

35 AUTOMATIC SEND-RECEIVE TELETYPEWRITER SET

GENERAL DESCRIPTION AND OPERATION

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1. GENERAL DESCRIPTION

1.01 This section has been generally revised to include recent engineering changes and to add late 35 type equipment.

1.02 The 35 Automatic Send-Receive (ASR) Set is basically an electro-mechanical device capable, when properly adapted, of sending and receiving messages over telephone networks, telegraph lines, or radio channels. The set accommodates message transmission at 100 words a minute. All messages (received or transmitted) may be typed on either page size copy paper or continuous business forms and they may be punched in paper tape with or without the message typed on the tape, depending on the equipment combinations and options used.

1.03 The component complement of an ASR Set may vary from one installation to another, depending upon the installation requirements. In general, an ASR Set will consist of a page printer, keyboard with reperforator, motor unit, transmitter distributor and its base assembly, electrical service unit, and cabinet. A call control unit is included with sets that operate with tone modulation over telephone networks (switched network service).

1.04 A data set, required for operation of the ASR Set over the telephone network, is mounted on the apparatus rack in the pedestal of the cabinet of sets so equipped. It is not supplied as a part of the ASR Set.

2. COMPONENTS

CABINET (Figure 1)

2.01 The cabinet is designed to house the components of the 35 ASR Set. It is a floor standing enclosure made up of two main parts: the pedestal, or lower cabinet, and the cover, or upper cabinet.

(a) The pedestal is of sheet metal construction, and rests on two feet which extend forward to support the weight of the set. Cabinets used with sets that print data on continuous business forms should be equipped also with rearward extending feet to prevent tilting of the enclosure due to the weight of the form container on the back of the cabinet. An equipment supporting pan is spot welded to the top of the pedestal. The pan contains

