads.

8.72 Fig. AQ and DX Option

When the decoders are arranged for operation with 3 digit translators and the subscriber senders register extended area codes having the prefix 1-1, DX option in Fig. AQ replaces Fig. Z and CF option.

When a subscriber dials a 1-1 prefix code, the subscriber sender either grounds the "EA" lead or the "CC2" and "CC7" leads. If the "EA" lead is grounded, the (EA) relay operates to place battery on the "EA" code point. The "EA" terminal is connected to the "CST-" terminal associated with the proper (STR-) relay to provide the routing. If the "CC2" and "CC7" leads are grounded, the operated (CC-) relays place battery on the "CST9" terminal, which is connected to the proper (STR-) relay to provide the routing.

8.8 11X Service Codes - Figure AX

8.81 When the decoders are arranged to translate 11X service codes, the
(11A) and 11B) relays operate through the (B5A) relay normal and the (B1) and (A1) relays operated. This is the A1 and B1 registration and the CO to 9 lead will be grounded by the "C" relay combination to one of the code points 110 to 119. When the (11A) and (11B) relays are operated, the "fifties" and "tens" relays are normal.

9. PROVISION OF ROUTE RELAYS

9.1 One route relay (R) per Fig. 1 or Fig. 7 is provided for each nontandem route from the district or office frames, and its winding is cross-connected to the corresponding code point or the "R-" terminal is extended over the "R-" leads to the 3 digit translator circuits, so that when that code is registered the (R) relay operates, provided it has a sufficient battery supply on its winding. Two exceptions are the 0 and 211 code points for special service and long distance operators when two or more routings are required for different classes of service. In that case the code points are cross-connected to the windings of service group relays instead of route relays.

9.2 One (R) relay per Fig. 1 or Fig. 7 is provided for all the offices situated in the same zone, having the same stations delay condition, and reached through the same tandem office. All the code points for those offices are connected together to the winding of that relay. In some cases where there are only a few offices in a zone with a certain station delay condition, a separate (R) relay may be provided for each office. If calls for an official code are routed through a tandem office, a separate (R) relay is provided for that code.

10. VACANT CODES

10.1 One (R) relay is provided with its
 winding connected to all vacant code
points.

11. OPERATING A ROUTE RELAY AND ROUTE BLOCK RELAY

11.1 When toll route prefix screening is provided, the use of Fig. 2, 3, 4 for route block and service groups is discontinued and service group relays per Fig. 8 and Fig. AV or AW; or Fig. 25 and Fig. T or N is used.

11.2 The (R) relay (Fig. 1, "DA" wiring) are arranged in sets of five so that the battery ends of their windings and the ground springs of their contacts can be cross-connected according to the zone charge conditions and according to whether for certain classes of service their operation is to be effective or ineffective.

11.3 The (R) relays for codes allowed to all classes have their contacts permanently grounded and their windings fed through resistance (B) or the winding of relay (TSA) or the winding of relay (CHA), or Fig. A. Whenever such a code is registered the proper (R) relay operates and passes tround to the transmitting circuit. If the (R) is fed through (TSA) or (CHA) the latter operates to send the proper charge information to the sender.

11,4 The (R) relays for each restricted zone have their contacts connected to those of the (BL) relay per Fig. 2 which is provided for that zone, and unless the (BL) operates the operation of the (R) is ineffective since it cannot pass ground to the transmitting circuit. Each restricted zone is assigned two make contacts on the (S-) relay for every class of service. One of these contacts oper-ates the (BL) relay by grounding its winding for all classes which can call that zone, but is left disconnected from ground for classes which are denied that zone. The other contact connects the windings of the (R) relays for battery supply according to the class of service calling, either to resistance (B) or relay (TSA) or relay (CHA) of Fig. A if the call is allowed, or to the winding of an (SG) relay per Fig. 4, assigned to that class, if the call is to be denied. If the (R) relay is fed through (TSA) or (CHA) the latter operates to send the proper charge information to the sender. If the (R) is fed through a (SF) the latter operates to route the call to an intercepting operator. In this latter case the (R) may or may not operate: it is immaterial since its contacts are disconnected.

11.5 The (R) relays for codes allowed to all classes have their windings fed through the winding of relay or resistance (ZO), or through the winding of relay (Z1), (Z2), (Z3), (Z4) or (Z5) of Fig. B, according to the zone charge. If there is no zone charging, resistance (ZO) is furnished, otherwise relay (ZO). Depending upon

whether or not the same zone charge applies to all classes of service, this battery feed connection may be made permanently or through a make contact on the (S) relays for every class of service, one make contact being assigned to each zone. Whenever such a code is registered the proper (R) relay operates and passes ground to the transmitting circuit. The proper zone relay also operates to send zone charge information to the sender, if such relays are furnished.

11.6 The (R) relays for each restricted zone have their windings fed through make contacts on the (S-) relays and in series with the (ZO) resistance or relay (ZO), (Z1), (Z2), (Z3), (Z4) or (Z5) of Fig. B for classes to which the zone is allowed, or in series with the winding of an (SG) relay per Fig. 8, assigned to the class, if the zone is denied. If the (R) is fed through a relay of Fig. B both relays operate. If the (R) is fed through an (SG) and (R) does not operate but the (SG) does.

11.7 When both remote control and local zone registration are provided for from the same group of decoders, a special class for remote control transmits the signal from the link and the (R) relay is connected to the C or D terminal of that class (S) relay. The associated A or B terminal is connected to the Z terminal of a relay that will provide the required talking selection by operating the (ZCP) or (ZXS) relay.

11.8 When remote control only is required with decoders wired for Fig. B but not equipped, Fig. I is substituted and connected as per Fig. A.

11.9 When restricted P.B.X. traffic is to be denied completion and no change in talking selections is required, Fig. AA is provided. Routes requiring the diversion feature will have their E terminals crossconnected to terminal RD of Fig. AA directly or by means of the class of service relay terminals depending upon the traffic requirement.

Routes cross-connected to the Zl, Z2, Z3, Z4 and Z5 terminals of Fig. B (Remote Local or no Control Zone Registration) may invoke the diversion feature in accord with optional wiring CH, CJ, CJ, CK, and CL provided in Fig. B.

Routes used in common for different zone requirements per Fig. 25, may crossconnect terminal ZE to terminal RD when no change in talking selections is required and restricted P.B.X. traffic is to be diverted.

