

37 AUTOMATIC SEND-RECEIVE (ASR) TELETYPEWRITER SET
 FOR SWITCHED NETWORK SERVICE
 GENERAL DESCRIPTION AND OPERATION

CONTENTS	PAGE	CONTENTS	PAGE
1. GENERAL	2	LOCAL OPERATION	16
2. DESCRIPTION	2	A. Device Selection	16
STANDARD FEATURES	2	B. Motor Control	16
VARIABLE FEATURES	3	C. Message Exchange	16
KEYBOARD SEND-RECEIVE		LINE OPERATION	16
UNIT COMPONENTS	3	A. Device Selection	16
A. Typing Unit	3	B. Channel Establishment	19
B. Keyboard	4	C. Message Exchange	19
C. Base	5	CHANNEL TERMINATION	19
D. Control Panel	5	SIMULTANEOUS LOCAL-LINE	
E. Motor Unit	5	OPERATION	19
F. Typing Unit Cover and Pan	5	5. REFERENCES	19
G. Table	9		
H. Electrical Service Unit	9		
REPERFORATOR-TRANSMITTER			
MODULE COMPONENTS	10		
A. Reperforator Unit	10		
B. Reader Unit	10		
C. Electrical Service Unit	10		
D. Motor Units	10		
E. Tape Module Cabinet	10		
ACCESSORIES	12		
A. Answer-Back Assembly	12		
B. Paper Handling Accessories	13		
C. Tape Handling Accessories	13		
3. TECHNICAL DATA	13		
4. OPERATION	15		
GENERAL	15		
PERIPHERAL INTERFACE	15		
CHANNEL INTERFACE	16		

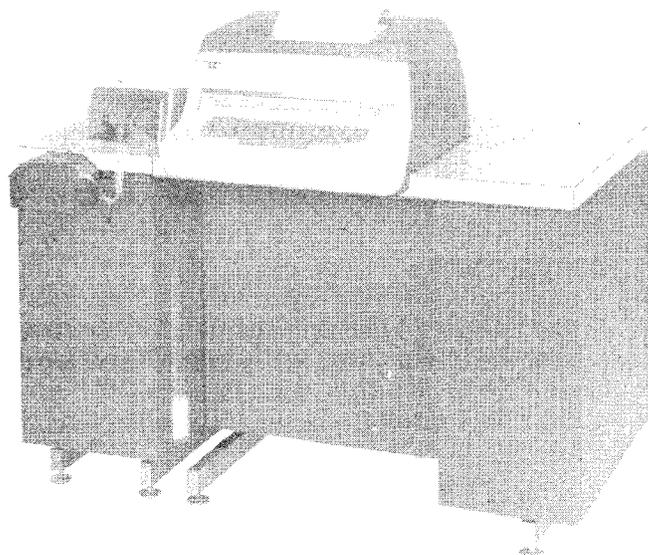


Figure 1 - 37 ASR Teletypewriter Set

1. GENERAL

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

1.02 A 37 ASR set is a heavy-duty terminal that functions with the ASCII (United States of America Standard Code for Information Interchange) and has Electronics Industries Association (EIA) Specification RS-232B interfacing. Sets can optionally be obtained which operate at speeds of either 100 or 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.

1.05 The 37 ASR set originates data through its keyboard or tape reader in the form of voltage signals, ie, positive (+) voltage for spacing signals and negative (-) voltage for marking signals. These voltages are converted into voice frequency tones by a data set for transmission over communication lines. Received data, in the form of voice frequency tones, is converted into voltage signals by a data set. The voltage signals are used by the 37 ASR set to copy the data on page size copy paper or business forms and/or communications 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-Receiver Unit
Typing Unit
Keyboard
Control Panel
Motor Unit
Typing Unit Cover and Pan
Table
Electrical Service Unit

Reperforator-Transmitter (RT) Module
Reperforator Unit
Reader Unit
Electrical Service Unit
Motor Units
Cabinet

