85A1 AND 85A2 DATA SELECTIVE CALLING SERVICE STATIONS USING DATA AUXILIARY SETS 820J AND 820L CONTROLLERS DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL 2
A. Purpose of Station 2
B. Purpose of System 2
C. System Arrangement 2
D. Station Arrangement 2
E. Uses of Station Components . . . 3
F. Station Operation 9
G. Station Power 10
2. PHYSICAL DESCRIPTION 11
A. General 11
B. Teletypewriters 12
C. Controllers 13
D. Data Sets 15
E. Attendant Sets 16
3. FUNCTIONAL DESCRIPTION 16
A. General 16
B. Message Format 24
C. Station Initialization 25
D. Polling Operations Description . . 25
E. Call-in 25
F. Roll Call 31
G. Station Functional Description . . . 32
H. TTY Functional Description 32
I. Controller Functional Description . . 39
J. Attendant Set Functional Description 41
K. Data Set Functional Description . . 41
L. ▶EIA Interface Coupler (AR 751 CP)◀ 41
4. OPERATION 41
A. Attendant Set Operation in the ORIG/TERM ASR TTY 41
B. Attendant Set Operation in the TERM ONLY RO TTY and ROTR 41
C. Auxiliary Receiver Operation . . . 42
D. Carrier Squelch 43
E. Loop-Back Operation 43
F. Test Poll Operation 44
G. Emergency Stop and Alarm Condition 44
H. ▶EIA Interface Coupler (AR751 CP)◀ 46

CONTENTS PAGE

5. REFERENCES 48

1. GENERAL

1.01 This section provides general information on the 85A1 and 85A2 data selective calling service (DSCS) stations, hereafter referred to as the stations. A physical and functional description of the components that make up the stations, with a description of the operation procedures and features, is discussed in this section. A brief description of overall operation of the 85A1 and 85A2 DSCS stations 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 add reference to AR75l circuit pack (CP), which is used instead of data sets (DS) 108- or 109-type to provide Electronic Industries Association (EIA) interface leads BA, BB, AA, and AB for use with a 1A data station single channel arrangement (SCA) or for interconnecting low speed data communications equipment (DCE) using EIA leads BA, BB, AA, and AB. AR751 CP also provides a means for station testing at the customer location using a 911P EIA test adapter and a 911NA data test set.

A. Purpose of Station

1.03 The 85A1 is a 100 word-per-minute (wpm) station while the 85A2 is a 150-wpm station. Both stations provide half-duplex (HDX) data service on a selective basis with other stations in the private network of which they are 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 comprises the DSCS system.

B. Purpose of System

1.04 The 85A1 and 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 on 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 a stop on STX and ETX (controller options).

C. System Arrangement

1.05 Figure 1 is a block diagram of a typical arrangement of a multistation line for an 85A1 or 85A2 DSCS system. The system consists of the switcher and a number of stations on an HDX line interconnected via hubbing points.

D. Station Arrangement

1.06 The 85A1 station terminal equipment can be either Model 33-type teletypewriter (TTY) equipment or Model 35-type TTY equipment. The 85A2 station terminal equipment is Model 37-type TTY equipment. Both stations are completely assembled at the distributing house prior to delivery.

1.07 The stations are available in the following arrangements:

(1) M33, M35, and M37 ASR TTYs (ORIG/TERM station — page receiving)

(2) M33, M35, and M37 RO TTYs (TERM ONLY station — page receiving)

(3) M35 and M37 ROTR TTYs (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 or ROTR TTY may be optionally provided as a slave unit to the primary ASR or RO TTY. However, the auxiliary machine must have the same model number as the primary TTY (eg, M35 ROTR cannot be an auxiliary to an M33 ASR or RO TTY). The auxiliary machine can be blinded and unblinded automatically during any message delivery under on-line signal control. In addition, the auxiliary may be blinded and unblinded manually.

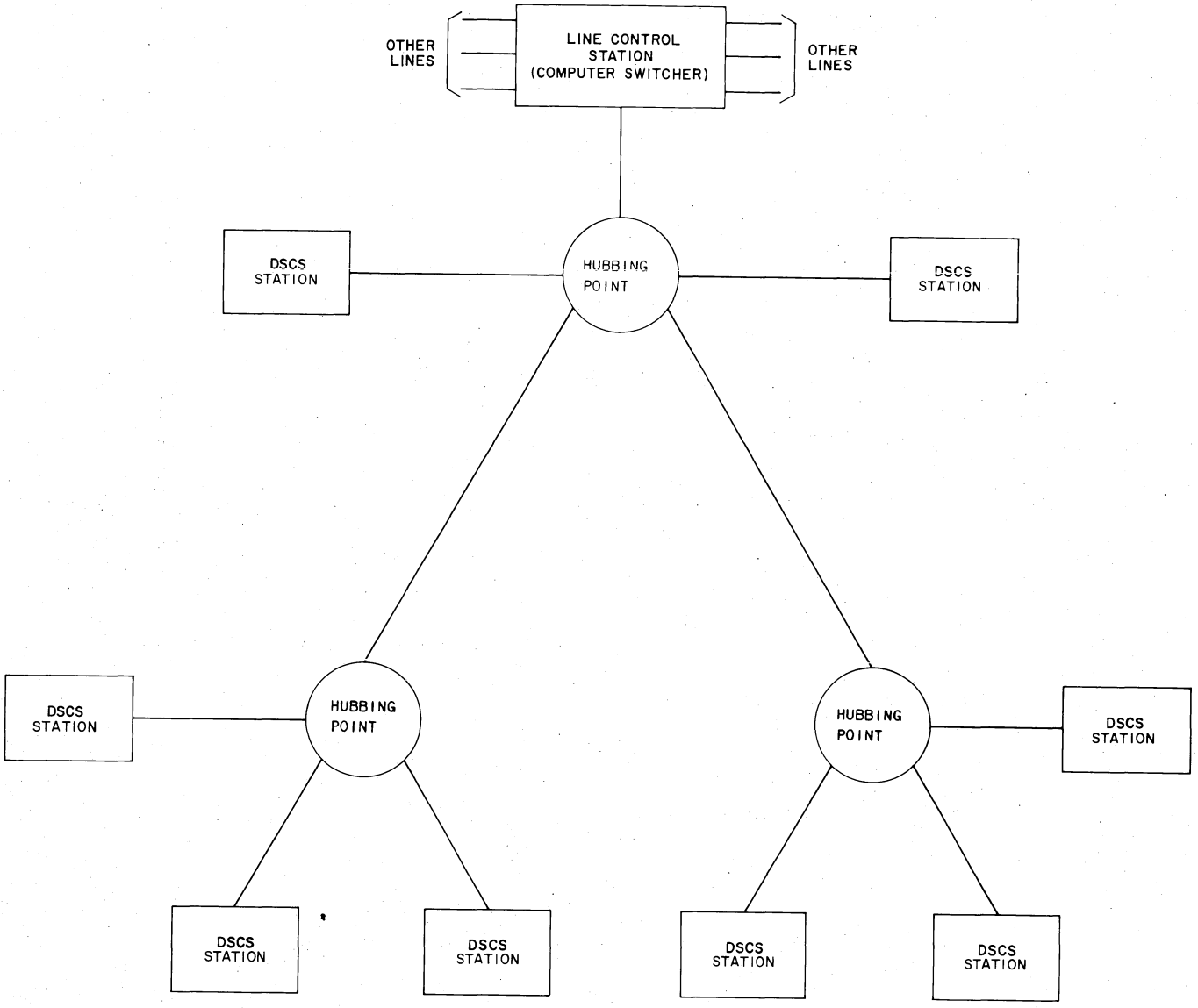


Fig. 1—Block Diagram of a Typical 85A1/85A2 DSCS Multistation Line in a System Arrangement

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

E. Uses of Station Components

1.10 The ASR TTY (Fig. 3 and 4) is used at an ORIG/TERM station to:

(1) Prepare tapes for message transmissions

(2) Send all station transmissions

(3) Print local copy of all station transmission and receptions

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

(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

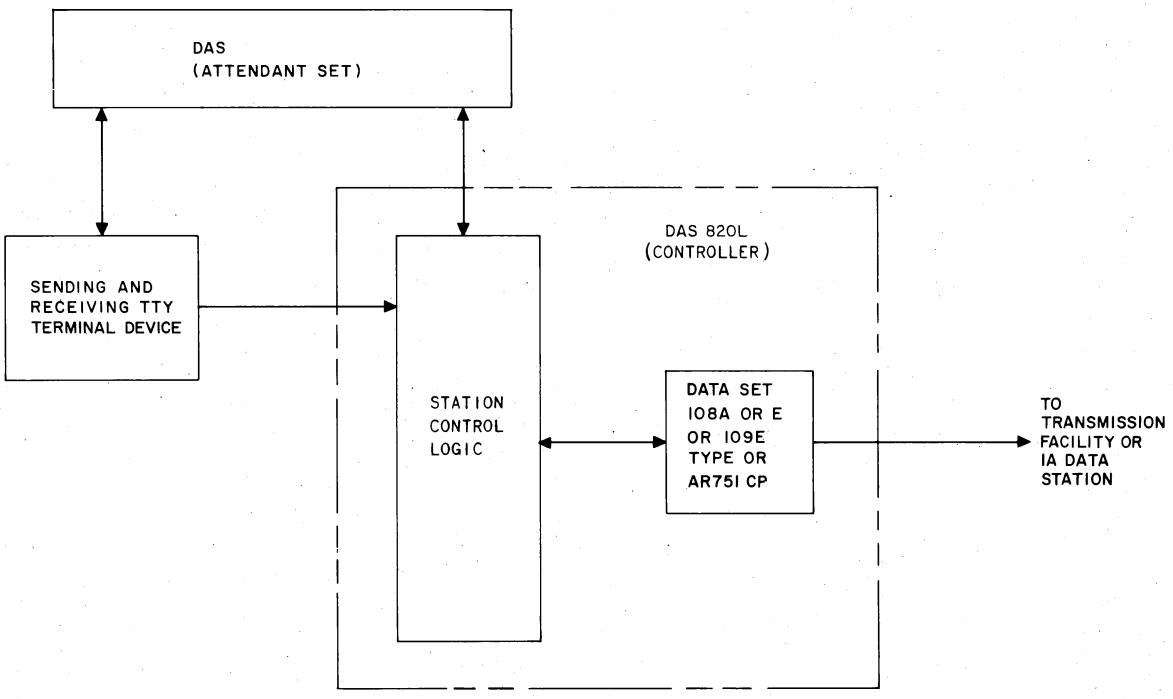


Fig. 2—Block Diagram of a Typical 85A1/85A2 ORIG/TERM Station

time, date, and message number (TDM) of messages sent or received by the station].

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. 5 for a 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 a tape of the information received instead of printing it in page form. The 35 ASR TTY has the option of printing the message on punched tape. The 37 ASR TTY has the option of using the perforator as an auxiliary tape receiver when no auxiliary machine is provided with the system.

1.13 A 33 RO TTY can be used only as an auxiliary machine to a 33 ASR TTY or a primary 33 RO TTY. A 35 RO TTY or ROTR can only be used as an auxiliary machine to a 35 ASR or a primary 35 RO TTY. A 37 RO TTY or ROTR may be used as an auxiliary machine to a primary 37 ASR or RO TTY only. Figure 6 is a block diagram of an ORIG/TERM station with auxiliary RO TTY station.

1.14 The data auxiliary set (DAS) 820-L 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 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.

TABLE A

STATION ARRANGEMENT SUMMARY

TYPE STATION	PRIMARY TTY	ATTENDANT SET	CONTROLLER *DAS	MTG BRKT	AUX RCVR TTY (OPTIONAL)
33 ORIG/TERM	33 ASR	804N5	DAS 820L-L1/2	91A	33 RO
35 ORIG/TERM	35 ASR	804N5	DAS 820L-L1/2	92A	35 RO or 35 ROTR
37 ORIG/TERM	37 ASR	804R5	DAS 820L-L1/3	93A	37 RO or 37 ROTR
37 TERM ONLY	37 RO	804R7	DAS 820J-L1/3		
	37 ROTR	804R7	DAS 820J-L1/3	95A	None
33 TERM ONLY	33 RO	804N3	DAS 820J-L1/2	91A	33 RO
35 TERM ONLY	35 RO	804N3	DAS 820J-L1/2	92A	35 RO or 35 ROTR
	35 ROTR	804R7	DAS 820J-L1/2	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). DAS 820L-type controllers supersede DAS 820G1 and 820G-L1/type controllers in ASR operation. DAS 820J-type controllers supersede DAS 820G1 and 820G-L1/type controllers in RO and ROTR operation. DAS 820G1 and 820G-L1/type controllers are rated Manufacture Discontinued (MD).