12. SERVICE GROUP RELAYS FIG. 4

12.1 When toll route prefix screening is provided, the use of Fig. 2, 3, 4 for route block and service groups is discontinued and service group relays per Fig. 8 and Fig. AV or AW; or Fig. 25 and Fig. T or N is used.

12.2 One (SG) relay per Fig. 4 is provided for each class of service, or several classes, having a separate routing to intercepted operator for restricted codes. It operates in series with (R) relays and passes ground to the transmitting circuit just as an (R) relay does.

12.3 One (SG) relay per Fig. 4 is provided for each class of service, or several clases, having a separate routing for dial zero calls to special service operator when there are two or more routings. Its winding is cross-connected to the O code point through a contact on the (S) relay for its class of service. Similarly (SG) relays are provided for long distance calls when there are two or more routings and cross-connected to the 211 code point (or the 261 or 201 code point when either is the L. D. code point) through contacts on the (S) relays.

12.4 One service group common relay (SGA)
 per Fig. 3 is provided if there are
any (SG) relays. It operates with any
(SG) and has an alarm function.

13. OPERATING A ROUTE RELAY AND SERIES RELAY

13.1 The (R) relays (Fig. 7 or Fig. 1 "DB" wiring) are arranged in sets of five so that the battery ends of their windings can be cross-connected according to the zone charge conditions and according to whether for certain classes of service they are to be allowed to operate.

13.2 When battery thru the (TSA) relay is connected to the (R) relay, that relay also operates to control talk selection.

13.3 The operation of route series relays are controlled by the operation of

the toll route prefix screening relays. If the proper screening relay is operated, the circuit to operate the route relay and the series relay is closed through to the battery supply. If the prefix one is registered when it is not needed, or is not registered when it is needed, then the reroute (RR) punching is activated and the SG relay for the intercept operator is connected to the battery side of the route relay. The 5000 winding of the SG relay, nonoperates the route relay of

Mig. 1 or 7 and the SG relay operates the Noute relay of Fig. AW or AV for the new ioute. If a zero is registered, the SNTO or STO terminal is activated to reroute the call to the special non-toll operator or special toll operator.

14. SERVICE GROUP RELAYS, FIG. 8

.14.1 One (SG) and one (R) relay per

Fig. 8 are provided for each class of service, or several classes, having a separate routing to intercepting operator for restricted codes. It operates in series with (R) relays. The (SG) relay immediately operates the (R) relay associated with it in Fig. 8 and relay (CHA) or (TSA) if furnished. The (R) relay passes ground to the transmitting circuit.

14.2 One pair of (SG) and (R) relays per

Fig. 8 are also provided for each class of service, or several classes, having a separate routing for dial zero calls to special service operator, when there are two or more routings. The winding of the (SG) is cross-connected to the O code point through a contact on the (S) relay for its class of service. Similarly (SG) and (R) relays per Fig. 8 are provided for long distance calls where there are two or more routings, with the (SG) relays crossconnected to the code point 211 or 261 or 201 through contacts on the (S) relays. The (SG) and (R) relays of Fig. 8 may also be used for zone and coin calls.

On Issue 43D, the route relay is removed from Fig. 8 and shown as 14.3 Fig. AV. The route relay per Fig. AW is shown to provide a route relay for use with Fig. 8, when Figures 2, 3, and 4 are replaced by a Fig. 8.

The SG relay per Fig. 8 and the R relay per Fig. AV or AW is used for the Intercept route and the special toll (or non-toll) operator route when prefix zero and/or prefix one route screening is provided.

Z

R R

TOLL ROUTE PREFIX CONTROL - FIGURE 26 15.

15.1 When the sender is connected to the

decoder through the decoder con-nector, ground on the LA and PF leads operate the LA1 and PF relays. Contacts of the LA1 and PF relays are in the check path to operate relay CK1 of Fig. D. When relay CK3 operates to open the check ground on leads CK1 and CK2, relay PF releases if no prefix was registered, relay LA1 releases if prefix one was registered, and relays PF and LA1 remain operates if prefix zero was registered. If both relays release, the X lead is grounded to operate the (X) relay.

15.2 With (LA1) operated and (PF) nonoper-ated, the (NPA) and (NPB), screening relays are operated to provide no-prefix screening.

15.3 With (LA1) nonoperated and (PF) oper-ated, the (PIA) and (PIB) screening relays are operated to provide prefix one screening.

15.4 With both (LA1) and (PF) operated, the (POA) and (POB) screening relays are operated to provide prefix zero screening,

15.5 When 3 digit translators are not provided, the operation of relay (NPA),
(PlA) or (POA) passes the check ground on to Fig. BA and then on to the contacts of the A register relays to operate a "Fifties" relays of Fig. AM.

15.6 When 3 digit translators are provided, the operation of relay (NPA), (PIA) or (POA) passes the check ground on to Fig. AZ and then on to Fig. AQ to operate the (LA) relay of Fig. AZ if the (CC-) relays of Fig. AQ are normal and then to pass the ground onto the contacts of the A register relays to operate a "Fifties" relay of Fig. AM.

15.7 The battery side of the route relays are connected to terminals as follows for toll route prefix screening:

Terminal	Prefix		PBX Toll Diversion	Condition
RB - Fig. A, I	None		No	No talking charge
RBT - Fig. 26	One		No	No talking charge
TS - Fig. A, I	None		No	Talking Charge
CH - Fig. A	None		As required by optional wrg.	Two charge condition
Z - Fig. B	None	art Saint Saint Sai	As required by optional wiring	Zone Registration
RD - Fig. AA	One		Yes	No talking charge
RDNP - Fig. 26	None		Yes	No talking charge

CD-21277-01 - ISSUE 22-D

Terminal	Prefix	PBX Toll Diversion	Condition
NCB - Fig. 26	Prefix Screening not required	No	No talking charge
TDB - Fig. 26	Prefix Screening not required	Yes	No talking charge

15.8 The RR terminal of Figure 26 is cross-connected to an (SG) terminal of Figure 8 to provide a high resistance relay (to nonoperate the original route relay) for operating a route relay for rerouting the call to an intercept operator or as required.

15.9 The SNTD and STO terminals of Fig. 26 are cross-connected to an SG terminal of Fig. 8 to provide a reroute to a special operator on prefix zero dialed calls.