STANDARD FEATURES

2.02 The following features are standard on ASR sets:

- Modern modular design.
- Interfacing which conforms with EIA Specification RS-232B.
- Sends on-line through 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 characters with even parity.
- Receives all 128 ASCII characters - prints 94 graphics including upper and lower case alphabet.
- Seventy-two characters on a line (10 per inch). Technician adjustable for shorter or longer lengths up to 80 characters.
- End of printed line indication (lamp) which is technician adjustable.
- On-line backspace.
- On-line carriage return and line feed.
- Local reperforator backspace.
- Local carriage return.
- Local paper feed-out.
- Single color printing.
- 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 flat-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 above standard features, certain options and accessories can be obtained which provide the following variable features:

- Two-color ribbon
- Printed graphics extension.
- Horizontal tabulation stop control.
- Vertical tabulation stop control.
- Half, forward and reverse line feed.
- Nonrepeat form feed.
- Carriage return on receipt of line feed, VT, or FF characters.
- Optional operating speed of 100 wpm (10 characters a second) with an 11-unit code transmission pattern.
- Optional dedicated half-duplex, dedicated full-duplex, or line control of home copy.
- Optional power tape handling winder or winder-unwinders.
- Optional tape storage bin.
- Answer-back triggered either automatically from data set, upon receipt of ENQ character, or manually with HERE IS pushbutton.
- Keyboard transmission blinded on NAK character, unblinded on ACK character.
- Disconnect capability on EOT character.
- Incorrect vertical parity indication.
- Parity sensitive control functions.

Note: Vertical parity is required on following control functions:

- (a) Carriage Return (CR)
- (b) Backspace (BS)
- (c) End of Transmission (EOT)
- (d) Bell (BEL)
- (e) Answer-Back Start (ENQ)
- (f) Print Suppression on ESCAPE (ESC)
- (g) Keyboard Blind (NAK)
- (h) Keyboard Unblind (ACK)
- (i) Full-Duplex Mode Shift (ESC:)
- (j) Half-Duplex Mode Shift (ESC;)
- (k) Horizontal Tabulation (HT)
- (l) Vertical Tabulation (VT)
- (m) Form Advance (Feed) (FF)

- Character repeat feature — technician adjustable

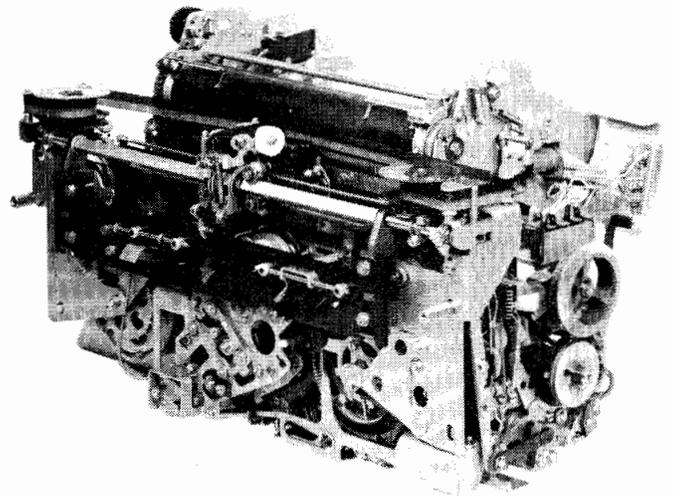


Figure 2 - Typing Unit

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 (technician adjustable).
- Horizontal tabulation (technician adjustable).
- Eighty-six characters on a line (12 per inch).

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.

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 "home" 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 12 characters per inch allowing 86 characters on an 8-1/2 inch platen with normal margins on the paper. Line feed provides for spacing six lines per vertical inch.

2.08 Two types of paper feed options are available:

(a) A typing unit arranged for friction feed is capable of accommodating roll paper widths of 3 to 8-1/2 inches and capable of providing multiple copies of one original and two carbons.

(b) A typing unit arranged with sprocket feed is capable of handling sprocket feed 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 is capable of providing multiple copies consisting of one original and up to five carbons.

