NO. 1 ELECTRONIC SWITCHING SYSTEM ADF HALF-DUPLEX—100 WORD PER MINUTE DATA STATION USING 4-ROW TELETYPEWRITERS DESCRIPTION AND OPERATION

CONTENTS PAGE

CONTENTS PAGE

1. GENERAL

1.01 This section covers in general terms the physical and functional description as well as the operating procedures for the No. 1 Electronic Switching System Arranged with Data Features (No. 1 ESS ADF) half-duplex (HDX), 100 word per minute (wpm) data station using 33- and 35-type teletypewriters (TTY).

A. Purpose of System

1.02 The No. 1 ESS ADF is a store and forward message switching system which administers a number of full-duplex (FDX) and HDX lines. FDX operation is described in the section entitled No. 1 Electronic Switching System ADF Full-Duplex—100 Word Per Minute Data Station—Using 4-Row Teletypewriters—Description and Operation (580-301-101). Each HDX line can accommodate a number of HDX stations which may be either automatic send and receive (ASR)- or receive only (RO)-type stations. More than one station on a particular line can receive data simultaneously, but only one station at a time may originate traffic on the line. The system will handle both interline and intraline traffic.

B. Purpose of Station

1.03 The No. 1 ESS ADF HDX data station is used to provide low-speed (100 wpm) TTY service to other stations, in the private network of which it is a part, under control of the No. 1 ESS ADF calling system. To simplify this section, the No. 1 ESS ADF will hereafter be referred to as the ADF.

C. System Arrangement

1.04 Fig. 1 is a block diagram of the typical arrangement for a network consisting of the ADF and a number of HDX, 100 wpm data stations.

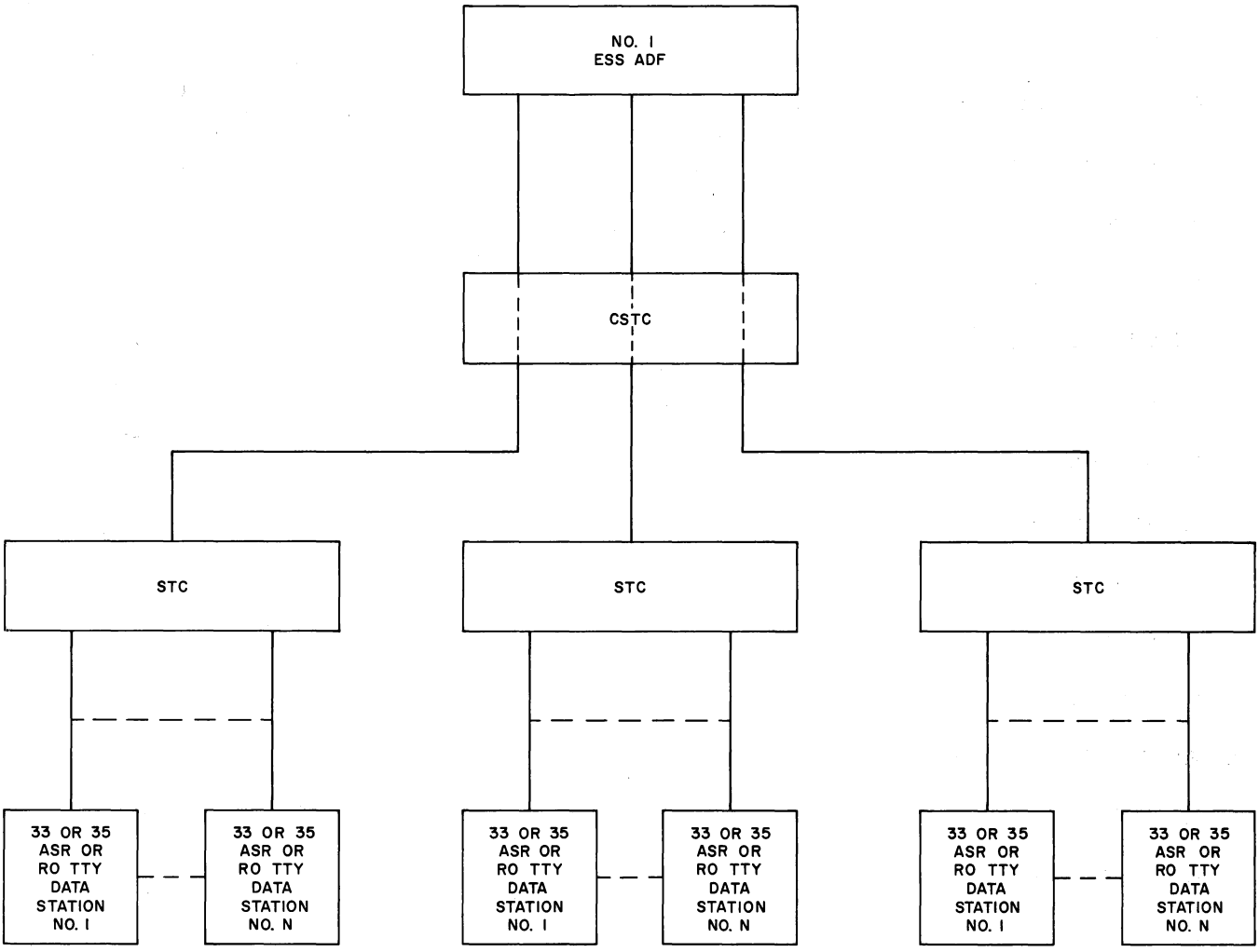


Fig. 1—Block Diagram of Typical No. 1 ESS ADF With HDX Operation

1.05 The data stations are connected to the ADF through a Serving Test Center (STC) and the Control Serving Test Center (CSTC) via a HDX line. The stations on each line can be ASR- or RO-type but they must be 100 wpm HDX stations.

D. Station Arrangement

1.06 The 100 wpm, HDX data station is a self-contained unit which is intended to be completely assembled by the distributing house prior to delivery, and consists of the following:

(a) A model 33 or 35 ASR or RO TTY or 35 typing reperforator TTY (ROTR).

(b) A half-duplex station controller (HDSC) which is made up of Data Auxiliary Set 820B1 or 820B2 (controller) with Data Set 108A or 109A, Data Auxiliary Set 804N2, 804N4, or 804R3 (attendant unit) with an M36F cord, and, as part of the controller, a 24A power unit. A model 33 RO TTY may be optionally provided as an auxiliary receiver to a 33 ASR or RO TTY master machine and a 35 RO TTY may be optionally provided as an auxiliary receiver to a 35 ASR or RO TTY master machine. In addition, a 35 ROTR TTY may be optionally provided as an auxiliary receiver to a 35 ASR or RO TTY master machine. Table A lists the arrangements for ASR, RO, and ROTR stations, and the components which make up each arrangement.

TABLE A

STATION ARRANGEMENT	MASTER MACHINE	DATA SET	ATTEN UNIT	CONT	M36F CORD	BRACKET	TYPE TTY THAT CAN BE USED AS OPTIONAL AUX REC
33 RO WITH AC TRANS	33 RO TTY	108A	804N2	820B2	YES	91A	33 RO
33 RO WITH DC TRANS	33 RO TTY	109A	804N2	820B2	YES	91A	33 RO
35 RO WITH AC TRANS	35 RO TTY	108A	804N2	820B2	YES	92A	35 RO or ROTR
35 RO WITH DC TRANS	35 RO TTY	109A	804N2	820B2	YES	92A	35 RO or ROTR
35 ROTR WITH AC TRANS*	35 ROTR	108A	804R3	820B2	YES (10′ Long)	95A	NONE
35 ROTR WITH DC TRANS*	35 ROTR	109A	804R3	820B2	YES (10′ Long)	95A	NONE
33 ASR WITH AC TRANS	33 ASR TTY	108A	804N4	820B2	NO	91A	33 RO
33 ASR WITH DC TRANS	33 ASR TTY	109A	804N4	820B2	NO	91A	33 RO
35 ASR WITH AC TRANS	35 ASR TTY	108A	804N4	820B1	NO	92A	35 RO or ROTR
35 ASR WITH DC TRANS	35 ASR TTY	109A	804N4	820B1	NO	92A	35 RO or ROTR

* KS-20018 L1, L2, L3, or L4 cabinet also required.

E. Uses of Station Components

1.07 The ASR TTY is used as a master machine in an ASR-type station to:

(a) Punch tapes for message transmission.

(b) Send all messages.

(c) Print local copy of messages sent by the station.

(d) Print copy of messages received by the station.

(e) Optionally punch tapes of messages received by the station.

1.08 The RO TTY is used as a master machine in RO-type stations or as an auxiliary machine to ASR or RO TTY master machines to print copy of messages received by the station.

1.09 The ROTR is used as a master machine in RO-type stations or as an auxiliary machine to 35 ASR or RO TTY master machines to punch tapes of messages received by the station.

1.10 The controller enables the TTY or ROTR units to send and/or receive messages automatically by providing circuits to recognize control characters from the ADF and to generate response and service characters for transmission to the ADF.

1.11 The attendant units are used to cause the controller to generate traffic available responses (ASR-type stations), place the station out of service, silence alarms, and extinguish alarm indication lamps (ASR- and RO-types stations). It also indicates when the station is selected as a sender or receiver, is out of service, or is in an alarm condition.

1.12 Data Sets 108A and 109A are used between the controller and the line to convert the digital data into a form suitable for transmission over telephone facilities.

F. Station Operation

1.13 The ADF interrogates each station individually in a continuous cyclic operation. The station replies and indicates the following:

(a) Whether or not the station is ready to receive

(b) Whether or not the station has traffic available to transmit

(c) Whether the traffic to be transmitted has regular or priority status.

This sequence is referred to as polling. If a bid to enter traffic is registered by a station, the ADF may select that station to transmit.

1.14 When the ADF elects to pick up traffic from a station that has entered a bid to transmit, the ADF will send an originating message number (if required) which may be followed by the time and date (if required) for the message pickup. The station typing unit will print this information when it is received. On signal from the ADF, the station will now send the message heading to the ADF. The message heading should contain the addresses of the stations to receive the message. If any of the stations addressed in the heading are on the same line (intraline) as the selected sender, the ADF will select them as receivers. The ADF then signals the selected sender to transmit the text of the message. The message is copied by the intraline receivers and stored by the ADF for future delivery to the interline addressee(s).

1.15 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 ADF to determine if it is ready to receive. If the station is not ready to receive, the ADF will store the message until, during one of the cyclic polling sequences, the ADF discovers that the station is 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, the ADF interrogates each receive station to determine if the message was received properly. This sequence is referred to as the "roll call." If a positive reply to roll call is received from a station, the ADF goes on to roll call the other selected receive stations; however, if a negative reply is received, an alarm is enabled at the station being roll called and the ADF will queue (intraline delivery) or requeue (interline delivery) the message for retransmission. After all the selected receive stations have been roll called, they are returned to idle by the ADF.

G. Station Power

1.16 The 100 wpm, HDX data station requires an individually fused line power source of 106 to 129 volts, 60 ±0.5 Hz, 6 amps. AC power for the 24A power unit is supplied from a terminal block on the TTY. DC voltages required for the controller are supplied by the 24A power unit which is part of the controller.

2. PHYSICAL DESCRIPTION

A. General

2.01 This part describes the physical appearance of the components of a No. 1 ESS ADF 100 wpm, HDX data station.

B. Stations

2.02 There are five types of HDX stations available:

(a) The 33 send-receive type (Fig. 2) consists of a model 33 ASR TTY, an 820B2 controller, an 804N4 attendant unit, a 91A bracket, Data Set 108A or 109A, and, optionally, a model 33 RO TTY as an auxiliary receiver.

(b) The 33 RO-type (Fig. 3) consists of a model 33 RO TTY, an 820B2 controller, an 804N2 attendant unit, a cord M36F, a 91A bracket, Data Set 108A or 109A, and, optionally, a model 33 RO TTY as an auxiliary receiver.

(c) The 35 send-receive type (Fig. 4) consists of a model 35 ASR TTY, an 820B1 controller, an 804N4 attendant unit, a 92A bracket, Data Set 108A or 109A, and, optionally, a model 35 RO TTY or 35 ROTR TTY as an auxiliary receiver.

(d) The 35 RO-type (Fig. 5) consists of a model 35 RO TTY, an 820B2 controller, an 804N2 attendant unit, a cord M36F, Data Set 108A or 109A, and optionally, a model 35 RO TTY or 35 ROTR TTY as an auxiliary receiver.

(e) The 35 ROTR-type (Fig. 6) consists of a 35 ROTR, an 820B2 controller, an 804R3 attendant unit, a cord M36F (10 feet long), a 95A bracket, a Data Set 108A or 109A, and a KS-20018 type cabinet. A 35 ROTR-type station cannot be arranged to operate with an auxiliary machine.

2.03 In 2.02 (a), (b), (c), and (d), the controller, data set, attendant unit, and cord are mounted in the TTY cabinet of the master machine. In 2.02 (e), the attendant unit is mounted in the ROTR cabinet door and the controller, data set, and cord are mounted in the KS-20018 type cabinet.

C. Teletypewriters

2.04 The model 33 ASR TTY is a 4-row, 100 wpm, FDX TTY. It consists of a page printer, tape punch, reader (TD) and keyboard. All messages originated by the 33 ASR stations are transmitted from the TD. Two switch selected modes of operation are possible. They are:

(a) The OFF LINE mode in which messages may be prepared, on tape, for transmission. In this mode, the page printer and tape punch operate from either the keyboard or TD, messages cannot be transmitted or received, and the motor runs continuously.

(b) The ON LINE mode in which the page printer and tape punch will copy any messages received at the station or transmitted by the station TD. The motor runs only when the station is receiving a message or has traffic available.

2.05 The 35 ASR TTY is a 4-row, 100 wpm, FDX TTY. It contains a page printer, tape punch, TD, and keyboard. All messages that originate from 35 ASR stations are transmitted from the TD. Three switch selected modes of operation are possible. They are:

(a) The OFF LINE mode in which messages may be prepared on tape for transmission. In this mode the typing unit and tape punch operate from the keyboard or TD under control of the punch switch, messages cannot be transmitted or received, and the motor runs continuously.

(b) The LINE mode in which the page printer will copy any messages received at the station or transmitted by the TD. In this mode the tape punch is connected to the keyboard. The page printer and TD are on-line and the motor runs continuously.

