37 AUTOMATIC SEND-RECEIVE (ASR) TELETYPEWRITER SET

GENERAL DESCRIPTION

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1. GENERAL

1.01 This section provides a general description of the 37 Automatic Send-Receive (ASR) Teletypewriter Set (Figure 1). The 37 ASR Set generates data from a keyboard or tape reader and converts received data into printed copy and/or perforated tape.

1.02 A 37 ASR Set is a heavy-duty terminal that functions with the ASCII (American National Standard Code for Information Interchange) code. The set operates at 150 words per minute (wpm).

1.03 The styling and equipment are designed to complement modern office furnishings. The operator interface including keyboard layout and touch, quality of printed copy, and equipment noise is comparable to that of an office typewriter. The equipment has a modular design which permits rapid conversion from one type of set to another.

1.04 References to left or right, front or rear, top or bottom, etc, apply to the set in its normal position as viewed by the operator.

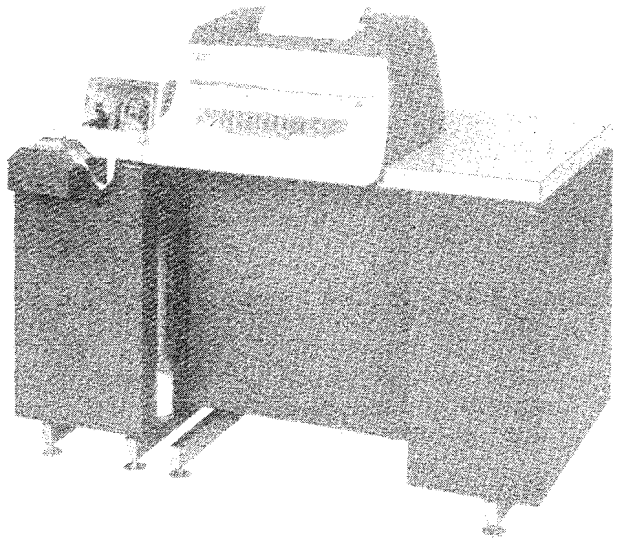

Figure 1 - 37 ASR Teletypewriter Set

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1.05 The 37 ASR Set originates data from its keyboard or tape reader in the form of voltage signals, ie, positive (+) voltage for spacing signals and negative (-) voltage for marking signals. Voltage signals received from a distant station or the local set, are used by the 37 ASR Set to copy the data on page size paper or business forms, and/or fully perforated paper tape.

2. DESCRIPTION

2.01 The ASR set is comprised of a keyboard send-receive unit and a reperforator-transmitter (RT) module. Figure 1 shows a typical set which consists of the following components:

Keyboard Send-Receive Unit:

Typing Unit
Keyboard
Control Panel
Motor Unit
Typing Unit Cover and Pan
Table
Electrical Service Unit

Reperforator-Transmitter Module:

Reperforator Unit
Reader Unit
Electrical Service Unit
Motor Units
Cabinet

STANDARD FEATURES

2.02 The following features are standard on ASR sets:

- Sends on-line from keyboard or tape reader.
- Receives through typing unit or reperforator unit.
- Sends and receives at the speed of 150 wpm (15 characters a second) with a 10-unit code transmission pattern.
- Generates all 128 ASCII code combinations with even parity.
- Receives all 128 ASCII code combinations — prints 94 graphics including upper and lower case alphabet.
- Seventy-two characters on a line (10 per inch). Craftsman adjustable for shorter or longer lengths up to 80 characters.
- End of printed line indication (lamp) which is craftsman adjustable.
- On-line backspace.
- On-line carriage return and line feed.
- Local reperforator backspace.
- Local carriage return.
- Local paper feed-out.
- Operator control of multiple copy.
- Operator control of vertical spacing.
  (a) 3 lines per inch.
  (b) 6 lines per inch.
- Local reader character advance.
- Roll paper (friction feed sets) or fan-folded, form-feed paper with marginal perforations (sprocket feed sets).
- Print position indicator (next character indicator).
- Print position scale.
- Low-tape alarm (lamps).

VARIABLE FEATURES

2.03 In addition to the standard features, certain options and accessories can be obtained which provide the following variable features:

- Interfacing that conforms with EIA standards.
- Two-color printing.
- Printed graphics extension.
- On-line horizontal tab set and clear.
- On-line vertical tab set and clear.
- Half-forward, half-reverse, and reverse line feed.
- Carriage return on receipt of VT or FF characters.
- Operating speed of 100 wpm (10 characters a second) with an 11-unit code transmission pattern.
- Dedicated half-duplex, dedicated full-duplex, or line control of home copy.
- Power tape handling winder or winder-unwinders.

- Tape storage bin.
- Answer-back triggered either automatically or manually.
- Keyboard transmission blinded on NAK character, unblinded on ACK character
- Disconnect capability on EOT character.
- Incorrect vertical parity indication.
- Parity sensitive control functions — vertical parity required on all control functions.
- Character repeat feature — craftsman adjustable.

