

8A1 DATA SELECTIVE CALLING

STATION SETS

GENERAL DESCRIPTION AND PRINCIPLES OF OPERATION

1. GENERAL

1.001 This addendum, which supplements Section 581-122-100, Issue 2, is issued to add information pertaining to the TP308424 circuit card, to change the information pertaining to the idle line time out period from 0.60 second to 1.0 second, to add information pertaining to the reception and implementation of a group CDC, and also, to correct a typographical error on Page 2. The group CDC is used to enable two or more data selective calling stations to receive a broadcast transmission.

1.002 Insert the attached pages in accordance with the filing instructions above. Arrows in the margins indicate changes and additions.

Attached:

Page 1 dated January 1968, reissued  
Page 2 dated January 1968, revised  
Page 5 dated August 1966, reissued; January 1968, reissued  
Page 6 dated August 1966, revised; January 1968, reissued  
Page 21 dated May 1966, revised; August 1966, reissued; January 1968, reissued  
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A. Power Switch . . . . .	13	add block diagrams and simplified schematics,	
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A. ASR Mode Switch . . . . .	30	propriate literature.	
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		the signal line is controlled by the sys-	
		tem line controller. The system line con-	
		troller performs the polling function to avoid	
		contention for the line. Each polled station,	
		in turn, selects one or more receiving stations	
		for message reception. Should a receiving	

station fail to respond, the system line controller has facilities to intercept a message for later transmission. All sending stations are given an opportunity to transmit messages to any receiving station in the system.

1.04 The logic package provides the equipment necessary to connect a teletypewriter set with a controlled, 8A1 half duplex, dc signal line. By adding either a 130-type subset and power supply or a 103-series data set plus TP198420 data set coupler and associated cables, an 8A1 Teletypewriter Set can be connected to a 110 Baud, ac signal line.

## 2. DESCRIPTION

2.01 The Automatic Send-Receive (ASR), Keyboard Send-Receive (KSR), and Receive-Only (RO) Teletypewriter Sets currently available for 8A1 service are listed in Table I.

### TELETYPEWRITER SETS

#### A. Automatic Send-Receive Set

2.02 A sprocket feed, Automatic Send-Receive Set is shown in Figure 1. The cabinet provides an enclosure and basic mounting facilities for all units including a data set or subset (neither shown) in the pedestal. The keyboard unit, attached to the upper compartment base, includes the keyboard mechanism,

tape supply reel, and character counter mechanism, and provides mounting facilities for the typing unit, tape punch (reperforator) unit, and motor unit. The tape reader (transmitter distributor) base includes a motor for driving the tape reader (transmitter distributor) unit. The electrical service unit has individual selector magnet drivers for the typing unit and tape punch unit, and is mounted to the rear of the keyboard unit.

2.03 The station controller assembly is attached to a relay rack in the pedestal. The special controls for the 8A1 logic package are located on the left side of the control panel (Figure 2). The print suppression mechanism, operating in conjunction with the typing unit stunt box and station controller logic elements, is mounted on the left side of the typing unit.

#### B. Keyboard Send-Receive Set

2.04 The Keyboard Send-Receive Set is shown in Figure 3. The keyboard unit includes the keyboard mechanism and provides mounting facilities for the motor unit and typing unit; it is mounted on the upper compartment base. The electrical service unit is mounted behind the keyboard unit and contains a selector magnet driver for the typing unit. The special controls for the 8A1 logic package are shown in Figure 4.

TABLE I  
AVAILABLE STATION SETS

Set	Tape Punch Unit		Typing Unit Platen	
	Typing	Nontyping	Friction Feed	Sprocket Feed
ASR (35BC)	X		X	
ASR (35BF)	X			X
ASR (35BP)		X	X	
ASR (35BR)		X		X
KSR (35BD)			X	
KSR (35BG)				X
RO (35BE)			X	
RO (35BH)				X

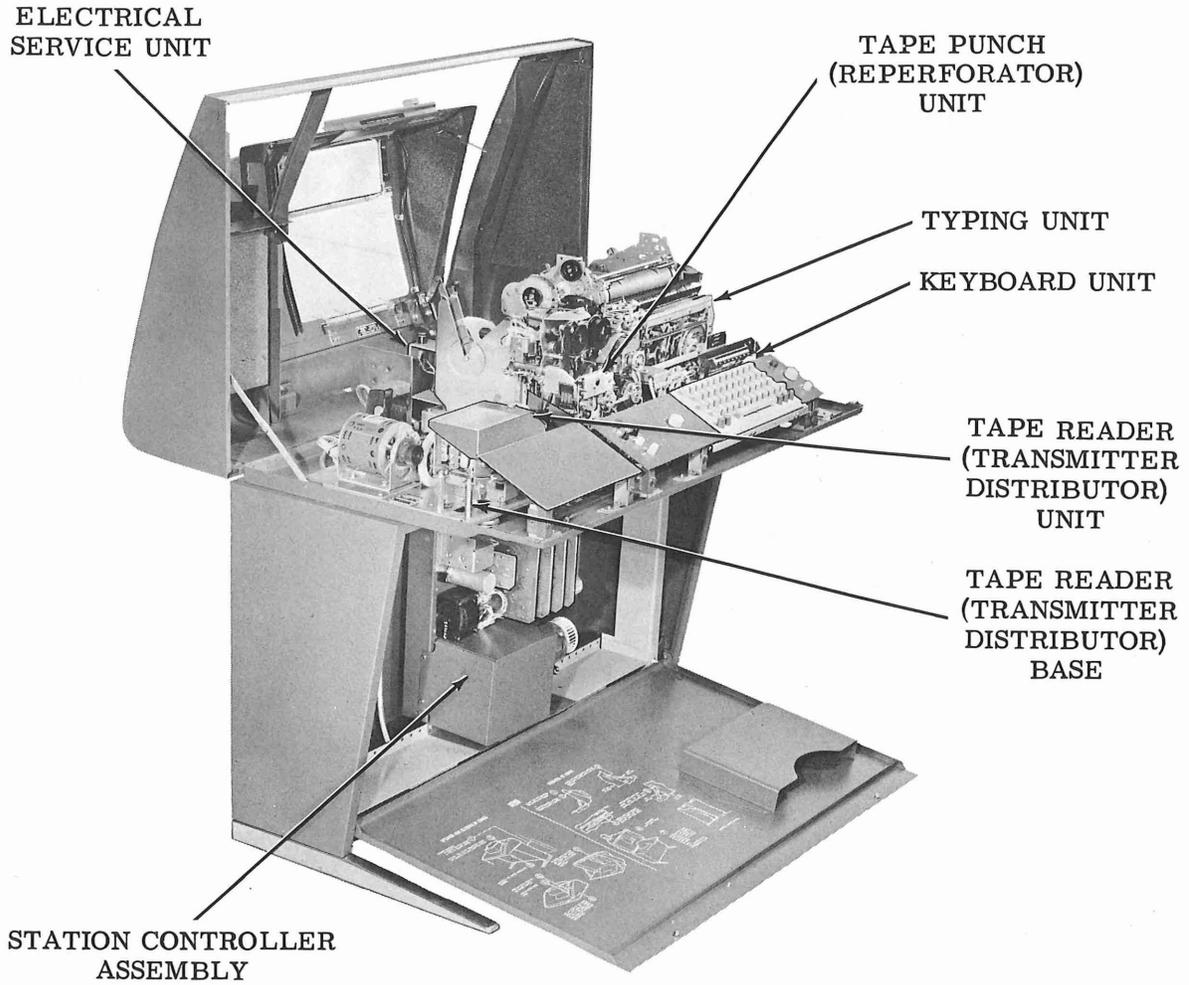
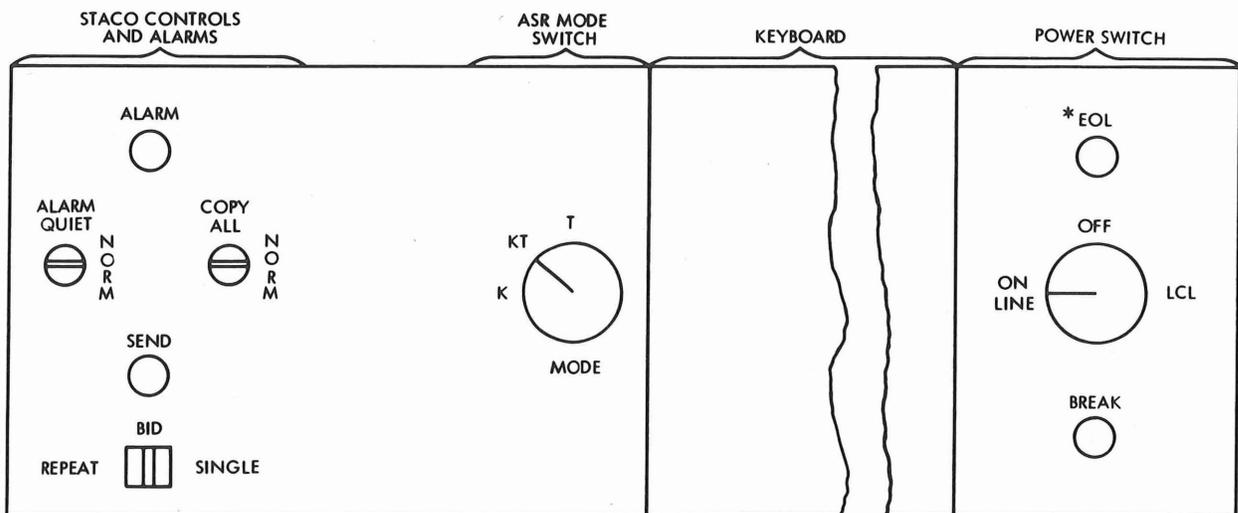


Figure 1 - Automatic Send-Receive Set (Covers Open)



\*Earlier design. EOL indicator on copyholder of later design cabinets.

Figure 2 - ASR Control Panel

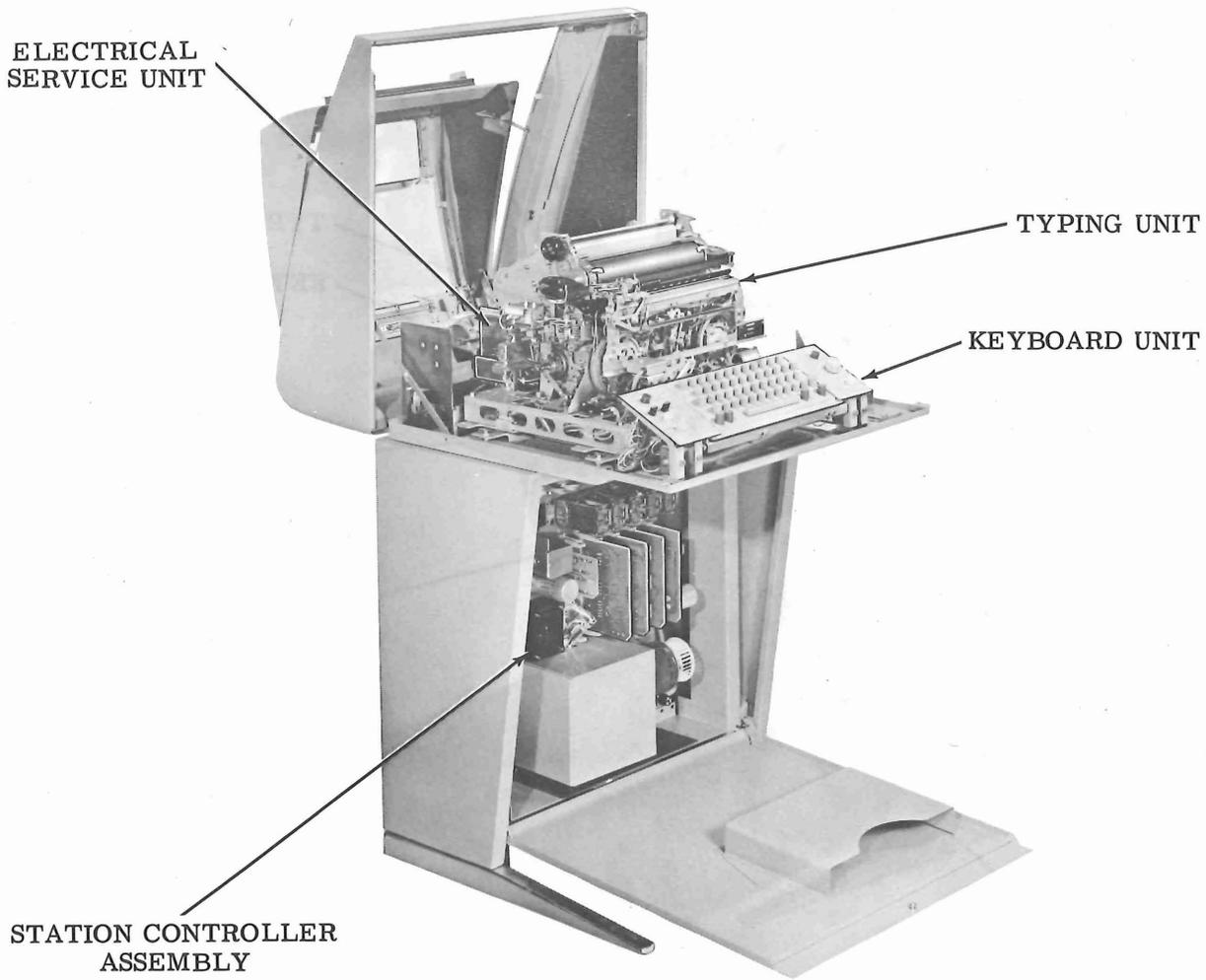
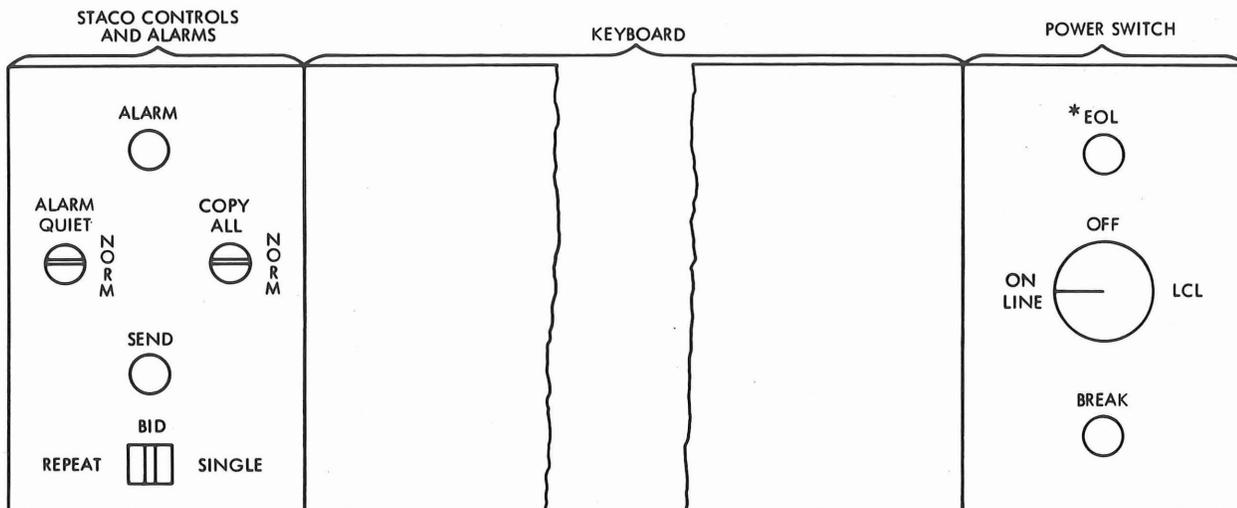


Figure 3 - Keyboard Send-Receive Set (Covers Open)



\*Earlier design. EOL indicator on copyholder of later design cabinets.

Figure 4 - KSR Control Panel

2.05 Space is available within the pedestal for mounting a 130-type subset or a TP198420 data set coupler to interface with a 103-series data set. Limited space is available for the installation of a subset power supply. However, if the power supply dimensions exceed the space available, it can be mounted externally.

