28 STUNTBOX MECHANISM

AND PRINCIPLES OF CDC ASSIGNMENTS ON THE BROADCAST CIRCUIT

ASSOCIATED WITH A DATA SWITCHING SYSTEM

1. GENERAL

1.01 This section describes the stuntbox arrangements devised so that the broadcast lines can accept the Data Switching System format, and gives the principles (imposed by the machine design) which underlie the choice of CDCs for the various interconnected lines.

1.02 Because current plans for a data switching system do not provide for the use of group codes, it is necessary to add a broadcast circuit arranged so that a number of stations can be called at the same time by a single 2-letter CDC. For this purpose one or more 83B2 selective calling lines are used (the number depending on the traffic requirements), which are interconnected by reperforator-transmitters. At the customer's option, such a broadcast circuit may also be used for the delivery of multiple address messages with more than a specified number of addresses, say 5. In addition, the design of automatic address stations receiving messages from planes in the air is simplified by letting them feed their traffic directly into the broadcast circuit.

1.03 One major difference in operating such a broadcast circuit as compared with an ordinary 83B2 system is that the order in which the CDCs appear at the head of a message is determined by the customer's operating arrangements, for instance, the order in which cities appear on an airline's flight path. It is thus not possible to follow the usual rule that all of the CDCs valid on the originating line must appear in the format before the RT cuton code, with offline CDCs appearing only after the cuton code. On the contrary, in the broadcast circuit case, the CDCs may appear in any order, with valid and nonvalid codes (for a particular originating line) mixed in any way in which they happen to occur.

1.04 The broadcast circuit design features discussed herein have three principal objectives:

(1) To prevent the sending transmitter from stopping on any CDC which is nonvalid for the line.

(2) To require that transmitter stop take place, on valid codes only, on the first CDC letter. With the prescribed format, this first letter will always immediately follow either a V, and M, or a LTRS character.

(3) To enlarge the capacity of the typing unit so that a particular station can respond to a large number of CDCs.

1.05 With the plan discussed herein, it is possible to assign a separate group of first CDC letters to each of the lines of the broadcast system and to leave a wide freedom of choice for the selection of the second letters, which, on a particular line, may be either valid or nonvalid letters.

1.06 A typical arrangement of a broadcast circuit associated with a data switching system is shown in Figure 1, together with the valid CDC first letters proposed for each of the lines.

COAST LINE
VALID 1ST CDC LETTERS
C I N (1, 3, 5)

WEST LINE
VALID 1ST CDC LETTERS
A D E F J K S U (1, 5)

EAST LINE
VALID 1ST CDC LETTERS
B X Y Z (1, 2, 5)

FROM
RADIO STATION

FROM
RADIO STATION

DALLAS

ATLANTA

LEGEND:
1 MEANS 1 SPACING
1 MEANS 1 MARKING, ETC.
REPERFORATOR-
TRANSMITTER (RT)

