# 83B2 TELETYPEWRITER SELECTIVE CALLING SYSTEM

## DESCRIPTION AND OPERATING PRINCIPLES

CONTENTS      PAGE

## 1. GENERAL

1.01 This section contains the description and operating principles for the 83B2 teletypewriter selective calling system.

1.02 In the general method of operation, the 83B1 system and the 83B2 system are the same. Many of the equipment components are common to the two. For this reason, reference should be made to the section covering the description and operating principles of the 83B1 teletypewriter selective calling system for the basic description of either system. This section is limited to the features of the 83B2 system which are different from those of the 83B1 system.

1.03 The principal distinctive features of the 83B2 system are:

(1) The 83B1 restriction on the first letters of CDCs has been removed. The first letter of an 83B2 CDC can be any letter, subject to some restrictions described below, where certain letters are reserved for control purposes. Most CDC letters will be chosen from 20 letters of the alphabet.

(2) The removal of this restriction adds much flexibility in the assignment of CDCs. This is particularly useful where interline switching arrangements are used.

(3) An automatic intercept is provided to reduce message delays when messages are undeliverable because of incorrect or garbled CDCs, or because a receiving station is out of order. This can be used with interline switching or on a single 83B2 line.

(4) The 83B2 system uses the 28 ASR (see Figure 1) with no provision for the 19 ASR. This favors operation at 100 words a minute.

(5) An improved 2- or 3-line interline switching arrangement is provided, with 28 RTs used as the switching medium.

(6) An optional arrangement known as Priority Bypass enables an operator, by sending the proper CDC, to bypass an RT and send a message directly from one line to another. This option is limited to a 2-line system.

(7) Individual lines can be interconnected, for switching purposes, through an 84A1 switching unit.

1.04 In apparatus and equipment, the principal differences are the use of the 28L typing unit instead of the 28H, the use of the 28B sequence selector at interline switching points, a revised transmitter start circuit, and the new intercept, power distribution, and RT control circuits for interline switching.

## 2. CHOICE OF CDCs, TSCs, AND OTHER CONTROL CODES

A. Assignment of Call-directing Codes (CDCs) in the 83B1 System

2.01 In the 83B1 system, the first letter of all of the CDCs for the stations on one line must be chosen from two specified letters. This is to obtain the circuit assurance feature provided by the V answerback. When a transmitter with Tape Available is started in its turn by its assigned transmitter start code (TSC), it runs through any LTRS fill characters which may be at the start of the prepared tape for handling convenience. When it then transmits the first letter of the first CDC, a contact is opened which initiates the stopping of the transmitter. The circuit timing is set so that the transmitter does not actually stop until it has sent out the two letters of the CDC, followed by the usual LTRS character.

2.02 When the called station receives its CDC and is connected, the V answerback which it returns serves to reclose the contact in the start magnet control circuit and so restarts the transmitter. This is repeated for as many CDCs as there may be in the tape; the CR LF sequence of the end-of-address code, CR LF LTRS, prevents any further selection of stations and also prevents any more stopping of the

KEY AND LAMP PANEL

PERFORATED TAPE

PAGE COPY

KEYBOARD
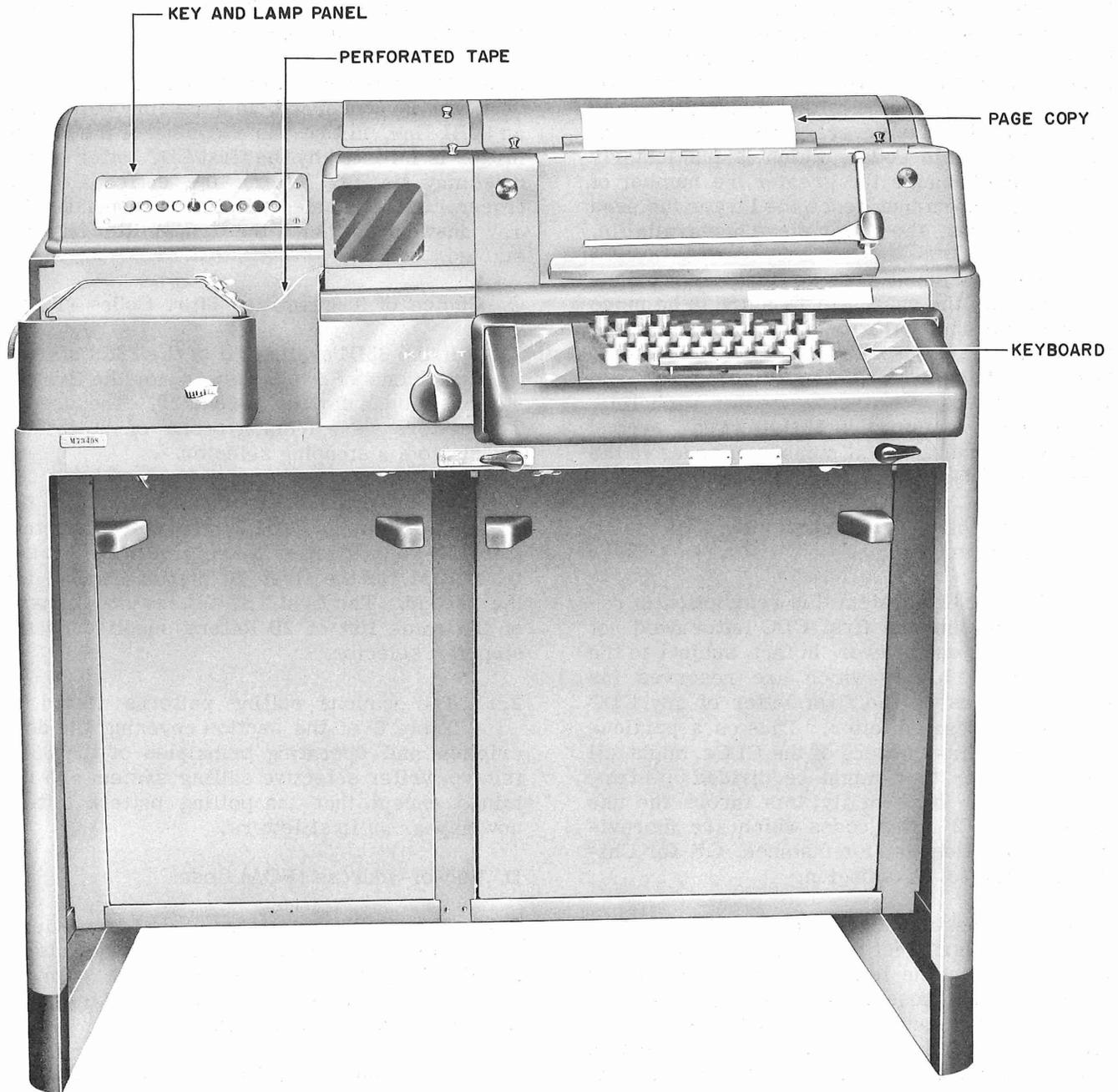
Figure 1 — Typical 28 ASR Set with Key and Lamp Panel for Station Control

transmitter by text letters which happen to be also first CDC letters.

2.03 Suppose now, for illustrative purposes, that one of the valid first CDC letters was A. Now assume the presence of a second selective calling line which will interchange messages with the first line, either by automatic means or by torn-tape relay. A station on the second line is assigned the letters CA as a CDC. If, now, a station on line A attempted to send a message to station CA on the second line, the letter A in the CDC would stop the sending transmitter on line A. Since, however, there is no station CA on line A, there would be no V answerback and the transmitter would remain stopped until the regular 10-second time-out and alarm took place. As this is an

intolerable operating situation, it can be seen that once a letter of the alphabet has been selected as the first letter of a CDC on a line, it cannot thereafter be used as the second CDC letter on any other line with which traffic is to be exchanged. This severely restricts the total number of usable codes, which is particularly undesirable because the greater the number of lines in a system and hence the larger the need for many codes, the fewer there are available.

2.04 For instance, assume that, as is frequently the case, all CDCs are to be made up of 20 alphabet letters. This allows a theoretical maximum of 20 by 20, or 400 codes. If, however, there were 10 lines in a system and 10 first letters were used, one for each line, there would remain only 10 letters for second letters, so that the total number of codes in the system would be limited to 100 instead of 400.

**B. Removal of CDC Restrictions in the 83B2 System**

2.05 In the 83B2 system this restriction is removed and the first CDC letter need not be limited to one of two. In fact, subject to the avoidance of letters which are reserved for control purposes, the first letter of any CDC may be any desired letter. Thus on a particular line the first letters of the CDCs might all be different or they might be divided up in any desired way. Incidentally, this favors the use of mnemonic 2-letter codes which are abbreviations for cities as, for instance, CG for Chicago, or WA for Washington.

2.06 For lines with not more than 20 stations, the control letters V and M cannot be used in CDCs, the letter H is usually avoided because of the possible danger of a false disconnect signal, and the letter Y has been arbitrarily reserved for use in the CDCs used to cut on reperforator-transmitters for automatic relay arrangements. If there are more than 20 stations on any line of a system, for reasons described later, the control letters G and O must also be avoided in the CDCs of the system.

2.07 For 83B2 lines connected to an 84A1 switching unit, a more rigid restriction appears. The director of the 84A1 unit is designed so that if any one of the letters T, O, M, V, H, or Y appears in a CDC, the message is sent to intercept. Consequently these letters cannot be used for any CDCs which have to be processed through the switching unit. Note that the letter Y used in reperforator cuton codes

does not appear in the RT tape and so does not reach the switching unit director.

2.08 So far as control of the sending transmitter is concerned, an 83B2 line works like an 83B1 line, in that the stopping of the transmitter is initiated by the first CDC letter (which now may be any letter), the entire CDC is transmitted, the selected station responds with a V answerback, and the transmitter is restarted.

**C. Choice of Transmitter Start Codes (TSCs)**

2.09 In the 83B1 system all of the TSCs started with one of two letters, Q for the first 20 stations, and X for the second 20. The second TSC letters were from a group of 20 letters coded from a stepping selector.

2.10 For reasons to be described later, the TSCs for the 83B2 system were inverted, with the second letter taken from one of two letters, M for the first 20 stations and G for the second. The first TSC letters now consist of the same list of 20 letters supplied by the stepping selector.

2.11 The various polling patterns listed in Table B of the section covering the description and operating principles of the 83B1 teletypewriter selective calling system are retained except that the polling pattern letters now appear as first letters.

**D. End-of-address (EOA) Code**

2.12 The end-of-address code, sometimes called the lockout code, is the same as for the 83B1 system, CR LF LTRS, with the physical operations of the stuntbox taking place on the sequential combination CR LF.