#### C. Receive-Only Set

2.06 A Receive-Only Set is shown in Figure 5. The base unit, typing and motor units, and electrical service unit are mounted on the upper compartment base. The 8A1 RO control panel is shown in Figure 6. The station controller assembly is mounted in the pedestal. Either a 130-type subset or a TP198420 data set coupler for a 103-series data set, can be mounted to the right of the station controller assembly. Limited space is available on the upper compartment base for a

subset power supply. Should the power supply dimensions exceed the space available, it can be mounted externally.

#### 8A1 OPERATING FEATURES

##### A. Control Codes

2.07 An 8A1 Teletypewriter Set cannot transmit on an 8A1 controlled signal line unless it is initially selected to send by the system line controller. A Transmitter Start Code (TSC), issued only by the system line controller during the SELECT period, can activate a sending station with a keyboard or tape reader. The TSC is comprised of two characters; the first character is always DC<sub>0</sub>, and the second character may be any one of 26 alphabet codes. Since the system line controller can poll a maximum of 25 sending stations, an adequate number of TSC code combinations are available to satisfy the requirements of each half duplex system.

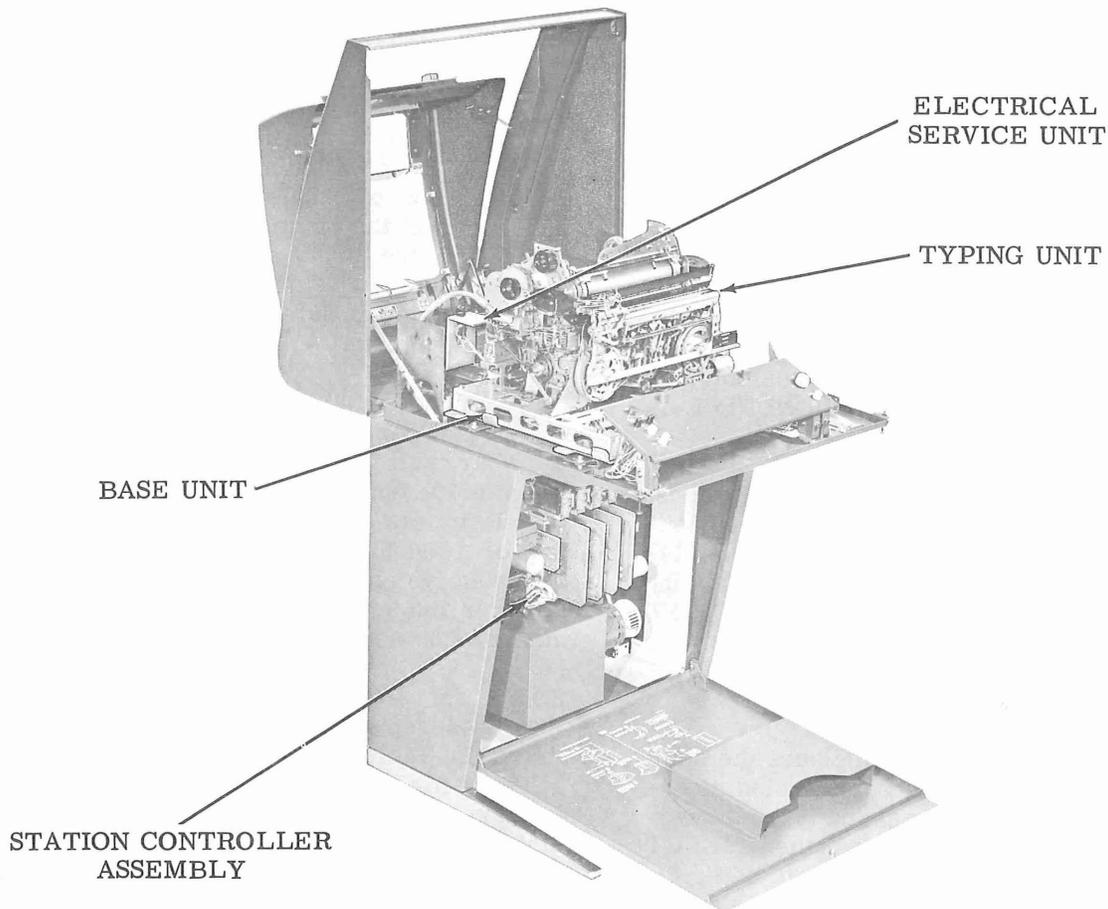


Figure 5 - Receive-Only Set (Covers Open)

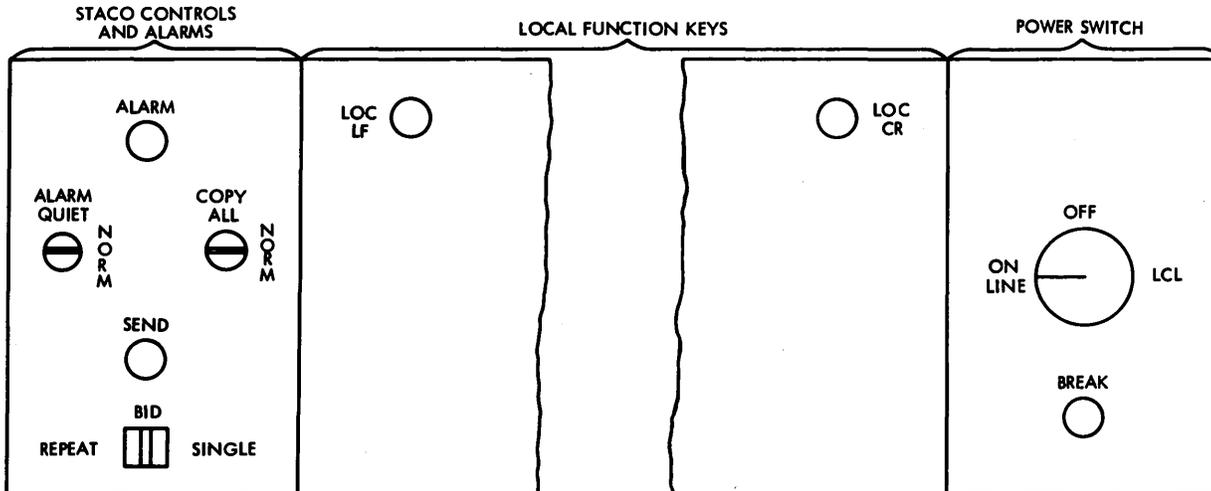


Figure 6 - RO Control Panel

2.08 A Call Directing Code (CDC) can be issued by any sending station but will be recognized only by the receiving station to which the CDC is assigned. Each receiving unit (tape punch or typing unit) is assigned a specific CDC. A group CDC can be assigned to all receivers for receipt of a broadcast transmission. A CDC consists of any two graphic characters with code level 6 spacing and code level 7 marking. A total of  $32^2$  or 1024 combinations are possible.

2.09 The End-Of-Address (EOA) code, issued by the sending station, places all stations in the NONSELECT condition. All previously selected receiving units enter the PRINT or PUNCH condition, while non selected receiving units remain in the NONPRINT or NONPUNCH condition.

2.10 The End-Of-Transmission (EOT) code, issued by either the system line controller or a sending station, is the system disconnect code. All sending and/or receiving stations return to the SELECT-NONPRINT (and/or NONPUNCH) condition.

#### B. 8A1 Logic Package

2.11 The 8A1 logic package includes the stunt box mechanism, print suppression mechanism, station controller assembly, and associated control panel. During the SELECT period, ie, between an EOT and an EOA, the station logic is conditioned to permit selection of a transmitter as well as subsequent selection of one or more receivers.

#### Stunt Box Mechanism

2.12 The stunt box mechanism (Figure 7) provides a mechanical means for recognizing control codes on the signal line. The signals are initially detected by, and arranged in, the typing unit selector mechanism. The mechanical arrangement of code bits, transferred to the codebar mechanism, is sensed by the stunt box mechanism. Typing of graphics will occur if the printing mechanism is not inhibited by the print suppression mechanism. Code reception and detection continues as long as the typing unit selector mechanism operates on the signal line.

2.13 If not inhibited by an adjacent function pawl or the codebar mechanism, a function bar will advance within the stunt box to operate its function pawl and lever. The function lever can operate either an electrical contact or a mechanical linkage. A function bar is returned to its unoperated position by the stripper blade, or unlatched at a later time by another function bar.

2.14 The stunt box has 42 slots for accepting 42 separately coded function bars. The listing in Table II (at end of the section) covers all sets for half duplex operation using either friction or sprocket feed typing units. Unused slots are omitted from the table. Certain stunt box function bars are inoperative unless the suppression codebar is operated (spacing). This group includes carriage return, line feed, vertical tabulation, line break, etc.

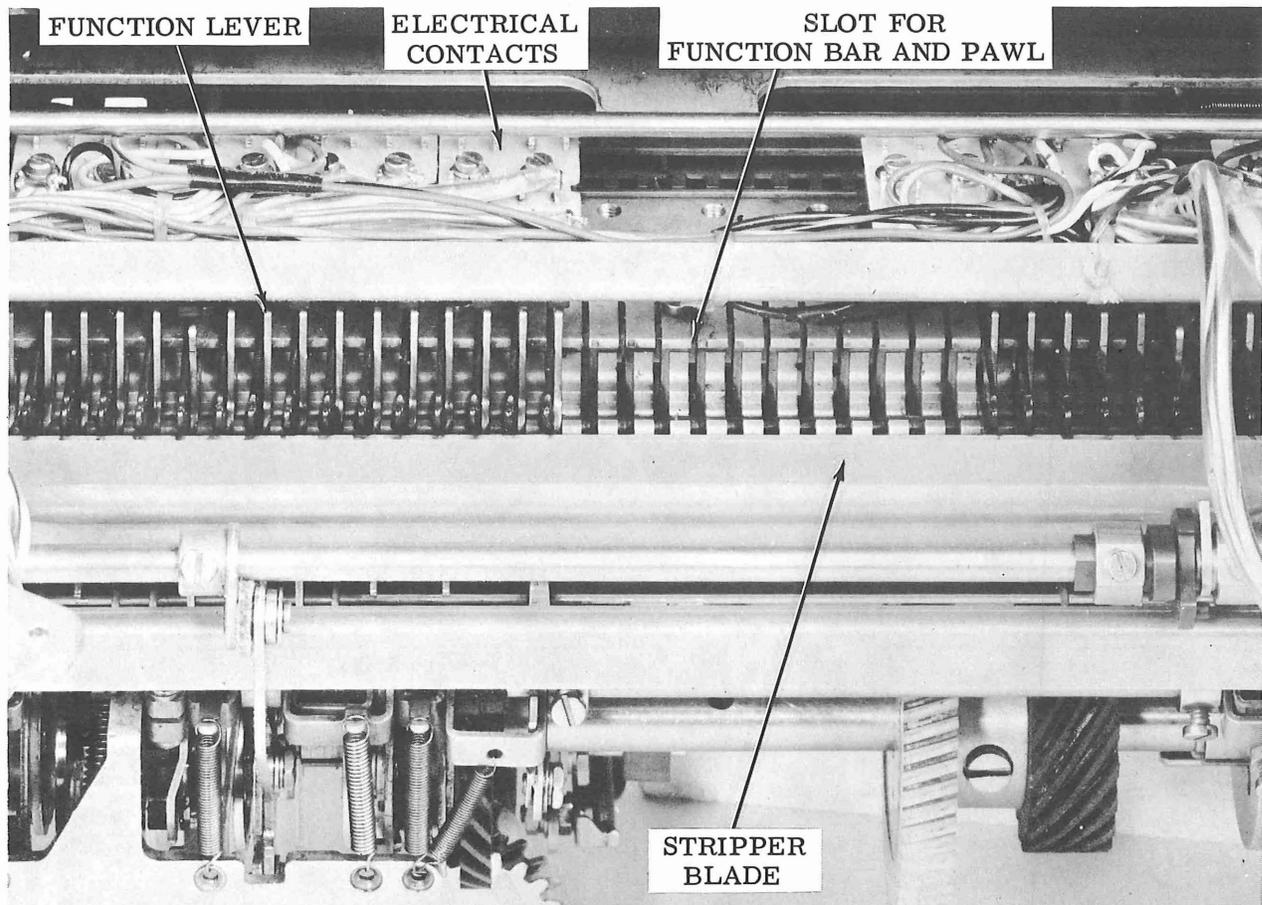


Figure 7 - Stunt Box Mechanism (Rear View)

#### Print Suppression Mechanism

2.15 The typing unit is equipped with a solenoid operated, print suppression mechanism (Figure 8) to facilitate PRINT and NON-PRINT conditions. The mechanism is capable of enabling or disabling the printing mechanism and certain function bars by shifting the suppression codebar. When the solenoid is energized, the operating link shifts the suppression codebar to the spacing (print) position.

2.16 Each 8A1 Teletypewriter Set is equipped with a COPY ALL twist key, located on the control panel. When operated, the twist key allows the solenoid to be energized directly from a -48 volt dc source.

#### Station Controller Assembly

2.17 The station controller assembly (Figure 9) is mounted on a relay rack within the pedestal of an 8A1 Teletypewriter Set. The answer-back assembly is mounted near the bottom of the panel. The relays attached to the

card assemblies respond to stunt box and station operated contacts. The relays mounted at the top of the panel respond to station operated contacts. The station alarm buzzer (not visible) is mounted on the rear of the panel.

2.18 The answer-back assembly consists of a base, motor, and answer-back mechanism. The drum in the answer-back mechanism is normally coded for three-cycle operation per revolution of drum, with \ ACK sequence. Character positions 1, 2, 5, 6, and 7 are suppressed in each 7-character cycle. One or two multicontact relays modify the \ ACK sequence when SOM SOM or BELL BELL responses are required.

2.19 The station controller relays are located and identified in Table III (at end of the section). The associated active contacts and terminals are listed in Tables IV and V (at end of the section). The H wiring field is located on the rear of the panel, behind the answer-back mechanism.

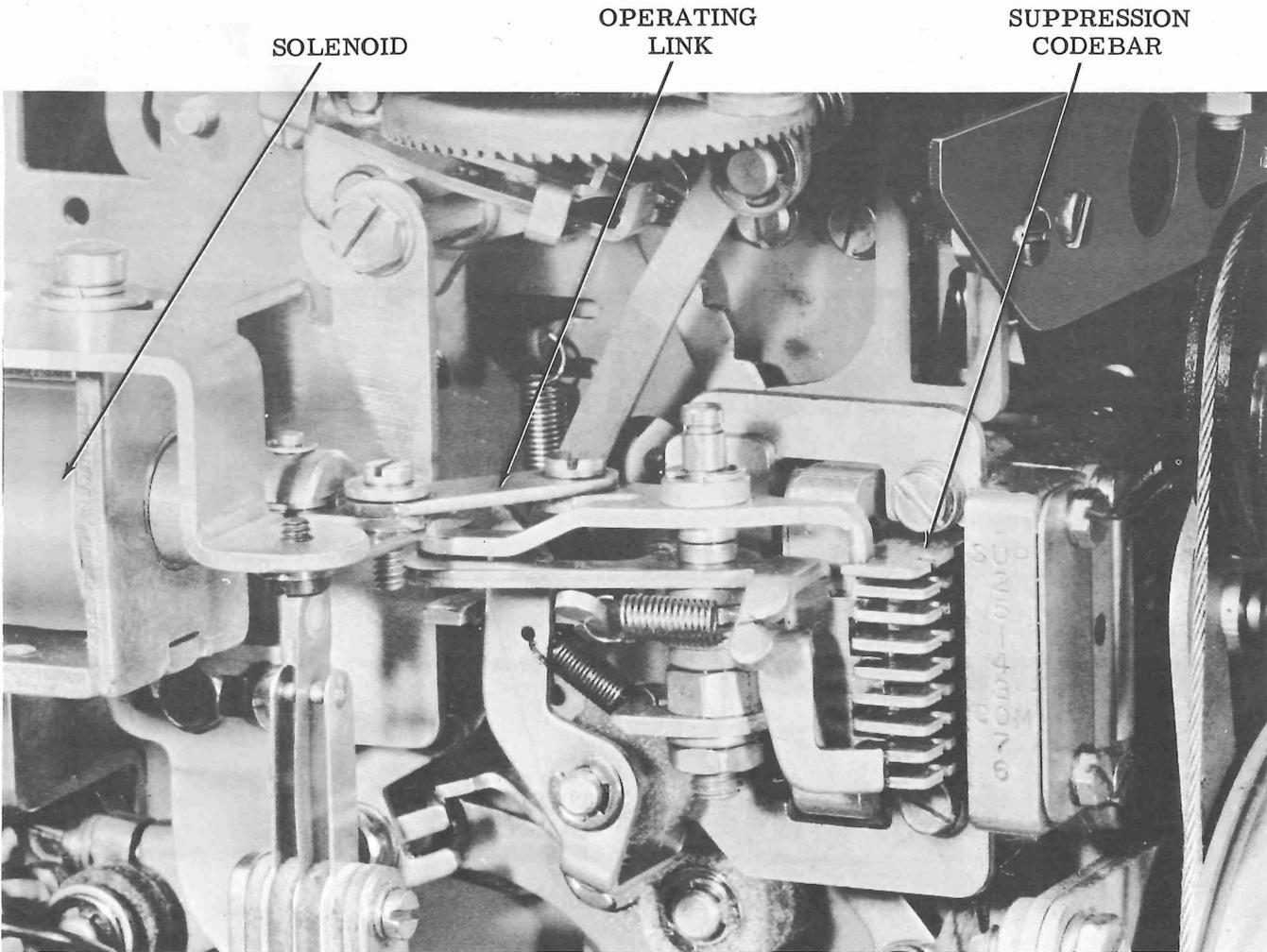


Figure 8 - Print Suppression Mechanism Mounted on Typing Unit

#### 8A1 Control Panel

2.20 The 8A1 controls are located on the left side of each control panel. Refer to Figures 2, 4, and 6. The controls include an ALARM lamp, ALARM QUIET twist key, COPY ALL twist key, SEND lamp, and BID lever.