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- 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- 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 voiceband frequency tones (108-type) or dc current levels (109-type) suitable for transmission over the line. It also converts the voiceband frequency tones or dc current levels received from the line into digital data suitable to operate the data terminal. The 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 a data set to activate the controller initialization circuits.

1.17 ▶The AR751 CP is provided to take the place of the data set, to provide an EIA interface. AR751 CP is designed for use with 820A, B, G, J, and L data auxiliary sets in 85-type selective calling service stations. AR751 CP provides EIA signal leads BA, BB, AA, and AB terminated in a 25-pin EIA connector and controller terminations to allow the 85-type selective calling station to be interconnected with a 1A data station SCA or for interconnecting low speed data communications equipment using EIA leads BA, BB, AA, and AB. For SCA or DCE operation, AR751 CP replaces the 108- or 109-type data set used in the station controller.

1.18 An M25A cable is used to connect between a connector on the front of AR751 CP and the 1A data station. For details on installation refer to Section 581-131-202.◀

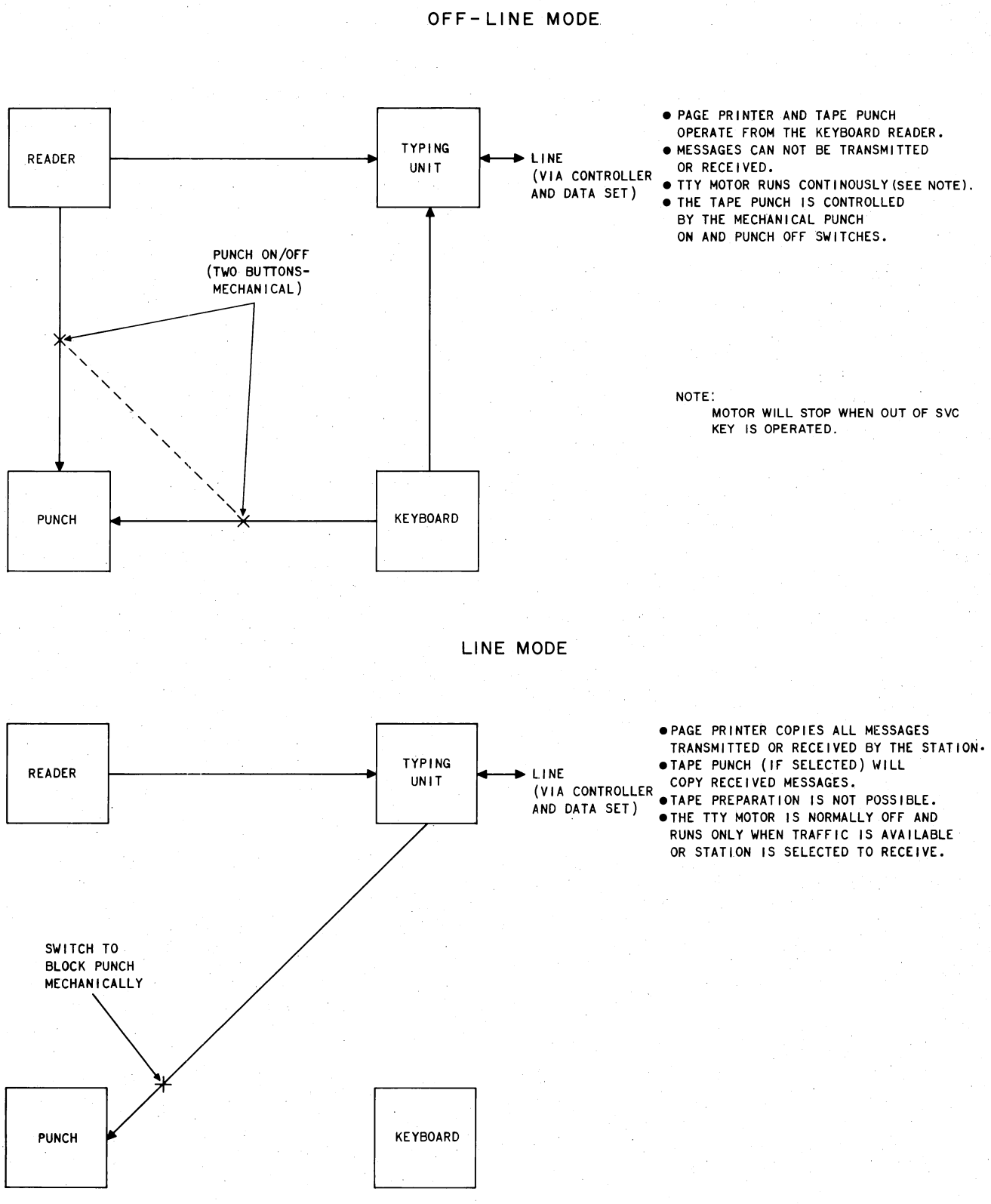
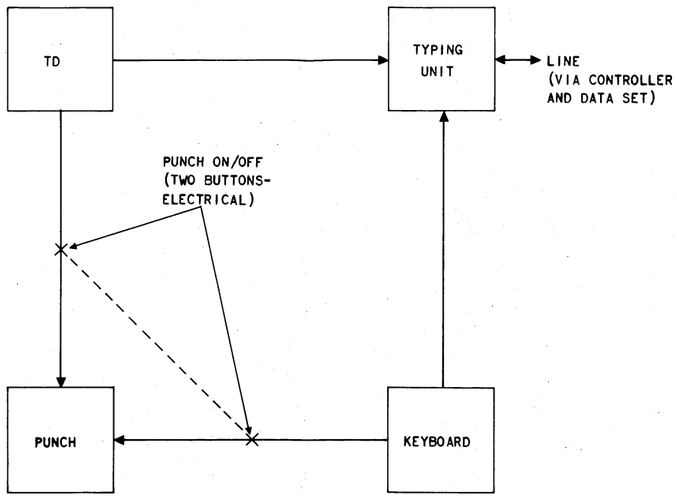


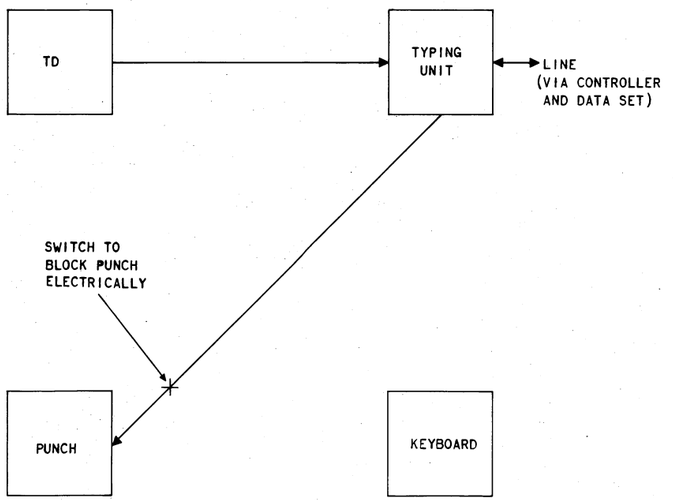
Fig. 3—Operational Modes of the 33 ASR TTY

OFF-LINE MODE



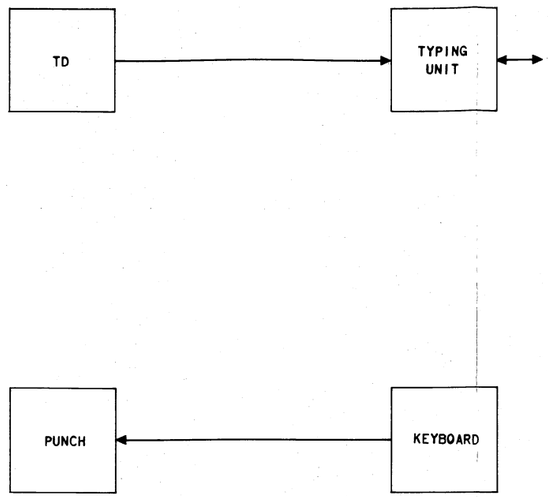
- PAGE PRINTER AND TAPE PUNCH OPERATE FROM THE KEYBOARD OR TD.
- MESSAGES CAN NOT BE TRANSMITTED OR RECEIVED.
- TTY MOTOR RUNS CONTINUOUSLY (SEE NOTE).
- THE TAPE PUNCH IS CONTROLLED BY THE ELECTRICAL PUNCH ON AND PUNCH OFF SWITCHES.

UNATTENDED MODE



- PAGE PRINTER COPIES ALL MESSAGES TRANSMITTED OR RECEIVED BY THE STATION
- TAPE PUNCH (IF SELECTED) WILL COPY RECEIVED MESSAGES.
- TAPE PREPARATION IS NOT POSSIBLE.
- THE TTY MOTOR IS NORMALLY OFF AND RUNS ONLY WHEN TRAFFIC IS AVAILABLE OR STATION IS SELECTED TO RECEIVE.

LINE MODE



- PAGE PRINTER COPIES ALL MESSAGES TRANSMITTED OR RECEIVED BY THE STATION.
- THE TTY MOTOR RUNS CONTINUOUSLY (SEE NOTE).
- MESSAGES CAN BE PREPARED ON TAPE (IN THE BLIND) WHILE TRANSMITTING OR RECEIVING MESSAGES.

NOTE:
THE TTY MOTOR RUNS CONTINOUSLY UNLESS THE OUT OF SVC KEY IS OPERATED.

Fig. 4—Operational Modes of the 35 ASR/37 ASR TTY

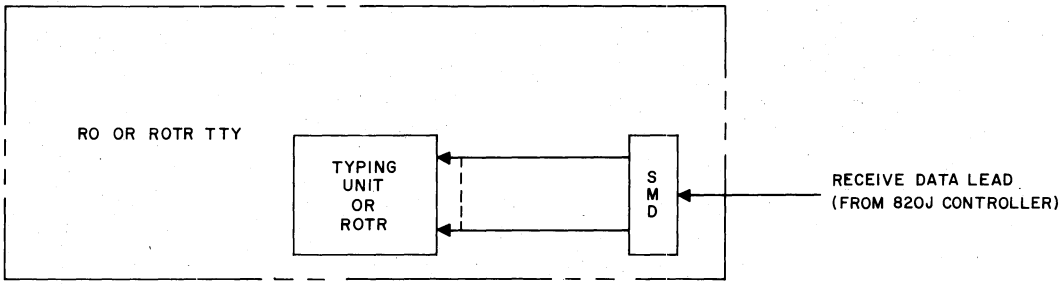


Fig. 5—Block Diagram of RO TTY

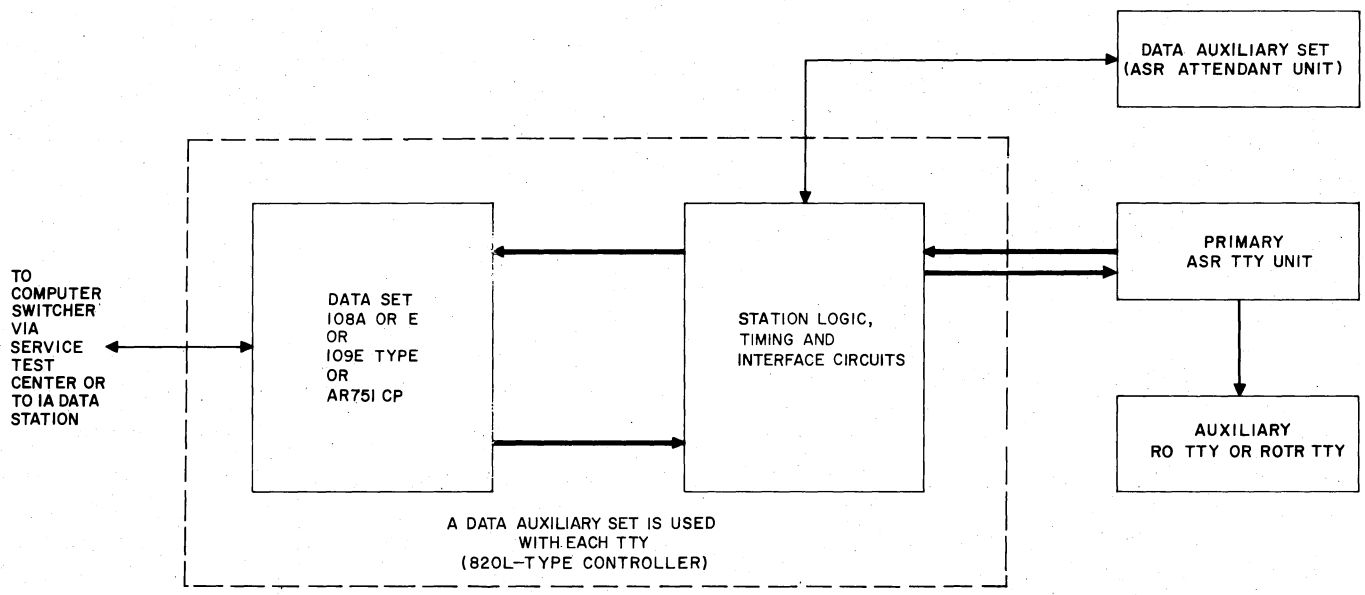


Fig. 6—Block Diagram of ORIG/TERM Station With Auxiliary RO TTY

1.19 The DAS 804N3, 804N5, 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 acknowledgement of alarm indications.

1.20 The 91A and 92A mounting brackets are used to mount the controller in the pedestal of the 33-type TTYs and 35-type TTYs, respectively. 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 in the KS-20018-type cabinet at an ROTR TERM ONLY station. The DAS 820J-type controller is provided with space and the associated mounting hardware required to mount it on the same brackets as the DAS 820L-type. For information on installing the spacers as required and mounting the data auxiliary set, refer to the installation section (581-131-202).