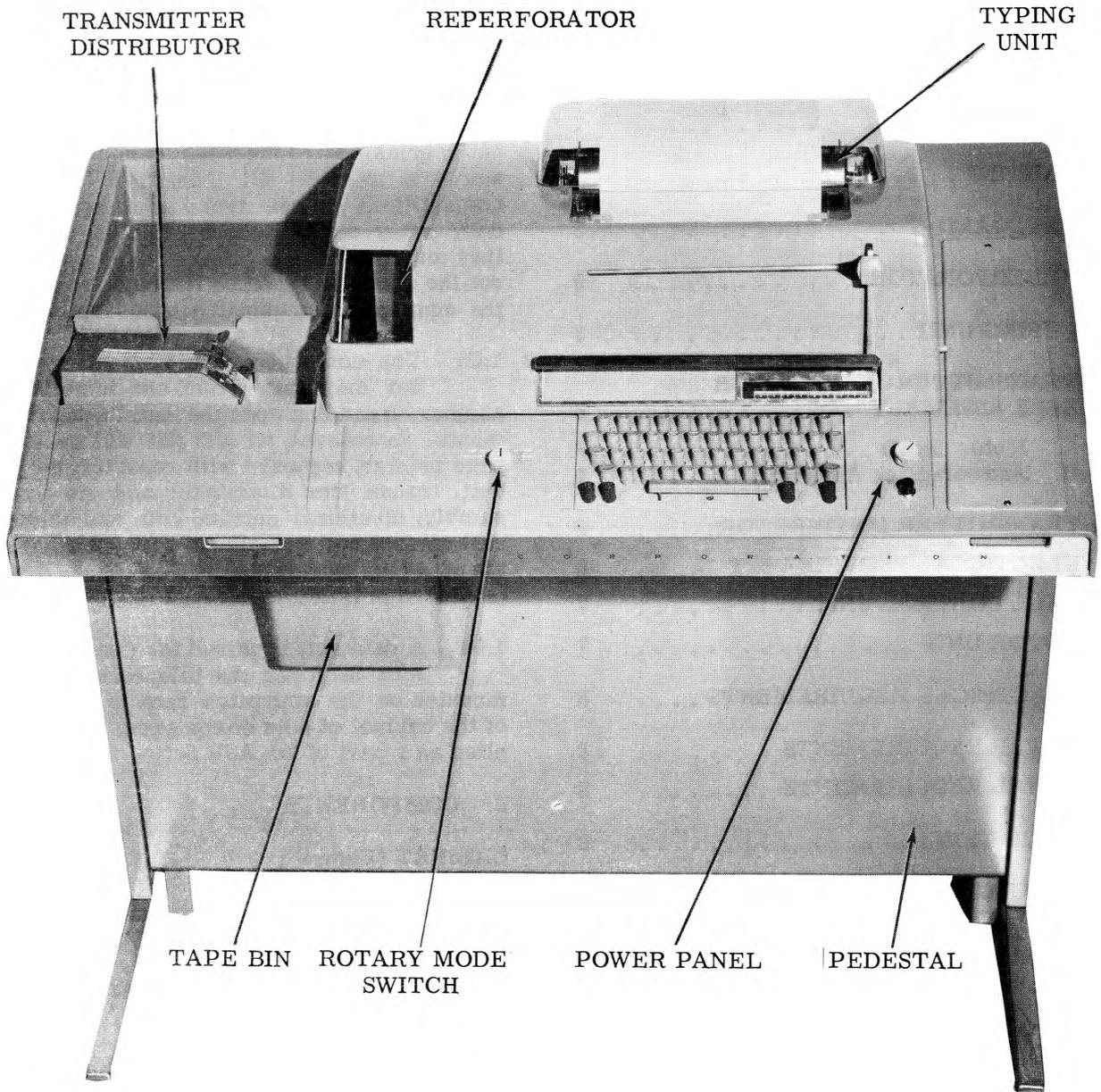


Figure 1 - 35 Automatic Send-Receive Set
(Private Line Service)

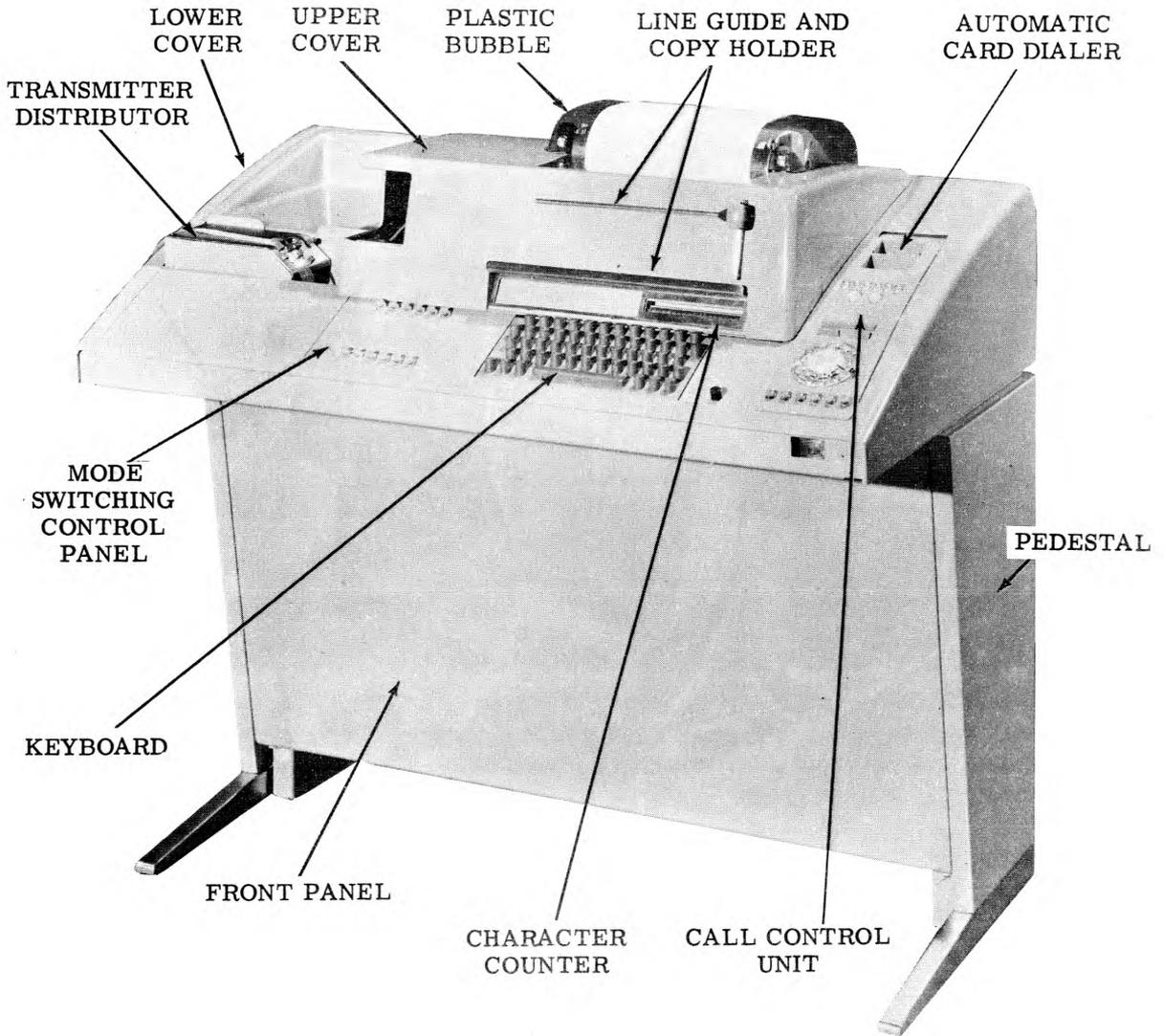


Figure 2 - 35 Automatic Send-Receive Set
(Switched Network Service)

