33 TELETYPEWRITER SETS

GENERAL DESCRIPTION AND OPERATION

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1. GENERAL

1.01 This section provides the general description and operation for 33 Teletypewriter Sets. It is reissued to consolidate 33 Teletypewriter Set coverage and to delete coverage of variable features and accessories. Description of the features and accessories can now be found in Section 574-100-104TC. Since this is a general revision, marginal arrows used to indicate changes and additions have been omitted.

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 Terminals in the 33 line are available with either 50 or 60 Hz motors and can use either teletypewriter paper (friction feed) or accommodate multiple-copy business forms (sprocket feed). They operate at 10 characters per second (110 baud), feature four-row keyboards, and utilize ASCII (American National Standard Code for Information Interchange). The sets offer a choice of type wheel/keytop combinations and generate alphas, numerics, and many special control codes in even parity. They also provide answer-back on most configurations. Transmission mode may be half or full duplex. Current interface is standard with Electronic Industries Association (EIA) RS-232-C available as a modification kit.

1.04 Some of the equipment available for use with the 33 Terminal (refer to Section 574-100-104TC for a description of optional features) includes various paper and tape handling devices and the magnetic tape terminal which may be added for on-line data transmission and reception up to 2400 words per minute. Model 33 Sets, with the addition of 9100 Series TELETYPE® Station Controllers, can be used in selective calling systems.

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

1.06 This section covers the following 33 Teletypewriter Sets:

(a) Receive-Only (RO) Teletypewriter Set

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

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

1.07 For schematic and actual wiring diagrams with circuit description, refer to the Wiring Diagram Package (WDP) shipped with the equipment.

2. TELETYPEWRITER SETS

RECEIVE-ONLY (RO) TELETYPEWRITER SET (Figures 1 and 4)

2.01 The RO set receives and prints messages on a paper copy. It consists of the following components:

Typing unit
Call control unit
Cover
Stand (if so equipped)

2.02 The RO set can only be used to receive and print messages from other connected sets. Sending is limited to the answer-back mechanism.

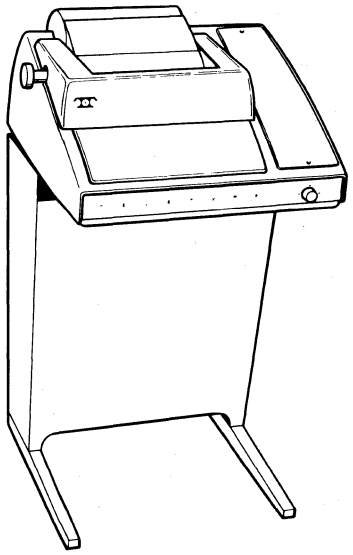


Figure 1 - Typical Model 33 Receive-Only (RO) Teletypewriter Set

KEYBOARD SEND-RECEIVE (KSR) TELETYPEWRITER SET (Figures 2 and 4)

2.03 The KSR set receives and prints messages on a paper copy. It can generate messages from its keyboard and answer-back mechanism. The KSR set consists of the following components:

Keyboard
Typing unit
Call control unit
Cover
Stand (if so equipped)

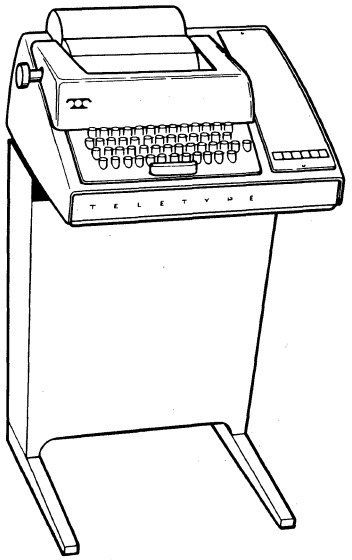


Figure 2 - Typical Model 33 Keyboard Send-Receive (KSR) Teletypewriter Set

2.04 The KSR set can be used in the following ways:

(a) To generate and send messages from its keyboard
(b) To receive and print messages from other connected sets and its own keyboard.