FROM
DATA SWITCHING
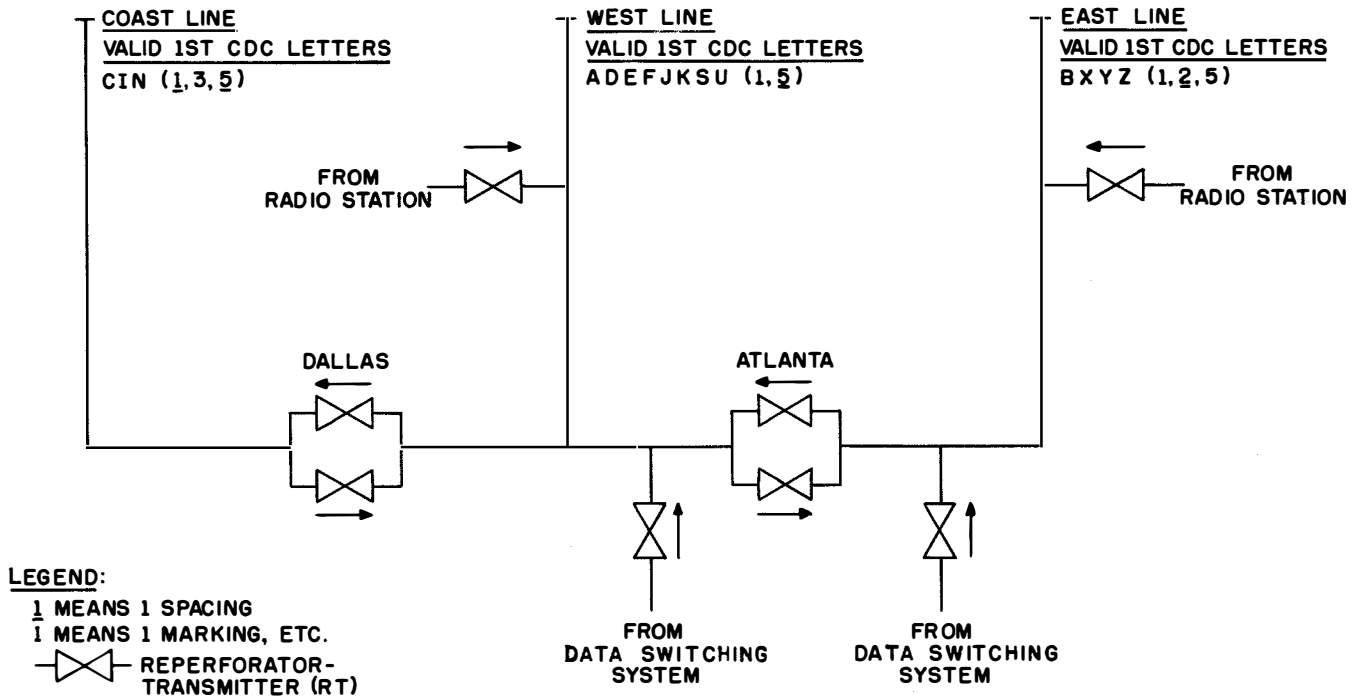SYSTEM

FROM
DATA SWITCHING
SYSTEM

Figure 1 - Typical Layout of Broadcast Circuit Associated with a
Data Switching System, with First CDC Letter Assignments

1.07 As Figure 1 indicates, identification of the CDCs valid for a particular line is made by the particular sets of code elements. For example, on the East line the valid first CDC letters are those which have elements 1 and 5 marking and element 2 spacing. The 2 spacing was added to assure that a LTRS character (1 and 5 marking) would not cause unwanted operation. On the Coast line 3 marking was added to prevent unwanted operation on BLANK (1 and 5 spacing).

1.08 The lines are interconnected by 28-type reperforator-transmitters (RTs). Access from the DDD network can be had into the East and West lines, with a connection to the Coast line through RTs at Dallas. The valid CDC first letters indicated for each line permit indiscriminate mixing of online and offline codes on all of the lines without stopping the transmitter on the sending line except on codes valid for that line.

2. TYPING UNIT STUNTBOX

A. Transmitter Start-Stop Control

2.01 The layout of the typing unit stuntbox is shown in Figure 2. The purpose of the mechanism in slots 34-37 is to control the starting and stopping of the transmitter which is sending to the line.

2.02 In normal 83B2 operation when the transmitter sends a CDC, the first CDC letter operates a contact to stop the transmitter; actual stoppage does not take place until the second CDC letter and the LTRS character have been sent. The transmitter then waits for the V answerback from the called station. This recloses the contact so that the next CDC is sent in the same way or, if all of the CDCs have been sent, the end-of-address code.

2.03 If, however, an offline CDC, nonvalid for the sending line, were sent, the transmitter would also stop unless means were provided to prevent it. Since there is no station on the line with that CDC, there would be no V answerback and the message would go to intercept.