1.21 The M36E cord is used to connect the DAS 804R7 attendant set used with ROTR stations to the DAS 820L-type and DAS 820J-type controller via the 212A adapter. The M36E cord is available in lengths of 10 or 50 feet.

F. Station Operation

1.22 Station operation usually begins when the computer switcher polls the individual stations. Because of feature options, however, there are many variations possible in the details of how a

system can operate with 85A1 or 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 it has traffic to send. The polled stations respond 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 (stop on SOH option). 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 message to the switcher and stops (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 it can verify the validity of the heading information.

1.23 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 to the available intended receivers. This is intraline operation which results in efficient utilization because the line is used only once to accomplish both the pickup and delivery of the message. If a message is not intended for delivery to stations on the 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 then 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.

1.24 The call-in process used for message delivery consists of the switcher asking each of the addressed receiving stations individually, in turn, whether it is ready to receive the message. The called stations respond 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, 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 message of its own. When there is a selected sending station, the originating station sends the text of the message directly to all selected receivers and stops (stop on ETX option) 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 resume transmission. The originating station then sends either the start-of-heading indicator (SOH) of another message or the end-of-transmission indicator (EOT) and stops.

1.25 In the case of a multiple message pickup when the selected sending station sends SOH and stops, the switcher delivers (optional) a date, a time, or a 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

1.26 The 85A1 and 85A2 stations require an individually fused line power source of 60 $\pm$0.45 Hz at 117.5 $\pm$11.5 volts. The dc voltages required to operate the controller are supplied by a 24A power unit which is a part of the controller. In the case of the 85A1 stations, ac power for the 24A power unit is usually supplied from a terminal block on the TTY via the M3AY cord which is supplied with the controller. The ac power for the 24A power unit used with the 85A2 station is supplied by a KS-type molded power cord which plugs into an outlet on the 37 TTY. When an ROTR-type station is utilized, the KS-type 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 85A1 and 85A2 stations. Various arrangements of each are shown in Table A.

2.02 The 33 ORIG/TERM station is shown in Fig. 7. Pictured is the 33 ASR TTY with its 804N5 attendant set. The data set ▸or AR751 CP,◂ controller, and the 91A bracket (not shown) are mounted inside the 33 ASR TTY pedestal.

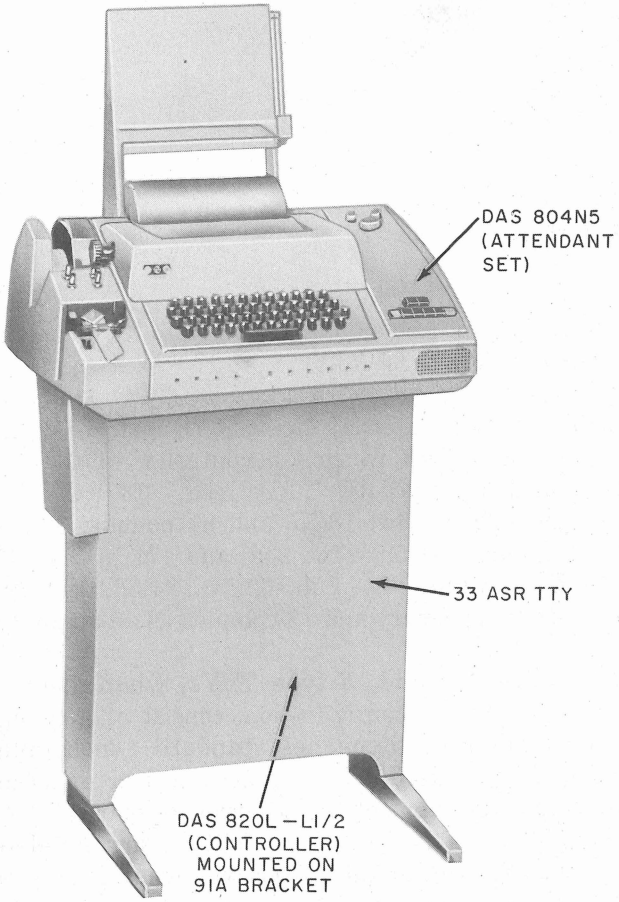


Fig. 7—Typical ORIG/TERM 33 ASR Station

2.03 A typical arrangement of the 35 ORIG/TERM station is shown in Fig. 8. This arrangement pictures the 35 ASR TTY with its 804N5 attendant set. The data set ▸or AR751 CP,◂ controller, and 92A bracket (not shown) are mounted inside the 35 ASR TTY pedestal.

2.04 The 37 ORIG/TERM station is shown in Fig. 9. The figure shows the 37 ASR TTY with its 804R5 attendant set. The data set ▸or AR751 CP,◂ controller, and the 93A bracket (not shown) are mounted inside the 37 ASR TTY pedestal.

2.05 The 33 TERM ONLY station is shown in Fig. 10. Pictured is the primary 33 RO TTY and its 804N3 attendant set. The data set ▸or AR751 CP,◂ controller, and 91A bracket (not shown) are mounted inside the primary 33 RO TTY pedestal.

2.06 The 35 TERM ONLY station is shown in Fig. 11. Pictured is the primary 35 RO TTY and its 804N3 attendant set. The data set ▸or AR751 CP,◂ controller, and 92A bracket (not shown) are mounted inside the primary RO TTY pedestal.

2.07 The 37 TERM ONLY station is shown in Fig. 12. The figure shows the primary RO TTY and its 804R7 attendant set. The data set ▸or AR751 CP,◂ controller, and 93A bracket (not shown) are mounted inside the primary 37 RO TTY pedestal.

2.08 The 35 ROTR TERM ONLY station is shown in Fig. 13. Pictured is the 35 ROTR TTY and its 804R7 attendant set. The data set ▸or AR751 CP,◂ controller, and 95A bracket are mounted in a KS-20018-type cabinet. The M36E cord connects the DAS 804R7 via a 212A adapter to the controller. With the 35 ROTR TERM ONLY station, it is not possible to have an auxiliary receiver.

2.09 The 37 ROTR TERM ONLY station is shown in Fig. 14. The figure shows the 37 ROTR TTY and its 804R7 attendant set. The data set ▸or AR751 CP,◂ controller, M36E cord, and 95A bracket are mounted in a KS-20018-type cabinet. The M36E cord connects the 37 ROTR via a 212A adapter to the controller. With the 37 ROTR TERM ONLY station, it is not possible to have an auxiliary receiver.

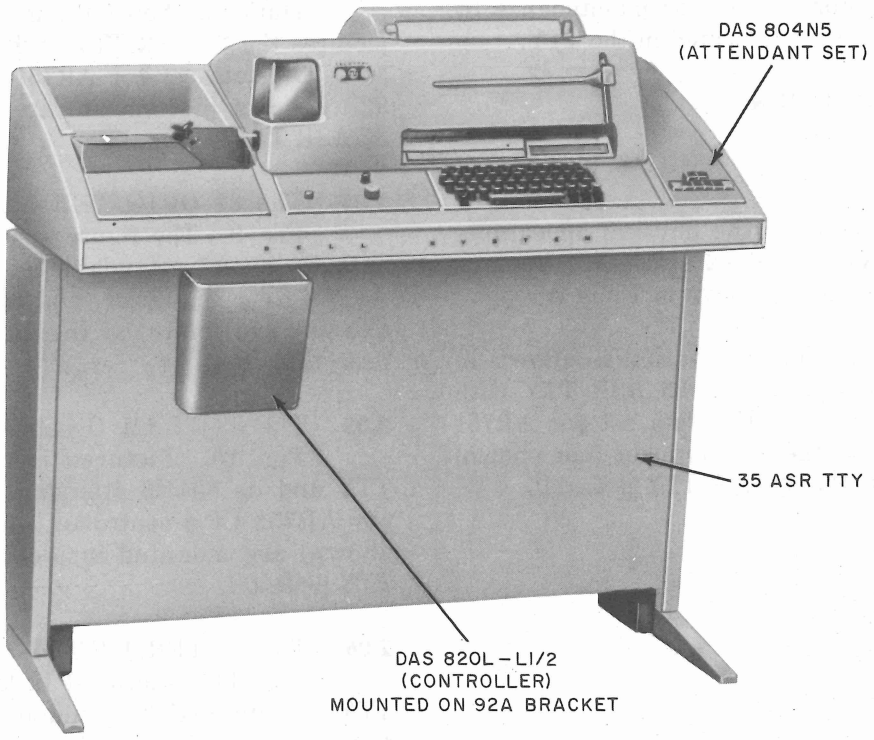


Fig. 8—Typical ORIG/TERM 35 ASR Station

B. Teletypewriters

2.10 The Model 33-, 35-, and 37-type TTYs are 4-row machines using the ASCII code. Models 33 and 35 operate at 100 wpm, Model 37 operates at 150 wpm. Models 33 and 37, when used in an ASR configuration, consist of page printer, tape punch, tape reader, and keyboard. The 35 ASR consists of page printer, tape punch, transmitter distributor (TD), and keyboard. The TD performs the same function as the tape reader on the 33- and 37-type machines.

2.11 Overall external dimensions, in inches, and the weight when equipped with the controller, of the 33, 35, and 37 ASR TTYs are: 33 ASR TTY cabinet—33h, 22w, 18.5d, and 105 pounds; 35 ASR TTY cabinet—38.5h, 40w, 24d, and 370 pounds; 37 ASR TTY cabinet—36.25h, 44.5w, 27.5d, and 360 pounds.

2.12 The 33-, 35-, and 37-type TTYs, when used in an RO configuration, consist of a page printer only. Each may be used as a primary receiver or as an auxiliary receiver to its own type primary RO or ASR TTY.

2.13 Overall external dimensions, in inches, and the weight without a controller of the 33-, 35-, and 37-type RO TTYs are: 33 RO TTY cabinet—33h, 18.6w, 18.5d, and 81 pounds; 35 RO TTY cabinet—38.5h, 24w, 24d, and 171 pounds; 37 RO TTY cabinet—36.25h, 32.5w, 24.5d, and 204 pounds as a primary and 180 pounds as an auxiliary.

2.14 The 35- and 37-type TTYs, when used in an ROTR configuration, consist of a typing reperforator that punches standard 1-inch tape. Each may be used as a primary receiver or as an auxiliary receiver to its own type primary RO or ASR TTY. The 35-type cannot be arranged to operate with an auxiliary receiver when it is used as a primary receiver.