AUTOMATIC SEND-RECEIVE (ASR) TELETYPEWRITER SET (Figures 3 and 4)

2.05 The ASR set receives and records messages on paper tape and/or page copy. It can generate messages from its keyboard,

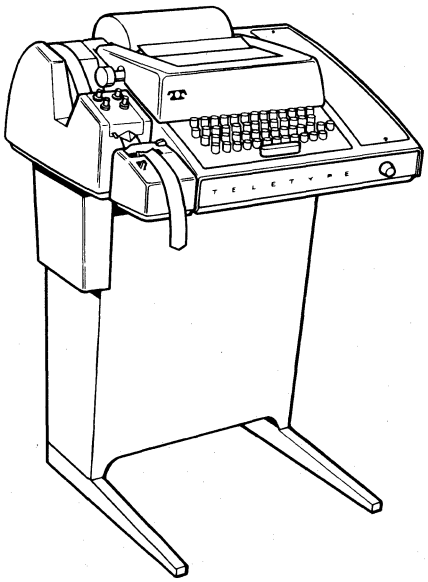


Figure 3 - Typical Model 33 Automatic Send-Receive (ASR) Teletypewriter Set

tape reader, and answer-back mechanism. The ASR set (Figure 5) consists of the following components:

Keyboard
Typing unit
Call control
Paper tape reader
Paper tape punch
Cover
Stand (if so equipped)

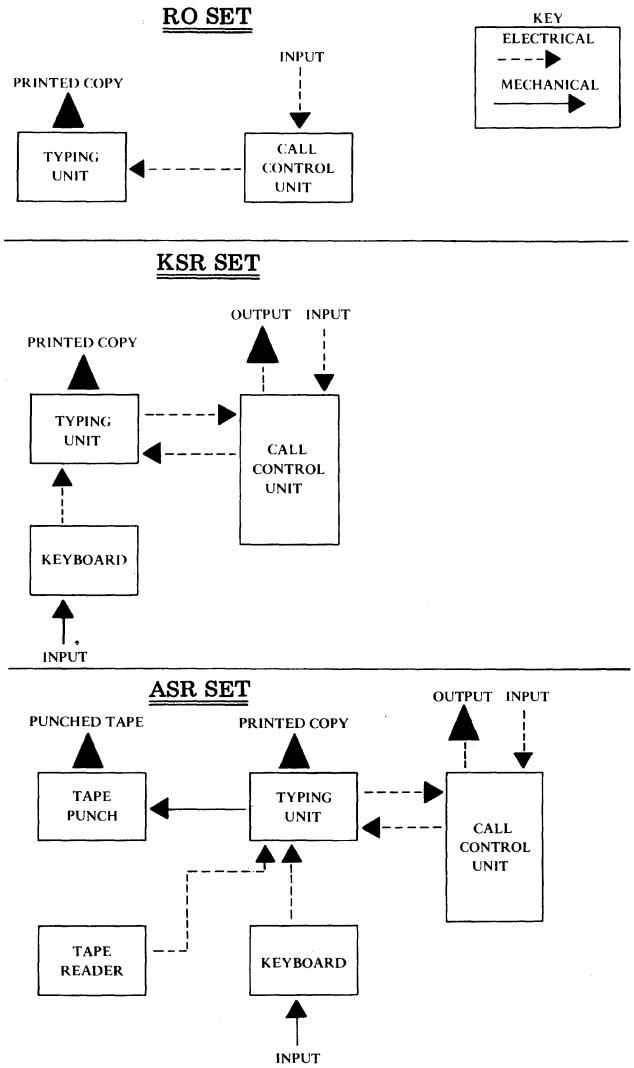


Figure 4 - Block Diagram of 33 Sets

2.06 The ASR set can be used in the following ways:

(a) To send messages from the keyboard while making a printed page copy with or without punching tape

(b) To receive messages from line and print them on page copy with or without punching tape

(c) To prepare tape locally from keyboard for later sending while making a printed page copy

(d) To send messages from tape while making a page copy with or without punching tape.

CUSTOMER OPTIONS

2.07 The following customer options are available:

(a) Automatic/manual (AUTO/MAN) tape punch (customer activated)

(b) Automatic carriage return and line feed (CR/LF) function (customer activated)

(c) Choice of either automatic/manual (AUTO/MAN) or manual tape readers

(d) Wiring options on the keyboard to retain even parity or to have the eighth bit always marking or spacing

(e) Distributor trip mechanism for reader and answer-back magnet options.