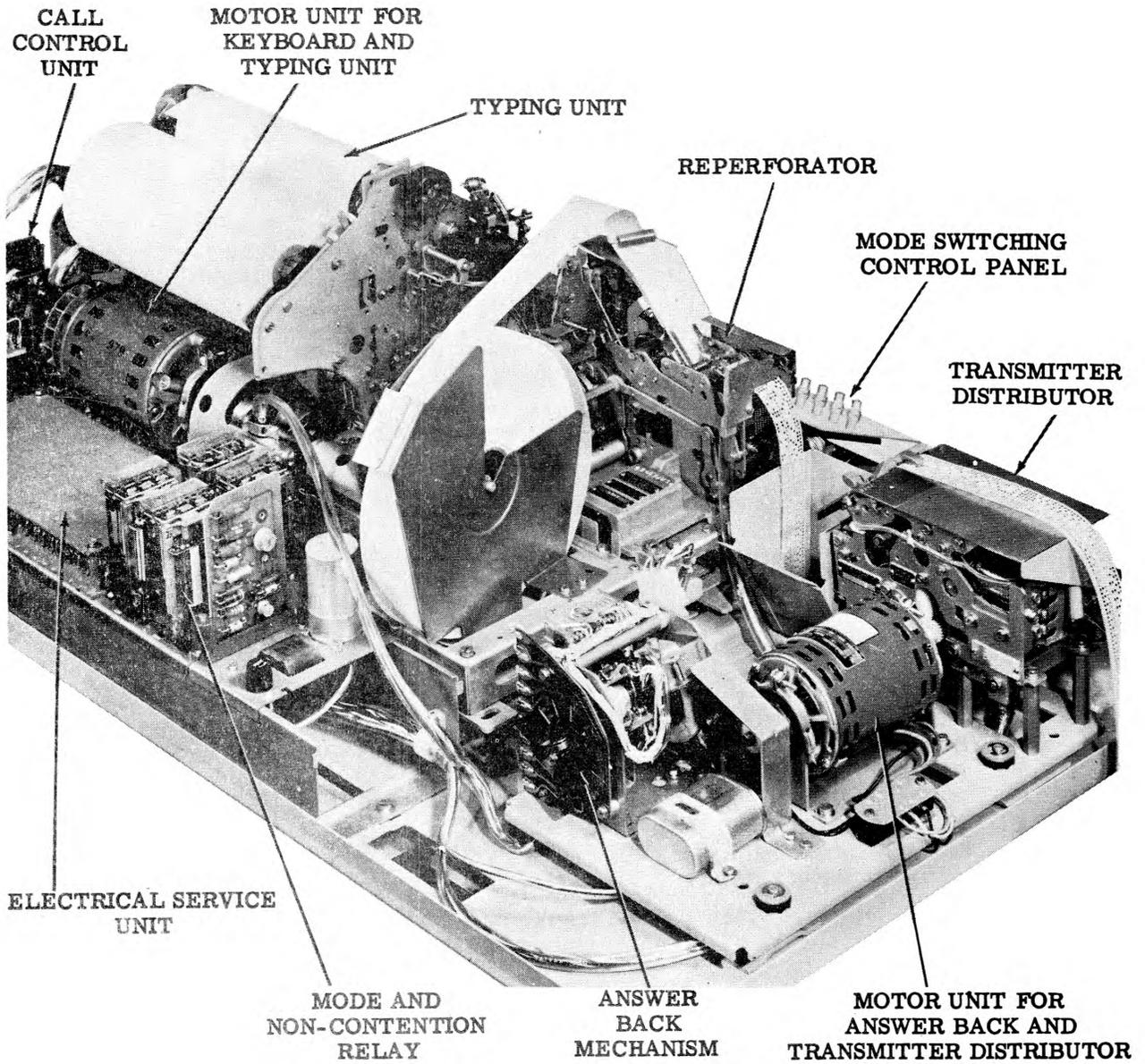


Figure 3 - 35 Automatic Send Receive Set Components

mounting facilities for the components of the set, including a shock-mounted cradle onto which the keyboard base is secured. A removable panel on the front of the pedestal provides access to the apparatus mounting rack, which is used to support any necessary relay assemblies or a data set.