  Note: This feature is normally disabled on all keys except the following:

Space	Period (.)
NEW LINE	Hyphen (-), Equal (=)
BACKSPACE	Underscore (_)
NULL	Colon (:), Asterisk (*)
DELETE	Character X

- Alarm indication for low-paper (friction feed sets) or paper-out condition (sprocket feed sets).
- Carriage return and line feed on NEW LINE character.
- Form advance (form-out).
- Vertical tabulation (craftsman adjustable).
- Horizontal tabulation (craftsman adjustable).
- Wide platen typing unit to accommodate 14-7/8 inch computer paper.
- Automatic carriage return at end-of-line.
- Print suppression.
- Electronic signal generator.
- Typing reperforator.
- "Character received" contact mechanism.
- Code reading contacts.

KEYBOARD SEND-RECEIVE UNIT COMPONENTS

A. Typing Unit

2.04 The typing unit (Figure 2) receives information serially by means of a single magnet (two coils) type of selector. A function box is provided for character and character sequence recognition.

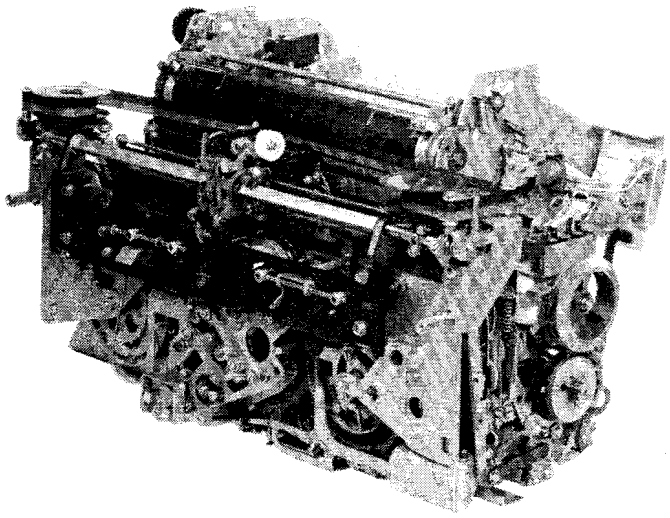


Figure 2 - Typical Typing Unit

2.05 Page copy is provided by the typing unit which prints both upper and lower case characters utilizing a typebox positioned by an aggregate motion mechanism. The typebox is moved from character to character and is returned to its retracted position when reception stops, thus, making all characters visible when the machine is idle.

2.06 The typing unit is capable of printing symbols for all 128 ASCII characters. Normally, however, it will be arranged to print the 94 graphic, numeric, and alpha characters of the ASCII code.

2.07 Normally the typing unit will print ten characters per inch allowing 72 characters on an 8-1/2 inch platen with normal margins on the paper. Optionally, other typing units may be arranged to print 80 characters. Line feed provides for spacing six lines per vertical inch.

2.08 A special wide platen typing unit is also available. It accommodates standard 14-7/8 inch wide computer paper and prints 132 characters per line at 10 characters per inch. A 12 character per inch option allows up to 163 characters per line.

2.09 Two types of paper feed options are available.

(a) The friction feed typing unit accommodates roll paper widths of 3 to 8-1/2 inches and can provide multiple copies consisting of one original and up to two carbons.

(b) The sprocket feed typing unit accommodates paper 11 inches long and 9-1/2 inches wide. One-half inch is needed on each side of a page to allow for sprocket holes. The typing unit can provide multiple copies consisting of one original and up to five carbons.

2.10 All typing units are equipped with line feed and carriage return (both on-line and local), on-line backspace, and craftsman adjustable margins.

2.11 Optional paper positioning controls are provided for either friction feed or sprocket feed typing units:

(a) Form-Feed — When the typing unit detects the form-feed character, it will position the paper for printing on the first line of the next page. Pages approximately 15 inches in length, adjustable by a craftsman, may be accommodated. The typing unit form feeds three lines during one character interval. Form feed will not function when the paper is positioned to print on the first line of the form.

(b) Horizontal Tabulation — This feature is a fixed tabulator stop type. The fixed stops are set by a craftsman to customer specifications.

(c) Vertical Tabulation — This feature is a fixed tabulator stop type. The fixed stops are set by a craftsman to customer specifications.

(d) Horizontal Tab Set and Clear — This is an on-line feature used to set and clear tabulation stops in the typing unit horizontal tabulation mechanism. The characters ESC 1 are used to set tabulator stops and the characters ESC 2 are used to clear the stops.

(e) Vertical Tab Set and Clear — This is an on-line feature used to set and clear the tabulation stops in the typing unit vertical tabulation mechanism. The characters ESC 5 are used to set the tabulator stops and the characters ESC 6 are used to clear the stops.

B. Keyboard

2.12 A 4-row keyboard configuration (Figure 3) is used. The keytop arrangement is consistent with a standard office typewriter (Figure 4), but certain keytop designations may vary slightly for system requirements.