2.13 The stuntbox mechanism which drives the lockout (O) codebar does not have the V mechanism arranged to ungate the CR LF slots as in the 83B1 system. The V mechanism in the 83B1 stuntboxes was put there to guard against the loss of messages in case the first letter of a CDC was garbled, making it nonvalid for the line. Because of the different method of operation of the 83B2 system, this feature is no longer required.

**E. End-of-message (EOM) Code**

2.14 The end-of-message, or disconnect code, as for the 83B1 system, is normally FIGS

H LTRS, with the actual operation of disconnect taking place on the LTRS character. The mechanism in the sequence selector occupies three slots, responding sequentially to FIGS, H, and LTRS, in turn; this is necessary because the sequence selector is not equipped to recognize the difference between upper- and lower-case characters. In the typing unit stuntbox, only two slots are provided for the disconnect mechanism, responding to upper-case H followed by LTRS.

2.15 The disconnect code sent by the transmitter start circuit in case of a 10-second idle-line time-out is FIGS H LTRS LTRS, instead of FIGS H LTRS V for the 83B1 system. The V is not required in the 83B2 system because the resetting of the transmitter stop contacts is done by the letter M (or G) in the ensuing transmitter start codes.

2.16 Looking ahead to the proposed use of four Ns for the disconnect code, as prescribed by the International Air Transport Association, it is noted that by a rearrangement of stuntbox slot mechanisms, the latch release bail can be arranged to be driven by this disconnect code. Because of uncertainty as to the present extent of demand for it, it has not been made a standard feature of the 83B2 system.

3. TRANSMITTER-DISTRIBUTOR START-STOP CONTROLS

A. General

3.01 Circuit assurance in the 83B2 system, as in the 83B1 system, is obtained by having the transmitter stop, after sending out a CDC, and wait for a V answerback before starting again. However, with the enlarged freedom in the assignment of CDC letters, an 83B2 transmitter must stop on any letter (the LTRS character excepted) rather than on one of just two letters, as in the 83B1 case. This requires a different treatment of the start-stop circuit, with the use of a new stuntbox mechanism designated M/V not-LTRS.

B. M/V Not-LTRS Mechanism

3.02 This mechanism, occupying two slots of the stuntbox of the typing unit or sequence selector, controls the starting and stopping of the transmitter (see Figure 2) during the sending out of CDCs. The transmitter must previously have been successfully polled, after having made a bid to send, so that its transmitter start (TS) relay has closed its contact.
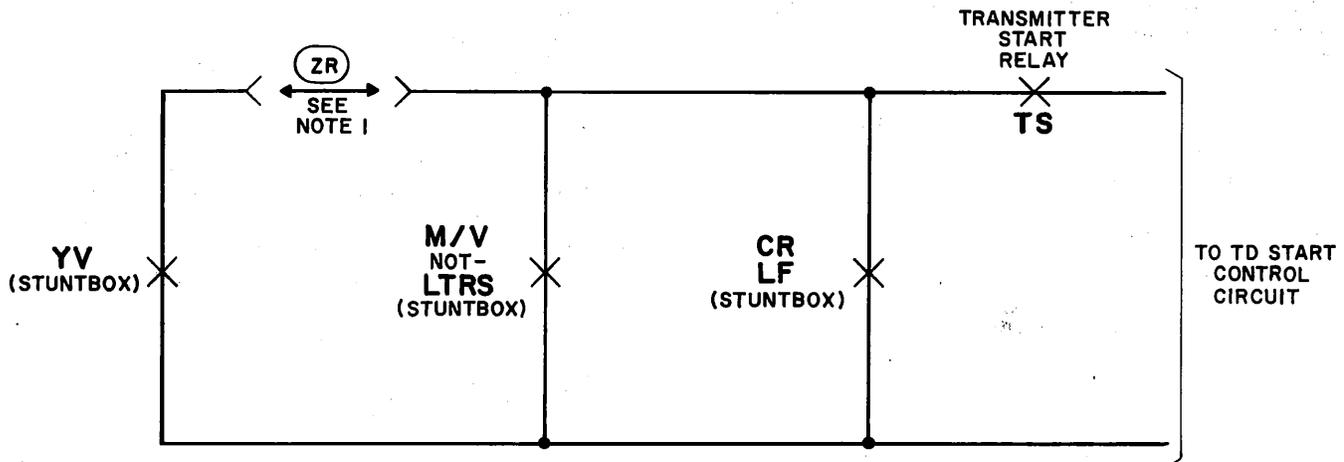
3.03 The function bar in the first slot is coded to go into selection on receipt of either the letter M or the letter V (hence M/V) and sometimes, as described later, also on G and O. The function lever in this slot has a stud which reaches over across the next slot, the "not-LTRS" slot, in such a way that it operates the function lever in that slot. When the "not-LTRS" function lever is operated, a control contact in the transmitter start relay circuit is closed, which allows the transmitter to start.

3.04 The not-LTRS slot is so designated because when operated it opens the transmitter control contact on any character which is not-LTRS. Actually, for reasons described below, the function bar in the slot is coded to go into selection (with some restrictions) when a LTRS character is received.

3.05 The function lever, when operated, is latched under control of the stripper blade, which means that it will be unlatched by every incoming character, opening the M/V not-LTRS contact in the transmitter start circuit. However, since the function bar in this slot is coded for LTRS, on a LTRS character the function lever, just unlatched, is reoperated by the function pawl and is again latched in the operated position, reclosing the contact. (This function lever cannot be reset by a LTRS character unless it has already been operated by the M/V slot mechanism; in its unoperated position, its own blocking extension inhibits the action of the LTRS function bar so that the contact does not reclose improperly on the LTRS character following each CDC.)

3.06 These introductory descriptive facts are the basis for the description of the purpose of this mechanism and how it works.

3.07 When a station tape transmitter is started by its transmitter start code, the first characters sent are usually LTRS characters punched in the tape for handling purposes. As each LTRS character is sent, the not-LTRS contact tries to open, to stop the transmitter. But it is immediately reclosed by the action of the LTRS character as described. However, when any character other than LTRS arrives, in this instance the first letter of the first CDC, the function lever is unlatched; it is also blocked so that it cannot now be operated by a LTRS character. The transmitter control contact is open and the transmitter stops. As in the case of the 83B1 system, the timing of the circuits is such that the actual transmitter stoppage takes

TRANSMITTER
START
RELAY

(ZR)
SEE
NOTE I

YV
(STUNTBOX)

M/V
NOT-
LTRS
(STUNTBOX)

CR
LF
(STUNTBOX)

TS

TO TD START
CONTROL
CIRCUIT

NOTES:
I. USE ZR STRAP WHEN 83B2 LINE CONNECTS TO 84AI SWITCHING UNIT
   OR WHEN DUPLICATE CODES ARE NOT TO BE USED.

Figure 2 — Stuntbox Contacts to Control Transmitter Start

place only after the entire 2-letter CDC, with its following LTRS character, has been sent.

3.08 If this CDC is a valid code for a station on the line, that station will reply with a V answerback. The V operates the M/V function lever, which closes the not-LTRS contact so that the transmitter starts off again. This is repeated for each CDC until all have been sent.

3.09 The end-of-address code, CR LF LTRS, operates and latches another contact in parallel with the not-LTRS contact so that thereafter characters in the text of the message do not stop the transmitter. (See Figure 2.) This contact is unlatched only by the latch release bail which operates on receipt of the disconnect signal at the end of the message.

3.10 When an 83B2 line is interconnected with one or two others by the interline arrangement or is connected to an 84A1 switching unit, some further modifications are introduced as described in 4.

C. Coding of the M/V Function Bar

3.11 From the above discussion it follows that for a line with 20 stations or less, the function bar in the M/V slot must be coded to operate on either M or V, and for more than 20 stations on M, V, or G. This is achieved by breaking off function bar tines for the appropriate signal element positions. For example, M and V, in the Baudot code, have a common spacing element in the No. 1 position, and common marking elements in the No. 3, 4, and 5

positions. Only the No. 2 element is different, being spacing for M and marking for V. Now if the function bar tines in position No. 2 are broken off, the machine can no longer distinguish between a mark and a space in that position. Consequently, the function bar will respond equally well to M or V. By an extension of this principle, with the tines broken off in two signal element positions, a bar is produced which responds to any one of four characters, in this case, M, V, G, and O. No use is made of the O in this application; it comes as a by-product of the process. But the possible O response does no harm, as the letter O is not used in either TSCs or CDCs and should not appear at any time during the selection operations. Since the function bar is coded for the SELECT condition, the mechanism in the M/V slot does not operate at any time during the transmission of text.

D. Transmitter Stop during TSCs

3.12 The reason for the reversal of the order of TSC letters may now be seen. If the 83B1 TSCs were used, the TSC letters, as well as the CDC letters, would stop the transmitter and in the absence of a returned V (when, for instance, a station had made a bid to send and was properly polled to take its turn) the transmitter would remain stopped, and the message would not go.

3.13 To prevent this, the transmitter-control contact mechanism was redesigned so that the transmitter would be restarted not only by V, but also by M (for 20 stations), and in addition by G (for 20 to 40 stations). Then by putting M or G as the second letters of all TSCs it is assured that the polled transmitter will be in condition to start when it should.

E. RT Transmitter Stop at End-of-message

3.14 At the end of a message it is essential that the transmitter of an RT stop on the disconnect code without inadvertently transmitting on the line any of the control characters of the following message, which may already be punched in the tape. To insure proper stopping of the transmitter on the end-of-message code, FIGS H LTRS, a new design feature was required. To show its operation, the changes in end-of-message format will be traced from the appearance on the first tape punched by the operator originating the message. Torn-tape operation at the originating station will be assumed.

3.15 After FIGS H LTRS at the end of a message, the operator must punch in the tape at least seven more LTRS characters to permit the FIGS H LTRS characters to go through the sensing pins before the sixth pin comes up to indicate the end of the tape. It is recalled that in the 83B systems, the actual contact operation initiating the stop of the transmitter occurs on the LTRS character of FIGS H LTRS, and not on the H character as in some other teletypewriter switching systems. The circuit timing, however, is such that before the transmitter actually stops, it has rolled out two more LTRS characters. This timing is primarily dictated by the sending of call-directing codes (CDCs) of the form AB LTRS, where the letter A initiates the stop operation but the rest of the three characters must be sent. However, there is an important difference in the operation on the disconnect code. While the transmitter rolls out the three LTRS characters, the TS relay drops at such a time that the last of the three does not go out on the line. The disconnect format on the line, then, is

FIGS H LTRS LTRS

3.16 This is also the format which is punched in the reperforator tape of the RT.

3.17 The TD stopping operations are initiated by the operation of contacts in the stuntboxes of the associated typing unit, at the originating station, or sequence selector at the cross-office point. Because of the time taken in the train of operations through the machine, a contact controlled by a character does not actually operate until well into the next character. For the RT stop on end-of-message this is not soon enough; consequently the stop operation is controlled from additional stuntbox contacts which operate on FIGS and FIGS H.

