

**85A2 DATA SELECTIVE CALLING SERVICE STATIONS
150-WORD PER MINUTE HALF-DUPLEX OPERATION
DESCRIPTION AND OPERATION**

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1. GENERAL

1.01 This section provides general information on the 85A2 data selective calling service (DSCS) stations, hereafter referred to in this practice as the stations. Physical and functional descriptions of the components that make up the station with a description of the operating procedures and features are discussed in this section. A brief description of overall operation of the 85A2 DSCS has also been included in order to explain the interchange of signals between the computer switcher and the station controller.

1.02 This section is reissued to provide coverage of the 85A Receive-Only (RO) station arrangement provided by the data auxiliary set (DAS) 820J-L1/3 controller. The new arrangement is compatible with all the present station configurations used in the 85A2 DSCS. This reissue also updates and corrects general information. Additional information is included on the data sets used in the DAS 820G-L1 type and 820J-type controllers.

Since this reissue constitutes a general revision, arrows ordinarily used to denote changes have been omitted.

A. Purpose of Station

1.03 The 85A2 station is used to provide 150-wpm half-duplex (HDX) data service on a selective basis with other stations in the private network of which it is a part. A customer-provided computer switcher serves as the line control station to control the network of stations. The line control station is hereafter referred to as the computer switcher or switcher. The entire configuration of switcher, stations, and interconnecting lines comprise what will hereafter be referred to as the 85A2 DSCS system. Some of the various options available in the operation of 85A2 DSCS stations are in the following list:

- Intraline (stop on STX and ETX) and interline (store and forward) operations versus an interline type of operation only (see 1.21),
- Automatic tape feedout on roll call or when station unselects, or automatic feedout only when station unselects,
- Optional use of roll call operation (see 3.09),
- Providing for "per station" information message delivery (see 1.11), and
- Optional response (ACK or NAK) to call-in while tape feeding.

B. Purpose of System

1.04 The 85A2 DSCS stations can be employed in a single-station line with the switcher or in a multipoint system involving multistation lines. The computer switcher, serving as the line control station, administers the system and governs the selection of stations for sending and receiving. Two basic modes of operation are used to accomplish the purpose of the system. They are interline/intraline operation versus an interline type of operation only. Interline operation requires store-and-forward capability for dealing with traffic that originates from a station in one line, but is destined for delivery to a station on another line. Intraline operation is required when the system is arranged to connect stations on the same line directly to

each other. Intraline operation requires stop on STX and ETX (controller options).

C. System Arrangement

1.05 Figure 1 is a block diagram of a typical arrangement of a multi-station line for 85A2 DSCS system. The system consists of the switcher and a number of stations on an HDX line interconnected via hubbing points.

D. Station Arrangements

1.06 The 85A2 station terminal equipment is Model 37-type teletypewriter (TTY) equipment. The 85A2 station is intended to be completely assembled and tested at the distribution house prior to delivery.

1.07 The 85A2 station is available in the following arrangements:

- (1) M37 ASR TTY (ORIG/TERM station—page receiving)
- (2) M37 RO TTY (TERM ONLY station—page receiving)
- (3) M37 ROTR alone (TERM ONLY station—tape receiving).

Note: All transmission must be from tape. There is no keyboard option for direct transmission.

1.08 In the case of 1.07 (1) and (2), an auxiliary RO TTY or ROTR may be optionally provided as a slave unit to the primary ASR or RO TTY. The auxiliary machine can be unblinded and blinded manually, or can be unblinded and blinded automatically during any message delivery under on-line signal control.

1.09 Figure 2 is the block diagram of a typical ORIG/TERM 85A2 station. The arrangements for ORIG/TERM and TERM ONLY stations and the components comprising each are given in Table A.

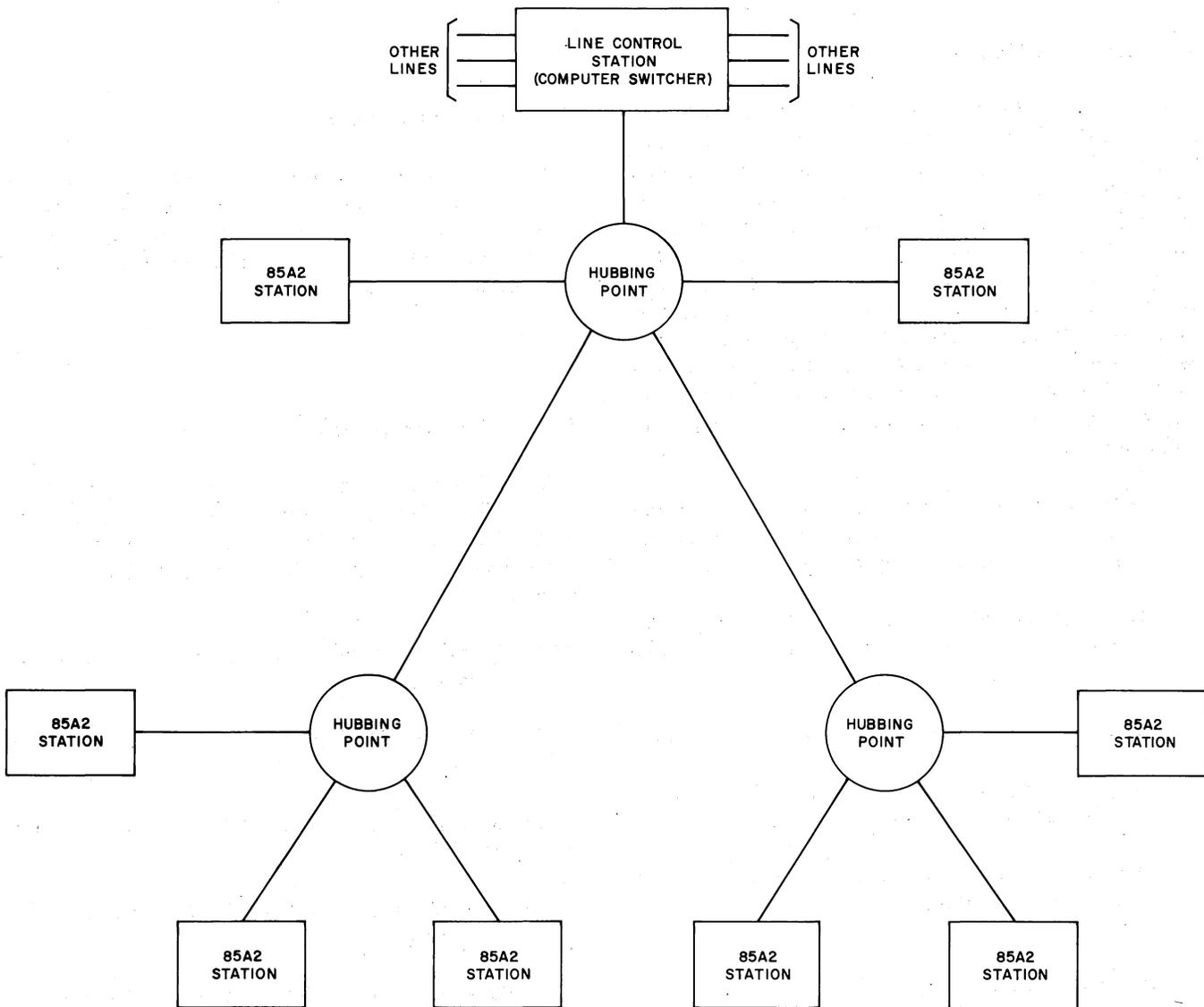


Fig. 1—Block Diagram of Typical 85A2 Multi-Station Line in a System Arrangement

E. Uses of Station Components

1.10 The ASR TTY (see Fig. 3) is used at an ORIG/TERM station to:

- (1) Prepare tapes for message transmission,
- (2) Send all station transmissions,
- (3) Print local copy of all station transmissions and receptions,

(4) Optionally punch tapes of all messages received by a station not equipped with an auxiliary receiver, and

(5) Print local copy of information messages sent by the switcher [eg, service messages concerning messages sent or received by the station, personal address information (PAI), or time, data, message number (TDM) of messages sent or received by the station].

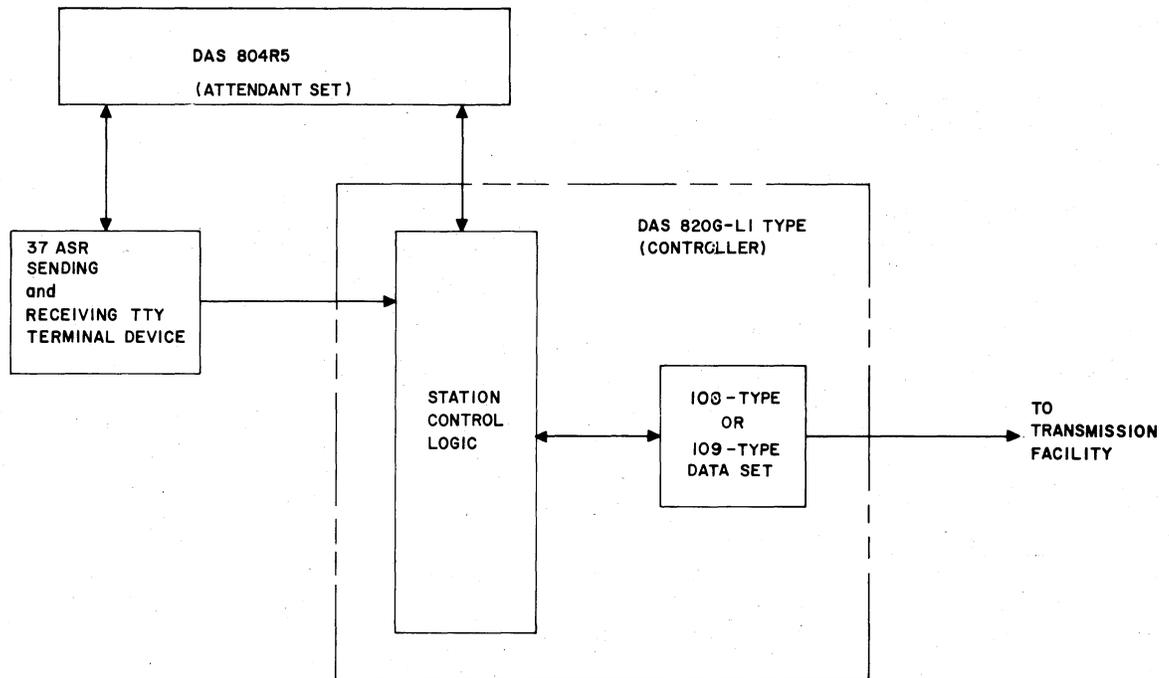


Fig. 2—Block Diagram of a Typical 85A2 ORIG/TERM Station

TABLE A
STATION ARRANGEMENT SUMMARY

TYPE STATION	PRIMARY TTY	ATTENDANT SET	CONTROLLER DAS	MTG BRKT	AUX RCVR TTY (OPTIONAL)
ORIG/TERM	37 ASR	804R5	820G-L1/2	93A	37 RO or 37 ROTR
TERM ONLY	37 RO	804R7	820G-L1/2 820J-L1/3		
	*37 ROTR	804R7	820G-L1/2 820J-L1/3	95A	None

*A KS-20018-L1, -L2, -L3, or -L4 cabinet is required to mount the controller. A 212A adapter is also required in order to connect the controller to the attendant set using an M36E cord (10 or 50 feet).

1.11 The primary RO TTY is used to print local copy of all messages received by the station and information messages sent by the computer switcher (eg, TDM of messages received by the station, PAI, or service messages received from the computer switcher concerning messages received

by the station). See Fig. 4 for block diagram of RO TTY.

1.12 The primary ROTR performs the same function as a primary RO TTY except that the ROTR punches and prints on a tape the

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information received instead of printing it in page form (see Fig. 4). The 37 ASR TTY also has the option of using the perforator as an auxiliary tape receiver when no auxiliary machine is provided with the station.

1.13 An RO TTY or ROTR may be used as an auxiliary machine to a primary ASR or RO TTY only.

1.14 The DAS 820G-L1 type (station controller) enables the station to send and/or receive messages automatically by providing circuits to recognize control characters from the computer switcher and to generate response characters for transmission. The DAS 820J-type station controller provides only the receiving functions. Both controllers house the circuit packs (CPs) and data set. The controllers also provide the operating voltages required. Refer to Table A for information on the controller used for each type station.

1.15 Data sets 108E and 109E are the current models being produced for use in DSCS. New installations will be equipped with these sets; however, older models (data sets 108A-type and 109A-type) currently in the field need not be replaced unless they are inoperative. In order to avoid confusion, the data sets in this BSP will be referred to as data sets 108-type and 109-type unless a specific model is being discussed.

1.16 The data set performs two functions. It converts the digital data received from the data terminal via the controller into frequency shift keyed (FSK) tones (108-type) or dc current levels (109-type) suitable for transmission over the line. It also converts the tones or dc current levels received from the line into digital data suitable to operate the data terminal. Data set 108-type also monitors for carrier failure. Should the carrier signal fail while the controller is selected as a receiver or transmitter, a signal is passed from the data set to activate the controller initialization circuits.

1.17 The DASs 804R5 and 804R7 attendant sets are used at a station to provide the human interface and alarm indications for the station. The attendant set keys are used to condition the station as required or to provide for the acknowledgment of alarm indications.