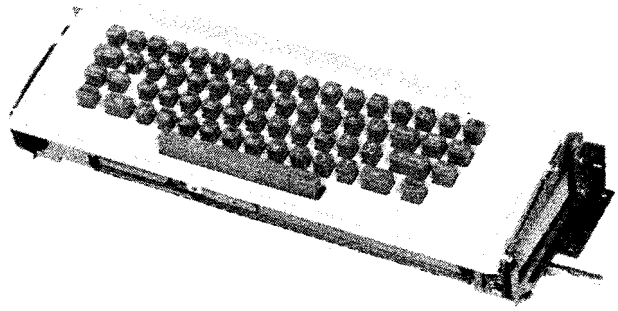


Figure 3 - Typical Keyboard

2.13 The keyboard is an electromechanical device for generating ASCII code combinations. It converts the mechanical depression of a key into electrical code paths. Keys move codebars which control electrical contacts. The electrical contacts present a parallel wire output to a keyboard control logic card and a distributor card in the electrical service unit, which converts the signals into a serial output with even vertical parity.

2.14 It is possible to generate all 128 code combinations of ASCII. Upper and lower case alpha characters, numerics, and special graphic characters are designated on the keytops. Control characters are designated on the keyboard in two ways. The most often used controls appear on separate keys and are active

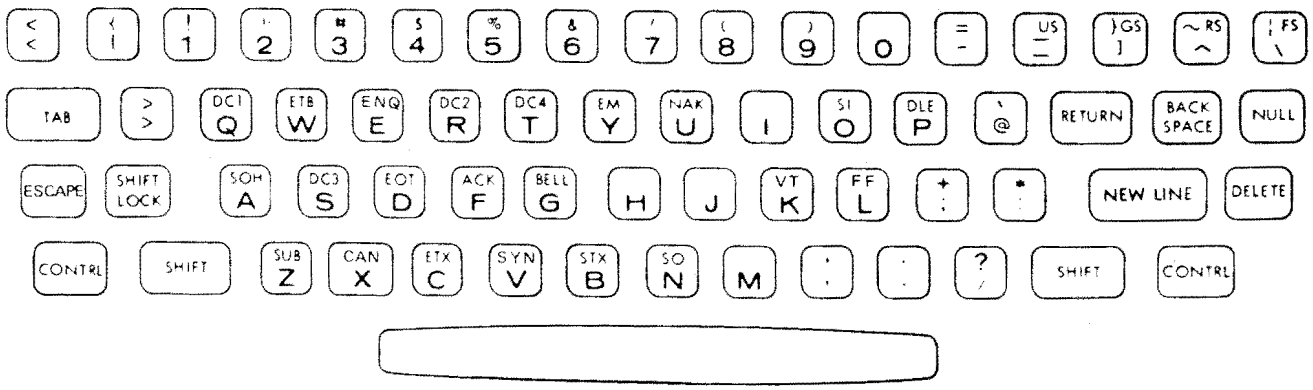


Figure 4 - Typical Keyboard Arrangement

in both the shifted and unshifted conditions without use of the CONTRL key. Another group of controls appear on the same keytop with a graphic. To generate these code combinations, it is necessary to depress the CONTRL key while the particular key is struck. All control character designations requiring the depression of the CONTRL key, as well as the individual key, are printed on the keytops in charcoal grey.

2.15 A repeat feature is provided on each key generating a character. Further depression of the key beyond its normal stop position will cause the associated character to be generated repetitively at the maximum character rate. The repeat feature can be enabled or disabled by a craftsman.

C. Base

2.16 The base provides mounting facilities for the typing unit, motor unit, and intermediate gear assembly. Holes are also provided on the base for mounting the keyboard reset mechanism and printer margin indicator switch.

D. Control Panel

2.17 The control panel which is located above the keyboard contains a number of nonlocking pushbuttons. In addition, there are two mechanical pushbuttons designated PAPER ADVANCE and LOCAL RETURN. The designations on the nonlocking pushbuttons vary according to customer requirements. The pushbuttons, in general, reflect the condition of the set or components, or cause certain components to become operational.

E. Motor Unit

2.18 The function of the motor is to provide electromechanical rotating motion for operating the typing unit and keyboard reset mechanism.

2.19 The motor is a synchronous-type, rated at 1/20 horsepower, and is operated from a 115 volt $\pm 10\%$ ac, single phase, 60 hertz $\pm 0.75\%$ source of commercial power. It consists of a 2-pole wound stator with two windings (a main running winding and a start winding), and a ball bearing rotor. In addition, the motor is protected by a start relay, capacitor, and thermal cutout switch which are mounted in a compartment of the motor mounting cradle.

F. Typing Unit Cover and Pan

2.20 The typing unit cover and pan includes copylights and provides the housing for the typing unit, keyboard and base, motor, and control panel. The cover and pan with assembled components normally mounts onto a table.

2.21 The cover is hinged to the pan and can be easily removed, or it may be raised and extended over interior components while maintenance is being performed.