3. COMPONENTS

33 Sets

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

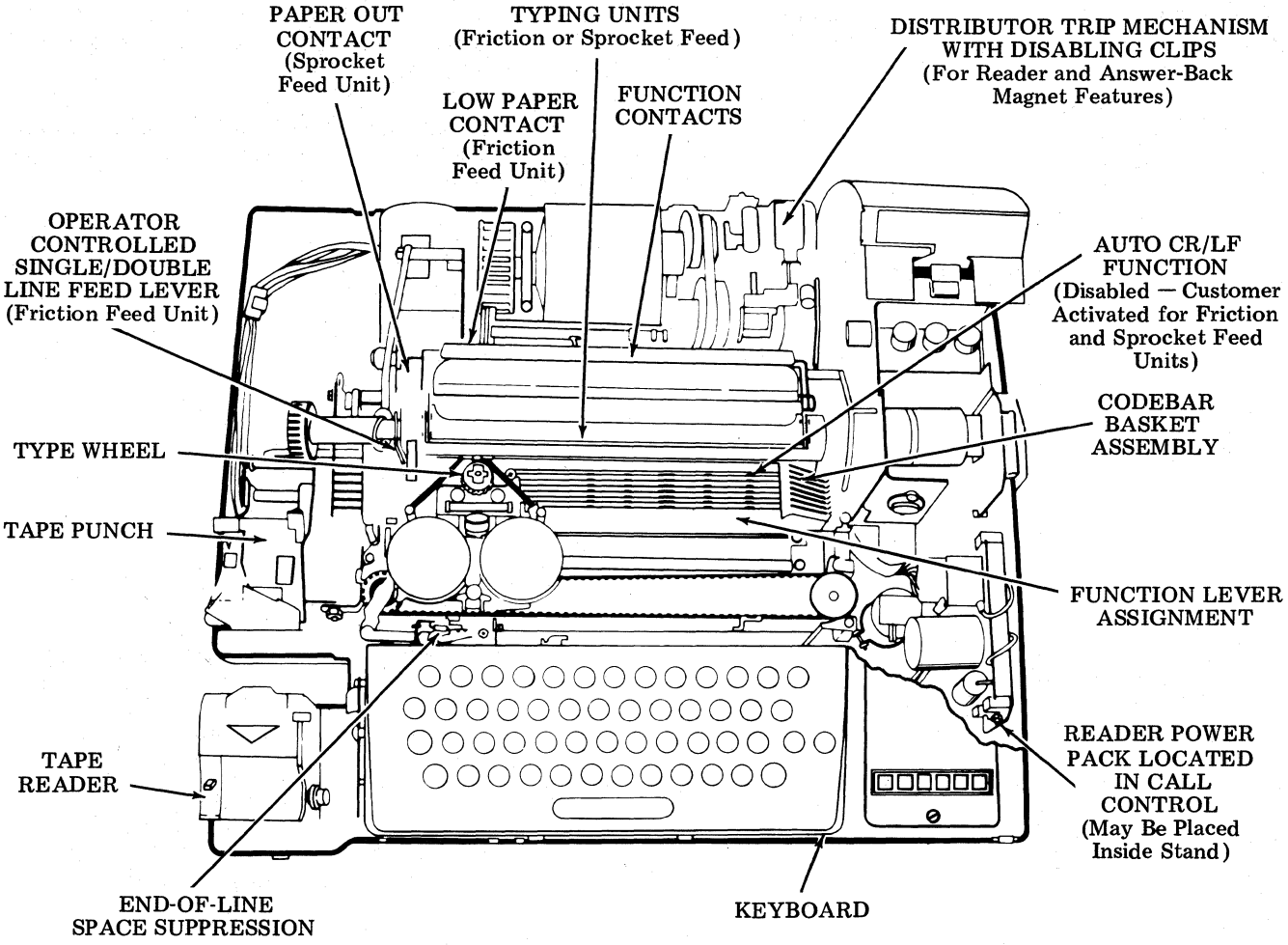


Figure 5 - Typical Model 33 Automatic Send-Receive (ASR) Teletypewriter Set With Cover Removed

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 72 characters per line, 10 characters per inch. Vertically the friction feed set will print three or six lines per inch and will normally print one original and one copy.

