33 TELETYPEWRITER SETS

GENERAL DESCRIPTION AND OPERATION

1. GENERAL

1.01 This section is issued to provide a general description and operation of the 33 teletypewriter set, describe a typical application, and give technical data. Formerly this information was contained in Section 574-100-102TC, 32 and 33 Teletypewriter Sets — Description which is hereby cancelled.

1.02 The 33 Teletypewriter Sets described in this section are electromechanical apparatus that provide terminal facilities for exchanging recorded communication via appropriate transmission facilities, including telegraph lines, telephone networks, and radio channels.

1.03 References to left, right, up, down, front, rear, etc consider the teletypewriter set as viewed by the teletypewriter operator.

1.04 This section covers the following teletypewriter sets:

(a) Receive-Only (RO) Teletypewriter Set

(b) Keyboard Send-Receive (KSR) Teletypewriter Set

(c) Automatic Send-Receive (ASR) Teletypewriter Set

2. TELETYPEWRITER SETS

RECEIVE-ONLY (RO) TELETYPEWRITER SET (Figure 1)

2.01 The RO set can only receive messages and print them on a paper copy. It has no transmitting capabilities. Essentially the RO consists of two components.

(a) Typing unit

(b) Call control unit

KEYBOARD SEND-RECEIVE (KSR) TELETYPEWRITER SET (Figure 2)

2.02 The KSR can receive and transmit messages, and print them on a paper copy or sprocket form. It consists of the following components.