2.22 Two lids at the top of the cover provide access to the typing unit for ribbon changing, replenishing paper supply, adjusting print hammer for multiple copy, etc.

G. Table

2.23 The table provides a mounting surface for the typing unit cover and pan and the other components which the cover and pan

houses. In addition, a compartment of the table provides facilities for mounting the electrical service unit including the utility strip. The ac power for the set components is obtained from the utility strip when its ac power cord is plugged into a commercial source of power.

2.24 Three optionally available tables may be obtained: A double-compartment table and two single-compartment tables which differ primarily in overall depth dimension (Figure 10).

H. Electrical Service Unit

2.25 The electrical service unit (Figure 5) consists of a chassis assembly and a utility strip which mount into the lower part of the knee well of the table. The chassis assembly has a multivoltage power supply, a wiring field, and is equipped with card connectors. A set of circuit cards is selected for a given arrangement to provide set logic. The cards mount into the card connectors.

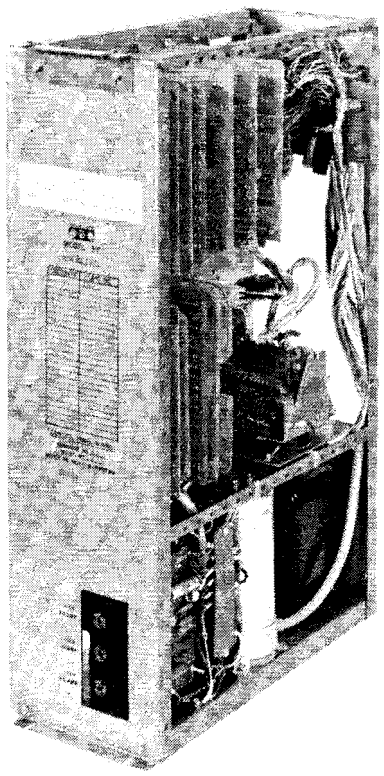


Figure 5 - Typical Electrical Service Unit

2.26 Wiring from the card connectors terminates at the wiring field which provides a centralized wiring location for the set. A cable assembly with several plugs also terminates at the wiring field. The plugs connect to the typing unit, keyboard and base, control panel, copylights, etc. An interface connector provides a signal interchange point.

TYPICAL CIRCUIT CARD SETS

Cards in Keyboard Send-Receive Unit	Quantity
Mode Control (150 wpm)	1
Receive Device Control	1
Receive Control	1
Alarms (or alarms and automatic control)	1
Keyboard Control	1
Distributor	2
Character Counter	1
Send Control	1
Channel Control	1
Cards in RT Module	**Quantity**
Receive Device Control	1
Reader Driver	1

2.27 A power cord from the chassis assembly plugs into one of the six ac power receptacles of the utility strip. The ac power for the set is provided over a single ac power cord which terminates at one of the two utility strip terminal boards, and is controlled by a circuit breaker.

2.28 A bell assembly, copylight transformer, and motor control relay are also a part of the utility strip and derive their power from the multivoltage power supply in the chassis through a second utility strip terminal board.

2.29 The multivoltage power supply converts ac power into appropriate dc power which is used for internal set operation, ie, the solenoids, lamp driver amplifiers, motor control relay, bell, integrated and discrete semiconductor circuits, etc.

REPERFORATOR-TRANSMITTER MODULE COMPONENTS

A. Reperforator Unit

2.30 The reperforator unit (Figure 6) receives data in serial pulses. It uses a single magnet two-coil selector to convert pulses into

corresponding perforations in fully perforated tape.

2.31 There are two types of reperforators, typing and nontyping. A type wheel on the typing reperforator provides printed copy on the tape of the characters perforated in the tape. Associated with the typing reperforator is a VIEW LAST CHARACTER pushbutton, which is added to the RT module control panel. This is a feature that allows the operator to view the last character printed on the tape.

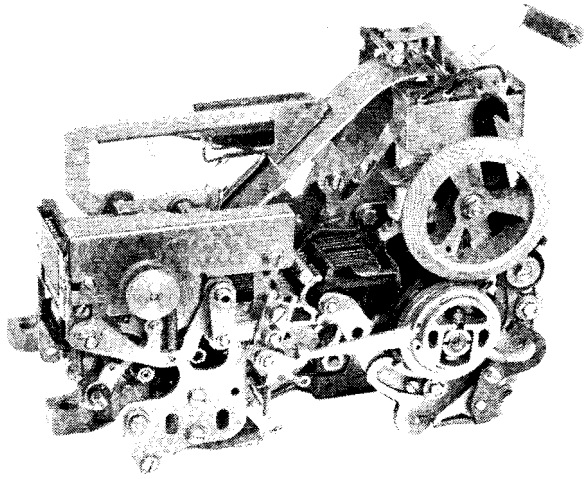


Figure 6 - Typical Reperforator Unit

2.32 All reperforators are equipped with a manual interfering tape feed-out mechanism to simplify tape loading. The TAPE ALARM pushbutton on the RT module control panel lights whenever tape in the reperforator is out. The PUNCH BACK SPACE pushbutton causes the tape in the reperforator to backspace one character each time it is depressed. This device permits backspacing the tape to eliminate erroneous data by overpunching with delete characters.