3.03 A TP183498 "A" codebar, TP186783 extension clip for friction feed printers, and a TP186803 extension clip for sprocket feed printers provide the end-of-line (EOL) bell on the 71st character and the automatic carriage return (ACR) line feed on the 72nd character (Figure 6). Refer to appropriate related sections for detailed descriptions, installation and adjustments.

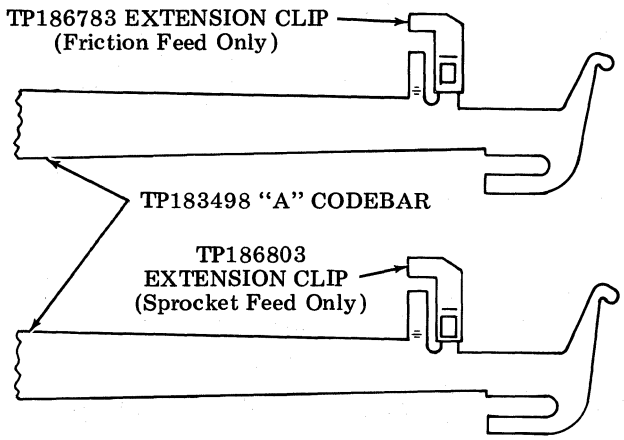


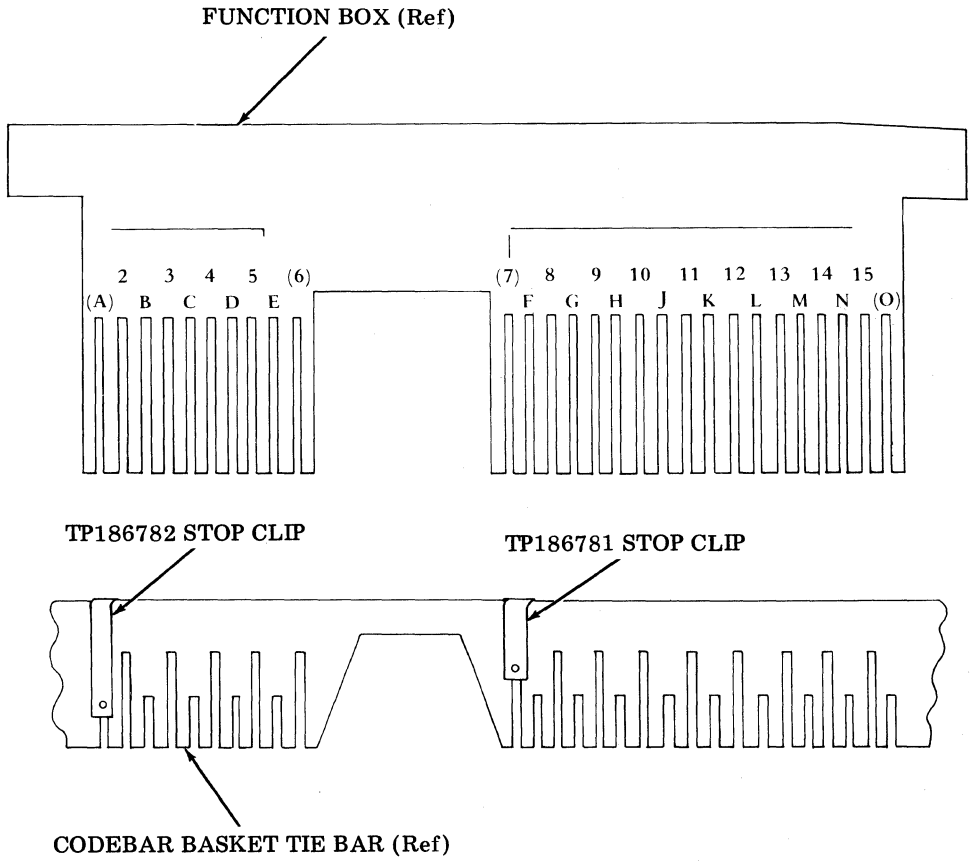
Figure 6 - Codebar With End-of-Line (EOL) Bell and Automatic Carriage Return (ACR) Line Feed Extension Clips