(b) The cover is also of sheet metal construction, and consists of a lower cover and a hinged upper cover. In an earlier model the cover rests on four rubber vibration isolators, three of which have locating pins to align it with the pan. In later models the cover is hinged and designed to pivot clear of enclosed equipment when opened. Hinge pins can be separated for complete removal of the cover. The upper cover is hinged to the lower cover to provide access to the equipment for changing the paper supply and ink ribbons. An information and character counter window is located in the lower front of the upper cover. A clear plastic bubble is located on top of the upper cover for viewing the copy and observing operation of the typing unit. A laminated glass window, in front of the plastic bubble, enables the operator to view the copy as it is typed. The rear edge of the glass provides a paper tearing surface for removal of typed copy. A window is also located at the left front of the upper cover for viewing the perforated tape, and an adjustable metal edge is provided for tearing the tape.

2.02 The cabinet is equipped with a copyholder and line guide for short copy, and copy illuminating lamps for the typing unit and reperforator areas.

KEYBOARD (Figure 2)

2.03 The keyboard mounts on the cradle assembly of the cabinet pan, and provides support for the motor unit, typing unit, reperforator, and intermediate gear assembly of an ASR Set. The front of the keyboard extends forward beyond the edge of the cabinet pedestal to place the typing keys in a convenient operating position. The keys are positioned in a four row arrangement with most punctuation marks and control symbols indicated as upper keytop characters. Refer to the appropriate section for an explanation of the character code arrangement for the keytop control and graphic symbols.

2.04 The keyboard incorporates code selecting and signal generating mechanisms (including parity - see 3.02), and signal line and

power line circuits. Motive power for activating the keyboard is derived from the motor unit and intermediate gear assembly, and through a gear arrangement on the typing unit main shaft. The reperforator receives its driving power from the motor unit via a jack shaft and gearing arrangement located on the keyboard.

REPERFORATOR (Figure 2)

2.05 The reperforator is located at the left front corner of the keyboard. It fully perforates eight level tape supplied from a reel located behind the unit. In sets that are equipped with a typing reperforator the message is also printed on the perforated tape. Chad from the punched tape is diverted from the punch head to a chad container located below the ASR cabinet pan assembly.

2.06 The reperforator operates in response to line signals or signals generated by keyboard operation. The selection of operating mode is controlled by pushbuttons on the automatic mode switching control panel in sets used with telephone switched networks and by a rotary mode switch to the left of the keyboard in sets used in standard (dc or private line) applications.

TYPING UNIT (Figure 2)

2.07 The typing unit incorporates the necessary electrical and mechanical elements to translate the signaling code combinations into mechanical actions which print the messages and perform functions incidental thereto. The typing unit is mounted centrally on the keyboard, in front of the motor unit and intermediate gear assembly.

2.08 Code signals are applied to a two coil magnet associated with a selecting mechanism which interprets the signals and controls the mechanical action involved in typing a character or performing a required function. Means are provided for orientating the selector to the received signal. The ac motor is geared to the main shaft of the typing unit by way of the intermediate gear assembly mentioned in 2.04. Typing and various functional sections of the typing unit are activated by individual clutches.

2.09 Typing is produced by type pallets which are arranged in a small type box. In operation the type box moves across the paper and presents the proper type pallets to the printing hammer while the platen remains stationary. The pallets are driven forward against the inked ribbon and paper to print characters.

2.10 The friction feed typing unit uses single or multicopy paper from a five inch diameter roll. The roll of paper is mounted between the side frames of the typing unit, and passes around the platen, which is a cylinder free to rotate on its axis. A low paper switch is operated when a low paper supply condition exists. In addition to the above functions, built in facilities in a function box permit the operation of associated contacts on predetermined code combinations for certain recognition or remote functions.

2.11 The sprocket feed typing unit uses form feed paper. The forms enter the cabinet through a slot at the rear of the cabinet. The supply of form feed paper is kept on a form supply and accumulating shelf attached to the rear of the cabinet, on sets so equipped. The forms are advanced around the platen by sprockets located at both ends of the platen. Vertical and horizontal tabulation and remote form feed-out are additional features of this typing unit.

2.12 Selector magnet signal lines and function box contact lines are connected to their associated circuits by way of a connector receptacle located on the right frame of the typing unit towards the rear.

TRANSMITTER DISTRIBUTOR BASE ASSEMBLY (Figure 2)

2.13 The transmitter distributor base assembly provides mounting facilities for a transmitter distributor and a motor. In switched network sets, the answer-back mechanism is also mounted on this base assembly. The base is located to the left of the keyboard in the cabinet, and is secured to the cabinet pan by means of four studs with flexible rubber mounts for vibration isolation.