(a) Typing unit
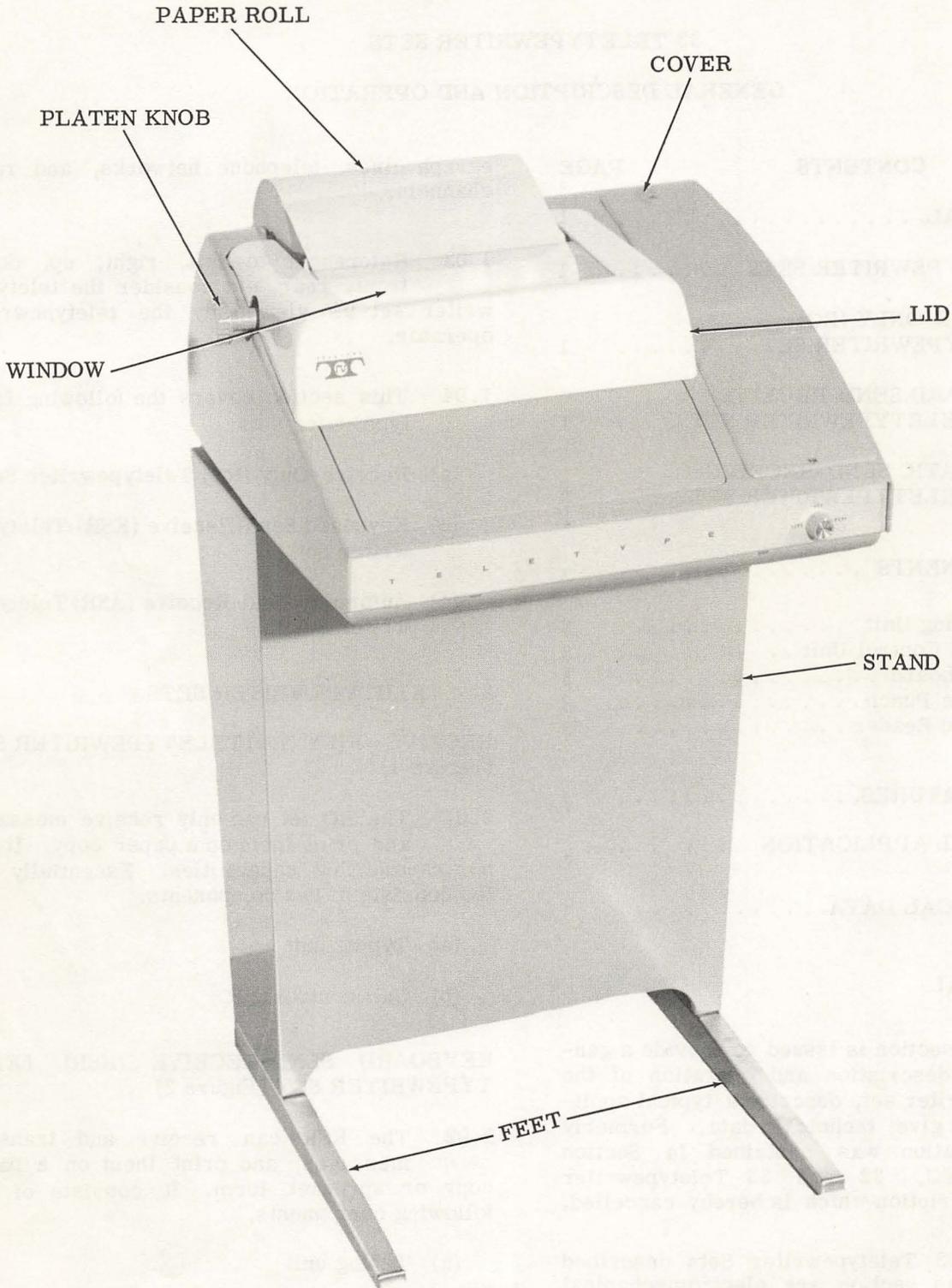
(b) Call control unit

(c) Keyboard

PAPER ROLL

COVER

PLATEN KNOB

LID

WINDOW

STAND

FEET

Figure 1 - Model 33 Receive-Only (RO)
Teletypewriter Set

AUTOMATIC SEND-RECEIVE (ASR) TELE-TYPEWRITER SET (Figure 3)

2.03 The ASR set consists of the following components:

(a) Typing unit

(b) Call control unit

(c) Keyboard

(d) Tape punch

(e) Tape reader

2.04 The ASR set can receive and transmit messages. It can print messages on paper copy or on sprocket form. The tape punch perforates paper tape. The reader senses the code punched in tape which can then be transmitted to the local or distant set.

3. COMPONENTS

3.01 In this section, only a brief outline of the component operation will be presented. Individual components are described in detail each in a separate section. Refer to the following for a general description and principles of operation of the components:

Typing Unit	574-122-100TC
Call Control Unit	574-123-100TC
Keyboard	574-121-100TC
Tape Punch	574-125-100TC
Tape Reader	574-124-100TC

A. Typing Unit

3.02 The typing unit is the receiving component of the set. A signal coming into the typing unit is translated into a mechanical arrangement of codebars. The position of these codebars determines two things: the position of a type wheel upon which characters are embossed, and the selection of functions such as CARRIAGE RETURN and LINE FEED. A motor, by means of a main shaft, supplies all the motive force to effect the printing and perform the functions. The friction feed set may be considered the standard type of set. It handles 8-1/2 inch paper, and will accommodate 74 characters per line, 10 characters per inch. Vertically the friction feed set will print 6 lines per inch and will normally print one original and one copy.

B. Call Control Unit

3.03 The call control unit serves as a bridge to electrically join the set to the communication networks. In some applications the call control unit serves to initiate, accept, control and complete the incoming calls. A power supply, local-remote control circuits, a selector magnet driver circuit, and a motor delay timer circuit are some of its basic elements.

C. Keyboard

3.04 The keyboard is the sending component of the set. Each of its keys controls an arrangement of levers which, in turn, position electrical contacts to represent the character. The keyboard output is a parallel output to the distributor of the typing unit. The distributor senses the keyboard output and sends it in a serial form to the selector magnet driver. From the selector magnet driver it then goes to the typing unit selector.

D. Tape Punch

3.05 The input to the tape punch is strictly mechanical. Extensions on the typing unit codebars position themselves in the tape punch to set up a similar coded arrangement of punch pins. With drive motion from the typing unit main shaft, the tape punch drives the punch pins to perforate holes in paper tape.