3.18 When the transmitter sends (and the stuntbox reads) the FIGS character, a prepare-to-stop contact operates. If the FIGS character, as in the course of message text, were followed by any other character than H, this prepare-to-stop operation would be cancelled and the message would proceed as if the contact had not operated. However, when an H follows, a second prepare-to-stop contact operates. When a LTRS character then follows, the operation is completed and the transmitter stops without sending any more characters. The format transmitted on the interconnecting line is then

FIGS H LTRS

3.19 The necessity for an exact stop on the first LTRS character is dictated by the requirement that keyboard sending shall be possible. While this is not recommended on automatic teletypewriter systems, it has been found that there is a demand for it. It may be particularly useful for maintenance work. An operator sending from a keyboard cannot be counted on to send the disconnect signal fast enough so that more than one LTRS character gets out on the line; in consequence, the end-of-message format on the line with keyboard sending will be

FIGS H LTRS

Here it may be seen that it is essential to stop the RT transmitter on the first LTRS character following FIGS H.

3.20 This feature also aids in the interconnection of an 83B2 line to an 81-type switching system, since the 81-type system has no LTRS character following FIGS H LTRS, nor does it have a LTRS character ahead of the CDC of the next message.

3.21 It can be seen from the foregoing that in the case of sending from an ASR station to a crossoffice RT, assuming that there is not already a loop of tape between the reperforator and the transmitter of the RT, when the RT transmitter stops on FIGS H LTRS at the end of a message, there will still remain a single LTRS character in the tape. This will continue the bid-to-send on the line to which the transmitter is connected. On the next successful poll, the transmitter will try to start, sending the single LTRS character, but will be immediately stopped by the transmitting head coming up against the punch. The transmitter start circuit will time out in the normal manner, send FIGS H LTRS LTRS and recycle to the beginning of the polling cycle.

3.22 Under this condition there will be no alarm, since it is not an alarm condition requiring attention by an attendant. Furthermore the transmitter is not locked out so that it is ready to pass the next arriving message in the normal manner.

3.23 It may be asked why the intercept circuit does not function in this situation. This is because the intercept circuit is only activated when a CDC letter (a character other than M, V, or LTRS) is sent so that the transmitter stops and waits for a V answerback. The single LTRS character sent does not operate the M/V contact which in normal CDC operation stops the transmitter.

3.24 The slight disadvantage of the operation caused by the extra LTRS is recognized. However, in busy traffic periods, where the 10-second loss of time in time-out is more important, the condition is less likely to occur because more frequently message traffic will be coming to the RT at such a rate that there will be a loop of tape in the RT with one or more messages ready to be sent. In this case the subsequent message continues the bid and traffic flow proceeds smoothly in the normal manner.

3.25 In cases where the weather keyboard is not used, and hence where FIGS H (for north wind) is not needed in message text, a possible way to get rid of the extra LTRS character would be to change the stuntboxes in the outlying stations so that the disconnect contact operation occurred on the H character of FIGS H instead of on the LTRS character of FIGS H LTRS. Thus the originating transmitter would send only FIGS H LTRS on the line and there would be no extra LTRS character left in the RT tape after disconnect. The stuntboxes at the crossoffice station remain as they were. This alternative is not shown as a standard feature on the circuit drawings. It cannot be used with keyboard sending without further complications.

F. Emergency Manual Control of Tape Sending

3.26 The following procedure may be useful if the transmitter start circuit is inoperative for any reason. The operations may be performed at any station on the line, and have to do only with starting the transmitter at that station. (Emergency transmitter start operations may be initiated from a remote station or control office by sending transmitter start codes from a keyboard.)

3.27 For the operations described herein, limited to one station at a time, transmitter start codes are not needed. The letter M called for in the procedure below is for the purpose of "cocking" the M/V not-LTRS mechanism so that answerback will function properly. The procedure is as follows:

(1) Note that the receiving unit is idle.

(2) Insert in the TD a prepared test tape containing at least one CDC followed by the standard message format ending with the disconnect code. The tape may, but does not have to, contain its own-station CDC; see (5).

(3) Turn the MR key to MON (MR key not present at 28 ASR stations).

(4) Push the MS button (and the PR button if provided). This activates the keyboard and prepares the TD to start.

(5) Send the own-station CDC from the keyboard to observe local copy.

(6) Send the letter M from the keyboard; this takes the place of the TSC for this operation.

(7) The TD should now start, transmit the message, and shut down on the disconnect code.

G. Operations on RT Torn-tape Alarm

3.28 In the case of torn tape in a crossoffice RT, so that the selecting sixth pin comes up momentarily, the transmitter immediately stops and four alarms come in, as follows:

(a) On the panel of the RT cabinet the RT-lamp lights.

(b) In the 7-foot cabinet:

(1) The CTO lamp (common tape-out) lights.

(2) The CAB ALM lamp lights.

(3) The audible alarm sounds.

(c) All of these alarms lock in until released.

3.29 Following is the suggested sequence of operations by the attendant to clear the alarm condition:

(1) Operate the HOLD key on the RT cabinet to HOLD.

(2) Correct the torn tape condition.

(3) Push the RT- button on the RT cabinet. This releases all the alarms.

(4) Restore the HOLD key to normal.

The RT is now ready to accept and transmit subsequent messages in the normal manner.

3.30 Note that if the attendant should complete these operations within the 10-second normal time-out interval, the transmitter of the RT would restart without waiting for another poll.

4. INTERLINE SWITCHING

A. Equipment

4.01 Any station can function as an automatic tape-relay station for the interchange of traffic between lines. Although it is technically possible to interconnect more than three lines, the number of lines is limited to three by economic considerations, principally the cost of the reperforator-transmitters required.

4.02 The number of RTs required is equal to $n$ $(n-1)$, where $n$ is the number of lines; it can thus be seen that if the number of lines were increased, the number of RTs would go up very rapidly.

4.03 The equipment required at an interchange station is shown in Figures 3 and 4. These photographs are of a laboratory model-shop product and are therefore not precisely representative of production models. One 7-foot cabinet (see Figure 3) is needed for each line. The two station control units shown in Figure 3 can be used in two ways:

(1) For a 3-line interconnection, each line needs a station control for each of the other two lines to which it connects.

(2) For a 2-line interconnection, only a single station control unit is required. The second one may be used to control an additional station, as, for example, an ASR station, or a transmitter-distributor outlet to reintroduce intercepted messages. The second one is also used for the RT bypass feature.

4.04 In each case the receiving portion of an RT acts as a receiving station on the line to which it is connected, and the transmitter as a sending station on the other line to which traffic is to be relayed. Both sending and receiving functions are then under the normal 83B2 system controls.

4.05 Because the crossoffice arrangement operates substantially on an unattended basis, the common control keys and lamps normally required at outlying stations (Figure 5) are not required and are therefore omitted.