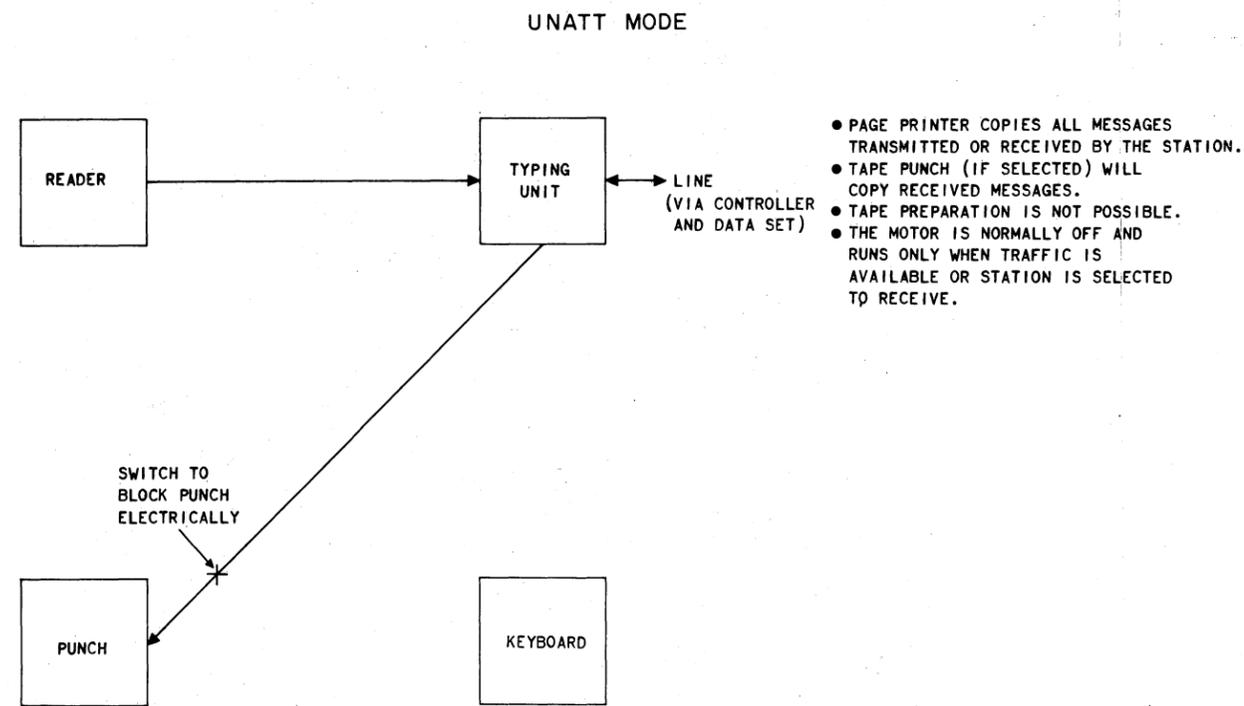
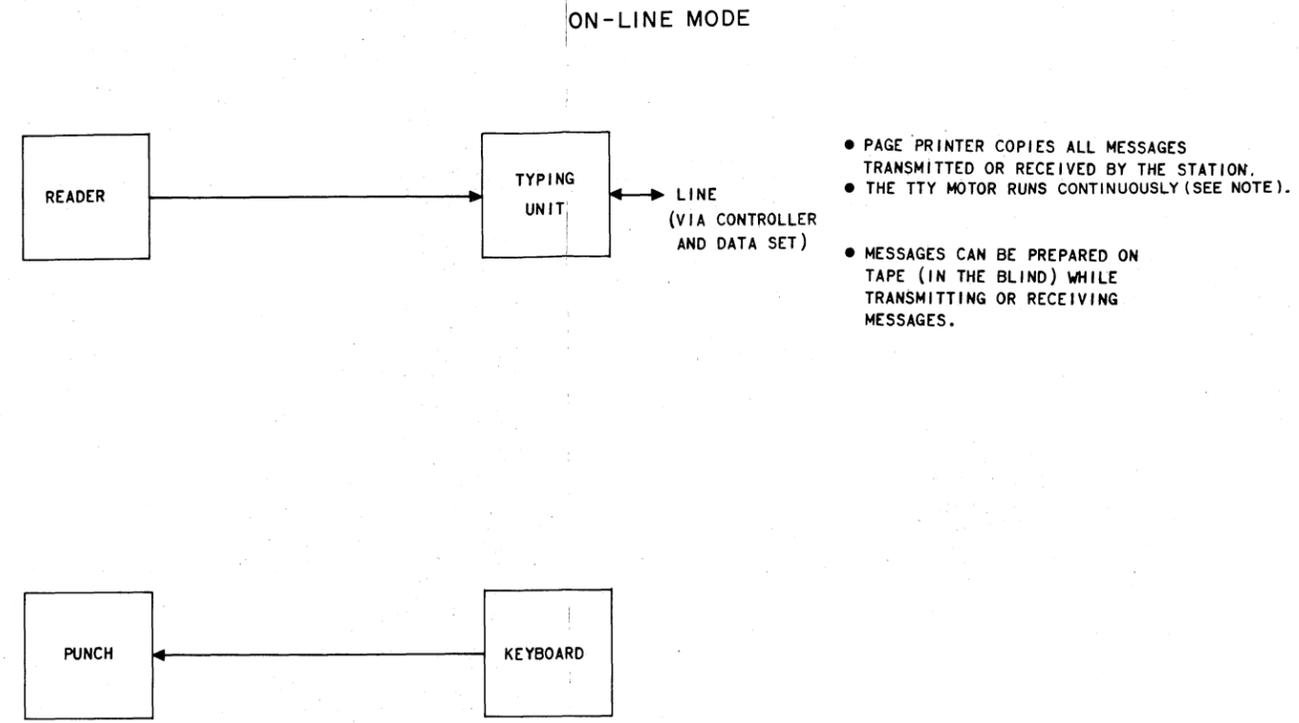
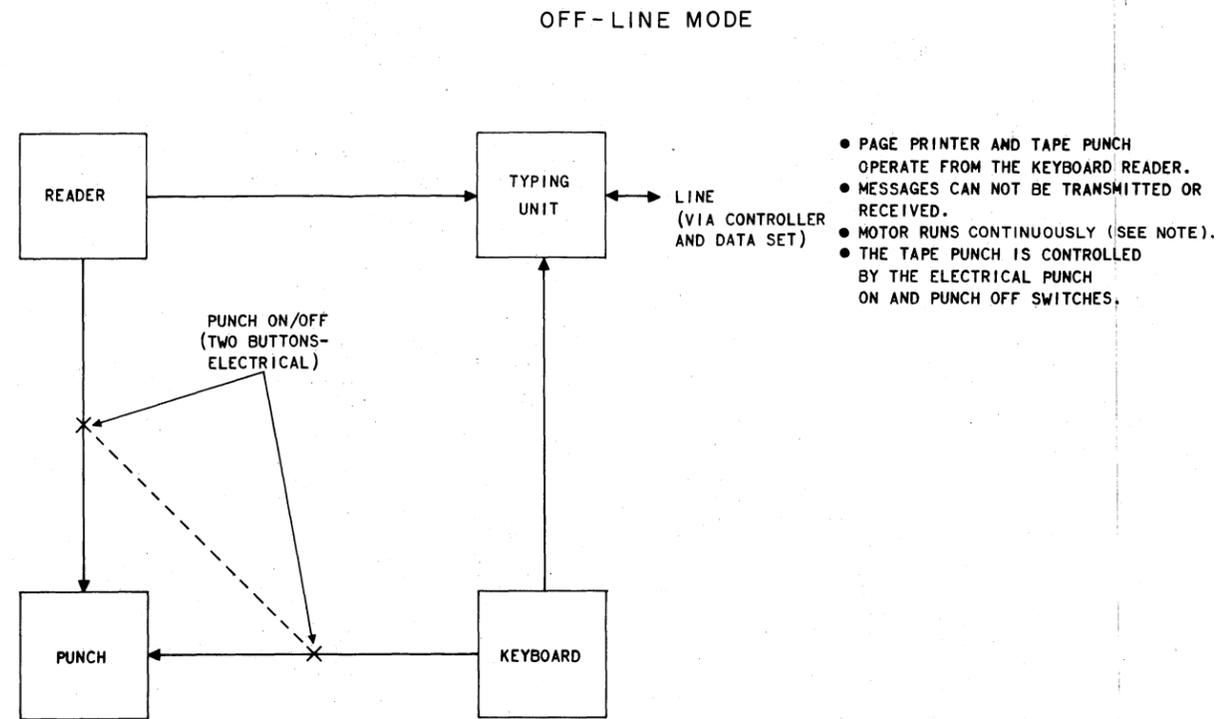
1.18 The 93A mounting bracket is used to mount the controller into the pedestal of the 37-type TTYs. The 95A mounting bracket is used to mount the controller into the KS-20018-type cabinet at an ROTR TERM ONLY station. The DAS 820J-L1/3 controller is provided with spacers and the associated mounting hardware required to mount the controller on the same brackets as the DAS 820G-L1 type. For information on installing the spacers and mounting the controller, refer to the installation BSP (581-131-201).

1.19 The M36E cord is used to connect the DAS 804R7 attendant set to the DAS 820G-L1/3 or 820J-L1/3 controller via the 212A adapter. The M36E cord is available in lengths of 10 or 50 feet.

F. Station Operation

1.20 Station operation usually begins when the computer switcher polls the individual stations (see Fig. 5). Because of feature options, however, there are many variations possible in the details of how a system can operate with 85A2 stations. For purposes of the brief description that follows, a method of operation will be discussed that involves maximum use of some of the ASR station capabilities. To pick up traffic, the switcher polls the individual stations, in turn, asking each station whether or not it has traffic to send. The stations respond, when polled, with discrete indications of their traffic-to-send status. When a station is selected to send, it transmits a start of heading indicator and stops (optional). The switcher may then send any programmed information that is to be printed at the selected sending station (eg, originating date and time, or originating message number record) before restarting transmission from the selected sender. The selected sending station then sends the entire heading of the message to the switcher and stops (stop on STX optional). The heading contains the address information of those stations that have been designated by the originator as recipients for this message. The switcher translates the address information into the appropriate station call-in codes, in the process of which it can verify the validity of the heading information.

1.21 If the message is intended for other stations on the same line, the switcher normally selects the required receiving stations, by initiating the call-in process before having the selected sending station transmit the text of the message, to enable delivery of the message directly from the originator



NOTE:
 THE MOTOR WILL STOP WHEN THE OUT OF SVC KEY IS OPERATED.

Fig. 3—Operational Modes of the 37 ASR TTY

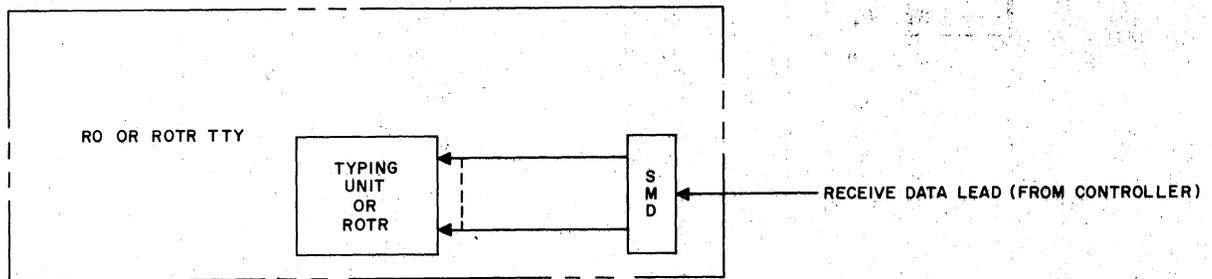


Fig. 4—Block Diagram of RO TTY

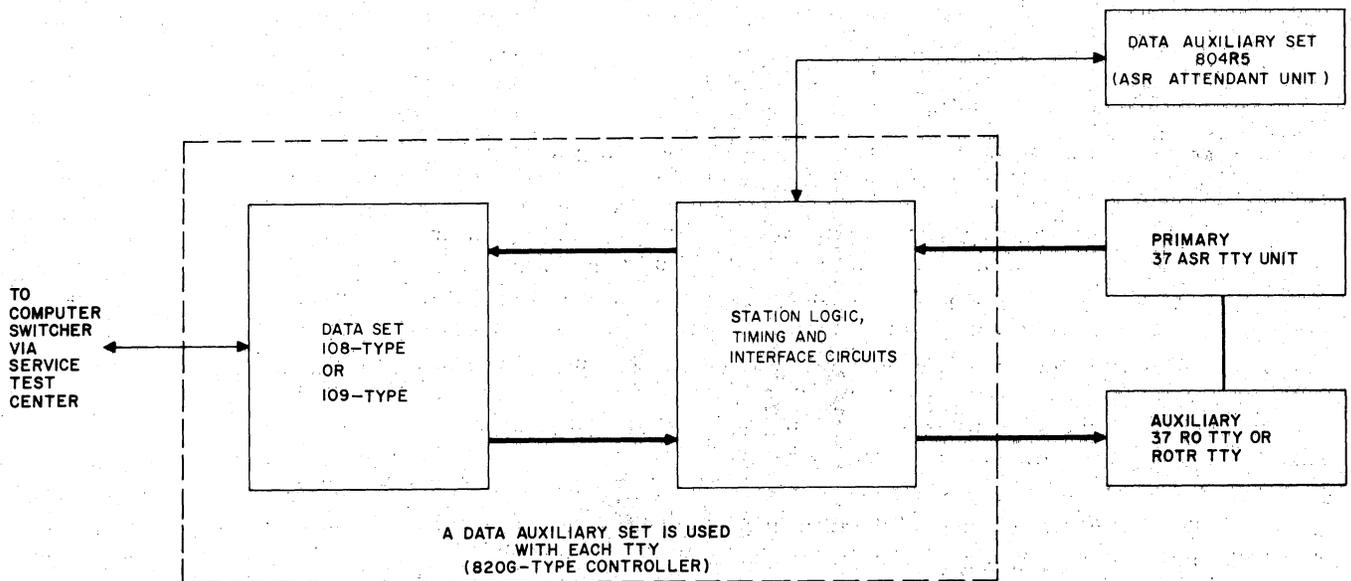


Fig. 5—Block Diagram of 85A2 ORIG/TERM Station With Auxiliary RO TTY Station

to the available, intended receivers. This is intraline operation which results in efficient utilization of the line because the line is used only once to accomplish both the pickup and the delivery of the message. If a message is not intended for delivery to stations on this line at this time, or if it is desired (optional) to treat all message handling transactions in the same way, the call-in process is bypassed at this time and originator transmission to the switcher is caused to resume. Store and forward handling is required. Store and forward operation is referred to in this section as interline operation, even when the addressed stations are on the same line as the originator.

1.22 The call-in process used for message delivery consists of the switcher asking each of the addressed receiving stations individually, in turn, whether or not it is ready to receive the message. The stations respond, when called, with discrete indications of their ready-to-receive status. Stations that respond ready-to-receive to call-in automatically become selected receivers. In the case of stations that respond not-ready-to-receive to repeated call-in attempts (computer programming option), the switcher invokes the message intercept routine being employed in the system. When all of the available addressed stations on the line have been called in, the switcher unblinds all selected receivers.

It then instructs the selected sending station to resume transmission, as previously mentioned or, if no station is selected as a sender, initiates delivery of a stored message.

In the case when there is a selected sending station, the originating station then sends the text of the message directly to all selected receivers, and stops (stop on ETX optional) upon detection of the end-of-text indicator (ETX). The switcher can now perform a roll-call function (optional) to determine if the delivery is satisfactory before releasing the selected receivers and instructing the originating station to then resume transmission. Following this, the originating station sends either the start-of-heading indicator (SOH) of another message or the end-of-transmission indicator (EOT) and stops.

1.23 In the case of multiple message pickup, when the selected sending station sends SOH and stops, the switcher delivers (optional) a date and time or message number record to the originator. The transmission from the selected sending station is reinitiated to obtain the heading information of the next message. When all messages have been sent, the selected sending station sends EOT and stops. The selected sending station will automatically assume the idle, unselected condition. The switcher then polls the next station searching for another station with traffic to send. It may also proceed with a delivery of its own by initiating the call-in process.

G. Station Power

1.24 The 85A2 stations require an individually fused line power source of 59.55 to 60.45 Hz with 106 to 129 volts. The dc voltages required to operate the controller are supplied by the 24A power unit which is a part of the controller. The ac power for the 24A power unit is supplied by a KS- molded power cord which plugs into an outlet in the 37 TTY. When used with an ROTR, the KS- molded power cord is plugged into the ROTR or the power source that supplies the ROTR.

Note: Power may be switched on independently of normal motor control for maintenance by operation of a switch located in the TTY.

2. PHYSICAL DESCRIPTION

A. General

2.01 This part describes the physical appearance of the 85A2 stations. The various arrangements of each are shown in Table A.

2.02 The 37 ORIG/TERM station is shown in Fig. 6. The figure shows the 37 ASR TTY with its 804R5 attendant set. The data set, controller, and the 93A bracket (not shown) are mounted inside the 37 ASR TTY pedestal.

2.03 The 37 TERM ONLY station is shown in Fig. 7. The figure shows the primary RO TTY and its 804R7 attendant set. The data set, controller, and 93A bracket (not shown) are mounted inside the primary 37 RO TTY pedestal.

2.04 The 37 ROTR TERM ONLY station is shown in Fig. 8. The figure shows the 37 ROTR TTY and its 804R7 attendant set. The data set, controller, M36E cord, and 95A bracket are mounted in a KS-20018-type cabinet. The M36E cord connects the 37 ROTR TTY via a 212A adapter to the controller. With the 37 ROTR TERM ONLY station, it is not possible to have an auxiliary receiver.

B. Teletypewriters

2.05 The 37 ASR TTY is a 4-row, 150-wpm TTY which uses the ASCII code. This machine consists of a page printer, tape punch, tape reader, and keyboard.

2.06 The overall external dimensions of the 37 ASR TTY cabinet are 36-1/4 inches high, 44-1/2 inches wide, and 27-1/2 inches deep. When equipped with the controller, the 37 ASR TTY weighs approximately 360 pounds.

2.07 The 37 RO TTY is a 4-row, 150-wpm TTY which consists of a page printer. Figure 7 shows the 37 RO TTY when used as a primary receiver; Figure 9 shows the 37 RO TTY when used as an auxiliary receiver.