16. TRANSMITTING INFORMATION TO SENDER

16.1 When an (R) relay per Fig. 1, Fig. 7 or Fig. 8, or an (SG) relay per Fig. 4, operates with its contacts grounded, it grounds six terminals designated CR, CL, DB, DG, OB and OG, individual to that relay. The decoder transmits six major and six minor items of information to that sender by means of six groups of transmitting relays, each controlled by one make contact of the operated (R) and (SG) relay. If there is any charging information to be transmitted it is done by a seventh group of transmitting relays operating in series with the (R) relay.

16.2 The seven groups of transmitting relays control seven groups of leads over which the information is transmitted.

The following table gives the master designation of the group of relays, the items of information, and the leads used. In each case the major item is given first in the table and the minor item follows it.

Group	Item of Information	•	Leads	Used	•
CR	Compensating resistance Trunk test relay (TG or MTG):		CR1, CR2, CB5	CR3,	CR4
CL	Class of call Cancel coin test		CL1, CL2, CL4	CL3	
DB DB	District brush or no district Talking selection	•	DB1, DB2, TS	DB3,	ND
DQ	District Group Distant Office or FM tandem		DG1, DG2,	DG4,	DG5
OB OB	Office brush		OB1, OB2,	OB4,	0B5
OG	Office Group	· · · ·	001, 002,	OG4,	005
20 20	Zone charge		TS1, ZC1,	ZX2	

16.3 The CR group consists of relays (CRO) to (CR9), (CRA) to (CRC),
(CRP), (CRS) and (CRX). Relays (CRO) to (CR9) are double wound, one end of each winding being wired to a terminal for cross-connection to the CR terminals of the (R) and (SG) relays; thus on each call the operation of an (R) or an (SG) relay causes the operation of one of relays (CRO) to (CR9). With the (CRO) relay operated none of leads CR1 to CR4 are connected to ground but with any one of relays (CR1) to (CR9) operated either one or two of these leads are connected to ground through the 200 ohm windings of either or both of the (CRB) and (CRC) relays. The secondary windings of the (CRO) to (CR9) relays are connected to battery through the windings of the (CRS) and (CRX) relays in series; the primary windings of these relays are connected to battery through the windings of the (CRP) and (CRX) relays in series. The (CRX) relay operates only when more than one of the numbered relay windings is grounded, in which case the operation of the (CRX) relay causes the operation of the decoder (X) relay thus blocking the call as described later. The relays operated and leads connected to ground for the various compensating conditions are as follows:

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CD-21277-01 - ISSUE 22-D

Office	Trunk	Leads	Grounding	Check
Test	Test	Grounded	Relays Operated	Relays Operated
900 600 300 900 600 300 900 600 900	0 0 0 300 300 300 600 600 600	None CR1 CR2 CR1-CR2 CR3 CR1-CR3 CR2-CR3 CR4 CR1-CR4 CR1-CR4 CR3-CR4	(CRO) (CR1) (CR2) (CR3) (CR4) (CR5) (CR6) (CR7) (CR8) (CR9)	None (CRB) (CRB) (CRB) (CRC) (CRB) (CRB) (CRC) (CRB) (CRC) (CRB) (CRB) (CRC) (CRB) (CRC)

When one of the (CRO) to (CR9) relays is operated through its primary winding the operation of the (CRP) relay connects the winding of the (CRA) relay to lead (CR5) thus telling the sender that the trunk test condition shall be such as is required when the incoming selector is of the type which has battery and ground connected to the trunk while returning to normal. When one of the (CRO) to (CR9) relays is operated thru its secondary winding the (CRS) relay operates instead of the (CRP) relay and does not ground lead CR5.

16.4 Class Group

16.41 Fig. AC

The CL group consists of relays (CLO) to (CL5), (CLA) to (CLC), (CLP),

(CLS), and (CLX). Relays (CLO) to (CL5) are double wound, one end of each winding being wired to a terminal for cross-connection to the CL terminal of the (R) and (SG) relays; thus on each call the operation of an (R) or an (SG) relay causes the operation of one of relays (CLO) to (CL5). The use of the (CLA), (CLB), (CLC), (CLP), (CLS) and (CLX) relays is similar to that described for the corresponding CR relays in the preceding paragraph. The relays operated and leads connected to ground for the various classes of calls are as follows:

Class of Call	Leads Grounded	Grounding Relays Operated	Check Relays Operated
Full selector	None	(CLO)	None
Operator, restricted code	CLI	(CL1)	(CLB)
C.I. tandem	CL5	(CL2)	(CLB)
C.I. direct	CL1-CL2	(CL3)	(CLB) (CLC)
Operator, special or official 3-digit code or permanent signal	CL3	(CL4)	(CLB)
Operator, official C.I. tandem	CL2-CL3	(CL5)	(CLB) (CLC)

When one of relays (CLO) to (CL5) is operated through its primary winding the (CLP) relay operates connecting the winding of the (CLA) relay to lead (CL4) thus telling the sender that coin test is to be cancelled. For offices equipped with both coin and noncoin senders either or both relays (D3) and (D3A) are furnished depending on the class indication from the sender. In some cases the noncoin senders cannot satisfy the decoder for the cancelled coin test conditions and it is necessary to operate the (CLA) relay

locally from either the (D3) or (D3A) relays in order to give a release signal to the sender as hereinafter described.

16.42 Fig. AD - Direct Distance Dialing

The CL group consists of relays (CLO) to (CL9), and relays (CLH), (CLA), (CLB), (CLC), (CLS) and (CLX). The (COIO) relay provides false ground check for the added class leads 7DG, SK2 and SK3. Fig. AD shows added class relays (CL6), (CL7), (CL8) and (CL9). These relays are for

transmitting to the sender information necessary when the sender operates with auxiliary senders for direct distant dialing. Relays (CLO) to (CL9) are double wound, but the primary windings are not to be used. The secondary windings are connected to respective S terminals of the class field terminal strip. The terminals for relays (CL6)-(CL9) are those terminals which originally were designated PO-P3. By doing this, the CL4 lead is dispensed with. This lead can be omitted where the coin test feature of coil senders is not in use. The S terminals for relays (CLO) to (CL9) provide the means for selecting by cross-connections the class information to be transmitted to the sender.