B. Manual Tape Relay Station at Crossoffice Point

4.06 For crossoffice stations where only two 83B2 lines are interconnected, use can be

POWER DISTRIBUTION CIRCUIT

STATION CONTROL CIRCUIT

INTERCEPT CIRCUIT

TRANSMITTER START CIRCUIT

RT CONTROL CIRCUIT

JACK, KEY AND LAMP
PANEL

2ND 23" STATION CONTROL CIRCUIT

SEQUENCE SELECTOR

120 VOLT RECTIFIER

48 VOLT RECTIFIER
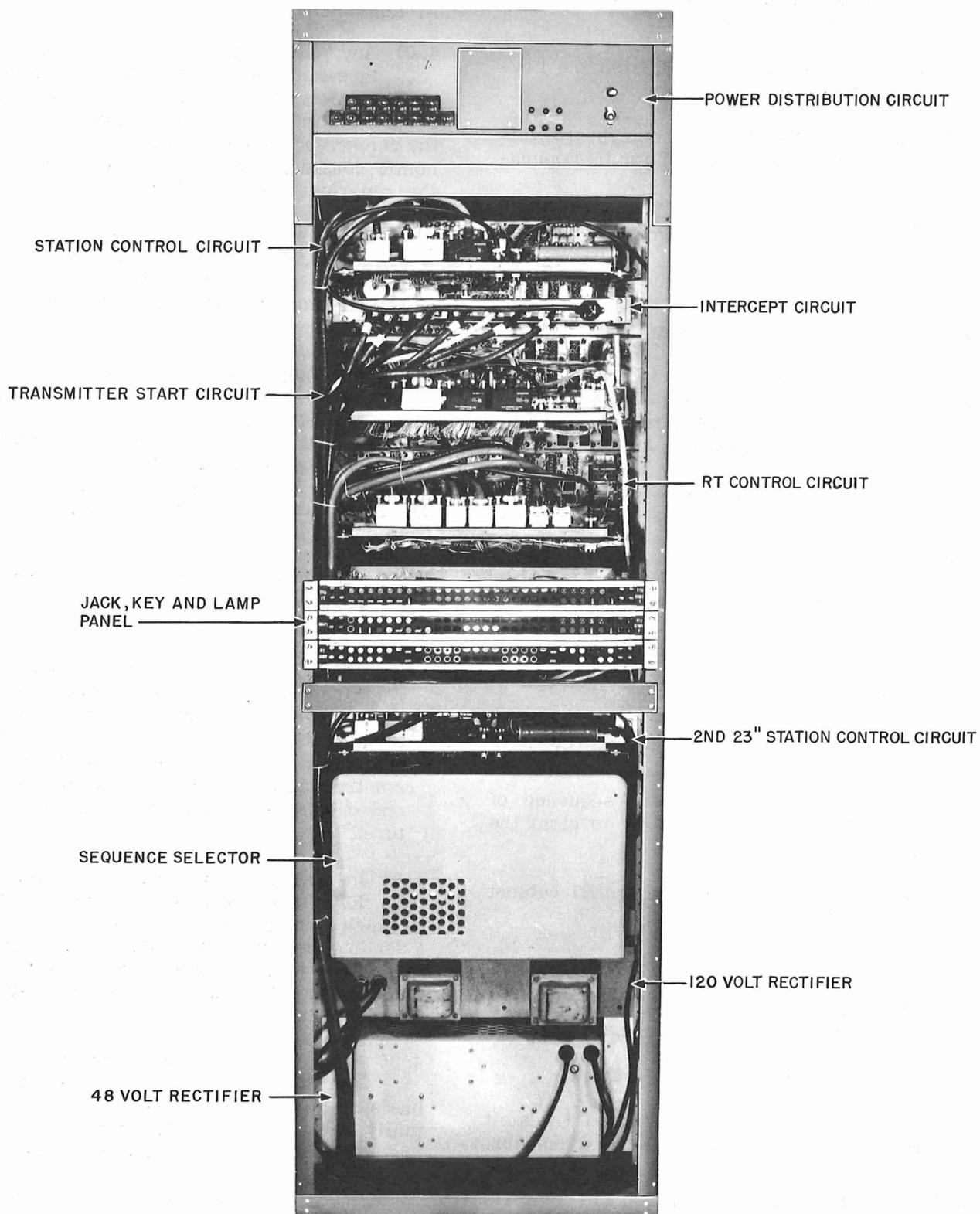
Figure 3 — Front View of 7-Foot Cabinet Equipment
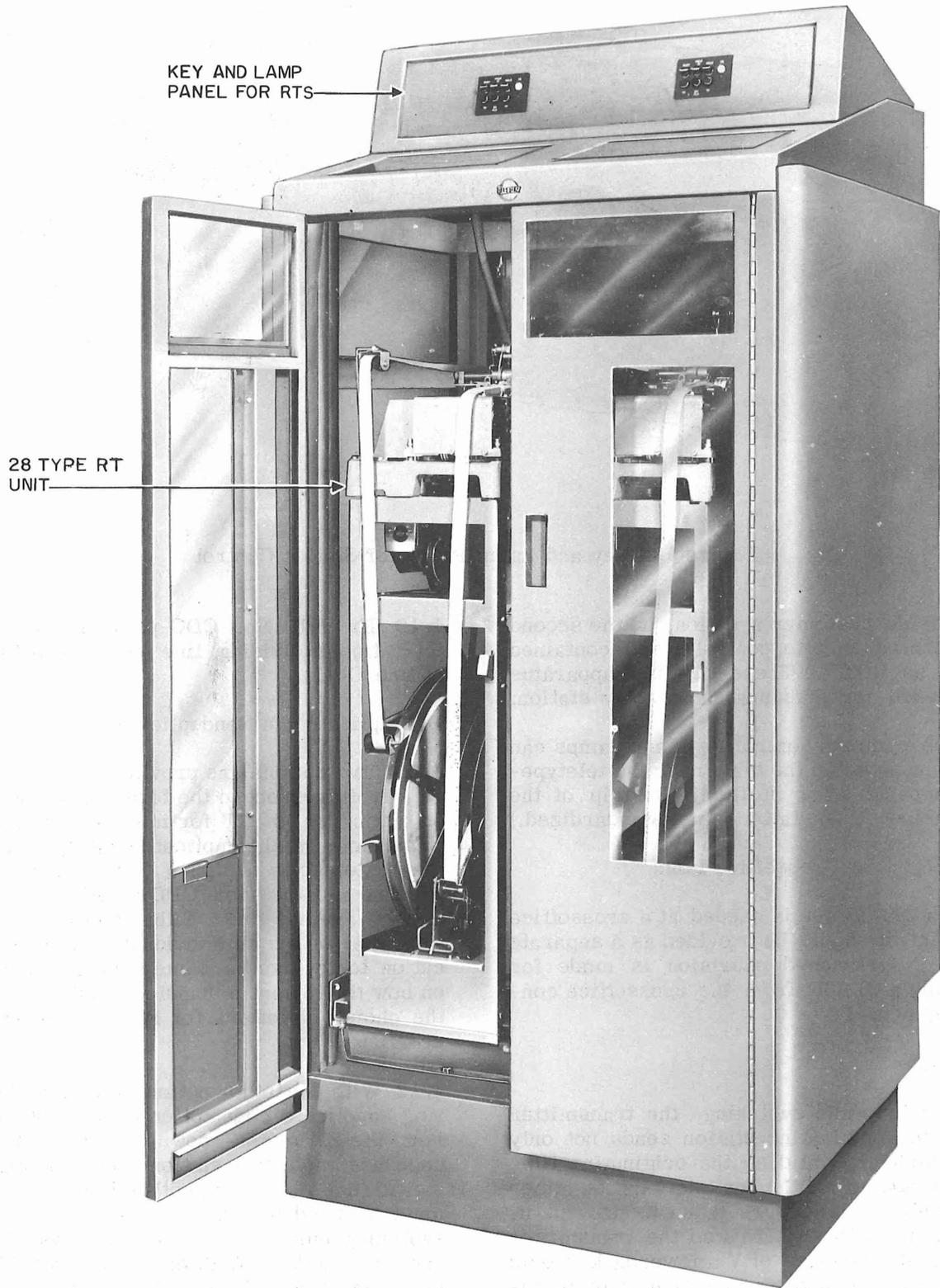
KEY AND LAMP
PANEL FOR RTS

28 TYPE RT
UNIT

Figure 4 — 28A Apparatus Cabinet Equipped with Key and Lamp Panel
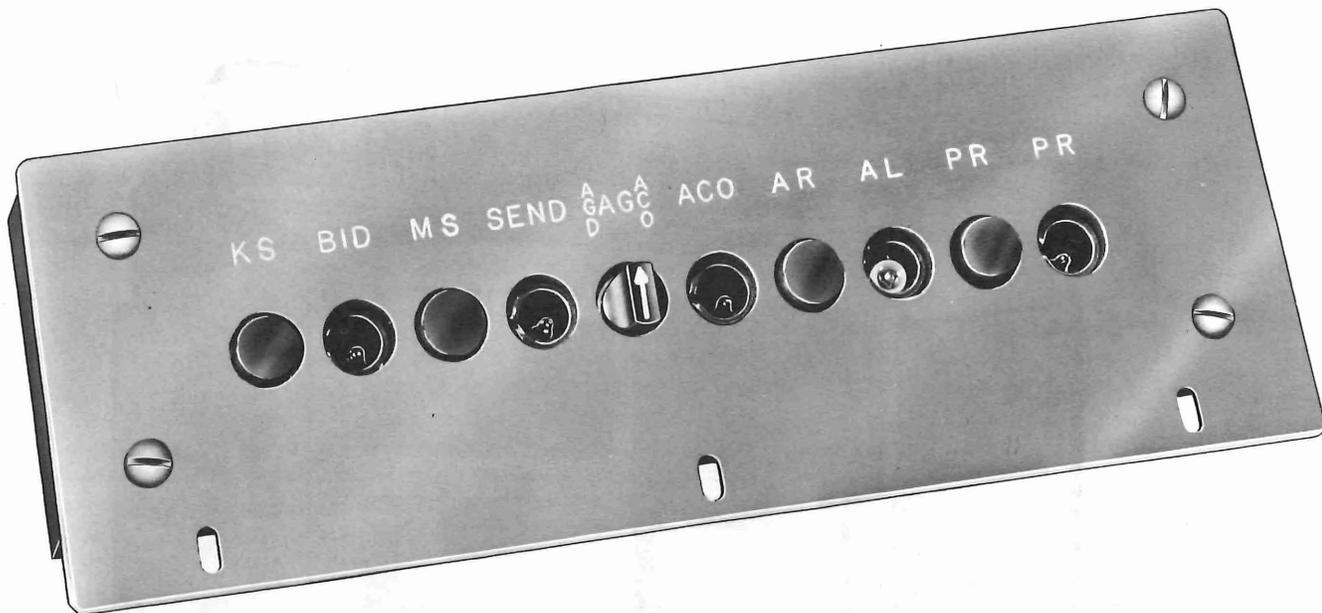(Part of RT Control Circuit and Two 28D RTs)

Figure 5 — Key and Lamp Panel for Station Control

made, at the customer's option, of the second station control unit to control a self-contained TD and an ROTR. These are the apparatus units needed for a manual tape relay station.

4.07 The common control keys and lamps can be mounted on the table near the teletypewriter apparatus, or in the jack strip of the 7-foot cabinet. (The latter is not standardized.)

C. 28 ASR Set at Crossoffice Point

4.08 If a 28 ASR set is needed at a crossoffice point, it should be provided as a separate station. No standard provision is made for controlling a 28 ASR from the crossoffice control equipment.

D. Format

4.09 For interline switching, the transmitter at the originating station sends not only CDCs which are valid on the originating line, but also offline CDCs for stations on other lines. Unless steps were taken to prevent it, these offline CDCs would stop the transmitter which, in the absence of V answerback, would not restart. For proper operation, it is essential that the originating operator, in preparing a tape, punch first the online CDCs for stations on the originating line. These are followed by an RT cuton CDC and then by the offline CDCs for the second or destination line.

4.10 The RT cuton CDC provides the operational dividing line between online and offline CDCs.

E. Duplicate and Nonduplicate Codes

4.11 Two options are provided to the customer with respect to the format and the method of cutting on an RT for interline traffic. The first, known as the duplicate code option, allows the customer to assign a CDC to a station on one line and the same CDC (duplicate) to a station on another line. Either one of these stations may be cut on individually, or both may be cut on to receive the same message, depending on how the format is handled. With this option, the choice of letters for RT cuton codes is not restricted.

4.12 With the other option, known as the nonduplicate code option (with a YV mechanism, the ZR option shown in Figure 2), a CDC once assigned to a station cannot be again assigned to a station on another line. This option must be used for lines connecting to an 84A1 switching unit which is not arranged to handle duplicate codes. With this option, all RT cuton codes must have Y as a first or second letter.

F. Description of Duplicate Code Option

4.13 In intersystem coding where duplicate CDCs (see Figure 6) may be assigned to

MESSAGE FORMAT FOR INTERLINE CONNECTION

OF TWO 83B2 LINES

DUPLICATE CODE CASE
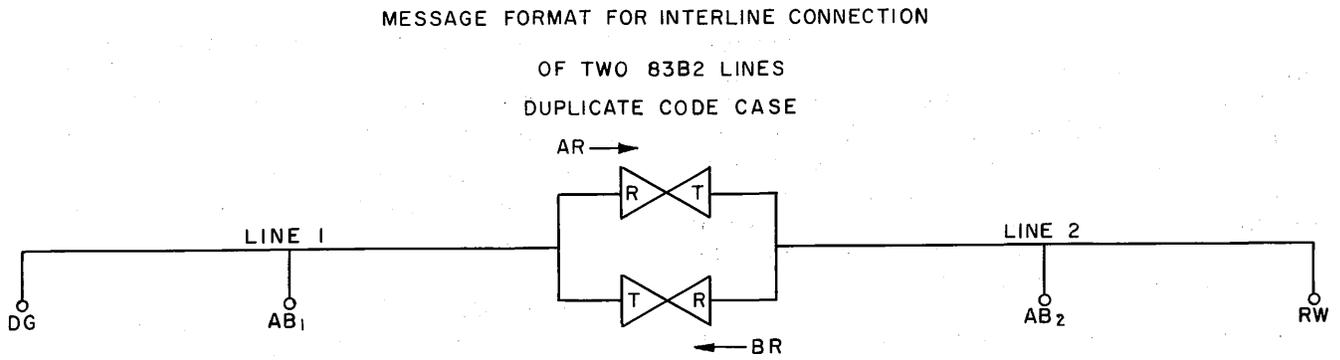


STATION DG SENDING TO AB₁, AB₂ AND RW

MESSAGE FORMAT IN ORIGINATING TAPE:

↑ ↑ ↑ ↑ ↑ ↑ DG ↑ AB ↑ AR ↑ <≡ ↑ AB ↑ RW ↑ <≡ ↑ (TEXT) ↑ H ↑ ↑ ↑ ↑ · · · · (SEE NOTE I)

TRANSMITTED ON LINE 2:

↑ AB ↑ V RW ↑ V <≡ ↑ (TEXT) ↑ H ↑ (SEE NOTE I)

NOTE I.
THREE LTRS CHARACTERS ARE REQUIRED BETWEEN SUCCESSIVE MESSAGES IN A SINGLE PIECE OF TAPE TO PREVENT THE IMPROPER TRANSMISSION OF A PART OF THE CDC FOR THE FOLLOWING MESSAGE. AT THE END OF A TORN TAPE, AT LEAST SEVEN LTRS SHOULD BE PUNCHED IN THE ORIGINATING TAPE; IF PRACTICABLE, TEAR THE TAPE ON EXACTLY THE SEVENTH LTRS.