2.14 The transmitter distributor base assembly consists of a sheet metal mounting plate, an answer-back assembly if so equipped, a motor and pinions for driving the answer-back and the transmitter distributor units, electrical terminal board and connector facilities, and mounting parts for a transmitter distributor unit.

A. Motor

2.15 The motor for the transmitter distributor is a four pole, 1/100 horsepower, 60 cycle, 1800 RPM synchronous type. It is mounted on the base assembly between the answer-back and transmitter distributor units, and furnishes driving power for each. In standard sets opera-

tion of the motor is controlled by the rotary mode switch. In switched network systems the motor may be controlled remotely or by operation of the proper push button on the mode switching control panel.

B. Answer-Back Assembly

2.16 The answer-back feature is found on sets used in switched network systems. The answer-back assembly is located at the rear of the transmitter distributor base assembly. Its main components are a coded message drum, a main shaft, and a distributor assembly. The answer-back receives its motive power from the motor via the intermediate gear assembly on the transmitter distributor base.

2.17 The answer-back assembly is designed to distribute, upon receipt of a WRU (who are you) or HERE IS signal, a predetermined sequence of characters which serves to identify the station. A maximum of 20 characters may be transmitted. The character sequence is determined by the manner in which the message drum is coded by the customer.

TRANSMITTER DISTRIBUTOR (Figure 2)

2.18 The transmitter distributor is located at the front of its base assembly, and is supported by three mounting studs. The unit receives its motive power from the motor mounted toward the rear of the base. (This is the same motor that drives the answer-back assembly.)

2.19 The transmitter distributor consists, basically, of a sensing mechanism to read the eight level perforated tape, and a distributing mechanism to transmit the coded message over the signal lines. A control lever is located near the right rear corner of the unit to manually operate the mechanism while loading and positioning the tape into the reading head. This control lever detents in any one of three positions; run, stop, and free, in most units. In other units the lever is spring biased to the RUN position and must be held manually to the FREE position while loading tape. Operation of the transmitter distributor is controlled in standard sets by the position of the rotary mode switch. In switched networks application it is controlled by selection of the proper pushbutton on the switching control panel or remotely when the proper code combination is received at the set.

ELECTRICAL SERVICE UNIT

2.20 The electrical service unit is mounted on the cabinet pan directly behind the typing unit. It consists of a main chassis and a number

of mounting plate assemblies. Each mounting plate assembly consists of a functional group of components. The assemblies mount on the chassis and are interconnected, as required, with strapping.

2.21 In general, the features contained in the electrical service unit for standard sets consist of:

- (a) A basic facilities assembly containing the convenience and copylight receptacles main fuse, power and signal line terminal board, copylight transformer, line-local relay, and power panel connector.
- (b) A power cord.
- (c) A strapping field which provides interconnection facilities between the components of the set, and between the components and the signal line.
- (d) Two selector magnet drivers, required for keying the page printer and reperforator selectors.

2.22 Features contained in the electrical service unit for switched network sets consist of:

- (a) Convenience and copylight receptacles and transformer, and a main terminal board.
- (b) The strapping field which provides for interconnection of various set components.
- (c) Mode switching control panel and cable assembly.
- (d) Noncontention relay and wiring field.
- (e) Signal regenerator circuit components for outgoing signal improvement.
- (f) Selector magnet driver assembly and power supply for keying the reperforator selector.
- (g) Transmitter distributor control circuits.

CALL CONTROL UNIT

2.23 The call control unit is a component required in switched network service. Used in conjunction with a data set, it provides facilities for initiating, accepting, controlling, and

completing calls. The assembly is located to the right of the page printer, and is mounted on the cabinet pan. It extends from the front to the rear of the set, and is higher at the rear than at the front.

2.24 A speaker, for monitoring the progress of calls, is mounted at the front of the unit. (An optional hand held receiver may also be used.) Immediately behind and above the speaker is a row of six illuminating pushbuttons designated from left to right: ORIG (originate), CLR (clear), ANS (answer), TST (test), LCL (local), and BUZ-RLS (buzzer release).

2.25 Behind the front row of illuminating push-buttons is a rotary or touch-tone dialing mechanism for making connections with called stations through dial switching facilities. Behind the dial mechanism is a cluster of four controls: a combined BRK-RLS (break-release) lamp and pushbutton (white, upper), a REST lamp (amber), and an OUT OF SERVICE switch.

2.26 In addition to the above, the call control assembly includes the following features:

- (a) A ringer mechanism to signal incoming calls.
- (b) A transistorized selector magnet driver to amplify the incoming line signal for efficient operation of the selector mechanism.
- (c) A transistorized amplifier to drive the call monitoring speaker.
- (d) A volume control to set speaker level.
- (e) Fuses, for protection of the main power and selector magnet circuits.
- (f) A cable termination area at the rear.
- (g) An ac power cord, with polarized plug, for connection of the set to the power line.
- (h) Provisions for mounting an automatic pulsing or tone card dialing mechanism.