E. Tape Reader

3.06 Sensing pins in the tape reader are driven upward for every cycle. Where holes are present in the tape the sensing pins close a set of contacts. Where no holes are present in the tape the sensing pins are blocked and make no contact. These current, no-current conditions are duplicated on the typing unit distributor as a parallel output. The distributor senses the condition of each pulse and sends it serially to the selector magnet driver in the call control unit. From the call control unit the pulses go to the typing unit to print the character.
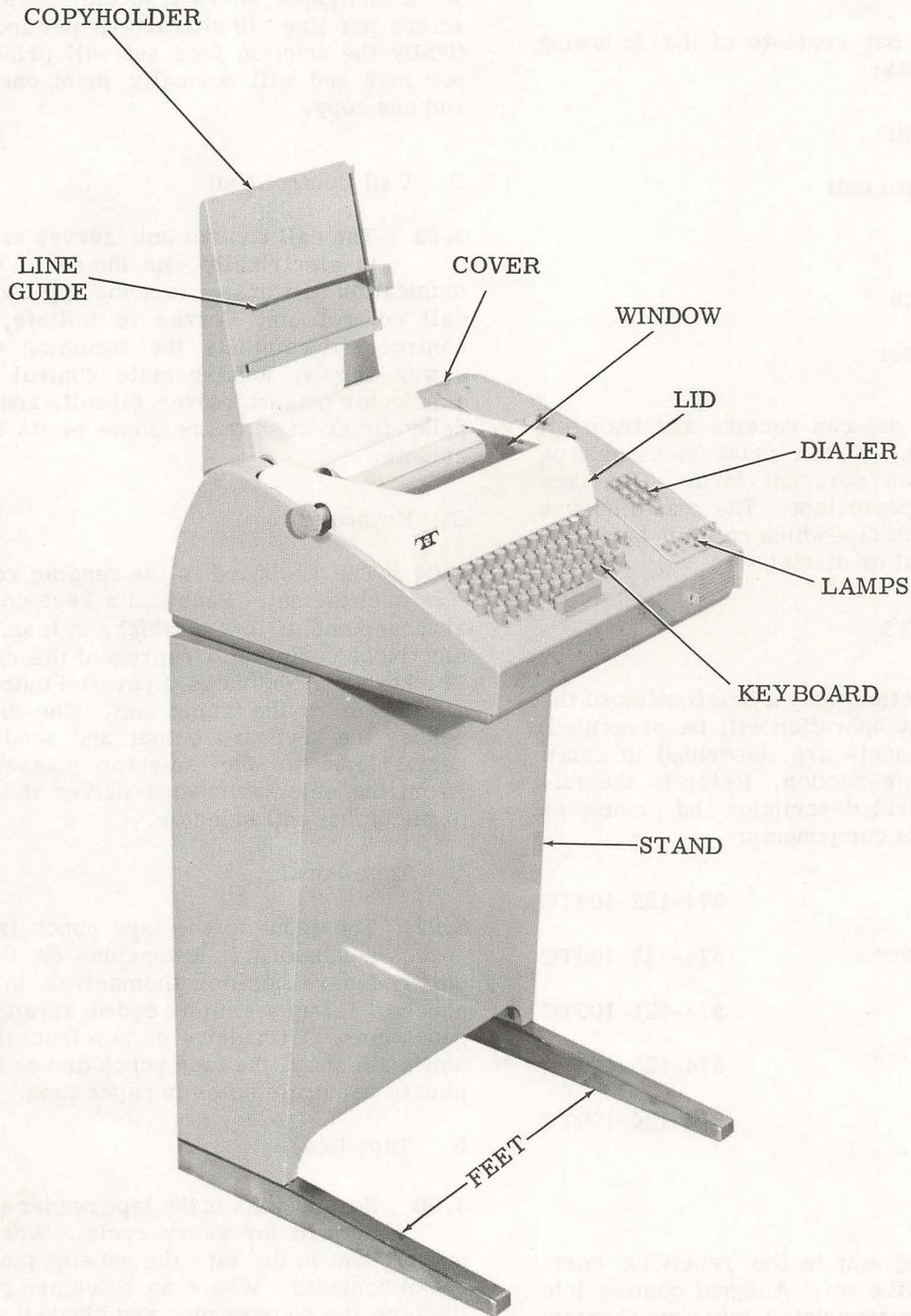
Figure 2 - Model 33 Keyboard Send-Receive (KSR)
Teletypewriter Set