B. Reader Unit

2.33 The reader unit (Figure 7) is an electromechanical device used to convert perforations in tape into corresponding parallel electrical pulses.

2.34 There are two types of readers. One reader is equipped with a manual control lever which has three positions: RUN (operating position); STOP (off position); and FREE (free wheeling tape threading position). Another reader is controlled by pushbuttons in the RT module control panel instead of by a control lever on the reader.

2.35 The TAPE ALARM indicator on the control panel lights whenever the reader tape is out, tight, twisted, or bunched. The READER STEP pushbutton advances the tape through the reader one character each time it is depressed.

C. Electrical Service Unit

2.36 The electrical service unit used in the RT module contains a wiring field and circuit cards required to control the reperforator and the reader units, interconnecting control and power cables, and a control panel.

2.37 The control panel (Figure 8) provides six pushbutton and indicator lamp positions for operating the reperforator and reader units.

D. Motor Units

2.38 The RT module includes two motor units. One is used to drive the reperforator and is identical to the typing unit motor unit (2.19). The reader unit is driven by a synchronous-type motor developing 25 millihorsepower operating at a speed of 1800 rpm. It uses 115 volts $\pm 10\%$ ac, single phase, 60 hertz $\pm 0.75\%$ power source.

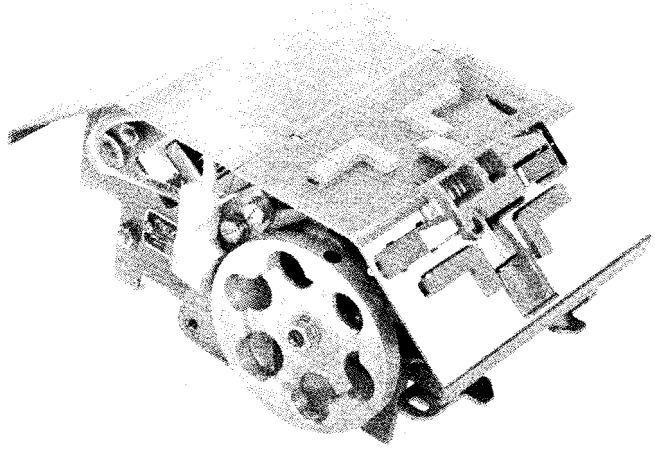


Figure 7 - Typical Reader Unit

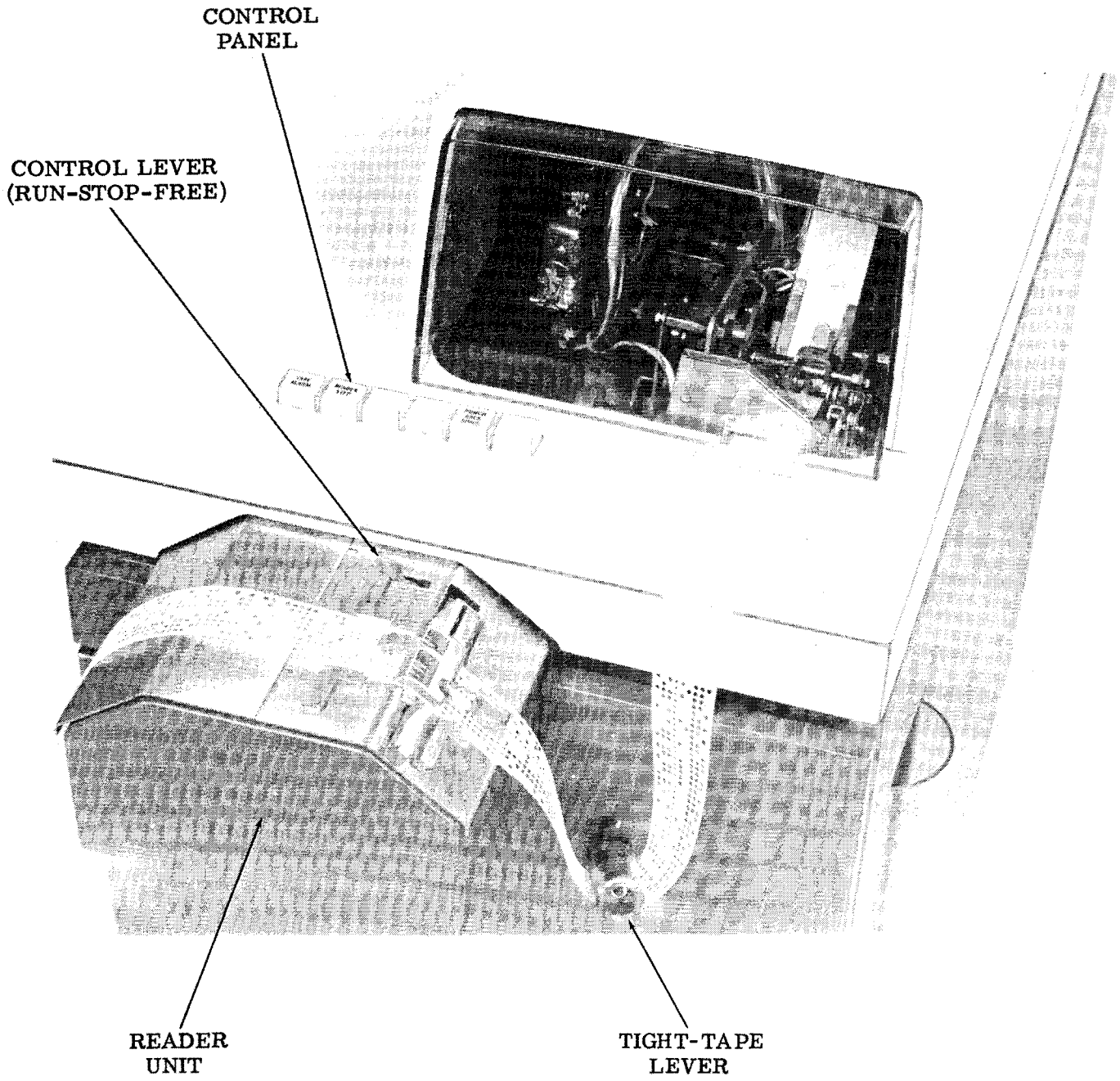


Figure 8 - RT Module Controls

E. RT Module Cabinet

2.39 The tape module cabinet provides mounting and operating facilities for the reperforator unit, reader unit, electrical service unit, motor units, and bases. It includes a hinged cover with a clear window for access to the reperforator unit and tape supply container. A chad disposal tube is provided also.

