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1. GENERAL

1.01 This section covers the physical and functional description as well as the operating procedures for the half-duplex (HDX), 100-word per minute (wpm) data stations associated with the 86A1 Data Selective Calling Service.

A. Purpose of Station

1.02 The 86A1 Data Station is used to provide 100-wpm (110-baud) HDX data service between itself and other stations in the private network of which it is a part, under control of a customer-provided line control station (computer switcher). This configuration comprises what will hereafter be referred to as the 86A1 Data Selective Calling System.

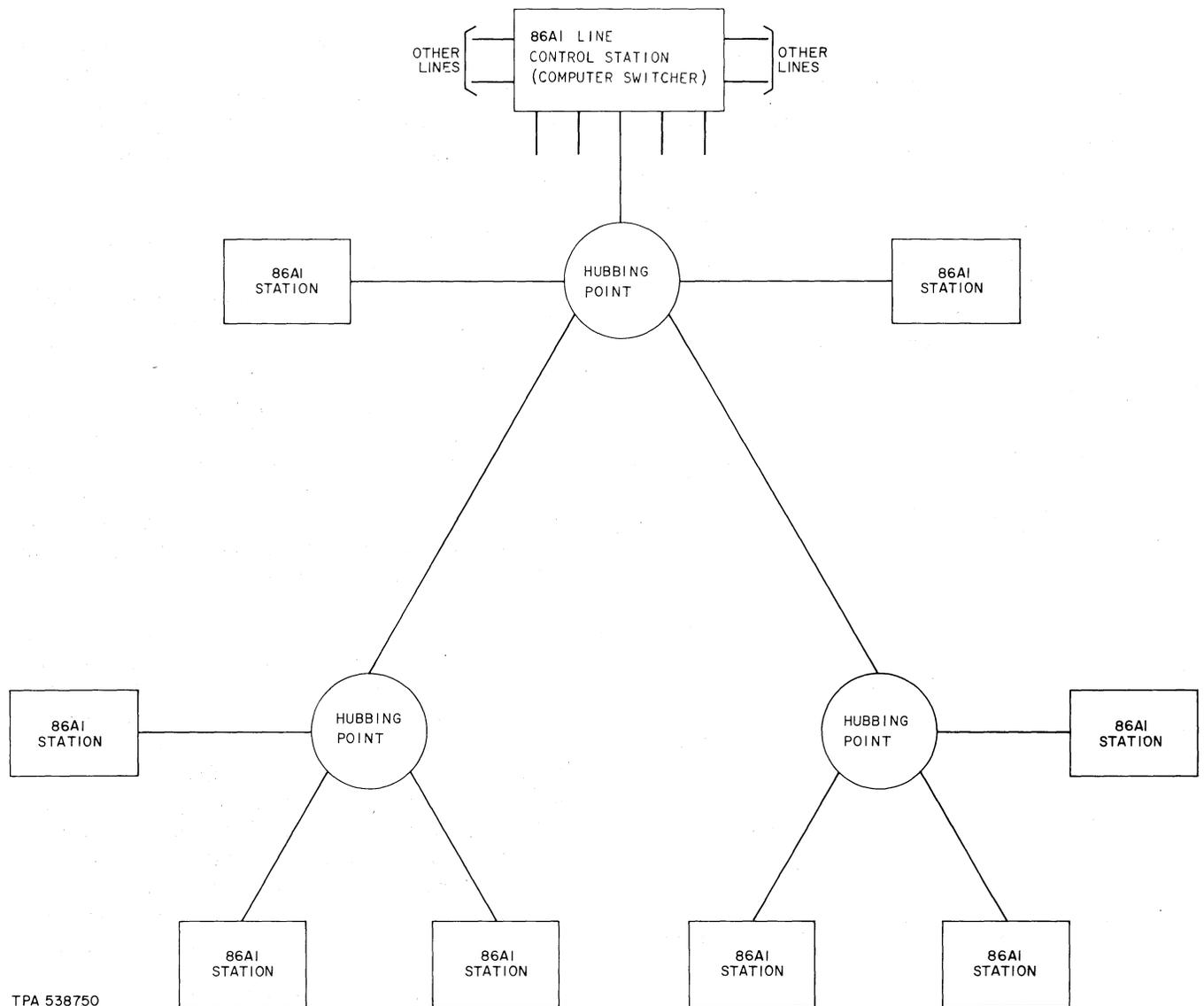
B. Purpose of System

1.03 The 86A1 Data Selective Calling System is a message switching system which administers one or more HDX lines. When more than one line is involved, the system also must provide store and forward capabilities. Each line can accommodate a number of stations which will normally be originate/terminate (ORIG/TERM) or terminate only (TERM ONLY) type stations.

C. System Arrangement

1.04 The block diagram of Fig. 1 shows a typical multistation line in a system arrangement. The system consists of the line control station (computer switcher) which has store and forward capabilities and normally a number of such lines.

1.05 The 86A1 stations and computer switcher are connected to the HDX lines via the hubbing points. All of the stations on each line must be arranged for HDX, 100-wpm operation.



TPA 538750

Fig. 1—Block Diagram of Typical 86A1 Data Selective Calling Service Multistation Line in a System Arrangement

D. Station Arrangement

1.06 The 86A1 station terminal equipment can be either model No. 33-type or model No. 35-type TTY equipment. The 86A1 station is a self-contained unit which is intended to be completely assembled at the distributing house prior to delivery.

1.07 The TTY station is available in the following arrangements:

(a) A 33 ASR TTY alone (ORIG/TERM station)

(b) A 35 ASR TTY alone (ORIG/TERM station)

(c) A 33 RO TTY alone (TERM ONLY station—page receiving)

(d) A 35 RO TTY alone (TERM ONLY station—page receiving)

(e) A 35 ROTR alone (TERM ONLY station—tape receiving)

1.08 In the case of 1.07(a) and (c), an auxiliary 33 RO TTY may be optionally provided as

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a slave unit to the primary TTY. In the case of 1.07(b) and (d), the auxiliary receiver may be either a 35 RO TTY or a 35 ROTR. In either case, the auxiliary machine can be turned on and off manually, or during any message delivery can be turned on and off automatically, under on-line signal control. In no case may a 35 ROTR TERM ONLY station be equipped with an auxiliary receiver. The 35 ROTR cannot be used as an auxiliary machine to a 33 primary TTY.

Note: The primary RO TTY has sometimes been referred to in the past as the master RO TTY.

1.09 The block diagram of Fig. 2 shows a typical ORIG/TERM station and a typical TERM ONLY 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 is used at an ORIG/TERM station:

- (a) To prepare tapes for message transmissions
- (b) To send all station transmissions
- (c) To print local copy of all station transmissions and receptions
- (d) To optionally punch tapes of messages received by a station not equipped with an auxiliary receiver
- (e) To print local copy of information sent by the computer switcher [ie, service messages concerning messages sent or received by the station; personal address information (PAI); or time, date, and message number (TDM) of messages sent or received by the station].

1.11 The primary RO TTY is used at a TERM ONLY station to print local copy of all messages received by the station and print local copy of information sent by the computer switcher (ie, TDM of messages received by the station, PAI, or service messages received from the computer switcher concerning messages received by the station).

1.12 The primary ROTR performs the same function as a primary RO TTY except that the ROTR punches a tape of the information received instead of printing it in page form. In addition, the ROTR also prints the message on the tape.

1.13 An RO TTY or ROTR may be used as an auxiliary machine to a primary ASR or RO TTY only. The auxiliary machine when unblinded performs as a slave to the primary TTY.

1.14 The Data Auxiliary Set (DAS) 820B-type (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 to the computer switcher. The controller also houses and supplies operating voltages for the Data Set 108A or 109A.

1.15 The data set converts the digital data voltages received from the data terminal via the controller into voiceband frequency tones (108A) or dc currents (109A) suitable for transmission over the line. It also converts the voiceband frequency tones or dc currents received from the line into digital data voltages suitable to operate the data terminal. In addition, Data Set 108A monitors the line for a carrier failure. Should the carrier fail while the station is selected to transmit or receive, a signal is sent from the data set to the controller. This activates the controller initialization circuits.

1.16 The Data Auxiliary Sets 804N4, N2, and R3 (attendant sets) are used to cause the controller to generate traffic-available responses (804N4 only), place the station out of service (OOS), silence the audible alarm, and extinguish alarm indication lamps. They also have lamps which indicate when the station is selected as a sender or receiver, is OOS, or is in an alarm condition.

1.17 The 91A and 92A mounting brackets are used to mount the controller in the pedestal of the 33-type TTY and 35-type TTY, respectively. The 95A mounting bracket is used to mount the controller in the KS-20018 type cabinet at an ROTR TERM ONLY station.

1.18 The M36H cord is available in three lengths (4, 10, and 50 feet). It is used to connect primary RO or ROTR TTY to the controller.

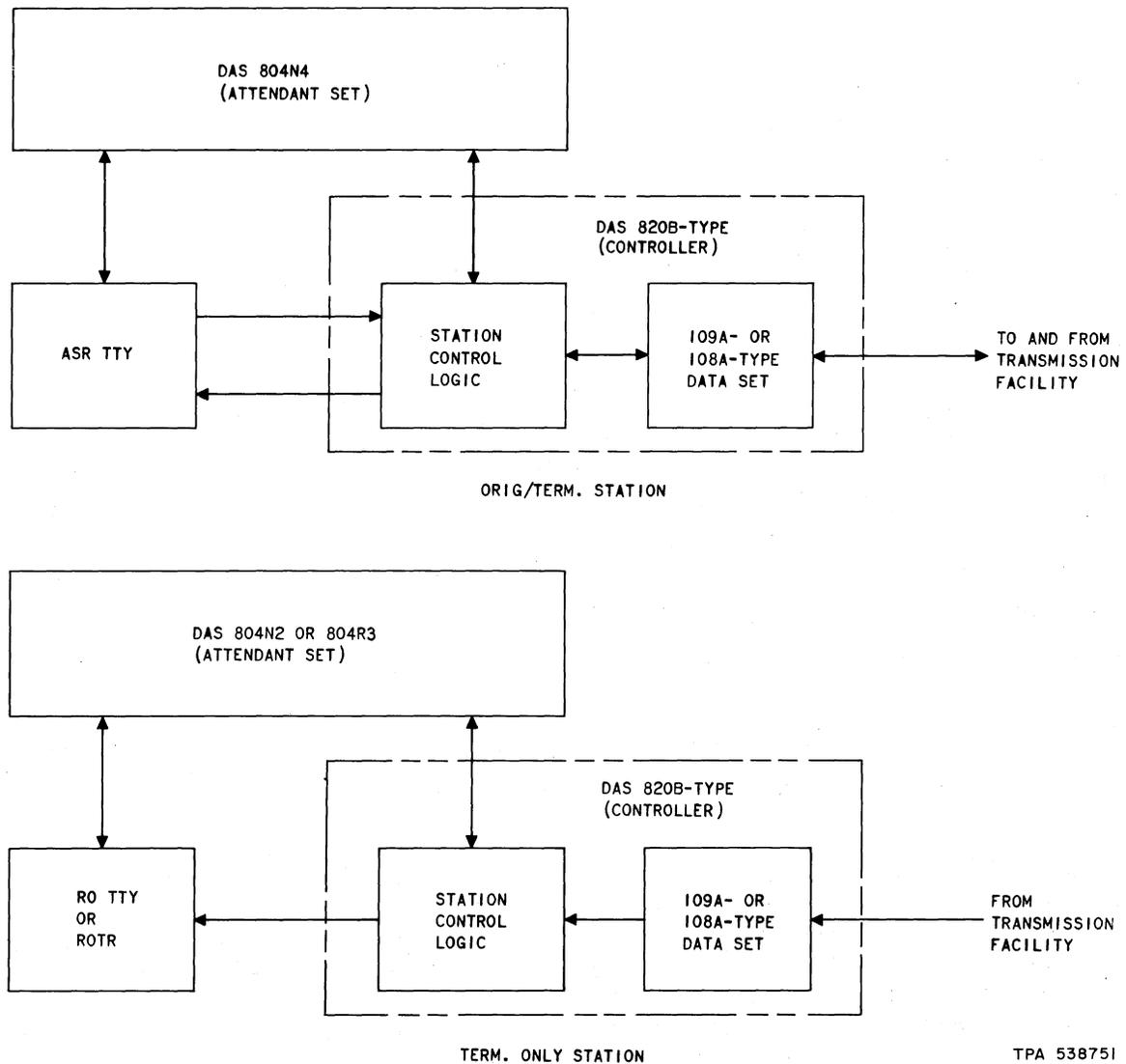


Fig. 2—Block Diagram of Typical 86A1 TTY Stations

F. Station Operation

1.19 Under normal operating conditions, the computer switcher interrogates each 86A1 station individually in order to determine the following:

- (a) Whether the station has traffic available to transmit
- (b) Whether the traffic to be transmitted has regular or priority status
- (c) Whether the station is ready to receive.

This procedure is referred to as polling. If the station responds to polling with a traffic-available response, the computer may select it as a sender.

1.20 When the computer switcher elects to pick up traffic from a station that has responded with a traffic-available response, it will select that station as a sender, and if programmed to do so, will send the station a time, date, and originating message number (TDM). At this time, dependent on the option provided in the station, one of the following will occur.

- (a) Intraline delivery—On signal from the computer switcher, the station will send the

TABLE A

TYPE STATION	PRIMARY TTY	ATTENDANT SET	CONTROLLER DAS	MTG BRKT	*M36H CORD	AUX REC TTY (OPTIONAL)
33 ORIG/TERM	33 ASR	804N4	820B1†, 820B2, or 820B7†	91A	No	33 RO TTY
35 ORIG/TERM	35 ASR	804N4	820B1†, 820B2, or 820B7†	92A	No	35 RO TTY or 35 ROTR
33 TERM ONLY	33 RO	804N2	820B1, 820B2, or 820B7	91A	Yes (4 feet long)	33 RO TTY
35 TERM ONLY	35 RO	804N2	820B1, 820B2, or 820B7	92A	Yes (4 feet long)	35 RO TTY or 35 ROTR
	35 ROTR‡	804R3	820B1, 820B2, or 820B7	95A	Yes (§)	None

* Early installations may be equipped with the M36F cord.

† Provides end-of-transmission (EOT) counter; however, counter cannot be used with M33 ASR TTY.

‡ A KS-20018-L1, -L2, -L3, or -L4 cabinet is also required for mounting the controller.

§ 10 or 15 feet dependent on location of KS-20018-type cabinet.

message heading to the computer switcher and stop. The message heading should contain the addresses of all of the stations that are to receive the message. If any of the stations addressed in the heading are on the same line as the selected sender (intra-line stations), the computer switcher may select them as receivers. The computer switcher then signals the selected sender to transmit the text of the message. The message is simultaneously copied by all the intra-line receivers, and if any stations on other lines (interline stations) were addressed in the heading, the message is also stored by the computer switcher for future delivery to the interline addressee(s).

(b) Interline delivery—On signal from the computer switcher, the station will send the entire message (heading and text). The computer switcher will store the heading and text for future delivery to all of the addresses. In this case the addressed intra-line stations are treated in the same manner as the interline stations.

1.21 Message delivery is administered on a selective call-in basis. Each station designated as an addressee in the heading of a message nominated for delivery is interrogated by the computer switcher

to determine if it is ready to receive. If the station is not ready to receive, the computer switcher will store the message until it discovers that the station is again ready to receive. If the station is ready to receive, it will be selected as a receiver and the message will be delivered. After the text of each message has been delivered to the selected receive stations, the computer switcher may (dependent on the option provided in the station) perform one of the following.

(a) Roll call—The computer switcher will interrogate each receive station in turn to determine if the message was received properly. If the computer switcher receives a positive reply to roll call, it will go on to roll call the other selected receivers; however, if a negative reply is received, an alarm is activated at the station being roll-called and the computer switcher will queue (intra-line delivery) or requeue (interline delivery) the message for retransmission at a later time. After all of the selected receive stations have been roll-called, they are returned to the idle state by the computer switcher.

(b) No roll call—In this case, the computer switcher will return the selected receivers

to the idle state immediately upon completion of the message delivery.

G. Station Power

1.22 The 86A1 Data Station requires an individually fused line power source of 106 to 129 volts, 59.55 to 60.45 Hz. The dc voltages required to operate the controller are supplied by the 24A power unit which is a part of the controller. The ac power for the 24A power unit is supplied from a terminal block on the TTY via the M3AY cord which is supplied with the controller.

2. PHYSICAL DESCRIPTION

A. General

2.01 This part describes the physical appearance of the 86A1 TTY Data Stations. The various arrangements of each are shown in Table A.

2.02 The 33 ORIG/TERM station is shown in Fig. 3. Pictured is the 33 ASR TTY with its 804N4 attendant set. The data set, controller, and the 91A bracket (not shown) are mounted inside the 33 ASR TTY pedestal. Only a 33 RO TTY may be used at this station as the auxiliary receiver.

2.03 A typical arrangement of the 35 ORIG/TERM station is shown in Fig. 4. The arrangement shown pictures the 35 ASR TTY with its 804N4 attendant set. The data set, controller and 92A bracket (not shown) are mounted inside the 35 ASR TTY pedestal. Either a 35 RO TTY or 35 ROTR may be used at this station as the auxiliary receiver.

2.04 The 33 TERM ONLY station arrangement is shown in Fig. 5. Pictured is the primary 33 RO TTY and its 804N2 attendant set. The data set, controller, M36H cord, and 91A bracket (not shown) are mounted inside the primary 33 RO TTY pedestal. Only a 33 RO TTY may be used at this station as the auxiliary receiver.

2.05 The 35 TERM ONLY station arrangement is shown in Fig. 6. Pictured is the primary 35 RO TTY and its 804N2 attendant set. The data set, controller, M36H cord, and 92A bracket (not shown) are mounted inside the primary 35 RO TTY pedestal. Either a 35 RO TTY or 35 ROTR may be used at this station as the auxiliary receiver.

2.06 The 35 ROTR TERM ONLY station arrangement is shown in Fig. 7. Pictured is the 35 ROTR TTY and its 804R3 attendant set. The data set, controller, and 95A bracket are mounted in a KS-20018 type cabinet. The M36H cord connects the 35 ROTR TTY to the controller. With the 35 ROTR TERM ONLY station, it is not possible to have an auxiliary receiver.

B. Teletypewriters

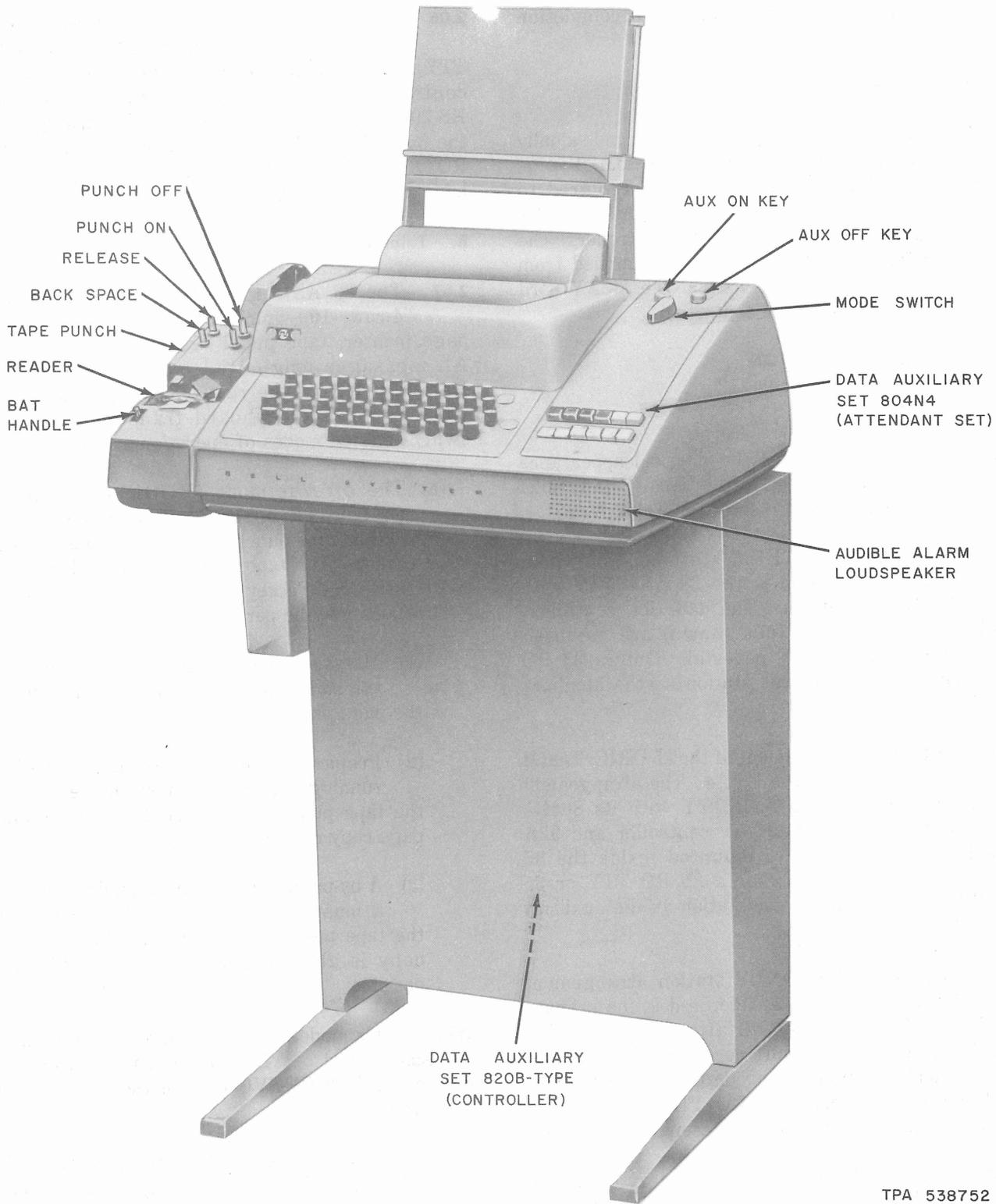
2.07 The 33 ASR TTY (shown in Fig. 3) is a 4-row, 100-wpm TTY which consists of a page printer, tape punch, reader, and keyboard. All messages originated by a 33 station are transmitted from the reader. No provisions are made for direct keyboard transmission. Two switch-selected modes of operation are possible:

(a) The *off-line* mode (MODE switch in the OFF LINE position) in which the page printer and tape punch operate from the keyboard or reader. The tape punch is controlled by the PUNCH ON-OFF key. In this mode, the following functions may be performed.