COPYHOLDER

LINE
GUIDE

COVER

WINDOW

LID

DIALER

LAMPS

KEYBOARD

STAND

FEET

COPYHOLDER

PAPER ROLL

LID
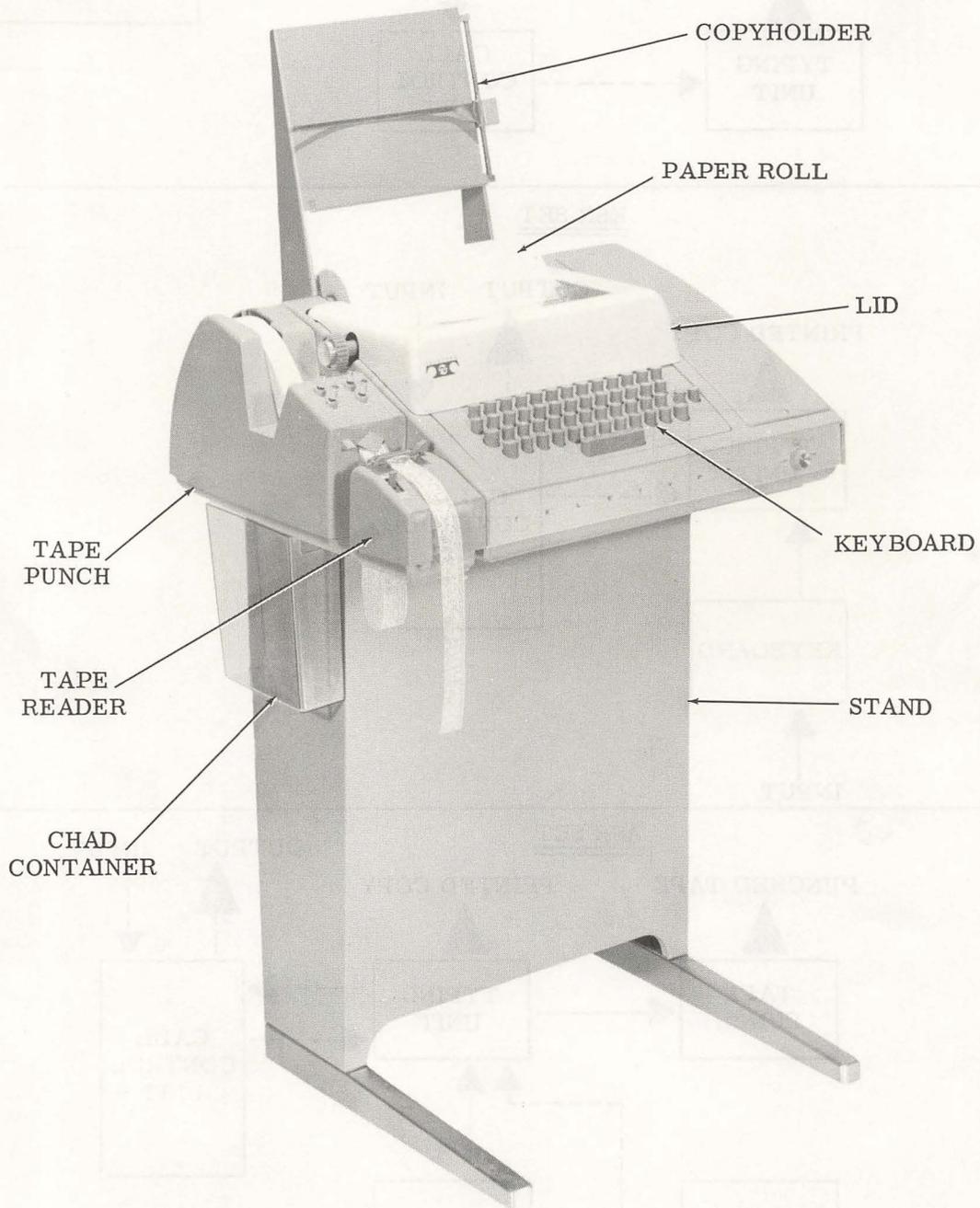
KEYBOARD

TAPE PUNCH

TAPE READER

STAND

CHAD CONTAINER

Figure 3 - Model 33 Automatic Send-Receive (ASR)
Teletypewriter Set

RO SET

PRINTED COPY

INPUT

TYPING
UNIT

CALL
CONTROL
UNIT

KEY
ELECTRICAL
--- ►
MECHANICAL
───►

KSR SET

PRINTED COPY

OUTPUT   INPUT

TYPING
UNIT

CALL
CONTROL
UNIT

KEYBOARD

INPUT

ASR SET

PUNCHED TAPE   PRINTED COPY