2.40 A reader base is fastened to a mounting bracket in the cabinet with vibration mounts. A toothed belt and pulley are used in conjunction with the motor unit to drive the reader unit.

2.41 The cabinet includes a reperforator mounting plate for installing the reperforator unit and motor unit. A tape supply

container with a low-tape alarm switch, and connecting cable are included with the reperforator base.

2.42 The cabinet door encloses the electrical service unit compartment. The door is normally plain, but the door optionally may be equipped with either one power tape winder or a combination of a winder and unwinder. Switches are provided on the door to control the tape winders (Figure 9).

ACCESSORIES

A. Answer-Back Assembly

2.43 The answer-back assembly provides for automatically transmitting a maximum of 20 characters for set identification. The assembly consists of a mechanism, an electronic circuit, and a mounting arrangement.

2.44 The mechanism (answer-back unit) has a magnet assembly which, each time it is pulsed and released, moves a 20-character codeable drum. Contact wires ride tines of the drum. The electronic circuit (answer-back driver card) drives the magnet and provides read-out for the contacts.

B. Paper Handling Accessories

2.45 A number of paper handling accessories are available for sets with sprocket feed typing units. Modification kits are available for either front or rear loading of a standard box of paper forms. Front loading of forms can be used for forms up to 14 inches in length. Forms approximately 14 to 15 inches long can be loaded from the rear of the table. A form accumulator is also available as an accessory if desired.