2.08 For either a primary or an auxiliary receiver, the overall external dimensions of the basic primary 37 RO TTY cabinet are 36-1/4 inches high, 32-1/2 inches wide, and 24-1/2 inches deep. Without

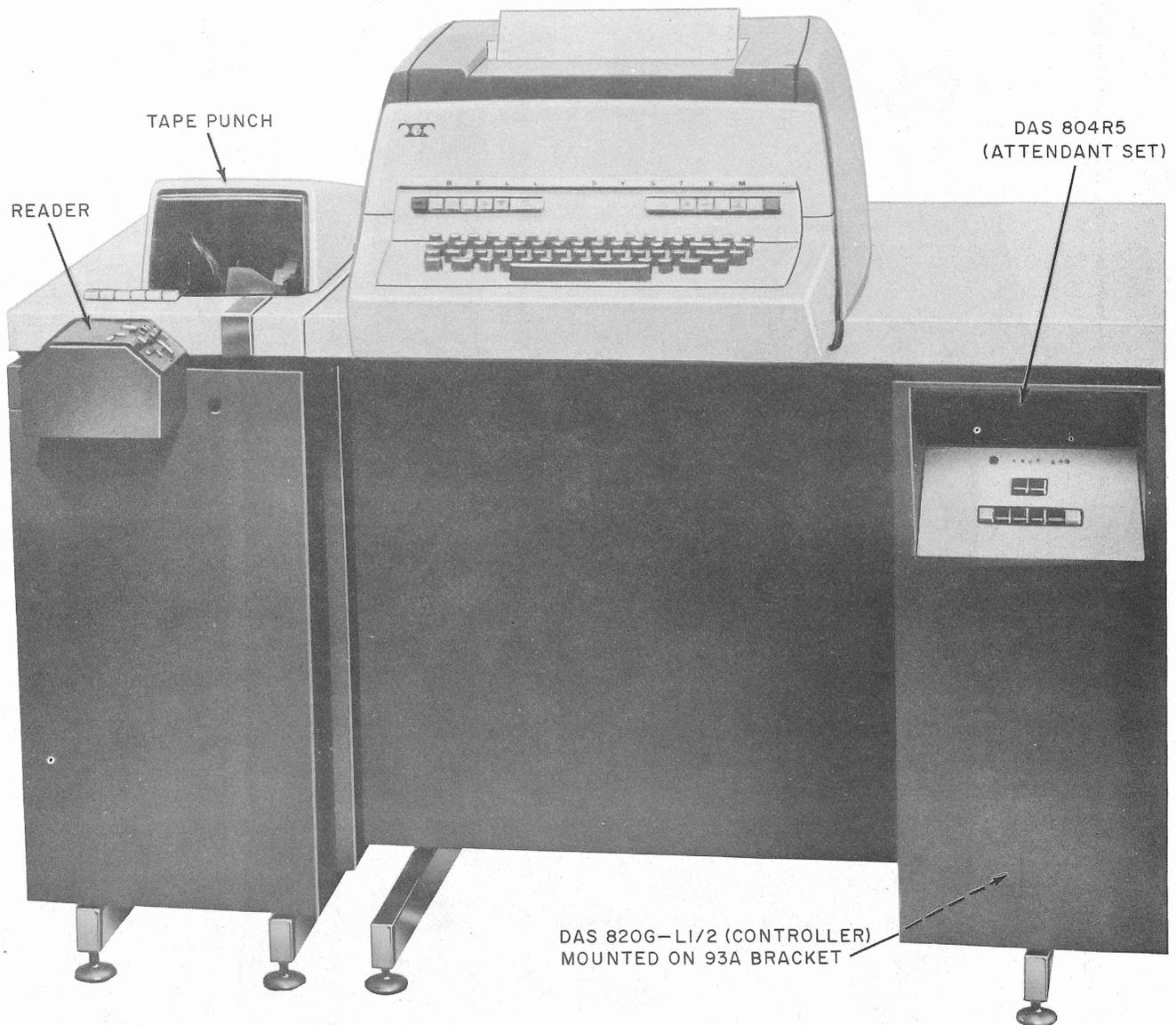


Fig. 6—Typical ORIG/TERM 37 ASR Station

controller, it weighs approximately 204 pounds and the auxiliary, approximately 180 pounds.

2.09 The 37 ROTR is a 150-wpm machine which consists of a typing reperforator that punches the standard 1-inch tape. It may be used as a primary receiver (Fig. 8) or as an auxiliary receiver (Fig. 10) to a 37 ASR or RO TTY. When used

as a primary receiver, the 37 ROTR cannot be arranged to operate with an auxiliary receiver.

2.10 The overall dimensions of the 37 ROTR cabinet for either the primary or auxiliary receiver applications, are 34-1/2 inches high, 15-1/2 inches wide (including tape winder), and 15 inches deep. It weighs approximately 75 pounds. When

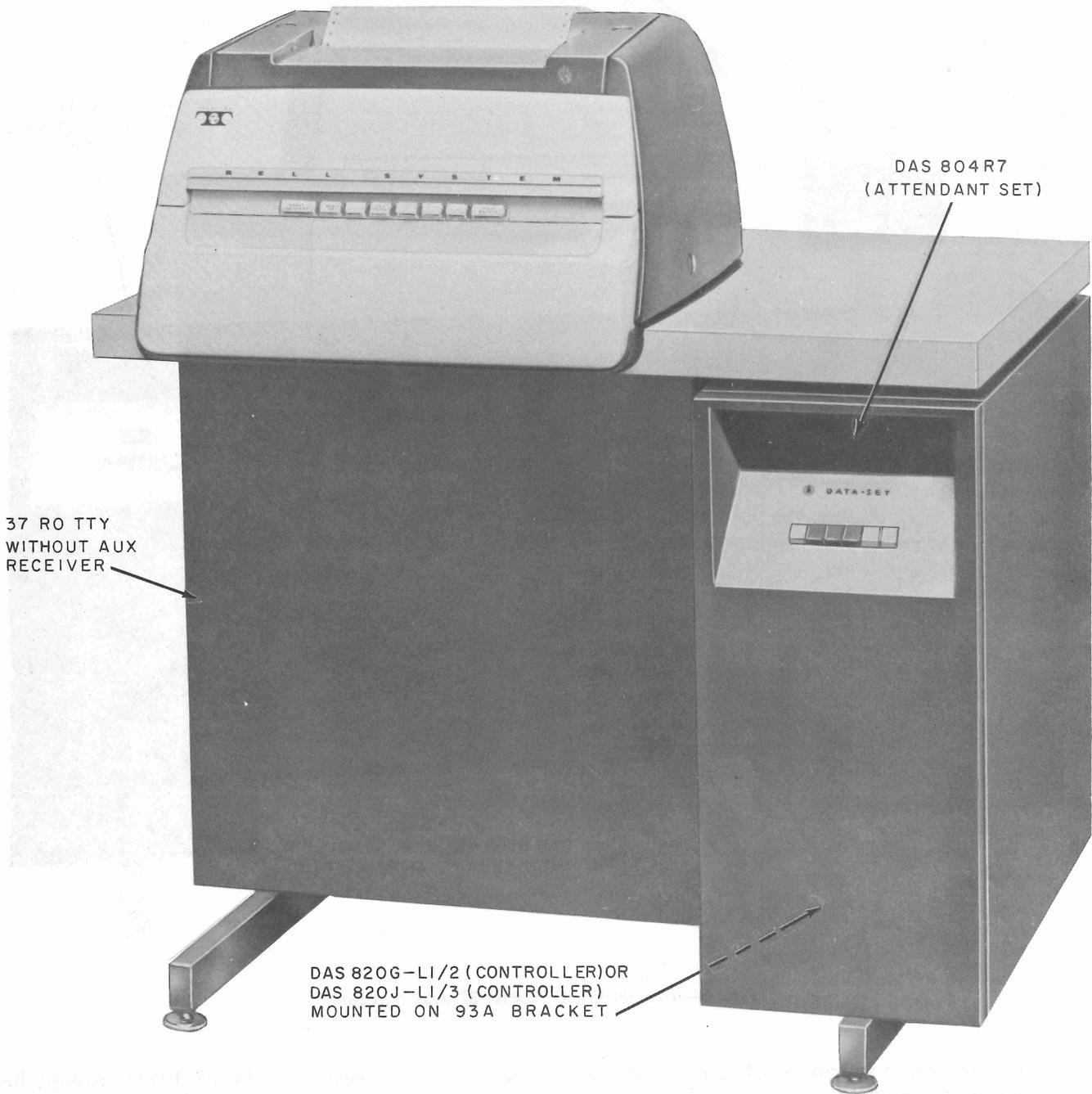


Fig. 7—Typical TERM ONLY 37 RO Station

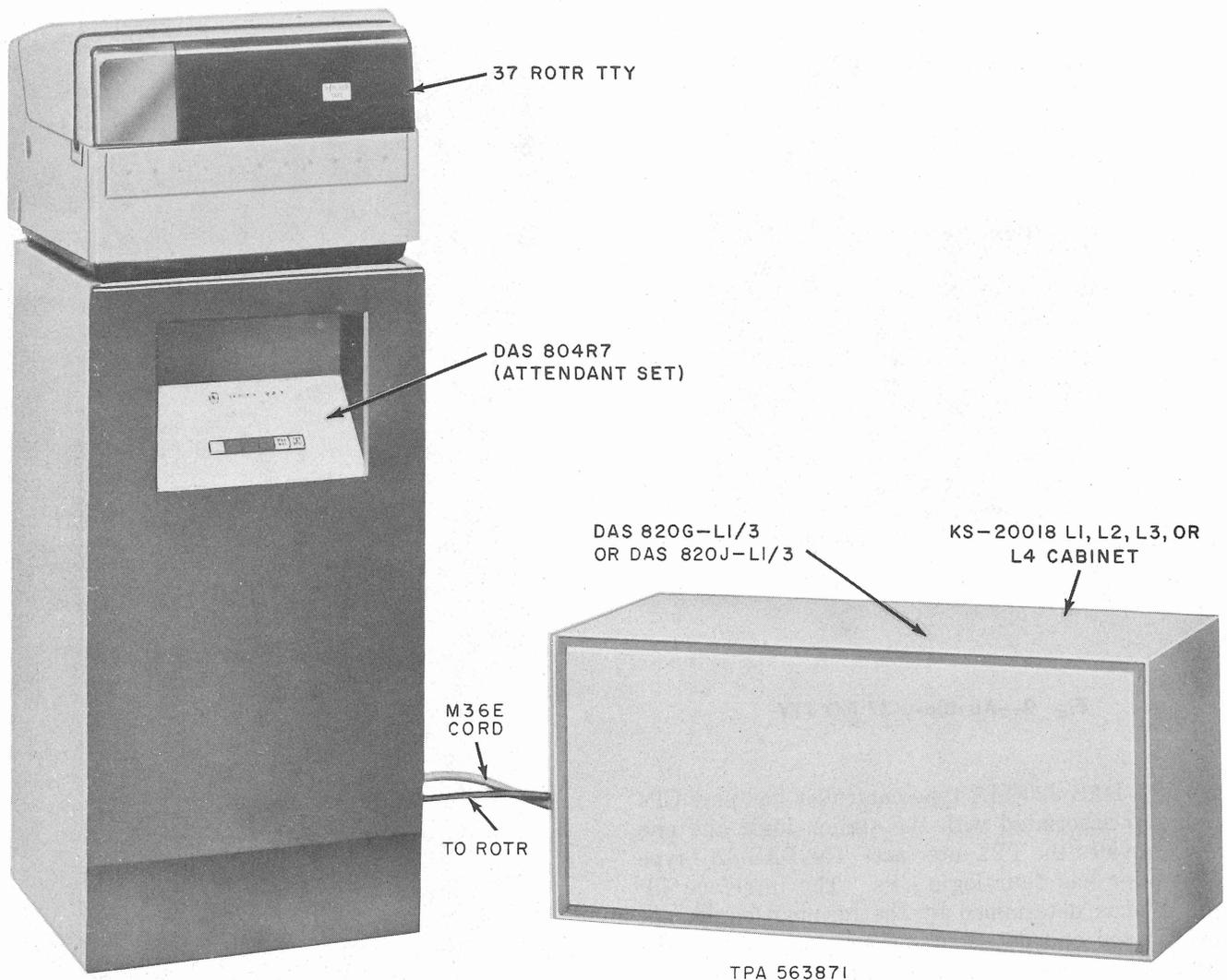


Fig. 8—Typical TERM ONLY 37 ROTR Station

the 37 ROTR is employed as a primary receiver, the required controller must be housed externally.

C. Controllers

2.11 The DAS 820G-L1 type and 820J-type controllers are used for the 85A2 stations. The physical dimensions are the same for both controllers. The controllers measure 9 by 15.5 by 6 inches and weigh approximately 19 pounds. The DAS 820G-L1/2 is shown in Fig. 11. The DAS 820J-L1/3 is shown in Fig. 12. The DAS 820G-L1/3 (not shown) provides AR269 CP for the interface card provided in slot 3, otherwise it is identical to DAS 820G-L1/2.

2.12 The major components that make up the DAS 820G-L1 type and DAS 820J-type station controllers are the 59C apparatus mounting assembly, the AR-type CPs, a 24A power unit, an M3AY power cord or equivalent, and a terminal strip for line connections. The M connector (for TTY connections) and the N connector (for attendant set connections) are mounted on a separate bracket on DAS 820G-L1 type controllers. The M and N connectors are mounted on the interface CP (AR681) on DAS 820J-L1/3 controllers. The 59C apparatus mounting assembly provides the connections required for the CPs and the data set.

2.13 The CP designation and the position the CP occupies in a controller is given in Table

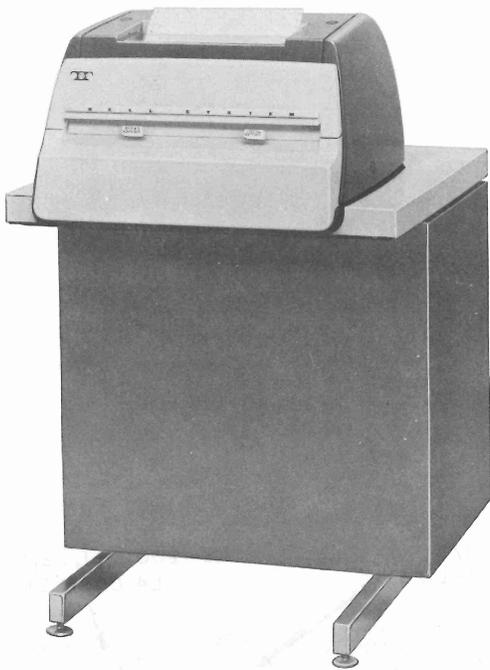


Fig. 9—Auxiliary 37 RO TTY

B. The DAS 820G-L1 type controller has nine CPs that are associated with the station logic and one that provides the TTY interface. The DAS 820J-type controller has four logic CPs. The interface CP provided is determined by the terminal equipment being used and determines the list number of the controller. Circuit packs that have the same AR number are identical; however, they may have different options installed when used in different controllers.

2.14 The controller for the 37-type stations (Fig. 13) is located behind the door on the right-hand side of the ASR or RO TTY table. It is mounted on a 93A bracket which allows it to be pulled out for maintenance and CP removal.

2.15 The controller for the 37 ROTR station (Fig. 14) is located in the KS-20018-type cabinet. It is mounted on a 95A bracket in a position that facilitates maintenance and CP removal without tilting. When a DAS 820J-L1/3 is used, the spacers and associated hardware provided with the controller will be required to position the controller in the cabinet. Refer to the installation BSP (581-131-201) for information on installing the controller.