Figure 6 — Message Format for Interline Connection of Two 83B2 Lines

the stations of the various interconnected lines of a system, the lockout code, CAR RET LINE FEED must follow the first RT cuton code. If, however, the message contains group or broadcast codes common to two destination lines, the corresponding additional RT cuton code should be sent before the lockout code. Since this particular lockout code must not appear in the crossoffice tape, the RT is blinded and is not cut on until after the receipt of the lockout code. This code puts all of the stations on the originating line in the nonselect condition to prevent their being cut on by duplicate codes intended only for stations on the destination line. A second lockout code must be inserted after the offline CDCs to put the destination line in the nonselect condition after all its CDCs have been sent. For tandem switching into a third line, still another lockout code, following the appropriate RT cuton code, is needed.

4.14 Figure 6 shows a typical format for a message addressed to duplicate stations on two lines.

4.15 The operation of the system at the receiving reperforator on the originating line is as follows: when the RT cuton CDC, in this case AR, as shown in Figure 6, is received at the reperforator, a preparatory cuton operation is performed, but the RT select magnet remains blinded, though held in the marking position. The shaft of the reperforator makes one revolution, punching a LTRS character in the tape. During the revolution, the operation of the RT universal contact trips the V generator, sending a V answerback to the originating transmitter. This transmitter restarts and sends CR LF LTRS from its tape. While the CR character looks to the station like the first letter of another CDC and so opens the M/V

contact to stop the transmitter again, the following LF closes the CR LF stuntbox contact (see Figure 2) which disables the transmitter stop feature so that thereafter the stop-to-wait-for answerback is disabled. The originating transmitter continues to send the material in the tape, the first of which is presumably one or more CDCs for the offline connection; the RT is now unblinded to receive it.

4.16 If an operator should inadvertently omit CR LF LTRS, one of two things would happen. If the next following character (other than M, V, or LTRS) were not part of a code valid on the originating line, the transmitter, on failing to receive an answerback, would stop. The intercept would time out, send M or V, and the sender would resume sending. This sequence would continue until CAR RET LINE FEED was sent or the sender stopped for some other reason, in which case the line would time out, alarm the transmitting station, and lock out the transmitter. If, on the other hand, a following CDC were valid for the line (presumably duplicate and intended for an intersystem station), the message would be incorrectly delivered to the originating-line station, thus calling the attention of the operator to the fact that something was wrong.

4.17 All CDCs for stations on the originating line must be sent before the RT CDC. For example, as in Figure 6, the code AB may be assigned to a station on an 83B2 line and also to a distant station on another 83B2 line. If the code is sent on the originating line before the interline code, it cuts on the station AB on the first 83B2 line; if it follows the RT CDC, it is punched in the RT tape and so is sent on to the second line where it cuts on station AB.

G. Description of Nonduplicate Code Option

4.18 When duplicate codes are not to be used, the ZR option, shown in Figure 2, is used, activating the YV stuntbox contact. All RT cuton CDCs must have Y as a first or second letter.

4.19 When an RT is cut on by its CDC ending in Y, and has in turn sent the V answerback, the combination of letters YV performs two functions:

(1) It closes the transmitter control YV contact, shown in Figure 2, so that thereafter the transmitter is not stopped by any characters.

(2) It disables the V answerback circuit at all stations so that if an online CDC, valid for that line, were inadvertently inserted, it would not trip the answerback.

4.20 Note that, in transmission, a LTRS character appears between the Y and the V, this being the LTRS character normally associated with the two letters of the RT CDC. Because of this, the usual two-character sequential arrangement used for CDCs cannot be used here for the YV sequence. In its place, the mechanism in the Y slot is arranged to latch up under the latch release bail so that it is not released until the end-of-message code. The V mechanism, which operates the YV contact, also latches under the latch release bail.

4.21 Operation of the CR LF contact of Figure 2 is not necessary if the YV mechanism has already been operated by the receipt of the RT cuton CDC. The CR LF mechanism, however, must be provided for messages where an RT is not called in.

H. Tandem Interline Switching

4.22 If there were two 83B2 lines in tandem beyond the first interconnection point, provision for the second crossoffice switch would be made by a second RT CDC. This would follow the online codes for the second line. Suppose that the online station codes for the second line were AB and RW, with DR for the RT between the second and third lines. To reach these stations and also station DF on the third line, the CDC format would then be as in Table A.

TABLE A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| AB | LTRS | AR | LTRS | CR LF | LTRS | AB | LTRS |
| RW | LTRS | DR | LTRS | CR LF | LTRS | DF | LTRS |

CR LF LTRS (text of message) FIGS H LTRS LTRS LTRS

See Note 1 in Figure 6.

23" STATION CONTROL CIRCUIT

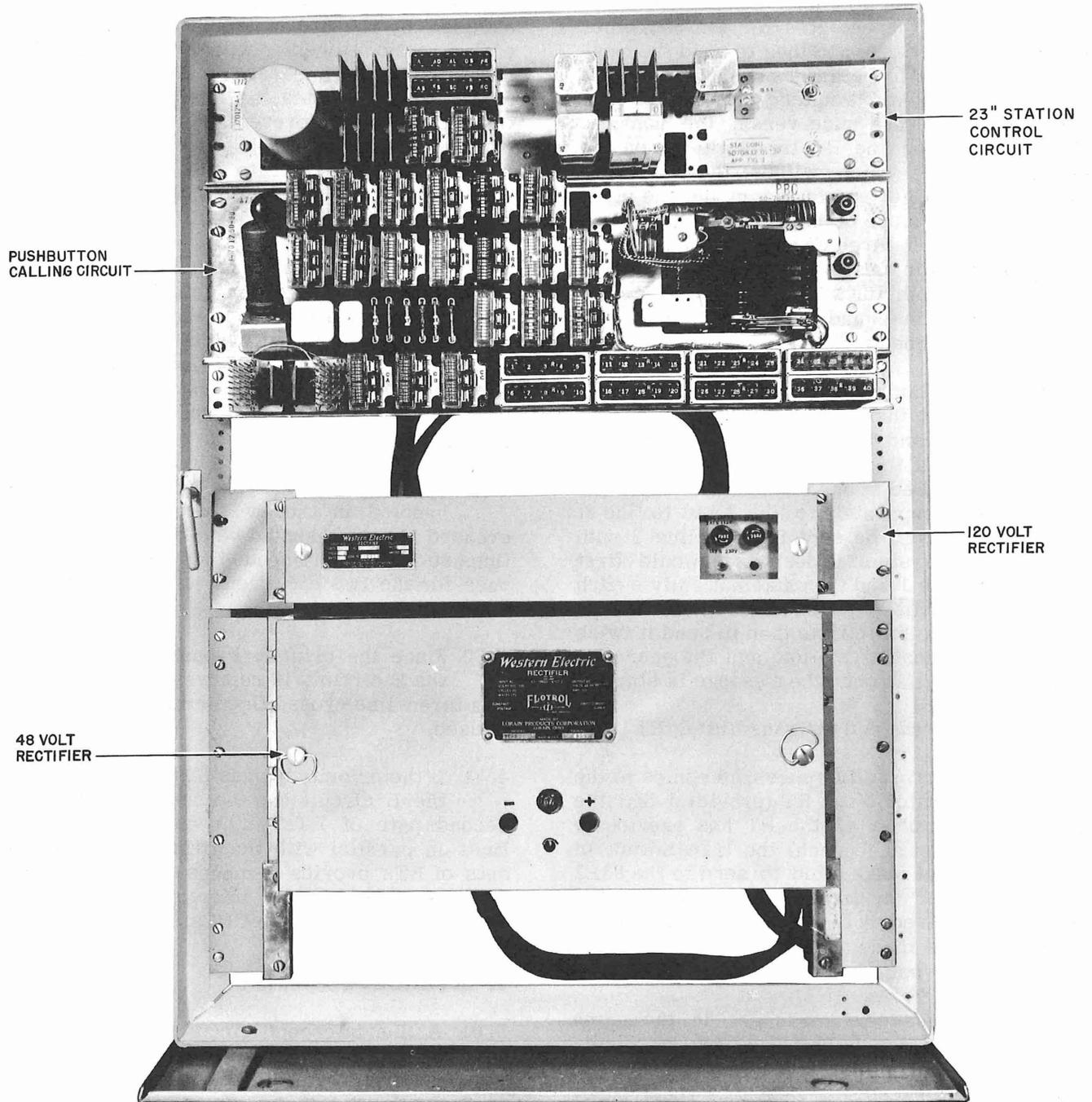PUSHBUTTON CALLING CIRCUIT

120 VOLT RECTIFIER

48 VOLT RECTIFIER

Figure 7 — Outlying Station Equipment Cabinet with Pushbutton Calling

4.23 For a three-line crossoffice interconnection, it is not possible, sending from one line, to cut on the two RTs for the two other lines at the same time and then to send the message in parallel to both lines. Since the CDCs for stations on line 2 would be nonvalid for stations on line 3 and vice versa, the nonvalid CDCs would stop the RT transmitters on the destination lines which, without the V answerback, could not get started again and the message would therefore be intercepted on the destination lines. If three crossoffice connections are provided for triangular interconnection, a message for both lines 2 and 3 could be sent from line 1 to line 2 and thence, by the tandem crossoffice connection, from line 2 to line 3.

4.24 If triangular interconnection were not provided, but there was a Y connection from line 1 to line 2 and from line 1 to line 3, a message from line 1 to stations on both lines 2 and 3 could be handled in one of two ways. First, it could be sent separately to line 2 and to line 3. Secondly, it could be sent first to line 2 with suitable intersystem codes which would first return it to line 1 and then automatically switch it to line 3. This requires double line time on line 1 though no more time than to send it twice from the originating station, and the operation is wholly automatic once the message is started.