MOTOR UNIT

2.27 The motor unit consists of a 1/20 horsepower synchronous motor cradled in a mounting bracket assembly. It is equipped with an overload device to protect the motor. The motor assembly is located in the right rear corner of the keyboard base and supplied rotary motion for the keyboard, typing unit, and reperforator mechanisms.

3. ELECTRICAL REQUIREMENTS

POWER REQUIREMENTS

3.01 The ASR Set operates on 115 volts ac $\pm 10\%$ single phase, 60 cycles ± 0.5 cycle. The power cord is a three pin, grounded type, and has a length of six feet external to the cabinet.

SIGNAL REQUIREMENTS

3.02 Data is received or transmitted using the ASCII eight level data interchange code. The data interchange code is an eleven unit, equal bit code. The start bit, always transmitted as spacing, eight intelligence bits, and a stop pulse two bits in length and always transmitted as marking for synchronization purposes, make up the code. Intelligence bits one through seven may be either marking or spacing depending upon the character or function to be transmitted. The eighth bit is always marking unless the set is equipped to provide an even parity output. In the event even parity is provided, the eighth bit may be either marking or spacing in order to always supply an even number of marking pulses for each code transmitted. (This is a feature of sets that provide error detection.) At an operating speed of 100 wpm, each bit is 9.09 milliseconds in length. See the applicable section for a detailed description of the code.

3.03 The dc signal received over the incoming line is an on-off (mark-space) current type which varies from zero ampere (spacing) to 0.020 ampere (marking). In sets used in tone modulation circuits a data set provides the 0.020 ampere dc signals by demodulating ac tones that have been transmitted over telephone lines.

3.04 The dc signals from the incoming line or from the data set are amplified to 0.500 ampere marking and zero ampere spacing pulses by the selector magnet driver.

4. OPERATION

4.01 The operation of 35 type sets differs from set to set, depending upon the equipment complement and the service for which the set is designed. In general, two types of application will be discussed: sets that operate over standard private lines and whose signal is transmitted as dc pulses, and sets that operate over telephone networks and employ a call control unit in conjunction with a data set to transmit by means of tone (or frequency) modulation.

STANDARD OPERATION (PRIVATE LINE)

4.02 The 35 ASR Set for private line applications is capable of sending and receiving data over a 20 milliamperere half duplex or full duplex (optional) signal line. The input signals are converted to 500 milliamperere signals, necessary to key the typing unit and reperforator selectors, by two solid state selector magnet drivers. The set may be equipped with a friction feed typing unit or a sprocket feed typing unit. The typing unit monitors all traffic which is transmitted from the keyboard or transmitter distributor, or received from a distant terminal. A manually operated rotary mode switch provides the desired mode of operation.

4.03 Data is transmitted from the keyboard or transmitter distributor using the eight level American Standard Code for Information Interchange (ASCII). The sending units insert additional marking pulses wherever necessary to keep the number of marking pulses even. This results in an even parity output. The code received or transmitted consists of neutral binary serialized signals.

4.04 The set is able to transmit on line and prepare subsequent traffic off line simultaneously. Other coded data may also be transmitted by the transmitter distributor or received by the reperforator.

A. Manual Controls

4.05 To the right of the keyboard is located the power panel which supports the end of line indicator (red), rotary power switch, and a BREAK switch and lamp combination (white). To the left of the keyboard is mounted the rotary mode switch.

(1) The set is turned on by rotating the power switch to the ON LINE position for operating on the external signal line or to LOC for operation on the local signal line.

(2) The BREAK pushbutton is used to immediately stop transmission over the line. It blinds the keyboard signal generator output, opens the transmitter distributor clutch trip magnet circuit, and illuminates the BREAK lamp. (It also operates the electrical motor control of sets on the line that are so equipped.) The ability to transmit must then be restored by operating the BRK RLS key on the keyboard.

(a) The keyboard signal generator output is blinded only when the set is in the K and KT modes.

(b) A BREAK condition does not affect the sets ability to monitor traffic.

(3) The position of the mode switch determines the mode of operation of the set. The set can be switched into the modes when either on line or in local condition. The positions are as follows:

K - keyboard
 KT - keyboard tape
 T - tape
 TTS - tape - tape send
 TTR - tape - tape receive

The last two positions, TTS and TTR, may be disabled where not applicable.