- (1) Messages may be prepared (on tape) for transmission with local copy provided by the page printer.
- (2) Prepared tapes may be proof-read by running the tape through the reader with the tape punch turned off, thereby obtaining page copy of the tape.
- (3) A by-product tape may 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.

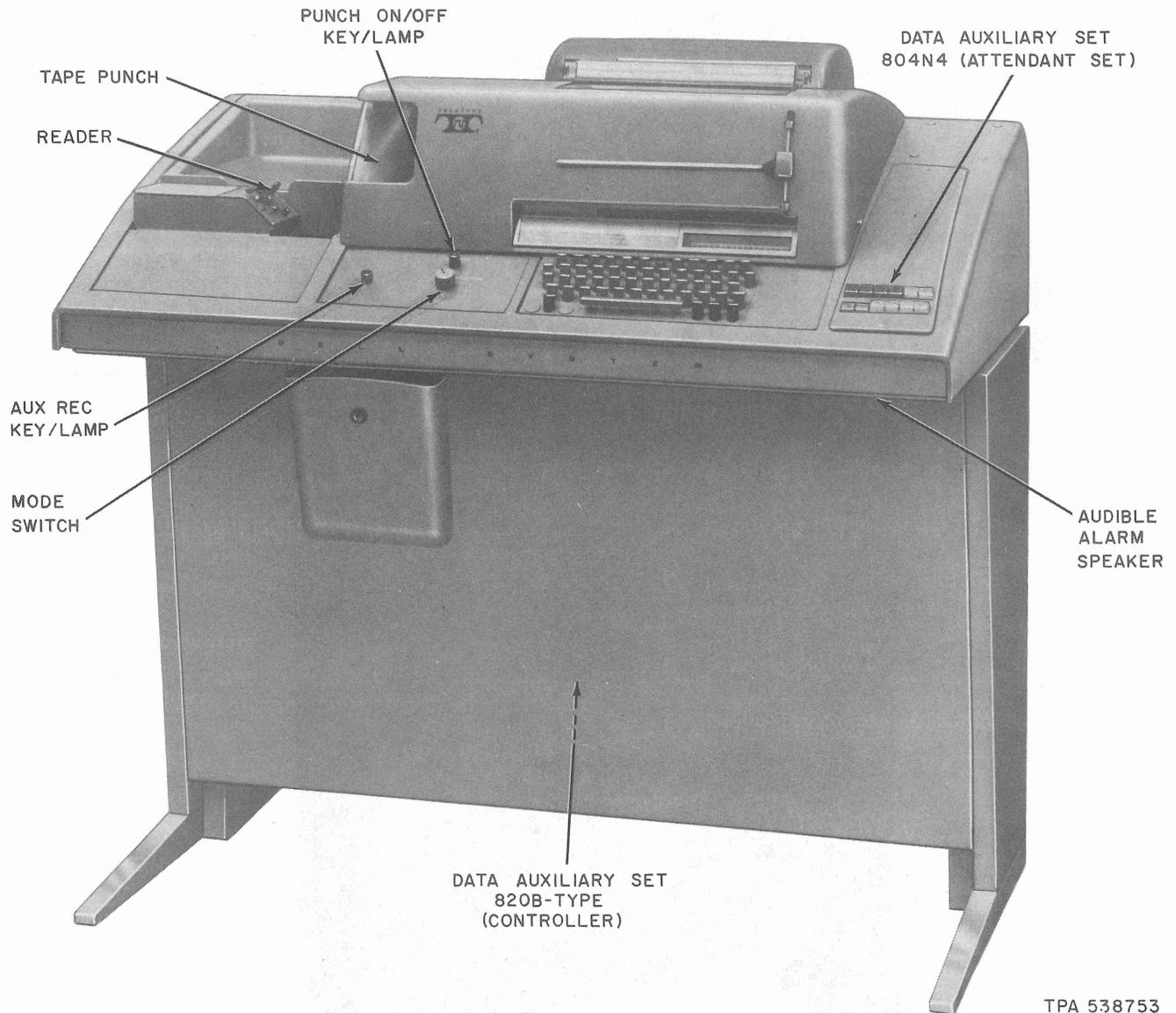
While in this mode, messages cannot be transmitted or received and the TTY motor runs continuously unless the OUT-OF-SVC key on the attendant set is operated.

(b) The *line* mode (MODE switch in the LINE position)—In this mode, tape preparation is not possible. The page printer will copy all messages transmitted or received by the station and the tape punch (if selected) will copy all messages received by the station. The motor starts when a request for traffic pickup is entered (BID key operated) or when the station



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Fig. 3—Typical 33 ORIG/TERM 86A1 Data Station



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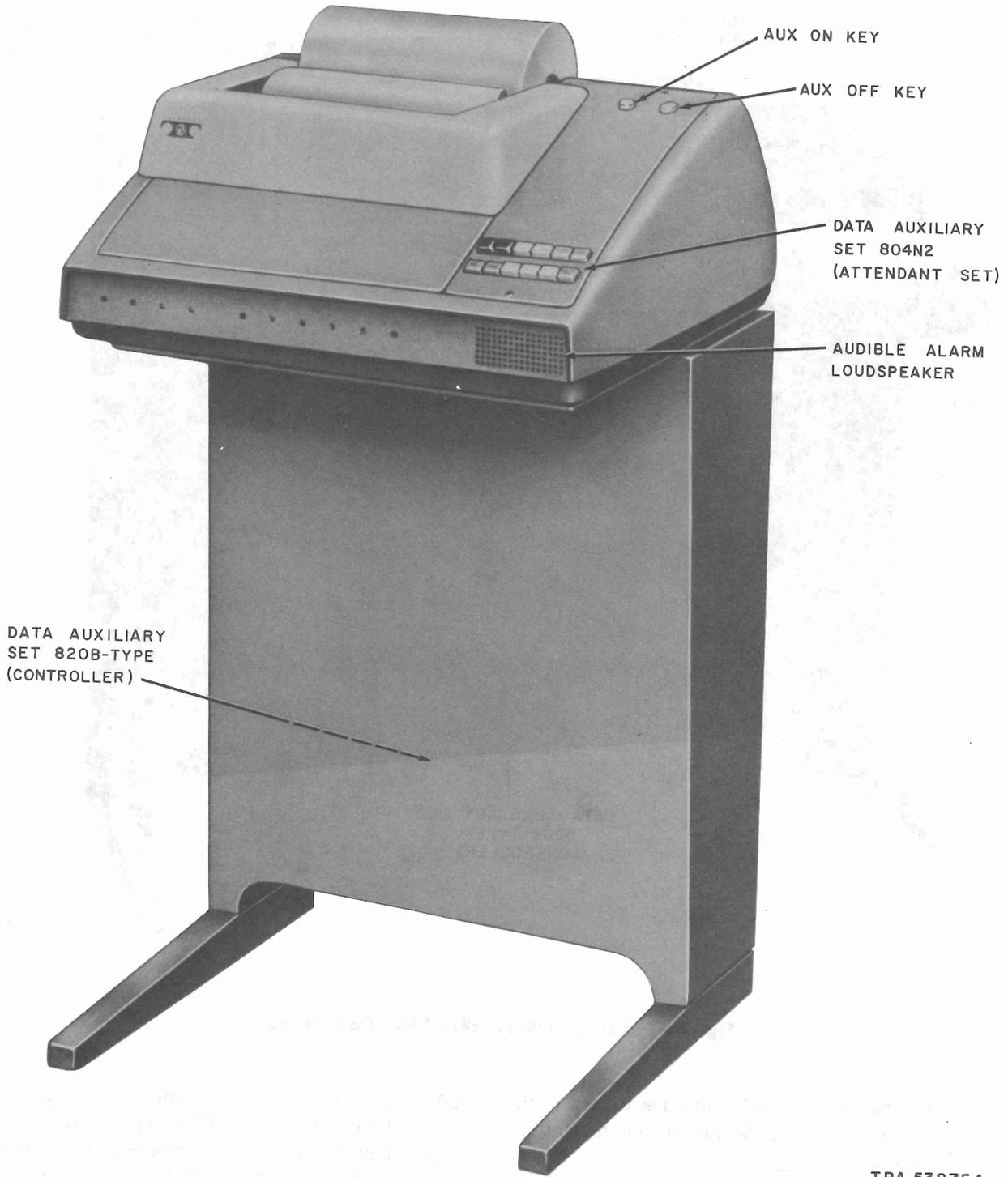
Fig. 4—Typical 35 ORIG/TERM 86A1 Data Station

is selected to receive, and continues to run until the traffic-available state is canceled or the station is unselected.

2.08 The overall external dimensions of the 33 ASR TTY cabinet are 33 inches high, 22 inches wide, and 18.5 inches deep. When equipped with the controller, the 33 ASR TTY weighs approximately 105 pounds.

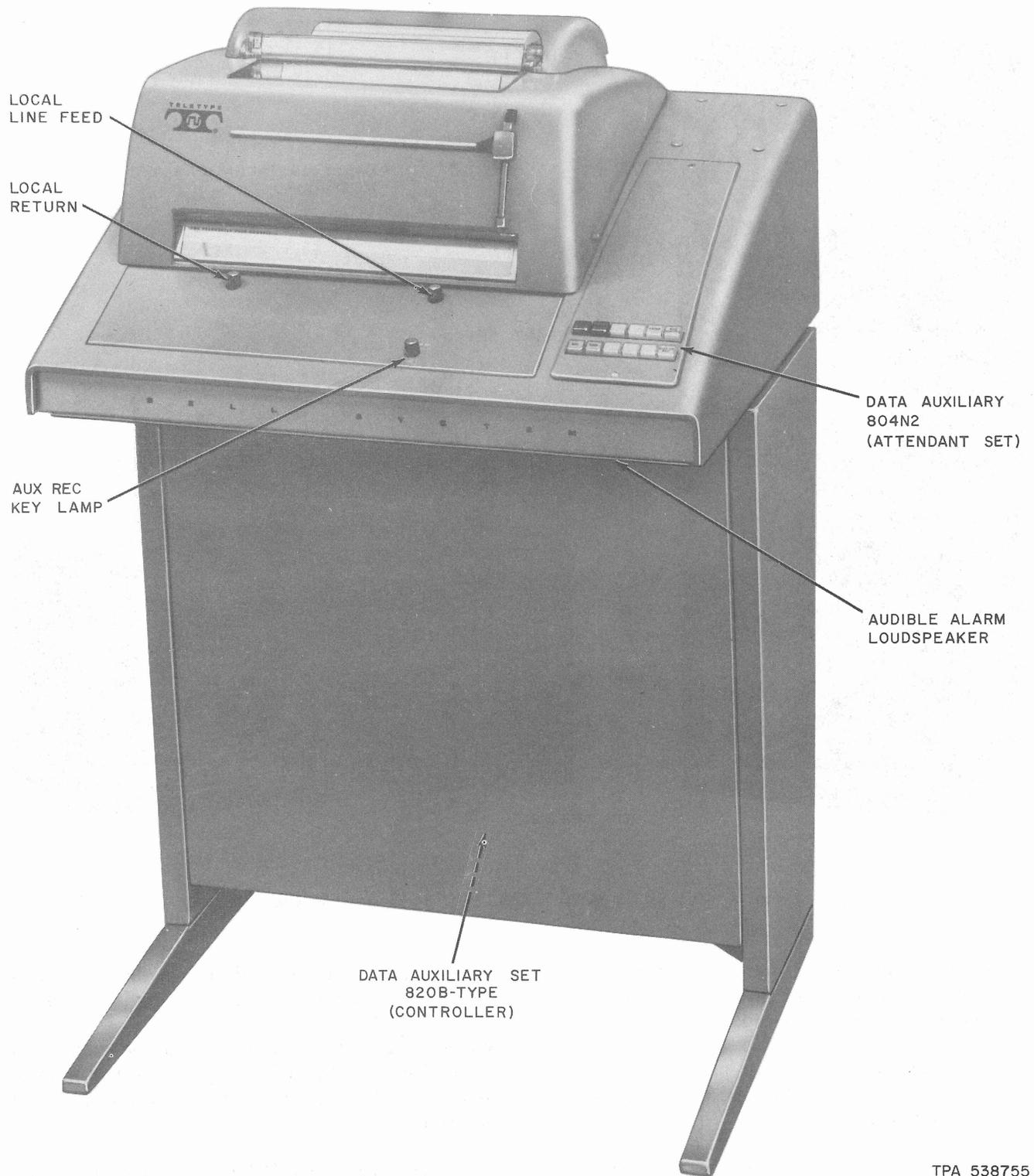
2.09 The 35 ASR TTY (shown in Fig. 4) is a 4-row, 100-wpm TTY which consists of a page printer, tape punch, reader, and keyboard. All messages originated by a 35 station are transmitted from the reader. No provisions are made for direct keyboard transmission. Three switch-selected modes of operation are possible:

- (a) The *off-line* mode (MODE switch in the OFF LINE position) in which the typing



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Fig. 5—Typical 33 TERM ONLY 86A1 Data Station



TPA 538755

Fig. 6—Typical 35 TERM ONLY 86A1 Data Station

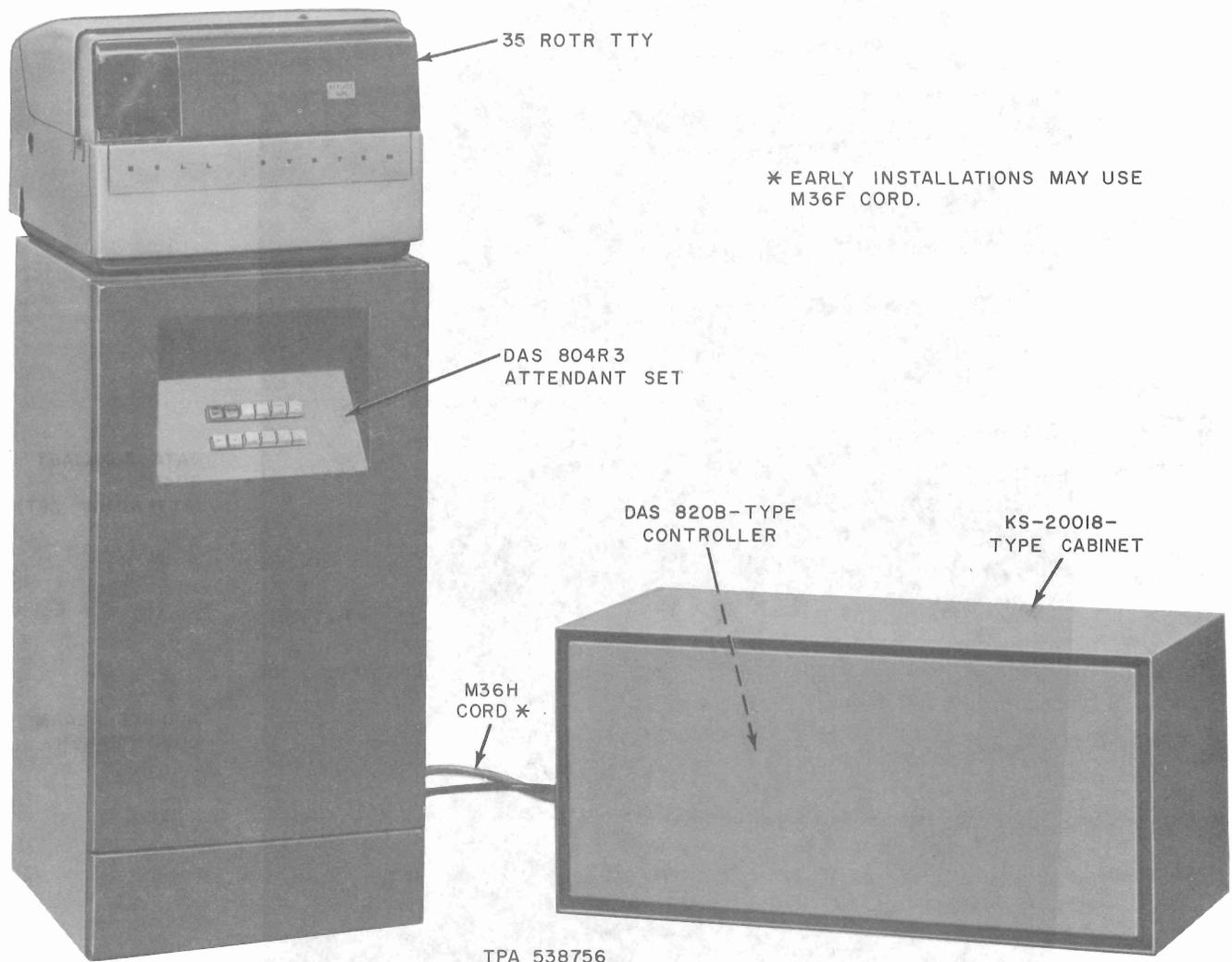


Fig. 7—Typical 35 ROTR TERM ONLY 86A1 Data Station

unit and tape punch operate from either the keyboard or reader. In this mode, the following functions may be performed:

- (1) Messages may be prepared (on tape) for transmission with local copy provided by the page printer.
- (2) Prepared tapes may be proof-read by running the tape through the reader with the tape punch turned off, thereby obtaining page copy of the tape.
- (3) A by-product tape may be made by running a master tape through the reader with

the tape punch turned on. In this case, page copy is obtained and tape editing is possible.

While in this mode, messages cannot be transmitted or received and the TTY motor runs continuously unless the OUT-OF-SVC key on the attendant set is operated.

- (b) The *line* mode (MODE switch in the LINE position)—In this mode, messages may be prepared on tape (without page copy) while the station is transmitting or receiving messages. The page printer copies all messages transmitted or received by the station, and the TTY motor runs continuously unless the OUT-OF-SVC key is operated.