I. Withholding the Bid at Transmitting RT

4.25 When a crossoffice message comes to the reperforator of an RT (provided that the pivoted transmitter of the RT has previously been up against the punch) the transmitter of the RT does not make a bid to send to the 83B2 line until after the first end-of-address code has been received by the reperforator. Thereafter the bid is made and the transmitter starts when properly polled.

4.26 For subsequent messages in the same tape loop, the withholding does not apply, and the bid is continuous so long as there is tape available except for messages received by the RT direct from an 81-system local outlet, in which case the bid is withheld during the time that the multiple address director of the 81 system is holding the local outlet circuit in processing CDCs. When all tape has been sent and the transmitter comes up against the punch, the bid is removed.

J. Priority Bypass

4.27 For a 2-line crossoffice arrangement, an optional priority bypass circuit makes it possible to relay messages from one line to another without using the RT. The option is obtained by the use of the TBP cord (one for each direction) together with a timing capacitor to increase the time-out on the originating line to 2, 4, or 8 minutes, as desired. This extra time is needed to prevent the originating line from timing out when it has made a bid to send via the bypass circuit to the second line but must then wait for the completion of a message in progress on the second line.

4.28 When the bypass option is provided, the originating operator selects the bypass path by the use of a CDC assigned for the purpose. This is followed by the CDC for the desired station on the second line. As the CDCs are sent from the tape, the rest of the operation is automatic and the required V answerbacks are sent at the proper times.

4.29 Where priority bypass traffic is to be handled in the two directions, the increased time-out should be different on the two lines so that simultaneous bids for priority bypass for the two directions will not lock each other out.

4.30 Since the priority bypass circuit usurps the B circuit, it removes the possibility of a three-line crossoffice arrangement when it is used.

4.31 If the priority bypass feature is not used, the B circuit can be used to control a second pair of RTs, interconnecting the two lines in parallel with the first pair. The two sets of RTs provide a means of assigning two degrees of priority to interline messages by suitable choice of cuton CDCs.

5. INTERCEPT

5.01 A line intercept circuit is available on an optional basis to intercept messages with incorrect or garbled addresses or during machine alarm if that occurs in the progress of a call. The circuit was developed primarily to improve the operation of automatic interline switching, either by the 2- or 3-line arrangements or through the 84A1 switching unit. It will reduce message delays caused by traffic blocks at the switching reperforator-transmitters. It will also reduce message delays where outlying stations are operated unattended as, for instance, after regular office hours. In either of these cases, a message otherwise held by incorrect or garbled codes will be released

to intercept so that other messages behind it in the tape can go forward. If desired, the intercept circuit can be used on individual 83B2 lines without interline switching.

5.02 The intercept function should be performed at the control station, ie, where the transmitter start circuit is located. If there is a crossoffice station, this would ordinarily be there. If the intercept function is performed at an office other than a control office, the TS key of the intercept circuit should be kept in the TO position to prevent the intercept from sending continuously repeated Vs every 5 seconds, preventing the transmitter start-circuit from ever timing out and clearing the line.

5.03 If there should be a second crossoffice station on an 83B2 line, the equipment panel of the intercept circuit would be required, its function now being to supply connecting arrangements through the plugs and sockets of the system. Since the intercept operation cannot function at two separate stations on the same line, it is disabled at the second station by the removal of the intercept timing tube.

5.04 This intercept circuit would not give sufficient protection with the 83B1 system since it would not detect and correct the situation where the first letter of a CDC is garbled to a nonvalid letter. Since with the 83B1 system the transmitter does not stop on a nonvalid first CDC letter, no V answerback is called for and there is no time delay available to call in the intercept circuit.

5.05 The intercept circuit makes use of the principle that the sending station stops transmission after each 2-letter CDC and waits for an answerback. This may be a V or, if desired, an M, provided there is available a second station control circuit which can generate and send the M. The advantage of the M is that whenever page copy is being made the letter M indicates to the attendant which CDC directed the message to intercept.

5.06 If a station which has sent a CDC fails to receive an answerback within 5 seconds (the transmitter remaining stopped), the T timing tube will fire, the intercept alarm lamp (IAL) and the CAB ALM lamp will light, and the buzzer will sound. The M or V answerback is then sent from the intercept circuit. This puts out the CAB ALM lamp and stops the buzzer, but the IAL lamp remains lighted until the disconnect code. The transmitter restarts and

sends the rest of the CDCs (if any) and the text of the message to the intercept station. If the message has multiple addresses and no answerback is received for the next CDC, the intercept circuit again times out and sends an M or V. The intercept circuit stays connected until the disconnect code.

5.07 If M is used for answerback from the intercept circuit, and the answerback occurs on an RT cuton code, the YV contact in the stuntbox will not operate as required to prevent subsequent stopping of the transmitter on offline CDCs. To overcome this difficulty, the function bar in the V slot of the YV mechanism should be coded, by breaking off tines, so that it goes into selection on either V or M.

5.08 Two different manners of intercept operation are offered, the choice depending on cost and desired operating practices. For the first, a permanent intercept machine, which may be either an ROTR or an RO, is assigned to each line. When a message is sent to intercept, it goes automatically to the assigned machine.

5.09 For the second method, which may be economically attractive where a number of 83B2 lines terminate in the same office, a single intercept machine is provided for several lines. A call for intercept by any line brings in an alarm. The attendant patches the intercept machine to the proper line, the patching operation releasing the message which is then received on the intercept machine.

5.10 The intercept machine can be used either to monitor the line continuously or during transmission from either of the two RTs by positioning the MR key. When the MR key (see Table F) is operated to the MON position, the intercept machine monitors the line continuously; when the MR key is operated to the MON S (monitor sending) position, the intercept machine is unblinded each time either of the outgoing RTs is successfully polled. The machine remains unblinded until the end of the message when FIGS H LTRS again blinds it.

5.11 With the MR key in the normal position, the intercept machine can also be used as a local outlet when a CDC is assigned to it. When the CDC is received, it unblinds the machine until the disconnect signal. In this case a V answerback will be sent after the ROTR is cut on, indicating that the message had been directed to it and that it was not an intercepted message.

5.12 Intercept will also function if there is an RT machine failure such as to bring in a machine alarm. In this case the ROTR will be cut on to receive the rest of the message intended for the RT. If the alarm has not been restored when the message comes to a normal end, the ROTR remains unblinded until the alarm is restored to normal.

6. PRIORITY OPERATION

6.01 Three options are now provided for both the 83B1 and 83B2 systems for the treatment of the priority feature. In summary, these are as follows:

(1) The original priority feature of the first 83B1 systems is now option ZD of SD-70832-01. A nonlocking pushbutton marked PR (see Figure 5) allows the attendant to get priority status for the next message. Priority here means that the transmitter will start the first time that the station is polled rather than the second. After the priority message has been sent, the station returns automatically to the Regular status.

(2) Where no priority feature is wanted, a strap, option ZV, short-circuits the contact of the priority button, disabling the feature. All stations with this option which have made a bid to send will start on the first round of polling.

(3) For the third option, ZE, a locking twist key is provided in place of the priority pushbutton. A possible panel engraving is DEF (deferred) and REG (regular). The regular position gives the same result as holding down the priority pushbutton of option ZD, that is, the transmitter will start the first time it is polled. A station with a lower priority for its traffic turns the key to the DEF position; its transmitter will not start until it has been polled twice in succession. The effect of this is that a station with deferred status cannot get a chance to send as long as any other station on the line has regular traffic to send during the first polling cycle. An alternate panel engraving for the two positions of this key might be REG and PR; the choice would depend on the operating practice desired. Here the PR position gives the priority condition when the transmitter is started on the first round of polling.

6.02 For the second and third options, ZV and ZE, the PR lamp is not needed and so is omitted.

7. KEYBOARD SENDING ON LINE

7.01 For manual keyboard operation directly on the line, some differences in operating procedures and in format are discussed in the 83B1 descriptive section. Some other factors bearing on the 83B2 system are added here.

7.02 In order to preserve circuit assurance, the keyboard operator must watch the page copy to see that each online code is followed by a V answerback (or M, if that is used for the intercept answerback). This is particularly important to be sure that the intercept circuit functions when needed. If the operator should send a garbled code, or if a called station should be out of order so that it did not answer back, and if, in typing, the operator did not then wait the five seconds for the intercept V (or M), but went on with the next CDC, the intercept time-out would not occur and the intercept machine would not cut on.

7.03 If the intercept action must wait for an attendant at the intercept point to plug in an ROTR, the keyboard sending operator must usually wait longer than five seconds for the intercept reply. Return of the answerback is the sign that sending may continue.

7.04 At the end of a message, the timing will be slightly different than with tape sending. It is recalled that with automatic tape sending, the originating TD actually sends out FIGS H LTRS LTRS before stopping; the stunt-box operation causing disconnect occurs on the first LTRS character and the other two are rolled out before the TD stops. However, the third LTRS character is not sent on the line because the TD signal generator contacts were shorted at the end of the second LTRS character by action of the station control circuit.

7.05 In the case of keyboard sending, the operator will usually not be fast enough to get out the extra LTRS and the actual format sent will be FIGS H LTRS. This is the reason for the new design feature discussed in Part 3E to assure that the RT transmitter stops on time. One way of assuring that the second LTRS character is sent from the keyboard is to send FIGS H and then press LTRS and repeat keys simultaneously. This will send two LTRS characters on the line at full line speed.

8. EQUIPMENT AND APPARATUS

A. List of Major 83B1 System Equipment Items
   Used Also in the 83B2 System

8.01 Most of the equipment items of the 83B1
     system can be used with only minor
changes provided by options.

8.02 Table B lists the items which will be re-
     usable in the 83B2 system. Two omis-
sions are conspicuous. The J70125C common
control key and lamp cabinet will not be used at
28 ASR stations because the keys and lamps will
be mounted as J70125K (see Figure 5) in the 28
ASR cabinet. Also, it is probable that there will
be no use for the 2-foot cabinet, ED-91194-01,
G9, because whenever the amount of equipment
is small enough to be contained by this cabinet
it would be put into the 28 ASR cabinet.

B. Equipment Components of the 83B2 System
   Which Differ from Those of the 83B1 System

8.03 Table C lists these components grouped
     in accordance with the cabinets in which
they are mounted.

8.04 Figure 3 shows the 7-foot cabinet. The
     number J70125S, List 1 and List 2, is a
blanket number covering the cabinet shell and
the common items required in every case. It
includes the power panel (J70125J, List 1), the
distributor panel (J70125L, List 1), the +120
volt rectifier (KS-15898, List 1), and the -48
volt rectifier (KS-15620, List 9). The remain-
ing equipment units that are mounted in the
7-foot cabinet are identified by their respective
J-numbers in Table C.