3.04 The TP186781 and TP186782 stop clips were designed to block the function levers of unwanted functions from sensing their printer codebars (Figure 7). The installation of the TP186781 and TP186782 stop clips is as follows:

(1) The TP186781 function lever stop clip is a short clip and is used in the related function box numbered slot. That is, the clip is placed over the slot of the codebar basket tie bar which is in direct line with the numbered function box slot. The TP186782 function lever stop clip is a long clip and is placed over the related letter slots of the codebar basket (Figure 7).

(2) To enable automatic carriage return-line feed in a friction feed type unit, a stop clip is not provided over slot "A". When the function is to be disabled, the stop clip is placed over slot "A" of the codebar basket.

(3) To inactivate the automatic carriage return-line feed functions in a sprocket feed typing unit, a TP186872 stop clip is placed over the related slot "A" and also slot "L" of the codebar basket tie bar. The function lever in slot "A" performs the automatic carriage return function and the function lever in slot "L" performs the automatic line feed function.



Note: Characters and numbers in ( ) are not moulded in function box casting.

INSTALLATION OF FUNCTION LEVER STOP CLIPS

Figure 7 - Stop Clips to Block Unwanted Functions

(4) To activate the two functions for ACR-LF in sprocket feed units, the stop clips are removed.

Note: The TP186781 or TP186782 stop clips cannot be used on typing units incorporating the print-nonprint feature using the TP183565, TP183566, and TP183567 blocking bars in their codebar baskets.

(5) To enable the margin bell and end-of-line bell, a function lever stop clip is not provided in slot "F" of the codebar basket.

(6) To disable the margin bell and end-of-line bell, a function lever stop clip is placed over slot "F" of the codebar basket.

(7) If margin bell is required and no automatic carriage return-line feed and end-of-line bell is required, the TP186783 "A" codebar extension for friction feed units or TP186803 extension clip for sprocket feed units is removed. When end-of-line bell is a requirement, the margin bell is also a requirement. Both functions are operated from the same function lever.

Note: The stop clips may be used to block other function levers located in the right side of the codebar basket. The stop clips, if removed, should not be reused. A new clip should be installed.

3.05 The TP186873 stop plate is for ASR sets without tape reader trip magnet option, and for KSR and ASR sets without answer-back trip magnet option (Figure 8). Following are the installation procedures for the stop plate:

(1) The stop plate prevents the TP183098 tape reader clutch trip lever or the TP180843 answer-back trip lever from operating when either the reader trip or answer-back magnets and associated armature parts are absent.

(2) The stop plate is present only when there is no magnet with associated parts and may be replaced by one of three different voltage type magnets for reader or answer-back operation. The voltages of the magnets are 24 volts dc, 48 volts ac or dc, or 115 volts ac.

(3) The TP186873 stop plate is installed in either the reader trip lever magnet position or answer-back position or both (Figure 8).

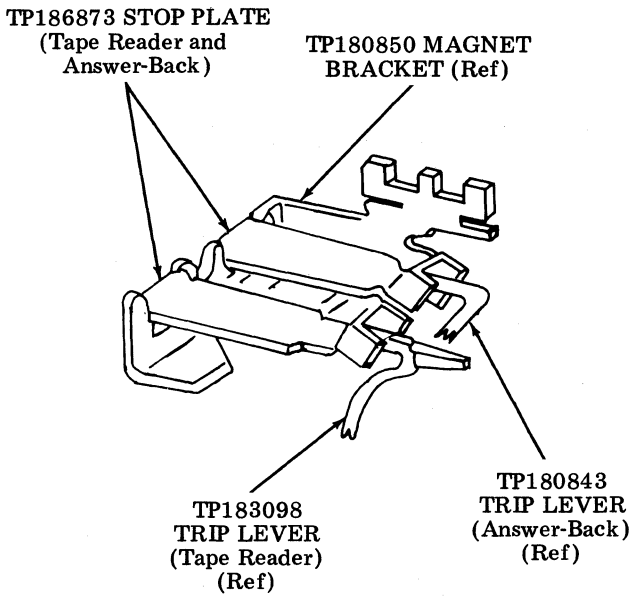


Figure 8 - Stop Plate for Tape Reader and Answer-Back Trip Levers

B. Call Control Unit

3.06 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, and a selector magnet driver circuit are some of its basic elements.