OUTPUT   INPUT

TAPE
PUNCH

TYPING
UNIT

CALL
CONTROL
UNIT
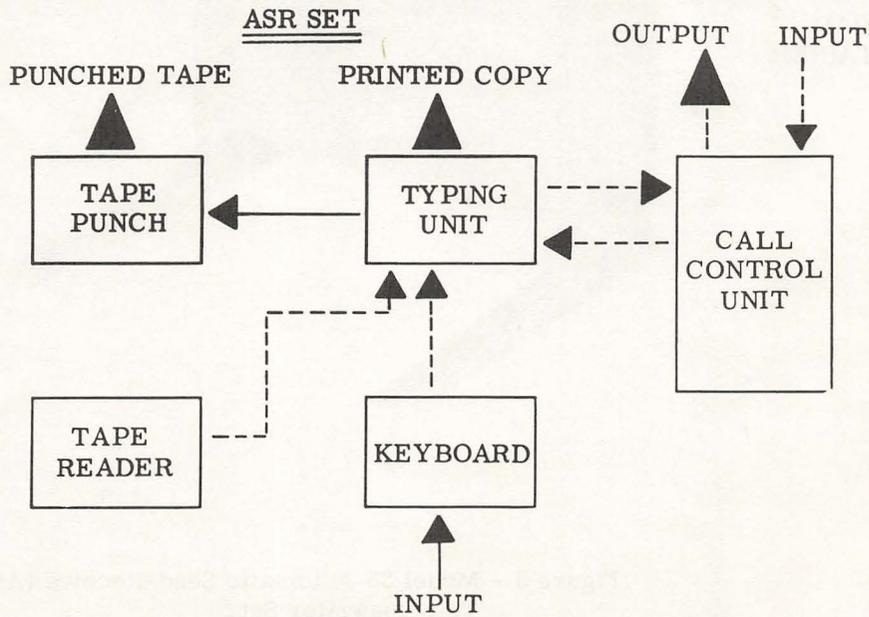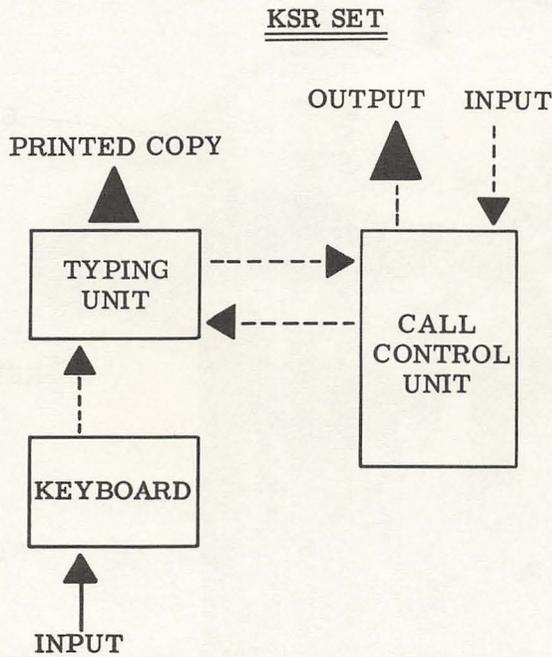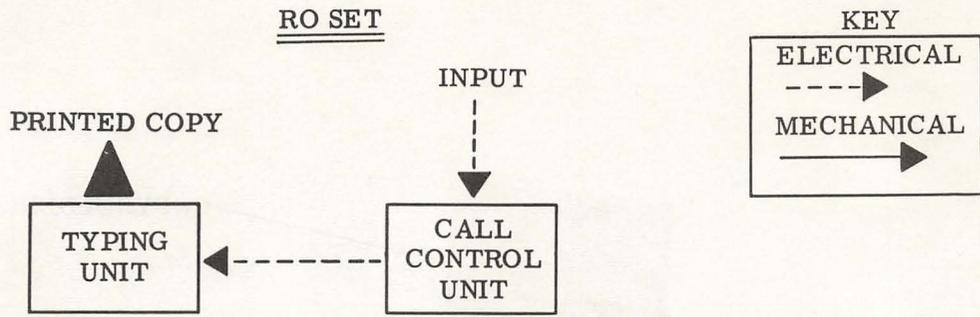
TAPE
READER

KEYBOARD

INPUT

Figure 4 - Block Diagram of 33 Sets

4. SET FEATURES

4.01 Standard Functions — Functions refer to nonprinting operations performed by the set which are supplementary to its purpose of printing characters. All sets are equipped with the following standard functions.