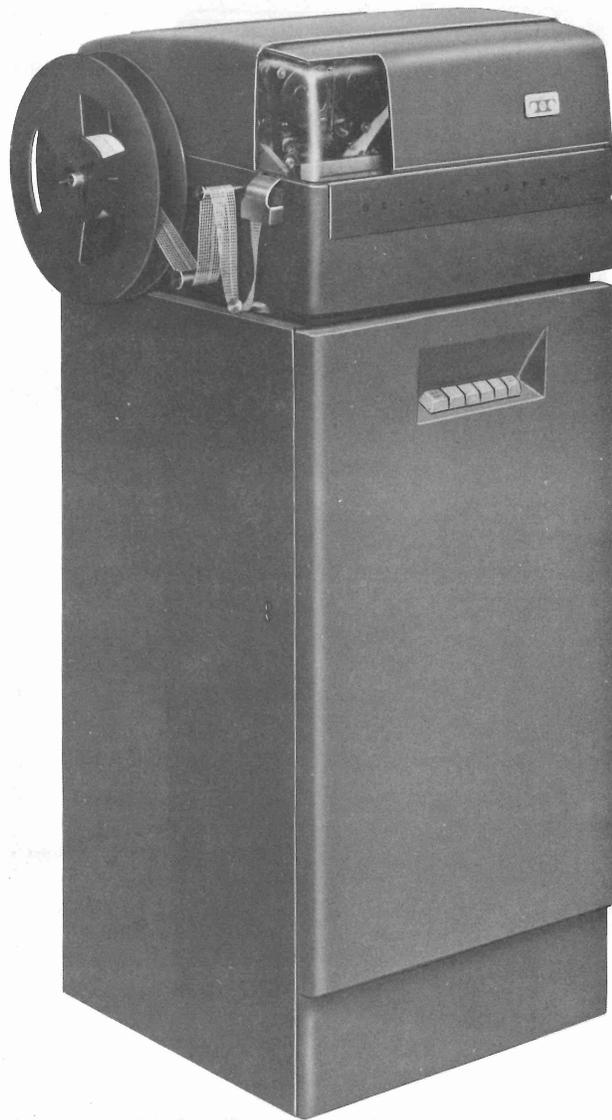


Fig. 10—Auxiliary 37 ROTR TTY

Note: The KS-20018-L1 cabinet is 12 inches high and provides only enough space for mounting the DAS 820G-L1/3 station controller. The remaining Lists 2, 3, and 4 cabinets are 17, 24, and 30 inches high, respectively, and may be used for mounting additional equipment or for appearance reasons.

D. Data Set

2.16 The data set 108-type or 109-type is the printed wiring board assembly located in the controller (see Fig. 11 and Fig. 12). The data

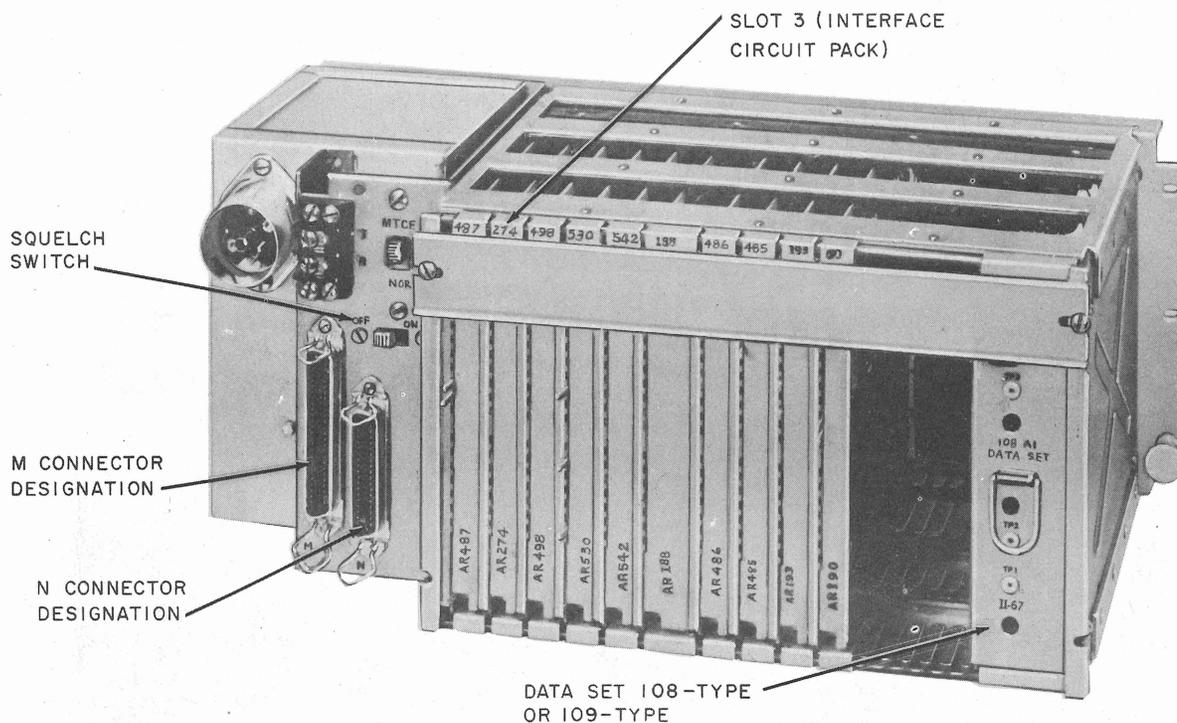


Fig. 11—Data Auxiliary Set 820G-L1/2 (Controller)

set is not supplied with the controller and, therefore, must be ordered separately for installation with the controller. The type of data set is specified on the service order.

E. Attendant Sets

2.17 Two types of attendant sets are used in the 85A2 stations. They are the DAS 804R5 and DAS 804R7. The 804R5 attendant set (Fig. 15) is used in the 37 ASR TTY. The 804R7 attendant set (Fig. 16) is used in the RO TTY and in the 35 ROTR. The ASR TTY attendant set (804R5) is mounted on the right-hand door of the TTY. It contains the keys and lamps, as shown in Table C and Fig. 17, which are associated with the sending and receiving functions of the station.

2.18 The RO TTY attendant set (804R7) is mounted on the right-hand door of the TTY. It contains the keys and lamps shown in Table D and Fig. 18 which are associated with the receiving functions of the station.

2.19 The ROTR attendant set (804R7) is mounted on the front door of the ROTR pedestal. It

contains the keys and lamps shown in Table D and Fig. 18 which are associated with the receiving functions of an ROTR station.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 In general, a station employs a 37 ASR as its terminal device, however, an RO TTY or ROTR may be used. An auxiliary receiving machine, either an RO or ROTR, may be provided as a secondary receiver to the primary ASR or RO. The description that follows covers the operation of an ASR station. The portion of this text relating to call-in and message delivery is equally applicable to an RO or ROTR station. The description of an auxiliary machine is treated separately.

3.02 Reference will be made to the ASCII code (Table E). An eighth bit is used to provide even parity. Table F gives the legend for the various ASCII code designations.

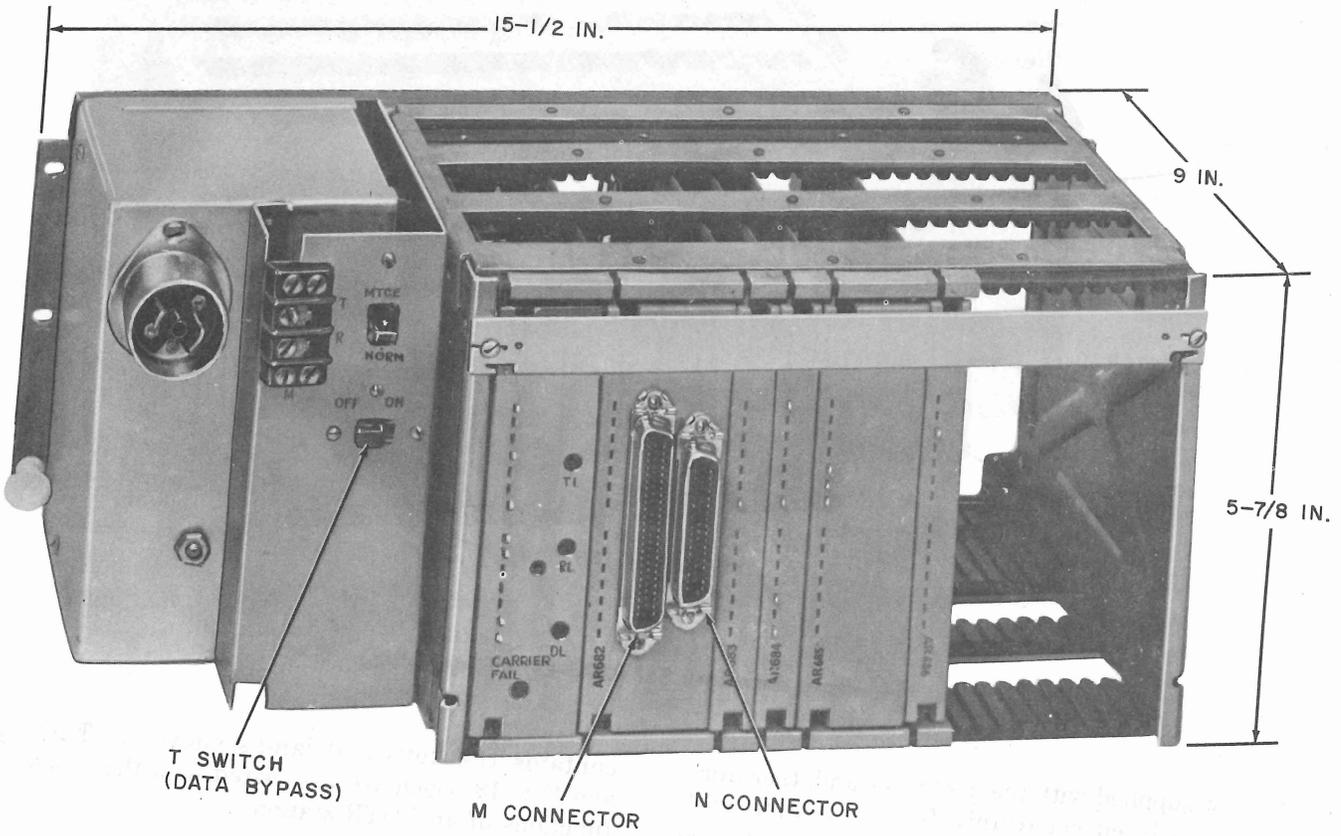
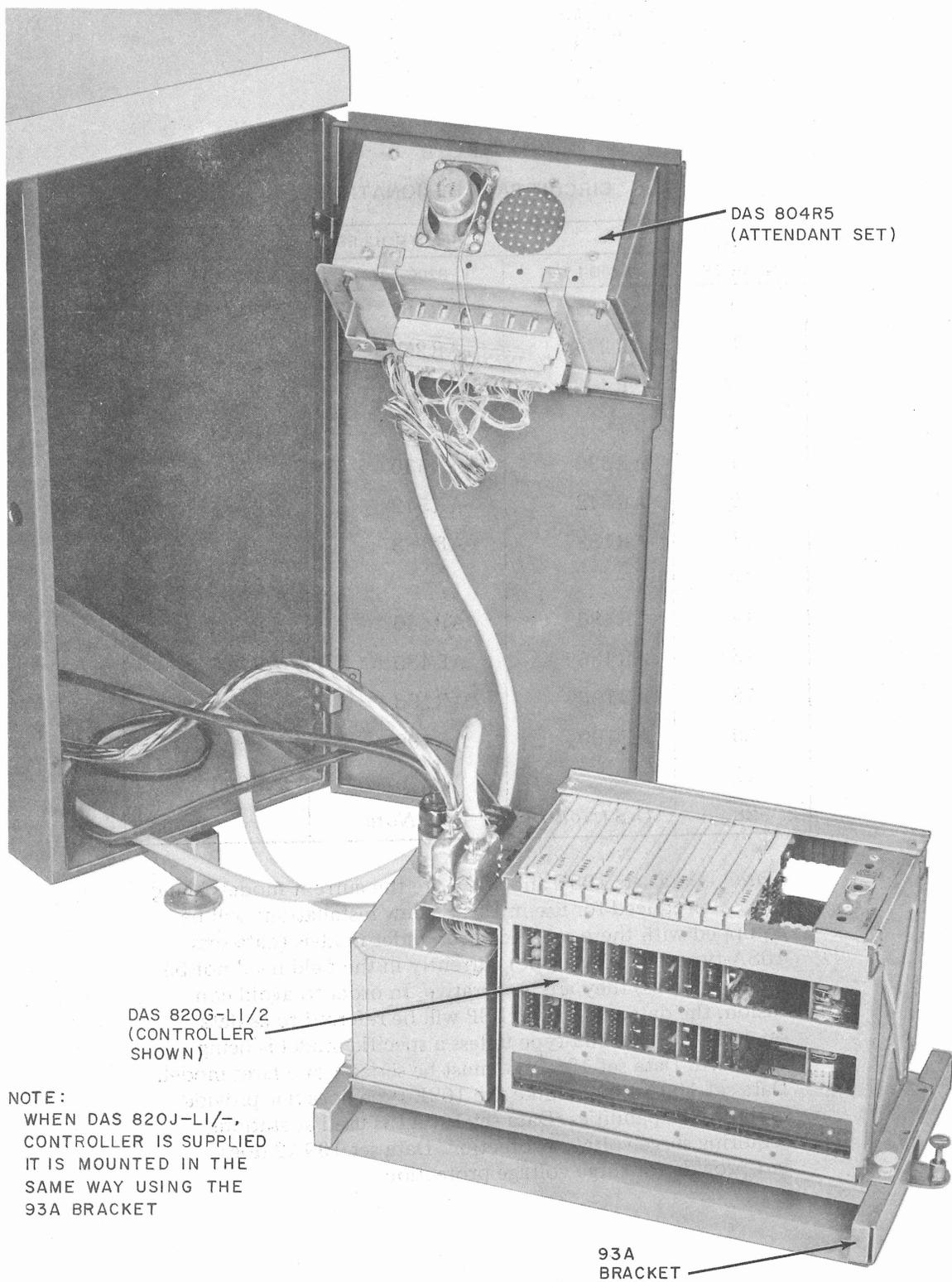


Fig. 12—Data Auxiliary Set 820J-L1/3 (Controller)

TABLE B
CIRCUIT PACK DESIGNATIONS

SLOT NUMBER	CONTROLLER		
	820G-L1/2	820G-L1/3	820J-L1/3
1	AR487	AR487	D/S (Note)
3	AR274	AR269	—
5	AR498	AR498	—
6	—	—	AR681
7	AR530	AR530	—
9	AR542	AR542	—
11	AR188	AR188	—
12	—	—	AR683
14	AR486	AR486	AR684
16	AR485	AR485	AR685
18	AR193	AR193	—
20	AR190	AR190	—
21	—	—	AR686
28	D/S (Note)	D/S (Note)	—

Note: Data sets 108E and 109E are the current models being produced for use in DSCS. New installations will be equipped with these sets; however, older models (data sets 108A-type and 109A-type) currently in the field need not be replaced unless they are inoperative. In order to avoid confusion, the data sets in this BSP will be referred to as data set 108-type and 109-type unless a specific model is being discussed. Data set 108-type must be series 4 or a later model. Data set 109A-type, unlike the 109E-type does *not* provide loop-back capabilities. Data set 109A1 is used at stations requiring surge voltage protection. Data set 109A2 does *not* provide for surge voltage protection.