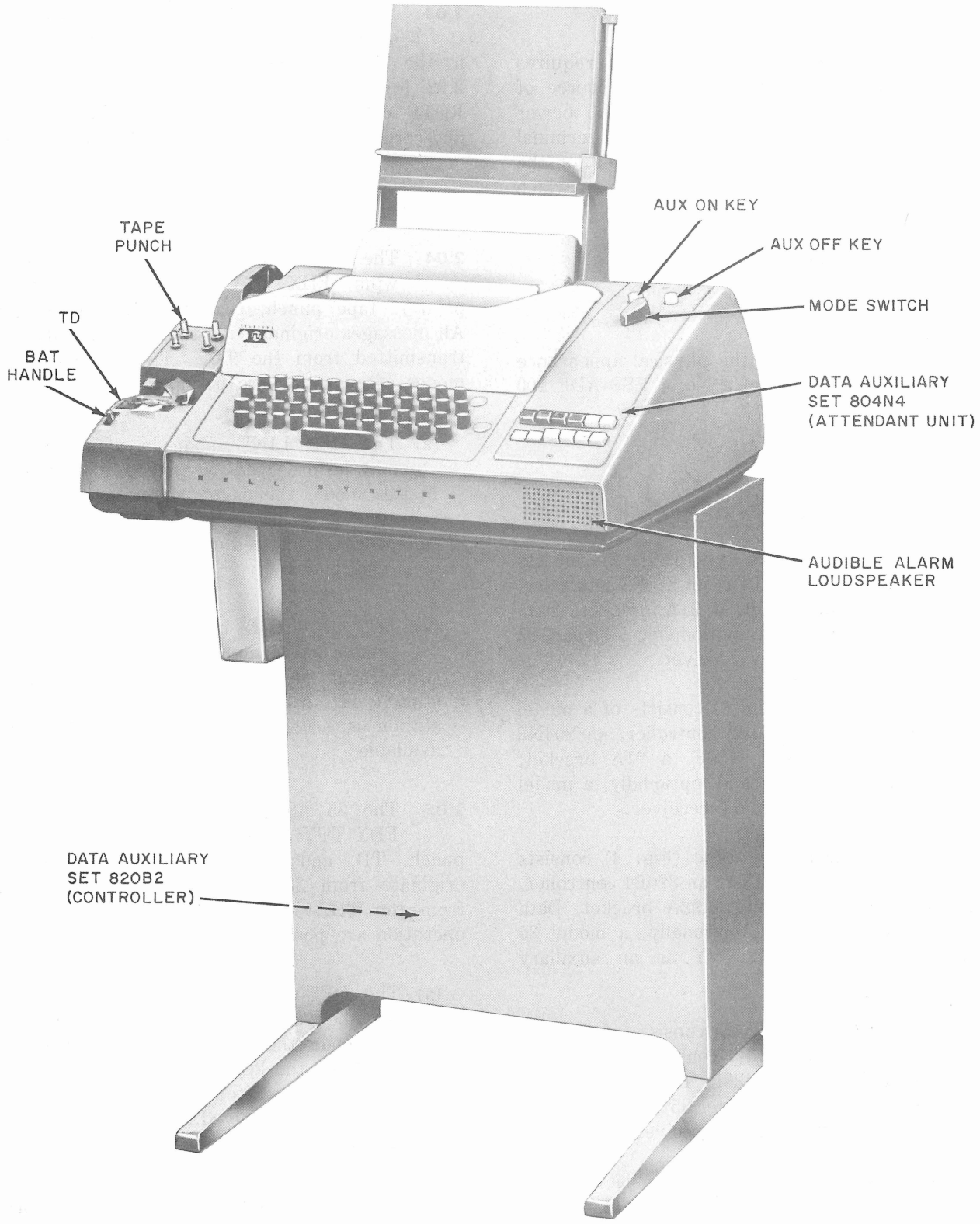


Fig. 2—33 ASR-Type HDX Station

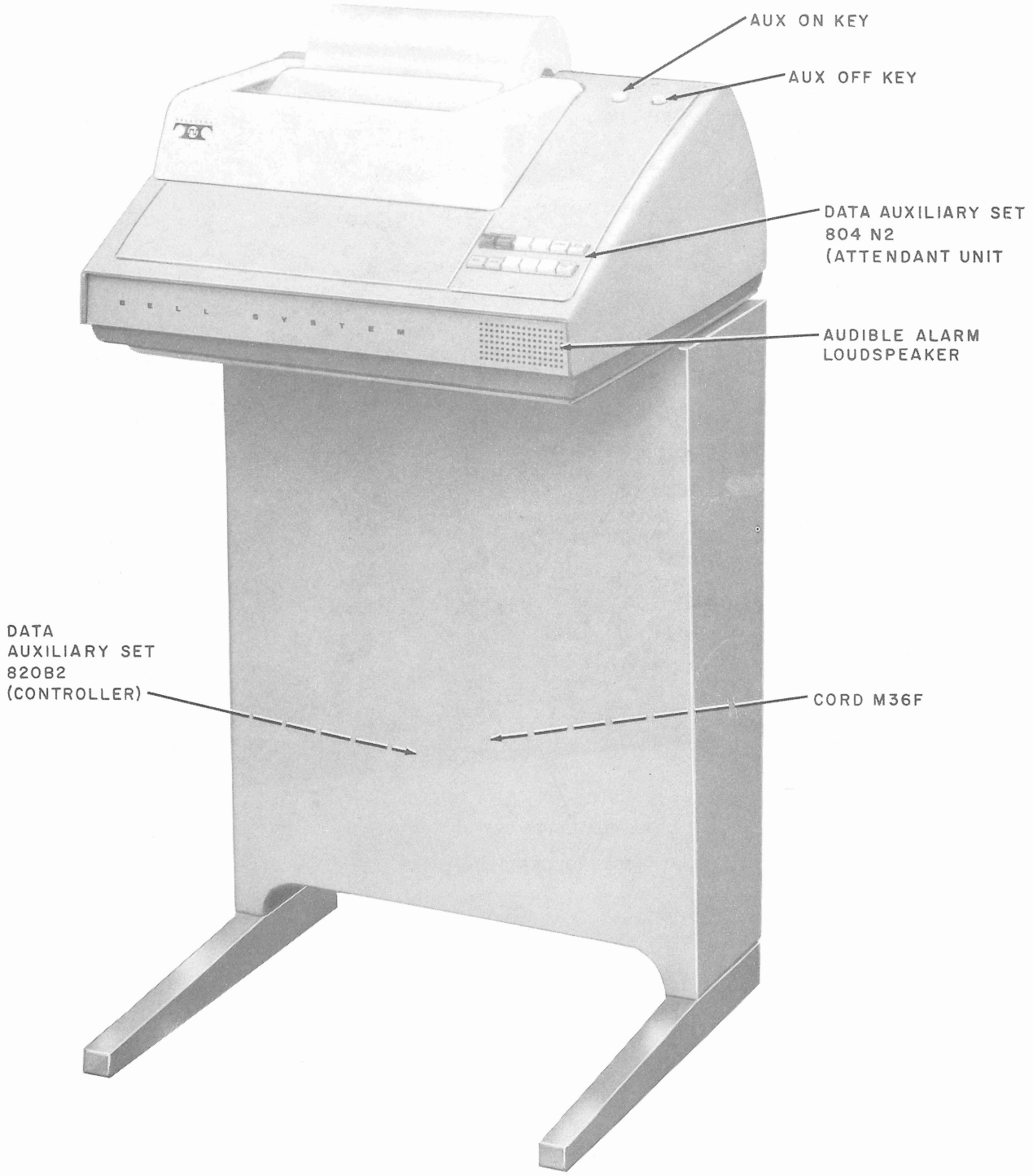


Fig. 3—33 RO-Type HDX Station

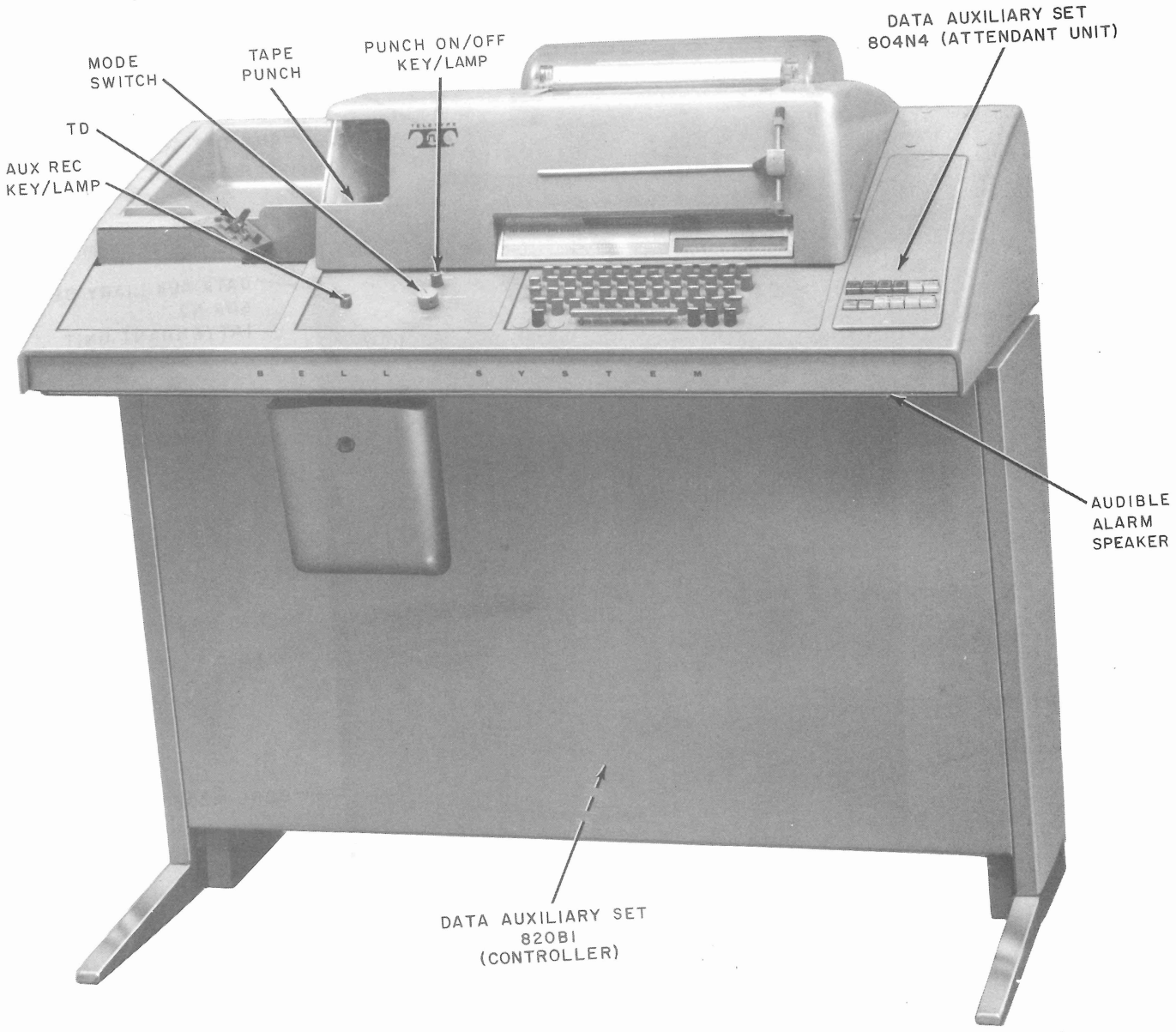


Fig. 4—35 ASR-Type HDX Station

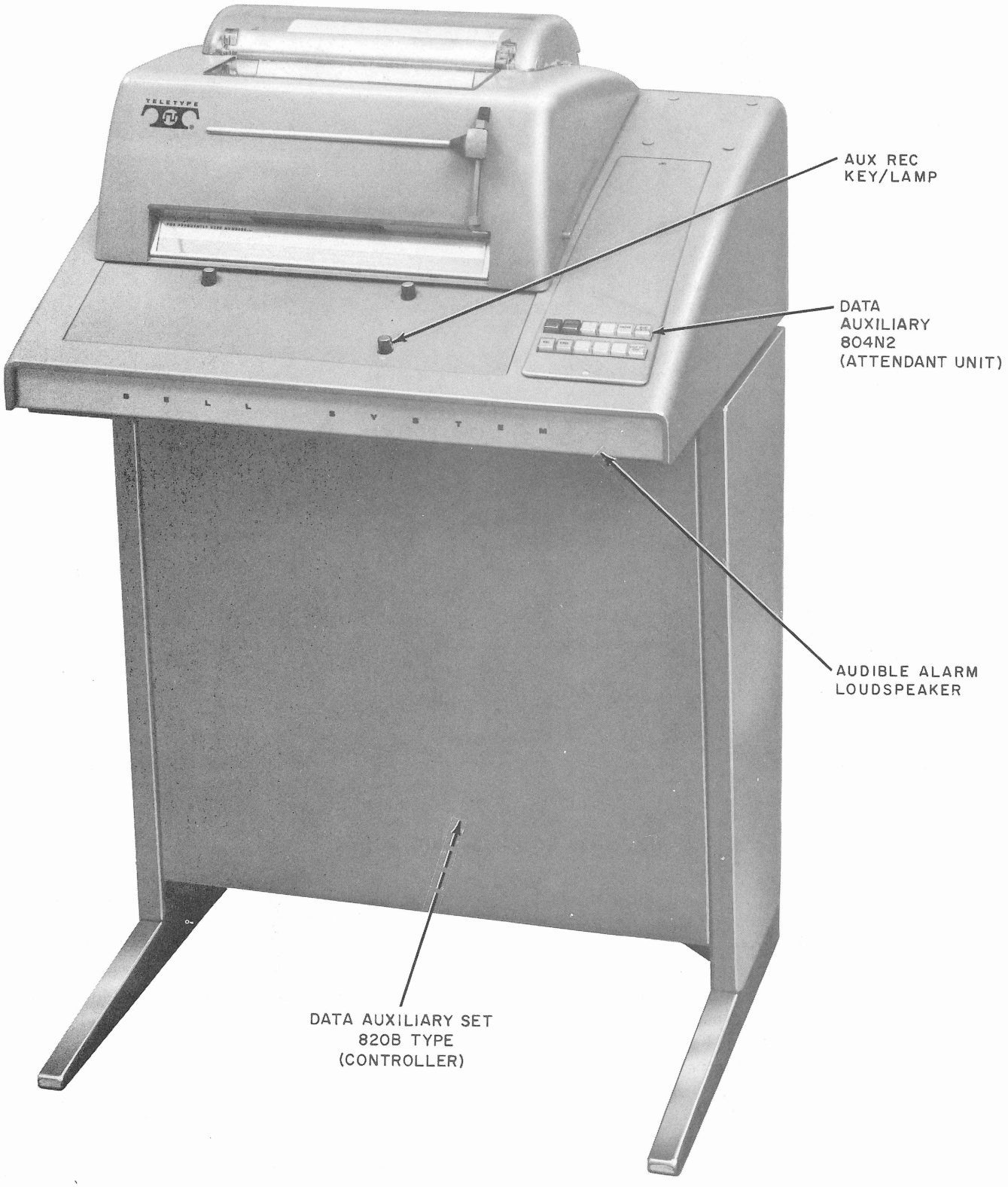


Fig. 5—35 RO-Type HDX Station

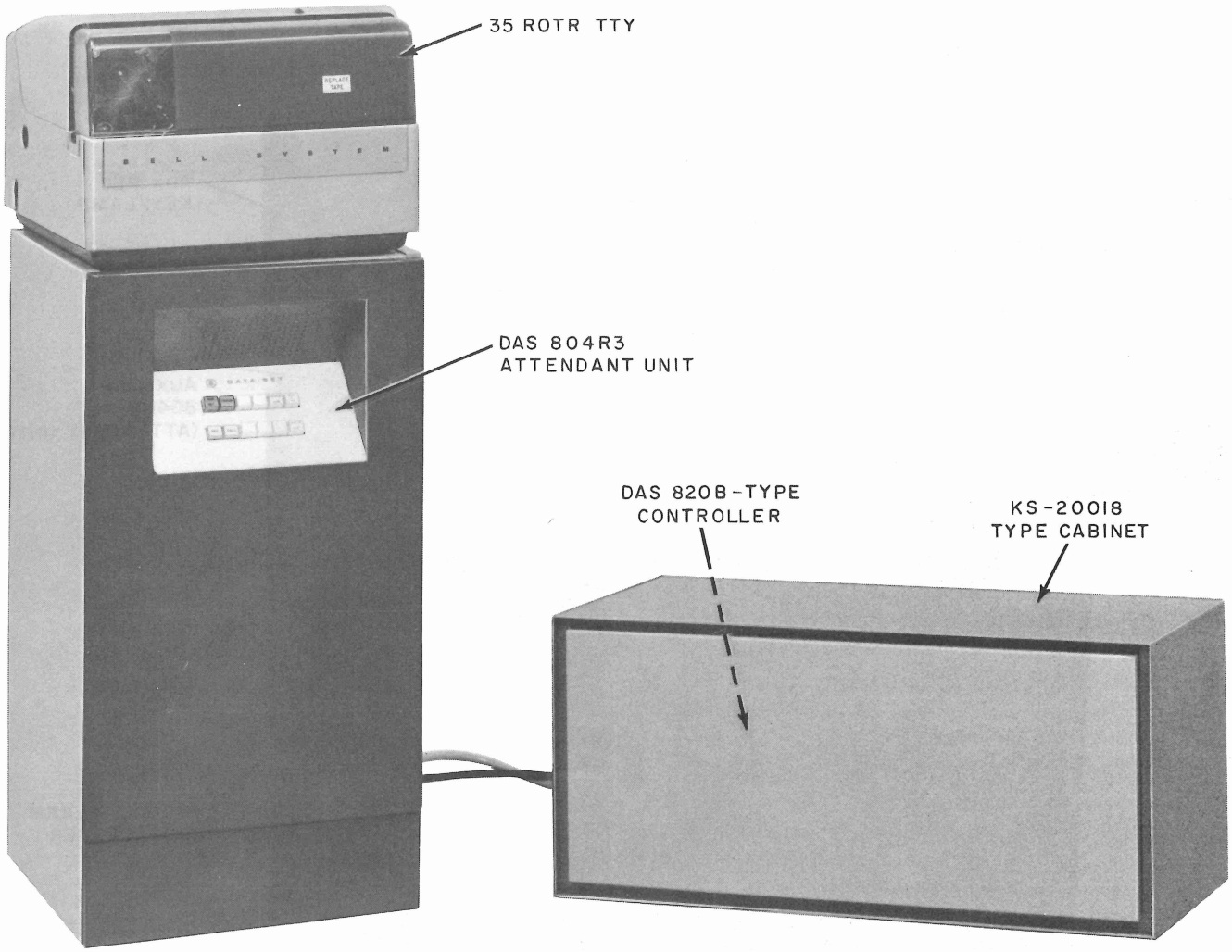


Fig. 6—35 ROTR-Type HDX Station

(c) The UNATTENDED mode in which the page printer will copy any messages received at the station. In this mode the tape punch may be either connected to the keyboard or, optionally when the station is not equipped with an auxiliary receiver, to the line. The page printer and TD are on-line, however, the TTY motor is turned on only when a message is being received and messages cannot be transmitted by the station. This arrangement permits use of the machine for receiving messages on an unattended basis at a half-duplex station without the necessity for having its motor running continuously.

2.06 The 33 RO TTY is a 4-row, 100 wpm TTY which contains a page printer. It may be used as the master machine at an RO-type station or as an auxiliary receiver to a master 33 ASR or RO TTY. When used as a master machine, the motor runs only when the station is selected to receive. When used as an auxiliary machine, the motor runs whenever the master machine motor runs.

2.07 The 35 RO TTY is a 4-row, 100 wpm TTY which contains a page printer. It may be used as the master machine at an RO-type station or as an auxiliary receiver to a master 35 ASR or RO TTY. When used as a master machine, the motor runs only when the station is selected to receive. When used as an auxiliary machine, the motor runs whenever the master machine motor runs.

2.08 The 35 ROTR TTY is a 100-wpm machine which contains a typing reperforator. It may be used as a master machine at an RO-type station or as an auxiliary receiver to a master 35 ASR or RO TTY.

D. Controllers