CARRIAGE RETURN

Upon command to CARRIAGE RETURN the movable printing mechanism returns to the left margin.

LINE FEED

Advances the paper or sprocket form one or two lines.

SPACE

Every character printed is spaced a certain distance from the previous one automatically. However the set can accept a separate command to SPACE in which case it will move the printing mechanism one character space to the right.

SPACE SUPPRESSION

In some instances, such as when commands to CARRIAGE RETURN or LINE FEED are given, the set spacing mechanism is suppressed and no spacing occurs. Spacing is suppressed on all functions, except the SPACE function.

PRINT SUPPRESSION

The printing mechanism is suppressed so that no printing occurs when the set receives commands to perform any of the functions.

BLANK

The BLANK function serves to suppress printing.

4.02 Even Parity Keyboard — The 33 sets use seven intelligence pulses to accommodate the code combinations of the ASCII code (USA Standard Code for Information Interchange). The remaining eighth pulse is used as an error detection device. In sets so equipped the even parity keyboard adds an eighth marking pulse whenever the number of marking pulses in a code combination is odd. If the number of marking pulses in a code combination is even, the eighth pulse is transmitted as a spacing pulse. This means that every code combination transmitted by the even parity keyboard has an even number of marking pulses.

Note: Keyboards not equipped with the even parity feature always transmit the eighth pulse as a marking pulse.

4.03 Numeric Keyboard — As the name implies, this optional feature consists of a keyboard with a numeric arrangement. It has no letters. This restricts the set for specialized applications where the exchange of data is of a numeric nature. Besides the numeric arrangement, the keyboard also transmits nonprinting functions such as EOT (End of Transmission), PACE, DELETE, CARRIAGE RETURN, LINE FEED, etc.

4.04 Answer-Back — In sets equipped with this feature, a mechanism coded with a predetermined sequence of characters is used for identification purposes. The mechanism may be actuated locally or remotely.

4.05 Automatic Carriage Return-Line Feed — This feature may be found on friction feed sets only; sprocket feed sets are unable to accommodate it. In sets so equipped, as printing approaches the end of the line the printing mechanism is returned to the left margin and the paper is advanced one line vertically.

4.06 Sprocket-Feed — Sprocket feed sets print characters on a sprocket fed form. Although the forms are 8-1/2 inches wide, they may be 6, 7, 8-1/2, 9, 10, or 11 inches in length. A total of 72 characters may be printed in a line on the form, with 10 characters per inch. The set will accommodate 6 lines of printed characters per inch. Varying with the weight of the carbon, the set will normally print one original and two copies. When the set has used all the forms available, an alarm will disable the set from accepting incoming calls.

4.07 Form-Out (Sprocket Feed Only) — In sets so equipped, the form-out mechanism advances the forms to a predetermined length upon command. The mechanism is adjustable to various form lengths.

4.08 Paper-Out Alarm (Sprocket Feed Only) — A set equipped with this feature will activate an alarm when the supply of forms is exhausted. The set will also refuse to accept any other incoming calls.

4.09 Low Paper Alarm (Friction Feed Only) — When the amount of paper on the roll reaches a certain amount, a switch activates an alarm which indicates to the operator that the paper supply is low.

4.10 Automatic Punch Controls — This feature allows a number of operating modes for turning the tape punch ON and OFF. The tape punch can be turned ON and OFF manually or automatically. An ON-LOCK feature which locks the tape punch in the ON mode is also available with the automatic punch.

4.11 End of Line Bell — Sets with this feature alert the operator that the printing mechanism is apporaching the end of the line at the right margin.

4.12 Print-Nonprint — This solenoid mechanism disables a set so equipped from printing or performing functions when operated. When unoperated the set can print and execute its operations in normal fashion.