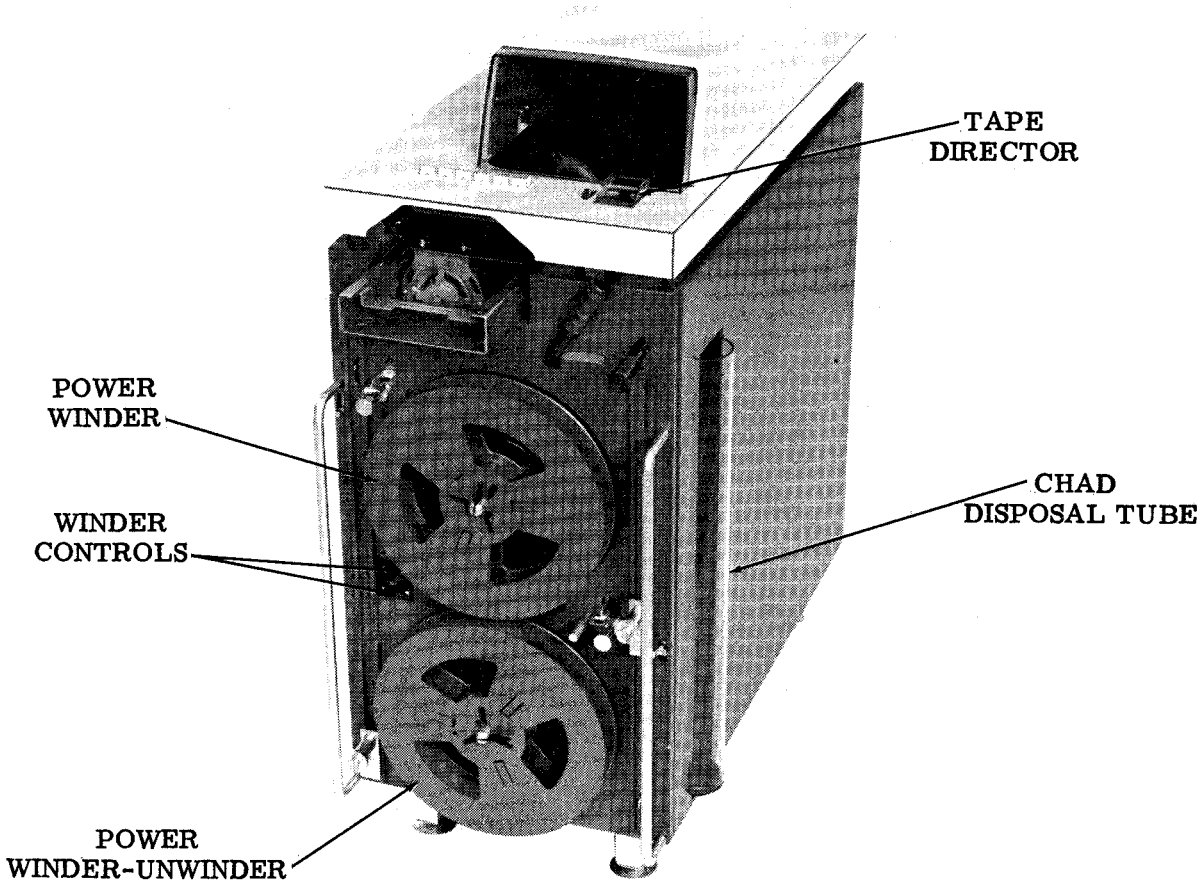
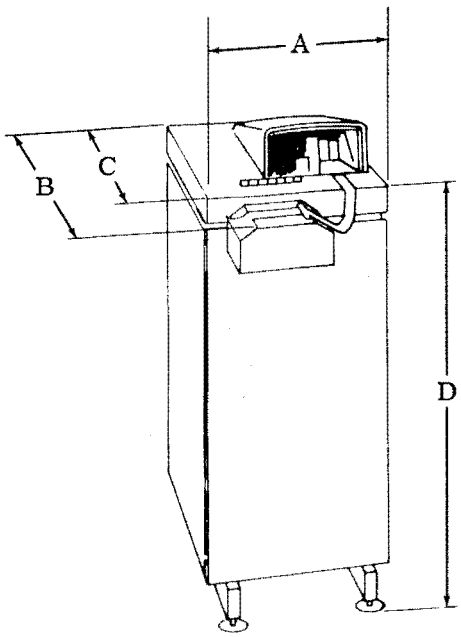
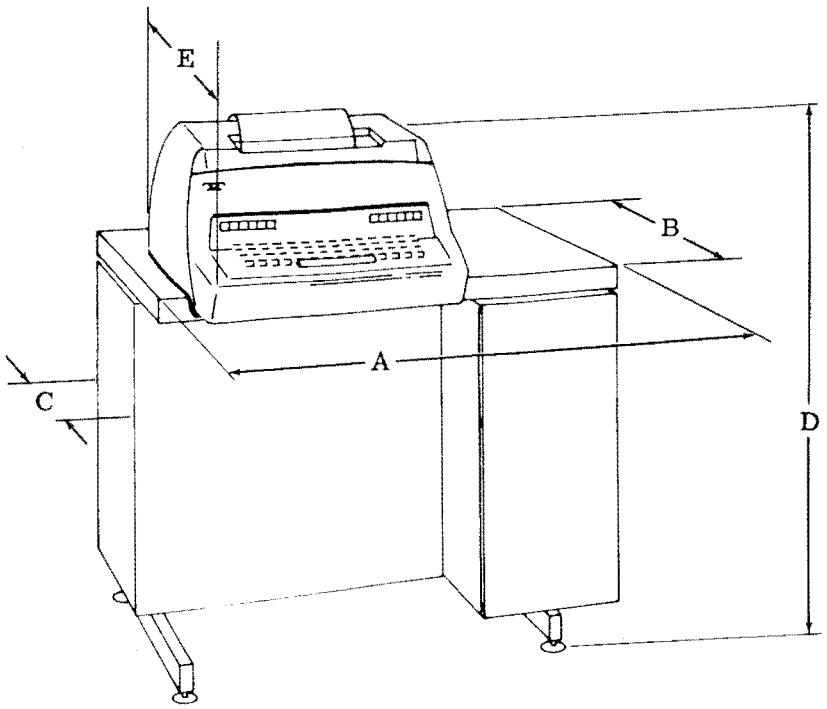