2.15 Overall external dimensions, in inches, and the weight, in pounds, of the 35- and 37-type ROTR TTYs are: 35 ROTR TTY cabinet—34h, 13.9w, 14d, and 75 pounds, 37 ROTR TTY cabinet—34.5h, 15.5w, 15d, and 75 pounds. When

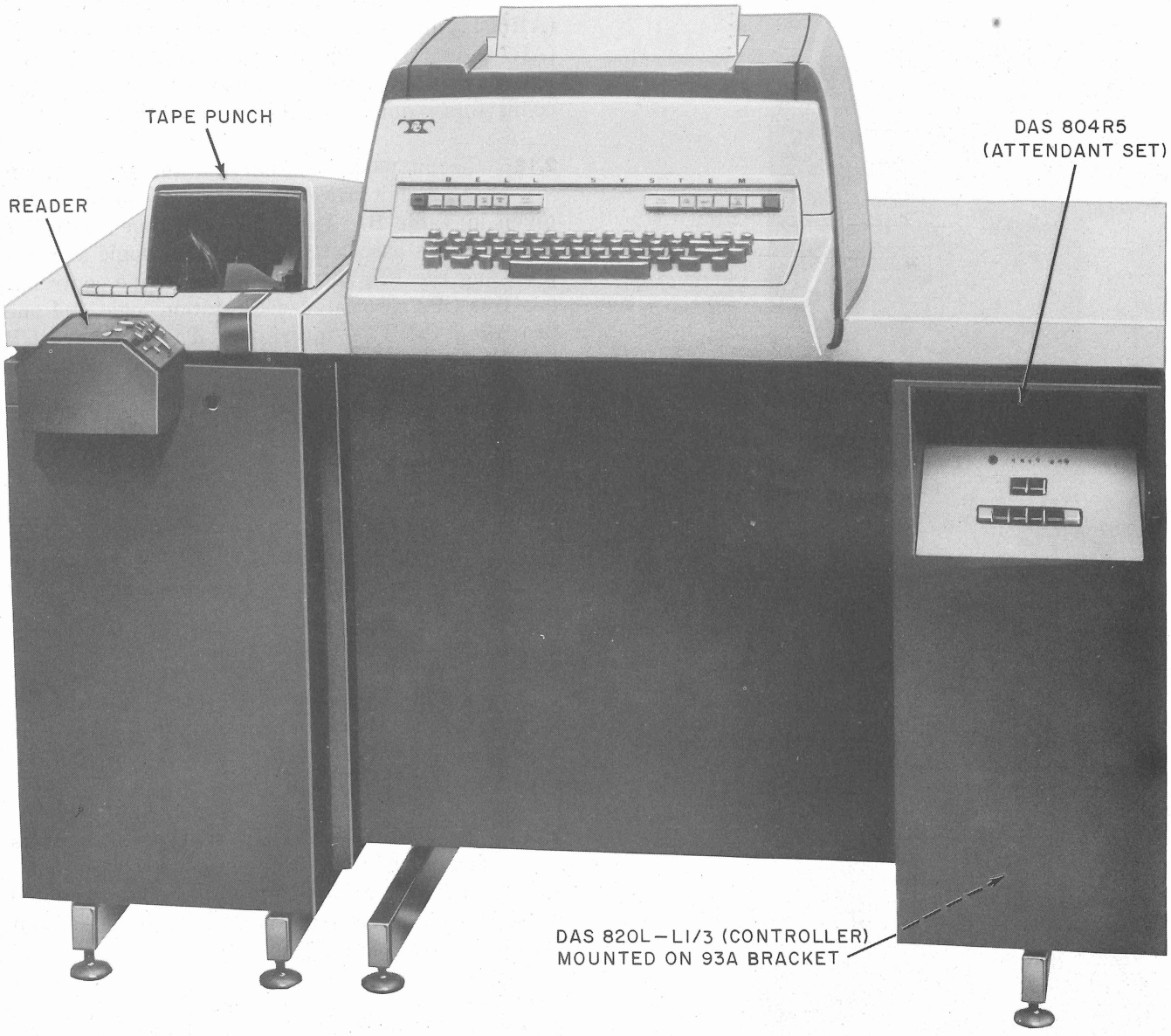


Fig. 9—Typical ORIG/TERM 37 ASR Station

either type is used as a primary receiver, the required controller must be housed externally.

C. Controllers

2.16 The DAS 820J- and L-type controllers are used with the 85A stations. The physical dimensions are the same for both controllers. The J-type controller provides RO and ROTR service while the L-type controller provides ASR service. ◗DAS 820J- and L-type controllers are designed to replace DAS 820G-type controllers. Option combinations (listed in Section 581-131-202) enable DS 820J- and L-type controllers to function in systems programmed for either DAS 820G-L1 or the older DAS 820G1 operating mode.◖

2.17 The major components that make up the controllers are a 59C apparatus mounting assembly, AR-type circuit packs (CPs), a 24A power unit, an M36E power cord (or equivalent), and a terminal strip for line connections. M and

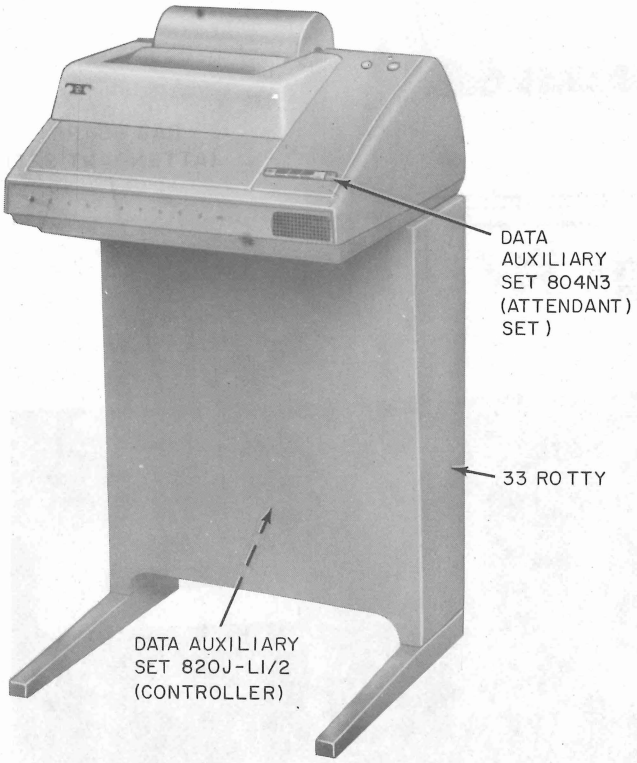


Fig. 10—Typical TERM ONLY 33 RO Station

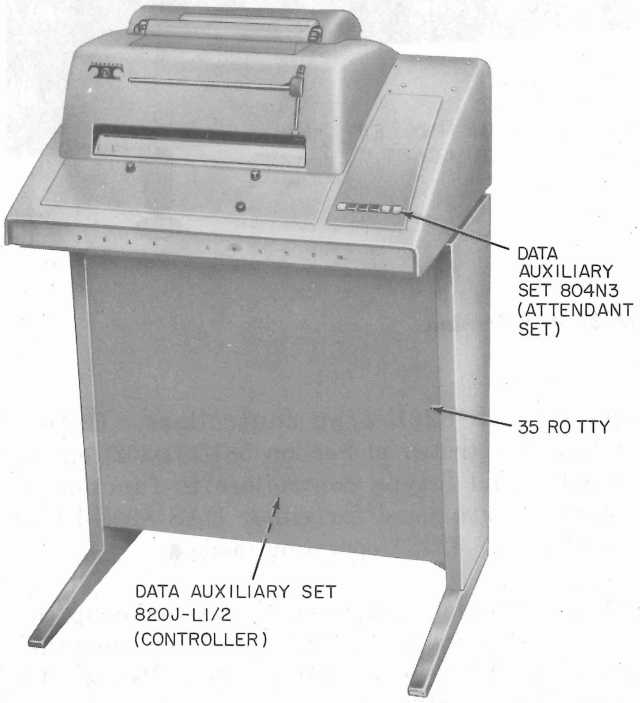


Fig. 11—Typical TERM ONLY 35 RO Station

N connectors are mounted on the interface CP (AR681 and AR682) on J-type controllers and (AR741 and AR742) on L-type controllers. The 59C apparatus mounting assembly provides the connectors required for the circuit packs.

2.18 Circuit pack designations and the position the circuit packs occupy in a controller are given in Table B. The DAS 820J-type controller has four CPs associated with station logic and one providing the TTY interface. The L-type controller has five CPs associated with station logic and one providing the TTY interface. The interface CP provided is determined by the terminal equipment being used. The remaining AR CPs may have different options installed when used in different controllers.

2.19 In the 33-type stations, the controller is located behind the rear panel of the TTY pedestal. It is mounted on a 91A bracket which allows it to be tilted out for maintenance and CP removal.

2.20 In the 35-type stations, the controller is located behind the lower front panel of the TTY pedestal. It is mounted on a 92A bracket in a position which facilitates maintenance and CP removal without tilting.

2.21 The controller for the 37-type stations 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.

2.22 The controller for the 35 and 37 ROTR stations 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. The spacers and associated hardware provided with the controller will be required to position the controller in the cabinet. Refer to the installation BSP (581-131-202) for information on installing the controller.

Note: The KS-20018-L1 cabinet is 12 inches high and provides only enough space for mounting the DAS 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.

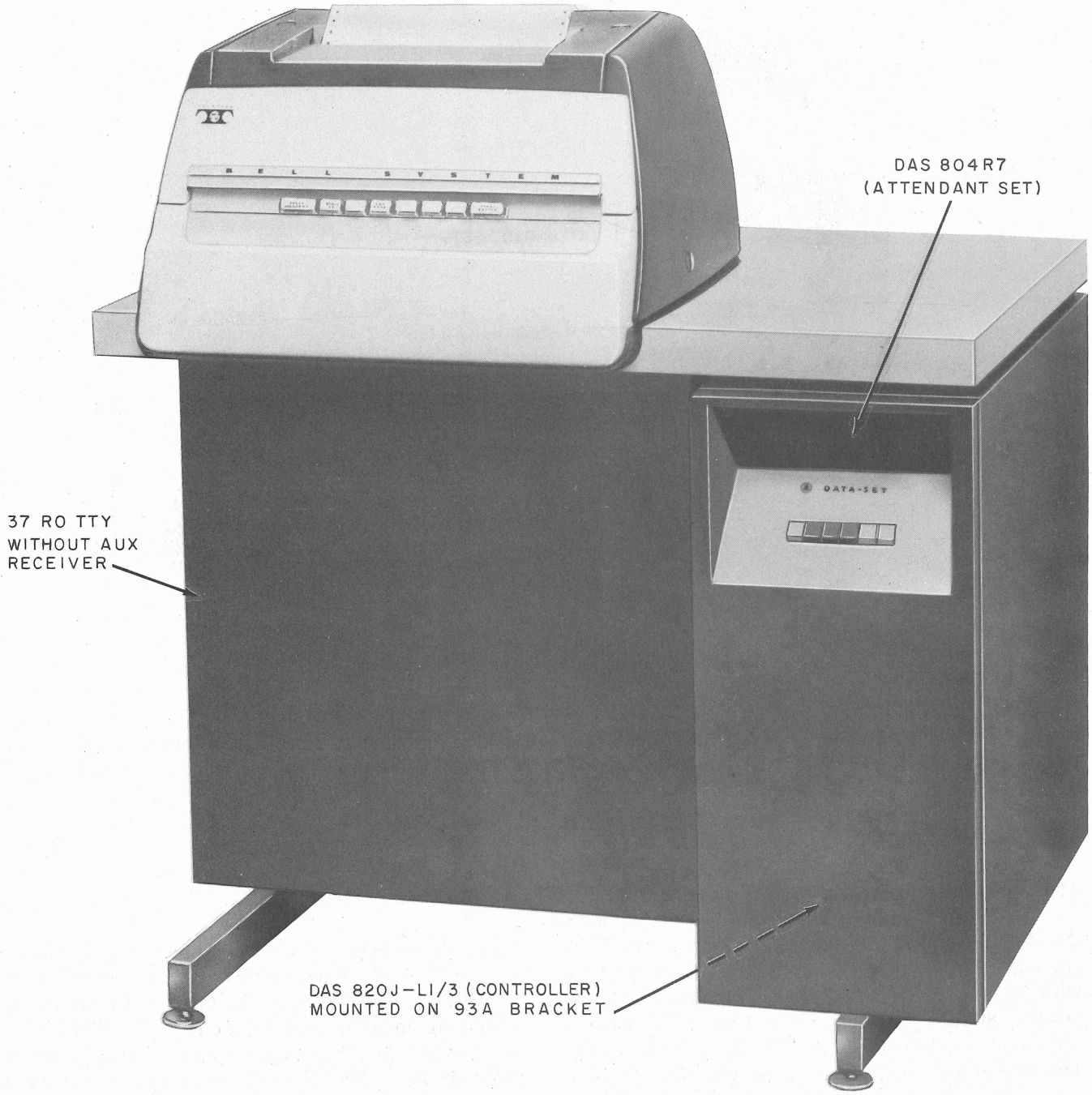


Fig. 12—Typical TERM ONLY 37 RO Station

D. Data Sets

2.23 The data set 108- or 109-type is an AR type CP located in the controller. The data set is not supplied with the controller and therefore must be ordered separately for installation with the controller. ▶The AR751 CP takes the place of the 108- or 109-type data set to provide an EIA interface for use with a 1A data station, low speed DCE, or for local station testing. An M25A cable

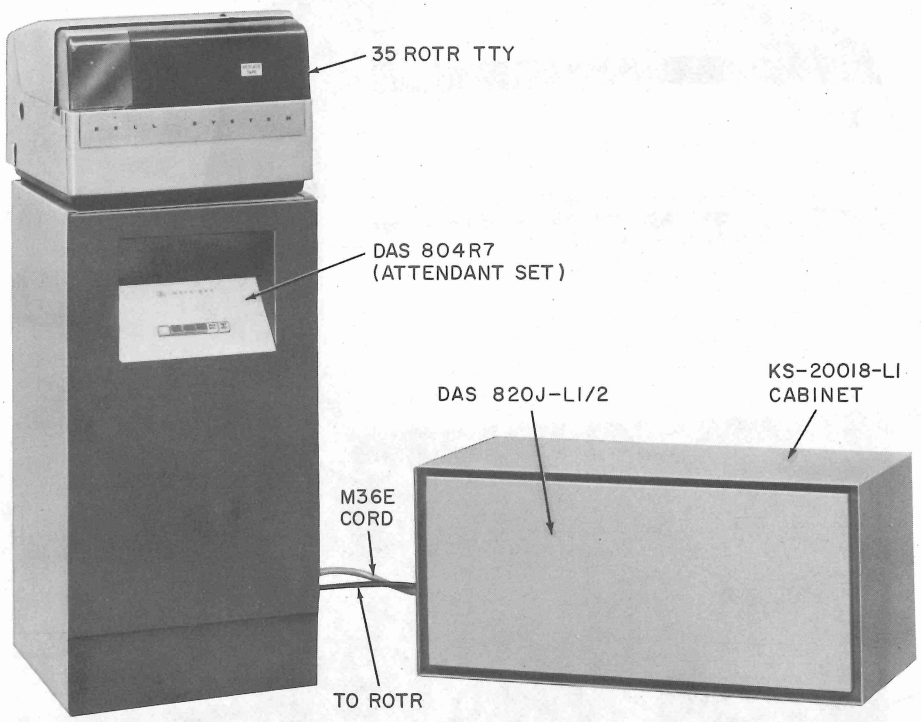


Fig. 13—Typical TERM ONLY 35 ROTR Station

connects between the connector on AR751 CP and the 1A data station.◀ The type of data set ▶or CP◀ is specified on the service order.