The (CLA), (CLB), (CLC) and (CLS) relays serve to close the checking circuit for the decoder release signal. The classes of call and the relays and leads involved are as follows:

Class Of Call	Leads Grounded	CL Relay Operated	Check Relays Operated	
Full selector	None	(CLO)	None	
Operator, re- stricted code	CLI	(CL1)	(CLC)	(CLS)
C.I. tandem *10DG	CL2	(CLS)	(CLC)	(CLS)
C.I. direct	CT1-CT5	(CL3)	(CLB) (CLC)	(CLS)
Operator, special or official 3-digit code or permanent signal	CL3	(CL4)	(CLC)	(CLS)
Operator, official C.I. tandem	CL2-CL3	(CL5)	(CLB) (CLC)	(CLS)
*7 digit	CL2, 7DG	(CL6), (CLH)	(CLC) (CLB)	(CLS)
*7 digit, skip 2	CL2, 7DG, SK2	(CL7), (CLH)	(CLC) (CLB) (CLA)	(CLS)
*7 digit, skip 3	CL2, 7DG, SK3	(CL8), (CLH)	(CLC) (CLB) (CLA)	(CLS)
*10 digit, skip 3	CL2, SK3	(CL9)	(CLB) (CLA)	(CLS)

*Associated sender operates with Auxiliary sender. When one of relays (CLO)-(CL9) is operated, the (CLS) relay operates. If more than one (CLO)-(CL9) relays operate, the (CLX) relay operates for trouble detection.

Auxiliary senders are arranged for multifrequency outpulsing. A subscriber sender will engage an auxiliary sender for codes having a zero or a one on the B register. In this case ten digits are expected, and the decoder serves its

Relay	Class	
(CL6) (CL7) (CL8) (CL9)	7 digits 7 digits less 2 7 digits less 3 10 digits less 3	

When the 7DG lead is grounded the subscriber sender will engage an auxiliary sender to provide the outpulsing. normal purpose, translating the call as for a tandem PCl class.

To make multifrequency outpulsing available for other than just for B register zero or one codes, the (CL6), (CL7), (CL8) and (CL9) relays are provided as follows:

CL2. 7DG 7 d	pulsing
CL2, 7DG, SK2 5 d CL2, 7DG, SK3 4 d CL2, SK3 7 d	digits digits digits digits

The feature for translating a B or C code zero as a six is dispensed with, and zero must be translated as zero.

Couline Tood

The CL4 lead is retained for decoder connector tests.

16.5 The DB group consists of relays (DBO) to (DB5), (DBA) to (DBC), (DBP),
(DBS) and (DBX). Relays (DBO) to (DB5) are double wound, one end of each winding being wired to a terminal for cross-connection to the DB terminals of the (R)

and (SG) relays; thus on each call the operation of an (R) or an (SG) relay causes the operation of one of relays (DBO) to (DB5). The use of the (DBA), (DBB), (DBC), (DBP), (DBS), and (DBX) relays is similar to that described for corresponding relays in group CR. The relays operated and leads connected to ground for the various district brush selections are as follows.

District Brush	Leads	Grounding	Check
	Grounded	Relays Operated	Relays Operated
0	None	(DBO)	None
1	DB1	(DB1)	(DBB)
2	DB2	(DB2)	(DBB)
3	DB1-DB3	(DB3)	(DBB) (DBC)
4	DB2-DB3	(DB4)	(DBB) (DBC)

When one of relays (DBO) to (DB4) is operated through its primary winding the (DBP) relay operates connecting the winding of the (DBA) relay to lead TS thus telling the sender that the district shall be advanced to the "Talking no-charge position". If one of the (DBO) to (DB4) relays is operated through its secondary winding the sender is thus informed that the district should be advanced to the "talking to operator" position. The (DB5) relay is used in connection with key pulsing "A" switchboard senders and when operated grounds the ND lead to indicate to the sender that district selections shall be skipped. 16.6 The DG group consists of the relays (DGO), to (DG9) (DGA) to (DGE), (DGP), (DGS) and (DGX). Relays (DGO) to (DG9) are double wound, one end of each winding being wired to a terminal for cross-connection to the DG terminals of the (R) and (SG) relays; thus on each call the operation of an (R) or an (SG) relay causes the operation of one of relays (DGO) to DG9). The use of the (DGA) to (DGD), (DGP), (DGS) and (DGX) relays is similar to that described for the corresponding relays in group CR. The (DGE) relay operates when the (DGS) relays operate to furnish additional contacts. The relay operated and leads connected to ground for the various district group selections are as follows:

-	Grounded	1. A.	Relays Operated	1	Relays Operated
0 1 2 3 4 5 6 7 8 9 -	None DG1 DG2 DG1-DG2 DG4 DG5 DG1-DG5 DG2-DG5 DG1-DG2-DG5 DG1-DG2-DG5 TW		(DGO) (DG1) (DG2) (DG3) (DG4) (DG5) (DG6) (DG7) (DG8) (DG9) (DGP)		None (DGB) (DGB) (DGB) (DGB) (DGB) (DGB) (DGC) (DGB) (DGC) (DGC) (DGC) (DGC) (DGD) (DGC) (DGD) (DGC) (DGD) (DGD) (DGD) (DGD) (DGD) (DGD) (DGD) (DGD) (DGC) (DGD) (DGD) (DGC) (DGD) (DGC) (DGD) (DGC) (DGD) (DGC) (DG

When one of relays (DGO) to (DG9) is operated through its primary winding the (DGP) relay operates connecting the winding of the (DGA) relay to lead TW thus telling the sender that the call is routed through a distant office selector or full mechanical tandem.

16.7 The OB group consists of relay (OBO) to (OB9), (OBA) to (OBE), (OBP),
(OBS) and (OBX). Relays (OBO) to (OB9) are double wound, one end of each winding being wired to a terminal for cross-connection

to the OB terminals of the (R) and (SG) relays; thus on each call the operation of an (R) or an (SG) relay causes the operation of one of the relays (OBO) to (OB9). The use of the (OBA) to (OBD), (OBP), (OBS) and (OBX) relays is similar to that described for the corresponding relays in group CR. The (OBE) relay operates when the (OB8) relay operates to furnish additional contacts. The relays operated and leads connected to ground for the various office brush selections are as follows:

CD-21277-01 - ISSUE 22-D

Office	Brush		Leads Grounded	. · ·	Grounding Relays Operated	Check Relays Operated
	0 1 2 3 4	v	None OB1 OB2 OB1-OB2 OB4		(OBO) (OB1) (OB2) (OB3) (OB4)	None (OBB) (OBB) (OBB) (OBC) (OBB)
	0 1 2 3 4		SD SD-0B1 SD-0B2 SD-0B1-0B2 SD-0B4 SD1		(0B5) (0B6) (0B7) (0B8) (0B9) (0BP)	(OBB) (OBB) (OBC) (OBB) (OBC) (OBB) (OBC) (OBD) (OBB) (OBC) (OBA)

The SD lead is grounded as above when the call is to any office other than a manual office with party lines on a jack per line basis or a full selector call when we add five to inc. group selection. When one of relays (OBO) to (OB9) is operated through its primary winding the (OBP) relay operates, connecting the winding of the (OBA) relay to lead (SD1) thus telling the sender that the call is to an office other than manual office with 5-digit line numbers or a high five incoming group class.