2.21 If an alarm condition occurs at a station, the ALARM lamp is illuminated red. An audible alarm (buzzer) accompanies the visual alarm. The ALARM QUIET twist key is used to reset the alarm relay circuit. It can also be used to temporarily suppress the buzzer. After the cause of an alarm has been corrected, the twist key is turned to the QUIET position then returned to the NORM position. In this sequence the condition is corrected and the alarm is retired.

2.22 The COPY ALL twist key, when operated, supplies -48 volts dc to the print solenoid. In this position all graphics are printed and all applicable functions are performed. In the NORM position only local transmissions and selected message traffic will be received by the typing unit.

2.23 The BID lever is operated by the attendant when a SINGLE or REPEAT bid is entered for the signal line. The lever is illuminated green for a SINGLE bid (nonlocking position) or illuminated amber for a REPEAT bid (locking position).

2.24 The SEND lamp is illuminated white after a station has secured the signal line for message transmission. The lamp is

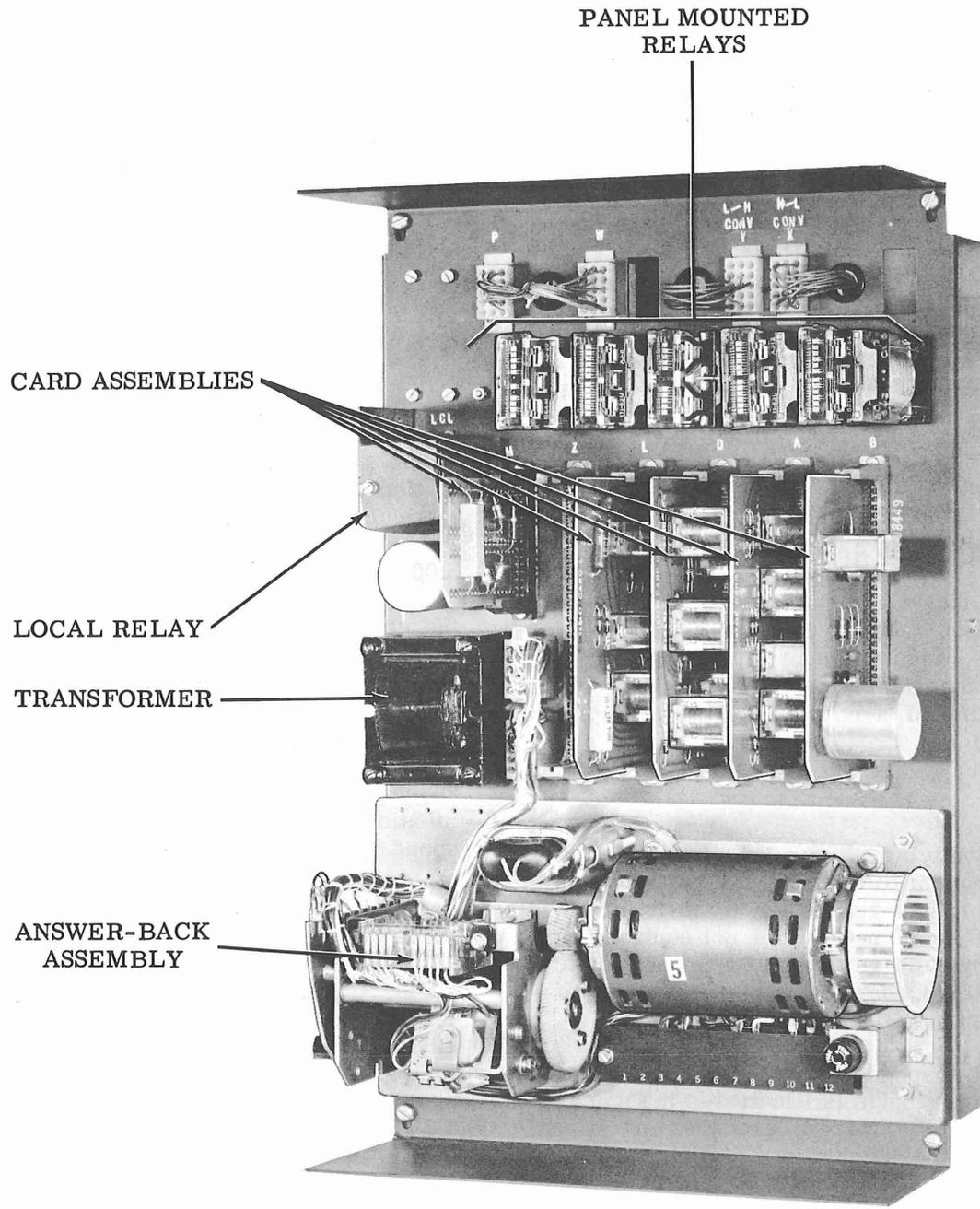


Figure 9 - 8A1 Station Controller Assembly

extinguished when the sending station is disconnected from the line through local or remote (system line controller) transmission of an EOT.

2.25 **Function Keys:** Each set is equipped with appropriate function keys to control local and remote station equipment. Certain functions can be performed to affect local station equipment only. Other functions are transmitted through the signal line to affect both local and remote station equipment. A signal line function is performed by depressing the CTRL (control) key and desired function key simultaneously. The code character associated with a function is received by the typing unit selector mechanism and detected by the stunt box mechanism.

Note: Functions transmitted on the signal line will occur only at stations where the typing unit is in the PRINT condition.

### 3. PRINCIPLES OF OPERATION

3.01 An 8A1 Data Selective Calling System is generally a fully automatic system precluding random use of a keyboard or tape reader. Station transmission is dependent upon receipt of a command from the system line controller.

3.02 An outlying station set, if equipped with a transmitting unit, will respond to its TSC with either traffic or a no-traffic response. A Receive-Only Set not equipped with an auxiliary tape reader will respond only to a Call Directing Code (CDC) generated and transmitted by an outlying sending station.

3.03 The response of an ASR set to local and system inputs is illustrated in Figure 10. Included in the diagram are the operational functions of the signal line, station logic, and power circuits.

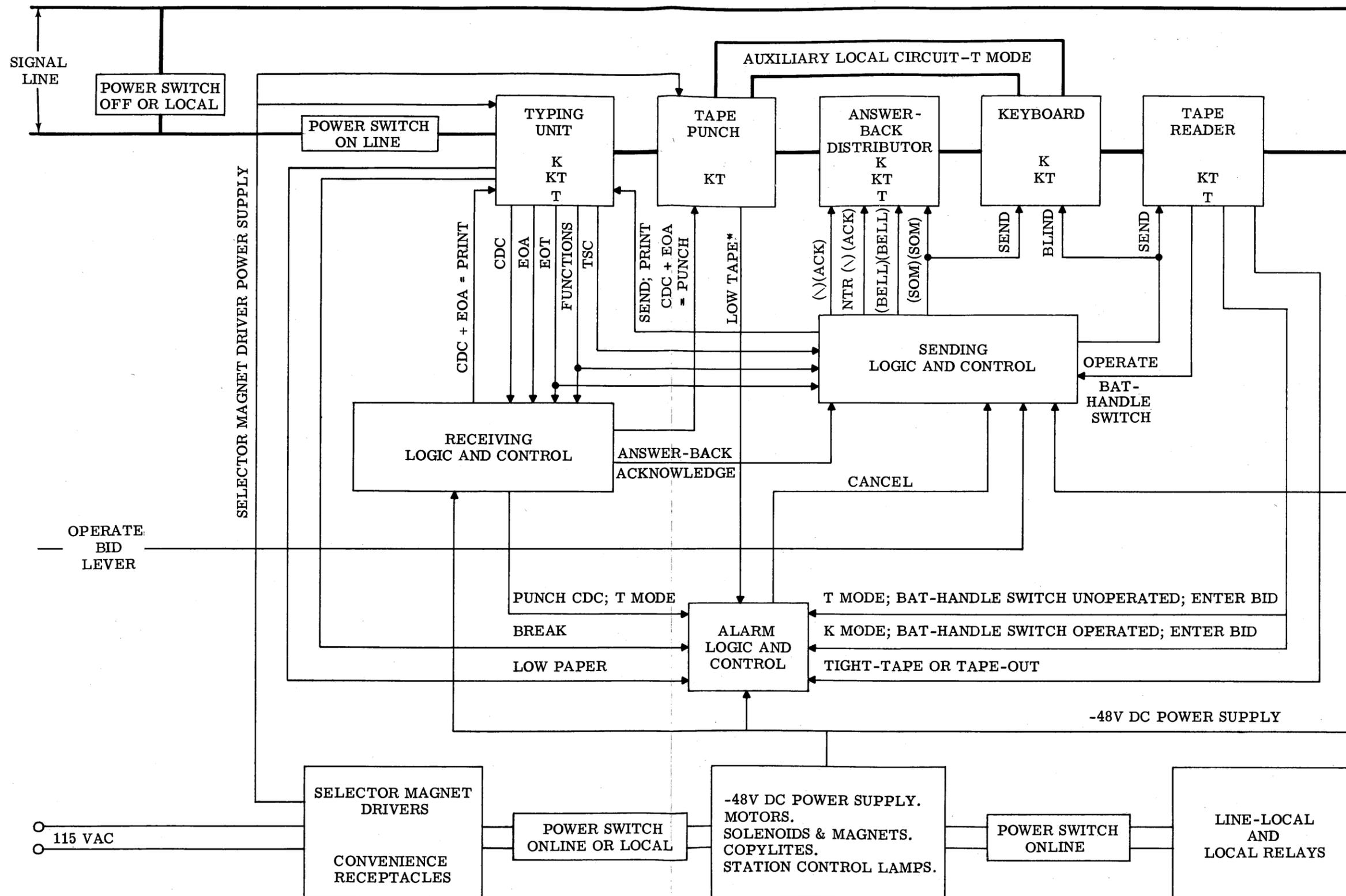
3.04 When an ASR set is connected to a 115 v ac power source and the power switch is OFF, the signal line is shunted to bypass the signal generating and receiving units. The selector magnet drivers (and convenience receptacles) are continuously energized as long as power is available to the set. Consequently, the typing unit and tape punch selector magnets are unaffected when changing the operational modes of the set.

3.05 When the power switch is rotated to the ONLINE position, all motors are activated, the -48 v dc power supply is energized, the copylites are illuminated, and the line-local and local relays are energized. Solenoids, magnets (other than selector magnets), and station control lamps are energized when their individual contacts are closed by local and signal line inputs. The energized line-local relay removes the shunt from the signal line, placing the typing unit selector mechanism directly on line. The selector mechanism delivers all code characters to the codebar mechanism for subsequent recognition by the stunt box mechanism.

Note: The EOA or EOT will be recognized by all stations whenever either character appears on the line. The TSC or CDC will be recognized only by the station to which the sequence is assigned. All other functions will not be recognized unless the particular station is selected to receive.

3.06 Receipt of a station TSC will initiate transmission. If no traffic is available, the station will automatically respond with a \ ACK sequence. If a maintenance condition exists, the station will respond with a BELL BELL sequence. If keyboard entry is planned, the station will respond with an SOM SOM allowing the operator up to 30 seconds to begin keyboarding. And finally, if tape reader transmission is intended, the tape reader will respond with its first CDC.

3.07 The preamble of all messages must contain a two-character CDC plus DELETE (sometimes called RUBOUT) for tape entry or a two-character CDC, pause, and DELETE for keyboard entry. Each character of the CDC must be a graphic, ie, code level 6 spacing and code level 7 marking. The DELETE is a fill character and is not part of the CDC. DELETE after a CDC must be present for tape entry to prevent preamble transmission garble. DELETE before a CDC insures a division between multiple addresses in keyboard entry. The preamble, for either tape or keyboard transmission can contain as many CDCs that are necessary; multiple addresses can be handled as easily as a single address. An EOA (End-Of-Address) DELETE code sequence terminates the message preamble. The message text follows with an EOT (End-Of-Transmission) code at the conclusion. The EOT is a system disconnect code.



\*LOW TAPE AFFECTS ALARM LAMP, BUZZER & PUN RELAY ONLY.

Figure 10 - ASR Block Diagram

3.08 DELETE codes should be used in both the leading and trailing portions of the message tape. Enough DELETE codes (approximately six inches of tape) should be used ahead and behind a message to bridge the gap between the reader and punch in an ASR set. At least ten (six for exact stop) DELETE characters are necessary in the tape trailer to prevent the tape-out contacts from operating before the EOT is transmitted.

3.09 The message preamble and receiving station responses will appear on the page copy at the sending station. The relay associated with the SEND lamp closes a set of contacts to energize the print solenoid.

3.10 However, the preamble will not appear on the page copy at the receiving station. The EOA code, following the CDC, will energize the print solenoid, placing the typing unit in the PRINT condition such that the following text will print. An EOT code at the conclusion of the message will return the typing unit to the NONPRINT condition. Suppression of printing during the preamble will not clutter the copy with needless codes. If the preamble CDCs are needed to identify the stations, they should be repeated as part of the text. The punch will not perforate tape during the TSC or preamble. The punch selector is blinded until its CDC and the EOA are received.

## OPERATIONAL MODES

### A. Power Switch

3.11 Each ASR, KSR, and RO Teletypewriter Set is equipped with an ONLINE-OFF-LOCAL rotary power switch. When the power switch is in the ONLINE position, the transmitting and receiving units associated with each set are placed on the external signal line and the motor units are turned on (Figure 11). The line-local relay in the electrical service unit and the local relay in the station controller assembly are energized. In the case of an ASR set, the operational mode can be further modified by the mode selector switch. See 3.14 for a discussion of the ASR mode selector switch.

3.12 When the power switch is placed in the OFF position, the line-local relay in the electrical service unit is de-energized, thereby shunting the signal line past the transmitting and receiving units. The selector magnet drivers and convenience receptacles remain

energized. Power is removed from all other electrical components.

3.13 By rotating the power switch to the LOCAL position, the set can be operated on an internal signal line. The external signal line is shunted by the de-energized line-local relay. The local relay in the station controller is de-energized; it removes the blind from the tape punch. All motor units are turned on, and the transmitting units are capable of sending to local receiving units, only.