C. Keyboard

3.07 The keyboard is the sending component of the set. Each of its keys control an arrangement of levers which, in turn, position electrical contacts to represent ASCII characters with or without even parity. The keyboard output is a parallel output to the distributor of the typing unit. In half-duplex, 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. In full duplex the output is sent by the distributor to the distant station.

D. Tape Punch

3.08 The input to the tape punch is strictly mechanical. The tape punch is a slave of the typing unit; 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.

3.09 Some of the tape punches incorporate the customer activated option of automatic operation. The automatic option is activated by removal of the two factory installed disabling clips. The manual controls are not disabled and may still be used for operation or to override the automatic functions if desired. The automatic functions may be disabled by reinstalling the clips. Refer to Section 574-125-100TC for more detailed description and to Section 574-100-201TC for installation instructions.

E. Tape Reader

3.10 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 at the distributor in parallel form. The distributor then sends the code 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.

3.11 In some sets, the tape reader power pack is located in the call control unit and enclosed in the right side of the set cover. Optionally, the power pack may be mounted in the stand.

3.12 There is a choice of either manual or an automatic/manual tape reader in the 33 line (Figure 5). Refer to Section 574-124-100TC for the detailed description of the readers.

Note: When preparing tape, all functions (except information separators), such as form-out, carriage return, line feed, etc, must be followed by two fill characters such as delete. These fill characters are required to provide time for the desired function to occur.

4. SET FEATURES

4.01 Functions — Functions refer to non-printing operations performed by the set which are supplementary to its purpose of printing characters. All sets are equipped for the following 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 at end-of-line and 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.

NULL — The null function serves to suppress printing.

4.02 Even Parity Keyboard — The 33 Sets use seven intelligence pulses to accommodate the code combinations of ASCII. The remaining eighth pulse may be 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 an ASCII 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. The even parity feature may be disabled by the customer to present an always marking or always spacing condition in the 8th level.

4.03 Numeric Keyboard — As the name implies, this optional feature consists of a keyboard with a numeric arrangement. This restricts the set for specialized applications where the exchange of data is mainly of a numeric nature. The keyboard can, if necessary, accommodate a limited number of alpha characters and nonprinting functions such as carriage return, line feed, etc.

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

4.05 Automatic Carriage Return-Line Feed — 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. The forms are 8-1/2 inches wide and feed out in half- or full-page segments (5-1/2 and 11 inches). Additional options for form lengths are available. A total of 72 characters may be printed in a line on the form with 10 characters per inch. The set will accommodate three or six 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 (with data set only).

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 fixed form lengths.

4.08 Paper-Out Alarm (Sprocket Feed Only) — A set equipped with this feature and a data set 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 (customer provided) 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.

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

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

4.13 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.

4.14 Automatic Reader Control — An ASR station equipped with automatic reader control may have its reader activated from a distant station upon receipt of DC1 (formerly X-ON) and off on DC3 (formerly X-OFF).

4.15 Copyholder — The feature consists of a metal frame equipped with a line 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.

4.16 End-of-Transmission (EOT) — When equipped with this feature (data set or station controller required), 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.

4.17 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 feet, equipped with leveling screws or roller casters (optional modification kit), 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, speaker, ringer, buzzer, and rotary, TOUCH-TONE* or card dialers.

*Registered Trademark of AT&TCo.

5. TYPICAL OPERATION AND APPLICATION

Telephone or Telegraph Network System Operation

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 telephone or telegraph network communciation system (Figure 9). 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, 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.