8.05 The 7-foot cabinet is used at an interline
     station where crossoffice transmission
through RTs is provided. It is also used where
the intercept function is provided on an individ-
ual 83B2 line. The station where the intercept
function is performed in either case should also
be the control station with the transmitter start
circuit. The 7-foot cabinet contains all of the
control keys and lamps except for the common
station control group which is on the 28 ASR
cabinet (J70125K — see Figure 5) when a 28 ASR
is provided or otherwise it is associated with
the teletypewriter apparatus.

C. Teletypewriter Apparatus

8.06 Table D lists the teletypewriter apparatus
     at outlying stations and the crossoffice
station.

8.07 The 28 ASR (see Figure 1) used at outly-
     ing stations will include the 28L typing
unit (see Table D, Note 1), the 28H transmitter-
distributor unit, and the 28H or 28H-1 trans-
mitter-distributor base.

8.08 The 28H transmitter-distributor unit is a
     single contact transmitter-distributor
equipped with a manually operated three-posi-
tion control lever, a tape-out-pin switch and a
tight-tape switch. The 28H unit internal wir-
ing terminates in a 36-terminal connector
which is mounted on the transmitter-distribu-
tor unit.

8.09 The 28H transmitter-distributor base is
     used for mounting the 28H transmitter-
distributor unit in the 28G teletypewriter cabi-
net (ASR).

8.10 The 28H-1 transmitter-distributor base
     is designed to mount in a 28G teletype-
writer cabinet of the 28 ASR. It is of the same
basic design as the 28H transmitter-distribu-
tor-base except that it is equipped with a 28J-1
distributor.

8.11 Two 28D reperforator-transmitters are
     housed in one 28A RT cabinet, as shown
in Figure 4. Two key and lamp control panels
which are a part of the RT control circuit are
mounted in the hood of the cabinet. The cabinet
is provided for the automatic relaying of mes-
sages between two 83B2 lines. Connections be-
tween the RT control circuit and the receiving
and transmitting elements of the RT are made
by Amphenol-connector-ended cords which are
part of the RT control circuit.

9. KEYS AND LAMPS

A. In 28 ASR Cabinet

Common Controls

9.01 The common control keys and lamps at
     28 ASR stations are mounted (as J70125K)
in the 28 ASR cabinet as shown in Figure 1. A
close-up of the key and lamp panel is shown in
Figure 5.

Transmitter Start and Pushbutton Calling

9.02 Where either of these are used at a 28
     ASR station, they are mounted in the
standard key and lamp cabinet, on a shelf at-
tached to the 28 ASR cabinet. Refer to the
83B1 descriptive section.

B. In 7-Foot Cabinet at Crossoffice Station

Duplicate Designations for Circuits A and B

9.03 A number of the designations on the control panel of the 7-foot cabinet are duplicated except that one of the pair has the suffix A and the other, B. Examples are ARA and ARB of Table F for the intercept circuit, and PAA and PAB of Table G for the RT control circuit. The suffix letters A and B apply to the A and B portions, respectively, of the RT control circuit for a particular line and hence in a particular cabinet. Both are associated with the same sequence selector, but each has its own station control circuit.

9.04 For a particular line, in a 3-circuit interline system, the A circuit is associated with the interconnection to the first of the other lines, and the B circuit with the second. Thus, on a 2-line interconnection only the A circuits are used on both lines. If the priority bypass is used, it pre-empts the B circuit, limiting this arrangement to a 2-line system.

Common Controls

9.05 As pointed out in 4. of this section, the common station control keys are not needed with an RT crossoffice arrangement and are therefore omitted. If the manual tape relay option is provided at such a station, the common controls may be mounted on the table with the TD, or locally engineered in the relay rack strip of the 7-foot cabinet.

Transmitter Start and Pushbutton Calling

9.06 Where a transmitter start circuit is part of a crossoffice station, the station lamps and skip keys will normally be mounted in the jack strips of the 7-foot cabinet; the key cabinet may be used if desired.

9.07 Pushbutton operation at the crossoffice station does not fit automatic crossoffice operation of RTs so it is not expected that it will be attempted here unless locally engineered for the particular application and to meet the customer's needs and operating procedures. However, if the manual tape relay option is used, pushbuttons might be wanted to address messages from the transmitter as, for instance, for relay tapes received from other systems. Here, it would appear that the most convenient location for the keys and lamps would be close to the TD.

Power Distribution Circuit

9.08 Table E shows the keys and lamps associated with the power distribution circuit.

Intercept Circuit

9.09 Table F shows the keys and lamps associated with the intercept circuit.

RT Control Circuit

9.10 Table G shows the keys and lamps associated with the RT control circuit.

Operation of Intercept Circuit on Machine Alarm

9.11 The term machine alarm, as used here, refers to the trouble condition where signals are being received by the reperforator of an RT but the shaft is not turning over. Since the incoming message is not being punched in the RT tape this could result in the loss of the message, and so is a condition which needs to be alarmed. The RT- lamp on the RT cabinet lights and the audible alarm sounds.

9.12 Protection against loss of messages is further provided by the action of the intercept circuit. If an ROTR is permanently assigned to the circuit, it is automatically cut on by the machine alarm and thereafter receives the characters being sent by the transmitter of the RT. If patching-in of an ROTR is required, the IAL lamp on the intercept panel lights.

9.13 Under this condition, and with the TS key of the intercept key and lamp panel in its normal (TS) position, the transmitter start circuit does not time out even though the line is idle. The attendant can release the condition, and allow transmitter-start circuit time-out and the resumption of polling of the other stations on the line by operating the TS key to TO (see Table F).

9.14 During transmission of message text, the time-out of the intercept circuit cannot occur. However, if during the sending of CDCs transmission stops, on characters other than M, V, or LTRS, the intercept circuit will time out and send one V.

Priority Controls

9.15 The priority control keys shown in Table F, keys PRA, PRB, PA, and PB, provide

at the crossoffice station the equivalent of options ZD and ZE discussed in 6. of this section. For a two-line crossoffice arrangement, only the PRA and PA keys are used on each line, controlling the priority of the transmitter of the RT receiving from the other line. For a three-line interconnection the A and B keys, respectively, control the transmitters bringing traffic from the other two lines.

9.16 The PRA and PRB keys are like the PR key at an outlying station (option ZD) while the PA and PB keys provide the deferred-regular feature of option ZE.

9.17 The PA and PB keys can also be used to give permanent priority to the crossoffice stations, where the keys are turned to the REG position while the keys at the rest of the stations are left in the PA or PB positions.

C. In Reperforator-Transmitter Cabinet

9.18 There are two sets each of six keys and one lamp, mounted on the control panel of the 28-type (see Figure 4) cabinet used to mount the two 28-type reperforator-transmitters, each set of keys being associated with the transmitter portion of one of the RTs and the receiver of the other. The designations and the functions of the keys and lamp are detailed in Table H.

9.19 The various keys provide an attendant with means for taking the sets out of service for such operations as putting in a new tape reel or repairing broken tape without the loss of messages while the maintenance operations are being performed. For example, if a reperforator is out of service, the operation of the HOLD IN key suppresses the V answerback so that any message destined for that RT is diverted to intercept for manual handling and reintroduction into the system.

10. GLOSSARY OF TERMS AND ABBREVIATIONS

A. Terms

10.01 BID — The word bid is used in connection with a TD or an RT to refer to the fact that there is punched tape in the machine ready to be sent when the automatic controls give the transmitter its turn to send. See Tape Available. When a transmitter-distributor has tape available it automatically makes a bid to send. In the case of an RT, the initial bid, as the pivoted transmitter comes away from the punch, is withheld until after CR LF LTRS is punched in the tape and read by the sequence selector associated with the receiving portion of the RT. For subsequent messages in the same tape loop, the bid is continuous until the transmitter again comes up to the punch.

An exception occurs in the case of a connection to an 81D1 system which withholds the bid during the time that the multiple-address circuit is holding the local outlet feeding the receive side of the RT.

10.02 CROSSOFFICE — Refers to the transmission of messages across the office, from an incoming line to an outgoing line. The term may refer to the traffic itself, when the traffic is interline or to the switching arrangements or functions used in getting the traffic across the office. The term crossoffice code is sometimes used for an RT cuton code. Priority bypass is a crossoffice path not involving an RT. For the duplicate code arrangement the RT cuton code need not contain Y; the RT bypass code should in no case contain Y.

10.03 DISCONNECT CODE — Sometimes called end-of-message code, consisting of the three characters, FIGS H LTRS, which signals the selective calling line, to end the circuit arrangement set up for one message and to prepare for the next message.

10.04 END-OF-ADDRESS CODE — Sometimes called end-of-code sequence or lockout code, consisting of the three characters, CR LF LTRS, which signals the system that all address codes for a particular line have been sent and that no following letter combinations should be acted on as CDCs on the originating line.

10.05 INTERCEPT — See WILLFUL and MISCELLANEOUS INTERCEPT.

10.06 MACHINE ALARM — Occurs when the reperforator side of an RT is receiving incoming signals but its shaft is not turning over. This is a trouble condition which could cause loss of messages unless protected against.

10.07 MISCELLANEOUS INTERCEPT — Is the intercept of a message which occurs automatically when there is an incorrect CDC or other trouble such that answerback is not received after a CDC is sent. Compare WILLFUL INTERCEPT.

10.08 TAPE AVAILABLE — Refers to the condition of a TD or RT and to the signal which the TD or RT gives to the associated control circuit, when the transmitter, because of tape in its gate, is ready to send. For a TD, tape available results when the 6th pin is held down by tape in the gate. For an RT, tape available results when the pivoted head is away from the punch, indicating the presence of a tape loop between them. See BID for control qualifications.

10.09 TEXT CONDITION — Sometimes called the nonselect condition or lockout condition, when the circuit is so conditioned that no letter combinations can operate either the transmitter start or the CDC selection functions. The text condition is usually produced by the end-of-address (lockout) code. However, for the nonduplicate code case, the RT cuton code containing Y produces the text condition so far as the suppression of the need for answerback is concerned. In this condition other receivers on the originating line can still be cut on by their CDCs. The full text condition is not reached until after the lockout code. In the duplicate code case, the lockout code immediately follows the RT cuton code.

10.10 WILLFUL INTERCEPT — Is the intentional intercept of a message which takes place when a deliberate operation has been performed to cause intercept. On 83B2 lines, the action corresponding to willful intercept is caused by turning off the station whose traffic is to be intercepted or otherwise stopping the V answerback from it.