- (c) The *unattended* mode (MODE switch in the UNATT position)—In this mode the page printer copies any messages received by the station. At installations not equipped with an auxiliary RO TTY, the tape punch may be called in by line signals and used as an auxiliary receiver. Only the page printer is normally on-line. However, if there is traffic to send and a bid condition is present, the reader remains on until all traffic has been sent. Then the motor turns off and is turned on again only when the station is called in to receive a message. This arrangement permits use of the machine for receiving messages without the necessity for having its motor running continuously.
- 2.10** The overall external dimensions of the 35 ASR TTY cabinet are 38.5 inches high, 40 inches wide, and 24 inches deep. When equipped with the controller, the 35 ASR TTY weighs approximately 370 pounds.
- 2.11** The 33 RO TTY is a 4-row, 100-wpm TTY which consists of a page printer. It may be used as a primary receiver (Fig. 5) or as an auxiliary receiver to a primary 33 ASR or 33 RO TTY (Fig. 8). When the 33 RO TTY is used as a primary receiver, the motor runs only when the station is called in to receive. When it is used as an auxiliary receiver, the motor runs whenever the primary receiver motor runs.
- 2.12** The overall external dimensions of the 33 RO TTY cabinet for either the primary or auxiliary receiver applications are 33 inches high, 18.6 inches wide, and 18.5 inches deep. Without the controller, it weighs approximately 81 pounds.
- 2.13** The 35 RO TTY is a 4-row, 100-wpm TTY which consists of a page printer. It may be used as a primary receiver (Fig. 6) or as an auxiliary receiver to a primary 35 ASR or 35 RO TTY (Fig. 9). When the 35 RO TTY is used as a primary receiver, the motor runs only when the station is called in to receive. When it is used as an auxiliary receiver, the motor runs whenever the primary receiver TTY motor runs.
- 2.14** The overall external dimensions of the 35 RO TTY cabinet for either the primary or auxiliary receiver applications are 38.5 inches high, 24 inches wide, and 24 inches deep. Without controller, it weighs approximately 171 pounds.
- 2.15** The 35 ROTR is a 100-wpm machine which consists of a typing reperforator that punches the standard 1-inch tape. It may be used as a primary receiver (Fig. 7) or as an auxiliary receiver to a 35 ASR or 35 RO TTY (Fig. 10). When used as a primary receiver, the 35 ROTR cannot be arranged to operate with an auxiliary receiver.
- 2.16** The overall external dimensions of the 35 ROTR cabinet for either the primary or auxiliary receiver applications are 34 inches high, 13-5/16 inches wide, and 14 inches deep. It weighs approximately 75 pounds. When the 35 ROTR is employed as a primary receiver, the required controller must be housed externally as shown in Fig. 7.
- C. Controllers**
- 2.17** The controllers are shown in Fig. 11 and 12. They come equipped with a 24A power unit and an M3AY power cord. The overall external dimensions of the controller are approximately 8.5 inches high, 15.5 inches wide, and 6.0 inches deep, and it weighs approximately 19 pounds.
- 2.18** The controllers have slots for 13 AR circuit packs (CP) and one slot for a Data Set 108A or 109A. In the 86A1 Data Selective Calling System, 12 of the CP slots are used. Seven of the CPs are for the state and control logic and timing functions, four are for interface functions between the TTY and the controller, and one contains the *in/out* shift register.
- 2.19** The controllers are equipped with a terminal strip for the connection of the transmission facility. Connectors are also provided for the connection of the ASR TTY (M connector), the ASR TTY attendant set (N connector), or the primary RO or ROTR TTY and associated attendant set (M and N connector). Switches are provided for control of the modulator squelch and maintenance test (manual loop-back) circuits.
- 2.20** In 33-type stations, the controller is located behind the rear panel of the TTY pedestal (Fig. 13). It is mounted on a 91A bracket which allows it to be tilted out for maintenance and CP removal.
- 2.21** In 35-type stations, the controller is located behind the lower front panel of the TTY pedestal (Fig. 14). It is mounted on a 92A bracket

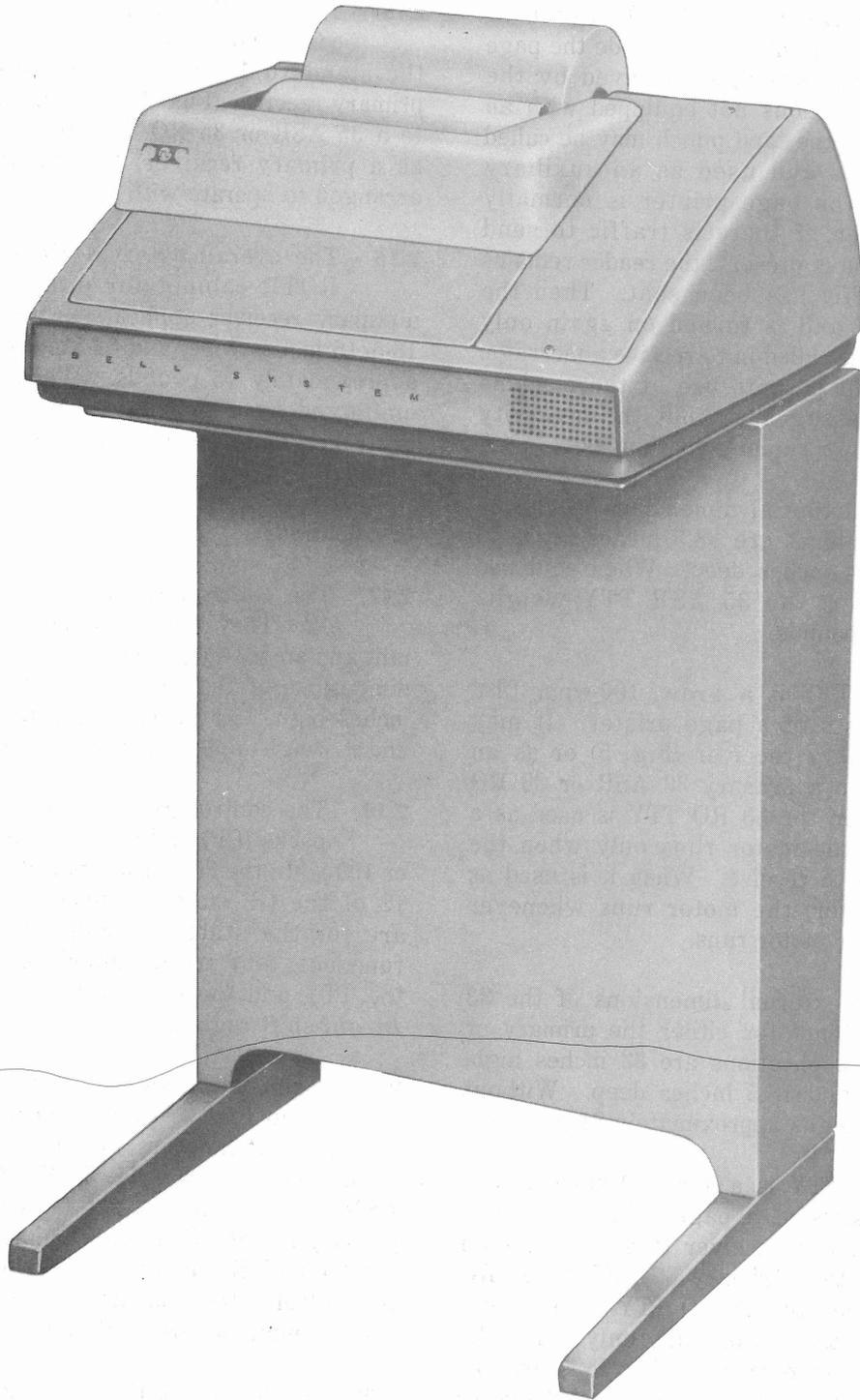


Fig. 8—Auxiliary 33 RO TTY

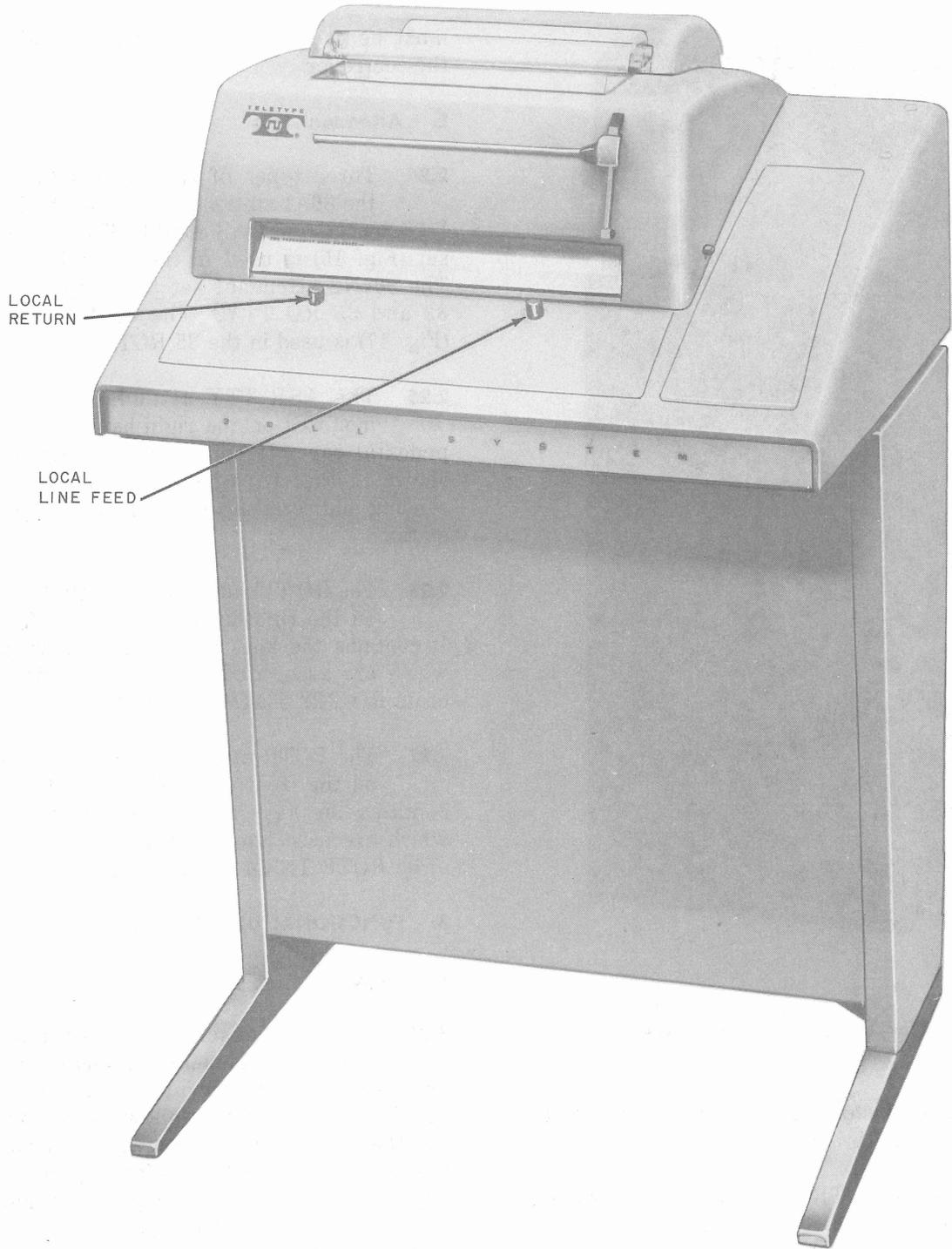


Fig. 9—Auxiliary 35 RO TTY

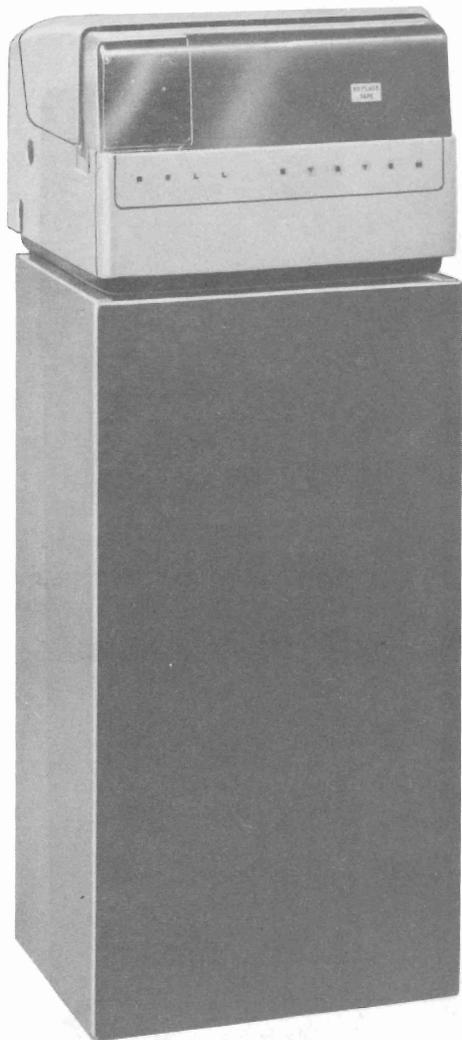


Fig. 10—Auxiliary 35 ROTR

in a position which facilitates maintenance and CP removal without tilting.

2.22 In a 35 ROTR station, the controller 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.

D. Data Set

2.23 The data set is the printed wiring board assembly located at the right-hand end of the controller (see Fig. 11 and 12). The data set is not supplied with the controller and therefore

must be ordered separately for installation with the controller.

E. Attendant Sets

2.24 Three types of attendant sets are used in the 86A1 stations. They are the DAS 804N4, DAS 804N2, and DAS 804R3. The 804N4 attendant set (Fig. 15) is used in the 33 and 35 ASR TTY. The 804N2 attendant set (Fig. 16) is used in the 33 and 35 RO TTY. The 804R3 attendant set (Fig. 17) is used in the 35 ROTR.

2.25 The ASR TTY attendant set (804N4) is mounted on the right-hand side of the TTY pedestal top. It contains the keys and lamps, shown in Fig. 18, which are associated with the sending and receiving functions of an ORIG/TERM station.

2.26 The RO TTY attendant set (804N2) is mounted on the right-hand side of the TTY pedestal. It contains the keys and lamps, shown in Fig. 19, which are associated with the receiving functions of an RO TTY TERM ONLY station.

2.27 The ROTR attendant set (804R3) is mounted on the front door of the ROTR pedestal. It contains the keys and lamps, shown in Fig. 19, which are associated with the receiving functions of an ROTR TERM ONLY station.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 This part describes the functions of the various components that make up the 86A1 Data Stations and their different arrangements. In the descriptions which follow, it will be assumed that the station under consideration is an ORIG/TERM station. Message transmission will be covered separately from the message reception in order that the latter method of operation may be applied to TERM ONLY station situations.

3.02 Reference will be made to the American National Standard Code for Information Interchange (ASCII) (Table B). An eighth bit is used to provide even-bit parity. Table C gives the legend for the various ASCII designations.

3.03 When power is applied or removed and then reapplied to a station, an initializer circuit

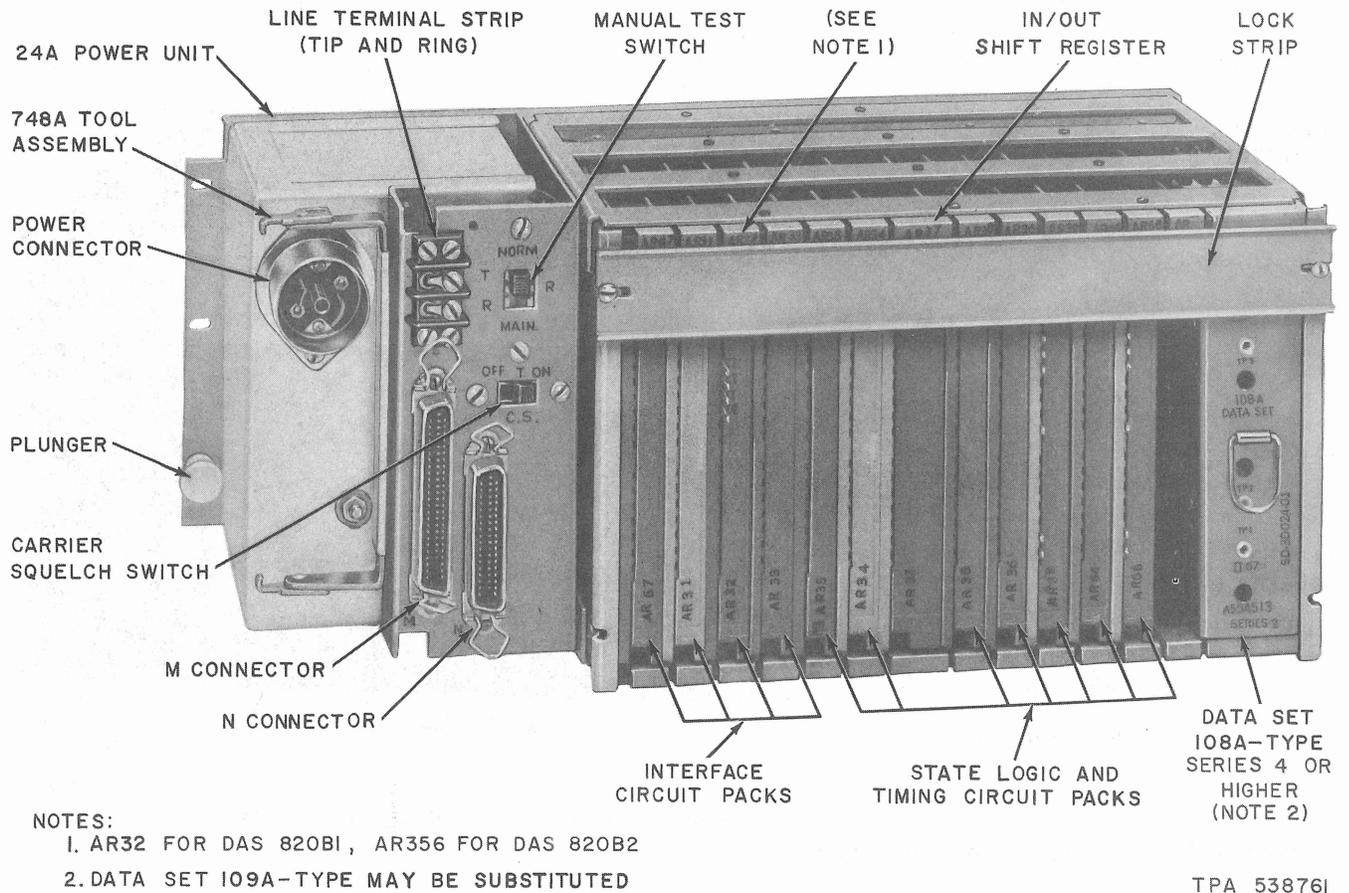


Fig. 11—DAS 820B1 or 820B2 (Controller)

in the controller applies a momentarily positive voltage to all critical state logic memory elements and places the controller in the idle mode.

Message Format

3.04 Messages are prepared from the keyboard on punched tape. All messages follow the same format which consists of an SOH, the message heading, an STX, the text of the message, and an ETX. If a second message is prepared on one continuous length of tape, it is put on the tape following the ETX of the first message. A third message may be put on the tape following the ETX of the second, etc. Each message must follow the same format:

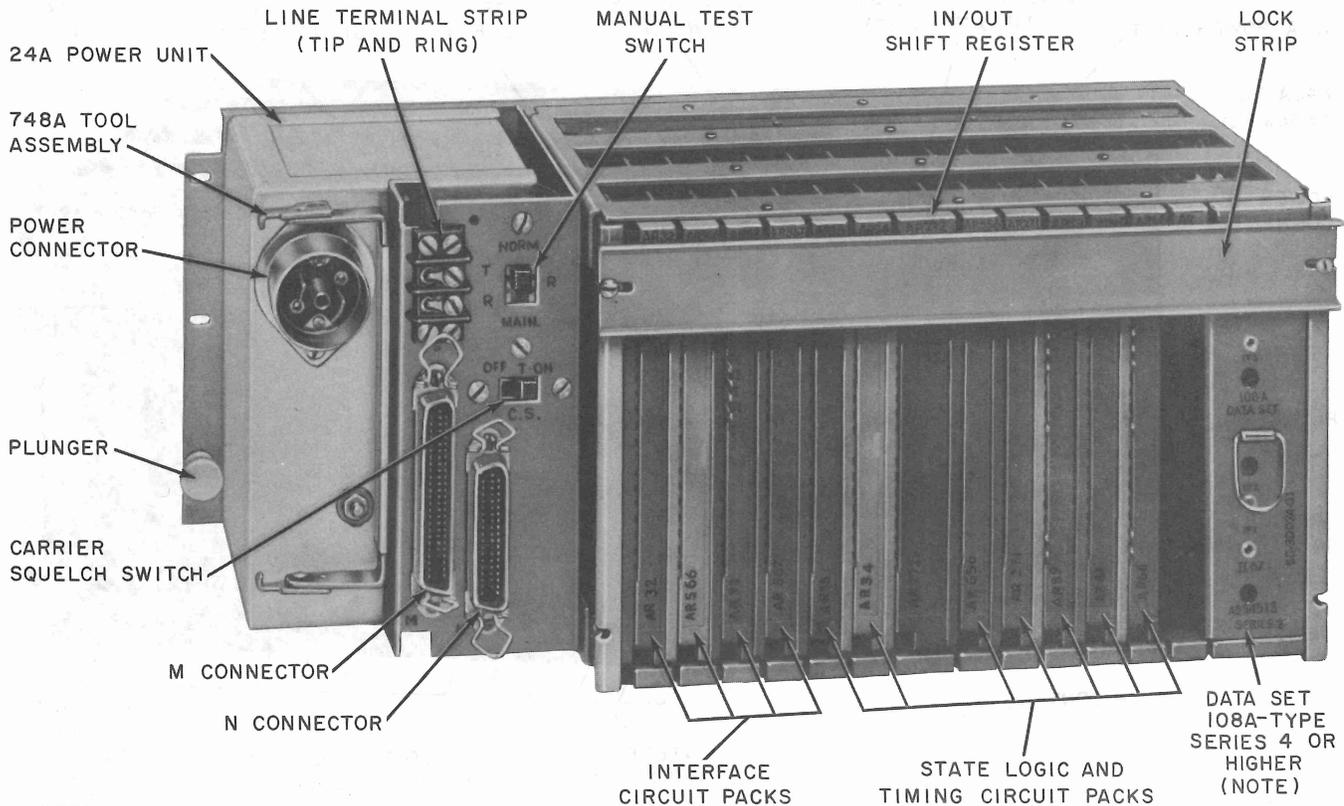
SOH heading STX text ETX.