4.13 Line Break — This feature places the set so equipped in an open line condition. A BREAK key on the keyboard effects the operation.

4.14 Repeat — Sets equipped with this feature can print a character or perform a nonprinting function continuously when the REPEAT key is depressed on the keyboard together with another key.

4.15 TD Call In — An ASR set having this feature can activate the tape reader of a distant set by momentarily closing a set of contacts. The tape reader can also be activated in two other ways: By closing a set of X-On (Reader On) contacts and by manually placing the tape reader in the ON mode.

4.16 Copyholder — The feature consists of a metal frame equipped with a page indicator. The frame mounts on the back of the set, facing the operator. Messages to be transmitted may be placed on the copyholder for convenience during transmission.

4.17 End of Transmission (EOT) — When equipped with this feature the sending set can indicate to the receiving set that the entire message has been sent out and transmission is terminated. The keyboard has an EOT key which will activate the mechanism.

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4.18 Accessories — A number of accessories are available with the set, including the following:

(a) A sheet metal stand which supports the subbase and components at a convenient operating level. It consists of chrome feet, equipped with leveling screws or roller casters, and an enclosure to house auxiliary apparatus, such as a data set and the tape reader power pack.

(b) Call control facilities, including buttons, indicator lamps, motor control relay, speaker, ringer, buzzer, and rotary, TOUCH-TONE*, or card dialers.

5. TYPICAL APPLICATION

5.01 The following is a brief description of how 33 Teletypewriter Sets, equipped with call control and answer-back features, may be used in a typical communication system (Figure 5). When a call is to be made, an operator uses the controls on the teletypewriter set to gain access to the system switching and transmission facilities, which may be dial telephone or telegraph networks. The operator then dials the number of the called station.

5.02 The switching center selects the proper station and signals the receiving station, indicated by visual and/or audible indicators. Using the controls on the teletypewriter set, the operator at the called station completes the connection and conditions the equipment so that communication can proceed in either direction. This is indicated visually and/or audibly at the calling station.

Note: Variations of call control features provide unattended reception of calls.

5.03 Ordinarily the stations then identify themselves by the answer-back feature. The operator at the calling station can then type the message on the keyboard, or if it is an ASR set, can send it by perforated tape. In either case the teletypewriter set at the calling station translates the message to dc sequential start-stop signals which are applied to the transmission facilities. The teletypewriter sets at both the sending and receiving stations receive the signals and translate them to mechanical motions which print the message on continuous page copy or forms, and/or in the case of the ASR,
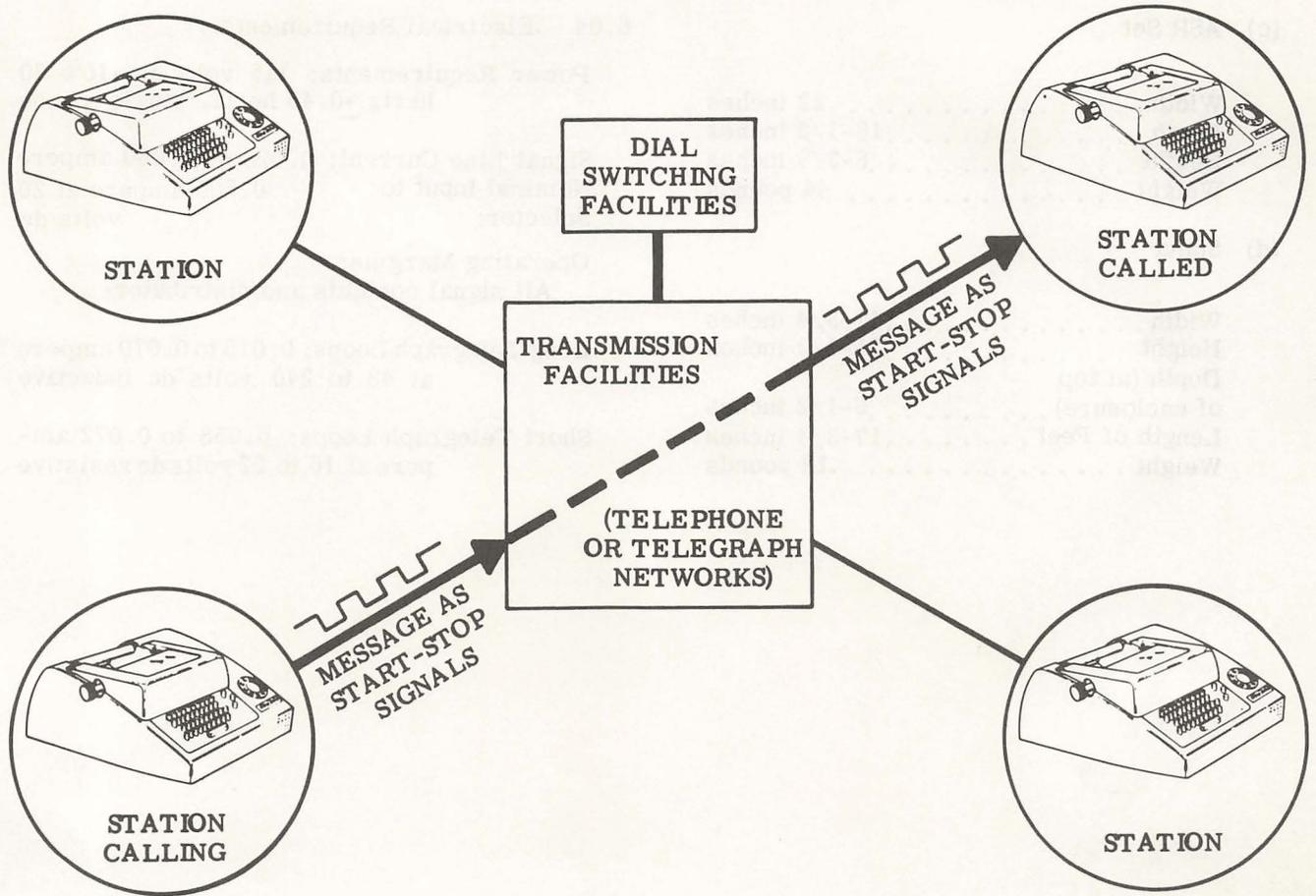
Figure 5 - Typical Applications