E. Attendant Sets

2.24 Attendant sets contain the keys and lamps, (Tables C and D) which are associated with the sending and/or receiving functions of the TTY station. Four types of attendant sets are used with 85A1 and 85A2 stations. They are the DAS 804N3, 804N5, 804R5, and 804R7. The 804N5 attendant set is used with 33 and 35 ASR TTYs. The 804R5 attendant set is used with the 37 ASR TTY. The 804N3 attendant set is used with 33 and 35 RO TTYs. The 804R7 attendant set is used with the 37 RO and ROTR TTY and the 35 ROTR TTY.

2.25 The 804N3 and 804N5 attendant sets are located on the top right side of the TTY. The 804R5 attendant set is located on the right side door of the TTY. The 804R7, when associated with the 37 RO TTY, is located on the right side door. The 804R7, when associated with 35 and 37 ROTRs, is located in the center compartment.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 In general, a station employs a 33, 35, or 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 control characters.

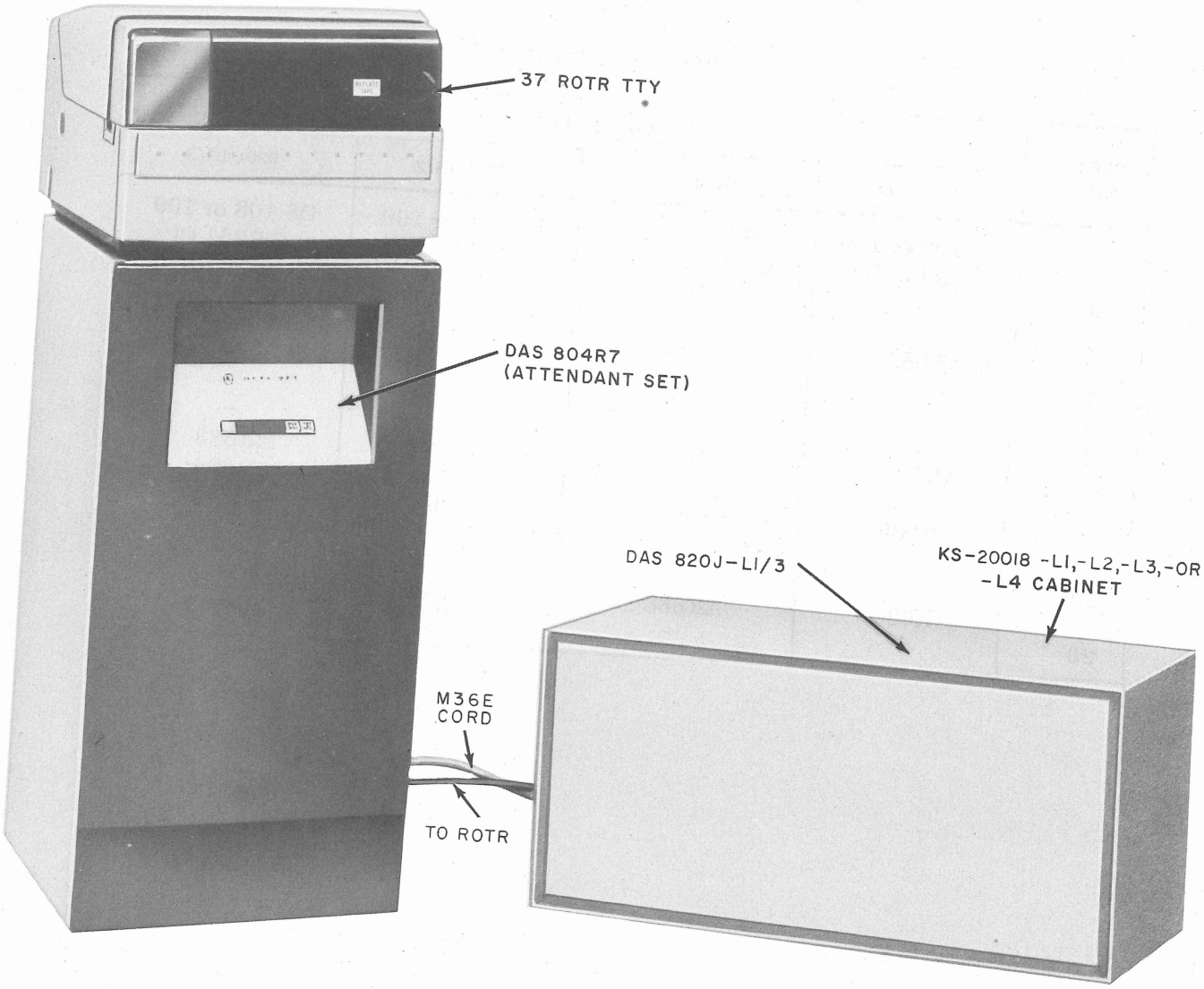


Fig. 14—Typical TERM ONLY 37 ROTR Station

→ TABLE B ←

CIRCUIT PACK DESIGNATIONS

SLOT NO.	CONTROLLER			
	820J-L1/2	820J-L1/3	820L-L1/2	820L-L1/3
1	DS 108 or 109 or AR751 CP	DS 108 or 109 or AR751 CP	DS 108 or 109 or AR751 CP	DS 108 or 109 or AR751 CP
3	—	—	—	—
5	—	—	—	—
6	AR682	AR681	AR741	AR742
7	—	—	—	—
9	—	—	—	—
11	—	—	—	—
12	AR683	AR683	AR683	AR683
14	AR684	AR684	AR684	AR684
16	AR685	AR685	AR685	AR685
18	—	—	—	—
20	—	—	—	—
21	AR686	AR686	AR686	AR686
23	—	—	AR743	AR743

TABLE C

33, 35 AND 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 and remain on until the EOT code is transmitted.
BID	L	Green	The 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 *not* 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, 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 820L, an installer option permits the station to either continue to send (friction feed) until it unselects on 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.

TABLE C (Cont)

33, 35 AND 37 ASR TTY ATTENDANT SET KEYS

KEY/LAMP DESIGNATION	TYPE KEY	COLOR	FUNCTION OR INDICATION
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.

TABLE D

33, 35, 37 RO, AND 35 AND 37 ROTR TTY ATTENDANT SET KEYS

KEY/LAMP DESIGNATION	TYPE KEY *(Note 1)*	COLOR	FUNCTION OR INDICATION
BLANK KEY	—	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 EXT: 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 2)*	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 2)*	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.

TABLE D (Cont)

33, 35, 37 RO, AND 35 AND 37 ROTR TTY ATTENDANT SET KEYS

KEY/LAMP DESIGNATION	TYPE KEY *(Note 1)*	COLOR	FUNCTION OR INDICATION
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 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: 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.

Note 2: 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.

TABLE E

ASCII CODE

BITS B_7 B_6 B_5					0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
B_4	B_3	B_2	B_1	ROW ↓ COLUMN →	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	¦
1	1	0	1	13	CR	GS	–	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	—	o	DEL

DENOTES A 1 IN THE EIGHTH BIT (PARITY BIT)

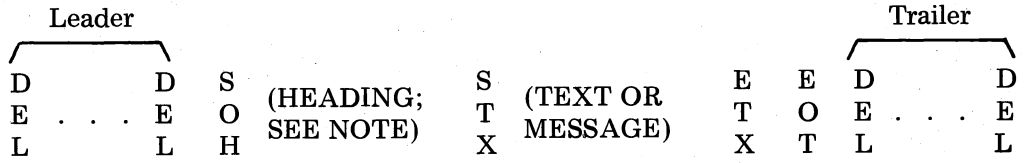
TABLE F

LEGEND OF ASCII CONTROL CHARACTERS

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 system is given as follows:



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 as follows:

ENQ DC2 ETX EOT DEL

This is to make sure all stations are in the idle state. If the switcher detects transmission on the line at this time, it sends a stop sequence as follows:

break (pause) ENQ EOT EOT

This is to ensure 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. The polling consists of the control character DLE followed by the SCC for the station which is being polled. See Fig. 15 for station polling response sequence chart.

(a) ▶Station controller polling mode simulating DAS 820G-L1 type station controller operation:

(1) The controller will respond with the character CAN when there is no traffic to send and the receiver is ready to receive.

(2) The controller will response with the character NAK when there is no traffic available and the receiver is not ready to receive.

(3) The controller will optionally start the tape transmitter or respond with the character ACK or SIC when traffic is available and the receiver is ready to receive.

(b) Station controller polling mode simulating DAS 820G1-type station controller operation:

(1) The controller will respond with a single character CAN if the last message was improperly received. The station must then be polled a second time and the controller will respond as in (a)(3) above if traffic is available.

(2) If traffic is not available, the response will be NAK. The receiver status is not given in this mode of operation.◀

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 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).