When the sender is equipped for "high five incoming group selection" the SD lead is not grounded on a full selector call over a common trunk group to two crossbar offices, for the "high 5" groups.

16.8 The OG group consists of relay (OGO) to (OG9), (OGA) to (OGC), (OGF), (OGS) and (OGX). Relays (OGO) to (OG5) are double wound, one end of each winding being wired to a terminal for cross-connection to the (OG) terminals of the (R) and (SG) relays; thus on each call the operation of an (R) or an (SG) relay causes the operation of one of relays (OGO) to (OG5). The use of the (OGA), (OGB), (OGC), (OGF). Coss and (OGK) relays is similar to that described for the corre- sponding relays in group CR. The relays operated and leads connected to ground for the various office groups selections are as follows:

Office	Leads	Term.	Grounding	Check
Group	Grounded		Relays Operated	Relays Operated
0 1 2 3 4 5 6 7 8 9 50	None 0G1 0G2 0G1-0G2 0G4 0G5 0G1-0G5 0G2-0G5 0G1-0G2-0G5 0G4-0G5 S0	ន ន ន ន ន ន ន ន ន ន ន ន ន ន ន ន ន ន ន	(OGO) (OG1) (OG2) (OG3) (OG4) (OG5) (OG6) (OG7) (OG8) (OG9) (SO)	None (OGB) (OGB) (OGB) (OGB) (OGB) (OGB) (OGC) (OGB) (OGC) (OGB) (OGC) (OGB) (OGB)

Normally, the secondary winding terminal of any relay (OGO) to (OG9) is connected to the "OG" terminal of the (R) or (SG) relay for the desired office group selection. However, under those cases where a "high five" office brush selection is required, any desired office group selection is determined by connecting the primary winding terminal (instead of the secondary winding terminal) of any relay (OGO) to (OG9) to the route relays. Under this condition the "OB5" lead is also grounded thereby adding five to the office brush selection. The (SO) relay, when operated, grounds the "SO" lead to indicate to the sender that the route contains no office selector.

16.9 The ZC group, some or all or none of which may be furnished according to the requirements, consists according to Fig. A of relays (TSA), (TSB), (CHA) and (CHB): or according to the Fig. B of relays (ZC), to (Z5), (ZCO) to (ZC2), (ZCA), (ZCB), (ZCF), (ZCS) and (ZCX). The way relays (TSA), (CHA) or (ZO) to (Z5) operate in series with (R) relays has been described above. If (TSA) or (CHA) operates

its grounds lead (TS1) or (ZC1) through the winding of check relay (TSB) or (CHB) respectively. If one of relays (ZO) to (Z5) operates, it grounds either the secondary or primary winding of one of relays (ZCO) to (ZC2), thus operating one of those relays and either (ZCS) or (ZCP). The use of the (ZCA), (ZCB), (ZCP), (ZCS) and (ZCX) relays is similar to that described for the corresponding relays in group CR.

The relays operated and leads connected to ground for the various charging conditions are as follows; lead TSI serving for the eventual advance of the district to the second or charge talking selection position, lead ZCI serving for the eventual operation of a sensitive relay in the district for multicharge and lead ZC2 serving for the eventual operation of both a sensitive and a marginal relay in the district.

Zone I.Jay Fig. B	Leads Grounded	Grou Relays (Fig. A	nding)perated Fig. B	Relays Fig. A	Operated Fig. B	P, S, and A Relays Operated Fig. B
(ZO) (Z1) (Z2) (Z3) (Z4) (Z5)	None TS1 TC1 TS1 -TC1 TC2 TS1 - TC2	None (TSA) (CHA)	(ZCO) (ZCO) (ZC1) (ZC1) (ZC2) (ZC2)	None (TSB) (CHB)	None None (ZCB) (ZCB) (ZCB) (ZCB)	(ZCS) (ZCP) (ZCA) (ZCS) (ZCP) (ZCA) (ZCS) (XCP) (ZCA)

When the decoder has been wired for Fig. B but not equipped and remote control of zone registration is desired, Fig. I is installed. The operation is similar to Fig. A except that the (CHA) relay is not provided. Provision is made to retain the existing (CO5) relay on modifications where Fig. P will not be used. When both local and remote control zone registration are required in the same decoder group, Fig. B is used with optional apparatus for all required features.

17. REGULAR RELEASE OF SENDER

17.1 Release relay (RL) operates through a chain circuit when the following relays have all operated:

17.11 On grounding relay in each of the first six transmitting groups, and in the ZC group if furnished in accordance with Fig. B.

17.12 All check relays associated in the above tables with the operated grounding relays in the seven transmitting groups.

17.13 Either the secondary relay in each of the first six groups, such as (CRS), or the primary relay and its check relay, such as (CRP) and (CRA); and also in the ZC group if furnished according to Fig. B.

17.14 A typical checking lead is as follows: The RL lead (OBD) is closed to the DGA lead by (DGS) or (DGA) operated. Lead (DGA) is closed to DGB by (DGB) operated. Lead DGB is closed to DGC by (DGC) operated. Lead DGC is closed to DGD by (DGD) operated. Lead DGB is also closed to DGD by (DG1-2-4-5) operated. Lead DGC is closed to lead DGD by (DG3-6-7-9) operated. Lead DGA is closed to lead DGD by (DGC) operated.

17.2 The operation of relay (RL) grounds the RL lead and so operates the sender (RL) relay, provided cross relay (X) has not operated. The (RL) relay in

(X) has not operated. The (RL) relay in the decoder is made slow operating to allow ample time for the operation of the sender register relays before the release signal is sent to the sender.

17.3 The sender then opens the ST lead to the decoder connector, the multicontact relays and other connecting relays associated with converted senders of the connector release, breaking all leads between sender and decoder and all decoder relays which were operated are thus released.

17.4 Relay (X) will be operated by any of the following faults, and its operation will prevent the sending of a regular release signal over lead RL, and so block the call. Relay (X) locks up even if the cause of its operation is momentary.