2.09 The controller is equipped with a 24A power unit and weighs approximately 18 pounds. It has slots for 13 AR circuit packs (CP) and either Data Set 108A or 109A. In the HDX stations, 12 of the CP slots are used. One slot remains as a spare. Seven of the CPs are used for the state and control logic and timing functions, four CPs are for interface functions between the controller and TTY and one CP contains the in/out shift register.

2.10 The controller for the 33 ASR and RO stations (Fig. 7) is located behind the rear panel of the TTY pedestal. It is mounted on a 91A bracket which allows it to be tilted out for maintenance and CP removal.

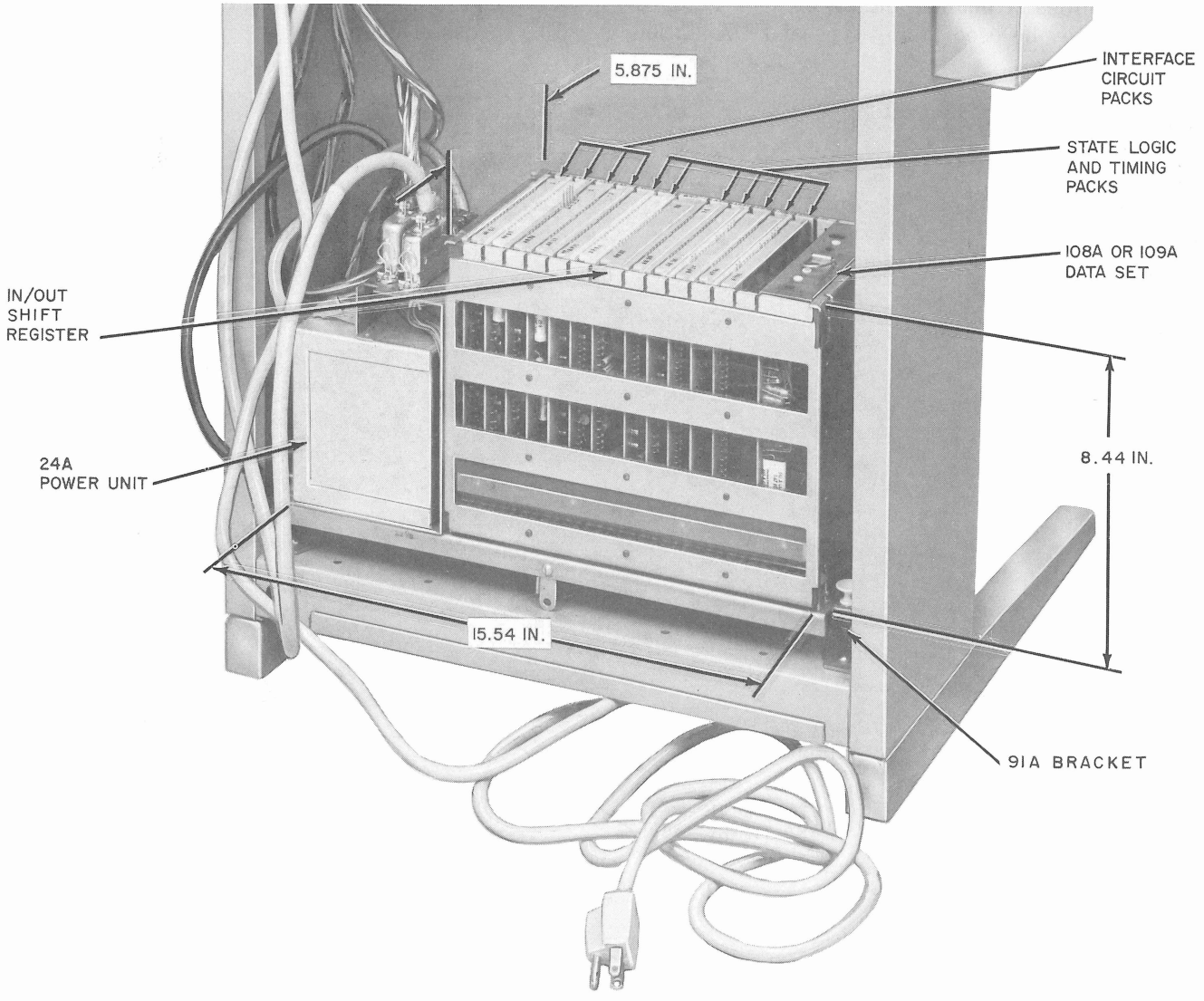


Fig. 7—DAS 820B2 for 33 ASR- and RO-Type HDX Stations

2.11 The controller for the 35 ASR and RO stations (Fig. 8) is located behind the lower front panel of the TTY pedestal. It is mounted on a 92A bracket in a position which facilitates maintenance and CP removal without tilting.

2.12 The controller for the 35 ROTR station (Fig. 9) is located in the KS-20018 type cabinet. It is mounted on a 95A bracket in a position which facilitates maintenance and CP removal without tilting.

E. Data Sets

2.13 Depending on the type of transmission facilities available, either of two types of data sets may be used in any type of HDX station. They are Data Sets 108A (ac operation) and 109A (dc operation). The data set is located on the right-hand side of the controller.

F. Attendant Units

2.14 Either of three types of attendant units are used in the HDX stations. The 33 and 35 RO TTY are equipped with Data Auxiliary Set 804N2 (Fig. 10 and 11). The 33 and 35 ASR TTY is equipped with Data Auxiliary Set 804N4 (Fig. 12 and 13). The 35 ROTR is equipped with Data Auxiliary Set 804R3 (Fig. 14). The attendant unit is mounted on the right-hand side of the TTY pedestal top for the ASR and RO TTY. The attendant unit for the ROTR is mounted on the TTY pedestal door.