The ETX of the last message must be followed by an EOT. The several messages followed by EOT

constitute a transmission. Since it is intended that the station operation be on a "continuous tape" basis, each transmission is usually followed by several inches of delete (DEL) characters (fill characters) which serve to allow the last significant character of the transmission (EOT) to be read by the reader before a taut-tape condition occurs.

EOT Counter

3.05 When a 35 ORIG/TERM station is equipped with DAS 820B1 or 820B7 controller, the EOT counter feature is provided. This allows the utilization of continuous tape operation without the possibility of starting to send a partially prepared transmission. The messages are prepared in the on-line mode and fed directly from the tape punch into the reader. When the EOT key of the keyboard is operated to mark the end of a transmission, a count is entered into the counter. Now, with the bat handle of the reader in the



NOTE:
DATA SET IO9A-TYPE MAY BE SUBSTITUTED

TPA 538762

Fig. 12—DAS 820B7 (Controller)

RUN position, the reader will start and the BID lamp will light. The reader will run, discarding the DEL fill characters that followed the EOT of the last transmission, and search for the first SOH of the next transmission.

Note: While the station is searching for SOH, its response to polling will be "no traffic available."

When the first SOH is detected, the reader will stop and the controller will be conditioned to the traffic-available state. A maximum of 14 EOTs may be counted. As the computer switcher picks up the messages, the EOT count is reduced by one each time the controller detects an EOT transmitted from the tape. The station gives a traffic-available response each time it is polled as long as the count in the EOT counter has not been reduced to zero. If the EOT count exceeds 14, the controller assumes an "infinite count" state, which is the same state as that obtained if the BID

key on the attendant set is operated. When in the "infinite count" state, the count in the EOT counter will not be reduced by the transmission of an EOT and the station will give a traffic-available response to polling until such time as the EOT counter is returned to the "zero count" state by a taut-tape condition, tape-out condition, or emergency stop sequence (3.28 and 3.29).

3.06 For tapes prepared in the off-line mode or at another location, the traffic-available state can be initiated when the tape is in the reader and the bat handle is operated to RUN by operating the BID key on the attendant set. Operation of the BID key lights the BID lamp, sets the EOT counter to the infinite count state, and starts the reader.

Note: While the station is searching for SOH, its response to polling will be "no traffic available."

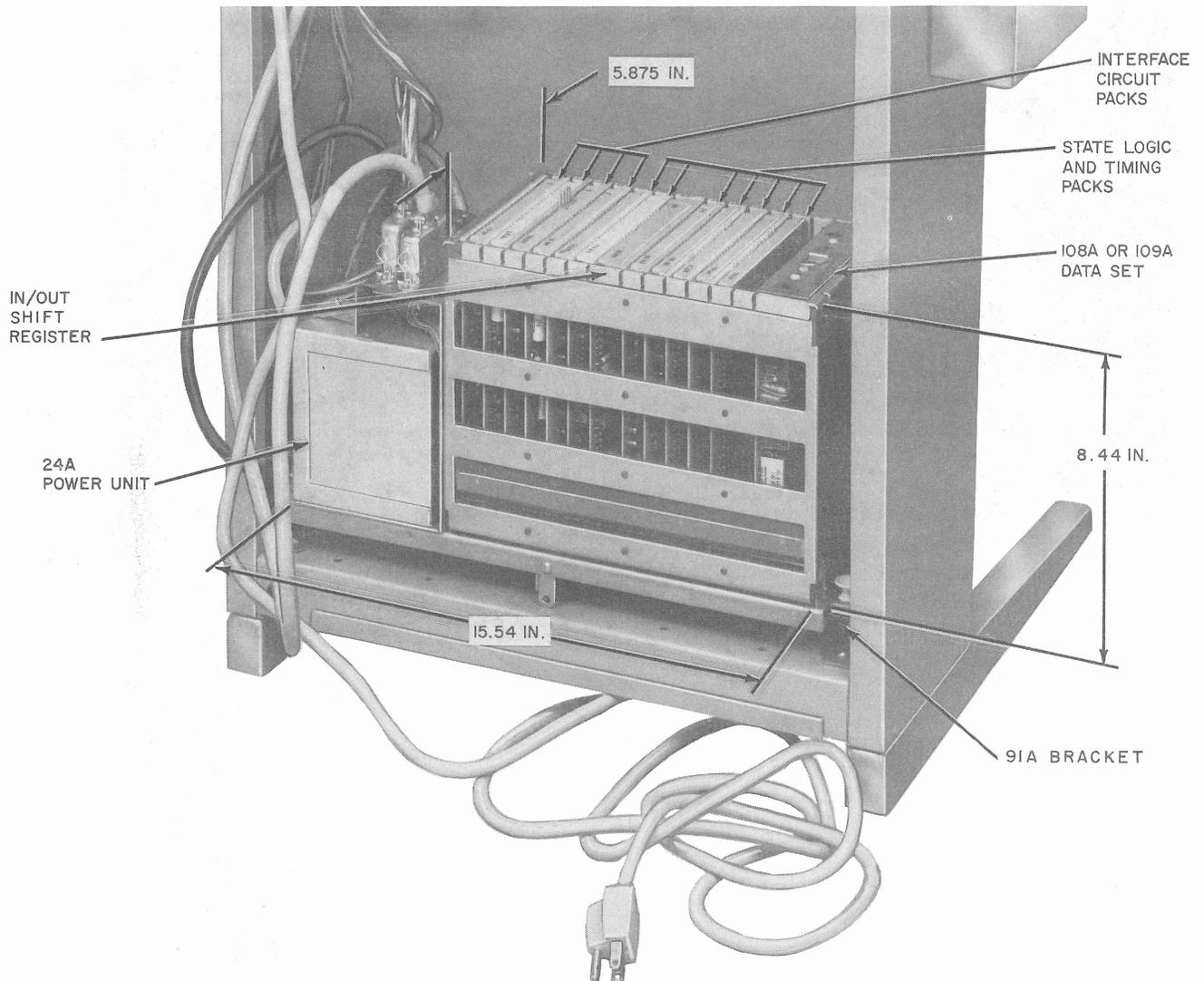


Fig. 13—Mounting Arrangement of DAS 820B-Type in a 33-Type Station

At this point, station operation will be the same as just described (see 3.05) until the first SOH character on the tape is detected. Detection of the SOH character stops the reader. The controller will now respond "regular traffic available," or if the PRIOR key is operated, "priority traffic available" when polled by the computer switcher. As previously mentioned (3.05), an "infinite count" state in the EOT counter causes the traffic-available state to be maintained until the EOT counter is returned to the "zero count" state by a taut-tape condition, tape-out condition, or emergency stop sequence. If a taut-tape condition occurs during message preparation, the counter is restored to

the "zero count" state and normal count-in/count-out operation of the EOT counter will be restored.

Polling and Polling Responses (Fig. 20)

3.07 The computer switcher polls every station on the line in turn by sending DLE followed by the unique station polling code (SPC) of the station being polled. The DLE defines the start of the polling sequence and activates the appropriate logic circuits in the stations. The SPC for each station is a single character chosen from the 94 printing graphics (with the exception of R, P, and +) of the ASCII characters.

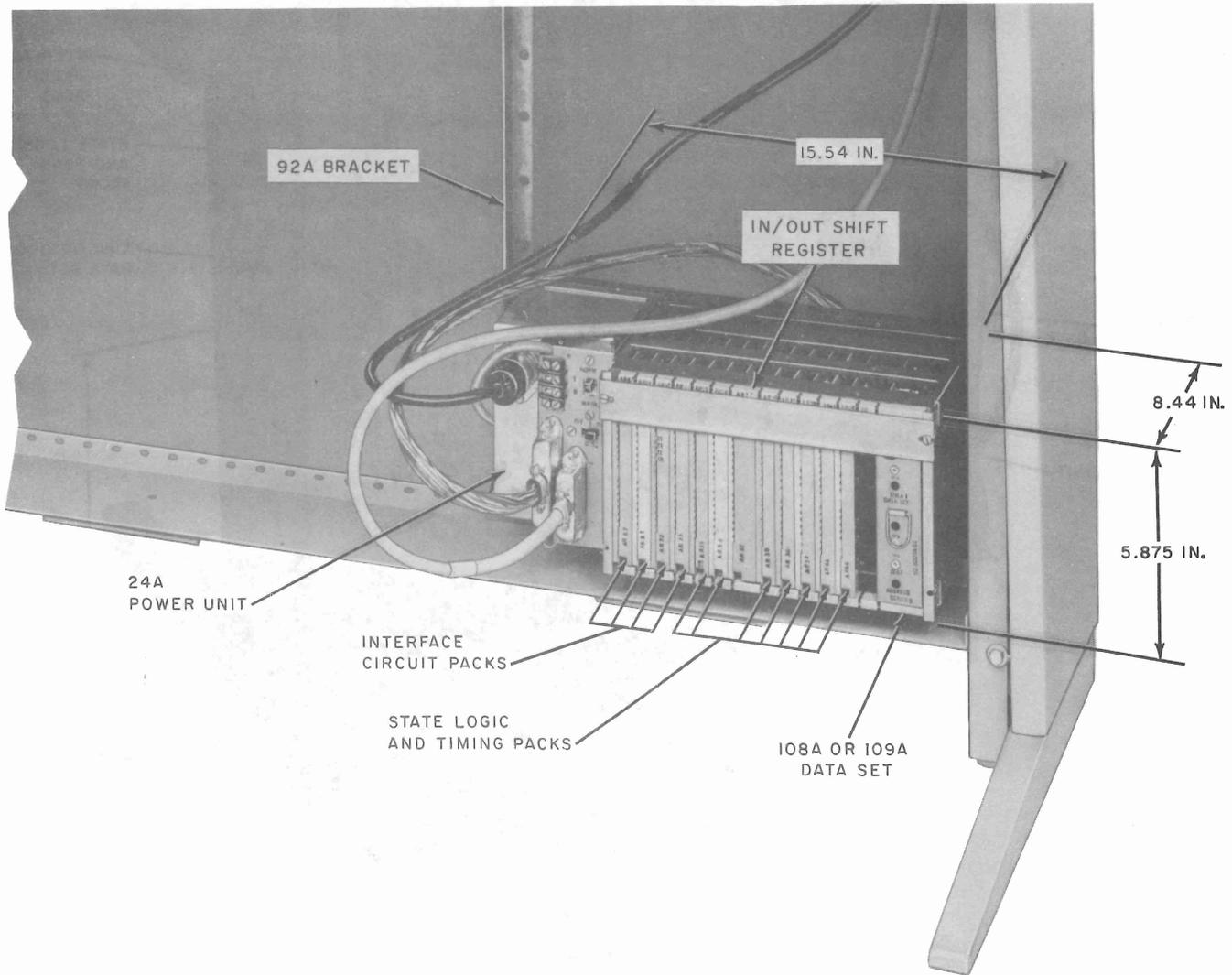


Fig. 14—Mounting Arrangement of DAS 820B-Type in a 35-Type Station

3.08 The station polling response depends upon the status of its sending and receiving circuits and are as follows:

- (a) CAN—the CAN response is sent if the station has no traffic to send but is ready to receive.
- (b) NAK—the NAK response is sent if the station has no traffic to send and is not ready to receive.
- (c) P-ACK—the P-ACK response is sent if the station has priority traffic to send and is ready to receive.
- (d) R-ACK—Same as (c) except that the traffic has regular status.
- (e) P-NAK—the P-NAK response is sent if the station has priority traffic to send but is not ready to receive.
- (f) R-NAK—Same as (e) except that the traffic has regular status.

The reaction of the computer switcher will be somewhat different for each of these possible responses.

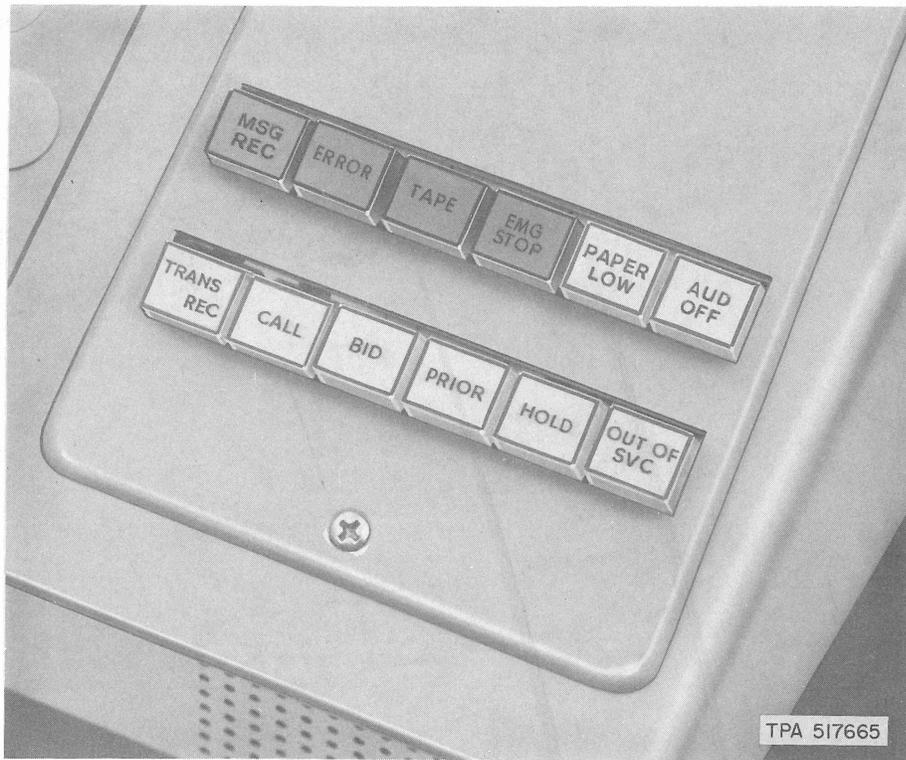


Fig. 15—DAS 804N4 Attendant Set



Fig. 16—DAS 804N2 Attendant Set

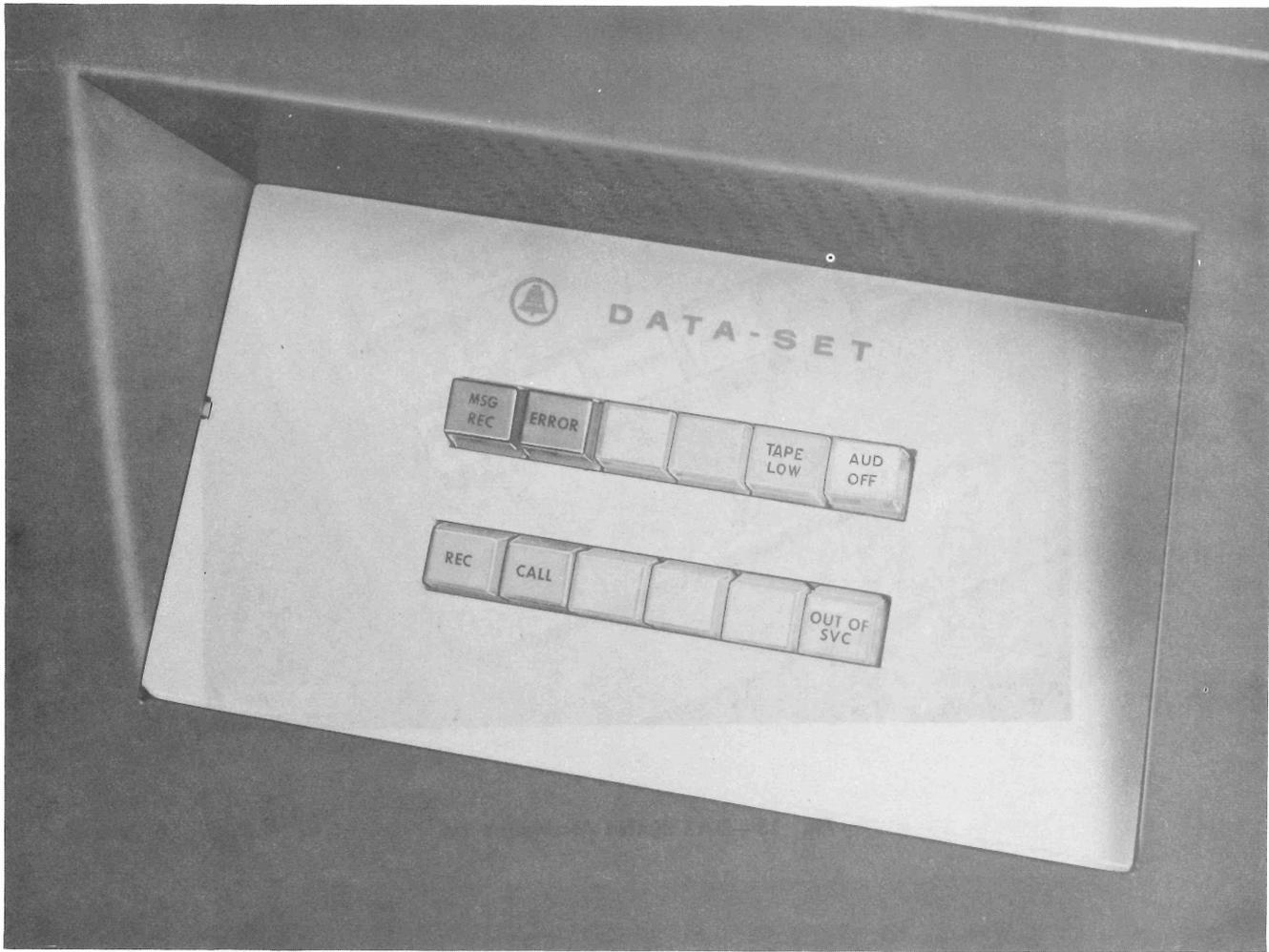


Fig. 17—DAS 804R3 Attendant Set

3.09 Upon reception of any polling response, the computer switcher may send the SPC of the next station to be polled. It is not necessary that the DLE be sent again; however, the presence of another DLE character will not adversely affect station operation.

3.10 Since the 86A1 station responds to polling without becoming selected as a sender, a separate function is required to assign selected-to-send status to a station. If the computer switcher does not discriminate between regular and priority pickup conditions, it may select the station as a sender upon receipt of either a P-ACK, P-NAK, R-ACK, or R-NAK response. However, if the computer switcher does discriminate between the regular and priority pickup conditions, it may immediately select a station to send only upon receipt of a

P-ACK or P-NAK response and send the SPC of the next station to be polled if the response is R-ACK or R-NAK.

3.11 If an invalid response (any response other than CAN, NAK, R-ACK, R-NAK, P-ACK, or P-NAK) is received, the computer switcher (if programmed to do so) will repoll the station in question by sending DLE to redefine the polling sequence, followed by the SPC of that particular station. The assumption in this case is that the response was legitimate but had been affected by noise on the line in such a manner that the computer switcher could not recognize it as valid.

3.12 If the invalid response takes the form of continuous transmission from one of the stations, the computer switcher (if programmed to

TABLE B
AMERICAN NATIONAL STANDARD CODE
FOR INFORMATION INTERCHANGE
USAS X3.4 — 1968

BITS					0	0	0	0	1	1	1	1
B ₇	B ₆	B ₅	B ₄	B ₃	0	0	0	0	1	1	1	1
B ₂	B ₁	COLUMN	ROW	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 (party bit).

do so) will initiate an emergency stop action with an explanatory service message and restart the polling sequence beginning with the last station polled.