B. Modes of Operation

4.06 The following discussion of the modes of operation assumes a half duplex signal line.

4.07 K (Keyboard) Operation: The keyboard and typing unit are connected to the external line. Transmission is provided from the keyboard and is monitored by the typing unit. The transmitter distributor is disabled and the reperforator is placed on the auxiliary local circuit. LOC operation is the same with the keyboard and typing unit connected to the local signal line.

4.08 KT (Keyboard-Tape) Operation: The keyboard, typing unit, transmitter distributor, and reperforator are connected to the external signal line. When the transmitter distributor is transmitting, the message is copied by the typing unit and a duplicate tape punched by the reperforator. The keyboard should not be operated when the transmitter distributor is sending. When the keyboard is transmitting, the message is copied by the typing unit and tape is punched by the reperforator. In this case the transmitter distributor should not be operated. LOC operation will be the same except the units are connected to the local signal line.

4.09 T (Tape) Operation: The transmitter distributor and typing unit are connected to the external signal line. The typing unit copies what is being transmitted from the transmitter distributor or received from a distant station. The keyboard and reperforator are on the aux-

iliary local circuit. Tape can be prepared on the reperforator from the keyboard without interfering with transmission on the external signal line. LOC operation will be the same except the transmitter distributor and typing unit are connected to the local signal line.

4.10 TTS (Tape-Tape Send) Operation: The transmitter distributor transmits data other than ASCII coded data over the external signal line. The typing unit is blinded to outgoing and incoming traffic. The keyboard and reperforator are connected in the auxiliary local circuit and can be used to prepare subsequent traffic.

4.11 TTR (Tape-Tape Receive) Operation: The reperforator is connected to the external signal line to receive from a distant station data other than ASCII coded data. The transmitter distributor is disabled, the typing unit is blinded and the keyboard is in the auxiliary local circuit. TTR and TTS modes in LOC operation provide no functional use.

C. Set Functions

4.12 The set includes certain nonprinting functions necessary for controlling both the local station equipment and distant station sets. These functions are accomplished by depressing the CTRL key and the desired function key on the keyboard simultaneously.

(a) Local and distant station equipment functions:

(1) TAB (horizontal tabulation), VT (vertical tabulation), and FORM (form-out) functions are used only in sets containing sprocket feed typing units. The function occurs at both the sending and receiving stations.

(2) A signal bell operates through function box make contacts in the typing unit at both the sending and receiving stations.

(b) Local station equipment functions:

(1) Operation of the CR (carriage return) key releases the type box carriage allowing it to return to the left.

(2) The LOC LF (local line feed) key, when depressed, causes the paper or form to feed out of the printer at an accelerated rate.

- (3) The REPT (repeat) key and any other key associated with a character depressed simultaneously results in repeated transmission of the character.
- (4) The LOC BSP (local backspace) key, when operated, causes the backspace magnet on the reperforator to energize, operating the backspace mechanism. The tape is backspaced one character each time the key is operated.
- (5) Operation of the SHIFT key simultaneously with any other key having a graphic symbol on the upper half of the keytop results in transmission of that code combination.
- (6) The BREAK key when operated causes the keyboard to be electrically shunted.
- (7) The BRK-RLS key allows the receive-break switch to return to its unoperated position, unblinding the keyboard.
- (8) ALT MODE (alternate mode) key provides other functions (customer option) in station equipment. Pressing ALT MODE key before operating the desired function key will provide the nonprinting function.

D. Variable Features (Options)

4.13 The electrical motor control is an option that allows the customer to have the set controlled remotely by other stations on the line, giving unattended operation. The motor control is placed in series with the signal line so that when a sending station transmits a "break" the motor control operates to turn the set on (see 4.05 (2)). After message transmission is completed, the sending station turns the local stations off by sending the EOT (end-of-transmission) code. In this system the rotary power switch remains in the ON LINE position during operating hours.

4.14 Full duplex operation permits receiving messages and transmitting them at the same time without interference between the two signals. This is accomplished by electrically separating the sending and receiving loops of the set by changes in the wiring on the basic facilities assembly in the electrical service unit and connecting the loops to the appropriate duplex signal lines.

OPERATION OF SWITCHED NETWORK SERVICE SETS

4.15 A more detailed explanation of operation of these sets will be found in the section describing the 35 Call Control Unit.

4.16 A call is originated by depressing the ORIG pushbutton. The ORIG lamp will light and remain on for the duration of the call. A dial tone (or busy signal) will be heard over the speaker in the set. Upon receipt of the dial tone, the operator may proceed to dial the desired telephone number. The progress of the call is monitored over the speaker. If the line is busy, depress the CLR (clear) pushbutton and try again. Dialing may be accomplished as follows, depending upon the equipment of a particular set:

- Rotary dial - used in the same manner as a telephone dial.
- Pulsing card dial - a card with the desired station's number punched in it is inserted into the card slot and pushed in. After the START bar is depressed the number is automatically dialed as the card advances out of the slot. Depress RELEASE bar to remove card.
- Touch-tone dial - depress the numbered pushbuttons in correct sequence. Each digit creates a tone which can be heard over the loudspeaker.
- Touch-tone card dial - operates same as pulsing card dial except the card is released by depressing the START bar a second time.