2.04 The arrangement of the mechanism in slots 34-37 is like the M/V not-letters mechanism in the standard 83B2 system stuntbox. Slot 34 is occupied by a function lever, operated either by V or M; whenever this function lever is operated, the function lever in slot 35 is also operated simultaneously and latched, thereby

unblocking the function bar in slot 36. The function lever in slot 35 also operates and latches when a LTRS character is received. The function lever in slot 36 operates when a valid online CDC first letter is received, and it latches to a latch release stud on the function lever in slot 37; it also opens a contact to stop the transmitter. Receipt of a V answerback momentarily operates the function lever in slot 37 to unlatch the function lever in slot 36 which, in turn, closes the contact to restart the transmitter. The complete operating cycle for both valid and nonvalid codes will be described later.

B. Mechanism for Multiple Group Codes

2.05 In the stuntbox for the 28L typing unit, the number of slots available for CDC use is limited. The typing unit used in the data switching system must be capable of responding to individual CDCs as well as to a large number of group codes in many instances. To give the increased CDC coverage necessary, the blocking bail mechanisms in slots 15-21 and slots 22-27 are used. A more detailed explanation of their operation is given in 5.

2.06 With this arrangement, for slots 15-21, a single first CDC letter may be associated with any one of five second letters. If the function bars in slots 16-20 are coded for multiple response, as discussed below, with, for instance, four letters in each slot, a larger number of CDCs can be realized. (Practical considerations, involving possible duplications, mean that it is not necessarily possible to obtain 5 times 4 or 20 CDCs with this combination.)

2.07 Some increase is possible by using multiple-letter function bars in the first-letter slots, 15 and 21. However, the use of this feature is severely limited by the necessity of preventing false cutons by unexpected duplications. For example, assume that the first letter slots at a particular station responded to both A and E, and one of the second letter slots responded to D. The code AD applies to this station. The apparently different code ED could not now be assigned to another station because if ED were sent both station ED and station AD would cut on. In general, it is suggested that the first letter slots be limited to a single letter, with multiple letters used in the second letter slots as required.

2.08 The mechanisms in slots 22-27 allow the use of one other first letter, with a maximum of 16 second letters (4 times 4) in slots 23-26.

FUNCTION	CHARACTER		SLOT	
		SPACE	1	
		FIGS.	2	
		LTRS	3	
		CAR. RET	4	LS
END OF MESSAGE		UC-H	5	LS
(DISCONNECT CODE)		LTRS	6	
2-LETTER TSC	S		7	LS
OR ROTR CDC	S		8	LS
SIGNAL BELL	P	UC-S	9	
2-LETTER CDC	S		10	LS
FOR ANSWERBACK	S		11	LS
LATCH RELEASE BAIL ——→		LINE FEED	12	
END OF ADDRESS	S	CAR. RET	13	LS
(LOCKOUT)	S	LINE FEED	14	LR
	S (1ST CDC LETTER)		15	LS
	S (2ND CDC LETTER)		16	LR
GROUP CODES	S		17	LR
COMMON	S		18	LR
1ST LETTER	S		19	LR
T.U. CONTROL	S (2ND CDC LETTER)		20	LR
	S (1ST CDC LETTER)		21	LS
	S (1ST CDC LETTER)		22	LS
	S (2ND CDC LETTER)		23	LS
GROUP CODES	S		24	LR
COMMON	S		25	LR
1ST LETTER	S (2ND CDC LETTER)		26	LR
T.U. CONTROL	S (1ST CDC LETTER)		27	LS
	S		28	LS
TWO 2-LETTER CDCs	S		29	LR
T.U. CONTROL	S		30	LS
	S		31	LR
END OF MESSAGE		UC-H	32	LS
(DISCONNECT CODE)		LTRS	33	
	S	M/V	34	F
AUTOMATIC TRANSMITTER	S	LTRS	35	LS*
STOP-START CONTROL	S	⊕	36	LR*
	S	M/V	37	
CONTROL CIRCUIT FOR		BLANK	38	LS
OPEN CIRCUIT INDICATION		BLANK	39	
	P	LINE FEED	40	
		(VERT TAB)	41	
		(FORM FEED)	42	