3.13 The computer switcher will employ a response time-out that will indicate when a response is not received within a specified interval of time (eg, 600 milliseconds). If a response time-out occurs,

the computer switcher is expected to repoll the station in question by sending DLE followed by the SPC of that particular station.

3.14 As shown in 3.08, the 86A1 station is designed to include information regarding the status of the station's ability to receive traffic as a part of every polling response. This information is to

TABLE C
LEGEND OF ASCII DESIGNATIONS AND DEFINITIONS

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 (Preferred for STOP)
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 Tabulate	EM	End of Medium
LF	Line Feed	SUB	Substitute
VT	Vertical Tabulate	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

aid the computer switcher in determining whether it is worthwhile to attempt a delivery to the station.

3.15 There are two ways to terminate the polling sequence:

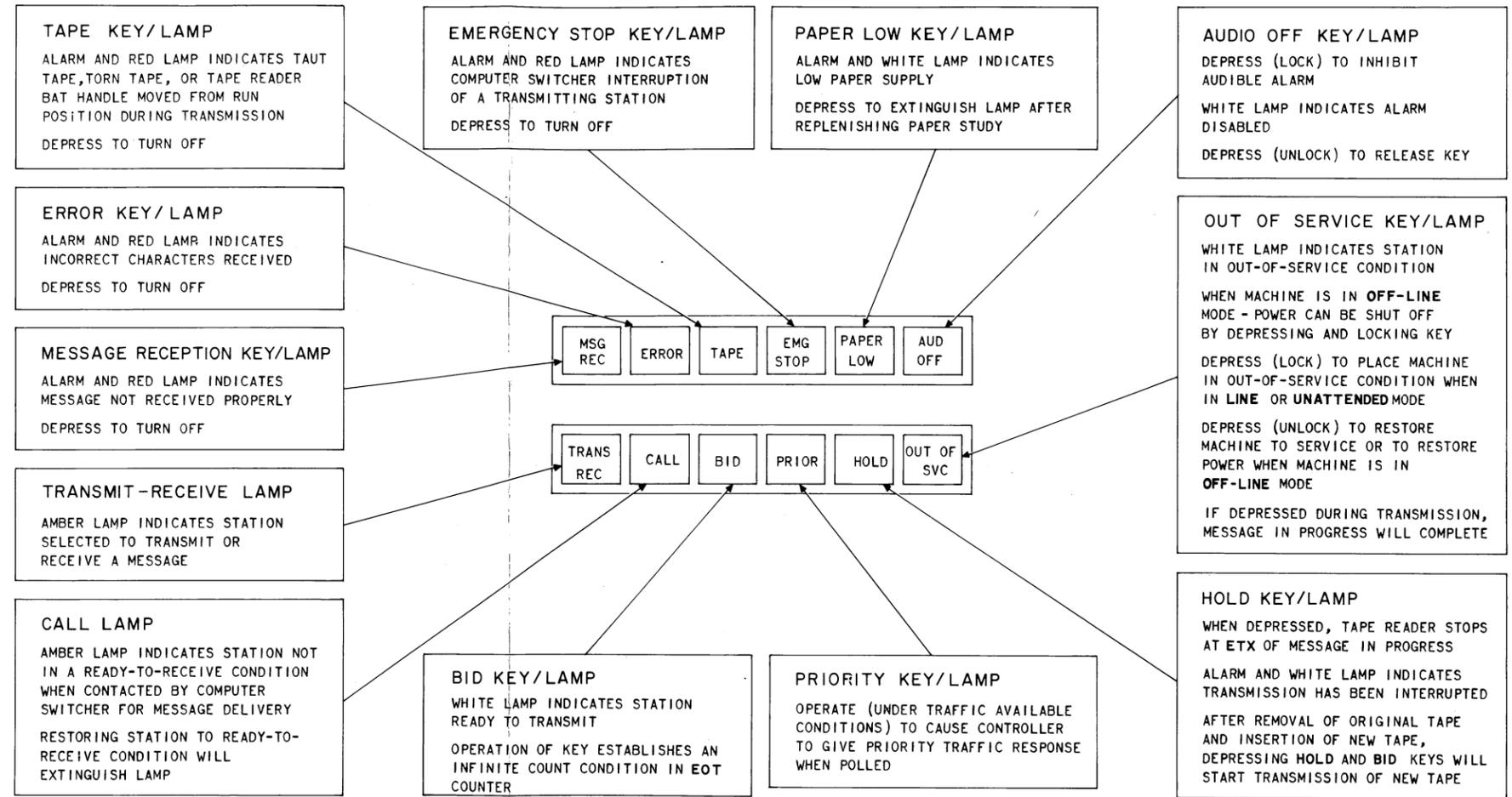
- (a) Returning all stations to idle—To return all of the stations to idle, the computer switcher sends the control character EOT. Upon detection of this code, all stations will assume the idle condition.
- (b) Selecting a station to send—When a response to polling indicates that a station has traffic that should be picked up, the computer switcher terminates the polling sequence by selecting that station as a sender. To do this, the computer switcher sends the control character ENQ (enquiry) followed by the CEC (call enquiry code) of the station being selected to send. Normal operation

will subsequently include the transmission of the control character DC1 (device control 1) by the computer switcher. This will define the end of polling for all other stations on the line and unblind the selected station page printer. The printer is now able to print the TDM when it is sent by (if programmed to do so) the computer switcher.

B. Sending the Message (Fig. 21)

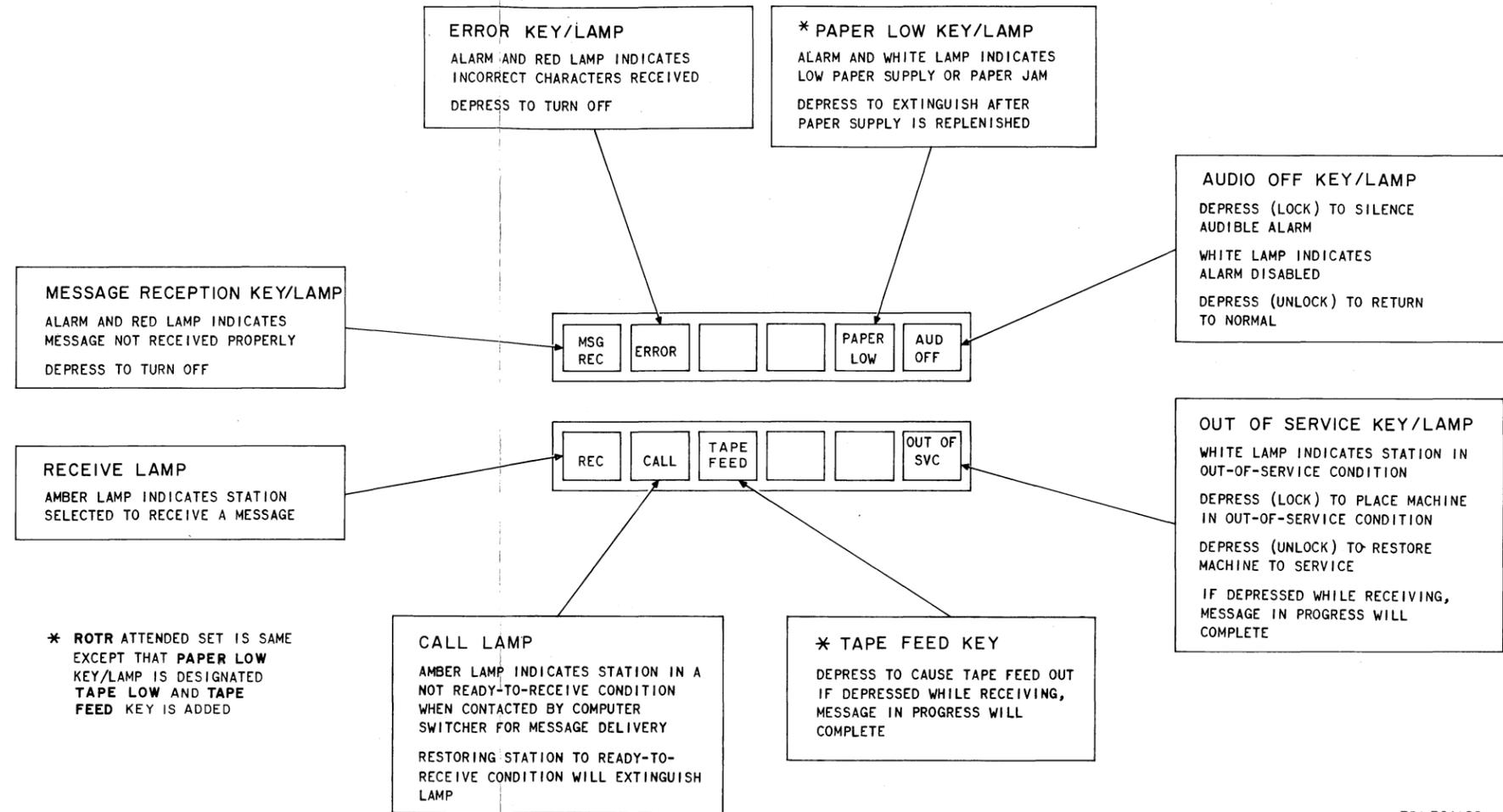
3.16 There are two conditions under which the computer switcher may elect to select a station to send:

- (a) After receiving a response to polling that indicates the station has regular or priority traffic to send (see 3.10)



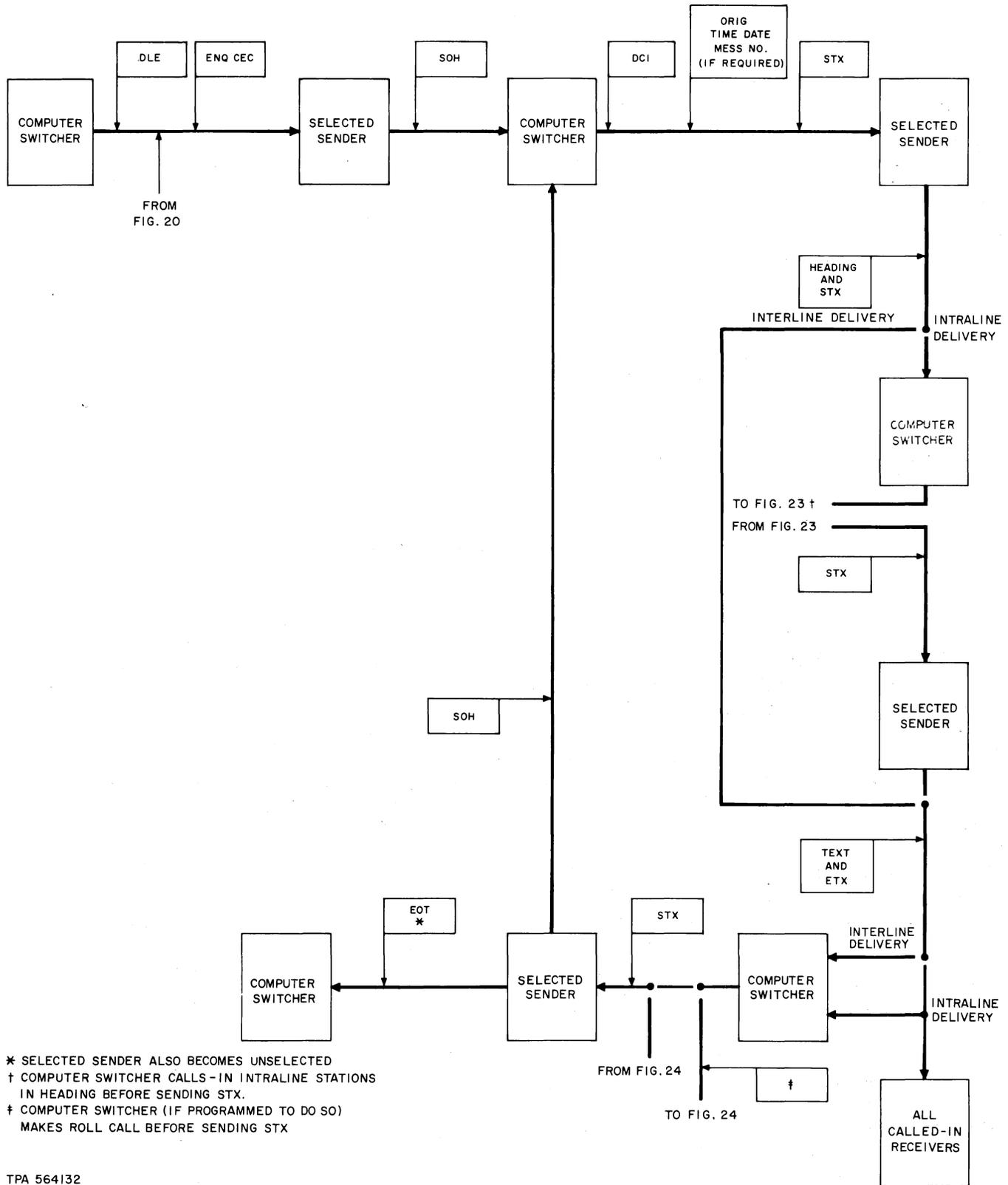
TPA 564121

Fig. 18—ORIG/TERM Station Attendant Set (DAS 804N4) Key Functions and Lamp Indications



TPA 564122

Fig. 19—TERM ONLY Station Attendant Set (DAS 804N2 or 804R3) Key Functions and Lamp Indications



* SELECTED SENDER ALSO BECOMES UNSELECTED
 † COMPUTER SWITCHER CALLS-IN INTRALINE STATIONS IN HEADING BEFORE SENDING STX.
 ‡ COMPUTER SWITCHER (IF PROGRAMMED TO DO SO) MAKES ROLL CALL BEFORE SENDING STX

TPA 564132

Fig. 21—Sender Selection Sequence Chart

3.21 In either case, detection of the STX character by the station starts the reader. If after having sent the STX the computer switcher gets no response from the station within the response time-out interval, the computer switcher will (if programmed to do so) send the STX code again. If repeated attempts to start the station transmitter are unsuccessful, the computer switcher will (if programmed to do so) initiate an emergency stop action, send an explanatory service message, and reactivate the polling sequence, starting with either the next station to be polled or the next station to be selected as a sender.

3.22 As previously mentioned, the detection of STX starts the selected station reader. At this point, operation of the station will depend on whether the station is arranged to stop or not stop (controller option) on STX, as follows:

(a) If the station *is* equipped with the "stop on STX" option, it will now send the message heading, any DEL fill characters, and STX. Detection of STX from the tape stops the reader. The computer switcher now checks the validity of the heading and proceeds, if intraline delivery is employed, to call in any intraline addressee. If programmed to do so, the computer switcher now sends personal address information (eg, "For Action," "For Info," etc) and delivery number to the called-in station before repeating the procedure for each of the other intraline addressees in turn. After all of the intraline addressees have been called in and have delivered their per station (if required) information, the computer switcher will send ENQ DC2, and if programmed to do so, the originating TDM to all of the called in intraline receivers. This may be followed by heading information and another STX. The STX will restart the reader and the selected sender will transmit the message text up to and including the ETX character. Detection of the ETX by the station may or may not stop the reader, dependent on whether the station is arranged to stop or not stop on ETX (controller option—see 3.23). In any case, the called in intraline receivers copy the message directly from the selected sender as it is sending. If any interline receivers are included in the heading, the computer switcher will store the message for future delivery.

(b) If the station *is not* equipped with the "stop on STX" option, it will now send the message

heading, any DEL fill characters, STX, and the entire message text up to and including the ETX character. Since the station does not stop on STX, intraline delivery of the message is not possible. Therefore all message deliveries will be made on an interline delivery basis. As in the case of (a), detection of the ETX may or may not stop the reader, dependent on whether the station is arranged to stop or not stop on ETX (controller option—see 3.23).

3.23 As mentioned in 3.22(a) and (b), the station may be optionally arranged to stop or not stop on detection of ETX from the tape. If a station is equipped with the "stop on ETX" option, the reader will stop when ETX is read from the tape. This provides an opportunity for the computer switcher (if programmed to do so) to perform a roll call (3.41 through 3.50) of the stations called in as receivers during an intraline delivery.

3.24 If a station is equipped with the "no stop on ETX" option, detection of ETX from the tape will not stop the reader. The ETX will be sent to the computer switcher and the reader will continue to run sending the EOT (if present) and any DEL fill characters until a taut-tape condition or tape-out condition exists or another SOH is detected from the tape. This option will normally be provided in the stations when the system employs only interline delivery of messages or the computer switcher is not programmed to perform roll call.

3.25 When the stations are arranged to "stop on ETX," intraline delivery is employed, and the computer switcher is programmed to perform roll call, the computer switcher will now roll call the selected intraline receivers to determine if the message was received properly (see 3.41 through 3.50). After roll call is complete, the computer switcher sends the sequence EOT STX. The EOT returns the selected receivers to idle and the STX restarts the selected send station reader. At this time one of the following may occur:

(a) If the station has additional traffic to send, its reader will start and continue to run until an SOH is detected on the tape. Upon transmitting the SOH, the reader is turned off by the controller. The station remains a selected sender and the previously described message pick-up process is repeated.

(b) If the station has no additional messages in that transmission, the ETX on the tape will be followed by an EOT. When the reader is restarted, transmission of the EOT from the tape will deselect the station and extinguish the TRANS REC lamp. Assuming that the traffic-available state had been effected by setting the EOT counter to the "infinite count" state, (ie, operating the BID key), the reader will continue to run until a taut-tape or tape-out condition exists. This will reset the EOT counter to zero and cancel the traffic-available state.

(c) However, if the traffic-available state had originally resulted from a "finite count" state in the EOT counter (ie, EOT characters counted when punched in tape), transmission of the EOT from the tape will deselect the station, extinguish the TRANS REC lamp, and cause the count in the EOT counter to be reduced by one. If the resulting count in the EOT counter now becomes zero, the reader is stopped and the traffic-available state is canceled. However, if the resulting count in the EOT counter remains greater than zero (indicating that at least one more complete transmission is available), the reader will not stop on the EOT in the tape but will continue to run searching for the SOH that marks the start of the next transmission. The SOH will stop the reader and the traffic-available state will be maintained (BID lamp lighted). To pick up the next message, the computer switcher *must* repeat the polling and sender selecting sequences.

Hold Operation (Torn Tape Message Introduction)

3.26 Use of the HOLD key on the ASR TTY attendant set permits interjection of a message contained on a separate piece of tape during an

in-progress transmission without relinquishing control of the line. Operation of the HOLD key while a message is being transmitted causes the station reader to stop upon sending the next ETX it encounters. When the reader stops, the HOLD lamp will light and the audible alarm will sound, indicating that the torn tape message may now be inserted in the reader. The tape alarm is inhibited during the hold state. When the reader gate is opened, the traffic-available status is canceled (EOT counter set to zero); however, the station remains selected to send. The torn tape message must conform to the standard message format. Once the torn tape message tape is in place, restoration of the HOLD key and operation of the BID key will restart the reader. The reader will run, transmitting any DEL fill characters on the tape, until it encounters the SOH of the torn tape message. Upon transmission of that SOH, the reader will stop, the switcher will send DC1 to unblind the ASR TTY page printer to permit delivery of per-station information, and subsequent operation will be as described in 3.20 through 3.25. Operation of the HOLD key while the torn tape message is being delivered will cause the reader to stop again on detection of ETX. The original tape can now be reinserted in the reader and the transmission caused to resume as before.

3.27 Because of the hold feature and the possibility that tape in the reader may accidentally become taut or twisted during transmission (thereby causing the reader to stop), it is recommended that a minimum intercharacter time-out interval of 30 seconds be employed by the computer switcher. This allows the computer switcher to measure periods of abnormal interruption in traffic pick-up before it takes corrective action. When corrective measures are required, the emergency stop action (3.28 and 3.29) is recommended to the customer.

Emergency Stop (Fig. 22)

3.28 There are circumstances (several of which have already been mentioned), that make it necessary for the computer switcher to interrupt a selected sender. When these occur, the computer switcher will perform an emergency stop action, transmit a service message to the sender, return the station to idle, and continue in the normal manner.