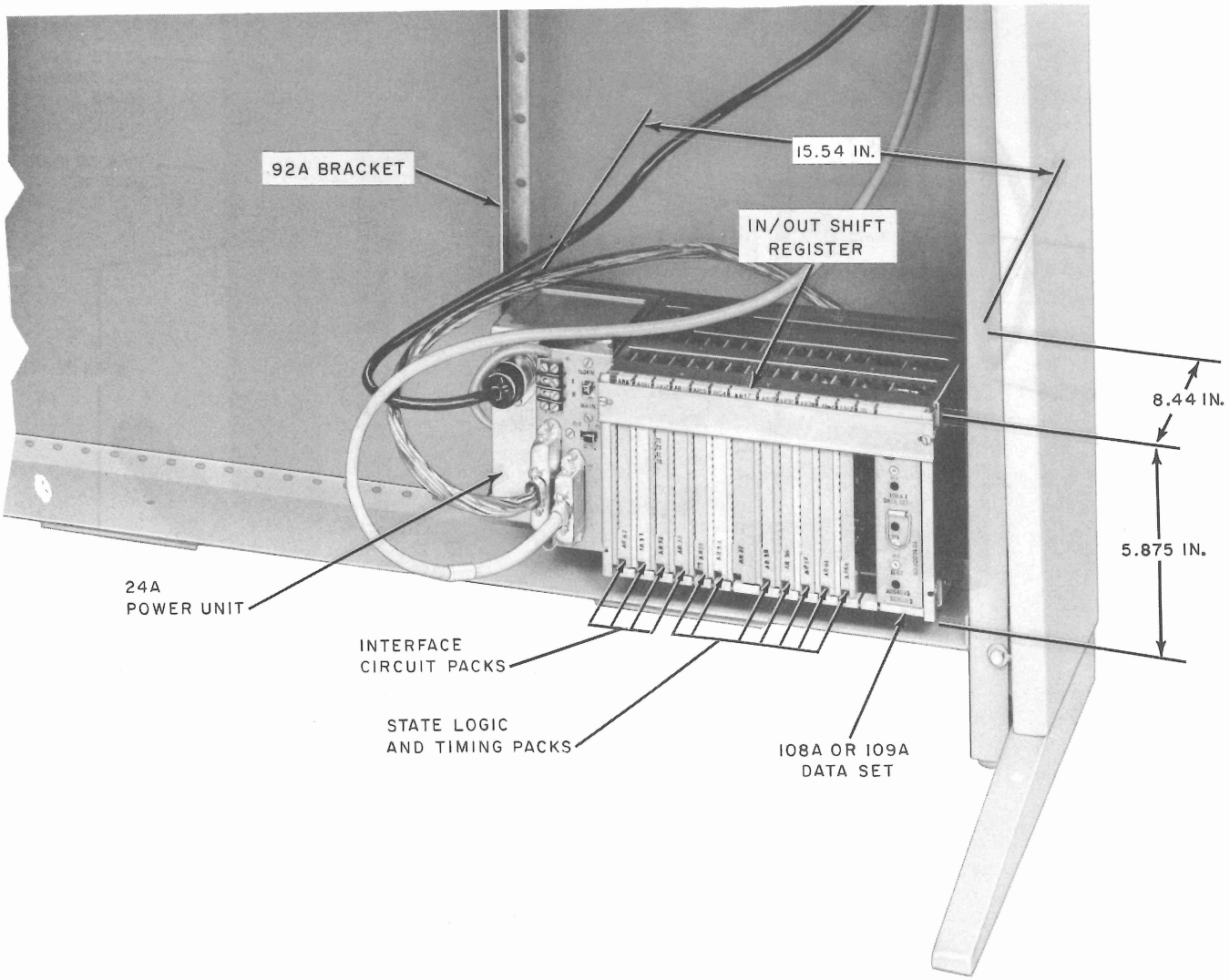


Fig. 8—DAS 820B-Type for 35 ASR- and RO-Type HDX Stations

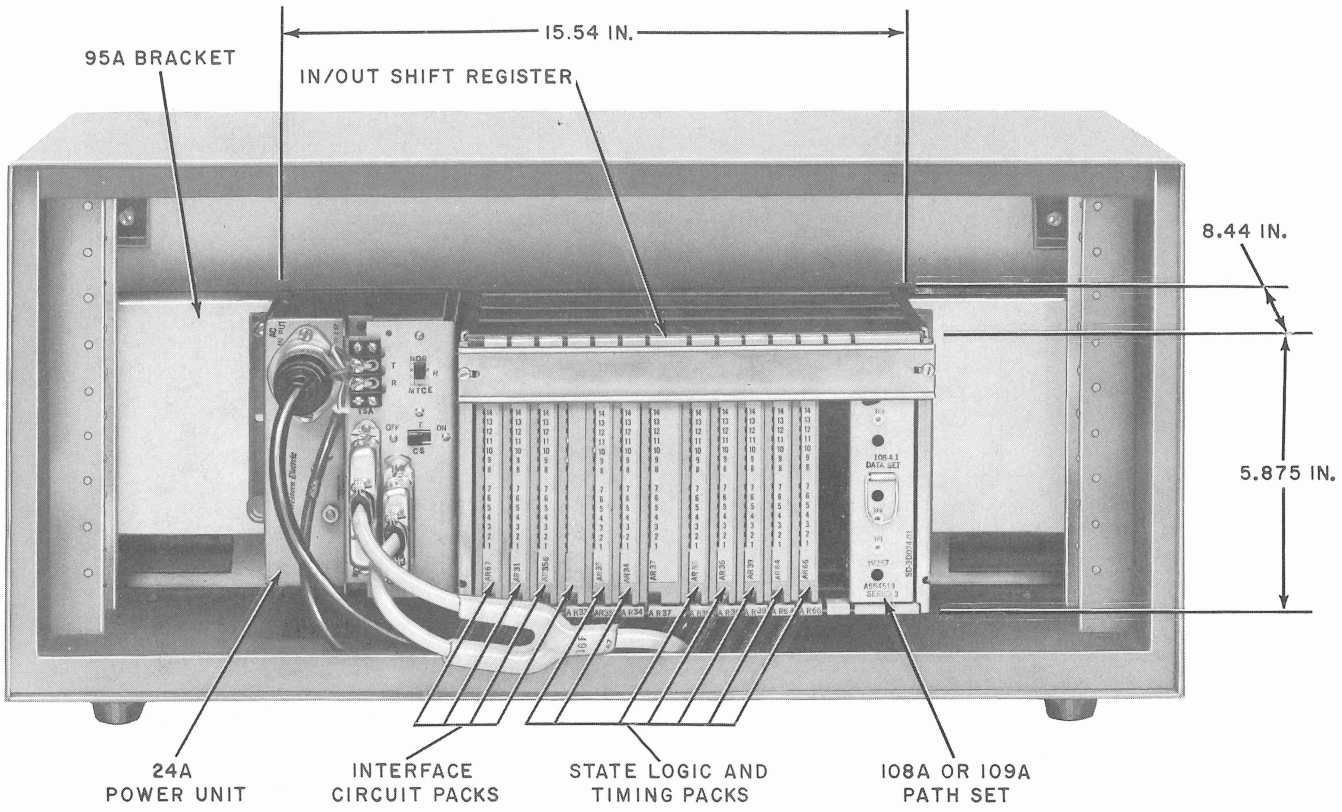


Fig. 9—DAS 820B-Type for 35 ROTR-Type HDX Station

2.15 The RO attendant unit (804N2) uses two red and four white keys in the top row, and two amber and one white key in the bottom row.

2.16 The ASR attendant unit (804N4) uses four red and two white keys in the top row and two amber and four white keys in the bottom row.

2.17 The ROTR attendant unit (804R3) uses two red and two white keys in the top row and two amber and one white key in the bottom row.

3. FUNCTIONAL DESCRIPTION

A. General

3.01 This part describes the functions of the various components which make up the five types of 100 wpm HDX stations and their various arrangements.

3.02 In the descriptions which follow, it will be assumed that the station under consideration is an ASR-type station. Message transmission will be covered separately from message reception in order that the method of operation may be applied to terminate only situations.