### B. ASR Mode Switch

3.14 The ASR mode switch (to the left of the keyboard) is used to facilitate three operational combinations. In the KT mode all units, ie, keyboard, tape reader, tape punch, and typing unit are available to the external signal line. In the T mode the tape reader and typing unit are available to the external signal line while the keyboard and tape punch are on a local, internal circuit. In the K mode, only the keyboard and typing unit are available to the signal line; the tape reader and tape punch are disabled. Refer to Figure 12 during the following discussion.

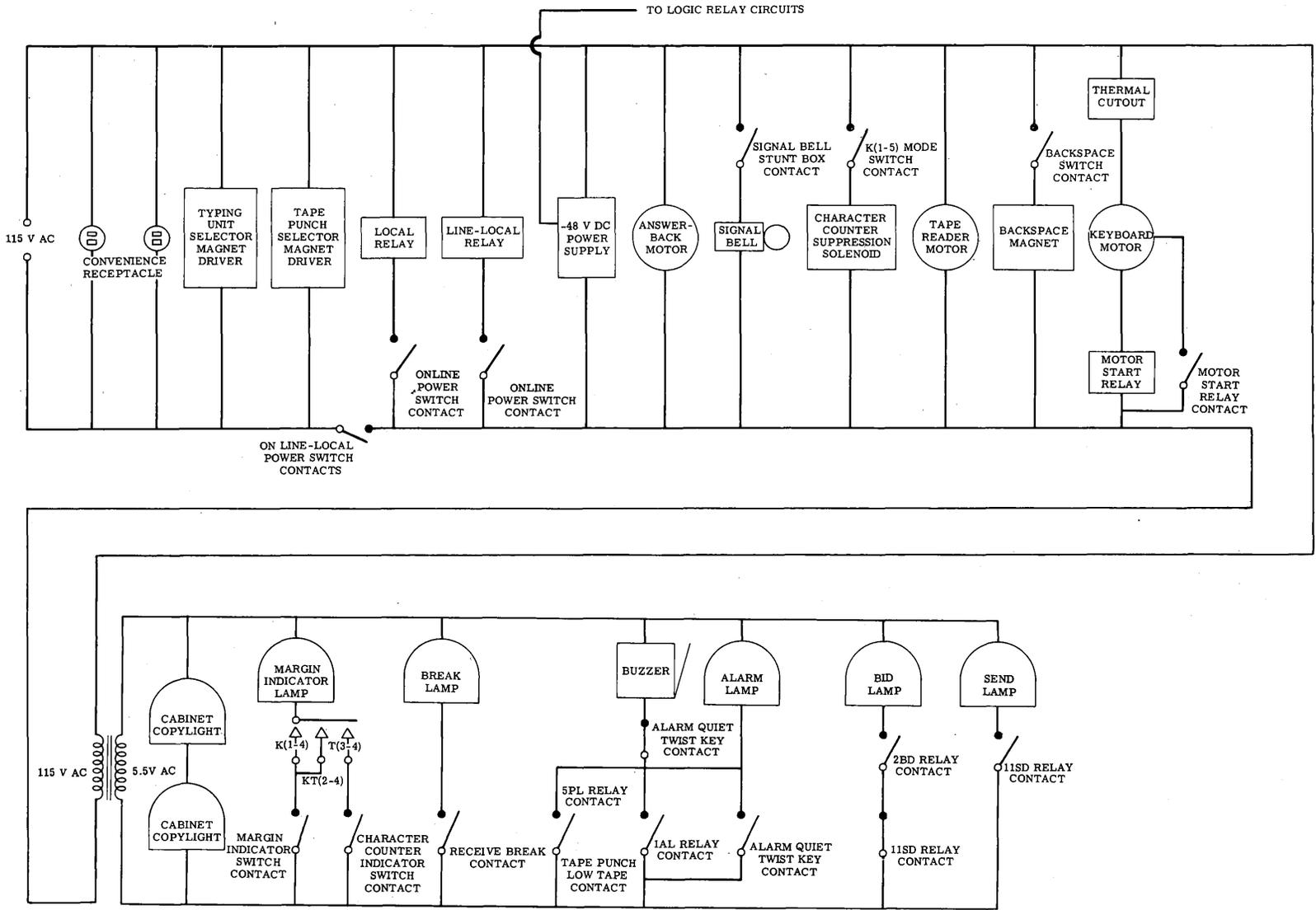
### K (Keyboard) Mode

3.15 The K (Keyboard) mode provides for keyboard entry on the line. Although the keyboard signal generator remains in series with the reader signal generator, the reader is disabled by opening its clutch trip magnet circuit. The typing unit selector magnet driver is not blinded allowing it to receive all transmissions from the keyboard. However, the tape punch selector magnet driver is removed from the signal line by K contact 1-3 and into an auxiliary circuit by K contact 7-2.

Note: When reference is made to the mode switch contacts, the first digit designates the mode switch terminal, and the second digit designates the mode switch section.

The signal line circuit extends from the positive side of the signal line through a set of line-local relay contacts, the tape reader signal generator contacts, K contact 1-2, K contacts 7-1 and 1-3, the typing unit selector magnet driver, a set of line-local relay contacts, and to the negative side of the signal line. The auxiliary circuit is from the positive side of the tape punch local power supply,

Figure 11 - ASR Power Circuit



TO LOGIC RELAY CIRCUITS



through K contact 7-2, the tape punch selector magnet driver, and to the negative side of the power supply.

#### KT (Keyboard-Tape) Mode

3.16 The KT (Keyboard-Tape) mode provides the ability to monitor both incoming and outgoing traffic on tape and page copy simultaneously. The keyboard signal generator is in series with the reader signal generator by KT contact 2-2. The typing unit and tape punch selector magnet drivers are in series with the transmitting units. The signal line circuit extends from the positive side of the signal line through the line-local relay contacts, the tape reader signal generator contacts, KT contact 2-2, the keyboard signal generator contacts, KT contact 8-1, the station controller answer-back distributor, KT contact 2-3, the tape punch and typing unit selector magnet drivers, through the line-local relay contacts, and to the negative side of the signal line.

#### T (Tape) Mode

3.17 The T (Tape) mode provides two circuits of operation, ie, line and auxiliary local. The keyboard and tape punch selector magnet drivers are switched from the signal line into the auxiliary local circuit by T contacts 9-1 and 9-2. The reader signal generator and typing unit selector magnet driver are placed on the line through T contacts 3-2 and 3-3. The signal line circuit is from the positive side of the signal line through the line-local contacts, reader signal generator contacts, T contact 3-2, the station controller answer-back distributor, T contact 3-3, typing unit selector magnet driver, through the line-local relay contacts, and to the negative side of the signal line. The auxiliary circuit is from the positive side of the tape punch auxiliary power supply, through T contact 9-2, the keyboard signal generator contacts, T contact 9-1, through the tape punch selector magnet driver, and to the negative side of the power supply.

#### Power Circuits

3.18 The tape reader clutch trip magnet circuit is controlled by KT contact 2-1 and T contact 3-1 (Figure 13). The tape reader can be operated in either the KT or T mode. When the set is in the K mode, the tape reader clutch trip magnet circuit is opened, thereby disabling the reader.

3.19 When the set is in the T mode, the margin indicator lamp is controlled by the character counter indicator switch through T contact 3-4 (Figure 11). When the set is in either the K or KT mode, the margin indicator lamp is controlled by the margin indicator switch through K contact 1-4 or KT contact 2-4. The character counter is disabled in the K mode by a solenoid. This solenoid, energized by K contact 1-5, prevents the character counter bars from falling. Disabling the character counter allows the operator to prepare tape in the T mode, go to the K mode, use the keyboard, and return to the T mode without destroying the count on the character counter.

#### SENDING

3.20 Any station with a keyboard and/or tape reader is capable of sending messages within a half duplex system. Neither unit can send, however, until the sending station is polled by the system line controller.

#### A. Tape Reader Transmission

##### Conditioning

3.21 Initially, the sending station must be preconditioned by placing the power switch in the ONLINE position and the mode switch for an ASR set in the KT or T position. An adequate supply of paper should be in the typing unit. To conform with the required message format the tape should include a DELETE leader, CDCs, EOA, text, EOT, and DELETE trailer.

##### Tape Insertion

3.22 When tape is inserted in the tape reader and the tape lid is closed, the tape-out pin is depressed, permitting the tape-out contact to assume its normally closed condition. When placing the tape reader bat-handle switch in the RUN position, the normally open bat handle switch and tight-tape contact is closed causing the BHS relay to energize (Figure 13).

##### Bid Entry

3.23 A bid is entered for the signal line by operating the BID lever. When a SINGLE bid is entered, the BID lever is operated momentarily toward the nonlocking position. As an option for multimessage tapes a continual bid can be entered by operating the lever

toward the REPEAT (locking) position. However, momentary operation of the BID lever is adequate for energizing the BD relay. Contact 1BD holds the BD relay to ground and 2BD closes to light the BID lamp.

Note: Contact 6 EOT in the BD relay circuit cannot operate before the SD relay is energized, ie, the SD relay must be energized before an EOT is received.

#### Affects of Remote Sending Stations

3.24 Since other sending stations could be operating on the line before the local station TSC is generated and received, the remotely generated EOA and EOT control codes can be recognized locally to prevent the send circuit from responding to a false TSC during remote message text.

3.25 An EOA, issued by a remote sending station, and followed by any character will latch open the EOA-UNIVERSAL stunt box contact. The open EOA-UNIVERSAL contact de-energizes the TSCI (Transmitter Start Code Inhibit) relay. The send circuit is therefore guarded against receipt of a false TSC by the open 12TSCI contact.

3.26 An EOT, issued by either the system line controller or a remote sending station, causes an EOT stunt box function lever to unlatch the EOA-UNIVERSAL stunt box contact. Closure of this contact provides a current path for energizing the TSCI relay. The send circuit, by closure of contact 12TSCI, is henceforth responsive to a Transmitter Start Code (TSC).

#### Receive TSC

3.27 Upon receipt of the station TSC, the TSC stunt box contact closes momentarily to energize the SD relay. Contact 1SD maintains a current path through the holding ground leg. The energized SD relay extinguishes the BID lamp and illuminates the SEND lamp through transfer contact 11SD.

3.28 The typing unit print solenoid is energized through contact 12SD; all transmissions (functions and graphics) will be recognized by the typing unit. Contact 8SD closes to energize the TDR relay and the tape reader clutch magnets. The energized tape reader clutch magnets initiates station transmission.

#### Preamble Transmission

3.29 When the tape reader starts operating, it transmits a DELETE leader followed by the first Call Directing Code (CDC). The reader must pause for an acknowledgement from the station it has called. To stop the reader and provide an idle line for a remote transmission, the graphic stunt box contact is latched open in the tape reader clutch magnet circuit. The stunt box function bar operates upon receipt of the first graphic character following the TSC sequence or subsequent CDC sequences. Since the function mechanism lags the selector mechanism (both in typing unit) by at least one character, the first graphic character is not fully detected until the second character is partially transmitted. (Detection occurs approximately 163 ms after transmission begins.) The reader magnets de-energize toward the end of the second cycle; however, the reader clutch may not be latched until the following cycle. The reader will transmit a DELETE character during the third cycle.

3.30 The sending station can determine the disposition of a message by monitoring the printing character of the answer-back sequence. With the print solenoid energized the typing unit will monitor all transmissions on the signal line. A reverse slant, \, indicates contact with called station; an asterisk, \*, indicates contact with the system line controller intercept; and a number sign, #, indicates a no-contact condition. The number sign, #, generated by the line controller intercept, means that neither the called station nor the intercept can receive the message.

3.31 The ACK code, transmitted by the receiving station as part of the answer-back sequence, will unlatch the graphic stunt box contact to restore -48 v dc to the tape reader clutch magnets. The ACK code is a nonprinting character and is detected by the ACK function bar in the stunt box mechanism.

#### End of Address

3.32 After the tape reader has transmitted all CDCs and received all acknowledgements, the tape reader completes the message preamble with the transmission of an End-Of-Address (EOA) code. The EOA, in effect, places all selected receiving units (other than the local typing unit) in the PRINT condition,

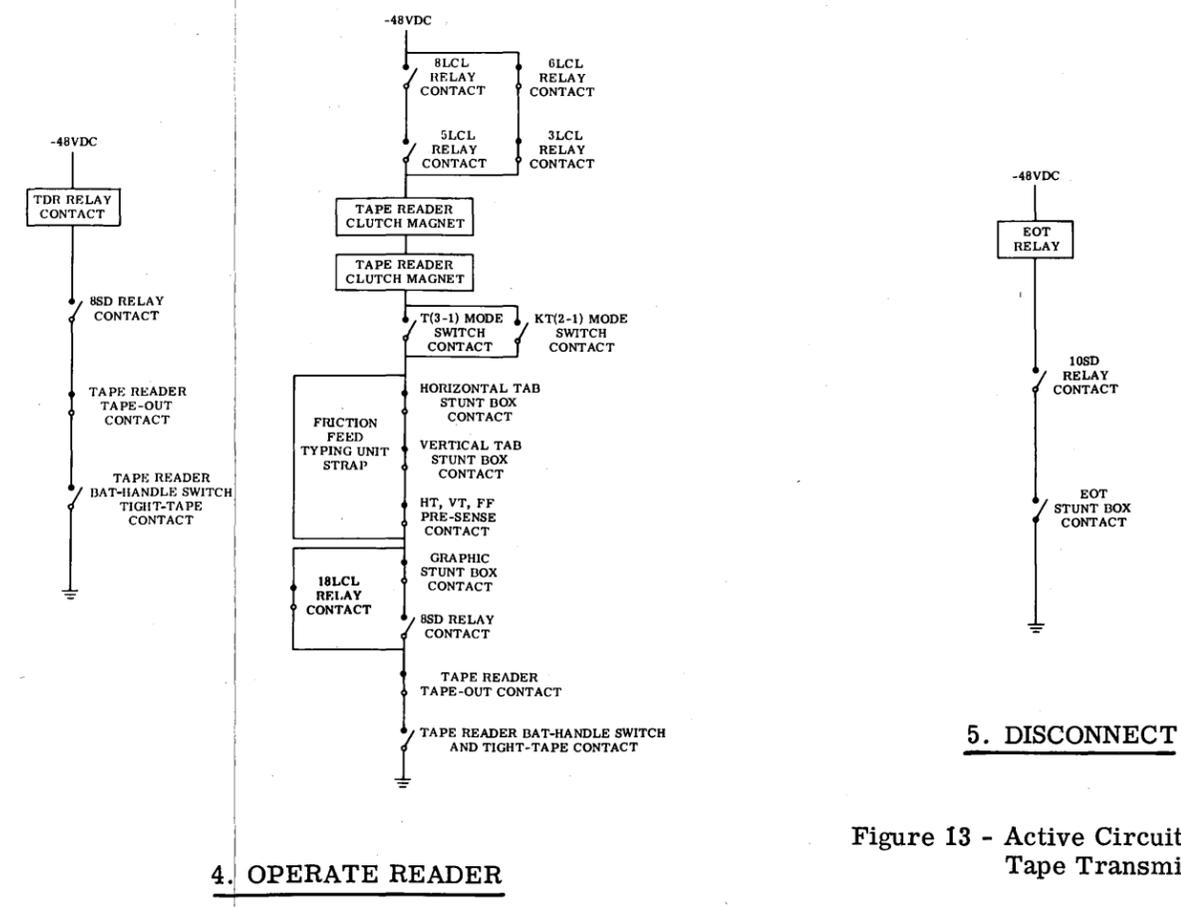
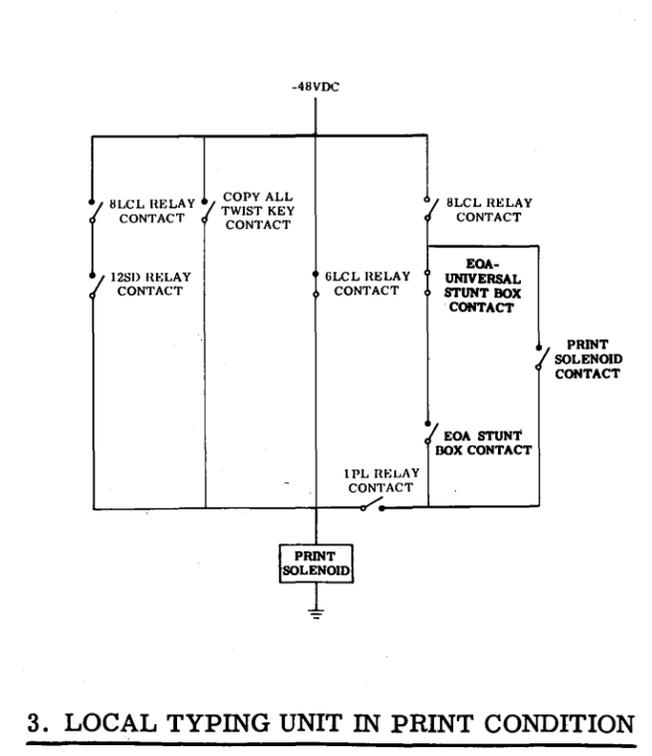
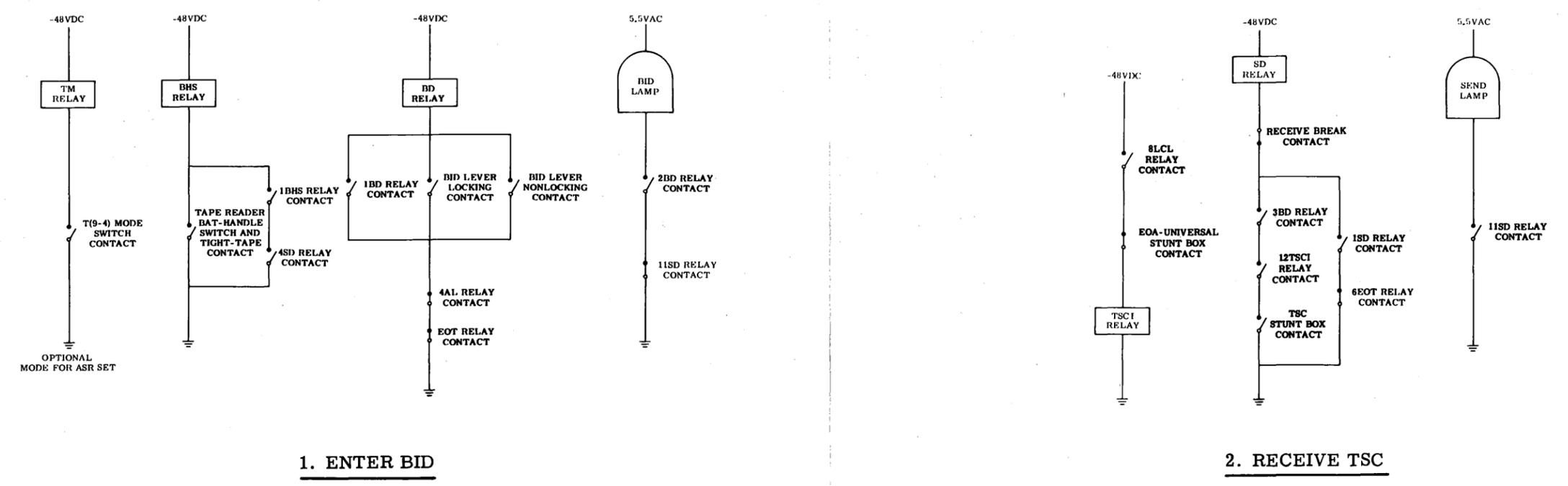