17.41 A cross which causes two of the numbered grounding relays in any one of the transmitting groups to operate, also causes the operation of marginal relay (CRX), (CLX), (DBX), (DGX), (OBX), (OGX) or (ZCX) as the case may be, and that operates (X).

17.42 A cross which causes two of the grounding relays of Fig. A to operate, also causes the operation of marginal relay (RX), and that operates (X).

17.43 A cross which causes two of relays (SA1) to (SA8) and (SAK) to operate, also causes the operation of marginal relay (SX), and that operates (X).

17.44 A false ground on any of the transmitting leads which is not grounded by a grounding relays, operates (X) directly if Fig. E is used, or operates (X1), or (X2) if Fig. F is used. Relay (X1) or (X2) operates relay (X) thus blocking the call. The reason for furnishing relays (X1) and (X2) is to prevent momentary false closures of the contacts of the marginal cross detecting relays (such as might be caused by relays out of adjustment buzzing on their front contacts when the nonoperate current was flowing in them) from falsely operating register relays in the sender, since these relays might lock, if they were operated when the decoder (RL) relay was operated.

17.45 Relay (XTD) is provided in Fig. AA, (Diversion of restricted P.B.X, traffic on extra charge calls), to safeguard against a false diversion signal to the subscribers senders on nondiverted calls. Relay (XTD) is connected to lead TDV whenever the (TDV) relay is normal, and if a false ground is received on lead TDV relay (XTD) will operate and lock. Relay (XTD) operated grounds lead XTD to the trouble indicator circuit and operates relay (X).

18. TIME MEASURE

18.1 Any open circuit in the decoder, any open or ground on the receiving leads on a first trial, or on a second trial with standard Fig. D, or any open in those transmitting leads which are employed on the call, will prevent the operation of relay (RL). Even if the (RL) relay operates, the release signal will not be sent if the (X) relay operates for any of the reasons given above. Or if the RL lead is open or the release function of the sender or the connector fails, the decoder remains connected to the connector channel until it times out.

18.2 Relay (ST) operates when the decoder is seized, and holds until the decoder is released. It connects operating and locking ground to the time measure circuit which consists of interrupter (TM) and relays (TM1), (TM2), (TM3) and (TM4). These relays are operated and clocked up in that order in case the (ST) relay remains operated long enough.

18.3 On the first back contact closure of the interrupter relay (TM1) operates and clocks; on the next front contact closure relay (TM2) operates; on the next back contact closure the (TM3) relay operates; and on the next front contact closure the (TM4) relay operates. The (TM2) relay is operated in from 1 to 2.3 seconds after the decoder is seized and the relays released whenever the decoder is released.

19. TROUBLE RELEASE AND CONNECTION TO TROUBLE INDICATOR

19.1 If the decoder is held long enough to operate the (TM2) relay, the slow release relay (SR) and trouble release relays (TR) and (TR1) operate. Battery is thus connected to the trouble indicator start lead TIS, providing the trouble indicator busy relay (TIB) is not operated and provided there is no plug in jack (TI). The (TIB) relay will be operated if the trouble indicator is still holding a record of some previous decoder failure or if there is a plug in the (TI) jack which keeps the trouble indicator from responding to the failure of this particular decoder.

19.2 If the trouble indicator is connected to another decoder the battery on the start lead will have no effect, and relay (TIB) operates. If the (TIB) relay does not operate, the trouble indicator is connected to this decoder over the leads designated "To Trouble Indicator Circuit" and to various points in the decoder connector. The trouble indicator circuit then takes a record of the leads which are grounded and then operates the (TIB) relays of all decoders.

19.3 With the (TIB) relay operated or with a plug in the (TI) jack the (CO5) relay operates connecting ground to the trouble release lead (TRL). This causes the sender to release the connector and the decoder, wiping out any record it may have received from the decoder. If it is the first trial the sender will immediately make a second call for the decoder; if this is a second trial a stuck sender results or the call is routed to a busy trunk group.

19.4 When the decoder is released, the (ST), (TM2), (SR), (TR) and (TR1) relays release in that order. The release of relay (SR) is slow so as to hold ground on decoder busy lead DB long enough to insure that the sender shall obtain another decoder for its second trial, provided there is no delay at the connector.

19.5 The battery connection through a contact of the (TRl) relay for the TIS lead also holds the (TIB) relay locked if it is operated. This is to insure that if a trouble condition holds the (TM2) relay operated indefinitely it will not make repeater calls on the trouble indi-cator. It also prevents the trouble indicator from being seized if it becomes disengaged after the trouble release signal is sent to the sender but before the release is completed.

19.6 Relay (TR1) operated, grounds leads IA and DL to the trouble indicator frame circuit and trouble indicator circuit respectively, grounds leads DB and DBA to the decoder connector and decoder test circuits respectively and also grounds lead MR to the test frame circuit.

20. TIME ALARM

20.1 If the trouble release signal rails to release the decoder before the (TM4) relay operates (on account of an open in the TRL lead or a failure of the release functions of the sender or the connector) this grounds leads to the decoder time alarm circuit and alsle pilot. It also grounds the TRL lead in case the previous failure of the trouble. release was due to a fault in the trouble indicator which prevented the (TIB) relay from operating.

GROUNDED RELEASE LEAD 21.

21.1 An RL or TRL lead permanently grounded in the decoder will cause every sender connecting therewith to be released before it has had time to function, resulting in the sticking of the senders. To give notice of this condition grounded release relay (GR) is provided. This operates to a ground on either RL or TRL lead and starts the time measure. If the ground persists the (TM4) relay operates and actuates the decoder time alarm.

22. PERMANENTLY OPERATED (R) OR (SG) RELAY

22.1 An (R) or an (SG) relay, if per-manently operated by a false ground, may send wrong signals to the senders, because although relay X will operate on each call it may not do so quickly enough to block the sending of a release signal over lead RL. To give notice of such a condition relay (RA) is provided in the battery feed to the (R) relays, and (SGA) in the battery feed to the (SG) relay per Fig. 4. These are not marginal and operate whenever an (R) or (SG) relay operates. Their contacts start the time measure. Ordinarily this only supplements the action of relay (ST) and has no effect, but in case one of them stays operated continuously it causes the (TM4) relay to operate and give the decoder time alarm.

FALSELY GROUNDED "DB" LEAD 23.