NOTE:
WHEN DAS 820J-L1/-,
CONTROLLER IS SUPPLIED
IT IS MOUNTED IN THE
SAME WAY USING THE
93A BRACKET

Fig. 13—Data Auxiliary Set 820G-L1/2 to be Mounted in a 37 TTY Using a 93A Bracket

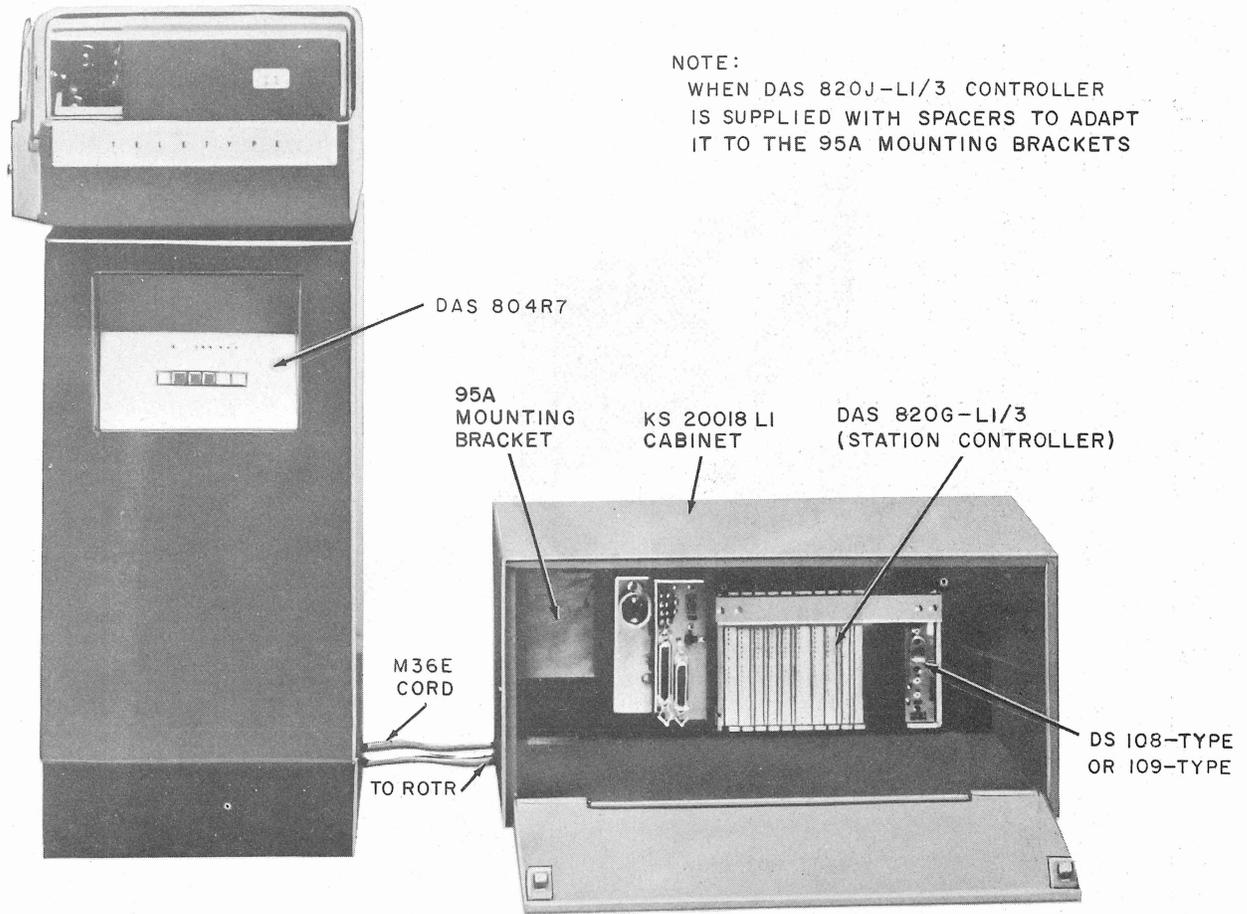


Fig. 14—Data Auxiliary Set 820G-L1/3 Mounting for 37 ROTR Station

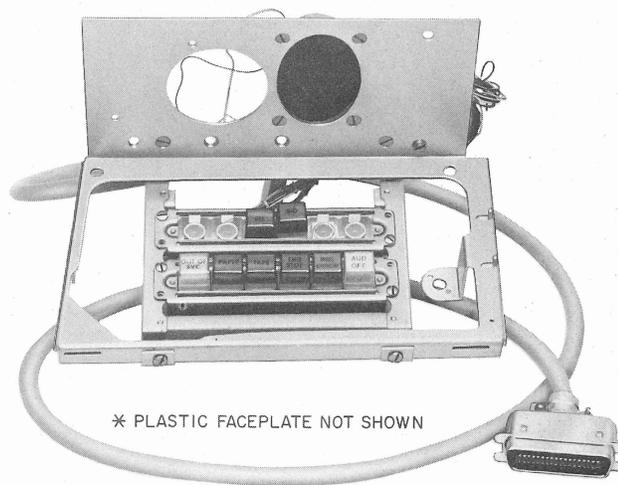
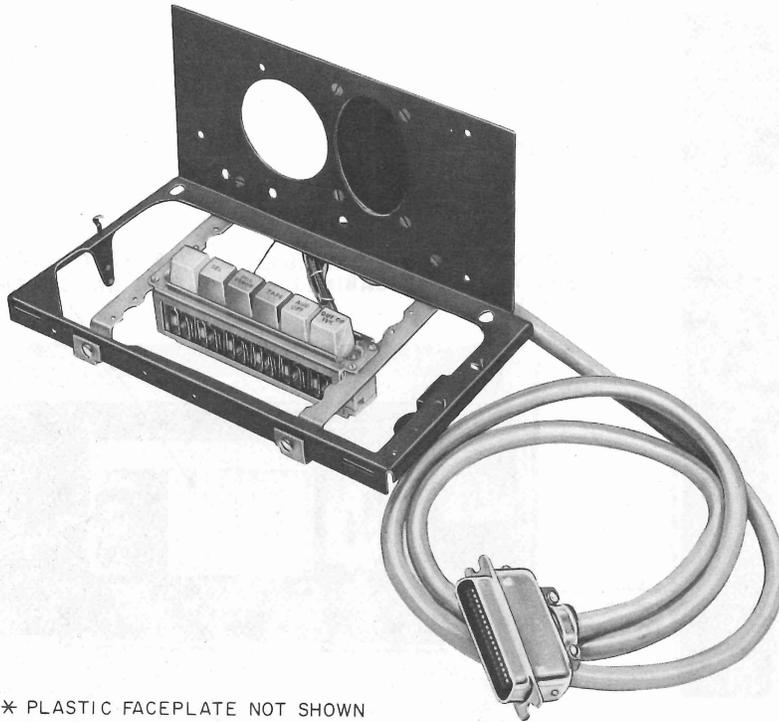


Fig. 15—Data Auxiliary Set 804R5 (Attendant Set)



* PLASTIC FACEPLATE NOT SHOWN

Fig. 16—Data Auxiliary Set 804R7 (Attendant Set)

TABLE C
37 ASR TTY ATTENDANT SET KEYS

KEY/LAMP DESIGNATION	TYPE KEY	COLOR	FUNCTION OR INDICATION
SEL	—	Green	The lamp will light steadily when the station is called in and the response is ACK. The lamp will remain lighted until an EOT is received. When the station response to call-in is NAK, the lamp will light momentarily and the audible alarm will sound. When the station is selected to send, the lamp will light momentarily and the audible alarm will sound. When the station is selected to send, the lamp will light and remain on until the EOT code is transmitted.
BID	L	Green	This lamp is turned on when all of the conditions for sending a message are fulfilled. When the BID key is operated at a station with a traffic-available condition (either before the station is polled or after it has been selected to send), its operation will take effect when the first EOT is sent by the station. It will cause the station to give a no-traffic response to subsequent polling regardless of the station condition with respect to traffic available. Restoring the key will cause the station to revert to giving normal response to polling.
OUT OF SVC	L	White	This key is operated to place the station in an out-of-service status. When the key is operated while the station is unselected, the lamp will light and the station will give a not-ready response to call-in and a no-traffic response to polling. When the key is operated while a station is selected, the lamp will <i>not</i> light and the key operation will not take effect until the station becomes unselected. Operation of this key will not inhibit the station from making a last-message-improperly-received (CAN) response. Operation of the key will cause the TTY motor to turn off unless the station is selected or a bid has been made. When the station has not been selected, operation of the key will extinguish the BID lamp but will be ineffective in turning off the motor until the reader key is released. The lamp will also light when the station is in the loop-back mode and/or the MODE switch is in the OFF-LINE position.
PAPER	NL	Red	In the case of both friction-feed and sprocket-feed machines, the operation of the paper contacts will light the lamp and sound the audible alarm at the time the contacts operate. The station alarm logic can be reset and the lamp can be extinguished only after the paper supply has been replenished. Under similar conditions at a station with the DAS 820G-L1/2, an installer option permits the station to either continue to send (friction feed) until it unselects on

TABLE C (Cont)

KEY/LAMP DESIGNATION	TYPE KEY	COLOR	FUNCTION OR INDICATION
PAPER (Cont)			EOT or to stop transmission when the paper out contacts (sprocket feed) operate. In the latter case, operating the PAPER key and holding it operated will override this stoppage and cause normal transmission to resume.
TAPE	NL	Red	This lamp will light and the audible alarm will sound when the station is in a selected-to-send mode and either a torn or taut tape condition occurs, or when the bat handle is released. The lamp is extinguished by operation of the key.
EMG STOP	NL	Red	The lamp will light and the audible alarm will sound when the station is in the selected sending mode and detects an ENQ EOT sequence or when a loss of incoming carrier occurs. Operation of the key will extinguish the lamp and silence the alarm. (See, also, information regarding lighting of this lamp under PAPER key/lamp.)
MSG ERROR	NL	Red	The message error lamp will be lighted (without the audible alarm) when the station is selected to receive and any of the following conditions occur in the interval between call-in and the receipt of ETX: loss of incoming carrier, detection of ENQ EOT, receipt of ETX if in the blinded state, detection of EOT or DLE in either the blinded or unblinded state. The lamp is lighted when the station page printer receives a parity error indication and the station will respond CAN to the next roll call or call-in. When the lamp lights, it will remain lighted until it is manually extinguished. The associated audible alarm can be enabled by an installer option.
AUD OFF	L	White	This key is used to silence any audible alarm. When the key is left in the depressed condition, it will inhibit any audible alarm and the lamp associated with the key will be lighted as a guard lamp to show that the key is operated.

Note: The key-type designation is defined as follows: NL indicates a nonlocking-type of key, L indicates a locking or "push-push" type of key where the first operation of the key causes it to lock and the key must be depressed a second time to restore it to the previous nonlocked condition.

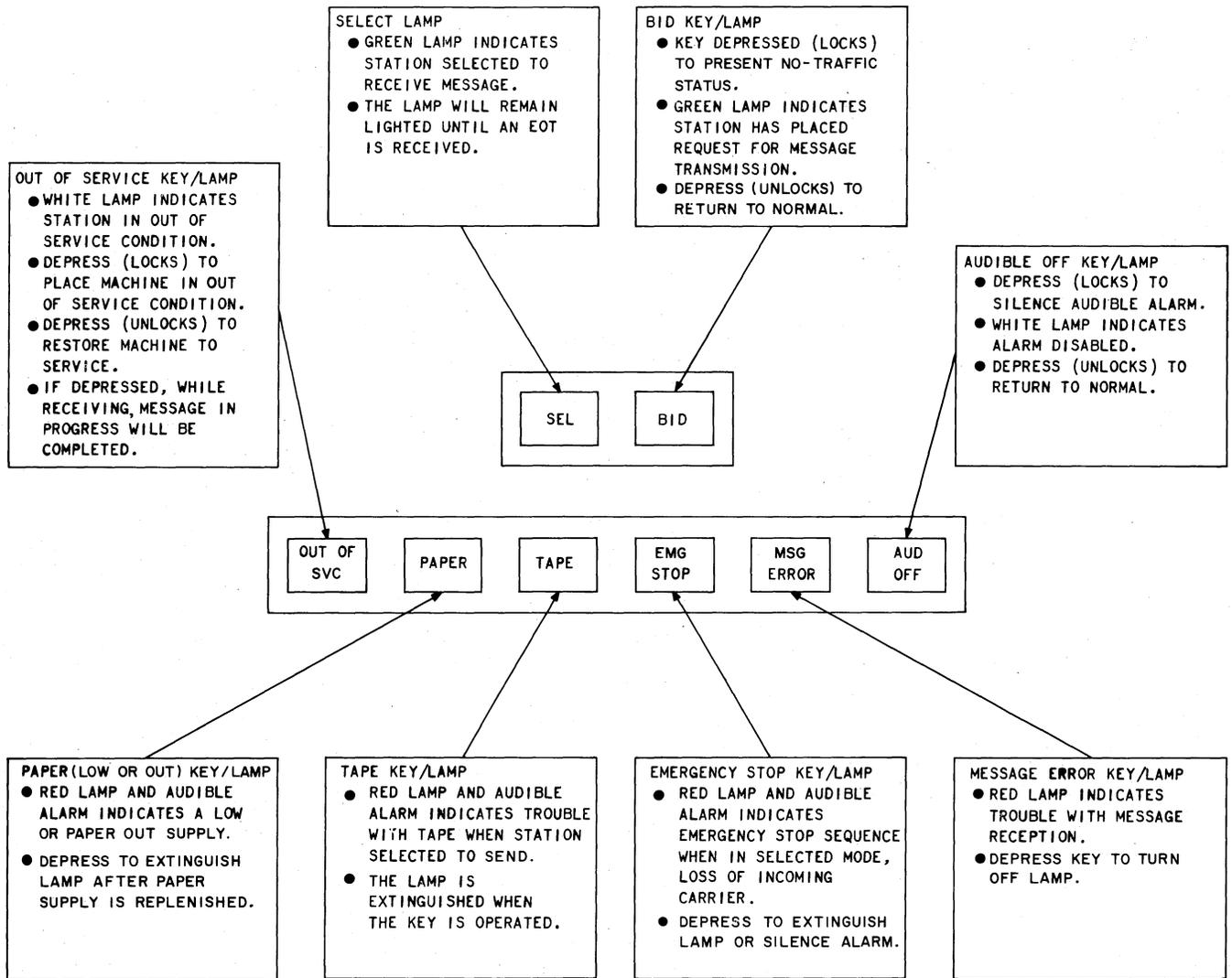


Fig. 17—ORIG/TERM ASR TTY Attendant Set Keys

TABLE D
37 RO AND 37 ROTR TTY ATTENDANT SET KEYS

KEY/LAMP DESIGNATION	TYPE KEY (Note 2)	COLOR	FUNCTION OR INDICATION
—	—	White	Not used
SEL	—	Green	The lamp will light steadily when the station is called in and the response is ACK. The lamp will remain lighted until an EOT is received. When the station response to call-in is NAK, the lamp will light momentarily and the audible alarm will sound momentarily.
MSG ERROR	NL	Red	The message error lamp will be lighted (without the audible alarm) when the station is selected to receive and any of the following conditions occur in the interval between call-in and the receipt of ETX: loss of incoming carrier, detection of ENQ EOT, receipt of ETX in the blinded state, detection of EOT or DLE in either the blinded or unblinded state. The lamp is lighted when the station page printer receives a parity error indication and the station will respond CAN to the next roll call or call-in poll. When the lamp lights, it will remain lighted until it is manually extinguished. The associated audible alarm can be enabled by an installer option.
PAPER (Note 1)	NL	Red	In the case of both friction-feed and sprocket-feed machines, the operation of the paper contacts will light the lamp and sound the audible alarm at the time the contacts operate. The station alarm logic can be reset and the lamp can be extinguished only after the paper supply has been replenished.
TAPE (Note 1)	NL	Red	The operation of the low-tape contacts will light the lamp and cause the audible alarm to sound at the time the contacts operate. The station alarm logic can be reset and the lamp can be extinguished only after the tape supply has been replenished.
AUD OFF	L	White	This key is used to silence any audible alarm. When the key is left in the depressed condition, it will inhibit any audible alarm and the lamp associated with the key will be lighted as a guard lamp to show that the key is operated.
OUT OF SVC	L	White	This key is operated to place the station in an out-of-service status. When the key is operated while the station is unselected, the station will give a not-ready response to call-in and the lamp will be lighted. When the key is operated while a station is selected, the lamp will not light and the key operation will not take effect until the station becomes unselected. Operation of this key will not inhibit the station

TABLE D (Cont)

KEY/LAMP DESIGNATION	TYPE KEY (Note 2)	COLOR	FUNCTION OR INDICATION
			from making a CAN response. Operation of the key will cause the TTY motor to turn off unless the station is selected. The lamps will also light when the station is in the loop-back mode.

Note 1: When an ROTR unit is provided, the PAPER key is replaced by the TAPE key as both keys are not provided on the same attendant set.

Note 2: The key-type designation is defined as follows: NL indicates a nonlocking key, L indicates a locking or "push-push" type key where the first operation of the key causes it to lock and the key must be depressed a second time to restore it to its previous nonlocked condition.