B. Abbreviations

10.11 General

ASR — Automatic Send-receive Teletypewriter Set

CDC — Call-directing Code

EOA — End-of-address

EOM — End-of-message

ICL — Incoming Line (direction with reference to the switching unit)

OGL — Outgoing Line (see Incoming Line)

ROTR — Receiving-only Typing Reperforator

RT — Reperforator-Transmitter

TD — Transmitter-Distributor

TS — Transmitter Start (refers to relay so designated)

TSC — Transmitter-start Code

10.02 Teletypewriter Characters

| Keytop Desig | Symbol | Function |
| --- | --- | --- |
| CAR RET (CR) | $<$ | CARRIAGE RETURN |
| FIGS | ⬆ | UPPER-CASE SHIFT |
| LINE FEED (LF) | $\equiv$ | LINE FEED |
| LTRS | ⬆ | LOWER-CASE SHIFT |
| SPACEBAR (No Desig) | ▬ | SPACE |

11. LIST OF DRAWINGS

11.01 This section lists the J specification, and the drawings applicable to this system.

Equipment Specification

J70125 — 83B1 and 83B2 Selective Calling Systems

Circuit Drawings

*SD-70832-01 — Station Control Circuit

*SD-70831-01 — Transmitter Start Circuit

SD-70867-01 — Intercept Circuit

SD-70868-01 — Reperforator-Transmitter Control Circuit

SD-70869-01 — Power Distribution Circuit

*SD-70835-01 — Pushbutton Calling Circuit

*Current issues of these drawings show both the 83B1 and 83B2 systems.

Equipment Drawings

ED-71119-70 — 7-foot Cabinet for Crossoffice Station

ED-71176-01 — Station Equipment — Typical Arrangements (Manufacturing Co. drawing has the suffix -30)

ED-71213-01 — Intercept Bay

ED-91180-01 — G25 — 3-foot Cabinet

ED-92185-01 — G6 — 4-foot Cabinet

### TABLE B

#### 83B1 EQUIPMENT USED ALSO IN THE 83B2 SYSTEM

| | |
|---|---|
| Station Control Unit (23-inch) | J70125A-( ) |
| Pushbutton Calling Unit | J70125D-L1 |
| Station Control Unit (19-inch) | J70125E-( ) |
| Transmitter Start Key and Lamp Cabinet (See Note) | J70125F-( ) |
| Pushbutton Calling Key and Lamp Cabinet (See Note) | J70125G-( ) |
| +120 Volt Rectifier | KS-15898-L1 |
| -48 Volt Rectifier | KS-15620-L9 |
| 3-Foot Cabinet (See Figure 7) | ED-91180-01-G25 |
| 4-Foot Cabinet | ED-92185-01-G6 |

Connecting cords and plugs are listed on equipment drawings.

Note: Common control key and lamp arrangements J70125C — List 1, J70125F — List 3, and J70125G — List 3, will not be required, since their equivalent will now be mounted in the 28 ASR cabinet as J70125K.

### TABLE C

#### EQUIPMENT COMPONENTS OF THE 83B2 SYSTEM WHICH DIFFER FROM THOSE OF THE 83B1 SYSTEM

7-Foot Cabinet J70125S Includes: { J70125S-L1 and L2

(1) Cabinet Power Panel J70125J-L1

(2) Power Distribution and Alarm Unit J70125L-L1

(3) (See Table B for the two rectifiers needed in this cabinet.)

Also Mounted in 7-Foot Cabinet:

(1) (See Table B for 23-inch Station Control Unit.)

| | |
|---|---|
| (2) Transmitter Start Unit | J70125B-L3 |
| (3) Intercept Unit | J70125H |
| (4) Reperforator-Transmitter Control Unit | J70125T |
| (5) Transmitter Start Key and Lamp Unit | J70125R |
| (6) Intercept Jack and Lamp Unit | J70125M |
| (7) RF Control Key and Lamp Panel | J70125N |
| (8) Priority Bypass (Cord and Plug-in Capacitor) | J70125T |
| (9) Manual-tape-relay Control Panel | J70125U |

Mounted in 28 ASR Cabinet (See Note):

(1) Key and Lamp Panel for Common Controls at all 28 ASR Stations    J70125K

Mounted in RT Cabinet:

(1) RT Key and Lamp Panel    J70125P-L1 and L2

Note: Common Control Key and Lamp Arrangements J70125C-L1, J70125F-L3, and J70125G-L3 will not be required since their equivalent will be mounted in the 28 ASR cabinet as J70125K.

TABLE D

TELETYPEWRITER APPARATUS

1. At Outlying Station:

28 ASR:

   (a)  28L Typing Unit (See Note)

   (b)  28H Transmitter-Distributor Unit

   (c)  28H Transmitter-Distributor base or 28H-1 Transmitter-Distributor base (includes a 28J-1 Distributor), if a Multicontact Distributor is required

28 RO: Optional Auxiliary Unit needed if copy is required during tape punching

2. At Crossoffice Station:

In 7-Foot Cabinet:

   (a)  28B Sequence Selector

   (b)  28J-2 Distributor (for 28B Sequence Selector)

In 28A RT Cabinet:

   (a)  28D RT Set (includes a 28D RT Unit plus a 28A RT Stand)

28-Type ROTRs needed for intercept or monitoring

Note: The 28L typing unit contains the stuntbox needed for the 83B2 stations. If an auxiliary 28 RO is provided, the 28L typing unit goes in it. At a crossoffice point, the stuntbox is provided in the 28B sequence selector.

TABLE E

POWER DISTRIBUTION CIRCUIT KEYS
AND LAMPS IN 7-FOOT CABINET

| Designation Keys | Key Type | Function |
|---|---|---|
| BR | Nonlocking Pushbutton | Buzzer Release |
| Lamps | Color of Lamp Cap | |
| AC | Red | Lights when AC power switch is off |
| FA (Fuse Alarm) | White | Lights when a DC fuse blows |
| 48 Fail | White | Lights when 48V DC fails |
| 120 Fail | White | Lights when 120V DC fails |
| AC Fail | White | Lights when both 48V and 120V DC fail |
| Cab. Alm (Cabinet Alarm) | White | Lights with buzzer operation |

For all of the fail conditions, cabinet alarm lamp lights and buzzer sounds.

TABLE F

INTERCEPT CIRCUIT KEYS IN 7-FOOT CABINET

| Designation Keys | Key Position | Function |
|---|---|---|
| MR (See Note 1) | MON | Continuous (ROTR) Line Monitor* |
| | MR (Normal) | Intercept and Subject to CDC |
| | MON S (Monitor Send) | Same as MR plus continuous monitor while transmitting from RT |
| TS (Transmitter Start — Time-out — Control Key) (See Note 2) | SPTO | (Stop Polling Time-out) Prevents transmitter start time-out under any condition. Intercept times out every 5 seconds and sends repeated Vs if originating TD has sent at least 1 character (except M, V, or LTRS) and then stopped. |
| | TS (Normal) | If a V answerback is not received within 5 seconds after a CDC is sent, the intercept circuit times out, sends the required V, and cuts on the ROTR. If a patchable ROTR is used, transmitter start time-out is prevented to give the operator time to plug in the ROTR. |
| | TO | (Time Out) Allows transmitter start circuit to time out and resume polling. |
| ARA | | Alarm Release on A Circuit |
| ARB | | Alarm Release on B Circuit |
| PRA | | Priority A — Pushbutton on A Circuit |
| PRB | | Priority B — Pushbutton on B Circuit |
| PA | | Priority A — Twist Key on A Circuit |
| PB | | Priority B — Twist Key on B Circuit |

*Alarm if intercept is called in by 5-second time-out.

Note 1: If ROTR is to be cut on by a CDC, permanent connection of ROTR to each line is required; otherwise a patchable ROTR may be plugged in for monitor or after intercept alarm is received.

Note 2: See text for description of operations under machine-alarm conditions.

TABLE F (Cont)

INTERCEPT CIRCUIT LAMPS IN 7-FOOT CABINET

| Designation Lamps | Lamp Color | Function |
|---|---|---|
| TR (Typing-Reperforator) | Clear | Intercept ROTR is connected |
| IAL | White | Intercept Alarm Lamp — Patchable ROTR is called for |
| ALA | Red | Alarm Lamp on A Line |
| ALB | Red | Alarm Lamp on B Line |
| PRA | Clear | Priority Lamp on A Line |
| PRB | Clear | Priority Lamp on B Line |

TABLE G

RT CONTROL CIRCUIT KEYS AND
LAMPS IN 7-FOOT CABINET

| Designation Keys | Description | Type of Key | Function |
|---|---|---|---|
| PAA ⎱ PAB ⎰ | Prepare to Patch | Locking Twist | Same as hold-in key on RT Cabinet |
| Lamps | | Lamp Color | |
| BTA ⎱ BTB ⎰ | Busy Transmit | White | Follows signals during transmission. Remains lighted after disconnect if hold key on RT is thrown. |
| BRA ⎱ BRB ⎰ | Busy Receive | White | Follows signals when reperforator is receiving. Remains lighted after disconnect of PAA (or PAB) key or hold-in key on RT cabinet is thrown. |
| WBA ⎱ WBB ⎰ | Willful Busy | White | Lights when busy key on RT is thrown. |
| CMA | Common Machine Alarm | White | Lighted lamp gives low-tape indication. |
| CTO | Common Tape-Out | White | Lighted lamp indicates that the 6th or torn-tape pin has come up. |
| PBD | Priority Bypass | White | Indicates bid has been made for priority RT bypass message. |

TABLE H

KEYS AND LAMP ON CONTROL PANEL
OF 28 RT CABINET (NOTE 1)

| Desig-nation (Note 2) Keys | Full Name and Type of Key | Function |
|---|---|---|
| Busy | (Locking) | If sending, immediate emergency stop and alarm. If stopped, withhold TD bid to send. |
| Hold | (Locking) | Withholds TD bid after end-of-message being sent. May be used to repair or reset torn tape. |
| Hold In | (Locking) | Prevents reperforator cuton for new message and disables answerback to CDC of RT so message goes to intercept. Momentary operation releases low-tape alarm. |
| Bid Hold RLS | Bid Hold Release (Nonlocking) | If bid is withheld but tape is available, this key restores bid without receipt of CR LF by the reperforator (Note 3). |
| TR | Tape Release (Nonlocking) | Releases torn-tape alarm after tape is fixed (with head away from punch). |
| TP | Transmitter Pulse (Nonlocking) | Steps transmitter to send one character for each push, provided tape is available. |
| Lamp | | |
| RTL RTR | Reperforator-Transmitter Trouble | Alarm for low tape, torn tape, busy, hold in, or machine alarm (Note 4). |

Note 1: These keys and lamps are on SD-70868-01.

Note 2: There are two sets of each, one for each RT in the cabinet.

Note 3: On the first message punched in the tape, the RT transmitter does not make a bid to send until the reperforator receives the end-of-address code CR LF. With several messages in the tape, the bid remains until the head is against the punch block.

Note 4: Incoming signals being received but receiving shaft not turning over.