GROUP CODE
ANSWERBACK

UNIVERSAL CONTACTS
OPERATED BY
STRIPPER BLADE
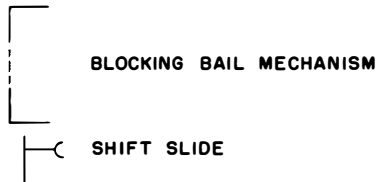
LEGEND:

BLOCKING BAIL MECHANISM

SHIFT SLIDE

LS   FUNCTION LEVER LATCHED UNDER STRIPPER BLADE.

LR   FUNCTION LEVER LATCHED UNDER LATCH RELEASE BAIL.

LS* FUNCTION LEVER IN SLOT 35 UNBLOCKS FUNCTION BAR IN SLOT 36.

LR* FUNCTION LEVER IN SLOT 36 IS UNLATCHED BY FUNCTION LEVER
     IN SLOT 37.

S   OPERATES ONLY IN THE SELECT CONDITION.

P   OPERATES ONLY IN THE PRINT CONDITION.

⊕   FUNCTION BAR IN SLOT 36 IS CODED FOR FIRST CDC LETTER FOR
     THE CIRCUIT INVOLVED; SEE FIG. 1.

F   FUNCTION PAWL IN SLOT 34 OPERATES FUNCTION LEVER IN SLOT 35.

Figure 2 - Stuntbox for Use in 28Y Typing Units at RO, KSR, and ASR Stations

2.09 As is pointed out in the section covering installation of function parts on a 28 stuntbox, it is possible to manufacture function bars which will respond to any one of the 8, 16, or 32 characters. Such a device would be difficult to handle in practice and it has therefore been assumed here that the process would not be extended beyond four characters per function bar.

Answerback on Group Codes

2.10 The answerback to a group code comes from only one of the stations called by that code. In cases where a number of group codes are used on a line, different stations would ordinarily be designated for each of the group codes. This distributes the contacts and wiring needed among the stations, and reduces stuntbox congestion at any particular station.

C Function-Bar Response

2.11 At some stations the typing unit will have to respond to a large number of CDCs or group codes. Because of the slot limitations in the stuntbox, it is necessary to arrange some of the function bars to respond to either one of two characters or to any one of more than two characters. Tables 1, 2, and 3 list the letter combinations available for function bar response to two- or four-letter combinations. While the letter combinations shown are primarily intended for the second CDC letters, they are not limited thereto. The method of coding function bars by breaking off tines is covered in detail in the section covering installation of function parts on a 28 stuntbox.

TABLE A

TWO-LETTER COMBINATIONS

AE	DE	HP	PQ
AJ	DF	HT	QU
AU	DJ	HY	QW
AW	ES	IP	QY
BD	EZ	IU	SU
BO	FK	JK	SY
BX	FN	JR	TZ
BZ	FS	KU	WZ
CI	FX	LP	XY
CK	GL	LT	YZ
CN	GO	LW	
CR	GR	OT	

TABLE B

FOUR-LETTER COMBINATIONS

(with no function characters)

ADEJ	CFKN	HLPT
AESU	CIKU	HPQY
AEWZ	CJKR	HTYZ
AJKU	DEFS	IPQU
AQUW	DFJK	LPQW
BDEZ	ESYZ	LTWZ
BDFX	FKSU	QSUY
BOTZ	FSXY	QWYZ
BXYZ	GLOT	