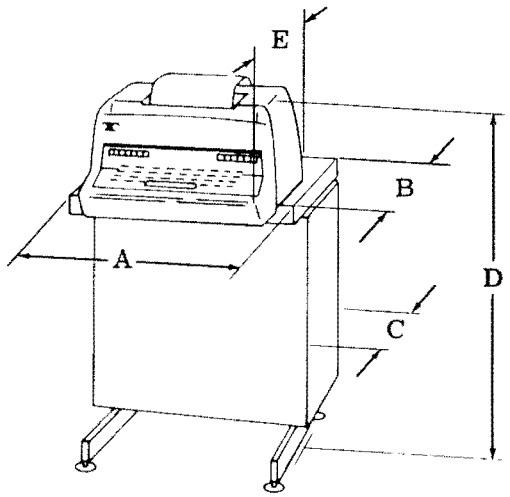
Figure 9 - Tape Handling Accessories



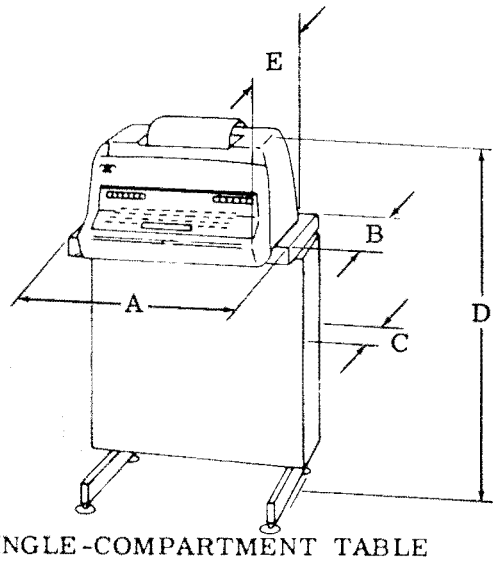
RT MODULE CABINET



TWO-COMPARTMENT TABLE



SINGLE-COMPARTMENT TABLE
(Standard Depth)



SINGLE-COMPARTMENT TABLE
(Narrow Depth)

DIMENSION	RT MODULE (INCHES)	TWO-COMPARTMENT (INCHES)	SINGLE-COMPARTMENT (STD DEPTH) (INCHES)	SINGLE-COMPARTMENT (NARROW DEPTH) (INCHES)
A	12	32-1/2	22-1/2	22-1/2
B	26-3/4	23	23	17-1/8
C	23	14-1/2	14-1/2	8-5/8
D	26-1/2	36	36	36
E	-	27-3/8	27-3/8	21-1/2

Figure 10 - 37 ASR Set Dimensions

C. Tape Handling Accessories

2.46 The tape module may be equipped with a power winder or winder-unwinder combination (Figure 9). These devices have a capacity of approximately 1000 feet. Separate control switches are provided. The single reel winder and the upper of the dual winders is used for reader tape winding. The lower winder is used to wind tape from the reperforator or can be used as a power unwinder to feed tape to the reader. With both winders available, the lower winder can provide fast reel to reel rewinding or power unwinding from a message reel to the reader unit.

2.47 An optional 75 foot capacity tape storage bin and tape director is also available for use with the RT module.

3. TECHNICAL DATA

3.01 Electrical and Environmental Characteristics

(a) Power . . . . . 115 volts ac ±10%, 60 Hz ± 0.45 Hz, 15 ampere fused circuits, single phase (3-wire)

(b) Ambient temperature . . . . From 40° F to 110° F

(c) Ambient relative humidity . . . . . From 0 to 95 percent

3.02 Physical Characteristics

(a) Dimensions . . . . . See Figure 10

(b) Weight (both modules) . . . . . 325 pounds

(c) Power cord

Purpose . . . . . Provides ac power for entire set

Type . . . . Single 3-pin polarized cord

Length . . . 8 feet from back of cabinet

Note: A similar cable supplies power to the RT module.

(d) Intercabinet cable

Purpose . . . . . Interconnects set logic

Length . . . . . 4 feet

(e) Interface cord

EIA type . . . . . 25-conductor plug

Length . . . . . 6 feet

Non-EIA . . . . . Variable plug

3.03 Set Internal Power Supply

(a) Multivoltage power supply

Output voltages . . Nominal + 12.5 volts 6 amperes
Nominal - 12.5 volts 3 amperes
Nominal + 5.25 volts 3 amperes
12 volts ac

(b) Utility Strip

Output voltages . . . . . 115 volts ac
5.5 volts ac (for copylights)

4. REFERENCES

4.01 Information to supplement the set section may be found in related component literature. (See reference list.) Differences in sets due to specific station arrangements are covered in the appropriate station section. The Bell System Teletypewriter Catalog and the Bell System Teletypewriter Station Engineering Arrangements also contain related information.

4.02 Reference List:

ASR SET

Removal and Replacement of Components	574-302-702

TYPING UNIT

Description and Principles of Operation	574-320-101
Wiring Diagrams	574-320-400
Adjustments	574-320-703
Lubrication	574-320-704
Disassembly and Reassembly	574-320-705
Parts	574-320-800