3.29 In order to perform the emergency stop procedure, the computer switcher transmits a BREAK consisting of from 400 to 750 milliseconds of space followed by a pause of at least 100 milliseconds of mark. The BREAK is detected by the station controller at the selected sender and the reader (if running) is stopped. Following the pause, the computer switcher sends DLE DC1 which lights the EMG STOP lamp on the sending station attendant set, actuates the audible alarm

(if not inhibited by the AUD OFF key), resets the EOT counter to zero, and unblinds the station page printer. If any intraline stations are selected to receive, the DLE DC1 sequence will light the MSG REC lamps on their attendant sets and activate their audible alarm (if not inhibited by their AUD OFF keys). The computer switcher may now send a service message (to explain the reason for the interruption) followed by an EOT. The service message will be copied at both the selected sender and any intraline station that has been selected to receive. The EOT will unselect both the selected sender and any intraline station that has been selected to receive. Operation of the EMG STOP key on the selected sender attendant set or the MSG REC key on the affected receiver attendant sets will extinguish the associated lamp, silence the audible alarm (if not already silenced by operation of the AUD OFF key), and restore the station to the idle state. Until the EMG STOP key is operated, the selected sender is locked in the no-traffic-available state.

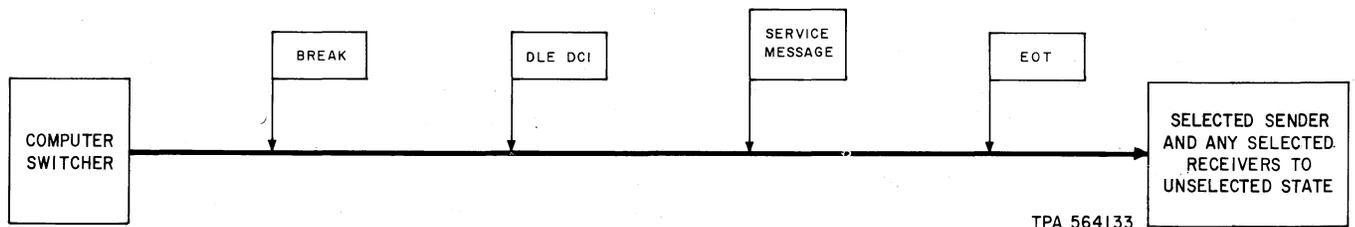


Fig. 22—Emergency Stop Sequence Chart

SECTION 581-136-100

C. Call-In and Roll Call

Call-In (Fig. 23)

3.30 Call-in involves calling each intended receiver and receiving a response indicating its ready-to-receive status. Prior to beginning the call-in routine, the computer may transmit the control character EOT to ensure that all of the receive stations are idle.

3.31 When the computer switcher elects to call in a station as a receiver, it initiates the procedure by the transmission of ENQ. This will blind any previously selected receive stations.

3.32 The computer switcher will follow the ENQ with the discrete call enquiry code (CEC) of the intended receiver and wait for the station response. The CEC for each station is a single character chosen from the set of ASCII printing graphics. Since detection of the entire ENQ CEC sequence is necessary for a station to become selected to receive, the computer switcher must send ENQ with each CEC generated.

3.33 The station will respond to call-in with its discrete station identity code (SIC) followed by either ACK if it is ready to receive or NAK if it is not ready to receive. If the station replies NAK, the CALL lamp on the receive terminal attendant set will be lighted to indicate to the attendant that an unsuccessful call-in attempt has been made. The CALL lamp is extinguished when the station is returned to ready.

3.34 A station is not ready to receive if any of the following conditions exist:

- (a) The station is in the out-of-service mode (OUT-OF-SVC key operated).

Note: A selected station will not assume the out-of-service mode until it is returned to idle.

- (b) Paper is low or form supply is exhausted and the station is not selected to receive.
- (c) Form feeding is taking place and the station is not selected to receive.
- (d) The TTY is in the off-line mode.
- (e) Tape is low at a 35 ROTR primary receiver.
- (f) Tape feed out (TFO) is occurring at a 35 ROTR primary receiver and the station is not selected to receive.

3.35 If the station response is ACK, the CALL lamp will flash momentarily and the TRANS REC (ORIG/TERM station) or REC (TERM ONLY station) lamp on the attendant set will light steadily. This indicates that the station is selected as a receiver. The computer switcher can now send per station information, such as personal address information (PAI) and/or message delivery number, to the called-in receiver. Since any previously called-in receiver has been blinded by the ENQ, this information will be copied only by the station being called in.

3.36 If additional stations are to be called in, the process described in 3.32 through 3.35 will be repeated for each such station. After all of the intended receivers have been selected, the computer switcher will send ENQ DC2 to unblind them. The computer switcher may now send any information, such as the date, time, and message heading, that is common to all of the selected receivers. This information will be followed by STX. In the case of intraline deliveries, the STX will start the reader of the selected sender which will send the entire message up to and including the ETX. In the case of an interline delivery, the computer switcher will follow the STX with the message text and ETX. In either case, the message text will be copied by all of the selected receivers.

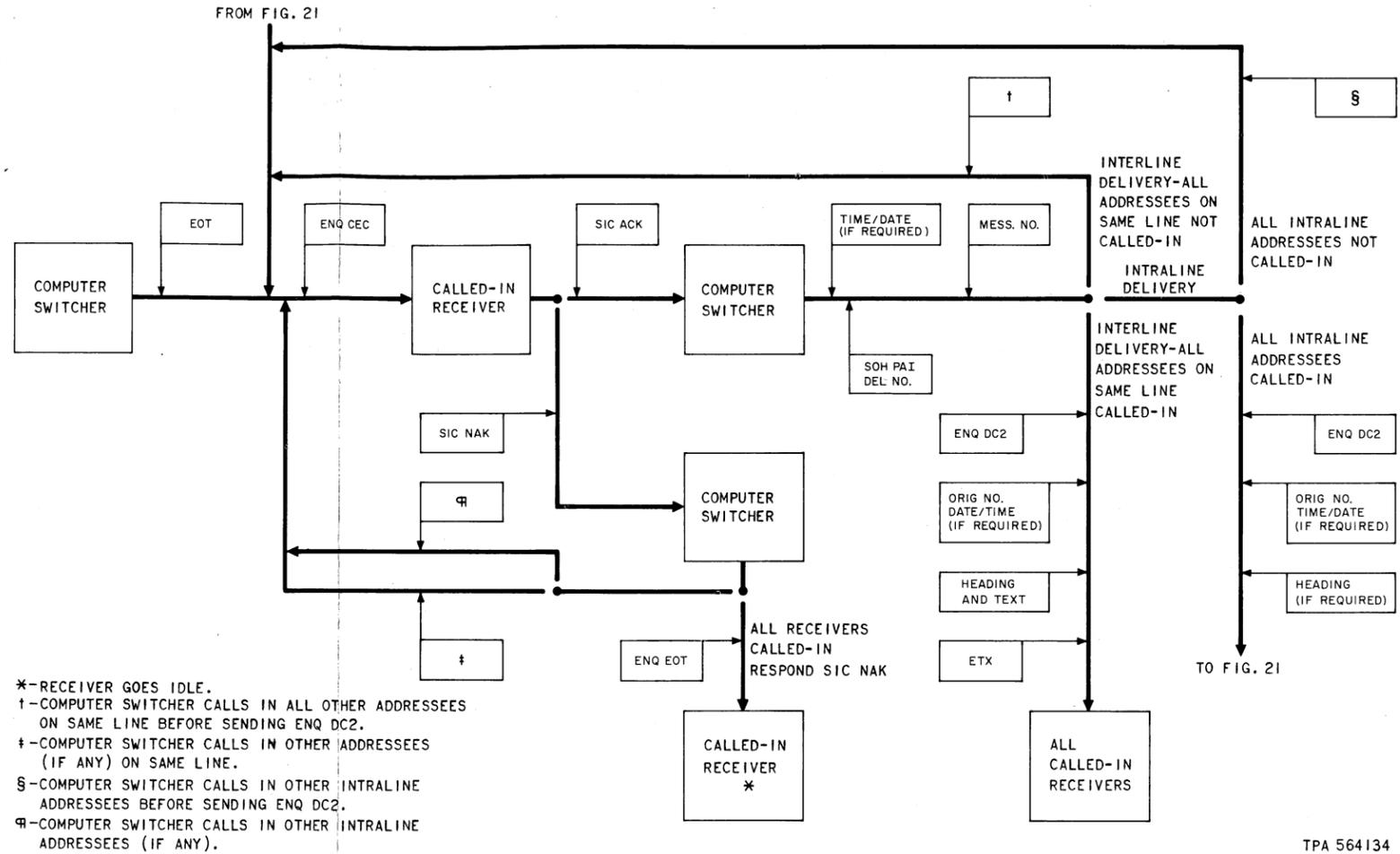


Fig. 23—Call-In Sequence Chart

Invalid Responses to Call-In

3.37 If the invalid response to call-in takes the form of SIC followed by something other than ACK or NAK, the computer switcher (if programmed to do so) will make a second attempt to call in the station.

3.38 If the invalid response takes the form of a continuous transmission, it indicates that a sender has been selected and falsely started. In this case, the computer switcher is expected to perform an emergency stop procedure (see 3.28 and 3.29) and send an explanatory service message. This emergency stop procedure will deselect any falsely selected or started send station.

3.39 If the invalid response takes the form of a SIC ACK with the wrong SIC, it means that the wrong receiver is (or may be) selected. In this case, one of three things can happen depending upon the programming of the computer switcher:

- (a) The computer switcher can deselect this along with any other previously selected receivers by sending EOT and reinitiating call-in with the first addressee.
- (b) The computer switcher can send ENQ DC2 to unblind all selected stations, follow this by an explanation of why unusual action is being taken, and then immediately deselect the stations. The message of explanation will be followed by EOT to perform the deselection process. In this instance, there will be no alarm activated at the selected receivers.
- (c) In the case of an interline delivery, the computer switcher can perform the emergency stop procedure (see 3.28 and 3.29). In this instance, an alarm will be activated at the selected stations.

No Response to Call-In

3.40 If the computer switcher receives no response to a call-in attempt within the response time-out interval (eg, 600 milliseconds), it (if programmed) will make one or more additional attempts to call in the station. If repeated attempts to call in a station fail, it is not necessary for the computer switcher to deselect any previously selected receivers. However, dependent on the programming

of the computer switcher, it may elect to do so as described in 3.39(a), (b), or (c).

Roll Call (Fig. 24)

3.41 Roll call is the performance of a call-in 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 calling each station individually and getting a response indicating whether or not they received the message properly. After delivery of the message up to and including ETX, the computer switcher may or may not, dependent on its programming, perform the roll call operation. If the computer switcher is programmed to deliver common information such as an end of delivery record to the called in stations, it may do so either before or after the roll call function. In cases where this delivery is to follow roll call, the computer switcher must precede the common information with ENQ DC2. In cases where the delivery is to precede roll call or no roll call is to be performed, the ENQ DC2 sequence is not necessary.

3.42 If the computer switcher is not programmed to perform roll call, the ETX or delivery of common information will be followed immediately by an EOT. If there are TERM ONLY ROTR stations on the line, there can be automatic tape feedout (TFO) under these circumstances (see 3.56).

3.43 If the computer switcher is programmed to perform roll call, it will initiate the operation by following the ETX of the message with ENQ. As in the call-in procedure, the ENQ will blind all the selected receivers. However, since ETX preceded the ENQ this time, it will define the beginning of roll call instead of initiating call-in. After sending ENQ, the computer switcher will follow with the CEC of a selected station to be roll-called.

3.44 The station will respond to roll call with its SIC followed by either CAN if the message was received properly, or NAK if the message was not received properly. The NAK response is generated if any of the following abnormalities occur during the interval between the time the station was selected to receive and roll call.

- (a) A paper-out condition was detected on a sprocket-feed machine that resulted in part of the message being lost [ie, the station received

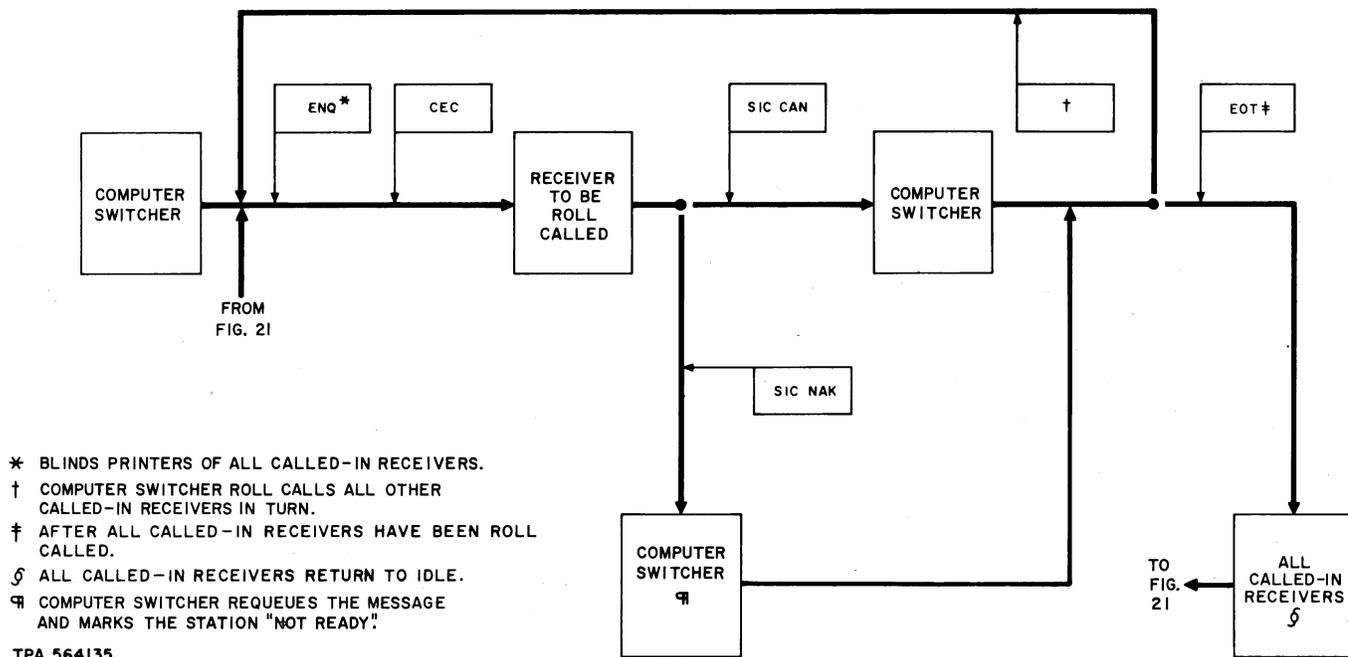


Fig. 24—Roll-Call Sequence Chart

a form feed (FF) order followed by a DEL, the form supply became exhausted while feeding was taking place, and the next character was not an ETX marking the end of the message].

- (b) The terminal device failed to respond to the received signals during message delivery (a character was lost and did not reach the typing unit).
- (c) An error-free ETX character was not received or was not detected by the controller.
- (d) The receiver became not ready during the delivery (ie, the ASR TTY MODE switch was operated to the OFF-LINE position).
- (e) A character was received with a parity error or there was a loss of synchronism which gave rise to a parity error indication (optional).

3.45 If the station responds to roll call with NAK, the MSG REC lamp on the attendant set will be lighted and the audible alarm (if not inhibited by the AUD OFF key) will sound. The MSG REC lamp can be extinguished and the alarm silenced (if not previously silenced by operation of the AUD OFF key) by operation of the MSG REC key on the attendant set. Following receipt of

either a CAN or NAK response to roll call, the computer switcher can proceed to roll call the next station in line by sending ENQ followed by the CEC of that station.

3.46 When an invalid response to roll call is received, the computer switcher (if programmed to do so) can repeat any given roll call as many times as desired, in an attempt to obtain a valid response.

3.47 If the response to roll call is SIC ACK, it means that the station involved is not selected at that time and is treating the roll call as a call-in. Since this is an abnormal condition that indicates the message was not properly received, the computer switcher will treat this response the same as a SIC NAK response.

3.48 If the roll call response takes the form of a continuous transmission, the computer switcher should send a BREAK to stop the sender and then proceed with the roll call function. Upon completion of roll call, the computer switcher can send EOT to deselect the receivers and then perform an emergency stop with an explanatory service message to inform the selected send station of the problem encountered.

3.49 As in the case of call-in, a response time-out feature will be employed by the computer switcher. The action taken here will be the same as for call-in.

3.50 After all of the receivers have been roll-called, the computer switcher will do one of two things.

(a) It will send ENQ DC2, as previously indicated, to unblind all of the selected receivers and then deliver common information, such as date and time record, to the receivers. This then would be followed by EOT.

(b) It will send EOT, which will return all the selected receivers to idle.

D. Auxiliary Receiver Connect and Disconnect

35 ORIG/TERM or TERM ONLY Stations

3.51 A 35 RO or ROTR TTY may be used as an auxiliary receiver at a 35 ASR TTY ORIG/TERM or 35 RO TTY TERM ONLY station. It may be connected or disconnected manually, and if a wiring option is provided in the primary TTY, automatically. In addition, the tape punch of a 35 ASR TTY ORIG/TERM station not equipped with an auxiliary 35 RO TTY or 35 ROTR, may 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, ETX, DC4).

3.52 An auxiliary 35 RO TTY or 35 ROTR is connected manually by the operation of the AUX RECEIVER key located on the primary TTY. This unblinds the auxiliary receiver selector magnet driver (SMD) which is in parallel with the SMD of the primary TTY, thereby allowing the auxiliary receiver to copy the same information that is received by the primary TTY. A lamp located in the AUX RECEIVER key on the primary TTY is lighted whenever the auxiliary receiver is connected. Restoration of the AUX RECEIVER key disconnects the auxiliary receiver.

3.53 When the wiring option that allows automatic auxiliary receiver connect and disconnect is provided in the primary TTY, reception of DC2 by the primary TTY stunt box will connect the auxiliary receiver, and reception of ETX and/or DC4 (option) will disconnect the auxiliary receiver.

In addition, once the auxiliary receiver is connected, it can be disconnected only when both the manual and automatic controls are in the disconnect state.

3.54 A print suppression option may also be provided. This option causes the typing unit of the primary TTY to be inhibited from printing and performing other paper-affecting functions while the auxiliary receiver is connected. Disconnecting the auxiliary receiver will restore the primary TTY typing unit to normal.

3.55 When the auxiliary receiver is a 35 ROTR, automatic tape feedout (TFO) will occur whenever the auxiliary ROTR is disconnected manually, or if the wiring option is provided in the primary receiver, whenever it is disconnected automatically (see Table D). In either case, between 2 and 10 inches of tape will be fed out punched with DEL characters. The length of feedout is adjustable mechanically. If the auxiliary ROTR is connected manually and the automatic disconnect TFO option is provided, reception of an automatic disconnect character (optionally ETX and/or DC4) will cause TFO to occur, but the auxiliary ROTR will remain connected. 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 a received character will be punched and printed on the tape.

35 ROTR Primary Receiver

3.56 When a 35 ROTR is used as a primary receiver, there are no provisions for connecting an auxiliary receiver. Automatic TFO (option) will occur whenever the station is roll-called. It is activated by the ENQ CEC sequence used in the roll call process, the CEC being that of the station in question. As for the auxiliary 35 ROTR, the TFO feature is noninterfering.

33 ORIG/TERM or TERM ONLY Stations

3.57 A 33 RO TTY may be used as an auxiliary receiver at any 33 ASR ORIG/TERM or 33 RO TERM ONLY station. It can be connected and disconnected both manually and automatically if the necessary wiring option is provided in the primary receiver.

3.58 The auxiliary receiver is connected manually by the operation of the AUX ON key located

TABLE D

AUTOMATIC TFO OPTIONS FOR AUXILIARY 35 ROTR

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

on the primary receiver. This unblinds the SMD of the auxiliary receiver, which is connected in parallel with the SMD of the primary receiver, thereby allowing the auxiliary receiver to copy the same information that is received by the primary receiver. A lamp under the AUX ON key is lighted whenever the auxiliary receiver is connected. Operation of the AUX OFF key, which is adjacent to the AUX ON key, will disconnect the auxiliary receiver by blinding its typing unit.

3.59 When the wiring option that allows automatic auxiliary receiver connect and disconnect is provided in the primary TTY, reception of DC2 by the primary TTY stunt box will connect the auxiliary receiver, and reception of ETX and/or DC4 (option) will disconnect the auxiliary receiver. Unlike the 35 stations, the 33 RO auxiliary receiver will be disconnected on reception of either the manual or automatic disconnect command.

E. TTY Functional Description

35 ASR TTY (Fig. 25)

3.60 The block diagram of Fig. 25 shows the functional arrangements of a 35 ASR TTY when the MODE switch is in the following positions.