TABLE C

FOUR-LETTER COMBINATIONS

(with function characters)

| AIU(LF)	CIR(LF)	GLW(FIGS)
AJR(LF)	CNR(CR)	GOR(CR)
AJW(FIGS)	DFN(CR)	HIP(SP)
AWL(LF)	DJR(CR)	HSY(SP)
BDJ(FIGS)	ETZ(BL)	ILP(LF)
BDO(CR)	FKX(LTRS)	ISU(SP)
BGO(FIGS)	FNS(SP)	KQU(LTRS)
BWZ(FIGS)	GJR(FIGS)	QXY(LTRS)
CIN(SP)	GLR(LF)	

Legend:

(FIGS) - Figures   (SP) - Space
(CR)   - Carriage Return (LF) - Line Feed
(LTRS) - Letters   (BL) - Blank

Note: These combinations have been included inasmuch as the characters FIGS, LF, etc, would not interfere with the remaining valid characters of the combinations. These combinations should be restricted to the second CDC letters.

3. SEQUENCE SELECTOR UNIT STUNTBOX

3.01 The layout of the stuntbox in the 28E sequence selector unit is shown in Figure 3. This particular sequence selector unit is designed to control RTs associated with an 83B2 broadcast circuit used with a data switching system. The RTs may interconnect two 83B2 lines or they may provide the access from the DDD network into the 83B2 system.

FUNCTION		CHARACTER	SLOT		
			1		
			2		
			3		
END OF MESSAGE (DISCONNECT CODE)		FIGS.	4	LS	
		H	5	LS	↑H↓
		LTRS	6		
END OF ANSWERBACK CODES	S	Y	7	LR	YV
	S	V	8	LR	
LATCH RELEASE BAIL →			9		
			10		↑
END OF MESSAGE (DISCONNECT CODE)		FIGS.	11	LS	
		H	12	LS	↑H
		LTRS	13		
END OF ADDRESS (LOCKOUT)	S	CAR. RET	14	LS	CR LF
	S	LINE FEED	15	LR	
2-LETTER TRANSMITTER START CONTACT	S		16	LS	AM
	S		17	LS	
THREE 2-LETTER CDCs	S		18	LS	BY
	S		19	LS	
	S		20	LS	BI
	S		21	LS	
	S		22	LS	BC
	S		23	LS	
2-LETTER TRANSMITTER START CONTACT	S		24	LS	CM
	S		25	LS	
THREE 2-LETTER CDCs	S		26	LS	FY
	S		27	LS	
	S		28	LS	FI
	S		29	LS	
	S		30	LS	FC
	S		31	LS	
			32		
AUTOMATIC TRANSMITTER STOP-START CONTROL	S	M/V	33	F	
	S	LTRS	34	LS✱	
	S	⊕	35	LR✱	
	S	M/V	36		
CONTROL CIRCUIT FOR OPEN CIRCUIT INDICATION		BLANK	37	LS	BB
		BLANK	38		
V ANSWERBACK		V	39		V
R-Y TEST	S	UNIV	40		
	S	Y	41		
	S	R	42		
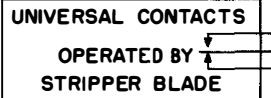
UNIVERSAL CONTACTS
OPERATED BY
STRIPPER BLADE

LEGEND:

⌐C SHIFT SLIDE

LS FUNCTION LEVER LATCHED UNDER STRIPPER BLADE.

LR FUNCTION LEVER LATCHED UNDER LATCH RELEASE BAIL.

LS✱ FUNCTION LEVER IN SLOT 34 UNBLOCKS FUNCTION LEVER IN SLOT 35.

LR✱ FUNCTION LEVER IN SLOT 35 IS UNLATCHED BY FUNCTION LEVER IN SLOT 36.

S OPERATES ONLY IN THE SELECT CONDITION.

⊕ FUNCTION BAR IN SLOT 35 IS CODED FOR FIRST CDC LETTER FOR THE CIRCUIT INVOLVED; SEE FIG. 1.