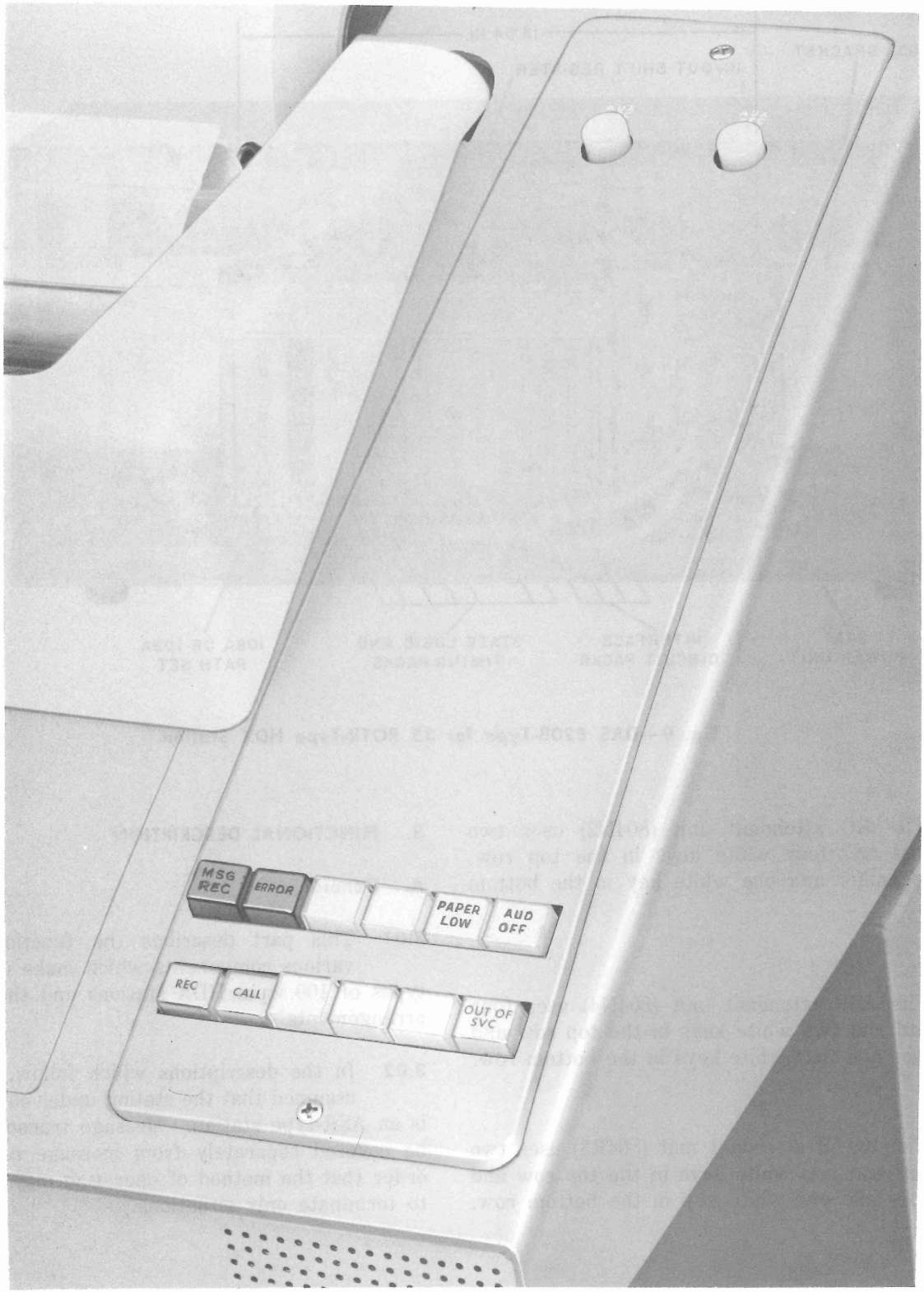


Fig. 10—33 RO-Type HDX Station Attendant Unit

Fig. 11—35 RO-Type HDX Station Attendant Unit

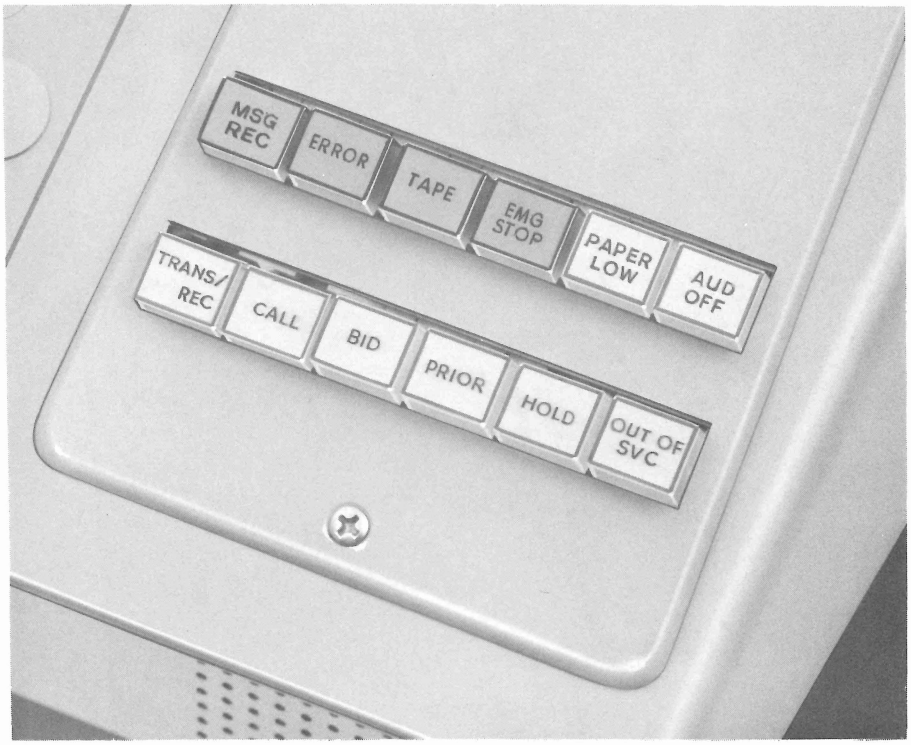


Fig. 12—33 ASR-Type HDX Station Attendant Unit

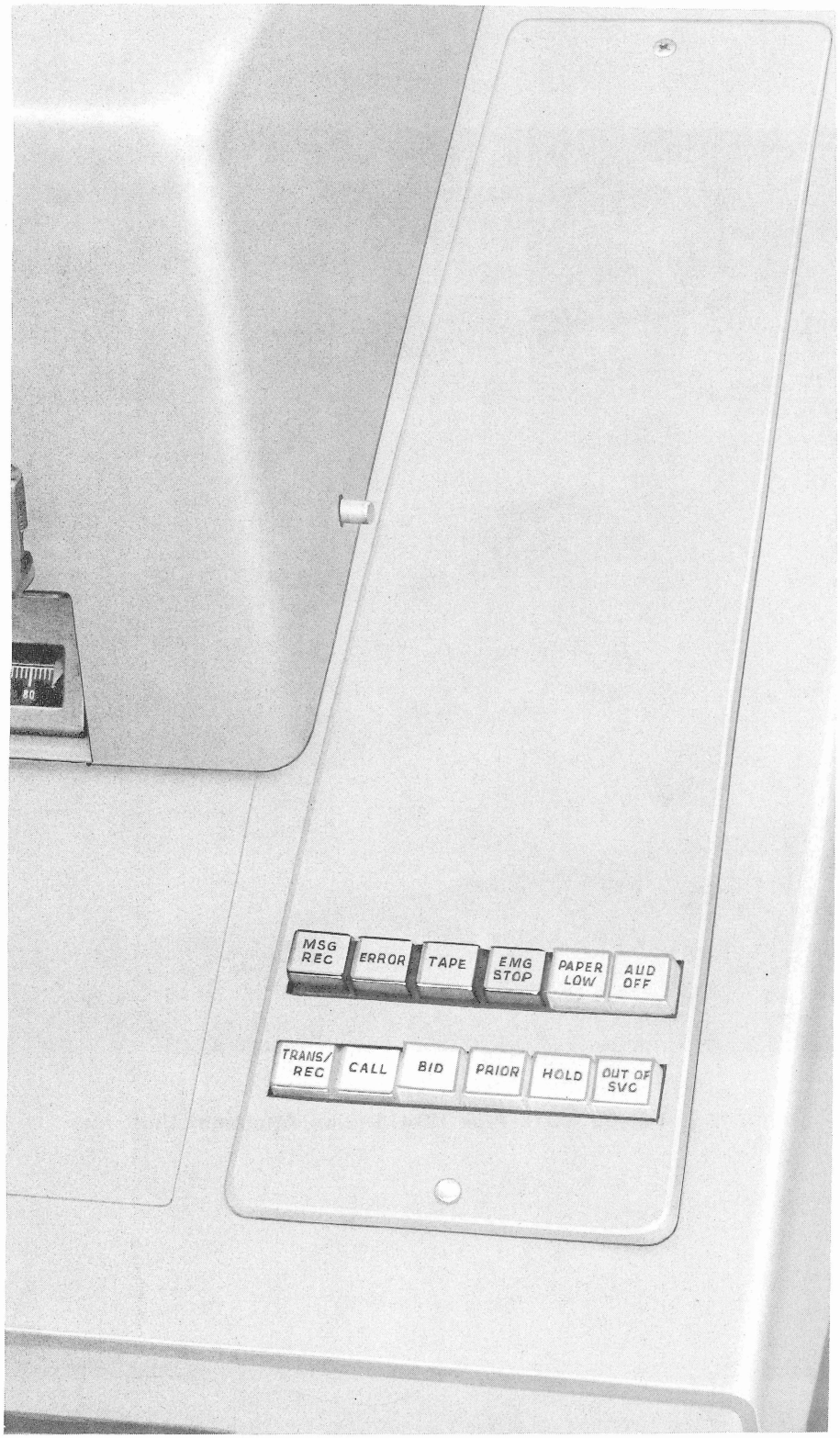


Fig. 13—35 ASR-Type HDX Station Attendant Unit

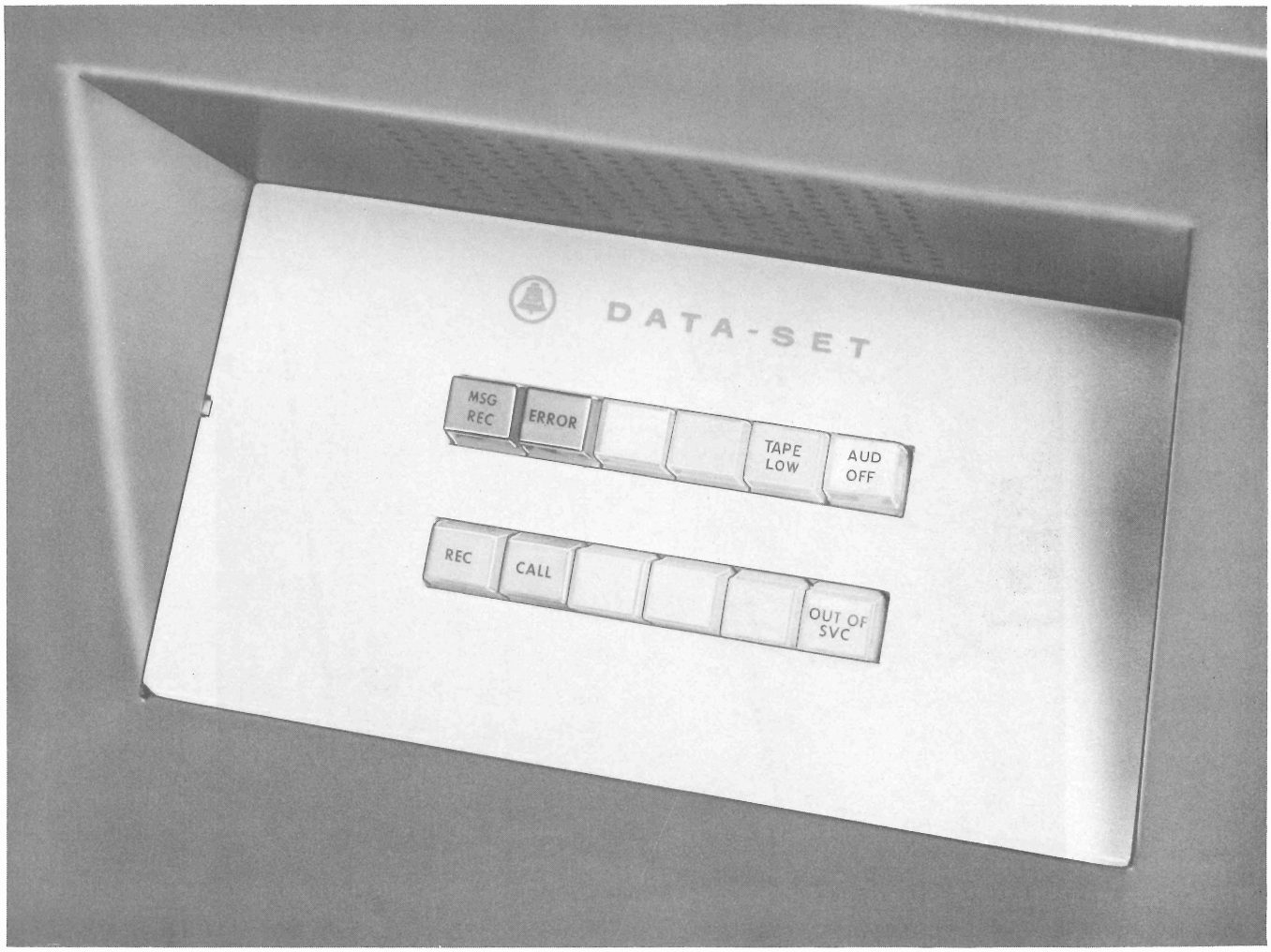


Fig. 14—35 ROTR-Type HDX Station Attendant Unit

3.03 Reference will be made to the ASCII code. Table B shows the ASCII code for bits one through seven. An eighth bit is added to provide even bit parity. Table C gives the definitions for the various ASCII code designations.

3.04 When power is first applied to the station, an initializer circuit in the controller applies a momentary positive voltage to all critical state logic memory elements and places the controller in the idle mode.

TABLE B

USA STANDARD CODE FOR INFORMATION INTERCHANGE

USAS X3.4 — 1967

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

TABLE C

DESIGNATION	DEFINITION	DESIGNATION	DEFINITION
NUL	All spaces	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 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 All Marks	SP	Space

Message Format

3.05 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 should be put on the tape following the ETX of the first message. A third message may be put on the continuous tape following the ETX of the second, etc. Each message must follow the same format, ie,

SOH heading STX text ETX.

In the last message, ETX must be followed by EOT. Each message should usually be preceded by several inches of deletes (DEL) characters which serve to allow introduction of the tape into the TD and permit the EOT character to reach the TD without causing a tape taut condition. The traffic available state can now be initiated by inserting the tape in the TD, operating the BAT handle to RUN, and operating the BID key on the attendant unit. Operation of the BID key lights the BID lamp and starts the TD which will run until the controller detects the first SOH character on the tape (the controller discards the DEL characters). Detection of the SOH stops the TD and the controller will now respond regular traffic available or, if the PRIOR key is operated, priority traffic available when polled by the ADF.

EOT Counter

3.06 When the station ~~is a 35~~ ASR-type, the EOT counter option is provided and continuous tape operation may be utilized without the possibility of starting to send a partially prepared transmission. The messages are prepared as described in 3.05 and fed directly from the tape punch into the gate of the TD. When an EOT, marking the end of a transmission, is punched, a count is entered in the counter, the TD is started, and the BID lamp is lighted. The TD continues to run until the first SOH is detected by the controller conditioning the controller to the traffic available state. A maximum of 14 EOTs may be counted. As the ADF picks up the messages, each time an EOT is detected from the tape by the controller, the EOT count is reduced by one and the "traffic available" state is maintained. The station gives a "traffic available" response to the ADF each time it is polled until the last message is picked up and the EOT count is reduced to zero. If the EOT count exceeds 14, the controller reverts to the infinite count state which is the same state that is obtained when the BID key is operated.

Polling Responses (Fig. 15)

3.07 The ADF polls every station on the line periodically by sending DLE followed by the unique Station Polling Code (SPC) of the station. The response of the station depends on the status of its sending and receiving terminal. The responses are as follows:

(a) CAN—The CAN response is sent if the station has no traffic to send and is ready to receive. The station will also respond with CAN if the station has no traffic to send, is not ready to receive, and the CALL lamp is extinguished.

(b) NAK—The NAK response is sent if the station has no traffic to send, is not ready to receive, and the CALL lamp is lighted. The CALL lamp is lighted if the station is not ready to receive during the call-in sequence (see 3.11).

(c) P-ACK—The P-ACK response is sent if the station has priority traffic to transmit and is ready to receive. The station also responds with P-ACK if the station has priority traffic to send, is not ready to receive, and the CALL lamp is extinguished.

(d) R-ACK—Same as (c) except traffic is regular.

(e) P-NAK—The station responds with P-NAK if it has priority traffic to send, is not ready to receive, and the CALL lamp is lighted.

(f) R-NAK—Same as (e) except traffic is regular.

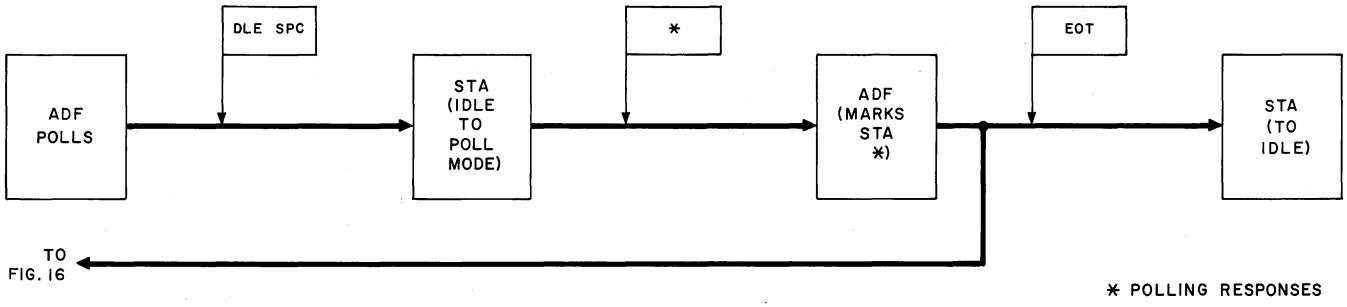


Fig. 15—Station Polling Response Sequence Chart

B. Sending the Message (Fig. 16)

3.08 Once the station has been polled and traffic is available, the ADF may elect to pick up the message regardless of the status of the station receiver, otherwise, the ADF sends EOT and the station is restored to idle. The ADF transmits ENQ followed by the unique Call Enquiry Code (CEC) of the station, and, if traffic is still available, the station transmits SOH and is selected as a sender (TRANS/REC lamp lighted). The ADF now sends DC1. Detection of DC1 by the selected station causes the station page printer to be unblinded. The ADF may now send an originating message number and originating date and time which are copied on the station page printer. STX is now transmitted by the ADF which starts the TD of the station. The station transmits the message heading and the TD continues to run until the controller detects STX from the tape. This STX stops the TD and is transmitted, on line, to the ADF. The ADF now checks heading validity and proceeds to call in any intraline station which is included in the heading. If required, the ADF sends personal address information and delivery number to the called-in receive station and then proceeds to call in any others addressed intraline stations. The ADF sends ENQ DC2, the date, time, originating number (if required) and complete heading to all of the called in receivers. The ADF now sends STX to the selected transmit station, thereby restarting the TD. The message text is transmitted and the TD continues to run until the controller detects ETX from the tape. ETX is also transmitted and the TD is stopped. The called-in receive stations receive the message, including ETX, directly from the selected sender and the ADF stores the message for later transmission to the interline addressees. The ADF now "roll calls" the called-in receivers to determine if the message has been received properly. After roll call is completed, the ADF sends EOT to return the selected receivers to idle and restarts the selected transmit station TD by sending STX. At this time, one of the following may occur:

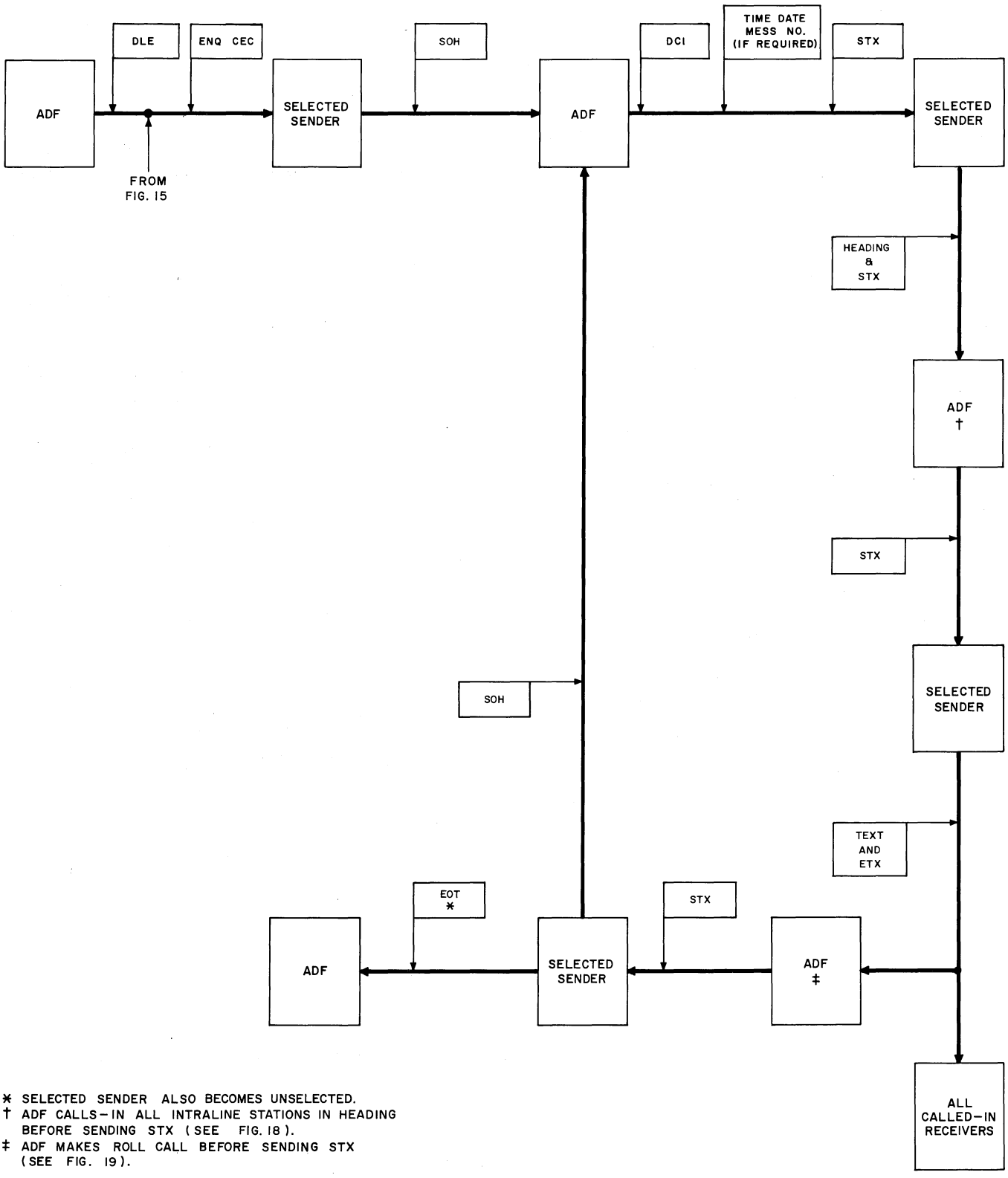
(a) If the station has additional messages to transmit, the TD will start and continue to run until an SOH is detected from the tape. The SOH is transmitted and the TD is turned off by the controller. The station remains a selected sender, and ADF now sends DC1, as before, and the pickup process is repeated.

(b) If no additional messages are to be transmitted, the ETX on the tape is followed by EOT. Assuming that the EOT counter option is not provided, the EOT is detected from the tape, the station becomes unselected as a transmitter (TRANS/REC lamp extinguished), the TD stops, and the traffic available state is cancelled.

(c) If the EOT counter option is provided, the tape continues to run until an EOT is detected from the tape. EOT is transmitted to ADF, the count is reduced by one, and the station is unselected as a transmitter (TRANS/REC lamp extinguished). If the count is reduced to zero, the TD is stopped and the traffic available state is cancelled. If the count is still greater than zero, indicating another complete transmission is available, the TD continues to run until the next SOH is detected. SOH stops the TD and the traffic available state is maintained. To pick up the next message, the ADF must repeat the polling and selecting sequence.