perforate it in tape. If telephone networks are used, the dc start-stop signals are converted to tone frequencies for transmission and reconverted to dc start-stop signals for reception.

5.04 Finally, the operator at either station can terminate the call and return the set to its idle condition by operating the OFF control. There are a variety of OFF controls, including the EOT key on the keyboard, a control knob, or a pushbutton on the call control unit. A set may be equipped with one or two of these controls. In the case of an RO set, only one OFF control is necessary. In the case of a KSR and ASR set, the EOT control on the keyboard or the pushbutton on the call control unit may be used.

6. TECHNICAL DATA

6.01 Speed: 100 words per minute
600 operations per minute

6.02 Transmission Code: 8 level start-stop signals with 11 unit transmission pattern.

6.03 Dimensions and Weights (Approximate)

(a) RO Set

Width . . . . .18-5/8 inches
Depth . . . . .18-1/2 inches
Height . . . . .8-3/8 inches
Weight . . . . .39 pounds

(b) KSR Set

Width . . . . .18-5/8 inches
Depth . . . . .18-1/2 inches
Height . . . . .8-3/8 inches
Weight . . . . .40 pounds

(c) ASR Set

Width . . . . .22 inches
Depth . . . . .18-1/2 inches
Height . . . . .8-3/8 inches
Weight . . . . 44 pounds

(d) Stand

Width . . . . .17-3/4 inches
Height . . . . .24-1/2 inches
Depth (at top
of enclosure) . . . . .6-1/2 inches
Length of Feet . . . . . . .17-3/4 inches
Weight . . . . .12 pounds

6.04   Electrical Requirements

Power Requirements: 115 volts ac +10% 60
        hertz +0.45 hertz, single phase

Signal Line Current: 0.020 or 0.060 ampere
Nominal Input to   0.500 ampere at 20
Selector: volts dc

Operating Margins:
All signal contacts and distributor:

Long Telegraph Loops: 0.015 to 0.070 ampere
        at 48 to 240 volts dc inductive

Short Telegraph Loops: 0.058 to 0.072 am-
        pere at 16 to 22 volts dc resistive