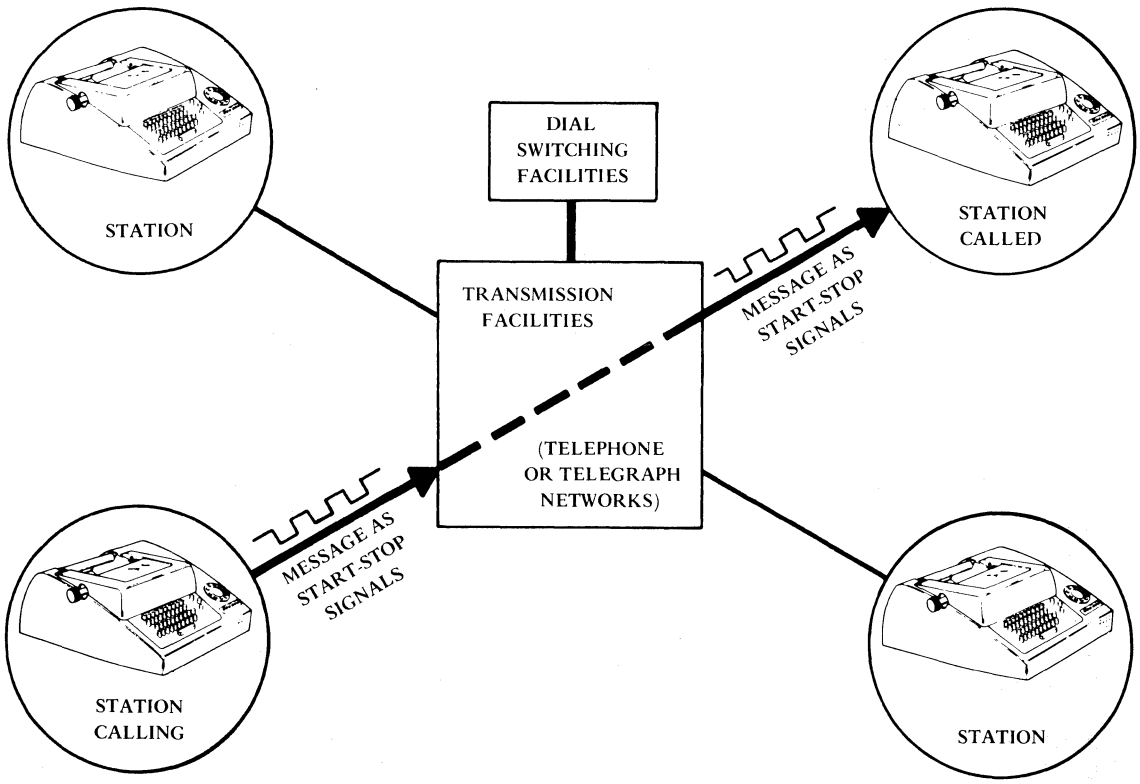


Figure 9 - Typical Applications

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, in conjunction with a data set, 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, in conjunction with a data set, or the pushbutton on the call control unit may be used.

6. TECHNICAL DATA

CAUTION: THIS EQUIPMENT IS INTENDED TO BE OPERATED IN A ROOM ENVIRONMENT WITHIN THE TEMPERATURE RANGE OF 40°F TO 110°F. SERIOUS DAMAGE TO IT COULD RESULT IF THIS RANGE IS EXCEEDED. IN THIS CONNECTION, PARTICULAR CAUTION SHOULD BE EXERCISED IN USING ACOUSTICAL OR OTHER ENCLOSURES.

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:

Start pulse . . . . . 1 unit of time
Intelligence pulses . . . . . 8 units of time
Stop pulses . . . . . 2 units of time
11-unit code

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%
either 60 or 50 hertz
±0.45 hertz, single phase

Signal Line Current . . . . 0.020 or 0.060 ampere

Nominal Input
to Selector . . . . . 0.500 ampere at 20 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 ampere at 16 to 22 volts dc resistive

6.05 Environmental Tolerances:

(a) The teletypewriter will operate under worst-case conditions within a temperature range of 40°F and 110°F; a relative humidity of 2 percent to 95 percent with the room air velocity between 5 and 55 feet per minute. Altitudes may vary from sea level to 10,000 feet.

(b) Storage temperatures may range from minus (-) 40°F to 150°F with altitudes up to 50,000 feet.