Hold Operation (Torn Tape Message Introduction)

3.09 The HOLD key permits introduction of a message contained on a separate piece of tape during an in-progress transmission following the ETX character of a message in progress. Operation of the HOLD key while a message is being transmitted, prevents the ADF from restarting the TD after it has been stopped by the transmission of the ETX that marks the end of that message. When the TD stops, the HOLD lamp will light and the audible alarm will sound indicating that the torn tape message may be inserted in the TD. The tape alarm is inhibited during the hold state. When the TD gate is opened, the traffic available state is cancelled, however, the station remains selected to send. The torn tape message should conform to the standard message format. Restoration of the HOLD key and operation of the BID key restarts the TD. The TD continues to run and the DELs are transmitted until the controller detects SOH from the tape. The controller transmits the SOH and stops the TD. Reception of STX from the ADF can now restart the TD and the torn tape message is picked up in the normal manner. To return to transmission of the original tape, the hold operation just described must be repeated while the torn tape message is in progress. When the TD stops, the original tape can be reinserted in the TD while the selected to send state is retained.



* SELECTED SENDER ALSO BECOMES UNSELECTED.
† ADF CALLS-IN ALL INTRALINE STATIONS IN HEADING BEFORE SENDING STX (SEE FIG. 18).
‡ ADF MAKES ROLL CALL BEFORE SENDING STX (SEE FIG. 19).

Fig. 16—Sender Selection Sequence Chart

Emergency Stop—Interrupting a Selected Sender (Fig. 17)

3.10 There are situations which make it necessary for the ADF to interrupt a selected sender. In order to interrupt a transmitting station, the ADF transmits a break consisting of a minimum of 0.5-sec space followed by 0.6-sec mark. The break is detected by the controller and the TD is stopped. The ADF now transmits DLE DC1 which lights the EMG STOP lamp, initiates the audible alarm, unselects the station as a sender, clears the "traffic available" state, and unblinds the page printer. The ADF may now transmit a service message, which is copied on the page printer, followed by EOT. Operation of the EMG STOP key will extinguish the EMG STOP lamp, silence the audible alarm and restore the station to the idle state.

C. Call In and Roll Call (Fig. 18 and 19)

Call In

3.11 If the ADF has a station marked "ready to receive," it can call in that station as a receiver. To call in the station, the ADF transmits ENQ followed by the unique CEC of the station. The station responds with its unique Station Identity Code (SIC) followed by either ACK if it is ready to receive, or NAK if it is not ready. If the station replies NAK, the CALL lamp is lighted. The CALL lamp is extinguished by restoring the station to ready. If the station is marked "not ready" by the ADF, further call-in attempts will not be made. The station is marked "ready" during polling only.

3.12 A station is not ready to receive if any of the following conditions exists:

(a) The station is out of service.

Note: The station cannot be placed out of service if it is selected as a receiver or sender.

(b) Paper is ~~low~~ or form is out and the station is not selected to receive.

(c) Form is being fed and the station is not selected to receive.

(d) The controller is in the process of initialization or is in the off line mode.

(e) Tape is low at master machine (35 ROTR).

3.13 If the station response is SIC ACK, the TRANS/REC lamp is lighted, which signifies that the station is selected as a receiver, and the page printer is unblinded. The ADF now transmits personal address information (if required) and the message delivery number to the station. If additional stations are to be called in, the process just described is repeated. The ADF now transmits ENQ DC2 and unblinds the page printers of all the called-in receivers. The ADF transmits delivery time, date, originating number (when available), and message heading followed by STX. The message text is now transmitted by the ADF (interline delivery) or by the selected transmit station (intraline delivery) followed by ETX.

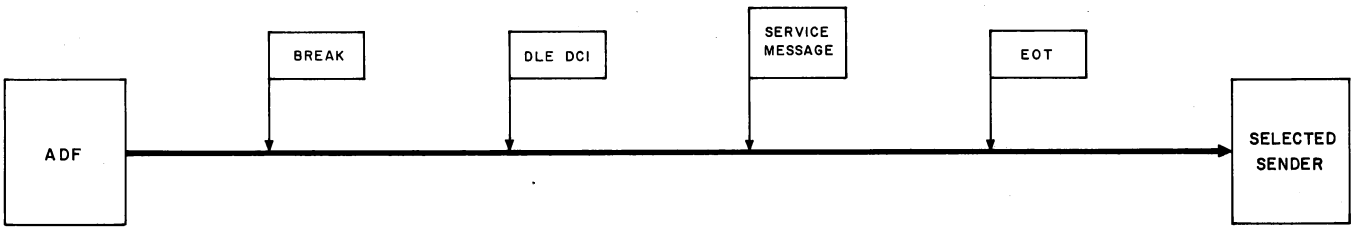


Fig. 17—Emergency Stop Sequence Chart

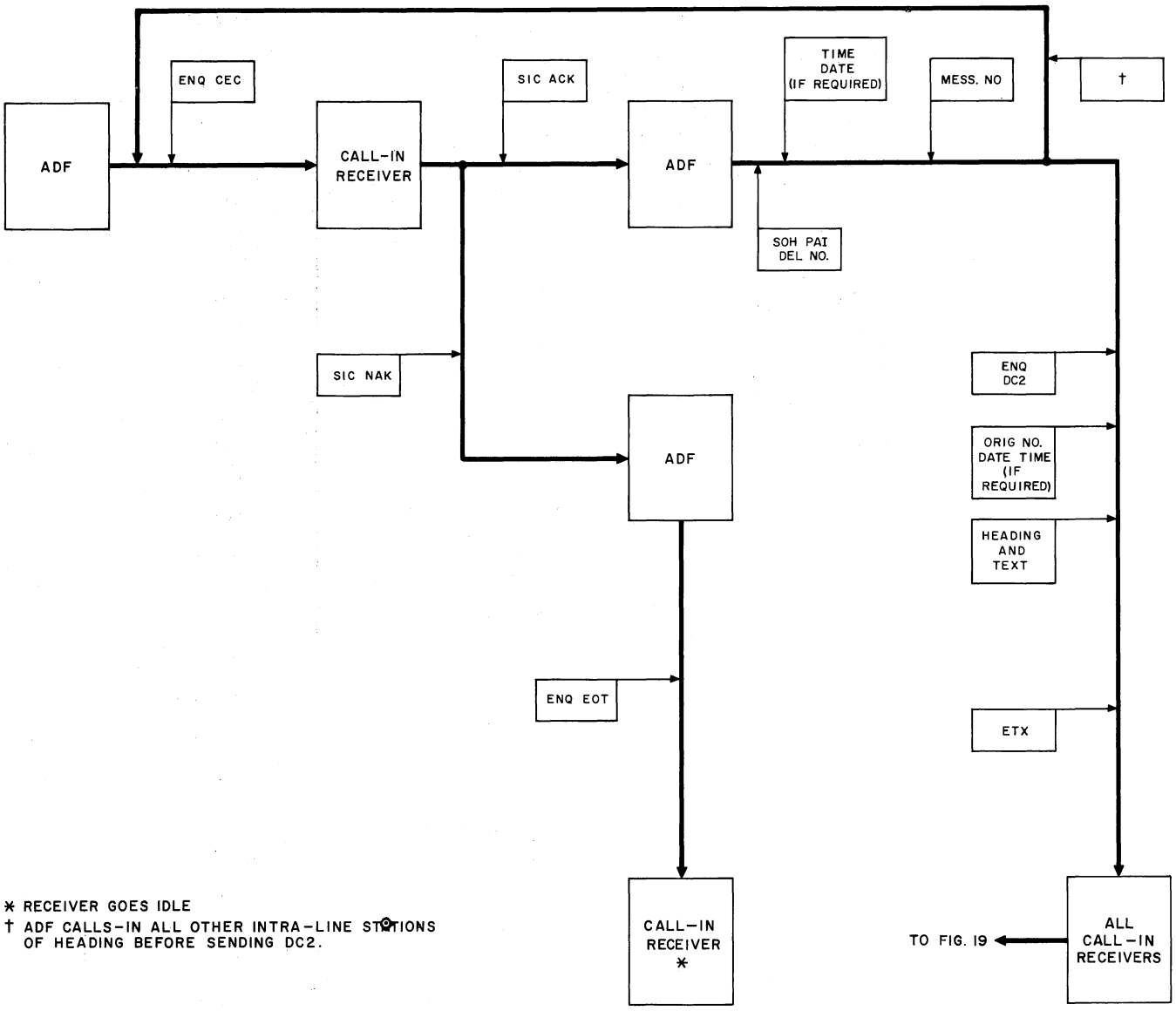


Fig. 18—Receiver Call-In Sequence Chart

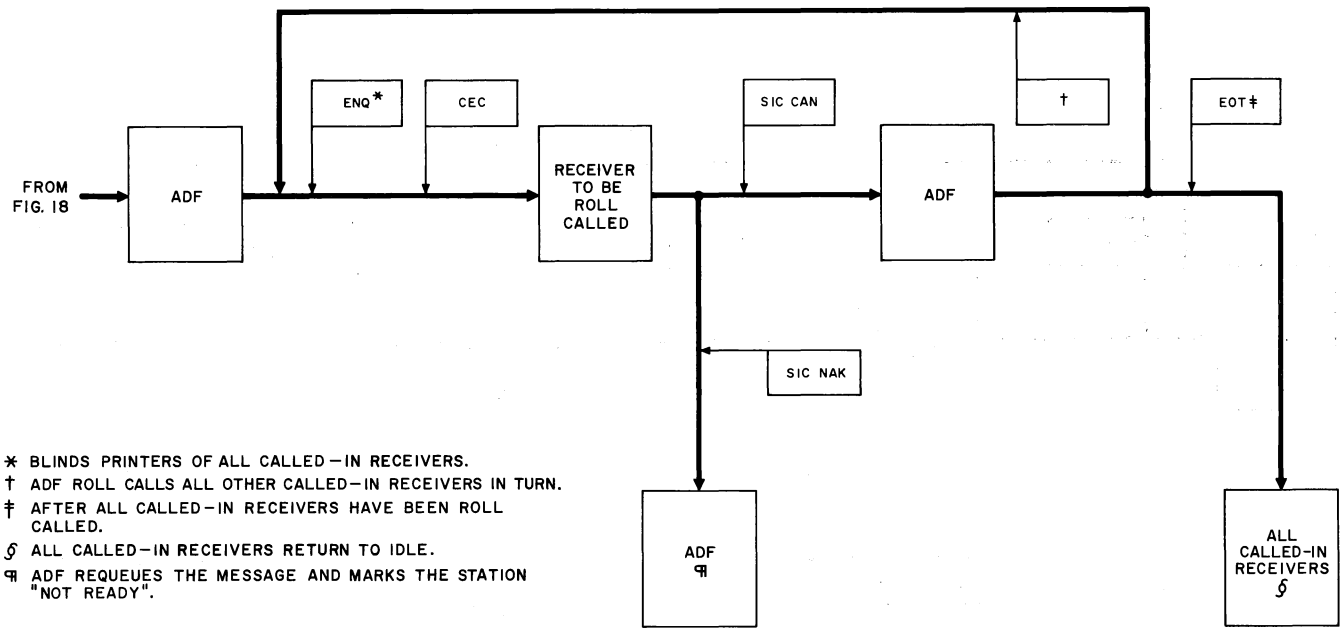


Fig. 19—Roll Call Sequence Chart

Roll Call

3.14 After the text and ETX have been transmitted, the ADF initiates roll call by sending ENQ followed by the station CEC. The station responds by transmitting its SIC followed by CAN if the message was received properly, or by NAK if it was not received properly. The NAK response is generated if any of the following occur during the interval between the time the station was selected to receive and roll call.

(a) The receiver became not ready.

(b) ETX was not received and/or detected error free by the controller.

(c) A character was lost and did not reach the typing unit.

(d) The station received a form feed (FF) order followed by DEL, form ran out while feeding, and the next character was not ETX (applicable to sprocket-feed page printers only).

If the station answers NAK to roll call, the MSG REC lamp is lighted and the audible alarm is sounded. The lamp can be extinguished and the alarm silenced by operation of the MSG REC key. When roll call is completed, EOT restores all called-in receivers to idle state.

D. Auxiliary Machine Connect and Disconnect

35 ASR- or RO-Type Stations

3.15 A 35 RO TTY or 35 ROTR TTY may be used as an auxiliary receiver. They may be connected and disconnected manually and, if a wiring option is provided in the master machine, automatically.

3.16 The auxiliary receiver is manually connected by operation of the AUX RECEIVER key located on the master machine. This places the selector magnet driver (SMD) of the Auxiliary receiver in series with the SMD of the master machine, thereby allowing the auxiliary receiver to copy information being copied by the master machine. A lamp located adjacent to the AUX RECEIVER key on the master machine is lighted whenever the auxiliary receiver is connected. Restoration of the AUX RECEIVER key disconnects the auxiliary receiver.

3.17 When the wiring option that allows automatic auxiliary receiver connect and disconnect is provided on the master machine, reception of DC2

by the typing unit stunt box will connect the auxiliary receiver, and reception of ETX and/or DC4 (option) by the stunt box will disconnect the auxiliary receiver if the master machine typing unit is not blinded. In addition, the auxiliary receiver can be disconnected only when both the manual and automatic controls are in the disconnect state.

3.18 A further option, called print suppression, may also be provided. This option causes the typing unit of the master machine to be inhibited while the auxiliary receiver is connected. Disconnecting the auxiliary receiver will restore the typing unit of the master machine to service.

3.19 When the auxiliary receiver is a 35 ROTR TTY, automatic tape feed out (TFO) will occur whenever the auxiliary ROTR is disconnected manually, or, if a wiring option is provided in the master machine, when the auxiliary ROTR is disconnected automatically. In either case, between 3 and 10 inches of tape will be fed out punched with rub outs (DEL). 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.

3.20 When 35 ASR station is not equipped with an auxiliary receiver, an option may be provided by which the tape punch can be automatically connected to the line by the reception of DC2 and automatically disconnected by the reception of DC4 when the station is in the UNATTENDED mode.

33 ASR- or RO-Type Station

3.21 A 33 RO TTY may be used as an auxiliary receiver. They may be connected and disconnected manually and, if a wiring option is provided in the master machine, automatically.

3.22 The auxiliary receiver is connected manually by operation of the AUX ON key located on the master machine. This places the SMD of the auxiliary receiver in series with the SMD of the master machine, thereby allowing the auxiliary receiver to copy information copied by the master machine. 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.

3.23 The auxiliary receiver is automatically connected on reception of DC2 by the stunt box and diconnected on reception of ETX and/or DC4 (option) by the stunt box provided the typing unit of the master machine is not blinded. Unlike the 35 ASR- and RO-type stations, the auxiliary receiver will be disconnected when either the manual or automatic disconnect order is received.