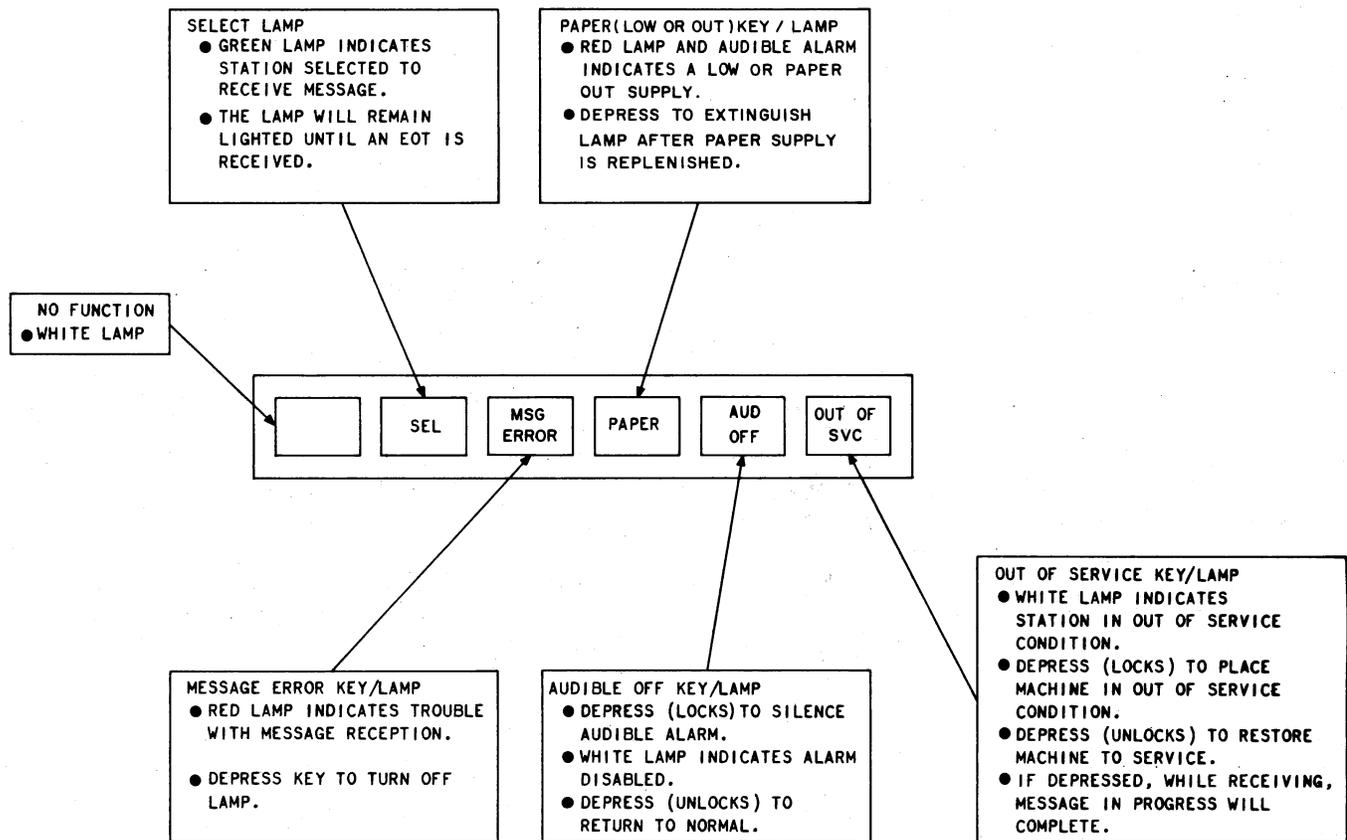


Fig. 18—TERM ONLY RO TTY Attendant Set Keys

TABLE E
 AMERICAN NATIONAL STANDARD CODE
 FOR INFORMATION INTERCHANGE -
 (ASCII)

BITS					0	0	0	0	1	1	1	1		
					0	0	1	1	0	0	1	1		
B ₇	B ₆	B ₅	B ₄	B ₃	COLUMN	0	1	2	3	4	5	6	7	
B ₄	B ₃	B ₂	B ₁	ROW		0	1	2	3	4	5	6	7	
0	0	0	0	0	0	NUL	▲	DLE	SP	0	@	P	'	p
0	0	0	1	1	1	▲	SOH	DC1	!	1	A	Q	▲	a
0	0	1	0	2	2	▲	STX	DC2	"	2	B	R	▲	b
0	0	1	1	3	3	▲	ETX	DC3	#	3	C	S	▲	c
0	1	0	0	4	4	▲	EOT	DC4	\$	4	D	T	▲	d
0	1	0	1	5	5	▲	ENQ	NAK	%	5	E	U	▲	e
0	1	1	0	6	6	▲	ACK	SYN	&	6	F	V	▲	f
0	1	1	1	7	7	▲	BEL	ETB	'	7	G	W	▲	g
1	0	0	0	8	8	▲	BS	CAN	(	8	H	X	▲	h
1	0	0	1	9	9	▲	HT	EM	)	9	I	Y	▲	i
1	0	1	0	10	10	▲	LF	SUB	*	:	J	Z	▲	j
1	0	1	1	11	11	▲	VT	ESC	+	;	K	[	▲	k
1	1	0	0	12	12	▲	FF	FS	,	<	L	\	▲	l
1	1	0	1	13	13	▲	CR	GS	-	=	M	]	▲	m
1	1	1	0	14	14	▲	SO	RS	.	>	N	^	▲	n
1	1	1	1	15	15	▲	SI	US	/	?	O	_	▲	o
														DEL

▲ DENOTES A 1 IN THE EIGHTH BIT (PARITY BIT)

TABLE F
LEGEND OF ACSII DESIGNATIONS

DESIGNATION	DEFINITION	DESIGNATION	DEFINITION
NUL	Null	DLE	Data Link Escape
SOH	Start of Heading	DC1	Device Control 1
STX	Start of Text	DC2	Device Control 2
ETX	End of Text	DC3	Device Control 3
EOT	End of Transmission	DC4	Device Control 4
ENQ	Enquiry	NAK	Negative Acknowledge
ACK	Acknowledge	SYN	Synchronous Idle
BEL	Bell or other signal	ETB	End of Transmission Block
BS	Backspace	CAN	Cancel
HT	Horizontal Tabulation	EM	End of Medium
LF	Line Feed	SUB	Substitute
VT	Vertical Tabulation	ESC	Escape
FF	Form Feed	FS	File Separator
CR	Carriage Return	GS	Group Separator
SO	Shift Out	RS	Record Separator
SI	Shift In	US	Unit Separator
DEL	Delete	SP	Space

B. Message Format

3.03 A typical message format for the 85A2 system is given as follows:

Leader	Trailer
D D S	E E D D
E . . . E O	T O E . . . E
L L H	X T L L
(HEADING SEE NOTE)	(TEXT OR MESSAGE)
S T X	

Note: The heading of a message is composed of one or more station code characters (SCCs), without any other interspersed characters. Deletes in a heading are acceptable, but are not a format requirement. An SCC is one alphanumeric character used as a station address.

C. Station Initialization

3.04 When power is turned on at a station, the station controller will automatically become activated and assume the idle state. In this condition, the station controller is sensitive to line signals and becomes selected to send or receive when the proper signals are detected. Noise on the line can sometimes be mistaken for valid

signals; therefore when the line has been left idle, the line should be initialized by the switcher sending the sequence (ENQ...DC2...ETX...EOT DEL) to make sure all stations are in the idle state. If the switcher detects transmission on the line at this time, it sends an emergency stop sequence (BREAK...pause...ENQ...EOT...EOT) to insure that the line is initialized. This ensures that all stations are in the idle state.

D. Polling Operations Description

3.05 After the line has been initialized, the response of the station to polling depends on the traffic-to-send status of the polled station. This status is indicated in Table G.

TABLE G
CONTROLLER RESPONSES

SWITCHER FUNCTION	TYPE OF CONTROLLER	SEND AND RECEIVE STATUS OF STATION			
		SELECTED SEND OPTION		NOTHING TO SEND	
		AUTOMATIC START OF READER	READY TO SEND	NOT READY TO RECEIVE	READY TO RECEIVE
Polling D S L C E C	DAS 820G-L1/--	TRAFFIC	ACK or SIC	NAK	CAN
	DAS 820J-L1/--	—	—	NAK	CAN
Test Poll D E D S L O L C E T E C	DAS 820G-L1/--	—	ACK or SIC	NAK	CAN
	DAS 820J-L1/--	—	—	NAK	CAN

The polling consists of the control character DLE followed by the SCC for the station which is being polled. See Fig. 19 for Station Polling Response Sequence Chart.

3.06 With the system in the idle condition, the computer switcher can:

- Proceed with the polling operation to pick up traffic.
- Proceed with the call-in operation to deliver traffic.

E. Call-In

3.07 The call-in operation may be initiated by the computer switcher as a result of a heading received in an intraline operation, or it may be initiated from the idle state because the computer switcher is going to originate a stored outgoing message (interline operation). In either case, all stations on the line detect the enquiry character (ENQ) sent by the switcher. This character defines the beginning of a call-in operation, blinds a previously selected sending station, blinds all selected receiving stations, and activates the logic in each unselected station to look for its station code

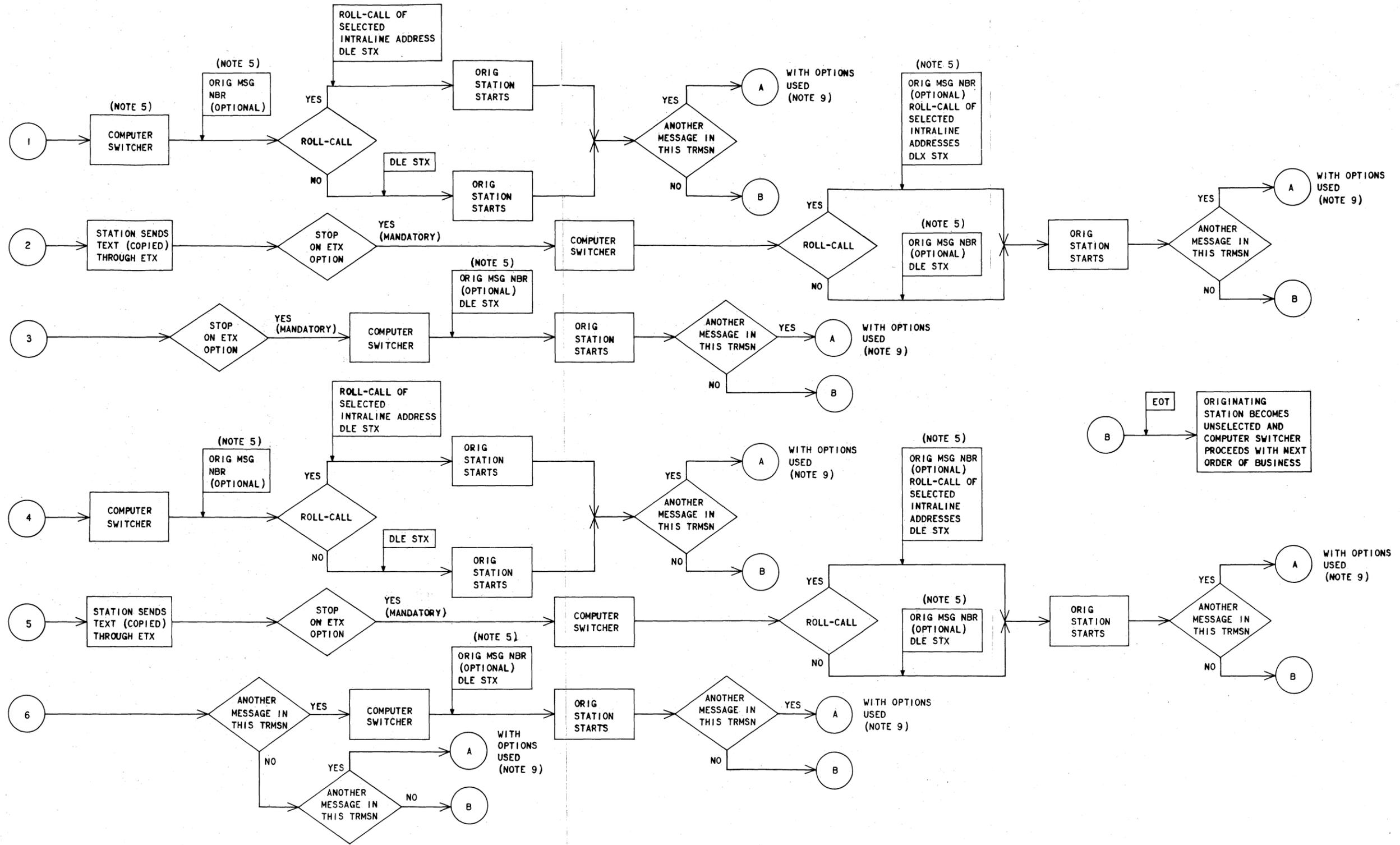


Fig. 19—Station Polling Response Sequence Chart (Sheet 2 of 2)

character (SCC). The stations have to detect their ENQ SCC sequence in order to become selected. The selected station responds to a call-in with one of the following responses.

- A ready-to-receive response (ACK) or, optionally, (SIC),
- A not-ready-to-receive response (NAK),
- A last-message-improperly-received response (CAN).

Note: The CAN response is sent the first time the station is called in. The station responds ACK (or SIC) or NAK after the **first** and **only** CAN response. Since a station responds with a CAN response only once, a roll call function will eliminate the first CAN response.

3.08 If the computer switcher receives no response to a call-in attempt, it will make a second attempt to call in the station (switcher programming option). If repeated attempts to call in a station fail, the computer switcher may perform a delivery abort to inform any previously selected receivers of the reason for the immediate disconnect without a message delivery. See Fig. 20 for Call-In Sequence Chart.

F. Roll Call

3.09 Roll call is an interrogative operation of the already selected receivers at the conclusion of the message delivery to determine if the receivers received the message properly. It consists of interrogating each of the stations individually and getting a response that indicates whether or not they received the message properly. After transmission of the message up to and including ETX, the computer switcher may or may not, dependent on its programming, perform the roll call operation. See Fig. 21 for Roll Call Sequence Chart.

3.10 If the computer switcher is not programmed to perform roll call, the ETX will be immediately followed by an EOT. When TERM ONLY ROTR stations are involved in message delivery, the EOT will be followed by a DEL to push out the EOT.

3.11 If the computer switcher is programmed to perform roll call, it will initiate the operation by following the ETX of the message with ENQ SCC. As in the call-in procedure, the ENQ will blind all of the selected receivers and the SCC will invoke an ACK or SIC from the called-in station. The computer will stop after each ENQ SCC for a station response. If there is no response from the station, the computer will proceed in accordance with programmed instructions.

3.12 The station controller will be conditioned to respond to roll call with ACK or SIC if the message was received properly or the last-message-improperly-received response (CAN) if any of the following conditions have occurred during message delivery:

- (1) A paper-out condition was detected,
- (2) The terminal device failed to respond to the received signals during delivery,
- (3) The mode switch on the terminal device was operated to the OFF-LINE position during delivery,
- (4) A loss of incoming carrier was detected during delivery,
- (5) A loss of commercial power occurred in the TTY during delivery. The station controller does not detect the loss of commercial power to the TTY; rather it detects the lost character function which is covered by item 2,
- (6) A selected receiver detected ETX while blinded,
- (7) A selected receiver detected EOT or DLE before detecting ETX,
- (8) A selected receiver detected the sequence ENQ EOT (part of emergency stop action),
- (9) A selected receiver detected a parity error in the message delivery (optional).

As illustrated by (6) and (7), the station performs a certain amount of message format checking. These are included primarily to insure that messages are indeed delivered as intended to the appropriate stations. Without certain format checks it would

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be possible for messages to be lost, even though transmitted in the prescribed fashion.

Note: Since a station responds with a CAN response only once for one specific cause, a roll call function will eliminate that first CAN response.