F FUNCTION PAWL IN SLOT 33 OPERATES FUNCTION LEVER IN SLOT 34.

Figure 3 - Stuntbox for Use in 28E Sequence Selector Units

3.02 This stuntbox performs all of the selecting functions of a station, which includes a maximum of two station control circuits. For interline relaying of messages, each station control circuit is associated with the receive side of an outgoing RT and the transmit side of an incoming RT. At the broadcast access connection to the DDD network all transmission is in one direction, into the 83B2 system, so that transmitter control only is involved. (Future arrangements might involve the reverse operation; an existing interchange station plan provides another means of getting from an 83B1 system into the DDD network.)

3.03 The mechanism in slots 33-36 controls the starting and stopping of the transmitter which is sending to the line. It is exactly the same as the mechanism in slots 34-37 in the stuntbox of the 28Y typing unit.

3.04 When an online station fails to respond to its CDC and does not send a V answerback, the intercept circuit will intervene and time out for maximum 5 seconds and then alarm. Immediately thereafter it will send an M* answerback and also connect an ROTR to receive the message intended for the called station. (If the ROTR is not permanently connected to the line, the intercept circuit alarm will persist until the operator patches an ROTR into the line.)

Note: *M or V are optional choices for the intercept answerback letter; refer to the 83B2 teletypewriter selective calling system.

3.05 After intervention by the intercept circuit, the M answerback will restart the sending transmitter. The M answerback also has an advantage in that the presence of the M on printed copy identifies which CDC called in the intercept circuit.

4. TRANSMITTER CONTROL MECHANISM

A. Valid CDC First Letter

4.01 The series of LTRS characters which precedes the CDCs in the tape will operate the mechanism in slot 35 (see Figure 4), and the function lever will latch to the stripper blade and also unblock the function bar in slot 36.

4.02 When a valid CDC first letter is sent by the transmitter the function lever in slot 36 operates and latches, under control of the latch release stud of the function lever in slot 37, and opens a contact to stop the transmitter.

The stripper blade unlatches the function lever in slot 35, but the LTRS character following the second CDC letter will again operate the function lever in slot 35 and unblock the function bar in slot 36.

4.03 When a V answerback is received, the function lever in slot 37 operates momentarily to unlatch the function lever in slot 36, thereby closing the contact to restart the transmitter. The V answerback will also cause the stripper blade to release the function lever in slot 35; however, the mechanism in slot 34 also functions on the V, and the function lever in slot 35 is immediately reoperated to unblock the function lever in slot 36.
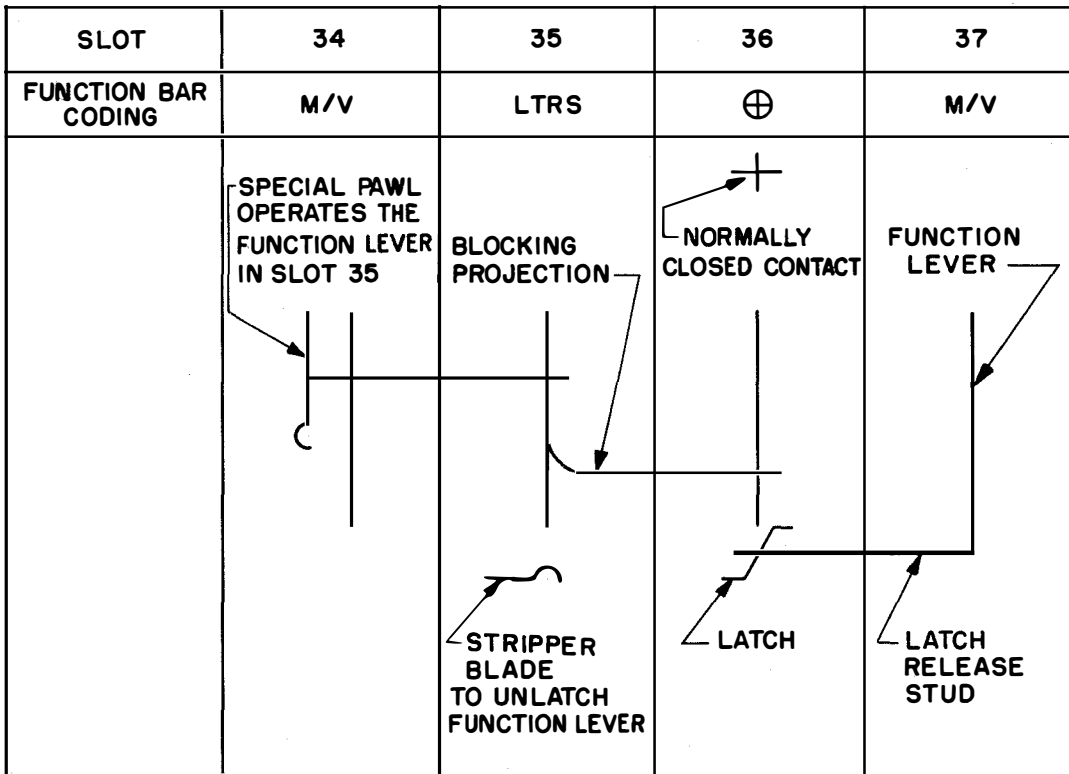
B. Nonvalid CDC First Letter