35 ROTR-Type Station

3.24 When a 35 ROTR TTY is used as a master machine, there are no provisions for connecting an auxiliary receiver. Automatic TFO will occur when the station is roll called.

E. Out of Service

3.25 The station is placed in the out-of-service mode by operating the OUT OF SVC key on the attendant unit. If the OUT OF SVC key is operated when the station is either selected as a sender or receiver, the station will not go out of service until it is unselected. If the station is an ASR-type, the station is also placed out of service when the master machine mode switch is placed in the OFF LINE position. In the out-of-service mode the controller is conditioned to the not ready state and the traffic available state is inhibited. When the station is in the out-of-service mode, the OUT OF SVC lamp is lighted, however, the converse is not always true (see 3.26 and 3.27). When the station is an ASR-type, the controller will always cause the TTY motor to turn off when the MODE switch is placed in the OFF LINE position and the OUT OF SVC key is operated.

F. Test Features

Automatic Loop-Back

3.26 If the controller is equipped with Data Set 108A, the controller will be conditioned to the loop-back mode when it receives DLE + DC1. In this mode, all data that would normally be delivered to the station receiver is transmitted back to the sender and the controller is conditioned to the ready state. The station is not inhibited from generating traffic, however, when the station receives DLE +, the OUT OF SVC lamp will be lighted and the station alarms disabled. When EOT is received the station is restored to idle. This mode allows the test center to make on-line performance tests of the controller.

Manual Loop-Back

3.27 The R switch located on the controller disconnects the data set from the remainder of the station and connects the transmitted data lead to the received data lead of the data set. This isolates the station equipment which allows tests of the transmission facility and data set to be performed from the test center. In the manual loop-back mode, the OUT OF SVC lamp is lighted.

G. Alarms

Message Reception Alarm

3.28 In addition to when the station answers NAK to roll call, the MSG REC alarm is activated at a selected-to-receive station when the ADF transmits DLE after interrupting a selected sender during the emergency stop sequence (see 3.10). The DLE blinds the receiver, however, DC1 following DLE unblinds the receiver and allows the called-in receive stations to copy any service message transmitted by the ADF. EOT following the service message unselects the called-in receivers and restores them to the idle mode. The MSG REC alarm is also activated at a selected-to-receive station when a carrier fail signal is received from the data set. The MSG REC alarm is deactivated by operation of the MSG REC key.

Parity Error

3.29 The eighth bit of the ASCII code is used to provide even-bit parity. That is, the eighth bit of each ASCII code character is chosen (mark or space) so that the character contains an even number of marking and 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 incorrect character is changed to an underline (_) by the controller. The ERROR lamp is extinguished and the alarm is silenced by operation of the ERROR key.

Out of Synchronism Error

3.30 In TTY systems, a synchronous character timing is employed. Specifically, a mode of operation known as start-stop is used. A fixed time pattern is used for the group of bits representing a character, but each group is preceded by a signal transition which serves to denote when the fixed pattern is to start. In this system, the beginning of a character is identified by a mark-to-space transition. The start interval is spacing and is one-bit interval long. The stop interval is marking and is two-bit intervals long for 100-wpm operation.

3.31 Normally the local clock, used for sampling and timing the information bits, is started on the mark-to-space transition of the start interval. The clock is arranged to run for a fixed number of cycles and 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 timing circuit is arranged to stop after the normal timing interval and to wait for the next mark-to-space transition before recycling. The receiver usually regains synchronization quickly unless some repeated combination is transmitted which causes the selector to synchronize on a mark-to-space transition other than the normal start.

3.32 In order to reduce the number of incorrect characters which are printed when the receiver is recovering synchronization, the controller samples the received character at the end of the timing interval. If this sample is found to be a space, the incorrect character is changed to an underline (_) by the controller, the ERROR lamp is lighted, and the audible alarm is activated. The alarm may be deactivated by operation of the ERROR key.

H. Carrier Squelch

3.33 The T switch located on the controller provides the option of squelching the data set 108A transmitter carrier whenever the data set detects the loss of received carrier.

I. Station Functional Description (Fig. 20)

3.34 During the transmit sequence, the TTY of an ASR-type station converts the punches on the tape into voltage signals which conform to Electronic Industries Association (EIA) Specification RS-232-B and presents them to the controller. In the controller, the EIA voltage signals are regenerated and sent to the data set. The data set converts the EIA voltage signals into voice-frequency data tones (Data Set 108A) or dc current signals (Data

Set 109A) and then transmits them to the line. The attendant unit provides keys and lamps used for local control and alarm and status monitoring of the station TTY or ROTR.

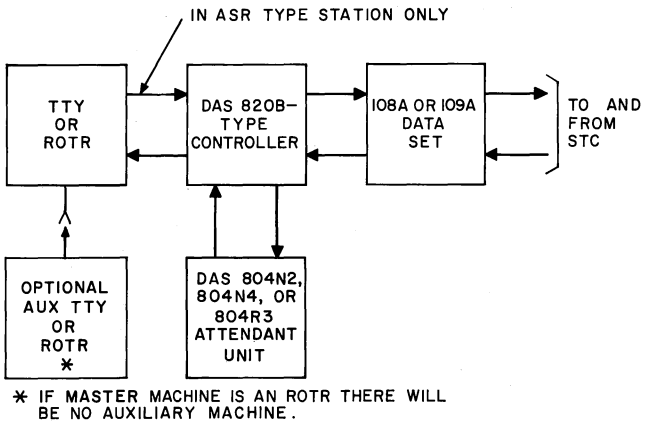


Fig. 20—Block Diagram of 100 WPM HDX Station

3.35 During the receive sequence, the data set converts the voice-frequency data tones (Data Set 108A) or dc current signals (Data Set 109A) from the line to EIA voltage signals which are presented to the controller. The EIA voltage signals are regenerated and sent to the TTY to operate the typing unit or typing reperforator.

J. Teletypewriter Functional Description (Fig. 21)

3.36 The keyboard and tape punch are used for preparing tapes or optionally punching a tape of received messages. The TD converts the punches on the tape to EIA voltage signals and presents them to the controller during the transmit sequence.

3.37 During the receive sequence, voltage signals from the controller are applied to the SMD which operates the typing unit or typing reperforator.

K. Controller Functional Description (Fig. 22)

3.38 Fig. 22 is a block diagram of the controller. The heavy lines represent the data transmission paths and the light lines the control signal paths.

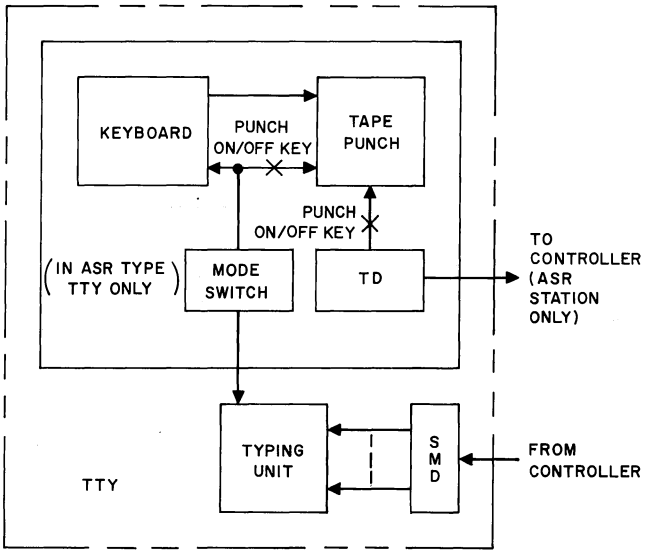


Fig. 21—Block Diagram of 33 or 35 ASR or RO TTY

Receive Mode

3.39 Characters are received serially from the data set under control of the gate and sample circuit. The start of each character triggers the local clock in the timing circuit and the clock runs for the duration of the character. The local clock is used to sample each bit of the received character and serially shift it into the shift register. Each character is monitored, as it is shifted into the shift register, by the character detection circuit. This is done in order to detect specific receive control characters. These characters are ENQ, CEC, ETX, EOT, DC2, DC1, DLE, STX, +, and SPC.

3.40 When a receive control character is detected, the character detection circuit signals the control and state logic circuit in order to sequence the controller through the various receive modes. Signals from the character detection circuit also trigger the clock circuit in order to provide timing for responses generated by the controller.

3.41 Each succeeding incoming character initiates a new timing cycle and the previous character is shifted out of the shift register and regenerated. After regeneration and provided the TTY is unblinded, the received characters are gated and applied to the TTY SMD via the interface circuit.

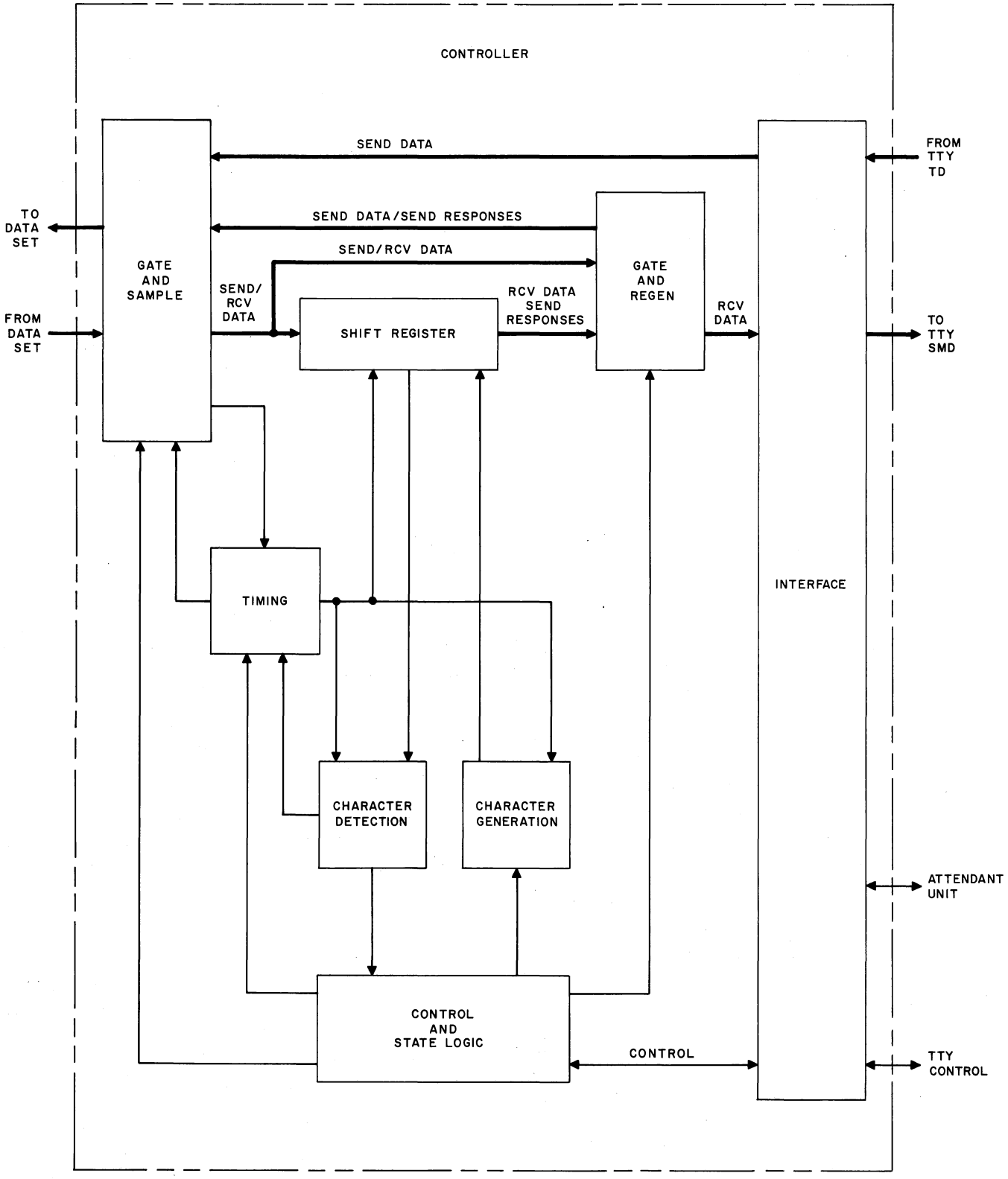


Fig. 22—Block Diagram of ASR- or RO-Type Station Controller

Generation of Responses

3.42 The responses generated by the controller are ACK, NAK, CAN, SIC, SOH, P, and R. Which of these characters are generated as a response is governed by the control and state logic circuit which monitors the status of the station equipment. The character is written into the shift register from the character generation circuit in a parallel fashion. The character is then serially shifted out of the register by the local clock, regenerated, and then gated to the data set for transmission to the line.

Send Mode

3.43 Characters from the TTY TD are applied serially, via the interface circuit, to the gate and sample circuit under the direction of the control and state logic circuit. Timing for the send characters is developed in the same manner as it was for the receive characters. After sampling, the send characters are regenerated and gated to the data set.

3.44 At the same time, the send characters are also serially inserted into the shift register. Each character is monitored, as it is shifted into the shift register, by the character detection circuit. This is done 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 control and state logic circuit in order to sequence the controller through various transmit modes.

Interface Circuits

3.45 The interface circuits control and monitor the station TTY or ROTR. Some of the more important functions of the interface circuits are:

(a) Data signal exchange

(b) Motor on-off control

(c) TD on-off control

(d) Lost character detection

(e) Paper/ tape low detection

(f) Form feed/form out detection

(g) Tape feed out control (35 ROTR master machine only)

(h) Ready/not ready monitoring

(i) Tape taut/tape out detection

(j) Noise filtering

L. Attendant Unit Functional Description

3.46 The attendant units provide keys and lamps used for local control and alarm and status monitoring of the station TTY. Three types of attendant units are available.

3.47 The DAS 804N4 attendant unit is used in the 33 or 35 ASR-type station and provides keys and lamps as follows:

(a) Control keys—BID, PRIOR, HOLD, OUT OF SVC, and AUD OFF.

(b) Alarm reset keys—MSG REC, ERROR, TAPE, EMG STOP, and PAPER LOW.

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

3.48 The DAS 804N2 attendant unit is used in the 33 or 35 RO-type station and provides keys and lamps as follows:

(a) Control keys—OUT OF SVC and AUD OFF

(b) Alarm reset keys—MSG REC, ERROR, and PAPER LOW

(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).

3.49 The DAS 804R3 attendant unit is used in the 35 ROTR-type stations. 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 key/lamp.

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

M. Data Set Functional Description

Data Set 108A (Fig. 23)

3.51 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.

3.52 In the idle or marking condition, a negative voltage is applied on the transmitter data lead BA. 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 of the send buffer amplifier passes through the hybrid and then over the private line facilities to the ADF.