Figure 13 - Active Circuit Elements During Tape Transmission

locks out unselected receiving units, and inhibits all other sending stations from transmitting should their TSC appear in the message text. The EOA-UNIVERSAL stunt box contact latches open in the PUN, PTR, and TSCI relay circuits and in the print solenoid circuit.

#### Message Text

3.33 Inhibit Codes: During message text, the tape reader must pause after transmission of certain control codes. These are the horizontal tab, vertical tab, and form feed functions and are used in sets containing sprocket feed typing units, only. During operation of these functions, the reader is disabled by the tabbing break contact in the typing unit, which de-energizes the clutch trip magnets. When the tabbing or form feed code appears in tape, it must be followed by a DELETE character. This allows the selector mechanism to receive a blank from the reader as the tabbing function is initiated by the stunt box mechanism. The tabbing or form feed function occurs at both the sending and receiving stations. The reader will restart when the function is complete and its respective tab contact is closed.

3.34 Line Break: Should the receiving station wish to stop a transmission, it can issue a line break of at least 200 ms. The line break is detected by the stunt box mechanism as a NULL NULL. The NULL NULL function bars, when operated, actuate a mechanical linkage to latch the keyboard and operate a bank of receive-break contacts. The BREAK lamp is illuminated, the station alarm is tripped, and the SD relay is de-energized. The line break disconnects the sending station from the line.

#### End-Of-Transmission

3.35 If the tape reader completes transmission of the text without being disconnected by a line break, the tape reader will issue an End-Of-Transmission (EOT) code. EOT, by definition, is the system disconnect code. Generation and transmission of an EOT will shut off a sending reader, return a typing unit to the NONPRINT condition, restore the blind across the selector magnet driver of a receiving tape punch, unlatch all latched contacts in a typing unit stunt box, and restore all logic in the system, except for alarms, to the unoperated state.

3.36 It is mandatory in tape transmission that an EOT code appears at the end of message text. Absence of a locally generated EOT when a reader stops sending is viewed as an alarm condition by the system line controller. The line controller which continuously monitors traffic in the system, will note the lack of an EOT after a 1.0 second idle line period and generate a BK-pause-EOT sequence to the system. The sending and selected receiving stations will be placed in an alarm condition by the break and disconnected from the line; all other unselected stations will be disconnected by the EOT.

3.37 When an operating reader sends an EOT, the typing unit stunt box contact in slot 31 transfers to provide ground for relay EOT through contact 10SD. Relay EOT energizes to open contact 6EOT in the ground leg of relay BD and SD. This erases all memory from the bid and send circuits, disconnecting the station from the line.

#### B. Manual Keyboard Transmission

3.38 During tape reader transmission, the system line controller is in a 1.0 second time-out mode. That is, the line controller will tolerate a 1.0 second idle line (except for permissible control functions) before disconnecting a station. When keyboarding a message on the line, the interval between two consecutive characters may approach 25 seconds. Therefore, the line controller is automatically shifted to a 30-second time-out mode upon receipt of an SOM SOM (Start-Of-Message) code sequence. This sequence is generated by the station controller answer-back assembly.

#### Conditioning

3.39 The keyboard sending station must have the power switch in the ONLINE position and the ASR mode switch in the K or KT position. An adequate supply of paper should be in the typing unit.

#### Bid Entry

3.40 With the tape reader bat-handle switch OFF, a bid is entered for the line by operating the BID lever. Momentary operation of the BID lever toward the SINGLE position is adequate to energize the BD relay. Contact 1BD holds the BD relay to ground and 2BD closes to light the BID lamp (Figure 14).

Note: Contact 6EOT in the BD relay circuit cannot operate before the SD relay is energized, ie, the SD relay must be energized before an EOT is received.

#### Affects of Remote Sending Stations

3.41 Other sending stations could be operating on the line before the local TSC is generated and received. The remotely generated EOA and EOT control codes are recognized locally to prevent the send circuit from responding to a false TSC during remote message text.

3.42 An EOA, issued by a remote sending station, and followed by any character will latch open the EOA-UNIVERSAL stunt box contact. The open EOA-UNIVERSAL contact de-energizes the TSCI (Transmitter Start Code Inhibit) relay. The send circuit is therefore guarded against receipt of a false TSC by the open 12TSCI contact.

3.43 An EOT, issued by either the system line controller or a remote sending station, causes an EOT stunt box function lever to unlatch the EOA-UNIVERSAL stunt box contact. Closure of this contact provides a current path for energizing the TSCI relay. The send circuit, by closure of contact 12TSCI, is henceforth responsive to a Transmitter Start Code (TSC).

#### Receive TSC

3.44 Upon receipt of the station TSC the SD relay, typing unit print solenoid, answer-back clutch magnets, and MM relay are affected simultaneously. The TSC stunt box contact closes momentarily to pulse the SD relay. Contact 1SD maintains a current path through the SD relay holding leg. The typing unit print solenoid is energized through contact 12SD; all transmissions (functions and graphics) will be recognized by the typing unit.

3.45 The answer-back clutch magnets require only a pulse to release the clutch for a complete answer-back cycle. When tripped, the answer-back magnet armature closes the answer-back off-normal contact for the duration of the answer-back cycle.

3.46 With the bat-handle switch off and a bid entered, the MM relay is pulsed through contact 2BHS and 8BD. The MM relay remains energized for the duration of the answer-back

cycle through the answer-back off-normal contact. The answer-back distributor sequence is changed from \ ACK to SOM SOM by relay contacts 1MM, 2MM, 3MM, 5MM, 6MM, 7MM, 9MM, and 12MM. Refer to Figure 12.

3.47 The answer-back mechanism, having its clutch magnet pulsed, responds to the TSC with a 7-character cycle. Characters 1, 2, 5, 6, and 7 are suppressed and characters 3 and 4 become SOM SOM, respectively. Upon completion of the answer-back response the station operator can begin keyboarding. Approximately 30 seconds of idle line will be tolerated between characters before the system line controller will generate a BK-pause-EOT sequence.

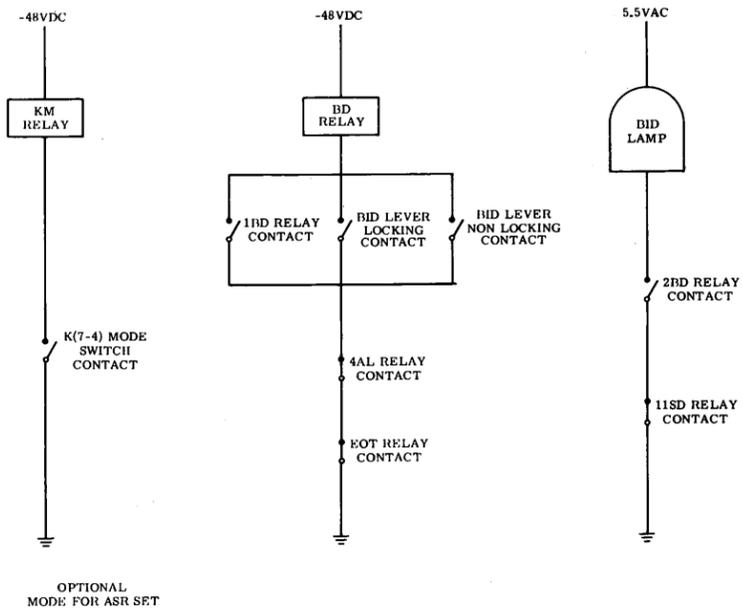
#### Keyboard Transmission

3.48 Each Call Directing Code (CDC) must be followed by a pause and then a DELETE. Upon receipt of the second character of its CDC, the receiving station will automatically respond with an answer-back sequence. To avoid line conflict (garble) the attendant must wait until the receiving station acknowledgement appears on the page copy at the sending station. The DELETE character, preceding a CDC, insures separation between multiple addresses. After the EOT, the line controller → shifts back to the 1.0 second time-out mode.

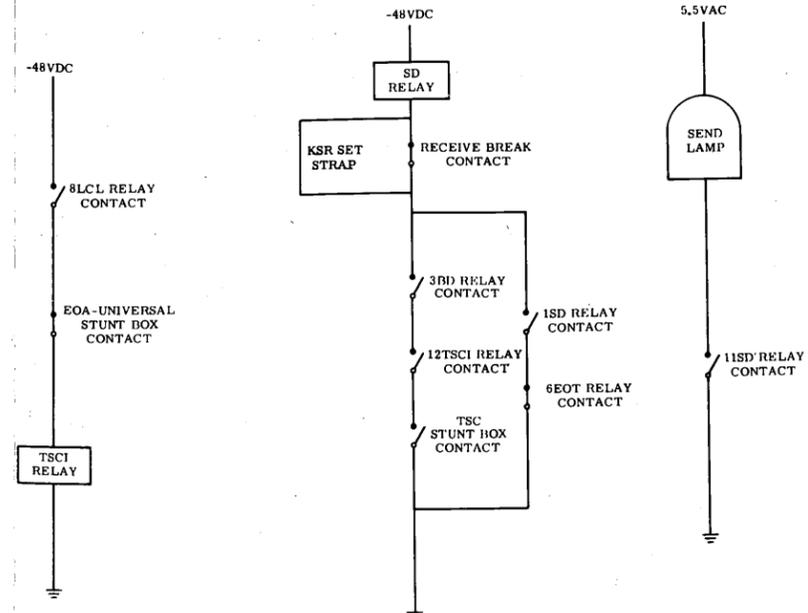
#### C. Wake-Up Command

3.49 If all stations on a polling loop fail to respond with traffic, the line controller enters a poll-rest mode. It will not start polling until tripped by an external clock pulse or tripped from within by a spacing bit on the signal line. Any station attendant can reactivate the line controller (if not in a poll-rest locked mode) by providing a spacing bit from the normal answer-back code sequence, \ ACK. A spacing bit or clock pulse causes the line controller to generate a BK-pause-EOT sequence, thus starting the polling cycle.

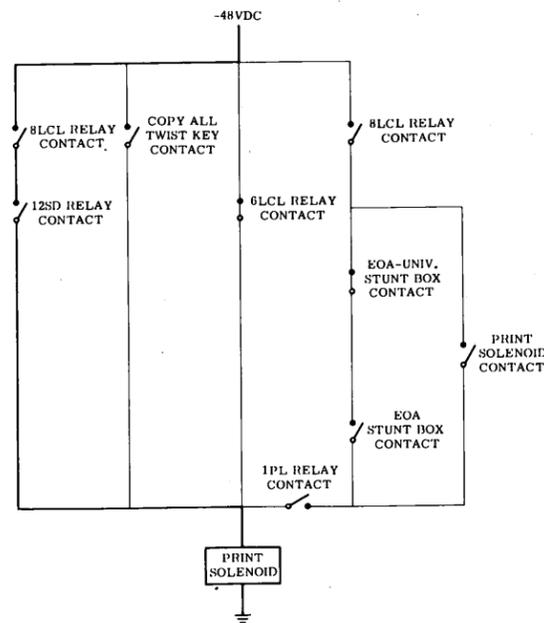
3.50 Normally, when traffic is ready for transmission from an idle station, a bid is entered by operating the BID lever. If the line → had been idle for at least one minute (8 seconds - → optional) before moving the BID lever, the answer-back mechanism will be pulsed into operation, sending \ ACK onto the line. At the conclusion of the wake-up code the signal line will remain idle until the line controller sends the TSC.