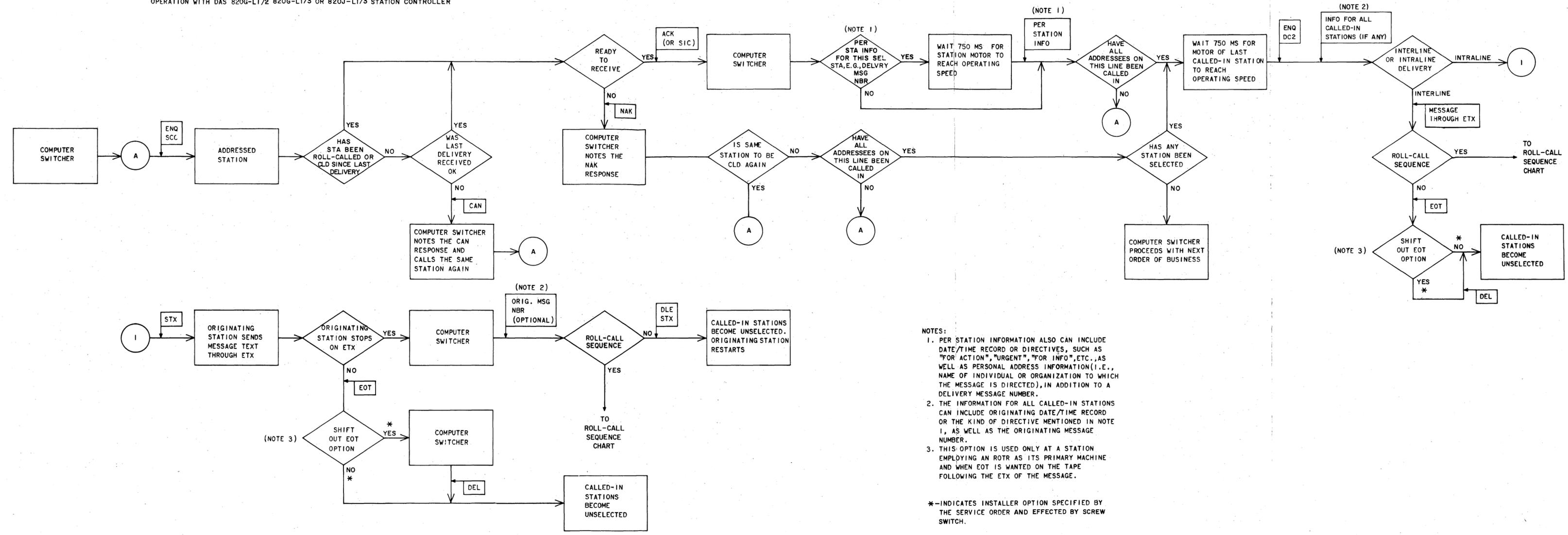
3.13 When the station responds with CAN to roll call, the MSG ERROR lamp on the receive terminal attendant set will light and the audible alarm will sound. The computer switcher should mark the receipt of this response and deal with the redelivery of this message in the manner prescribed by the particular system application. The computer switcher may now proceed to roll call the next station in line in the manner just described. The MSG ERROR lamp can be extinguished and the alarm silenced by operation of the MSG ERROR key on the attendant set. If the station answers ACK or SIC to roll call, the computer switcher will proceed to roll call the next station in line by sending ENQ followed by the SCC of that station.

Note: The CAN response used in roll-call and call-in functions differs in meaning from the CAN response used in the polling sequence (see 3.05 and 3.12).

3.14 The roll-call function can be employed at any time during message delivery. Therefore, it is possible to use this function to provide a very elementary type of error control on deliveries from the computer switcher. This is possible mainly because of an option in the station that allows parity error detection to be one of the factors that can cause a message-improperly-received response. Consequently, the computer switcher can deliver a block of information (eg, one line) and then roll call to see if each station received the block without parity errors. If there were parity errors detected, then the block could be retransmitted to each station requiring it as separate information for just that station. However, because the retransmission of blocks can only be to one or to all selected receivers, this type of error control with retransmission may find limited application in systems with a significant amount of multiple address traffic with more than two addresses.

3.15 Multiple message transmission capability allows the station attendant to decide how many messages the station should send when it is polled. Hence, it would be possible to effectively provide a day-to-day, or even hour-to-hour, varying traffic pickup pattern to optimize the overall traffic pickup operation of the system. Multiple message transmission capability also provides a more efficient

OPERATION WITH DAS 820G-L1/2 820G-L1/3 OR 820J-L1/3 STATION CONTROLLER



NOTES:

1. PER STATION INFORMATION ALSO CAN INCLUDE DATE/TIME RECORD OR DIRECTIVES, SUCH AS "FOR ACTION", "URGENT", "FOR INFO", ETC., AS WELL AS PERSONAL ADDRESS INFORMATION (I.E., NAME OF INDIVIDUAL OR ORGANIZATION TO WHICH THE MESSAGE IS DIRECTED), IN ADDITION TO A DELIVERY MESSAGE NUMBER.
2. THE INFORMATION FOR ALL CALLED-IN STATIONS CAN INCLUDE ORIGINATING DATE/TIME RECORD OR THE KIND OF DIRECTIVE MENTIONED IN NOTE 1, AS WELL AS THE ORIGINATING MESSAGE NUMBER.
3. THIS OPTION IS USED ONLY AT A STATION EMPLOYING AN ROTR AS ITS PRIMARY MACHINE AND WHEN EOT IS WANTED ON THE TAPE FOLLOWING THE ETX OF THE MESSAGE.

*-INDICATES INSTALLER OPTION SPECIFIED BY THE SERVICE ORDER AND EFFECTED BY SCREW SWITCH.

Fig. 20—Call-In Sequence Chart

- NOTES:
1. BY INSTALLATION OPTION (PARITY ERROR RESPONSE OPTION) THE STATION CAN BE CAUSED TO TREAT AS UNSATISFACTORY A DELIVERY IN WHICH A PARITY ERROR OCCURRED.
 2. SERVICE MESSAGE MIGHT EXPLAIN, FOR EXAMPLE, THAT DELIVERY WOULD BE REPEATED LATER, BY THE COMPUTER SWITCHER.
 3. THIS OPTION IS USED ONLY AT A STATION EMPLOYING AN ROTR AS ITS PRIMARY MACHINE AND WHEN EOT IS WANTED ON THE TAPE FOLLOWING THE ETX OF THE MESSAGE.

* - INDICATES INSTALLER OPTION SPECIFIED BY THE SERVICE ORDER AND EFFECTED BY SCREW SWITCH.

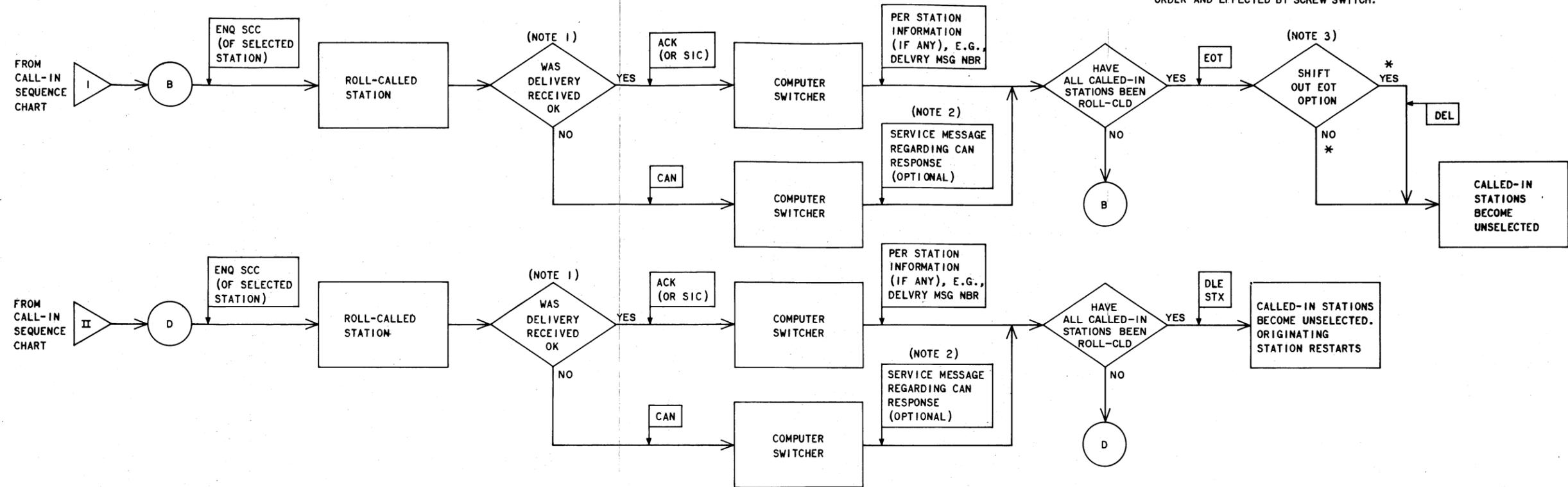


Fig. 21—Roll Call Sequence Chart

means for picking up multiple messages from a given station than having to expend the line time required to repoll the station after each message pickup to determine the traffic-to-send status.

G. Station Functional Description

3.16 During the transmit sequence, the ASR TTY of a sending station converts the characters from the tape to voltage signals and presents them to the controller. In the controller, the EIA voltage signals are monitored (so that control actions can be taken when required), regenerated, and sent to the data set. Data set 108-type converts the signals into FSK tones which are suitable for transmission over the line and, without noise conditions, has no loop limit. Data set 109-type converts the signals into dc current levels which are suitable for transmission over the line and has a 2000-ohm loop limit and maximum capacity of 1 μ F.

3.17 The receive sequence for a station is essentially the reverse of the transmit sequence. The data set converts the FSK tones or dc current levels received from the line into EIA voltages and presents them to the controller. The controller performs the same as it did for the transmit sequence and delivers voltage signals to the primary and, if provided, auxiliary TTY. The controller has a one-character delay between reception of a character and the character selection by the terminal device. This is caused by a one-character delay in the controller.

H. TTY Functional Description

3.18 The terminal device performs the function of transmitting or receiving the message after being connected to the line by the station controller. Because the terminal device is a Bell System TTY, certain mechanical functions of the machine require that time be allowed for the machine to complete the mechanical operation. Typical functions that require a time interval are carriage return-line feed, tabulation, and form feed.

3.19 Perhaps the most often used mechanical operation that requires a time interval is the carriage return-line feed function. When this function is performed at an operating speed of 150 wpm, two fill characters, or their equivalent, are required following the carriage return (CR) character to allow sufficient time for the maximum physical

return of the typing mechanism. The line feed (LF) character provides one of these timing character intervals. The other may be a timed interval of continuous marking, or a DELETE character. It is suggested that the computer switcher adopt the policy of sending the sequence CR LF DEL when executing this function to allow sufficient time for the carriage return function to be completed independently of the type of TTY terminal or transmission speed employed. In systems that employ TTY terminals equipped with the "new line" feature, where both the CR function and the line feed function are executed upon receipt of a single control character (LF), two DELETE characters, or an equivalent interval of continuous marking signal, are required at an operating speed of 150 wpm to allow sufficient time for the maximum physical return and proper positioning of the typing mechanism. Therefore, when the "new line" feature is employed, it is suggested that the computer switcher adopt the practice of always sending the sequence LF DEL DEL when executing this function, independently of the type of TTY terminal or transmission speed employed. The operating speed for the tabulation and form feed functions of the TTYs employed in the 85A2 system is given in Table H. This information is expressed in terms of the number of spaces or lines moved per character interval during the execution of the function.

TABLE H
TERMINAL DEVICE OPERATING SPEEDS

TERMINAL DEVICE	TABULATION		
	HORIZONTAL	VERTICAL	FORM FEED
37	3:1	3:1	3:1

37 ASR TTY

3.20 All messages that originate from the 37 ASR stations are transmitted from the tape reader; no provisions are made for direct keyboard transmission. Three switch-selected modes of operation are possible; they are:

- (1) The OFF-LINE mode, in which the page printer and tape punch operate from either

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the keyboard or reader. In this mode, the following functions may be performed:

- (a) Messages can be prepared (on tape) for transmission with local copy provided by the page printer,
- (b) Prepared tapes can be proofread by running the tape through the reader with the tape punch key OFF and obtaining page copy,
- (c) Tape editing can be accomplished while making a byproduct tape by running a master tape through the reader with the tape punch key ON; at the same time, page copy is obtained.
- (d) The OUT OF SVC lamp lights and the station is conditioned to respond to polling and call-in.

While in this mode, messages cannot be transmitted, and the motor runs continuously unless the OUT OF SVC key on the attendant set is operated. The tape punch is controlled by the PUNCH OFF-ON switch.

- (2) The ON-LINE mode in which messages can be prepared on tape in the blind while transmitting messages from the reader. A record copy of the message being transmitted or received by the reader is reproduced by the page printer. The TTY motor runs continuously unless the OUT OF SVC key is operated.
- (3) The UNATTENDED (UNATT) mode permits the TTY motor to be stopped when the station is idle. At installations not equipped with an auxiliary RO TTY, the tape punch can be called in by line signals and used as an auxiliary receiver. If there is traffic to send and a bid condition is present, the reader remains on until all traffic has been sent. The motors then turn off and are turned on again when the station is called in to receive a message or when a bid condition is again established. This arrangement permits use of the machine for receiving messages.

3.21 A bid condition exists, and the BID lamp lights only when all of the following conditions exist:

- Tape is loaded in the reader (reader gate closed),

- The READER ON key is operated,
- The MODE switch is in the ON-LINE or UNATT position,
- A taut tape condition does *not* exist,
- EMG STOP lamp is not lighted,
- PAPER lamp is not lighted, and
- The BID key has been released after it was used to withhold a bid on the previous message.

I. Controller Functional Description

3.22 The basic functions of the DAS 820G-L1 type or 820J-type controller operating in an 85A2 DSCS station are:

- (1) To recognize ASCII characters (especially when combined into control sequences) from the line and data terminal,
- (2) To generate responses to the line in the form of ASCII characters in accordance with the status of the station,
- (3) To interconnect with the line through a data set,
- (4) To interconnect with a data terminal through an interface circuit (part of the controller), especially designed for the type of terminal in use, and
- (5) To perform logic functions associated with the automatic operation, including motor control, of the station.

Table I shows the characters that the station controller is capable of detecting and/or generating.

3.23 With the DAS 820G-L1/2 controller, ASR station operating procedure with friction-feed TTY results in the following when paper is low :

- (1) Audible alarm sounds,
- (2) Paper lamp lights,
- (3) Tape reader continues to operate and maintain transmission, and

TABLE I
STATION CONTROLLER

CHARACTERS DETECTED: (<i>Note 1</i>)
DLE
ENQ
EOT
STX
DC2
SOH
ETX
CHARACTERS GENERATED:
ACK (or SIC: <i>Note 2</i>)
NAK
CAN
UNDERLINE

Note 1: A station controller is arranged to detect the station code character (SCC) used for identification of the station.

Note 2: A station can be optionally arranged to generate a station identity code (SIC).

- (4) At end of transmission, station becomes unselected and the bid function and receiver selection are inhibited until paper is replenished.

When a DAS 820G-L1/2 is used with a sprocket-feed ASR TTY, the operating procedure is as follows:

- (1) Audible alarm sounds.
- (2) Paper lamp lights.
- (3) Tape reader stops but station remains selected under control of the computer switcher.
- (4) Depression of PAPER key before the switcher times out will cause station to override transmission halt and continue transmitting while

key is being depressed. The "low-paper" operating procedure makes it possible to finish a short transmission on the remaining paper. Station selection is inhibited until the alarm condition is cleared.

When a DAS 820G-L1/2 or 820J-L1/3 is used with an RO friction-feed TTY as the receiver and a low-paper condition occurs during message reception, the following results:

- (1) Audible alarm sounds.
- (2) Paper lamp lights.
- (3) Station continues to receive until disconnected and remains unavailable to selection as a receiver until the alarm condition is cleared.

When a DAS 820G-L1/2 or 820J-L1/3 is used with an RO sprocket-feed TTY as the receiver and a paper-out condition occurs during message reception, the following results:

- (1) Audible alarm sounds.
- (2) Paper lamp lights.
- (3) Station becomes unselected and remains unavailable to selection as a receiver until the alarm condition is cleared.

Parity Error

3.24 The eighth bit of the ASCII code is used to provide even parity. That is, the eighth bit of each ASCII code character is chosen (mark or space) so that the character contains an even number of marking bits. The controller monitors the number of spacing information bits of each received character. If the count is odd, indicating a parity error, the MSG ERROR lamp is lighted and the audible alarm is sounded. The character with the incorrect parity is changed to an underline (_) by the controller and sent to the TTY terminal with incorrect parity. Transmitting characters with incorrect parity is significant only when the terminal is an ROTR which is tape receiving. The ROTR punches an underline (_) with incorrect parity. Therefore, if the ROTR tape is used for retransmission, the incorrect parity is identified at the receiving

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terminal. The MSG ERROR lamp can be extinguished only by operation of the MSG ERROR key. The alarm is also silenced by the operation of the MSG ERROR key if it has not already been silenced by operation of the AUD OFF key.