4.04 Assume that the second CDC sent by the transmitter is nonvalid for the line. After the V answerback following the valid first CDC was received, the function lever in slot 35 was operated and latched under control of the stripper blade, and the function bar in slot 36 was unblocked.

4.05 When the transmitter sends the first letter of the nonvalid CDC, the function bar in slot 36 will not respond, and the stripper blade will release the function lever in slot 35. Thus the mechanisms in slots 34 through 37 are inoperative and will remain so during receipt of the second letter of the nonvalid CDC. The transmitter will not be stopped.

4.06 However, when the LTRS character following the nonvalid CDC is received, the mechanism in slot 35 will function and the function lever in slot 35 will be latched up. The function lever in slot 36 will be unblocked and will be conditioned to operate if the first letter of the next CDC is a valid letter for the line.

5. BLOCKING BAIL MECHANISM

5.01 This mechanism is used in conjunction with slots 15-21 and slots 22-27 on the stuntbox. The function levers in slots 15 and 21 support a bail which extends across slots 16-20 and blocks or prevents selection of the function bars in slots 16-20. The function bars in slots 15 and 21 are coded to respond to the same CDC first letter, and the function bars in slots 16-20 are coded to respond to the various CDC second letters.

SLOT	34	35	36	37
FUNCTION BAR CODING	M/V	LTRS	⊕	M/V
	SPECIAL PAWL OPERATES THE FUNCTION LEVER IN SLOT 35	BLOCKING PROJECTION —	NORMALLY CLOSED CONTACT	FUNCTION LEVER —
		STRIPPER BLADE TO UNLATCH FUNCTION LEVER	LATCH	LATCH RELEASE STUD

⊕ 1ST CDC LETTER FOR THE CIRCUIT INVOLVED; SEE FIG. 1

Figure 4 - Transmitter Control Mechanism

5.02 The first CDC letter simultaneously actuates the function bars in slots 15 and 21 and the function levers in these slots move the blocking bail away from the second CDC function bars and latch under control of the stripper blade. Reception of a CDC second letter actuates the corresponding function bar and function lever in one of the slots 16-20 to operate a shift slide or a contact. The stripper blade releases the function levers in slots 15 and 21 and restores the mechanism to the blocking condition. The function lever operated by the second CDC letter is latched under control of the latch release bail.

5.03 Operation of the mechanism in slots 22-27 is identical with the operation of slots 15-21, as described above.

6. REFERENCES

6.01 For additional information refer to the 83B2 Teletypewriter Selective Calling System.