23.1 In case of a steadily maintained, ground on the "DB" lead, which would hold the decoder permanently busy, interrupter (DB) causes the operation of relay (TM5) and then relay (TM6), and they remain locked as long as the "DB" lead remains (TM6) grounds the "TA" and "TAP" grounded. leads just as does relay (TM4) when it operates, thus giving the decoder time alarm.

23.2 The (CO) relay is operated by the test circuit to disable the decoder time alarm and to prevent calling in the trouble indicator. When the test circuit advances at the completion of test, all decoder relays should be normal. If the (CO) relay does not return to normal at the end of test due to a trouble re-lease condition with "DP" option there will be no alarm. With "DQ" option and Fig. AI at the decoder time alarm will function if the DB lead is grounded, the (TDB) relay is released signifying that the test cir-cuit has advanced and the (CO) relay failed to release.

24. CUT OFF RELAYS FOR TESTING

24.1 Relay (CO) is operated by the decoder test circuit when testing the decoder or when testing connectors in connection with the decoder. This prevents the (TM4), (TM5) and (TR1) relays from operating and thereby prevents the decoder when held by the test circuit from calling the trouble indicator or giving any alarms, but allows. it to give a trouble release.

Relays (CO1) to (CO9) are operated by 24.2 the decoder test circuit when testing connectors in connection with the decoder, This operation removes ground from leads CK1, CK2, CK3, TRL and the transmitting leads to the sender, to allow them to be tested through the channels for absence of false grounds and crosses.

25. PEG COUNT AND TRAFFIC USAGE RECORDER

25.1 "DG" Wiring and Apparatus

Relays (PC1) to (PC8) are provided to supply a ground pulse via the "PC" lead to the peg count register circuit for every ten operations of the decoder. The operation is as follows: with the "PCI" lead grounded by a key in the "Miscellaneous Register Circuit" the (PCI) relay operates and locks when the (RL) relay operates; the (PC2) relay operating and locking when the (RL) relay releases. The next opera-tion and release of the (RL) relay operates and locks the (PC3) and (PC4) relays. The third operation and release of the (RL) relay operates and locks the (PC5) and (PC6) relays. The fourth operation and release of the (RL) relay releases the (PC1) and (PC2) relays: the fifth operation and release of the (RL) relay releases the (PC3) and (PC4) relays, with the (PC3) relay down and the (PC5) relay up the (PC8) relay operates and locks. The (PC4) and (PC5) relays are released in turn and the (PC1) to (PC6) relays are again operated and locked. On the tenth closure of the (RL) relay the (PC1) releases. On the tengh open of the (RL) relay; and with the (PC3) relay operated, ground is connected to the (PC7) relay thereby operating and locking it to the

back contact of the (RL) relay. The (PC7) relay operated connected ground to the "PC" lead to operate the peg count register and releases all other operated relays to prepare them for the following cycle of operations. When the (RL) relay again operates the (PC7) relay releases.

25.2 "SH" Wiring and Apparatus

Relay (PC) is provided to supply a ground pulse to the peg count circuit over "PC" lead. Relay (PC) is operated by the (RL) relay by ground from the peg count circuit over the "PC1" lead. The protection is to reduce wear on the (PC) relay contacts.

25.3 Code Point Peg Count

When a number of code points all have the same route information, they normally operate the same route relay. In those cases where a peg count of the traffic offered to this common route by each individual code point is desired, a (PC--) pre-route relay is furnished for each such code point (Fig. AO). Contacts 1 or 8 of each pre-route relay in the group are \cdot multiple to operate the common route relay, while contacts 2 or 9 operate individual peg count registers. The operation of the (PC--) relay from the grounded code point grounds the "PCT" lead to the miscellaneous register circuit to operate the peg count register for the code point.

25.4 Compressed Code Peg Count

If the decoder is arranged to operate with subscriber senders arranged for code compression and recycle operation, the operated (CC-) relays operate the (CCK) relay. Each operation of the (CCK) relay grounds the "CC-PC" lead to the miscellaneous register circuit to obtain a peg count of all recycled calls handled by the decoder.

25.5 Traffic Usage Recorder

Two leads are grounded to the traffic usage recorder circuit under the following conditions:

MB lead grounded on all service and test calls

MBM lead grounded for plugged busy only

26. CONNECTION TO DECODER TESTING CIRCUIT

26.1 When it is desired to make a routine test of the decoder, battery is connected to the "DBA" and "T" leads from the test circuit and ground is connected to the "DF" lead thereby operating the (TDB), (TA), and (TB) relays. These relays operated, connect the transmitting, receiving and miscellaneous leads to the test circuit for testing purposes.

2.7 ROUTE TRANSFER

Figs. 10 and 11 are furnished for 27.1 transferring routes and may be used in various ways, one typical one is shown below: When long distance calls, code 211, are transferred from a decentralized "A" Board to the Long Distance Board the (RT) Key shown in Fig. 11 is furnished per de-coder. This Key is located at the "A" Board and when operated it operates its associated (RT) relay Fig. 10 provided relay (RC) Fig. 10 is not operated. Relay (RT) locks to relay (RC) operated so that the release of the (RT) Key will not cause it to release and interfere with a call in progress. Relay (RC) prevents the operation of relay (RT) when the decoder is off normal. A Key per decoder is provided so that a small part of the calls can be transferred at one time. Relay (RT) operated lights a lamp at the decoder test frame so that the maintenance force is informed of the status of the decoder.

28. 10 AND 15 CENT COIN CALLS

28,1 Using Fig. 8

10 and 15 cent coin calls are routed through sender tandem where the sender is arranged to hold up trunk guard test until the operator at the local office has re-quested the deposit of 10 or 15 cents depending on the trunk group selected. In order to provide for this routing which is different from the routings provided for noncoin classes it is necessary to cross-connect the E points of the route relays involved through the class of service relay contacts so that on coin calls a service group relay and its auxiliary route relay per Fig. 8 will operate and the regular route relay will nonoperate. A maximum of two service group relays are normally provided for 10 cent calls and two for 15 cent calls, one each for stations delay and no stations Although this may cause the sender delay. to wait for a stations digit in some cases where no stations digit is possible it is felt that the saving of service group relays justifies the delay involved on a relatively small number of calls. Fig. 12 is added to provide extra class of service contacts which may be employed for this coin feature as well as for any other use for which they may be required.