(a) **OFF-LINE**—This position places the station in the off-line mode. In this mode, the TTY is disassociated from the line (station can neither send or receive data). The TTY motor runs continuously (unless OOS key is operated), and the keyboard, punch, reader, and typing unit can be used for the following:

- (1) To prepare tapes from the keyboard with local copy provided (PUNCH ON/OFF key ON).
- (2) To obtain page copy of previously prepared tapes for the purpose of proof-reading (PUNCH ON/OFF key OFF).
- (3) To prepare a by-product tape from a previously prepared tape PUNCH ON/OFF key ON), editing or adding to it in the process by keyboarding in the corrective or additional information

(b) **LINE**—This position places the station in the on-line mode. In this mode, the reader is always connected to the line (via the controller and data set) and the TTY motor runs continuously. When the station is selected to send, the reader can transmit data to the line and the typing unit will provide local copy of the signals transmitted. When the station is selected to receive, the typing unit will print copy of the messages received by the station. In either case, the punch and keyboard can be used to prepare tapes without local copy being provided.

(c) **UNATT**—This position places the station in the unattended mode. In this mode, the TTY motor is normally under control of the line and runs only when the station is selected as a receiver. However, if the station has traffic available to send when the unattended mode is selected, the motor will run until all traffic has been sent before it turns off and becomes

controlled by the line. In addition, the keyboard and punch are deactivated while the station is in this mode. An option is available whereby the punch can be manually or automatically selected when the unattended mode is used.

Note: Without a strap across the unattended contacts in the TTY, when the MODE switch is switched to the UNATT position while the station is transmitting, that transmission will be completed and the traffic-available indication will be canceled as the station becomes unselected to transmit.

3.61 In the case of the 33 ASR TTY, there is no UNATTENDED position on the MODE switch. The off-line mode of operation for the 33 ASR TTY is the same as that for the 35 ASR TTY [see 3.60(b)]. The on-line mode of operation

for the 33 ASR TTY is the same as that for the 35 ASR TTY [see 3.60(c)] with the following exceptions.

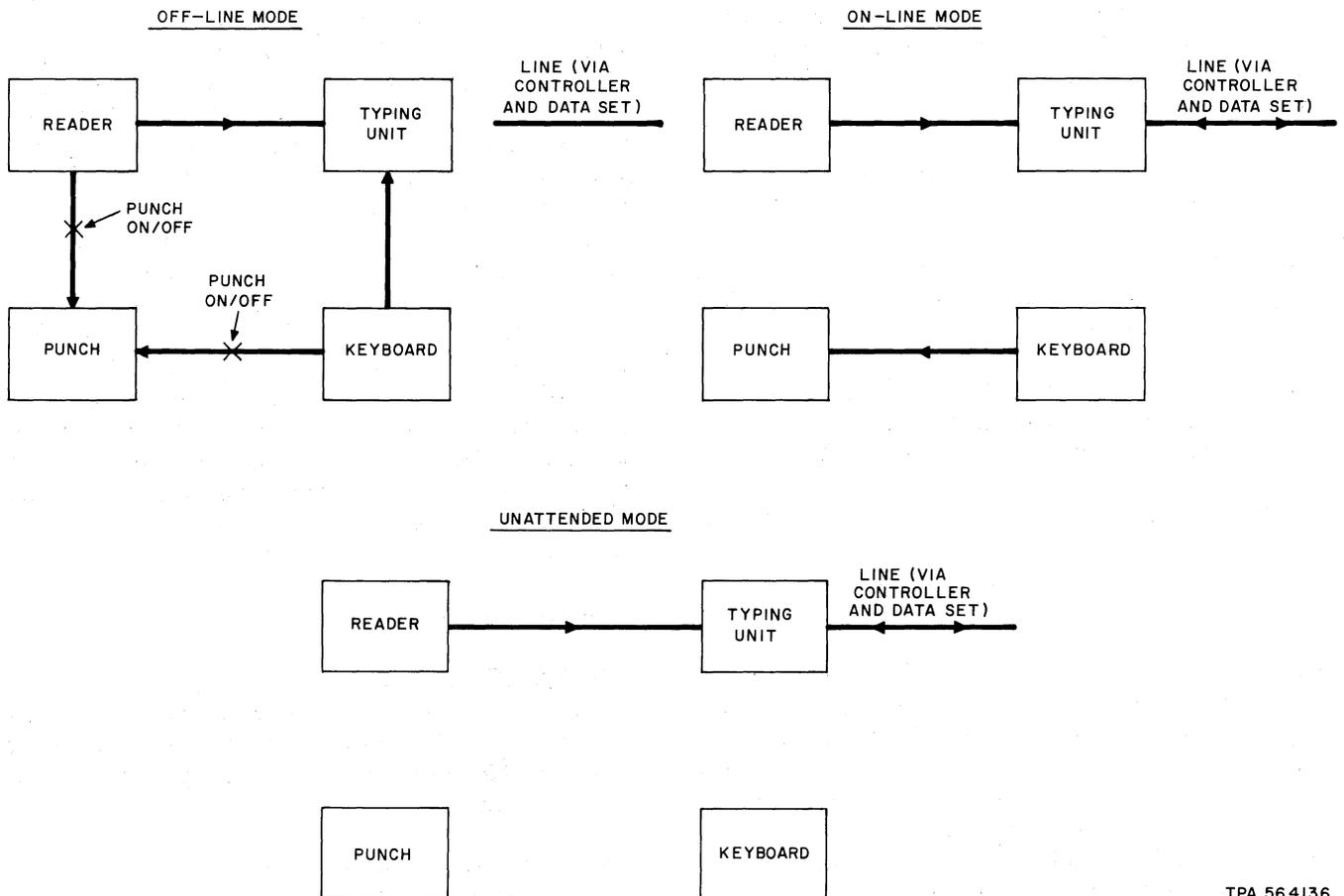
- (a) Blind preparation of tapes is not possible.
- (b) The TTY motor runs only when the station is selected to receive or has traffic available to send.

RO TTY (Fig. 26)

3.62 The voltage signals from the controller are applied to the SMD via the received data lead. The SMD operates the RO TTY page printer or ROTR typing reperforator.

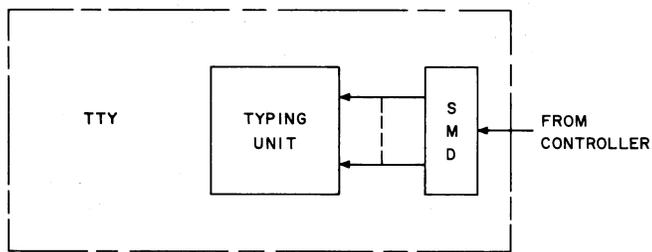
F. Station Functional Description (Fig. 27)

3.63 During the transmit sequence, the ASR TTY of a sending station converts the



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Fig. 25—Block Diagram Showing Operational Modes of 35 ASR TTY



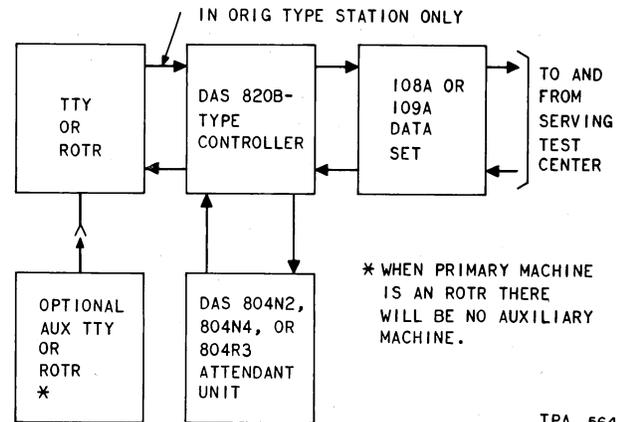
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Fig. 26—Block Diagram of RO TTY

characters from the tape to voltage signals which conform to the Electronic Industries Association (EIA) Standard RS-232-C, and presents them to the controller. In the controller (DAS 820B-type), the EIA voltage signals are monitored (so that control actions can be taken when required), regenerated, and sent to the data set. The data set converts the signals into voice-frequency tones or dc currents which are suitable for transmission over the line. The attendant set (DAS 804N4) is used with the ASR TTY unit to perform the following functions:

- (a) Provide audible and visual alarms and a means for silencing these alarms
- (b) Condition the controller to respond to polling with either a regular or priority traffic-available indication
- (c) Provide manual TTY control functions such as the HOLD operation feature and placing the ASR TTY in an out-of-service condition
- (d) Provide indications as to the status of the station, such as selected to send or receive, traffic available, bid condition present, etc.

3.64 The receive sequence for a station is essentially the reverse of the transmit sequence. The data set converts the voice-frequency tones or dc currents received from the line into EIA voltages and presents them to the controller. The controller performs the same as it did for the transmit sequence and delivers regenerated voltage signals to the SMD of the primary, and if provided, auxiliary TTY. Because of a buffering action in the controller, there is a one-character delay between the reception of and printing of a character.



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Fig. 27—Block Diagram of 86A1 ORIG/TERM or TERM ONLY Station

Out-Of-Service (OOS)

3.65 Each attendant set is provided with an OUT OF SVC lamp and key. The key is a push-to-operate, push-to-release type switch. The lamp is illuminated whenever the terminal equipment with which it is associated is OOS. When the station is OOS for any reason, the controller responds to polling with a no-traffic-available—ready-to-receive indication until the computer switcher tries to call it in as a receiver. At this time, the station will respond to call-in with the not-ready-to-receive indication and the CALL lamp will be lighted. The station will now respond not-ready-to-receive to both polling and call-in until the CALL lamp is extinguished. The CALL lamp is extinguished by putting the station back in service. If the OUT OF SVC key on the attendant set is operated while the station is selected to send or receive, the station will not go OOS until it is unselected.

Automatic Loop-Back Test Mode



Before a station is put into the automatic loop-back mode, it must be disconnected from the system at the central office and put on a test line.

3.66 If the station controller is equipped with Data Set 108A, it may be automatically placed in the loop-back mode. This mode of operation is intended for use by maintenance personnel only. It allows tests to be made from

the test center of most of the controller circuits and the transmission facility. In the loop-back mode, the controller will respond to polling, call-in, and roll call in the normal manner; however, all message text characters received by the station will be sent directly back onto the line with a one-character delay.

3.67 The station is automatically looped back when it receives the sequence DLE + DC1 ENQ CEC. The DLE blinds the station receiver. The + character lights the OUT OF SVC lamp and initiates the loop-back mode. The DC1 character performs its normal function and the ENQ CEC conditions the controller to the loop-back mode. Reception of the EOT character disables the loop-back mode, restores the station to the idle state, and extinguishes the OUT OF SVC lamp.

Manual Loop-Back Test Mode (Data Set 108A)



Before a station is put into the manual loop-back mode, it must be disconnected from the system at the central office and put on a test line.

3.68 Operation of the R switch, located on the station controller, disconnects the data set from the controller and interconnects its transmitted data lead and received data lead. In this mode, the OUT OF SVC lamp is lighted and tests of the data set and transmission facility can be made from the test center.

G. Alarms

Parity Error

3.69 The eighth bit of the ASCII code is used to provide even-bit parity. That is, the eighth bit of each ASCII character is chosen (mark or space) so that the character contains an even number of spacing information bits. The controller monitors the number of spacing information bits of each received character. If the count is odd indicating a parity error, the ERROR lamp is lighted, the audible alarm is sounded, and the character with the incorrect parity is changed to an underline () by the controller. The underline character (generated by the controller) is of *odd* parity. This is done deliberately so that in the event the message (including the error) is punched on tape and retransmitted to another station, the underline replacing the incorrect character will

enable the alarm at that station also. The ERROR lamp can be extinguished only by operation of the ERROR key. This will also silence the audible alarm if it has not already been silenced by operation of the AUD OFF key.

Out-of-Synchronism Error

3.70 The 86A1 station employs asynchronous (start—stop) operation. Each character consists of a start bit, the information bits of the ASCII code, the parity bit, and a 2-bit stop interval.

3.71 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.

3.72 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 ERROR lamp is lighted, and the audible alarm is sounded. The error alarm can be silenced and the ERROR lamp extinguished as described earlier.

H. Carrier Squelch

3.73 The T switch located on the controller provides the option of squelching the Data Set 108A transmitted carrier whenever the data set detects the loss of received carrier.

I. Controller Functional Description (Fig. 28)

3.74 The block diagram in Fig. 28 is of the controller. The signal paths are shown in heavy lines, the control paths in light lines.

3.75 One shift register is employed in the controller as both the in-line shift register (in the receiving data path) and the out-line shift register (in the transmitting data path). It performs the functions of character detection and generation in both circuits. The incoming signal is delayed one character length and the outgoing signal is delayed 1/2-bit length. Because of the timing function performed by the clock (see 3.71 through 3.73), both the incoming and outgoing signals are, in effect, regenerated.

Receive Mode

3.76 In the receive mode, characters are received serially from the data set via the sampling gates. The start of each character triggers the receive clock in the timing circuit and the clock runs for the duration of the character. As explained in 3.71 and 3.72, the clock is used to sample each bit of the character and to shift it serially into the shift register. While in the shift register, each character is monitored by the character detection circuit to determine if it is one of a number of specific characters, these being the control characters ENQ, SOH, ETX, EOT, DC1, DC2, STX, and DLE, together with the character ® and the stations CEC and SPC. The shift register is wired at installation to detect the unique SPC and CEC assigned to the station.

3.77 The detected characters control the receive states (such as blinding the TTY, etc) of the station and, together with the state logic circuits, initiate appropriate responses.

3.78 Each succeeding incoming character initiates a new timing cycle and causes the previous character to be shifted out of the shift register. (Exceptions to this occur in the case of the characters DLE, ENQ and EOT, which are erased from the shift register rather than shifted out.) As the characters are shifted out they are regenerated, gated to the SMD via the interface circuit, and recorded by the receiving element of the station. Because the operation of the controller involves a one-character storage, there is a one-character delay between the reception of a character from the line

and the outputting of it to the receiving element of the station.

3.79 An underline (——) generator is provided for printing an underline in place of an erroneously received message character resulting from a parity failure or an out-of-synchronism condition. A generated underline character applied to the shift register wipes out and replaces the erroneous character.

Generation of Responses

3.80 The responses generated by the controller are ACK, NAK, CAN, SOH, P, and R. In addition, the shift register is wired at installation to generate the unique SIC assigned to the station. Which of these characters are generated in a response is governed by the state control logic circuit which monitors the status of the station. The character is written into the shift register in a parallel fashion. It is then serially shifted out of the register by the transmit clock, regenerated, and gated to the data set for transmission to the line.

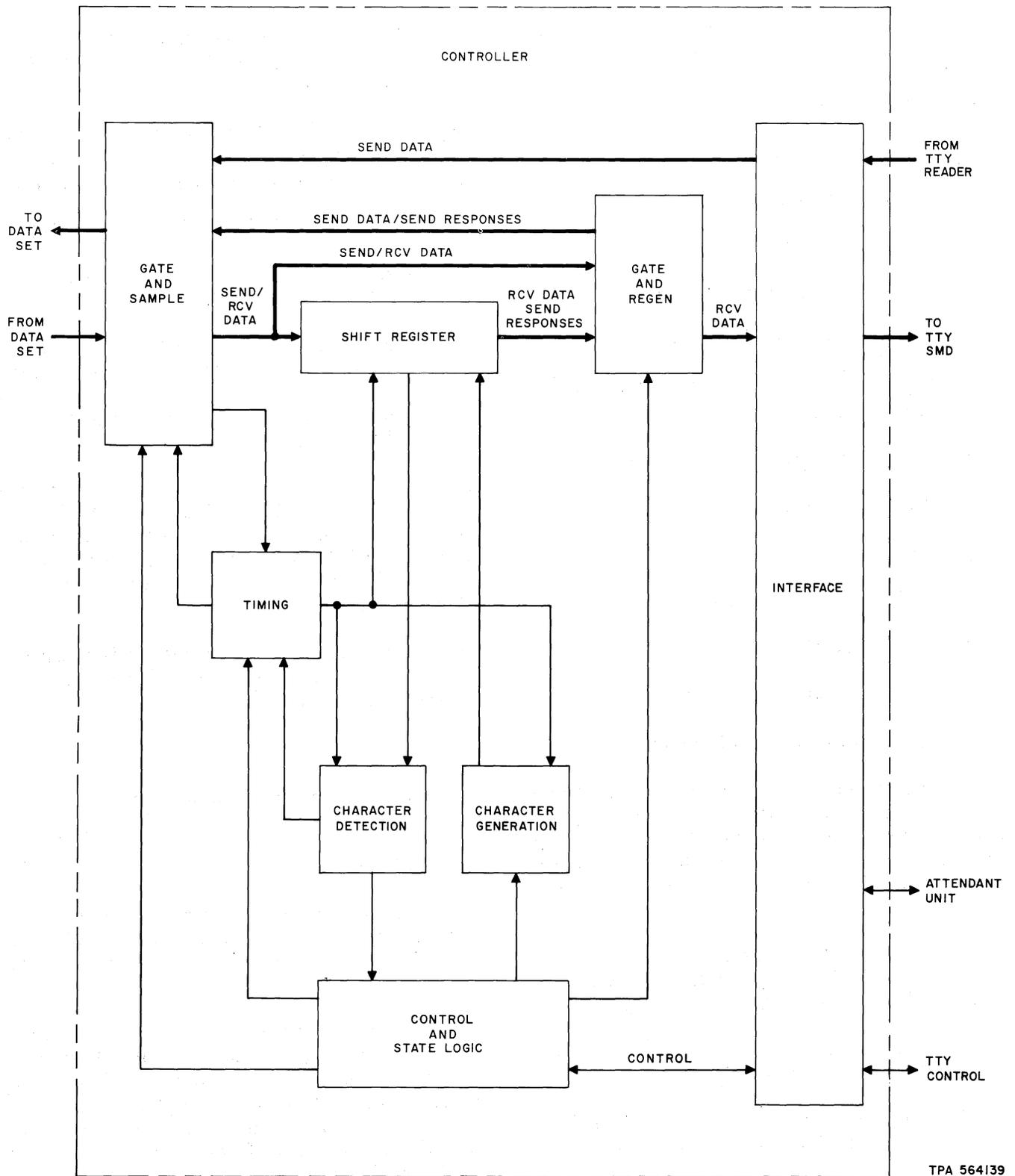
Send Mode

3.81 Characters from the TTY reader are applied serially, via the interface circuit, to the gate and sample circuit under the direction of the state logic control circuit. Timing for the send characters is developed in a manner similar to that for the receive characters. After sampling, the characters are regenerated and gated, with a 1/2-bit delay, to the data set.

3.82 At the same time, the characters are serially inserted into the shift register. Each character is monitored as it is shifted into the register by the character detection circuit in order to detect specific transmit control characters. These characters are SOH, STX, ETX, and EOT. When a transmit control character is detected, the character detection circuit signals the state logic control circuit to sequence the controller through various transmit modes.

Interface Circuits

3.83 The interface circuits control and monitor the station TTY or ROTR. Some of the



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Fig. 28—Block Diagram of Station Controller

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more important functions of the interface circuits are:

- (a) Data signal exchange
- (b) Motor on-off control
- (c) Reader on-off control
- (d) Lost character detection
- (e) Low paper/tape supply detection
- (f) Form feed/form out detection
- (g) Tape feedout control (35 ROTR primary receiver only)
- (h) Ready/not ready receiver status monitoring
- (i) Taut tape/tape out detection
- (j) Noise filtering
- (k) EOT counting (35 ASR TTY only)
- (l) Alarm generation
- (m) Bid indications (ASR TTY only).

J. Attendant Set Functional Description

3.84 The attendant sets provide keys and lamps used for local control, alarm monitoring and status monitoring of the station TTY. Three types of attendant sets are used with the 86A1 stations. They are the DAS 804N4, DAS 804N2, and DAS 804R3.

3.85 The DAS 804N4 attendant set is used in the ASR TTY of an ORIG/TERM station and provides the following keys and lamps:

- (a) Control keys—BID, PRIOR, HOLD, OUT OF SVC, and AUD OFF
- (b) Alarm reset keys—TAPE, EMG STOP, MSG REC, ERROR, PAPER LOW, and AUD OFF
- (c) Status lamps—BID (white), PRIOR (white), HOLD (white), OUT OF SVC (white), TRANS/REC (amber), CALL (amber), and AUD OFF (white)

(d) Alarm lamps—TAPE (red), EMG STOP (red), MSG REC (red), ERROR (red), and PAPER LOW (white).