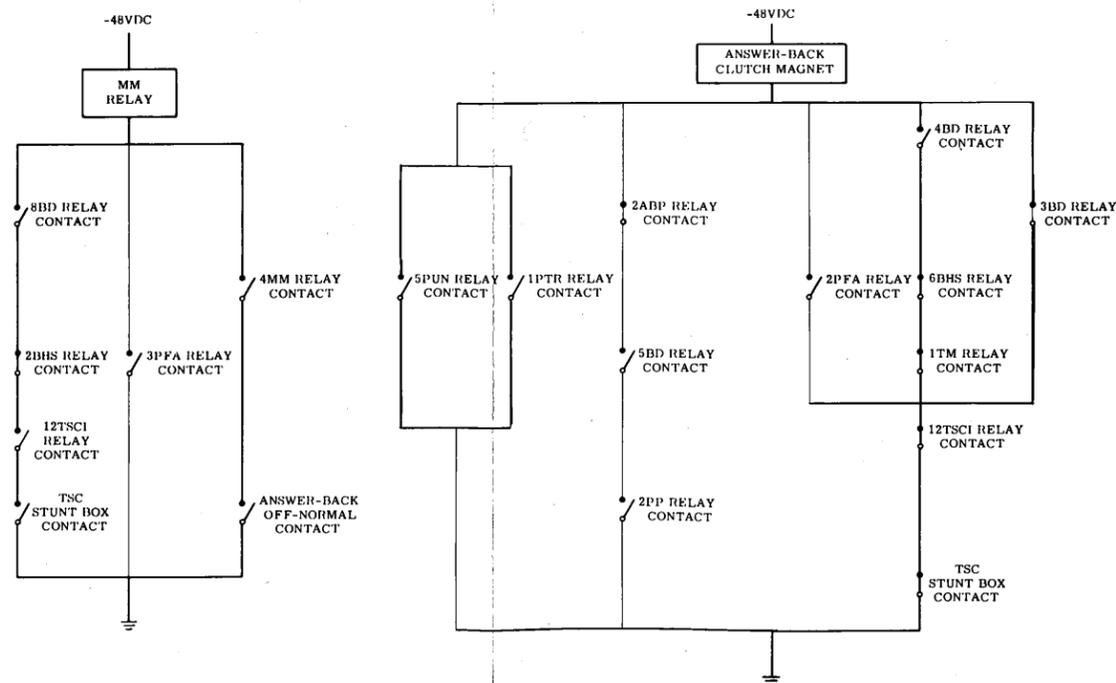
**1. ENTER BID**



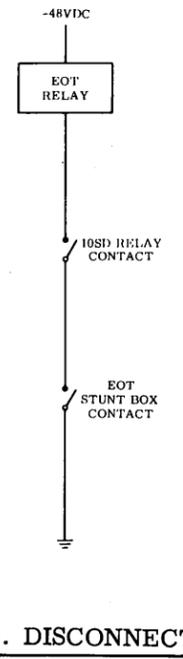
**2. RECEIVE TSC**



**3. LOCAL TYPING UNIT IN PRINT CONDITION**

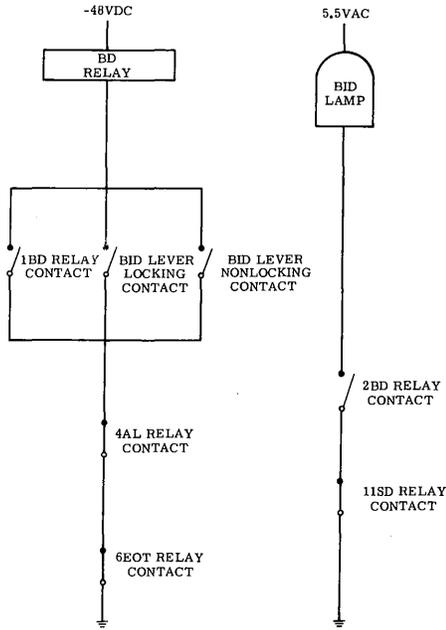


**4. SEND SOM SOM RESPONSE TO TSC**

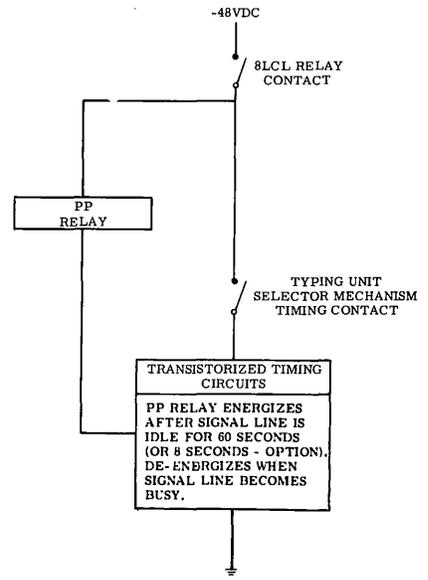


**5. DISCONNECT**

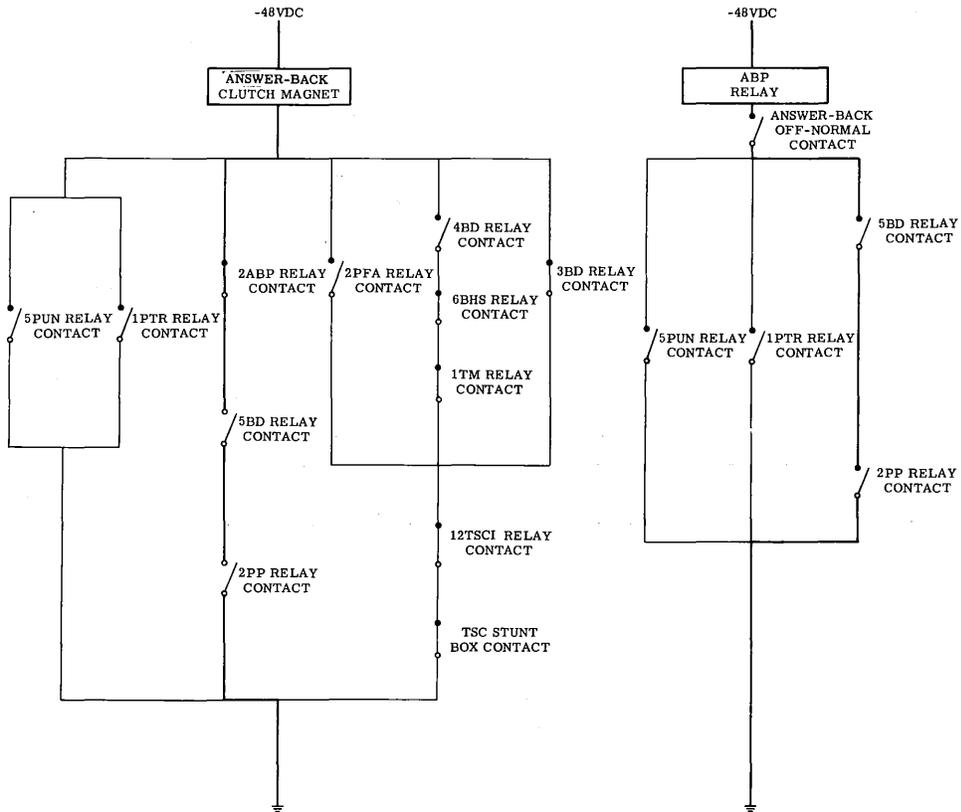
Figure 14 - Active Circuit Elements During Keyboard Transmission



1. ENTER BID



2. DETECT SIGNAL LINE STATUS



3. AUTOMATICALLY SEND ACK  
IF LINE WAS IDLE FOR MORE THAN ONE MINUTE  
(8 SECONDS - OPTIONAL)

Figure 15 - Bidding During Poll Rest Period

The start element in the reverse slant character will trip the line controller. The ACK code serves no purpose; it is transmitted as part of the normal answer-back code sequence.

→ 3.51 A 60 (8 - option) second timer circuit card is located in the station controller to originate the please poll request. The etched circuit card assembly is comprised of transistor driver circuits and a relay. An external contact mounted on the typing unit selector mechanism, closes for approximately 75 milliseconds during each character cycle. A closure occurs every time the selector cam rotates in response to line signals. Repeated closure of the selector contact keeps capacitor C101 charged to 48 volts. When the contact remains open, as it will on an idle line, capacitor C101 discharges through resistors R105 and R112 for the 60 second interval. Transistor Q102 will turn on when its base voltage drops to approximately 24 volts. At least one minute is required for the energy level of C101 to decrease from 48 to 24 volts. When Q102 does turn on, transistor Q101 is biased ON; current then flows through the collector and emitter of transistor Q101, energizing relay PP. Relay PP will remain energized as long as the signal line is idle. A character appearing on the line will recharge capacitor C101 shutting off the transistors and de-energizing relay PP. The relay will not energize as long as the signal line is never idle for more than one minute. If the shorter interval (8 seconds) is desired, a strap added between posts 1 and 2 will place resistor R111 in parallel with series resistors R105 and R112. This will reduce the time constant and cause capacitor C101 to discharge more rapidly.

3.52 Energized relay PP closes contact 2PP in the answer-back clutch magnet ground circuit (Figure 15). A subsequent closure of contact 5BD, due to a BID command, will energize the clutch magnet. The answer-back mechanism starts distributing a code sequence onto the signal line, which is recognized by the line controller as a wake-up command. Relay ABP (answer-back pulser) opens contact 2ABP to de-energize the clutch magnet. This prevents the answer-back drum from operating beyond a single cycle. (Only two characters are encoded in each drum cycle; the other five character positions are suppressed.) Relay ABP will de-energize when contact 2PP opens. This occurs when relay PP is de-energized through the existence of traffic on the signal line.

3.53 It is possible to enter a bid before the line has been idle for 60 seconds (or 8 seconds — optional). Premature bidding will not effect

↳ an immediate transmission of the answer-back code sequence since the timer has not yet conditioned the answer-back clutch magnet circuit. Only after an idle line period of one minute (or 8 seconds - option) will relay PP become energized to start the sequence described in 3.52.

#### D. No Traffic Response

3.54 During periods of light traffic, there will be times when no traffic is available for transmission from a polled station. A TSC will affect a no-traffic response from the answer-back mechanism in the station controller. Momentary closure of the TSC stunt box contact pulses the answer-back clutch magnet. The answer-back distributor rotates, sending the \ ACK and then stops. The system line controller, upon receipt of a no traffic response, will advance to poll the next sending station.

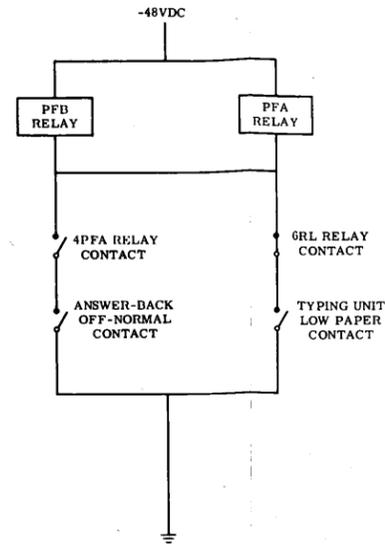
#### E. Maintenance Response

3.55 Since a low paper condition might prevent the typing unit from completely monitoring its own station transmission the station will not respond with traffic until the paper supply is replenished. Whenever the paper supply becomes low during station transmission, the tape reader (or keyboard) is permitted to complete its transmission. Adequate paper reserve should exist to monitor the remainder of the message.

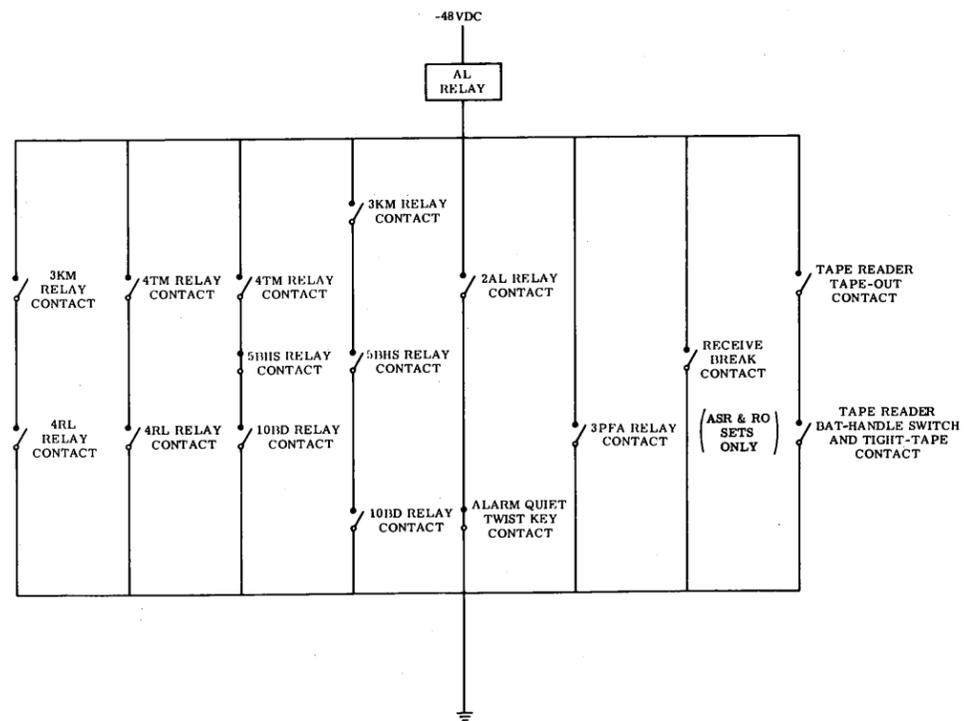
3.56 Bidding is not permitted if the paper supply is low. Low paper will close a set of contacts in the ground leg of the PFA and PFB relay circuits (Figure 16). (The typing unit low paper contact remains closed until the paper supply is replenished). Contact 3PFA is closed to energize the MM relay.

3.57 Contacts 1PFB, 2PFB, 1MM, 2MM, 3MM, 5MM, 6MM, 7MM, 9MM, and 12MM operate in the signal line circuit to change the answer-back sequence from \ ACK to BELL BELL. Refer to Figure 12. Contact 3PFB closes to energize the AL relay. The ALARM lamp is illuminated and the buzzer sounded by contact 1AL. Contact 4AL is opened in the ground leg of the BD relay circuit, preventing a BID from being entered.

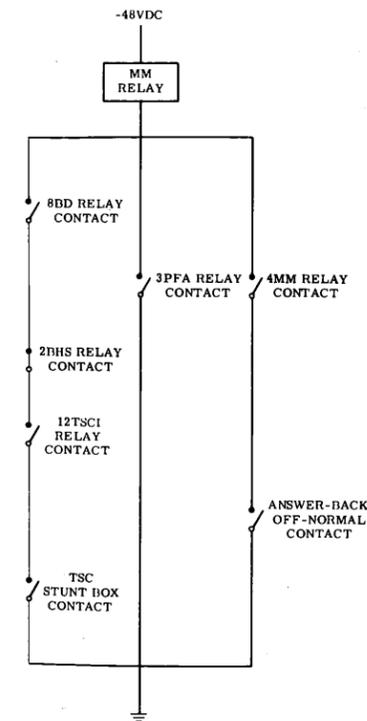
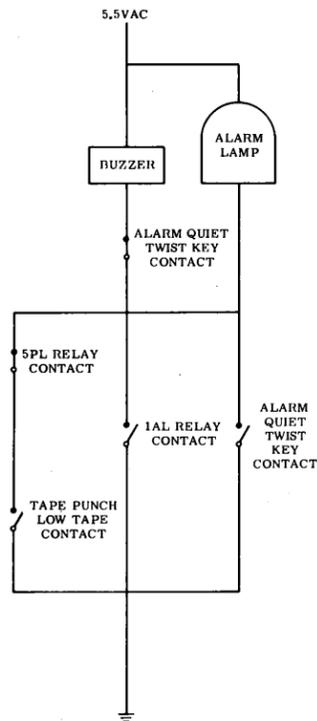
3.58 Receipt of a TSC will pulse the answer-back clutch magnet through the circuit previously conditioned by 2PFA. The answer-back distributor rotates, sending the BELL BELL sequence and then stops. The BELL BELL sequence, received by the system line controller indicates that a station is inoperative due to a low paper condition.



1. LOW PAPER OCCURS



2. STATION ALARM



3. SEND BELL BELL RESPONSE TO TSC

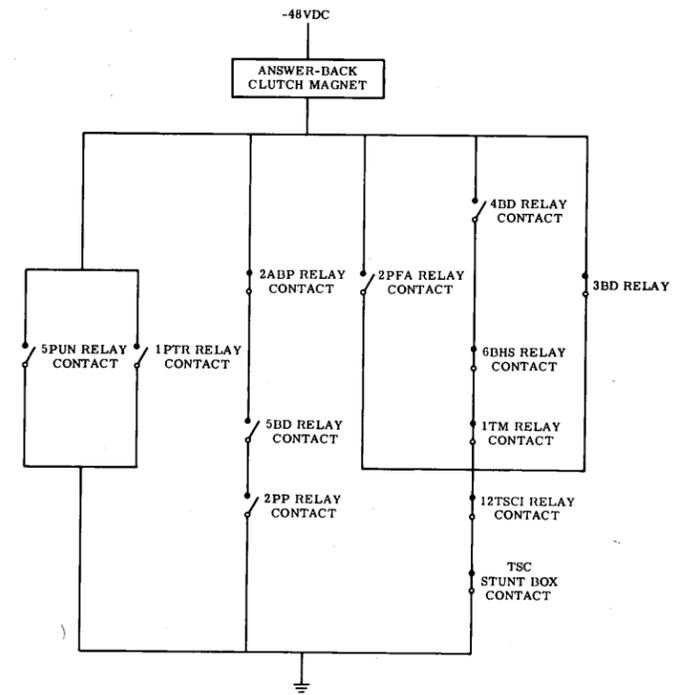


Figure 16 - Maintenance Response

## RECEIVING

3.59 Any typing unit and/or tape punch at an 8A1 station will receive traffic upon recognition of its Call Directing Code (CDC). The CDCs are transmitted from an 8A1 sending station. A CDC consists of any two graphic characters with code level 6 spacing and code level 7 marking. A total of 32<sup>2</sup> or 1024 combinations are possible.