28.2 Using A & M Figs. 2 & 4

When the marker is arranged to use (BL) and (SG) relays per Figs. 2 and 4 the class of service relays must connect these relays in the same manner as previously described for restricted zones. One (BL)

Melay, Fig. 2, is required per charge and restricted zone per stations delay condition. For example, assuming one zone where coin calls and 10 cents, flat rate calls 2 charges and message rate calls one charge; a second zone where coin calls are 10 cents and both message and flat mate calls are 2 charges; and a third zone where coin calls are 15 cents and message and flat rate calls are each 3 charges, a total of 6 Figs. 2 would be required if there were only 2 stations delay conditions, namely delay and no delay in each zone. For the example cited above 4 Figs. 4 would be required, 2 for 10 cent calls and 2 for 15 cent calls, one of each set providing no stations delay and the other providing a delay. The (SC-) relays per Fig. 12 must be furnished if the (SA-) and (SB-) relays do not provide sufficient contacts for controlling these routes.

29. SPECIAL ROUTE RELAYS

29.1 Fig. 14

This figure provides for a code point to be connected to a service group common terminal, and then to route relays by means of A or B terminals.

When it is necessary to provide a route through crossbar tandem with remote control zone registration for one group of districts and a direct route to the same terminating point with local zone registration for a different group of districts, the code point is connected to special R terminal cabled to a BR terminal of Fig. 14. The BR terminal is connected to a service group C or D common terminal. The A or B terminal representing the direct route local registration is connected to the route relay R terminal of Fig. 14 and the AE terminal is connected to the re-quired Z terminal for the charge. The A or B terminal representing the crossbar tandem remote control zone registration is connected to an assigned route relay R terminal, and the E terminal is connected to ZO. Restricted classes will have the A or B terminal connected to an "SG" terminal of Fig. 8. The "BR-" terminal is also extended over an "R-" lead to the 3 digit translators.

29.2 Fig. 25

This figure is an extension of facilities for translating a code into direct routes or crossbar tandem routes. Fig. 25 differs from Fig. 8 in that the associated route relay has a ZE terminal for connection to any Z terminal, while Fig. 8 is always connected to ZO.

With Fig. 25, a code point is connected to an R terminal of a route relay connected for crossbar tandem route, with OB & OG establishing the tandem code. The tandem route E terminal is connected to a service group common terminal. The remote control zone registration classes have the A or B terminal connected to ZO and the crossbar tandem route relay operates. The local zone registration classes have the A or B terminals connected to a ZR terminal, and the associated ZE terminal is connected to a required Z terminal. The ZR and its route relay operates to provide direct route translation, but the series crossbar tandem route relay does not operate.

Restricted classes will have the A or B terminals connected to an SG terminal of Fig. 8.

30. DIVERSION OF RESTRICTED PBX TRAFFIC ON EXTRA CHARGE CALLS

When extra charge calls dialed by P.B.X. subscribers are to be denied machine completion, the panel system pre-viously required these P.B.X. lines to be segregated so that the service class sig-nal could be established which the decoder translates for denied route. The use of centralized automatic message accounting, extended area dialing or F.A.C.D. makes it important to divert these P.B.X. extra charge calls without requiring line segregation or service class marks and without loading this denied traffic on the M.S.A. switchboard. On this issue a P.B.X. Extra Charge Diverting feature is provided. This feature causes the sender to reverse the dialing tip and ring after dialing completion on all extra charge calls requiring it. The reversal serves no purpose on non-P.B.X. lines, but on the P.B.X. lines a polar relay in the P.B.X. trunk circuit responds to the re-versal and diverts the call to the P.B.X. operator or P.B.X. tone diverting circuit. Panel central office equipment thereby is released early.

30.1 P.B.X. Diversion Feature Fig. AA

In order to cause the subscribers sender to invoke the tip and ring reversal at dialing completion, which is a function of the P.B.X. diversion feature, the decoder must provide a signal determined by the particular route and zone translations involved in the P.B.X. diversion feature. For this purpose Fig. AA, comprised of relays (RAD), (TDV), (TDK) and (XTD) is provided.

30.2 P.B.X. Diversion Signal

The (RAD) relay controls the diversion feature and may be operated by direct cross-connection or by means of optional wiring provided to control the start of the diversion feature which will be described in paragraph 31.3.

The operation of the (RAD) relay operates the (TDB) relay and relay (TDV) transfers the "TDV" lead from the winding of relay (XTD) to the winding of the (TDK) relay, also it transfers the operating circuit of relay RL under control of the (TDK) relay and grounds the TM interrupter to guard against sustained false operation. The (TD) relay operates in series with a relay in the subscribers sender which constitutes the diversion signal. Relay (TDK) operated closes the operating circuit of the (RL) relay and grounds lead "TDK" to the trouble indicator circuit. The (RL) relay operates and the sender and decoder release in the normal manner.

If the (TDV) relay is operated and the (TDK) relay circuit is open, the (RL) relay will not operate and the decoder will block time and call the trouble indicator to record the failure. The sender is given a trouble release and may attempt a second trial to complete the call.

The function of relay (XTD) is described in paragraph 16.45.

30.3 Route Auxiliary Diverting Relay (RAD) Fig. AA

Routes that do not require a change in talking selections and do require the diversion feature will have their E terminals cross-connected to terminal RD, of Fig. AA, directly or by means of the class of service terminals A and B and then to terminal RD. Code point ground connected

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to the R terminal of the particular route relay causes the operation of relay (RAD) in series to battery.

Routes cross-connected to terminals Zl, Z2, Z3, Z4 and Z5 of Fig. B, (Remote Local or No Control Zone Registration), may invoke the diversion feature by operating relay (RAD) under control of optional wiring CH, CI, CJ, CK and CL respectively, provided in Fig. B.

Routes used in common for different zone requirements, (per Fig. 25, may invoke the diversion feature, if no change in talking selections is required, by crossconnecting terminal ZE to terminal RD which operates the (RAD) relay.

Zero operator and 211 routes which were previously cross-connected to terminal RB of Figs. A and I or to terminal 20 of Fig. B shall be cross-connected to terminal RD of Fig. AA to invoke the diversion feature.

Restricted routes that would normally be restricted to the intercepting operator by means of cross-connection to terminals SG of Figs. 3 or 8 will, when the diversion feature is provided, operate the (RAD) relay and invoke the diversion feature.

When Fig. A is provided and it is desirable to divert restricted P.B.X. traffic on those routes cross-connected to terminal CH, optional wiring provided in Fig. AA, enables the operation of relay (RAD) in series with relay (CHA) of Fig. A.

DEPT, 2364-JFP-RJJ-DB

Page 22 22 Pages