3.86 The DAS 804N2 attendant set is used in the primary RO TTY of a TERM ONLY station and provides the following keys and lamps:

- (a) Control keys—OUT OF SVC and AUD OFF
- (b) Alarm reset keys—MSG REC, ERROR, PAPER LOW, and AUD OFF
- (c) Status lamps—OUT OF SVC (white), AUD OFF (white), REC (amber), and CALL (amber)
- (d) Alarm lamps—MSG REC (red), ERROR (red), and PAPER LOW (white).

3.87 The DAS 804R3 attendant set is used in the primary 35 ROTR of a TERM ONLY station. The keys and lamps provided are the same as those provided on the DAS 804N2 except that the PAPER LOW key/lamp is designated as the TAPE LOW key/lamp.

3.88 In addition, each attendant set is equipped with a loudspeaker in order to provide audible alarm indications.

K. Data Set Functional Description (Fig. 29)

Data Set 108A

3.89 The transmit frequencies for the Data Set 108A are 2225 Hz for a mark and 2025 Hz for a space. Its receive frequencies are 1270 Hz for a mark and 1070 Hz for a space.

3.90 In the idle or marking condition, a negative voltage is applied to the transmitted data (BA) lead. This negative voltage conditions the keyer to cause the oscillator to generate a tone representing a mark signal. This frequency will pass through the send filter to the send buffer amplifier. The send buffer amplifier, in addition to isolating the send filter impedance from the hybrid, is an adjustable gain amplifier. The output from the send buffer amplifier passes through the hybrid and then over the private line facilities to the computer switcher.

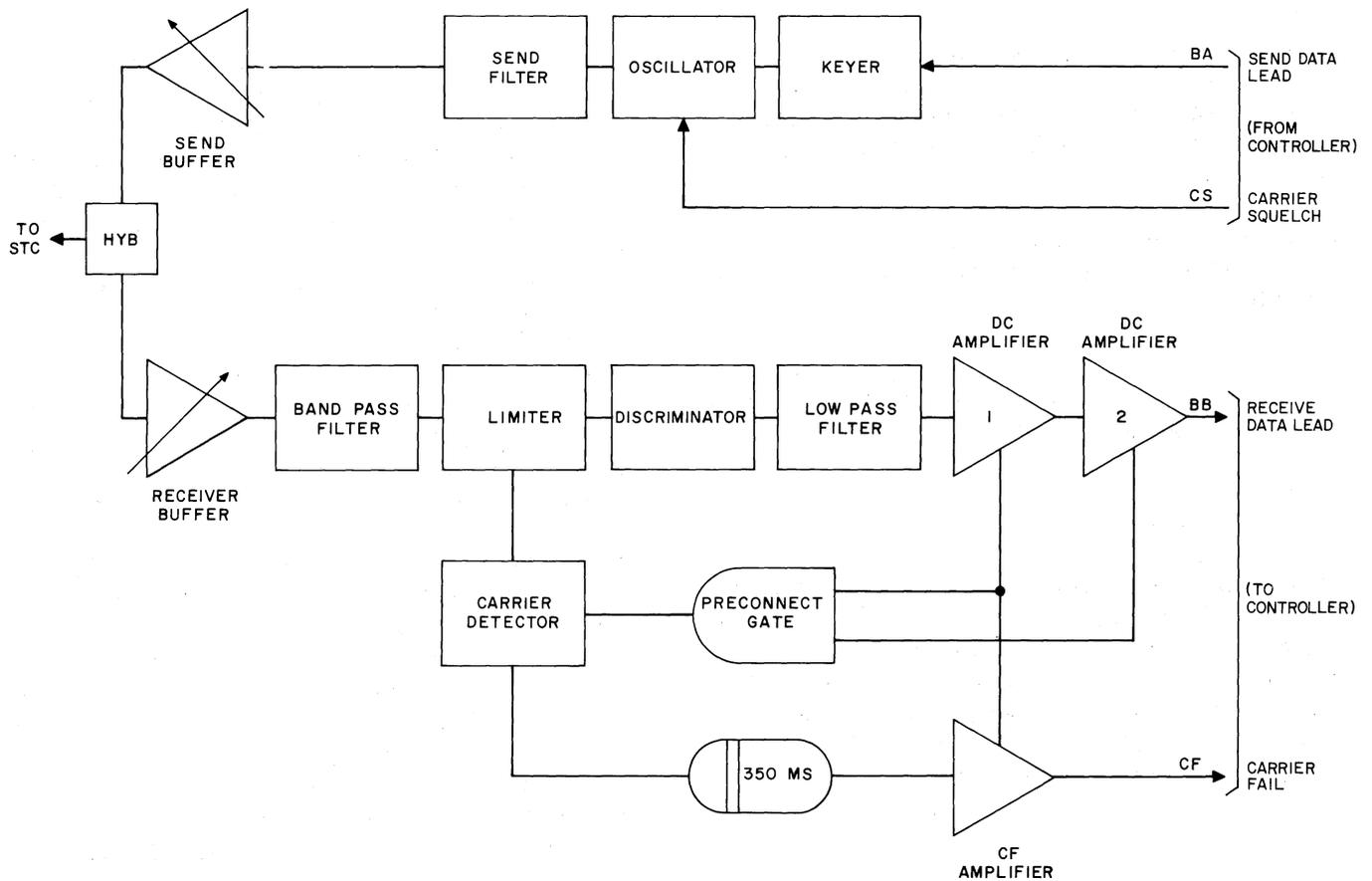


Fig. 29—Block Diagram of Data Set 108A

Note: When a Data Set 108A is installed at the data station, a Data Set 108B-type must be installed at the hub.

3.91 A marking signal transmitted from the computer switcher will pass through the hybrid at the data station to the receive buffer amplifier. The receive buffer amplifier, in addition to isolating the telephone line from the bandpass filter, is an adjustable gain amplifier. The gain of the amplifier is adjusted in two 4-dB steps by means of the D screw switch. The output of the receive buffer amplifier passes through the bandpass filter to the limiter. The limiter amplifies the output to provide a constant amplitude signal to the discriminator. The two outputs of the limiter are to the discriminator and the carrier detector. The discriminator detects, rectifies, and produces a voltage signal that is proportional to the frequency. The output of the discriminator passes through the low-pass filter. The dc voltage output from the low-pass filter passes through the dc amplifiers

and out to the terminal equipment on the received data (BB) lead in the form of EIA voltage signals.

3.92 The second output from the limiter is to the carrier detector. The carrier detector monitors this output for the presence of an acceptable level of carrier. In the event that the carrier power level falls below -40 , -36 , or -32 dBm, dependent on the setting of the D switch, for approximately 110 to 250 milliseconds, the carrier detector operates and a signal passes to the amplifier. The amplifier conditions the data carrier detector to turn off lead CF. This notifies the terminal equipment that a failure exists. The amplifier also clamps the BB lead in the marking condition (ie, mark-hold condition). The data set will assume a preconnect mode in which it monitors for incoming marking carrier via the preconnect gate.

3.93 Some service applications will use carrier squelch on the data carrier failure option. When this option is provided and the T switch is

operated to the ON position at the controller, the CF amplifier will cause ground to be applied on lead CS to the oscillator. This shuts off the oscillator thereby inhibiting the transmission of carrier to the hub.

3.94 In order to restore the station to normal following a carrier failure, two conditions must be met:

- (a) A carrier power level greater than -40 , -36 , or -32 dBm, dependent on the setting of the D switch, must be received.
- (b) The received carrier must be a mark frequency.

When the two conditions have been met for 200 to 500 milliseconds, the carrier detector circuit removes the signal to the amplifier. The amplifier then removes the clamp on lead BA, turns on lead CF to notify the controller that carrier has been restored, and, if the squelch option is provided, removes the ground from the oscillator.

Data Set 109A (Fig. 30)

3.95 The Data Set 109A is a current transmitting device. The output level is nominally 3 mA for both mark and space. The maximum allowable loop resistance for the 109A is 1500 ohms with one microfarad of shunt capacitance.

Note: When a Data Set 109A is used at a station, a Data Set 109B must be used at the hub.

3.96 A space signal applied to lead BA is inverted. This applies an off condition to the transmit OR gate which causes the transmitter to develop 12 volts. The monitor circuit couples the 12 volts to the line polarized so that 3 mA space current flows in the line. A mark signal applied to lead BA also is inverted. This applies an on condition to the transmit OR gate which causes the transmitter to develop four volts. The monitor circuit couples the four volts to the line polarized so that 3 mA mark current flows in the line.

3.97 Since the monitor in the data set recognizes both received and transmitted signals without distinction, it is necessary to prevent transmitted signals from appearing on lead BB. This is accomplished by the transmit delay circuit, receive

NOR gate, and receive OR gate. The receiver NOR gate is operated by a positive voltage on either of its inputs. The output of the receiver is positive for a mark while the transmit delay circuit output is positive for a space. The operated receive NOR gate causes the BB lead to be held marking. To compensate for any delay (due to line capacity) in detecting a mark transmission, the transmit delay circuit holds the receive NOR gate for approximately 200 μ sec after a space-to-mark transition. To ensure that the receive NOR gate is operated before the receiver detects space transmissions, the delay circuit will operate the receive NOR gate before the receiver output goes negative following the mark-to-space transition.

3.98 When the data set is receiving, the BA lead is clamped to mark by signals from the controller. This places a negative voltage on the receive NOR gate input from the transmit delay circuit, thereby permitting the receiver to control the receive NOR gate. The monitor circuit senses the magnitude and polarity of the line current and provides mark and space indications to the receiver. The receiver recognizes the difference in these indications and converts them into EIA voltage signals. These signals are sent through the receive NOR and OR gates and on to the controller on lead BB.

3.99 As long as the line current exceeds 1.5 mA in either a mark or space direction, the bridge conducts, thus producing a negative output. The integrator circuit eliminates amplitude variations and presents a constant negative voltage to the inverter where it is inverted. A positive voltage is sent to the controller carrier fail circuit on lead CF. If the line current drops below 1.5 mA, the bridge stops conducting, the integrator discharges, a positive voltage is applied to the inverter, and the inverter sends a negative voltage to the controller carrier fail circuit. This brings in a carrier fail alarm at the station. The negative voltage from the inverter is also applied to the receive OR gate which clamps the BB lead to mark.

4. OPERATION

A. Sending TTY Attendant Set

4.01 The ORIG/TERM station attendant set (DAS 804N4) contains ten designated keys, all of which contain lamps, plus two additional designated lamps. Figure 9 shows the keys and the functions

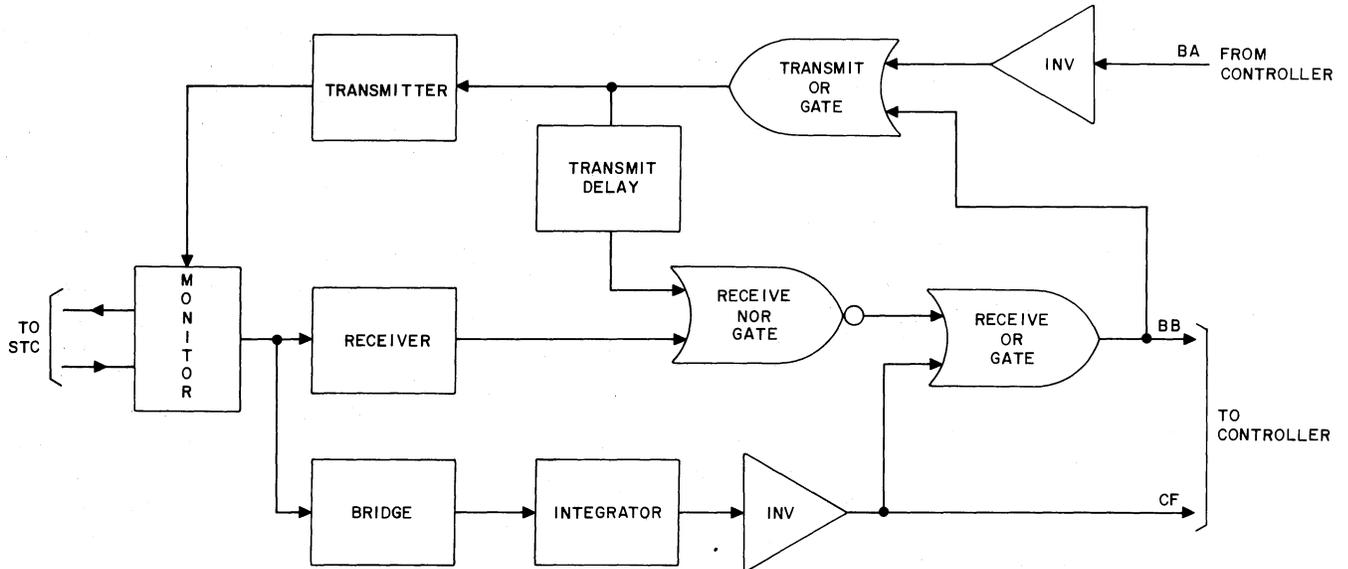


Fig. 30—Block Diagram of Data Set 109A

they perform when operated, along with the lamps and when they are lighted.

B. Receiving TTY Attendant Sets

4.02 The TERM ONLY station attendant sets (DAS 804N2 or 804R3) contain five designated keys, all of which contain lamps, plus two additional designated lamps. Figure 19 shows the keys and what function they perform when they are operated, along with the lamps and when they are lighted.

C. Manual Connection and Disconnection of Auxiliary Receiver

33-Type Primary Receiver

4.03 To manually connect the auxiliary receiver to a Model 33 primary machine, operate the AUX ON key on the primary receiver. This connects the auxiliary receiver and causes the AUX ON lamp to be lighted. Operation of the AUX OFF key on the primary machine will disconnect the auxiliary receiver and extinguish the AUX ON lamp.

35-Type Primary Receiver

4.04 To manually connect the auxiliary receiver to a Model 35 primary machine, operate the AUX RECEIVER key on the primary receiver.

This will connect the auxiliary receiver and cause the AUX RECEIVER lamp to be lighted. Operation of the AUX RECEIVER key while the auxiliary receiver is connected will disconnect the auxiliary receiver and extinguish the AUX RECEIVER lamp unless, while connected manually, an automatic auxiliary receiver connection was called for by line signals (DC2) at a station equipped with the automatic auxiliary receiver connect option. In the latter case, the disconnect will not occur until an auxiliary receiver disconnect is called for by line signals (ETX and/or DC4).

35 ROTR Primary Receiver

4.05 The 35 ROTR is not provided with a means for connecting an auxiliary receiver.

D. Sending Stations

35 ASR TTY

4.06 The 35 ASR TTY is equipped with a 3-position MODE switch (OFF-LINE, LINE, and UNATTENDED positions). Tapes can be prepared with the MODE switch in either the OFF LINE or LINE position.

4.07 When preparing tapes in the off-line mode, the OUT OF SVC lamp on the sending station attendant set will be lighted and the station cannot

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be selected to send or receive. In this mode, the ASR TTY page printer will make hard copy of the message being punched and (optionally) printed on the tape and the punch may be turned on and off by the PUNCH ON/OFF key.

4.08 When preparing tapes in the on-line mode, the page printer will not make copy of the message being punched; however, the message will still be punched and (optionally) printed on the tape. In this mode, the PUNCH ON/OFF key has no control over the punch.

4.09 To prepare a tape, select with the MODE switch the mode of operation most desirable for the station at this time and (if tape punch is empty) load a supply of tape into the tape punch. Assure that the PUNCH OFF key is not operated (off line mode only) and type out the message on the keyboard.

4.10 To send a transmission when the EOT counter is to be used, the station must be in the on-line mode. Advance the tape from the punch to the reader by means of DEL characters. Close the reader gate, set the bat handle to RUN, and type the message or messages (including EOT) on the keyboard, thus causing the punch to perforate the tape. The EOT (when typed on the keyboard) will raise the count in the EOT counter by one, light the BID lamp (assuming the count in the EOT counter had been zero), cause the reader to run until the controller detects SOH from the tape, and cause the station to give a traffic-available response to polling.

4.11 To send a transmission when the EOT counter is not to be used or (DAS 820B2 only) is not provided, select the line mode (MODE switch to LINE), and with the prepared tape in the reader and the reader gate closed, set the reader bat handle to RUN, and operate the BID key on the attendant set. This lights the BID lamp and starts the reader which runs until the controller detects SOH from the tape. The detection of SOH causes the station to give a regular-traffic-available response to polling. If the PRIOR key is operated in conjunction with the BID key, the station will give a priority-traffic-available response to polling. The first EOT detected from the tape will remove the priority status; however, the traffic-available state will be maintained until the reader gate is opened or a taut-tape or tape-out condition occurs.

4.12 Normally to send a message or series of messages in the unattended mode, it is necessary to operate the MODE switch to the UNATTENDED position after the station is selected to send while in the on-line mode. This will allow the transmission to continue unaffected until the first EOT is read from the tape. This EOT will normally revoke the bid even when the count in the EOT counter is not yet zero. However, an option is available on the 35 ASR TTY that permits the introduction of a bid (by operation of the BID key) while the MODE switch is in the UNATTENDED position. With this option, the bid remains valid until the tape runs out or the count in the EOT counter is reduced to zero. In the latter case the EOT count *must* be introduced in the counter while the MODE switch is in the LINE position.

33 ASR TTY

4.13 The 33 ASR TTY is equipped with a 2-position MODE switch (OFF-LINE and LINE positions). Tapes can be prepared only when the MODE switch is in the OFF-LINE position.

4.14 When preparing tapes in the off-line mode (MODE switch to OFF-LINE), the OUT OF SVC lamp on the attendant set will be lighted and the station cannot be selected to send or receive.

4.15 To prepare a tape, set the MODE switch to the OFF-LINE position, load a supply of blank tape into the punch (if punch is empty), operate the PUNCH ON key, and type the message out on the keyboard. The ASR TTY page printer will make hard copy of the message that is being punched on the tape.

4.16 To send a transmission, set the MODE switch to the LINE position. With the prepared tape in the tape reader and the reader gate closed, set the bat handle to RUN and operate the BID key on the ASR TTY attendant set. This will light the BID lamp, start the TTY motor, and, after a short delay, make the tape reader run until the controller detects SOH from the tape. The detection of SOH causes the station to give a regular-traffic-available response to polling. If the PRIOR key is operated in conjunction with the BID key, the station will give a priority-traffic-available response to polling with the same subsequent operation occurring as described for the 35 ASR TTY (see 4.10).

33 or 35 ASR TTY Hold Operation

4.17 To send a message on a tape other than one the station is already transmitting, depress the HOLD key (on the attendant set) before the ETX on the tape being transmitted reaches the reader. This causes the HOLD lamp to light, the audible alarm to sound, and the reader to stop when the controller detects the ETX from the tape. The new tape, which must conform to the standard format, can now be placed in the reader in place of the original tape. Opening the reader gate to remove the original tape causes the count in the EOT counter to become zero and extinguishes the BID lamp. With the new tape inserted in the reader and the bat handle set to RUN, restore the HOLD key, and operate the BID key. This will cause the transmission to resume with the new tape being transmitted. Restoration of the HOLD key extinguishes the HOLD lamp and silences the audible alarm if it was not previously silenced by operation of the AUD OFF key.

4.18 To resume transmission of the original tape, the hold operation described in 4.17 must be repeated and the original tape reinserted in the reader at the point where the original transmission was stopped.

4.19 If the computer switcher transmits an emergency stop procedure to the station during the transmission of a message, the following will occur:

- (1) The station reader will stop, the traffic-available state is canceled, and the EOT counter will be set to zero.

- (2) The EMG STOP lamp will be lighted and the audible alarm will be sounded. The computer switcher may now send an explanatory service message, which is copied by the TTY page printer. Upon completion of delivery of the service message (if any), the station will become unselected as a sender (TRANS REC lamp extinguished). The ASR TTY is idle and it is necessary to operate the EMG STOP key in order to extinguish the EMG STOP lamp and (if not already silenced by operation of the AUD OFF key) silence the audible alarm.

4.20 When a taut-tape condition occurs at the reader while the station is selected as a sender and not in hold, the TAPE lamp will light and the audible alarm will sound. After the condition is cleared, operation of the TAPE key will extinguish the lamp and (if not already silenced by operation of the AUD OFF key) silence the alarm. If during the taut-tape condition an intercharacter time-out has not occurred causing the computer switcher to perform an emergency stop, transmission of the message may be resumed by operation of the BID key.

E. Emergency Stop of ASR TTY Motor

4.21 In order to stop the ASR TTY motor in an emergency, operate the OUT OF SVC key on the attendant set and set the MODE switch to the OFF-LINE position.