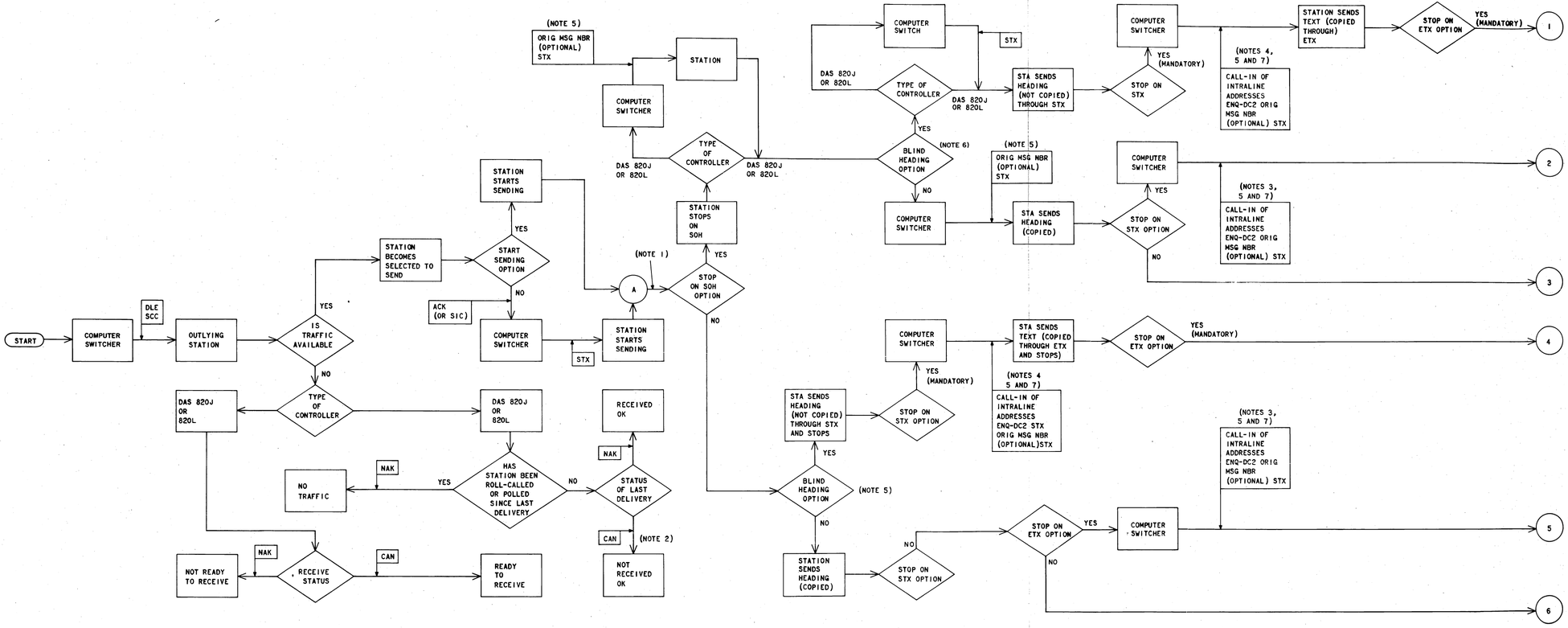
→TABLE G←

CONTROLLER RESPONSES TO POLLING

85A1 AND 85A2 DATA SELECTIVE CALLING SERVICE			SEND AND RECEIVE STATUS OF STATION				
			SELECTED SEND OPTION		NOTHING TO SEND		
SWITCHER FUNCTION	TYPE OF CONTROLLER	OPERATING MODE	AUTOMATIC START OF READER	READY TO SEND	NO TRAFFIC TO SEND	NOT READY TO RECEIVE	READY TO RECEIVE
Polling DLE SCC	DAS 820L-Type (send-receive)	820G-L1	TRAFFIC	ACK OR SIC	—	NAK	CAN
		820G1	CAN [1] TRAFFIC	CAN [1] ACK OR SIC	CAN [1] NAK	—	—
	DAS 820J-Type (receive only)	820G-L1	—	—	—	NAK	CAN
		820G1	—	—	CAN [1] NAK	—	—
Test Poll ENQ EOT DLE SCC	DAS 820L-Type (send-receive)	820G-L1	—	ACK OR SIC	—	NAK	CAN
		820G1	—	CAN [1] [2] ACK OR SIC	CAN [1] NAK [2]	CAN [1] NAK [2]	CAN [1] ACK OR SIC [2]
	DAS 820J-Type (receive only)	820G-L1	—	—	—	NAK	CAN
		820G1	—	—	CAN [1] NAK [2]	CAN [1] NAK [2]	CAN [1] ACK OR SIC [2]

Note 1: The station may respond with the discrete character CAN. This response is the LAST-MESSAGE-IMPROPERLY-RECEIVED response. To obtain the status of the station, it must be polled a second time. The station will then respond as indicated for 820G1 operating mode.

Note 2: The 820G1 operating mode for test poll optionally provides for indicating the status of either the transmitter or receiver. This option is selected at time of installation.



NOTES:

1. WHEN STATION SENDS SOH, POLLING STATE IS TERMINATED AND UNSELECTED STATIONS ARE RETURNED TO IDLE STATE.
2. CAN RESPONSE GIVEN ONLY THE FIRST TIME POLLING IS PERFORMED. IF POLLING IS REPEATED, RESPONSE AT THIS POINT WILL BE NAK.
3. IF ORIGINATING MESSAGE NUMBER IS TO BE SENT ONLY TO ORIGINATING STATION, RATHER THAN TO BOTH ORIGINATOR AND INTRALINE ADDRESSEES, THIS SEQUENCE SHOULD BE:
   ORIG. MSG NBR
   CALL-IN OF INTRALINE ADDRESSEES
   ENQ-DC2-STX
4. IF ORIGINATING MESSAGE NUMBER IS TO BE SENT ONLY TO ORIGINATING STATION, RATHER THAN TO BOTH ORIGINATOR AND INTRALINE ADDRESSEES, THIS SEQUENCE SHOULD BE:
   ENQ-DC2
   ORIG. MSG NBR
   CALL-IN OF INTRALINE ADDRESSEES
   ENQ-DC2-STX
5. DATE/TIME RECORD CAN BE FURNISHED BY THE COMPUTER SWITCHER AT THIS POINT EITHER IN ADDITION TO OR INSTEAD OF ORIGINATING MESSAGE NUMBERING; IF NEITHER IS DESIRED, OTHER INFORMATION CAN BE SUBSTITUTED.
6. "BLIND/UNBLIND ON SOH" OPTION OF THE 820GI CONTROLLER; "COPY HEADING" OPTION OF THE 820G-LI/- CONTROLLER.
7. THE "CALL-IN OF INTRALINE ADDRESSEES" PORTION OF THIS SEQUENCE CAN BE OMITTED IF TRAFFIC IS NOT TO BE HANDLED ON AN INTRALINE BASIS.
8. THE RECEIVE ONLY DAS 820J-TYPE CONTROLLER CAN BE CONDITIONED TO FUNCTION WITH THE DAS 820G-TYPE CONTROLLERS ON THE SAME MULTISTATION LINE. RECEIVE ONLY STATIONS ON THE LINE ARE SUBJECT TO THE SAME ON LINE DIALOGUE FROM THE SWITCHER AS SEND-RECEIVE STATIONS. THE RESPONSE OF A RECEIVE ONLY STATION TO POLL AND TEST POLL WILL BE A NO-TRAFFIC-TO-SEND INDICATION (SEE TEST). RESPONSES ARE COVERED IN TABLES G AND H.
9. INSTALLER OPTIONS INDICATED BY DECISION BLOCKS ARE SPECIFIED ON THE SERVICE ORDER AND ARE INSTALLED BY EITHER SCREW SWITCH SETTINGS OR ROCKERARM TYPE SWITCH SETTINGS. THE SELECTED OPTION USED MUST BE REPEATED WITH EVERY MESSAGE IN THE TRANSMISSION.

Fig. 15—Station Polling Response Sequence Chart (Sheet 1 of 2)

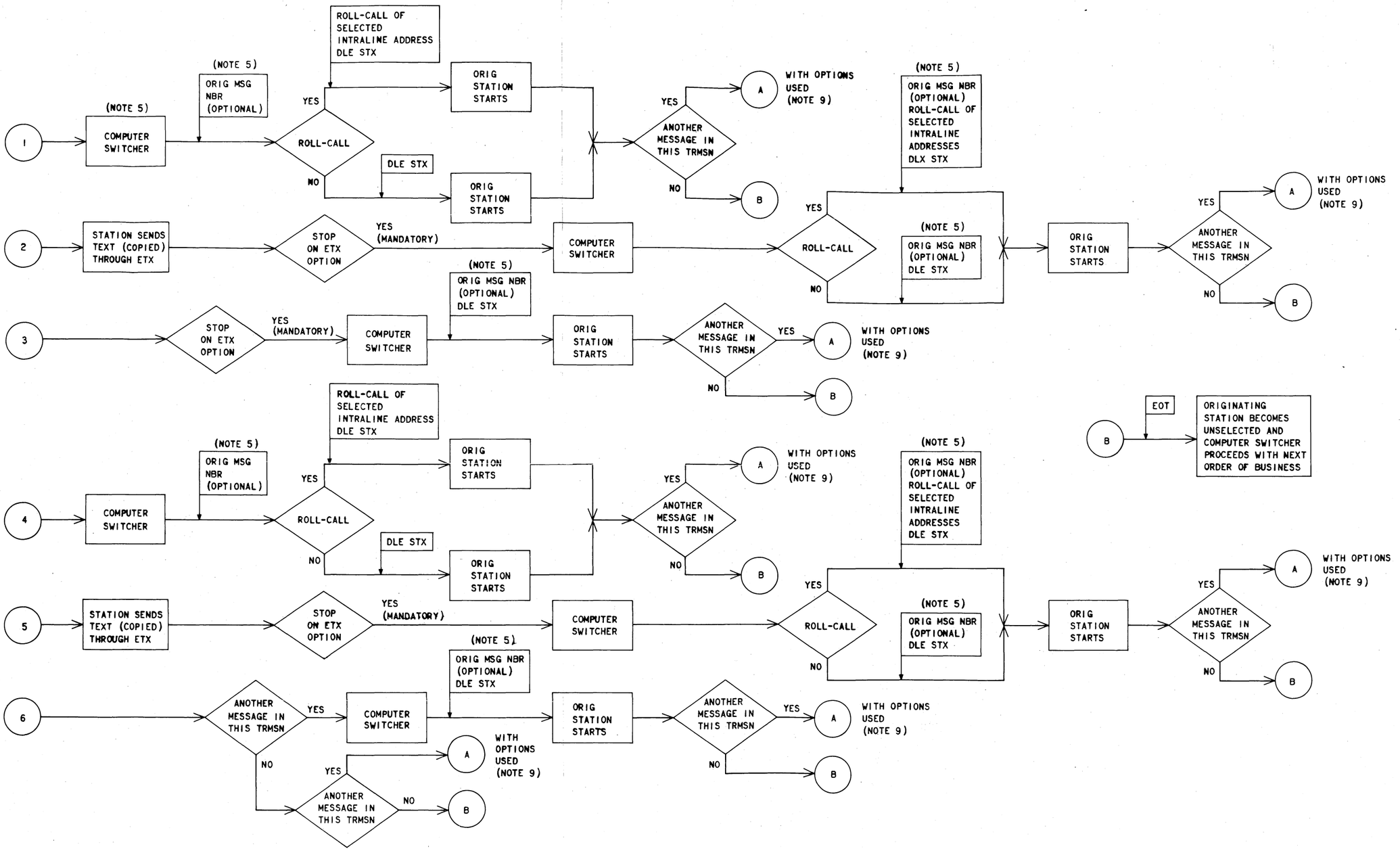


Fig. 15—Station Polling Response Sequence Chart (Sheet 2 of 2)

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. 16 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 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. 17 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. It will respond with CAN (last-message-improperly-received) if any of the following conditions have occurred during message delivery:

(1) A paper-cut 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 the emergency stop action).

(9) A selected receiver detected a parity error in the message delivery (optional).

As illustrated by (6) and (7) above, the station performs a certain amount of message format checking. These are included primarily to ensure that messages are indeed delivered as intended to the appropriate stations. Without certain format checks it would 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 differ in meaning from the CAN response used in 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 one 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 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 μF.

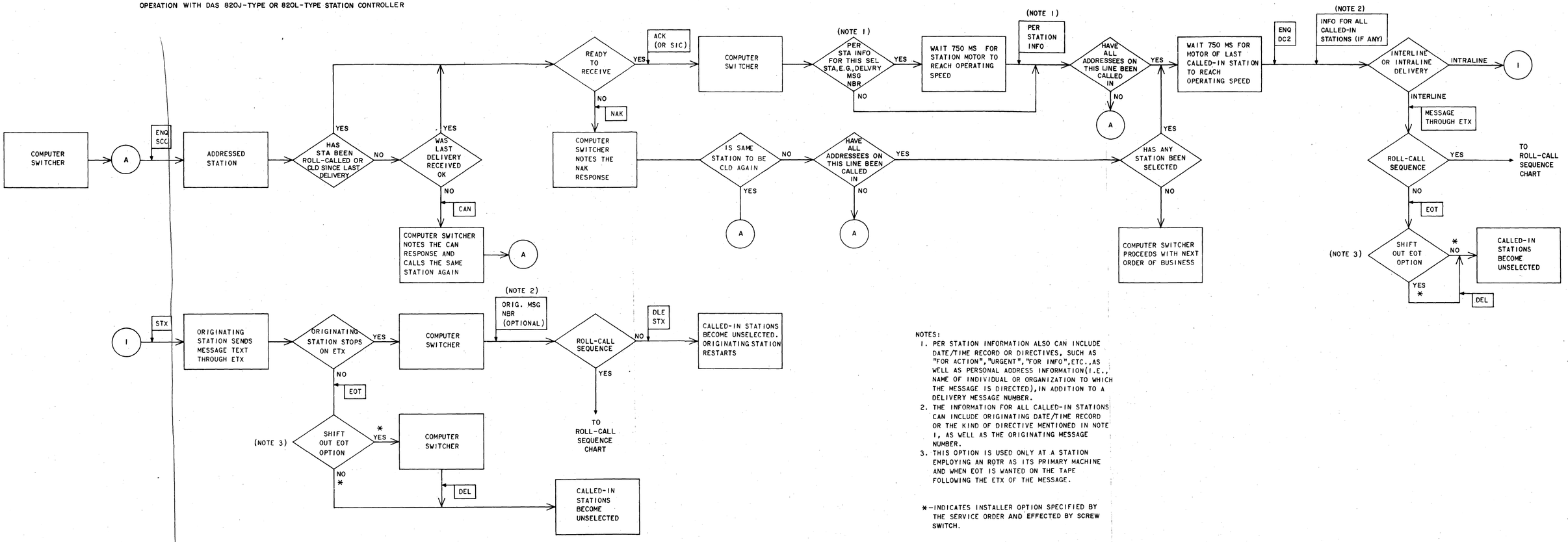
3.17 The receive sequence for a station is essentially the reverse of the transmit sequence. The data set converts the FSK tones or dc current levels from the line into EIA voltages and presents them to the controller. The controller performs the same as it did for the transmit sequence and delivers voltage signals to the primary and, if provided, auxiliary TTY. The controller has a 1-character delay between reception of a character and the character selection by the terminal device.