4.17 When a distant station is called, the ringer will momentarily sound and the set will automatically answer. The ANS (answer) lamp will light, and remain on for the duration of the call. If the set is in LCL (local) mode, the automatic answer feature is disabled, and the ANS pushbutton must be depressed in order to answer the call.

4.18 Other features of the set include the following:

- (a) Provision is made for insertion of an auxiliary receive only typing reperforator (ROTR) selector magnet driver in series with the typing unit selector magnet driver. In this way, a perforated and typed record of message transaction can be prepared on tape. A detailed description of the ROTR Set will be found in the appropriate section.

(b) The **OUT OF SERVICE** switch will make the set unresponsive to incoming calls. The **OUT OF SERVICE** lamp will light and the ringer becomes inoperative. As an option the station can be made to appear off hook (busy) to the central office.

(c) Paper handling controls of the ASR Set provide low paper alarm circuits, a paper out disconnect feature, and a form control and tabulating system.

(1) Low paper alarm is given by a buzzer.

A **BUZ RLS** (buzzer release) key silences the buzzer and lights the **BUZ RLS** lamp. The paper supply must be replenished and the key released to return the set to normal.

(2) The automatic answer circuit is disabled by operation of the low paper switch or when the tape supply runs low in the auxiliary **ROTR** set. However, an operator can over-ride the disabled automatic answer circuit by manually answering.

(3) The paper out disconnect feature in sprocket feed typing units performs the same function as the **CLR** key. It is used in conjunction with low paper contacts, so that no calls will be accepted following the disconnect until paper is replaced in the set.

(4) The form feed operation in a sprocket feed typing unit is initiated from the function box following recognition of the **FORM** code operation. It is also tripped whenever the data set disconnects, unless the paper is already between forms.

(5) The sprocket feed typing unit is also equipped with horizontal and vertical tabulation mechanisms which are controlled by code recognition in the function box.

(d) The **WRU** (who are you) key (**E**), when held down simultaneously with the **CTRL** (control) key, allows either station to operate the distant stations answer-back.

(e) The **RU** (are you) key (**F**), when held down with the **CTRL** key, allows a station to communicate with a distant station equipped with this confirmation type answer-back mechanism. It is not automatic and depends upon operation of certain contacts in the function box of the receiving typing unit to trip the abbreviated answer-back.

(f) The **HERE IS** key allows a station to send its own answer-back code combination to the distant station. This key should be

blocked at **RU** stations to prevent manual answering of an invalid **RU** sequence.

(g) The **BREAK** pushbutton is used by either station to immediately stop transmission without losing the connection. The **BREAK** will blind both sending and receiving keyboards so no transmission can occur. The condition is indicated by the lighting of the **BREAK** lamp in the **BRK RLS** pushbutton. The **BREAK** pushbutton should not be operated when the set is in **LCL** mode.

(h) The **RESTRAIN** lamp lights to warn the typist to slow down when communicating with a slower speed **TWX** station. If the conversion apparatus is overloaded, a **BREAK** signal will be generated. This **BREAK** is distinguished by the fact that both the **RESTRAIN** and **BREAK** lamps are lighted. To restore transmission, the **BRK RLS** pushbutton must be operated.

(i) The **EOT** (end-of-transmission) code combination is transmitted from the keyboard to disconnect a call. This operates contacts in the function boxes of the sending and receiving typing units to provide a fast disconnect by the data set.

(j) To use the set for practice typing and other off-line functions, depress the **LCL** (local) pushbutton. This will turn the motor unit on and disable the automatic answer-back mechanism. The ringer will signal any incoming calls. These can be answered by depressing the **ANS** pushbutton.

(k) If the **TEST** key is operated while the set is connected to a test center, the message sent by the test center will be turned around and sent back for analysis.

(l) The automatic mode switching control panel, at the left of the keyboard, furnishes the operator with the facilities to:

(1) Prepare tape while transmitting or receiving traffic. (The **TTS** and **TTR** button extensions are blocked where this feature is not used.)

(2) Transmit or receive traffic using codes foreign to the equipment, i.e., codes other than **ASCII**.

(3) Receive traffic on tape and by page copy simultaneously.

(4) Revert to a common mode of operation upon clearing the set or on a break or call disconnect.