## A. Receipt of a Call Directing Code

3.60 The typing unit stunt box contains the mechanical and electrical elements to provide momentary contact closure whenever a typing unit or tape punch CDC is received. The stunt box is designed to respond to two distinct and separate CDC codes, one for the typing unit and one for the tape punch; however, both units can be enabled by one CDC by rearranging the stunt box wiring. Additional slots are vacant in the stunt box for adding a broadcast CDC if desired. Momentary closure of the appropriate stunt box CDC contact will energize relay PTR or relay PUN, latching either relay to ground (Figure 17). The PL relay is energized through 4PTR and latched to ground through 3PL; the RL relay, energized by 4PUN, latches to ground through 2RL. Although not shown in the figure, a group CDC stunt box contact, when used, could be wired in parallel with the individual receiving unit CDC stunt box contact. Operation of either the group or individual CDC stunt box contact would then provide ground to its respective PTR and/or PUN relay. Instructions for implementing a group CDC are given in the section entitled: 8A1 and 8B1 Data Selective Calling, Station Sets, Installation and Checkout.

## B. Answer-Back Response

3.61 When the PTR or PUN relay becomes energized upon receipt of its respective CDC, either contact 1PTR or 5PUN closes in a ground leg of the answer-back clutch magnet.

Note: For a group CDC, only one station can be permitted to respond; the answer-back response must be suppressed at all other stations. At stations where the response is to be suppressed, additional stunt box transfer contacts, operated by the group CDC, can be used to prevent both the answer-back clutch magnet and ABP relay from energizing.

When the answer-back mechanism is tripped, the answer-back off-normal contact is closed to energize the ABP relay. Contact 3ABP opens in the PTR or PUN relay circuit. With the PTR or PUN relay de-energized, contact

1PTR or 5PUN is restored to the normally open condition, causing the answer-back clutch magnet to de-energize. Relay ABP performs an inhibit function preventing repeat operation of the answer-back mechanism. When tripped, the answer-back mechanism distributes the ACK code sequence on the line.

## C. PRINT or PUNCH Conditions

3.62 When either relay PTR or PUN energizes, contact 4PTR or 4PUN closes in the ground leg of the PL or RL relay circuit. Momentary closure of either contact causes the PL or RL relay to energize. The PL or RL relay remains energized by contact 3PL or 2RL.

3.63 If relay PTR has energized, relay PL would have latched through the closed EOT stunt box contact closing 1PL in the typing unit print solenoid circuit. Similarly, if relay PUN had energized, relay RL latches to enable relay RCR by closing contact 4RL. Either the typing unit and/or punch are now conditioned to record traffic upon receipt of an EOA.

3.64 The EOA code will place the typing unit or tape punch in the PRINT or PUNCH condition so that monitoring now begins at the receiving station. The EOA code closes the stunt box contact in slot 33. The next character following an EOA (any character) will latch open stunt box contact EOA-UNIVERSAL in slot 34 and reopen the closed EOA contact in slot 33. In this manner a gate, one character long, permits current to flow energizing the print solenoid or relay RCR. The solenoid is latched to -48 v dc through contact 1PL and its own solenoid contact. Similarly, relay RCR latches through contact 5RCR when energized for one character length by the EOA-UNIVERSAL contact. Therefore, the EOA code places the typing unit in a nonselect, print condition and/or enables the tape punch by removing the blind from the tape punch selector magnet driver (refer to Figure 13). Unblinding of the tape punch selector magnet driver is accomplished when relay RCR energizes to open contact 6RCR.

## D. Disconnect Code

3.65 A receiver is disconnected when the EOT code is detected. An EOT code operates the EOT stunt box contact, unlatching the energized PL and/or RL relays. The open 1PL or 4RL contact cause the print solenoid or RCR relay to de-energize. The EOT code places the typing unit in the select, nonprint condition and the tape punch in the select, non-punch condition.

## SECTION 581-122-100

### ALARMS

3.66 Each station controller assembly is equipped with relays and contacts to detect abnormal station conditions. A visual (lamp) and audible (buzzer) alarm will operate due to the following signal line and station conditions:

- (a) Incorrect position for ASR mode switch.
- (b) Low paper or tape supply.
- (c) Tape or reader malfunction.
- (d) Line break.

The logic elements effecting a station alarm are shown in Figure 16.

#### A. ASR Mode Switch

3.67 The normal position of the ASR mode switch is the KT position. The mode switch must be in the KT or T position for automatic tape transmission, or in the K or KT position for manual keyboard transmission. Should the mode switch be in the K position with tape in the reader and the bat handle switch in the RUN position, an alarm will be given when a bid is entered. If in the T mode and the bat-handle switch is unoperated, ie, in the OFF position, the alarm will operate when a bid is entered. When signal line traffic is intended for the tape punch, the mode switch must be in the KT position; otherwise, an alarm will be given when the punch CDC energizes the PUN and RL relays.

#### B. Maintenance

3.68 If low paper (or forms) exists in the typing unit, the PFB relay will be energized. Contact 3PFB closes in the alarm relay circuit causing the AL relay to energize. Both the lamp and buzzer operate as contact 1AL closes. A low paper alarm occurs whenever the condition exists; it will hold until the paper is replenished.

3.69 Low tape in the punch tape supply will cause only the alarm buzzer and lamp to operate; it will not operate the alarm relay. Low tape will not affect station transmission; therefore, this condition does not affect the bid circuit. However, all other alarm conditions which cause the alarm relay to energize, will de-energize the BD relay.

#### C. Tape Failure

3.70 The tight tape contact is opened when the bat handle switch is in the OFF position or a tight tape condition occurs. Tight tape will cause an alarm after a series of relays de-energize to stop the reader, and the line controller sends a BREAK upon detection of an idle line.

3.71 The tape-out contact, located in the tape reader, will operate when either the tape ends or is broken. The tape-out contact, when operated, transfers, ie, breaks in the ground leg of the reader clutch magnet and TDR relay circuits and makes in the alarm relay circuit. The tape-out contact causes the reader to stop and station alarm to operate. Whenever tape is missing from the reader and the bat-handle switch is placed in the RUN position, a station alarm will occur.

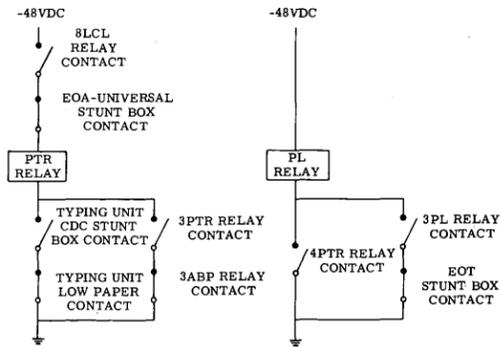
#### D. Line Break

3.72 A line break can be issued from any selected receiving station, or from the line controller. In half duplex a break is automatically issued from the line controller as part of the BK-pause-EOT sequence after the → signal line has been idle for 1.0 second (automatic transmission time mode) or for 30 seconds (keyboard transmission time mode).

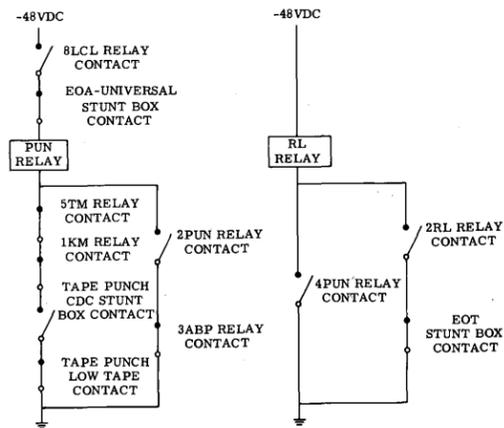
Note: A line break cannot be issued or received from the signal line unless the typing unit is selected to print. Either relay RL or PL must be energized to activate the BREAK switch. For receiving, the print suppression codebar must be operated to detect a line break.

→3.73 Interruption of traffic for 1.0 second (or 30 seconds for half duplex keyboarding) will cause a line controller BREAK-pulse-EOT. The BREAK signal is approximately 300 milliseconds long and will operate the visual and audible station alarms. An abnormally long idle line may be caused by torn or tight reader tape or absence of format responses.

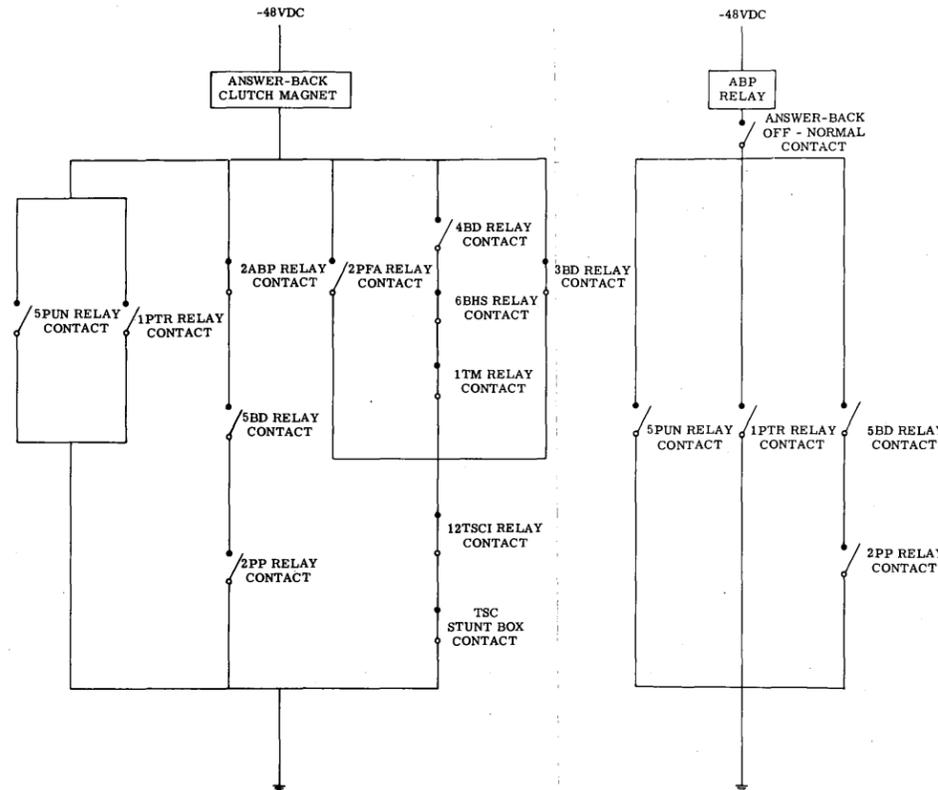
3.74 The line break is initially detected at a selected station by the NULL NULL function bars which, when operated, will actuate a mechanical linkage to latch the keyboard lock mechanism. A bank of receive-break contacts associated with the keyboard lock mechanism, is simultaneously operated and latched. One receive-break contact makes in the alarm relay circuit to give a station alarm. The BRK RLS key must be operated to return the lock mechanism to the normal condition.



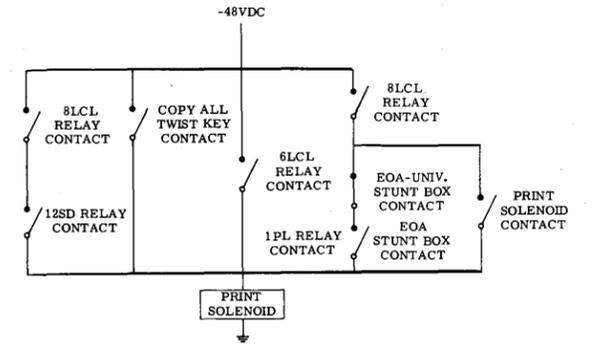
1A. SELECT PRINTER



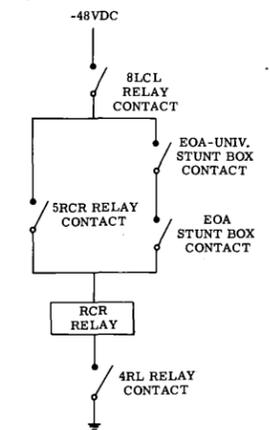
1B. SELECT PUNCH



2. TRANSMIT \ ACK ANSWER-BACK RESPONSE



3A. ENTER PRINT CONDITION



3B. ENTER PUNCH CONDITION

Figure 17 - Active Circuit Elements When Receiving Traffic

## E. Resetting the Alarm

3.75 If a station alarm is caused by a holding condition, ie, contacts closing and latching in the alarm relay circuit, the condition must be corrected before the station alarm is removed. After the condition is corrected, first turn the ALARM QUIET twist key to the QUIET position, then return the key to the NORM position. In this manner, the condition is corrected and the alarm is retired. The alarm will not be removed if the twist key is operated before the cause is corrected.

3.76 The audible (buzzer) alarm can be temporarily disabled by turning the ALARM QUIET twist key to the QUIET position. The key, when turned, confines the alarm indication to the lamp only but will restore the audible alarm if returned to the NORM position before the trouble is corrected. Correcting the trouble will not extinguish the lamp if the key is in the QUIET position. To turn off the lamp, the key must be restored to NORM. This is a fail-safe feature which assures that the alarm buzzer is never left disabled.

## 4. AUXILIARY EQUIPMENT PROVISIONS

## H/L OR L/H CONVERTER

4.01 Strapping plugs are provided for shunting the signal line by the message relay station output connectors. The connectors (Tables VI and VII) provide a connection with high to low and/or low to high speed converters when the station controller is installed in a Keyboard-Send-Receive or Receive-Only station set. A strapping plug also shunts the signal line past the data set coupler junction points.

## DATA SET COUPLER

4.02 Provisions are made for mating a data set coupler with the station controller assembly. Connections are made through the 15-pin connector, marked W, on the station controller assembly (Table VIII). The receive signal line circuit is strapped to -20 volts between terminal C2 and terminal F5 in the station controller wiring field, H. This permits both the send and receive circuits to utilize a common -20 volt supply.

TABLE II  
STUNT BOX CODING FOR 8A1 DATA SELECTIVE CALLING (SHEET 1 OF 2)

Slot	Code Character	Contact Type	Function
1	DC <sub>0</sub>	-	Provide momentary contact closure for TSC sequence.
2	Uncoded	Make (Mom.)	
5	CR	-	Mechanical carriage return.
6	DC <sub>0</sub>	-	Strips TSC graphic character from Slot 10 by actuating function lever in Slot 7 (if TSC graphic was not previously stripped).
7	EOA	-	Strips latched TSC graphic character from Slot 10.
8	EOT	-	Strips latched TSC graphic character from Slot 10.
9	DC <sub>0</sub>	-	TSC sequence will latch Slot 10, thereby enabling Slot 11 for subsequent recognition of first CDC character.
10	Uncoded	-	
11	Graphic	Break (Latch)	First graphic character following TSC sequence latches contact open in reader magnet circuit. To stop/start reader for A/B.
12	ACK	-	ACK character of no-traffic or answer-back response sequence. When sequence is answer-back, it strips latched Slot 11.