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

3.53 A marking signal transmitted from the ADF 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 incoming frequency and then limits the output to provide a constant amplitude

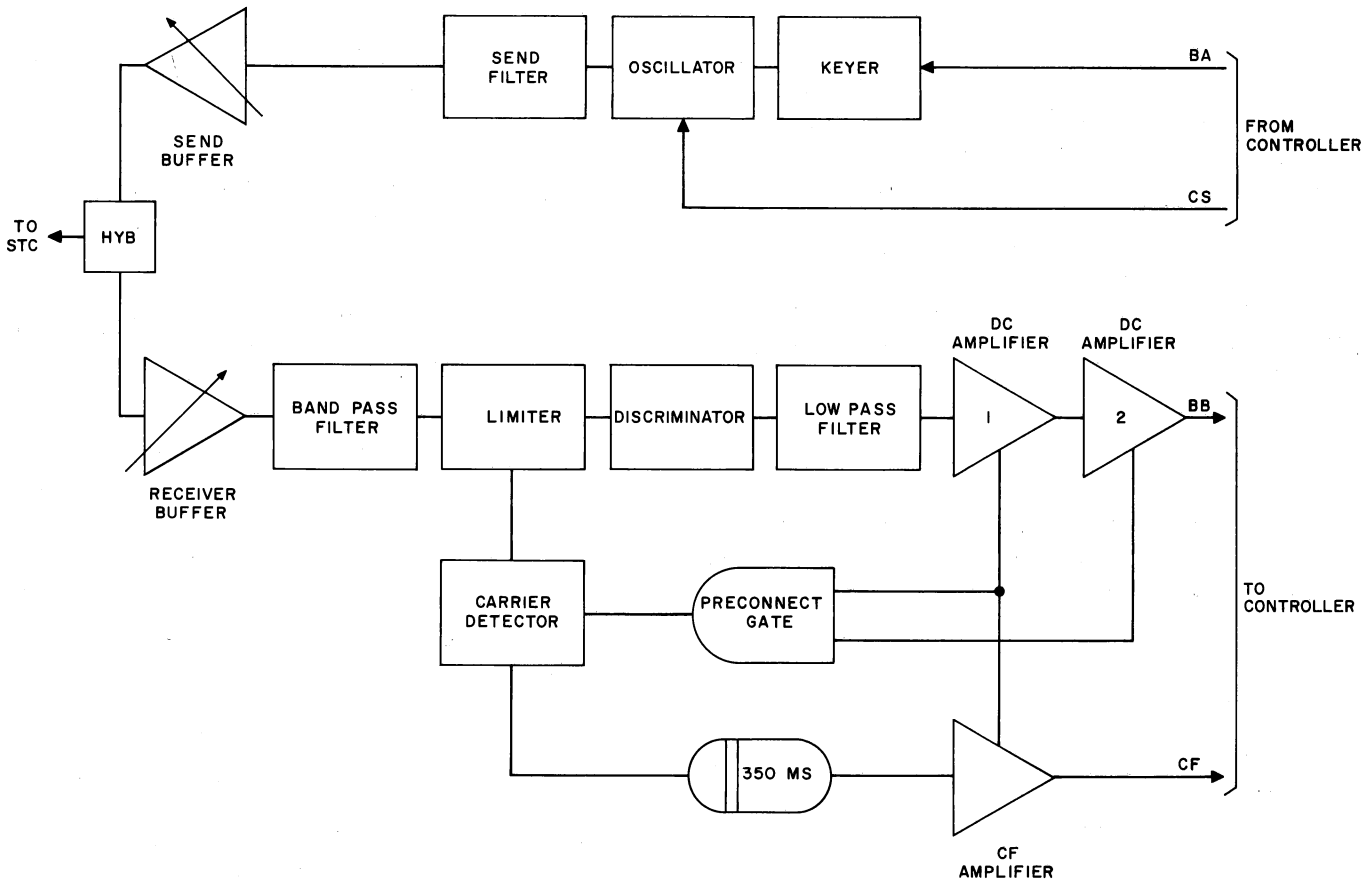


Fig. 23—Block Diagram of Data Set 108A

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 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 lead BB in the form of EIA voltage signals.

3.54 The second output from the limiter is to the carrier detector. The carrier detector monitors the output of the limiter 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 lead BB in a 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.

3.55 Some service applications will use carrier squelch on the data carrier failure option. When this option is provided and the CS switch is operated at the controller, the CF amplifier will cause a ground to be applied on lead CS to the oscillator. This shuts off the oscillator, thereby turning off the carrier being transmitted to the hub.

3.56 In order to restore the station to normal after 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 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 to the oscillator.

Data Set 109A (Fig. 24)

3.57 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.**

3.58 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.

3.59 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 μsec 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.

3.60 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.

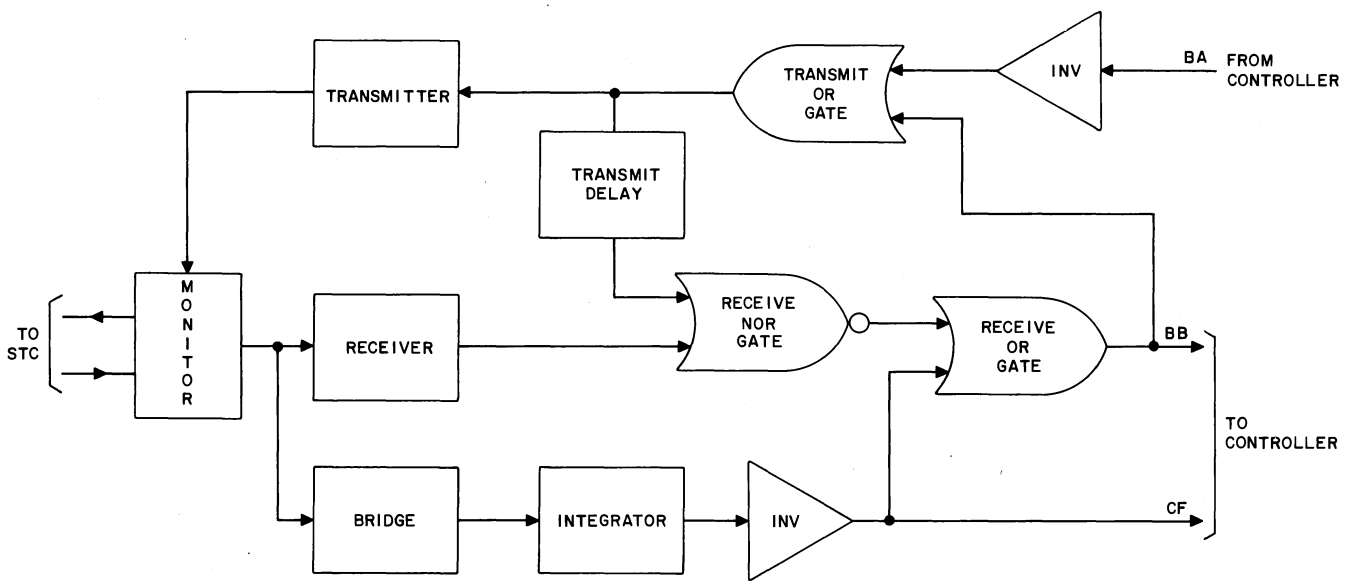


Fig. 24—Block Diagram of Data Set 109A

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.

3.61 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. RO-Type Stations

4.01 There are seven designated keys, all of which contain lamps, on the RO-type station attendant unit. Table D lists the lamps and when the lamps light. Table E lists the keys and what function the operation of the key performs.

4.02 When ac power is applied to the station, the controller circuits will be initialized.

4.03 To manually connect the auxiliary receiver at an RO station, operate the AUX ON key (33 RO) or AUX RECEIVER (35 RO) on the master machine. This will light the AUX ON or AUX RECEIVER lamp, respectively.

4.04 To manually disconnect the auxiliary receiver at an RO station, restore the AUX RECEIVER key (35 RO) or operate the AUX OFF key (33 RO) on the master machine. This will extinguish the AUX ON lamp (33 RO) or AUX RECEIVER (35 RO) and, if the auxiliary receiver is an ROTR (35 RO-type station), cause automatic TFO to occur.

4.05 When the RO station is a 35 ROTR-type station, to manually cause TFO, momentarily operate the TFO key located on top of the ROTR cover.

B. ASR-Type Stations

35 ASR

4.06 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 position, the OUT OF SVC lamp will be

TABLE D

LAMP	WHEN LAMP LIGHTS
MSG REC (Red)	Controller has answered NAK to roll call, DLE is received while station is selected, or carrier fail signal is received from the data set. (Audible alarm sounds)
ERROR (Red)	Parity or synchronization error is detected (audible alarm sounds)
PAPER LOW (White)	Typing unit paper supply is low (audible alarm sounds)
AUD OFF (White)	AUD OFF key operated
REC (Amber)	Station has been selected as a receiver
CALL (Amber)	Controller has answered SIC NAK to call-in (audible alarm sounds)
OUT OF SVC (White)	The station is in the out-of-service, remote controller loop-back, or manual loop-back mode

TABLE E

KEY	FUNCTION PERFORMED
MSG REC	Extinguishes MSG REC lamp and, if no other alarm condition exists, silences audible alarm
ERROR	Extinguishes ERROR lamp and, if no other alarm condition exists, silences audible alarm
PAPER LOW (TTY) TAPE LOW (ROTR)	After paper/tape is replenished, extinguishes PAPER LOW/TAPE LOW lamp and, if no other alarm condition exists, silences audible alarm
AUD OFF	Silences and inhibits audible alarm
OUT OF SVC	Places the station in the out-of-service mode (if station is not selected to receive)

lighted, the station will answer "no traffic—not ready to receive" to station polling and "not ready to receive" to receiver call-in, and the typing unit will make copy of the message being punched and printed on the tape. In this mode the punch may be turned on and off by the PUNCH ON/OFF key.

4.08 When preparing tapes in the LINE position, the typing unit will not make copy of the message being punched, however, the message will still be printed on the tape.

4.09 To prepare a tape, select with the MODE switch, the mode of operation most desirable at this time for the station, load the blank 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 option is not to be used, insert the prepared tape into the TD, close the TD gate, set the TD BAT handle to RUN, and operate the BID key on the attendant unit. This lights the BID lamp and starts the TD. When the controller detects SOH from the tape, the TD is turned off and the station responds "regular traffic available" when polled by the ADF. Operation of the PRIOR key on the attendant unit, in conjunction with the BID key, lights the PRIOR lamp in addition to the BID lamp and causes the station to respond "priority traffic available" when polled by the ADF.

4.11 To send a transmission when the EOT counter is to be used, the station must be in the LINE mode. Load the blank unprepared tape into the punch and punch enough DELs so that the end of the tape may be inserted into the TD. Close the TD gate and set the BAT handle to RUN. Now type out the message or messages, making each message conform to the standard format, ie, DELs SOH heading STX text ETX. After the last message, type out an EOT. The EOT will raise by one the count in the EOT counter, light the BID lamp, cause the TD to run until the controller detects SOH from the tape, and cause the station to respond "traffic available" when polled by the ADF. After the EOT of the last message to be prepared is punched, several inches of DELs should be punched to prevent a taut tape condition from occurring when the last message is picked up.

4.12 To manually connect the auxiliary receiver, operate the AUX RECEIVER key on the master machine. This will light the AUX RECEIVER lamp.

4.13 To disconnect the auxiliary receiver, restore the AUX RECEIVER key. This will extinguish the AUX RECEIVER lamp and if the auxiliary receiver is an ROTR, cause automatic TFO to occur. When the automatic auxiliary receiver connect-disconnect wiring option is provided, manual disconnect of the 35 ASR cannot be made if an automatic auxiliary receiver connect order has been received by the station.

33 ASR

4.14 Tapes can only be prepared with the MODE switch in the OFF LINE position. This will light the OUT OF SVC lamp and cause the station to respond "no traffic available—not ready to receive" to station polling and "not ready to receive" to receiver call-in.

4.15 To prepare a tape, set the MODE switch in the OFF LINE position, load the blank tape into the punch, operate the PUNCH ON key, and type out the message on the keyboard. The typing unit will make copy of the message being punched on the tape.

4.16 To send a transmission, load the prepared tape into the TD, close the gate, set the BAT handle to RUN, and operate the BID key on the attendant unit. This will light the BID lamp, and turn on the TD which will run until the controller detects SOH from the tape. When the TD stops, the station will respond "regular traffic available" when polled by the ADF. Operation of the PRIOR key on the attendant unit, in conjunction with the BID key, lights the PRIOR lamp in addition to the BID lamp and causes the station to respond "priority traffic available" when polled by the ADF.

4.17 To manually connect the auxiliary receiver, operate the AUX ON key. This will light the AUX ON lamp.

4.18 To manually disconnect the auxiliary receiver, operate the AUX OFF key. This will extinguish the AUX ON lamp. The 33 ASR can

be manually disconnected even when an automatic auxiliary receiver connect order has been received.

33 or 35 ASR

4.19 To send a message on a tape other than the one the station is transmitting, operate the HOLD key on the attendant unit before the ETX on the tape being transmitted is reached by the TD. This causes the HOLD lamp to light and the TD to stop when ETX is detected from the tape. The new tape, which must conform to standard format, can now replace the original tape in the TD. Opening the TD gate to remove the original tape extinguishes the BID lamp. Insert the new tape into the TD, restore the HOLD key, and proceed as for a normal transmission.

4.20 To resume transmission of the original tape, the hold operation just described must be repeated. The original tape can now be reinserted in the TD and positioned just past the ETX of the last message transmitted of the original transmission.

4.21 If the ADF performs an emergency stop on the station during the transmission of a message, the following will happen:

(a) TD will stop

(b) EMG STOP lamp lights

(c) Audible alarm sounds

(d) Station is unselected

(e) Traffic available state is cancelled

(f) TTY typing unit is unblinded.

The ADF will now send a service message, which is copied by the typing unit, and restore the station to idle. When this happens, operate the EMG STOP key. This will extinguish the EMG STOP lamp and silence the alarm.

4.22 When a taut tape condition occurs at the TD, the TAPE lamp will light and the audible alarm will sound. After the condition is cleared, operate the TAPE key. This will extinguish the TAPE lamp and silence the audible alarm.

4.23 The TRANS/REC lamp serves the same purpose as the REC lamp in the RO-type station (See Tables D and E) except it also lights when the station is selected as a sender.

4.24 The MSG REC, ERROR, PAPER LOW, AUD OFF, CALL, and OUT OF SVC lamps and keys on the attendant unit light under the same conditions and perform the same functions as they do for the RO-type station (see Tables D and E).

Emergency TTY Motor Stop

4.25 To stop the TTY motor in an emergency, operate the OUT OF SVC key on the attendant unit and set the MODE switch to the OFF LINE position.