Out-of-Synchronism Error

3.25 The 85A2 station employs asynchronous (start-stop) operation. Each character consists of a start bit, the seven information bits of the ASCII code, the parity bit, and one-bit (two-unit) stop interval.

3.26 The controller receive clock, used for sampling and timing the information and parity bits, is started on the mark-to-space transition of the start interval. It is arranged to run for a fixed number of cycles and to stop during the stop interval of the incoming character. If the local clock is falsely started, or if the character is mutilated, there may be no marking interval on which to stop at the end of the normal sampling cycle. In this case, the clock will stop at the end of the normal sampling cycle (a fixed timing interval) and wait for the next mark-to-space transition before recycling. The receiver usually regains synchronism quickly unless some repeated combination is transmitted that causes the selector to synchronize on a mark-to-space transition other than the normal start.

3.27 In order to reduce the number of incorrect characters that are printed when the receiver is recovering synchronism, the controller samples the received character at the end of the timing interval. The controller is looking for the marking stop interval. If this sample is found to be a space, the character is incorrect and is replaced with an underline () character, the MSG ERROR lamp is lighted, and the audible alarm is sounded. The error alarm can be silenced and the MSG ERROR lamp extinguished as described in 3.24. This condition may give a CAN response like a parity error.

J. Attendant Set Functional Description

3.28 The basic functions of the attendant sets are to provide:

- (1) Keys to control the functions of the stations,

- (2) Lamps to indicate the status of the station, and

- (3) An audible alarm when a failure occurs.

K. Data Set Functional Description

3.29 The basic functions of the data sets are:

- (1) To provide means for transmitting to the line data received from the controller,

- (2) To provide means for delivering data received from the line to an associated controller, and

- (3) To provide a carrier fail indication to the associated station controller.

4. OPERATION

A. Attendant Set Operation in the ORIG/TERM ASR TTY

4.01 The DAS 804R5 used with the 37 ASR TTY has two rows of keys that are designated by their functions (see Table C). Each of the keys has a lamp associated with it. The first row contains the SEL (selected) lamp and BID key. The second row contains the OUT OF SVC (out of service), PAPER (low paper or paper out), TAPE (torn or taut tape), EMG STOP (emergency stop), MSG ERROR (message error), and AUD OFF (audible alarm off) keys.

B. Attendant Set Operation in the TERM ONLY RO TTY and ROTR

4.02 The DAS 804R7 used with the 37 RO and ROTR TTYs has one row of keys that are designated by their functions (see Table D). The row contains the SEL (selected), MSG ERROR (message error), TAPE (low tape or out of tape for ROTR, but key is designated PAPER with RO and indicates low paper or out of paper), AUD OFF (audible alarm off), and OUT OF SVC (out of service) keys.

C. Auxiliary Receiver Operation

4.03 When an auxiliary RO TTY or ROTR is associated with an 85A2 station, both "manual" and "stunt box" control of the auxiliary unit are provided. The tape punch of a 37 ASR

TTY ORIG/TERM station not equipped with an auxiliary 37 RO TTY or 37 ROTR can be used as an auxiliary ROTR while the station is in the UNATTENDED mode. This is accomplished manually by operation of the PUNCH ON key on the ASR TTY. The auxiliary unit may be unblinded and blinded manually as indicated in 4.04 and 4.05. The following control characters, when detected in the text of message by the stunt box of the primary TTY, provide for the automatic connect and disconnect of the TTYs.

- The control character DC2 is used as a connect order.
- The control character DC4 is used as a disconnect order.
- The control character ETX is also used as a disconnect order.

4.04 Manual unblinding of an auxiliary receiver associated with a 37 ASR TTY is accomplished by operation of the auxiliary receiver key located on the primary ASR TTY. This unblinds the auxiliary receiver selector magnet driver (SMD) which is in parallel with the SMD of the primary receiver, thereby allowing the auxiliary receiver to copy the same information that is received by the

primary TTY. A lamp located in the auxiliary receiver ON key on the primary TTY is lighted whenever the auxiliary receiver is unblinded. Restoration of the OFF key blinds the auxiliary receiver and extinguishes the lamp. An auxiliary receiver can be manually blinded anytime there is no transmission in progress. If a manual disconnect is attempted during a message delivery, the auxiliary receiver will disconnect unless a DC2 connect signal has been received without receiving a DC4 or ETX.



The auxiliary receiver can be blinded only when both the manual and automatic controls are put in the blind state.

4.05 When the auxiliary receiver is a 37 ROTR, automatic tape feedout (TFO) will occur whenever the auxiliary ROTR is blinded manually, or, if the wiring option is provided in the primary TTY, automatically (Table J). In either case, between 2 and 10 inches of tape will be fed out punched with DEL characters, and the length of feedout is electrically adjustable. In addition, it should be noted that the TFO feature is noninterfering. That is, if any mark-to-space transition is received while a TFO is occurring, the TFO will be stopped and the received character will be punched and printed on the tape.

TABLE J
AUTOMATIC TFO OPTIONS FOR AUXILIARY 37 ROTR

AUXILIARY ROTR CONNECT	AUTOMATIC TFO OPTIONS AVAILABLE
Manual Only	No automatic TFO
	Automatic TFO on manual disconnect only
Manual or Automatic (DC2)	No Automatic TFO
	Automatic TFO on ETX disconnect only
	Automatic TFO on DC4 disconnect only
	Automatic TFO on ETX or DC4 disconnect
	Automatic TFO on manual disconnect only
	Automatic TFO on manual or ETX disconnect
	Automatic TFO on manual or DC4 disconnect
Automatic TFO on manual, ETX, or DC4 disconnect.	

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4.06 When an ROTR is used as a primary receiver, there are no provisions for connecting an auxiliary receiver. Automatic TFO (option) will occur when the station is either roll called, unselected, or, optionally, only when the station is unselected. To manually cause tape feedout to occur, operate and release the TAPE FEED key which is located on the ROTR attendant set.

4.07 A print suppression option can also be provided which will cause the typing unit of the primary TTY to be inhibited from printing and performing other paper-affecting functions while the auxiliary receiver is unblinded. Blinding the auxiliary receiver will restore printing on the primary TTY.

D. Carrier Squelch

4.08 The T switch located on the DAS 820G-L1 type controllers provides the option of squelching data set 108-type transmitted carrier. Whenever a data set 108-type detects the loss of received carrier and the T switch is operated to the CARRIER SQUELCH position, the transmit carrier is squelched and the hub receives an indication that service is temporarily discontinued. On DAS 820J-L1/3 controllers, the carrier squelch feature is provided by switch S1 on the AR681 CP. For information on the use of the DAS 820J-L1/3 T switch (data bypass), refer to 4.12.

Note: When the carrier squelch option is used, data set 108B at the STC must be placed in the mark-hold condition.

E. Loop-Back Operation

Controller Loop-Back

4.09 Loop-back is a test mode of the 85A2 system. In this mode, the station responds to the control sequences (polling, call-in, etc) in the normal fashion but sends back to the line all message text characters received. This function is provided to facilitate testing of a station and is not intended for customer use. The sequence used to place a station in the loop-back mode for testing is given as follows: ENQ...EOT...ENQ..SCC. (The station designated by the SCC is now in the loop-back mode.)

Caution: *Remote controller loop-back testing can be performed with DAS 820G-type*

and DAS 820J-type controllers that are equipped with data set 108-type or data Set 109E. Data set 109A does NOT provide loop-back testing capabilities. When the loop-back test mode is used, the station must be disconnected from the system and connected to a test hub at the STC.

4.10 The control character sequence EOT EOT is used to terminate the loop-back mode.

Data Set Loop-Back

4.11 Data sets 108-type and 109E can be looped back manually by operation of the R switch (located on the DAS 820G-type and 820J-type controllers) to MTCE position. This test will check operation of the data set.

Data Bypass Test Feature

4.12 The DAS 820J-type controller provides for driving the TTY selector magnet driver from the data set signals by using the T switch (data bypass switch). Operation of the T switch causes the controller state logic to be bypassed and supplies the data set signals directly to the TTY via the controller interface logic. When the T switch is operated, the TTY MAINT ON-OFF-NORM switch must be operated to the MAINT ON position to start the TTY motor. Use of the T switch will permit normal TTY ranging procedures by virtue of bypassing the controller signal regeneration. When the T switch is operated, the OUT OF SVC lamp on the attendant set is lighted.

F. Test Poll Operation

4.13 Test poll is an 85A2 system operating mode that can be used by the computer switcher to determine the traffic-to-send status or ready-to-receive status of the stations on a particular line without becoming selected to transmit or selected to receive. The stations are put into the test poll mode by the switcher sending the three-character sequence ENQ EOT DLE followed by the SCCs of the stations being test polled. Their responses to test polling indicate their status. The response to test polling indicates, in a single response, both the traffic-to-send status and the ready-to-receive status of a station, as indicated in Table G. The test poll mode is terminated when the switcher sends an EOT (to return the line to

an idle condition) or DLE (to put the line in a normal polling mode).

G. Emergency Stop and Alarm Conditions (See Fig. 22)

4.14 An emergency stop function is provided that will stop the transmission from a station.

BREAK-PAUSE-ENQ-DC2 TEXT OF SERVICE MESSAGE ENQ-EOT-EOT

4.15 The initiation of an emergency stop action during the transmission causes the following actions and conditions to occur:

- The tape reader will be stopped by the break.
- The page printer will be conditioned to receive from the line when ENQ DC2 is received.
- The EMG STOP lamp will light and the audible alarm will sound when ENQ EOT is received.
- The station will become unselected when the second EOT is received.
- The "bid" condition is canceled and the station therefore will not again be selected as a sender until the alarm is restored. However, the station can be selected as a receiver while the alarm condition remains.

A service message can be sent by the switcher that will be copied by the page printer. Operation of the EMG STOP key at the station will extinguish the EMG STOP lamp and restore the station to normal. It will also silence the alarm if the alarm has not already been silenced by operation of the AUD OFF key.

4.16 Refer to Tables C and D for information concerning the alarm conditions indicated by the attendant set lamps. After clearing the condition causing an alarm, the associated key is operated

This will be used whenever the transmission is not acceptable to the switcher. The station is not capable of initiating this emergency stop function toward the switcher. The emergency stop format, including text of an explanatory service message, is as follows:

to extinguish the lamp. Operation of the key also will silence the alarm if it has not already been silenced by operation of the AUD OFF key.

4.17 If an emergency condition occurs at a station that requires the TTY motor to be stopped, it can be stopped by operating the OUT OF SVC key on the attendant set and positioning the TTY MODE switch to the OFF-LINE position. The entire station can be tested as outlined in the practice entitled 85A2 Data Selective Calling Service Stations—150-Word Per Minute Half-Duplex Operation—Test Procedures.

5. REFERENCES

5.01 The following schematic drawing (SDs), circuit descriptions (CDs), and Bell System Practices (BSPs) pertain to the 85A2 DSCS stations:

SD- & CD-3D041-01 Data Systems Station

SD- & CD-1D244-01 Data Auxiliary Set 820J-Type

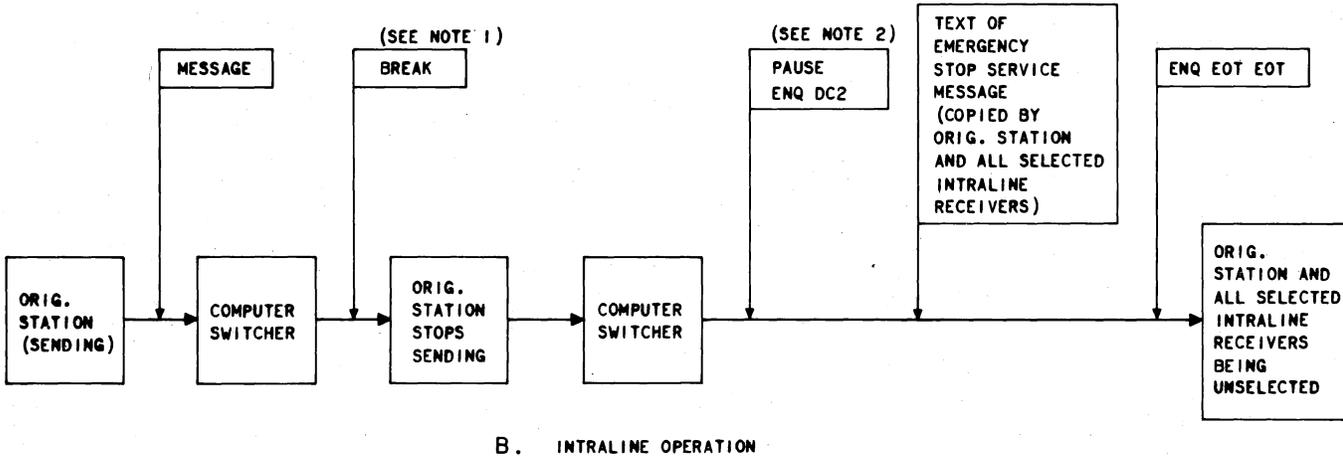
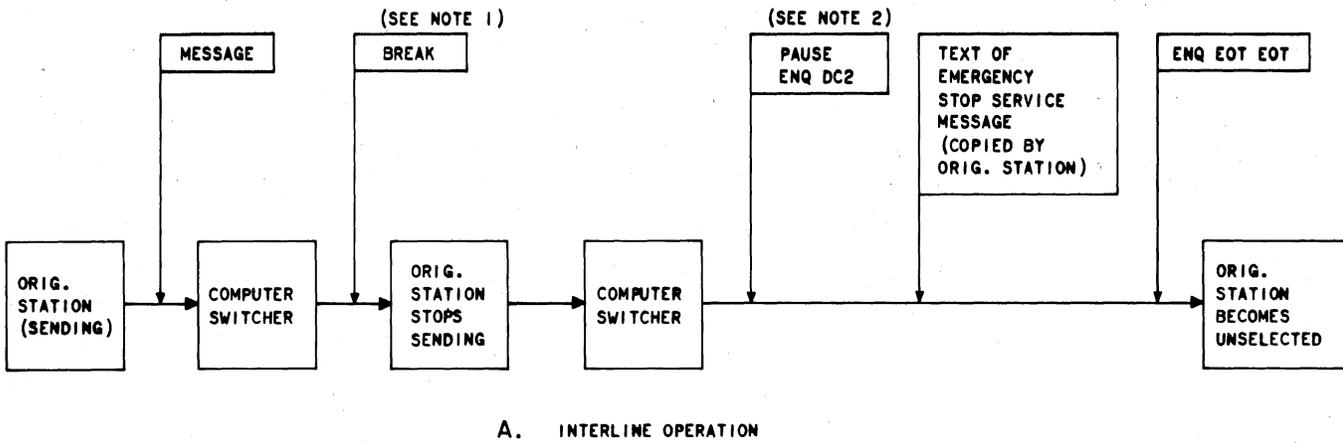
SD- & CD-3D024-01 Data Set 108A

SD- & CD-1D229-01 Data Set 108E

SD- & CD-1D198-01 Data Set 109E

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85A2 Data Selective Calling Service Stations—150-Word Per Minute Half-Duplex Operation—Installation



- NOTES:
1. THE BREAK SIGNAL CONSISTS OF 400 MS. (MIN.) TO 750 MS. (MAX.) OF CONTINUOUS SPACING.
 2. THE PAUSE INSURES THAT STATIONS WILL REGAIN SYNCHRONISM SO THAT THEY CAN RESPOND PROPERLY TO SUBSEQUENT LINE SIGNALS. IT MUST BE AT LEAST ONE DELETE CHARACTER, OR AT LEAST ONE CHARACTER INTERVAL OF CONTINUOUS MARKING.

Fig. 22—Emergency Stop Sequence Chart—Interline and Intraline Operation

581-131-301 85A2 Data Selective Calling Service Stations—150-Word Per Minute Half-Duplex Operation—Maintenance

Half-Duplex Operation—Test Procedures.

581-131-501 85A2 Data Selective Calling Service Stations—150-Word Per Minute