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, 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 DEL 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

OPERATION WITH DAS 820J-TYPE OR 820L-TYPE 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. 16—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.

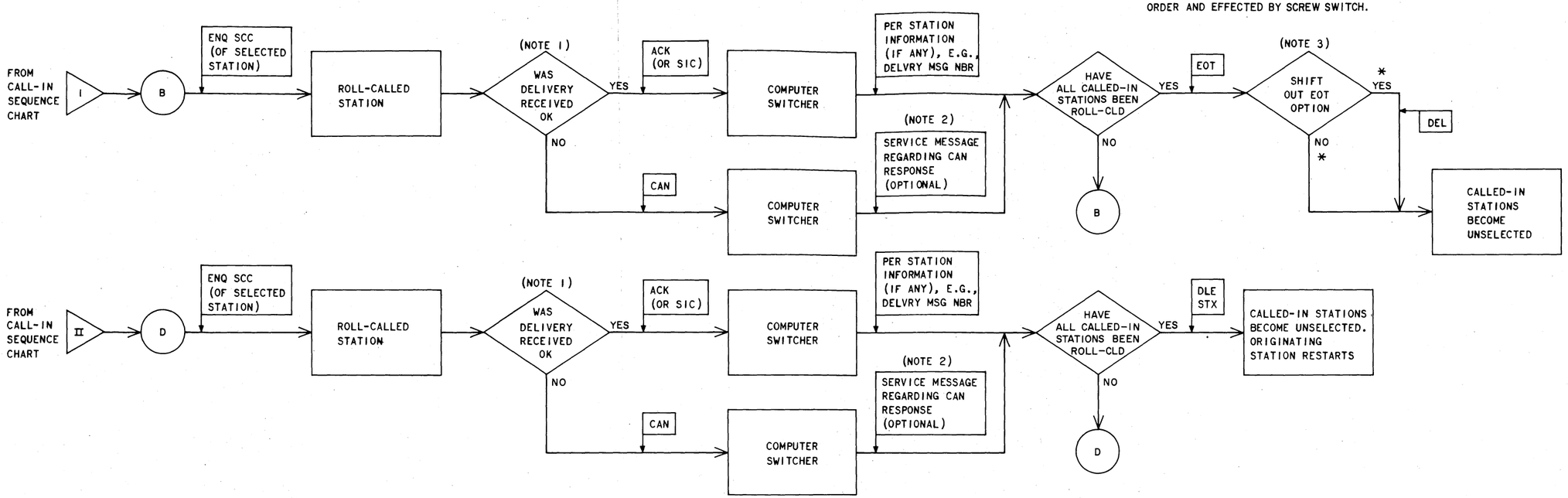


Fig. 17—Roll Call Sequence Chart

function and the line feed function are executed upon receipt of a single control character (LF), two DEL 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 an 85A1 or A2 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		FORM FEED
	HORIZONTAL	VERTICAL	
33	—	—	6:1
35	3:1	6:1	6:1
37	3:1	3:1	3:1

33 ASR TTY

3.20 All messages originated by the 33 ASR stations are transmitted from the tape reader; no provisions are made for direct keyboard transmission. Two switch-selected modes of operation are possible. These modes are described as follows:

(1) The OFF-LINE mode in which the page printer and tape punch operate from 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 turned off, thereby obtaining page copy of the tape.

(c) A by-product tape can be made by running a master tape through the reader with the tape punch turned on. In this case, page copy is also obtained and tape editing is possible.

While in this mode, messages cannot be transmitted or received, 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 ON, PUNCH OFF switches.

(2) The LINE mode, in which the page printer will copy all messages transmitted or received by the station, and the tape punch (if selected) will copy received messages. In this mode, tape preparation is not possible. The motor, normally off, runs when the station has traffic available or when the station is selected to receive and continues to run until the traffic-available status is canceled or the station is unselected as a receiver. Tapes can be prepared only when the MODE switch is in the OFF-LINE position. This will light the OUT OF SVC lamp and condition the station to respond to polling or call-in as if an OUT OF SVC condition had been created by operating the OUT OF SVC key (refer to Tables C and D).

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

- Tape is loaded in the tape reader.
- The bat handle is in the RUN position.
- The MODE switch is in the LINE position.
- A taut tape condition does ***not*** exist.
- EMG STOP lamp is not lighted.
- PAPER lamp is not lighted.
- BID key has been released after it was used to withhold a bid on the previous message.

35 ASR TTY

3.22 The TD provided with the 35 ASR TTY performs the same function as the tape reader on the 33-type machine. All messages that

originate from the 35 ASR stations are transmitted from the TD; no provision is 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 the keyboard or TD. In this mode, the following functions may be performed:

(a) Messages may 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 TD with the tape punch key OFF and obtaining page copy.

(c) Tape editing can also be accomplished while making a by-product tape by running a master tape through TD with the tape punch key ON. At the same time, page copy is obtained.

(d) The OUT OF SVC lamp lights and the station responds to polling or call-in as if an OUT OF SVC condition had been created by operating the OUT OF SVC key (refer to Tables C and D).

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

(2) The LINE mode, in which messages can be prepared on tape (in the blind) while transmitting or receiving messages. A record copy of the message being transmitted by the TD is reproduced by the page printer. The printer also reproduces information received from the switch, eg, TDM, etc.

(3) The UNATTENDED 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 TD remains on until all traffic has been sent. The motors then turn off and are turned on again only when the station is called in to receive a message or, optionally, when a bid condition is again established. This arrangement permits the use of the machine for receiving messages.

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

- Tape is loaded in the TD.
- The bat handle is in the RUN position.
- The MODE switch is in the LINE or UNATTENDED position.
- A taut tape condition does ***not*** exist.

37 ASR TTY

3.24 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 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 by-product 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 UNATT (unattended) 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.

3.25 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 OFF-LINE or UNATT position.
- A taut tape condition does ***not*** exist.
- EMG STOP lamp is not lighted.
- PAPER lamp is not lighted.
- The BID key has been released after it was used to withhold a bid on the previous message.

I. Controller Functional Description

3.26 The basic functions of the DAS 820J- and L-type controllers operating in an 85A1 or A2 station are:

(1) To recognize ASCII characters and 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.

(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.

TABLE I

STATION CONTROLLER CHARACTERS

CHARACTERS DETECTED	CHARACTERS GENERATED
SCC (Note 1) DLE ENQ EOT STX DC2 SOH ETX	ACK (or SIC: Note 2) 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 identify code (SIC).

3.27 Different operating procedures exist during station operation when a paper-low or paper-out condition occurs. The model and type TTY being used will also determine some of the differences in operation.

3.28 With the DAS 820L-type controller, ASR station operating procedure with friction-feed TTY results in the following when paper is low during message transmission:

(1) Audible alarm sounds.

(2) Paper lamp lights.

(3) Tape reader continues to operate and maintain transmission.

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

3.29 When a DAS 820L-type is used with a sprocket-feed ASR TTY, the operating procedure when paper is low during message transmission 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 "paper out" operating procedure makes it possible to finish a short transmission on the remaining paper. Station selection is inhibited until the alarm condition is cleared.

3.30 When a DAS 820L- or 820J-type is used with a 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.

3.31 When a DAS 820L- or 820J-type is used with a 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

3.32 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 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. The station can optionally be arranged to respond CAN after detection of parity error.

Out-of-Synchronism Error

3.33 The 85A1 and 85A2 stations employ a synchronous (stop-start) operation. Each character consists of a start bit, the seven information bits of the ASCII code, the parity bit, and a one-bit (two-unit) stop interval.

3.34 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.

3.35 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 3.13. This condition may give a CAN response like a parity error.

J. Attendant Set Functional Description

3.36 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.

(3) An audible alarm when a failure occurs.

K. Data Set Functional Description

3.37 Basic functions of the data sets are:

(1) To provide a means for transmitting data received from the controller to the line.

(2) To provide a means for delivering data received from the line to an associated controller.

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

L. ▶EIA Interface Coupler AR751 CP◀

3.38 ▶Basic functions of the AR751 CP are:

(1) To provide a means for interconnecting a 1A data station single channel arrangement to the 85-type selective calling station.

(2) To provide a means for interconnecting low speed data communication equipment to an 85-type station controller using leads BA, BB, AA, and AB.

(3) To provide a means for terminating an 85-type station controller for operation without DS 108- or 109-type.

(4) To facilitate testing the station controller at the customer's location using a 911P EIA test adapter in connection with a 911NA data test set.◀

4. OPERATION

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

4.01 The DAS 804N5 used with the 33 or 35 ASR TTY has two rows of keys that are designated by their functions (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.

4.02 The DAS 804R5 used with the 37 ASR TTY has two rows of keys that are designated by their functions (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

4.03 The DAS 804N3 used with the 33 or 35 RO TTY has one row of keys and associated lamps that are designated by their functions (Table D). The row contains the SEL (selected) lamp, MSG ERROR (message error), PAPER (low paper or paper out), AUD OFF (audible alarm off), and OUT OF SVC (out of service) keys.

4.04 The DAS 804R7 used with the 35 or 37 ROTR and the 37 RO TTYs has one row of keys that are designated by their functions (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

4.05 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 4.06 and 4.07. The following control characters, when detected in the text of message by the stunt box of the primary TTY, provide for automatic connect and disconnect of the TTYs:

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

4.06 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 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.

4.07 Manual connection of an auxiliary receiver associated with a 33-type primary TTY station is accomplished by operating the auxiliary ON key at the primary station. The ON lamp will light indicating that the auxiliary receiver is unblinded. To manually blind the receiver, the auxiliary OFF key is operated. The auxiliary ON lamp will extinguish, and the auxiliary receiver will be blinded. Unlike the 35 stations, the 33 RO auxiliary receiver will be blinded on reception of either the manual or automatic blind command.

4.08 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.

4.09 The tape punch of a 35 ASR TTY ORIG/TERM station not equipped with an auxiliary 35 RO TTY or 35 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 or automatically via line signals (DC2 for ON condition or ETX and/or DC4 for OFF condition.)

4.10 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 TFO to occur, operate and release the TAPE FEED key which is located on the ROTR attendant set.

4.11 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.

4.12 When the auxiliary receiver is a 35 ROTR, automatic TFO will occur whenever the

TABLE J

AUTOMATIC TFO OPTIONS FOR AUXILIARY 35 OR 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.

auxiliary ROTR is disconnected manually or automatically (Table J). In either case, between 2 and 10 inches of tape will be fed out punched with DEL characters (the length of feedout is mechanically adjustable). The TFO feature is noninterfering; therefore, 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.

4.13 When an ROTR is used as a primary receiver, there are no provisions for connecting an auxiliary receiver. Automatic TFO will occur optionally when the station is either roll called or unselected versus when the station is unselected only.

D. Carrier Squelch

4.14 Screw switch S1 located on DAS 820J- and 820L-type controllers (interface cards AR681 CP or AR682 CP and AR741 CP or AR742 CP, respectively) provides the option of squelching transmitted carrier of data sets 108A and E and 109E. Whenever a data set detects the loss of received carrier and switch S1 is operated to the CARRIER SQUELCH position, the transmit carrier is squelched and the hub receives an indication that service is temporarily discontinued.

E. Loop-Back Operation

Controller Loop-Back

4.15 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.)

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

Data Set Loop-Back

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

Data Bypass Test Feature

4.18 Both the DAS 820J-type and the 820L-type controllers provide 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

4.19 Test poll is a 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 their becoming selected to transmit or selected to receive. The stations are put into the test poll mode by the switcher sending the 3-character sequence ENQ EOT DLE followed by the SCCs of the stations being test polled. Their responses to test polling indicate their status. For detailed information on test polling responses, refer to Table G. The test poll mode is terminated when the switcher sends an EOT (to return the line to an idle state) or DLE (to put the line in a normal polling mode).

(a) ◗Station controller test poll mode simulating DAS 820G-L1-type station controller operation:

(1) The controller will respond with CAN when there is no traffic to send and the receiver is ready to receive.

(2) The controller will respond with NAK if it has no traffic to send and the receiver is not ready to receive.

(3) The controller will respond with ACK if it has traffic to send and is ready to receive.

(b) Station controller test poll mode simulating DAS 820G1-type station controller operation:

(1) The controller will respond with a single CAN when the last message delivered was not properly received. On the following test poll the response will revert to indicate the status of the station. Depending on the station option, either the status of the transmitter or receiver will be given. Directly following the single CAN, on the next test poll, the controller will respond NAK if it has no traffic to send, or optionally if it is not ready to receive. Status of the station will be preceded by a single CAN only if the last message was received improperly.