TABLE II  
STUNT BOX CODING FOR 8A1 DATA SELECTIVE CALLING (SHEET 2 OF 2)

Slot	Code Character	Contact Type	Function
13	Graphic	-	Punch CDC sequence momentarily closes contact.
14	Graphic	Make (Mom.)	
15	Graphic	-	Printer CDC sequence momentarily closes contact.
16	Graphic	Make (Mom.)	
*17	H. TAB	-	Sprocket feed printers only. Mechanical horizontal tab.
18	BELL	Make (Mom.)	BELL code momentarily closes contact.
19	Graphic	-	**Suggested location for detecting group CDC code sequences. Select tape punch and/or typing unit.
20	Graphic	Make (Mom.)	
21	Graphic	-	
22	Graphic	Make (Mom.)	
23	Graphic	-	**Suggested location for detecting group CDC code sequences. Suppress answer-back response at stations where response must be prevented. NOT REQUIRED AT STATION WHERE RESPONSE IS DESIRED.
24	Graphic	Transfer (Mom.)	
25	Graphic	-	
26	Graphic	Transfer (Mom.)	
31	EOT	Transfer (Mom.)	EOT code strips Slot 34 (if latched) by actuating function lever in Slot 32.
33	EOA	Make (Mom. for 1 ch duration)	An EOA of EOA-UNIVERSAL sequence will latch EOA contact in Slot 33 closed for one character's duration. The UNIVERSAL code will strip EOA memory in Slot 33 and latch contact open in Slot 34. Action of contacts in Slots 33 and 34 serve as a gate to energize either solenoid or relay RCR placing receiver in NONSELECT, PRINT mode..
34	EOA-UNIV	Break (Latch)	
35	NULL	-	Mechanical open-line (break) detector.
36	NULL	-	Mechanical open-line (break) detector.
*37	H & V Tab	-	Sprocket feed printers only. Horizontal tab, vertical tab, and form feed pre-sense contact is latched open for duration of function.
*38	Form Feed	Break (Mom.)	
40	LF	-	Mechanical line feed.
*41	V Tab	-	Sprocket feed printers only. Mechanical vertical tab.
*42	Form Feed	-	Sprocket feed printers only. Mechanical form feed.
*Items are on sprocket feed printers only.			
**See Table IIA for stunt box parts required.			

TABLE IIA  
STUNT BOX PARTS REQUIRED FOR GROUP CDC

Station Answer-Back	Call In	Quantity of Parts Required			
		TP153440	TP153915	TP153916	TP172581
Suppressed	Tape Punch	4	2	2	1
	Typing Unit	4	2	2	1
	Tape Punch & Typing Unit	8	4	4	2
Not Suppressed	Tape Punch	2	1	1	1
	Typing Unit	2	1	1	1
	Tape Punch & Typing Unit	4	2	2	1

TP153440 - universal function bar.  
 TP153915 - modification kit to provide sequential function lever operation in first slot.  
 TP153916 - modification kit to provide sequential function lever operation in second slot.  
 TP172581 - contact switch assembly.

TABLE III  
LOCATION OF CIRCUIT CARDS, WIRING FIELD,  
AND MULTICONTACT RELAYS

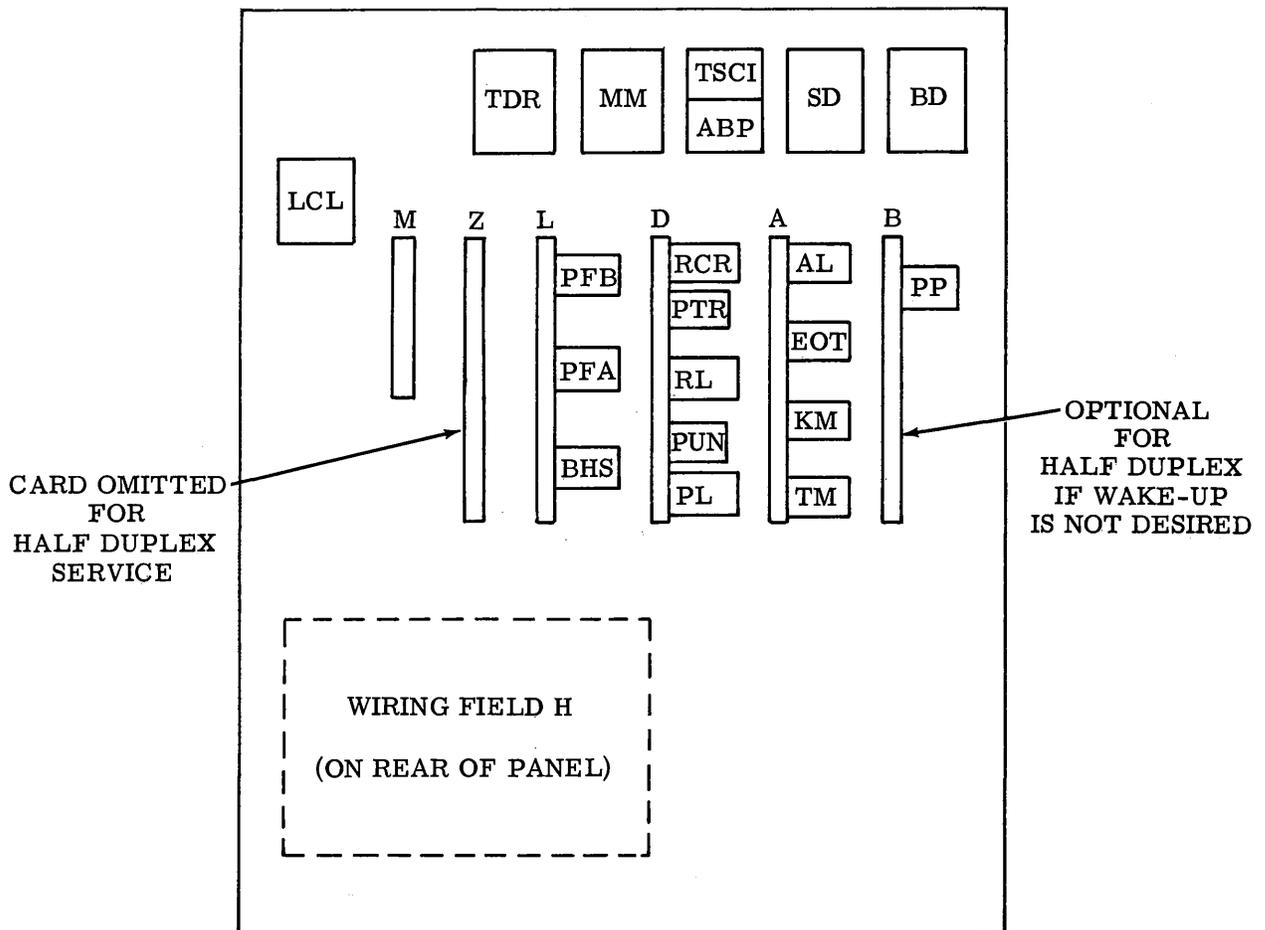


TABLE IV  
CARD MOUNTED RELAYS IN STATION CONTROLLER ASSEMBLY (SHEET 1 OF 2)

Relay		Active Contacts and Terminals		
Code	Name and Card Data	Type	Function	WD Location*
AL	Alarm Card A TP198448	1U; 1L 1M 2M 4B	Energizing terminals of AL relay. Provides ground for Staco alarm circuit. AL relay holding contact. Breaks in BID circuit.	5-F7 1-E5 5-D8 3-C6
BHS	Bat-Handle Switch Card L TP198447	1U; 1L 1M  2B 5M; 5B 6B	Energizing terminals of BHS relay. Provides alternate ground for BHS relay when SD relay is energized. Breaks in alternate ground of MM relay circuit. Transfers in ground paths of AL relay. Breaks in keyboard entry ground path of answer-back clutch magnet.	2-B6 2-B5  3-D1 5-D8 3-B4
EOT	End-of-Transmission Card A TP198448	1U; 1L 6B	Energizing terminals of EOT relay. Ground leg of BD relay circuit. Breaks to de-energize BD relay.	5-F6 3-E7
KM	Keyboard Mode Card A TP198448	1U; 1L 1B 3M	Energizing terminals of KM relay. Breaks in ground leg of PUN relay circuit. Makes in ground leg of AL relay.	2-B7 5-C2 5-F8
PFA	Paper Failure "A" Card L TP198447	1U; 1L 2M  3M 4M	Energizing terminals of PFA relay. Makes in maintenance response ground path of answer-back clutch magnet. Provides ground for MM relay. Makes in ground leg of PFA and PFB relays.	3-D3 3-C4  3-D1 3-D2
PFB	Paper Failure "B" Card L TP198447	1U; 1L 1M  2M  3M	Energizing terminals of PFB relay. Provides marking pulse for code level 2 in answer-back cycle. Provides marking pulse for code level 3 in answer-back cycle. Provides ground leg for AL relay.	3-D2 4-B4  4-B4  5-E8
PL	Printer Latch Card D TP198446	1U; 1L 1M 3M 5B 6B	Energizing terminals of PL relay. Holds ground in printer solenoid circuit. PL relay holding contact. Breaks in PUN relay circuit. Activates half duplex signal line break switch.	5-F4 5-C5 5-F4 5-E1 6-E6(ASR) 7-E8 (KSR, RO)

\*See wiring diagrams 6471WD-B1 through 6471WD-B10 in the appropriate section. The digit to the left of the hyphen refers to the sheet number, eg, 2 means 6471WD-B2; the letter and digit to the right of the hyphen refers to the coordinate location on the sheet.

TABLE IV  
CARD MOUNTED RELAYS IN STATION CONTROLLER ASSEMBLY (SHEET 2 OF 2)

Relay		Active Contacts and Terminals		
Code	Name and Card Data	Type	Function	WD Location*
PP	Please Poll Card B TP308424	1U; 1L 2M	Energizing terminals of PP relay. Provides ground for answer-back clutch magnet if BD relay is operated.	3-E2 3-C2
PUN	Punch Card D TP198446	1U; 1L 2M 4M 5M	Energizing terminals of PUN relay. PUN relay holding contact. Provides ground for RL relay. Provides ground for answer-back clutch magnet.	5-B2 5-B2 5-B4 3-B2
PTR	Printer Card D TP198446	1U; 1L 1M 3M 4M	Energizing terminals of PTR relay. Provides ground for answer-back clutch magnet. PTR relay holding (to ground) contact. Provides ground for PL relay.	5-B3 3-B2 5-B2 5-F4
RCR	Reperforator Control Relay Card D TP198446	1U; 1L 1B  5M 6B	Energizing terminals of RCR relay. Activates an auxiliary tape punch selector magnet driver (message relay station). RCR relay holding (to voltage source) contact. Activates local tape punch selector magnet driver.	5-B7 4-F2  5-B6 4-D5
RL	Reperforator Latch Card D TP198446	1U; 1L 1B  2M 4M 5M 6B	Energizing terminals of RL relay. Activates half duplex signal line break switch.  RL relay holding contact. Provides ground leg for RCR and AL relays. Provides ground leg for remote solenoid. Opens ground leg of paper failure circuit.	5-F4 6-E6(ASR) 7-E8 (KSR, RO) 5-F4 5-B7 5-B8 3-D4
TM	Tape Mode Card A TP198448	1U; 1L 1B  2B 4M 5B 6B	Energizing terminals of TM relay. Breaks in keyboard entry leg of answer-back clutch magnet.  Activates tape punch selector magnets. Conditions AL relay ground leg. Breaks in ground leg of PUN relay. Removes shunt from keyboard sending contact.	2-B7 3-B5  4-D5 5-F7 5-C2 4-D6

\*See wiring diagrams 6471WD-B1 through 6471WD-B10 in the appropriate section. The digit to the left of the hyphen refers to the sheet number, eg, 2 means 6471WD-B<sub>2</sub>; the letter and digit to the right of the hyphen refers to the coordinate location on the sheet.

TABLE V  
PANEL MOUNTED RELAYS IN STATION CONTROLLER ASSEMBLY (SHEET 1 OF 2)

Relay		Active Contacts and Terminals		
Code	Name	Type	Function	WD Location*
ABP	Answer-Back Pulsing	1L; 2L 2B	Energizing terminals of ABP relay. Breaks in answer-back clutch magnet circuit.	3-B2 3-B2
BD	Bid	1U; 1L 2M 3M; 3B 4M 5M 8M 10M	Energizing terminals of BD relay. Makes to light BID lamp. Transfers in ground leg of send circuit. Makes in answer-back clutch magnet circuit. Makes in answer-back pulsing circuit. Makes in manual entry circuit. Makes in alarm circuit.	3-B6 1-E3 3-B5 3-B4 3-B2 3-D1 5-D8
LCL	Local	1; 2 3B; 4; 5M 6B; 7; 8M  13-14M 15-16M 17-18 B	Energizing terminals of LCL relay. Transfers in tape reader clutch magnet circuit. Transfers in tape reader clutch magnet, solenoid, RCR relay, TSCI relay, PTR relay, PUN relay, and PP relay circuits. Makes in signal line circuit. Makes in signal line circuit. Breaks in tape reader magnet circuit.	1-C5 2-B2 3-A4 5-C4  4-D6 4-D5 2-F3
MM	Manual - Maintenance	1U; 1L 1M 2M 3B 4M 5B 6B 7B 9B 12B	Energizing terminals of MM relay. Provides marking pulse for code level 1. Provides marking pulse for code level 8. Breaks for code level 7. Makes in MM relay circuit. Breaks for code level 6. Breaks for code level 3. Breaks for code level 5. Breaks for code level 4. Breaks for code level 2.	3-D1 4-B6 4-B6 4-C5 3-D1 4-B5 4-B5 4-B5 4-B5 4-B5
SD	Send	1U; 1L 1M 2M 3B  4M 6M 8M  10M 11B; 11M 12M	Energizing terminals of SD relay. Provides ground for SD relay. In data set coupler "Request to send" circuit. Enables TDR contact leg of shunt to keyboard sending contact. Makes in BHS relay circuit. Makes in data set coupler "Originate" leg. Makes in transmitter-distributor clutch magnet circuit. Makes in EOT relay circuit. Transfers from BID lamp to SEND lamp circuit. Energizes solenoid in print suppression solenoid circuit.	3-E6 3-D6 4-C2 4-D6  2-B5 4-D3 2-F4  5-E6 1-D4 5-C5
TDR	Transmitter Distributor Running	1U; 1L 11M 12M	Energizing terminals of TDR relay. To H/L converter relay station (EOT output). Makes in shunt to keyboard sending contact.	2-F6 5-F4 4-D6

\*See wiring diagrams 6471WD-B1 through 6471WD-B10 in the appropriate section. The digit to the left of the hyphen refers to the sheet number, eg, 2 means 6471WD-B2; the letter and digit to the right of the hyphen refers to the coordinate location on the sheet.

**TABLE V**  
**PANEL MOUNTED RELAYS IN STATION CONTROLLER ASSEMBLY (SHEET 2 OF 2)**

Relay		Active Contacts and Terminals		
Code	Name	Type	Function	WD Location*
TSCI	Transmitter Start Code Inhibit	1U; 2U 12M	Energizing terminals of TSCI relay. Makes in ground leg of send circuit.	5-B3 3-C5

\*See wiring diagrams 6471WD-B1 through 6471WD-B10 in the appropriate section. The digit to the left of the hyphen refers to the sheet number, eg, 2 means 6471WD-B<sub>2</sub>; the letter and digit to the right of the hyphen refers to the coordinate location on the sheet.

**TABLE VI**  
**CONNECTOR X FOR HIGH-TO-LOW CONVERTER**

Function	Connector Terminal
Signal Line	10(-) & 11(+)
Traffic Available (BID)	12, 13, & 5
EOT "make" Output	3
EOT "break" Output	4
Reader Send Command	1, 6 & 2 (circuit ground)
Frame Ground	15
Circuit Ground	7 (circuit ground)

**TABLE VII**  
**CONNECTOR Y FOR LOW-TO-HIGH CONVERTER**

Function	Connector Terminal
Signal Line	9(-) and 8(+)
Low Tape "make"	14
Low Tape "break"	6
Low Tape swinger	7 (circuit ground)
Low Paper "break"	5
Frame Ground	15

TABLE VIII  
CONNECTOR W FOR DATA SET COUPLER

Function	Connector Terminal
Send	5
Receive	15
-20 v	9
Request to Send	3
+20 v	1
Local	4
Motor Control	6
Optional Relay	10
Originate	11
117 v ac	13 & 14
Clear to Send	12 & 2
Frame Ground	7 & 8