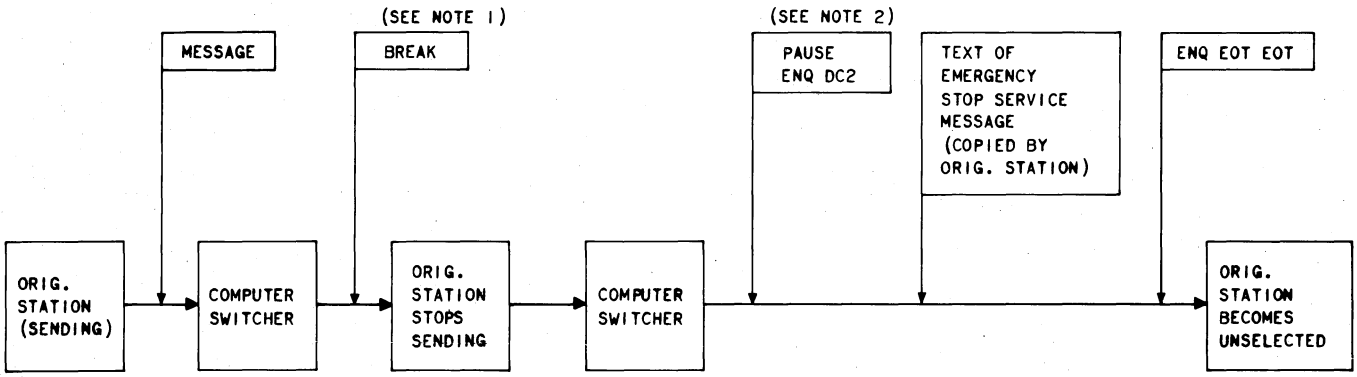
(2) Messages received properly, or if the station was roll-called prior to polling, inhibits the CAN response. In this case, the CAN will be deleted and the first character response will indicate the status of the controller. Status of the controller will be reported upon each successive test poll. However, if the station becomes ready to send, or optionally, ready to receive, the response will revert to ACK or SIC.

(3) Caution should be observed that the appropriate option (eg, DAS 820G-L1 or DAS 820G1) is applied to the controller if CPs are changed. See Section 581-131-202 for further details.◀

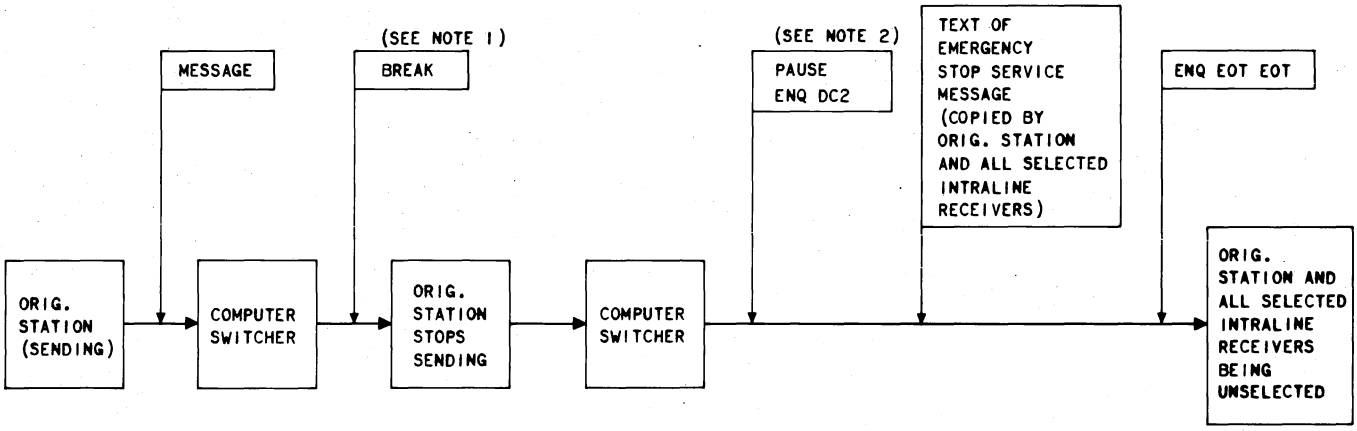
G. Emergency Stop and Alarm Condition

4.20 An emergency stop function (Fig. 18) is provided that will stop the transmission from a station. 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 explanatory service message, is as follows:

break (pause) ENQ DC2 (text of service message) ENQ EOT EOT.



A. INTERLINE OPERATION



B. INTRALINE OPERATION

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. 18—Emergency Stop Sequence Chart

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

- The tape reader or TD 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 be selected again 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.

4.22 After clearing the condition causing an alarm, the associated key is operated 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.

4.23 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 OFF-LINE position. The entire station can be tested as outlined in the appropriate practice referenced below.

H. ▶EIA Interface Coupler AR751 CP◀

▶Application

4.24 The EIA interface coupler (AR751 CP) is used in place of DS 108- or 109-type normally used in 85-type selective calling service stations (Fig. 19). AR751 CP universally adapts for operation with all half-duplex 85-type selective calling station arrangements. Optional changes are not required within the connecting controllers or on AR751 CP. Connection between the 1A data station and the 85-type station controller is by an M25 cable which plugs into an EIA connector mounted on the faceplace of AR751 CP.

Functions

4.25 Functions of AR751 CP are given in 3.38.

Description of Operation

4.26 EIA interface coupler AR751 CP is used for SCA operation and essentially provides a convenient means for extending and terminating the station controller's existing internal send data, receive data and ground signal leads to a standard 25-pin EIA connector for interconnection to an external 1A data station instead of the usual DS 108- or 109-type. When AR751 CP is inserted into the 85-type station controller in place of DS 108- or 109-type, the transmitted data lead (BA), received data lead (BB), protective ground lead (AA), and signal ground lead (AB) are extended from a 927-type connector on the backplane of the 85-type station controller to terminals on a 25-pin EIA connector (J1). EIA control leads AA, BA, BB, and AB are the only interfacing leads required for operation with this circuit. All other EIA control leads from and to the data communication equipment are not used. Pins associated with the unused EIA control leads are left unterminated on AR751 CP EIA connector J1. Connector J1 is mounted on the faceplate of AR751 CP. EIA level data signals (mark low and space high) are thus exchanged between station controller and the 1A data station over a cable which connects to connector J1.

4.27 EIA interface coupler AR751 CP, in addition to providing external accessibility to the send data, receive data, signal and protective ground leads, provides the required 85-type station controller interface terminations to enable character detect and generate logic (carrier detect and data set ready clamps ON) and to enable the station controller loop-back capability. The primary application of AR751 CP is to provide 85-type interfacing with the 1A SCA. However, other low speed data communication equipment (DCE) may be used if arranged for private line telegraph service. The connecting DCE should be arranged as follows:

(a) Binary signals applied by the 85-type station controller to lead BA shall be transmitted by the DCE at all times except upon loss of incoming carrier when the DCE carrier squelch option (if available) is employed.

(b) Binary signals shall be applied by the DCE to lead BB at all times except when incoming carrier is lost. A DCE option should then clamp lead BB mark-hold.

(c) The DCE should have a permanent request-to-send option in effect.

(d) Circuit CD (data terminal ready) is not required for private line telegraph service and should be disabled or ignored by a DCE option.

Interface With the 1A Data Station (EIA Faceplate Connector J1)

4.28 Interface with the 1A data station is provided on the following leads:

- AA (protective ground) PIN 1
- BA (transmitted data) PIN 2

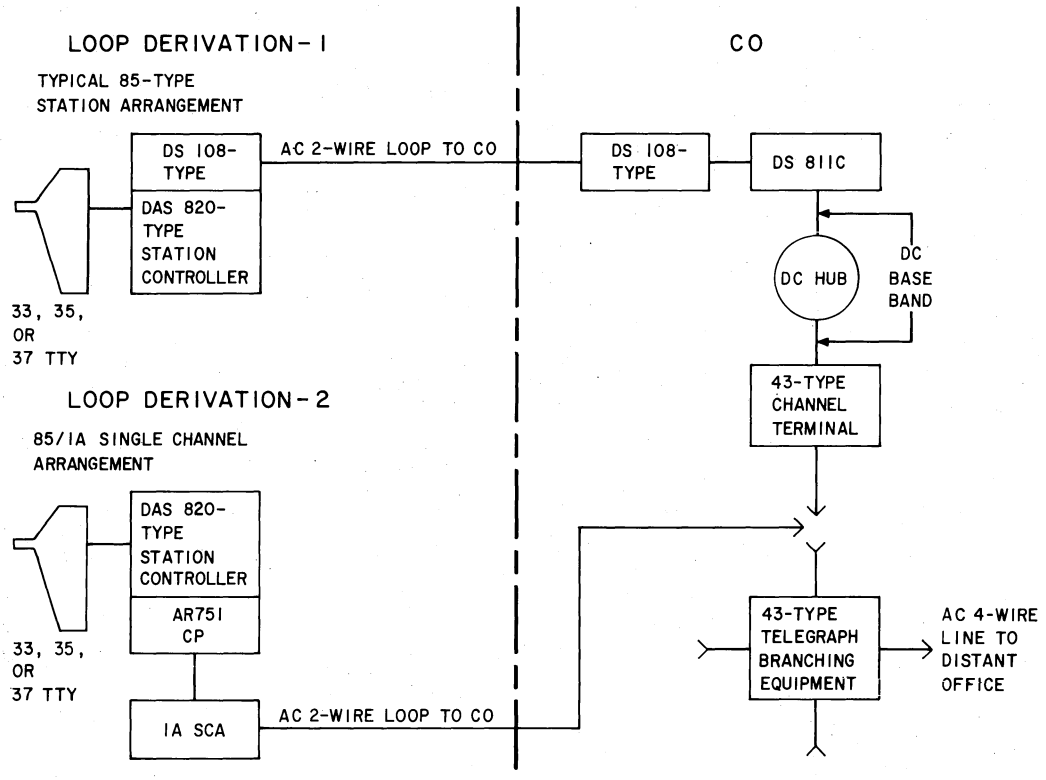


Fig. 19—Loop Derivation Comparison

- BB (received data) PIN 3
- AB (signal ground) PIN 7

Interface With DAS 820J- or L-Type (Via Nest Connector)

4.29 Interface with DAS 820J- or 820L-type is provided on the following leads:

- BA (transmitted data) PIN 3
- BB (received data) PIN 10
- AB (signal ground) PIN 8
- (Enables character detect and generate logic) PIN 7
- (Enables loop-back) PIN 2 bridged to PIN 4
- (Positive 24 volts) PIN 1
- (Negative 24 volts) PIN 20

Mounting Arrangements

4.30 Typical mounting arrangements for the 1A data station SCA in connection with the 85-type selective calling station are shown for the 35 and 37 TTYs on SD-1D258-01. All connections are made by means of plug and socket arrangements or screw terminals.

Testing 85-Type Station Controllers

4.31 Access to EIA signal leads BA, BB, and AB may be obtained for local testing of the 85-type station controllers by the use of AR751 CP in place of DS 108- or 109-type. These EIA signal leads may then be cross-connected to a 911NA data test set (DTS) or equivalent using a 911P test adapter. The 911NA test sentence generator may be used to transmit over the BB lead to the connected controller. The station may be tested by using three programmable characters to transmit the desired control code sequence (eg, call enquiry code, roll call, station polling code, blind, unblind, disconnect, etc). The distortion measuring set of the 911NA can be used to monitor

controller answer-back signals over lead BA. Controller answer-back signals will be shown on the LED display of the distortion measuring set of the 911NA DTS. The correctness of the received character, parity errors, and the amount of distortion can thus be checked.◀

5. REFERENCES

5.01 The following schematic drawings, circuit descriptions, and Bell System Practices (BSPs) pertain to the 85A1 DSCS stations:

NUMBER	TITLE
SD- & CD-1D198-01	Data Set 109E
SD- & CD-1D229-01	Data Set 108E
SD- & CD-1D244-01	820J-Type and 820L-Type Controller
SD- & CD-1D258-01	EIA Interface Coupler (AR751 CP)
SD- & CD-3D024-01	Data Set 108A
SD- & CD-3D041-01	Data Systems Station
SD- & CD-73092-01	▶Data Test Set 911NA◀
SD- & CD-73112-01	▶EIA Test Adapter 911P◀

SECTION	TITLE
103-813-110	▶911NA Data Test Set—Description and Operation◀
103-813-111	▶911P EIA Test Adapter—Description and Operation◀
581-131-202	85A1 and 85A2 Data Selective Calling Service Stations Using Data Auxiliary Sets 820J and 820L Controllers—Installation
581-131-302	85A1 and 85A2 Data Selective Calling Service Stations Using Data Auxiliary Sets 820J and 820L Controllers—Maintenance
581-131-502	85A1 and 85A2 Data Selective Calling Service Stations Using Data Auxiliary Sets 820J and 820L Controllers—Test Procedures