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

2.10 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 up to 15 inches in length, adjustable by a technician, may be accommodated. The typing unit form feeds

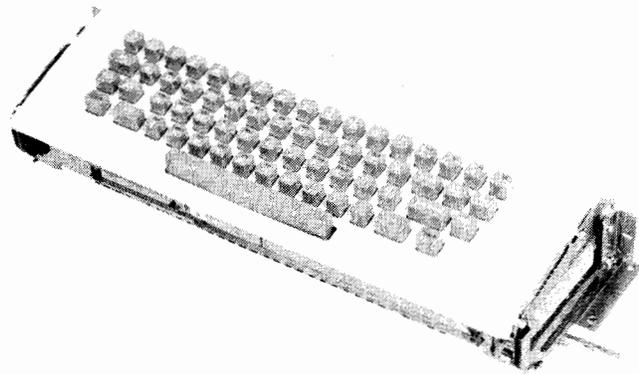


Figure 3 - Keyboard

three lines during one character interval. Two successive form feeds are prevented unless there has been an intervening line feed.

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

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

(d) Horizontal Tabulation Stop Control — 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 Tabulation Stop Control — 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

2.11 A standard 4-row keyboard configuration (Figure 3) is used. The keytop arrangement is consistent with a standard office typewriter (Figure 4).

2.12 The keyboard is an electromechanical device for generating ASCII code combinations. It converts the mechanical depression

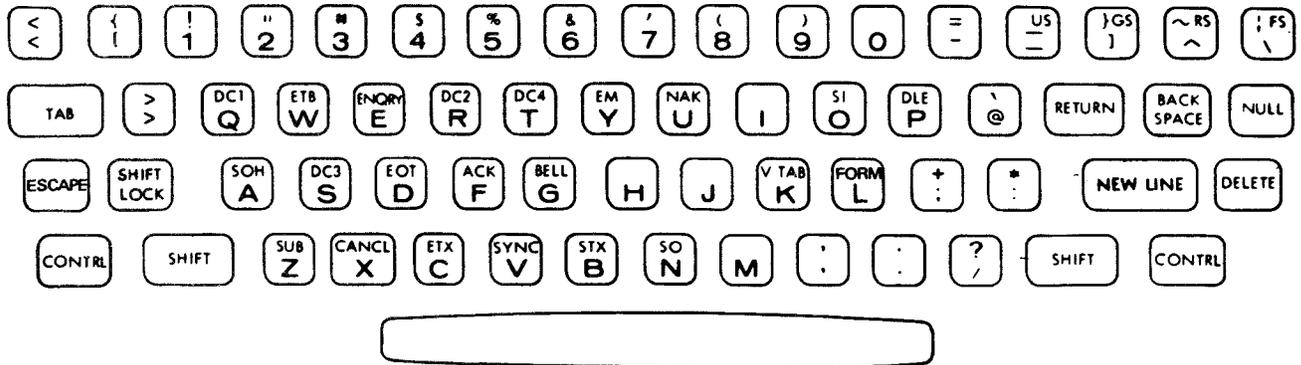


Figure 4 - Keyboard Arrangement

of a key into electrical code paths. Keys move codebars which control electrical contacts. The electrical contacts present an even vertical parity parallel wire output to a keyboard control logic card in the electrical service unit which converts the signals into ASCII.

2.13 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 in both the shifted and unshifted modes 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, appear on the keyboard in charcoal grey.

2.14 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 technician.

C. Base

2.15 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 margin indicator switch.

D. Control Panel

2.16 The control panel (Figure 5) which is located above the keyboard contains a number of nonlocking pushbuttons (keys). In addition, there are two mechanical pushbuttons (keys) designated PAPER ADVANCE and LOCAL RETURN. The three different arrangements available to meet varying applications are shown in Figure 5. Functional descriptions of the different controls, and the locations of controls within each arrangement, are given in Table A.

E. Motor Unit

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

2.18 The motor is a synchronous-type, rated at 1/20 horsepower, and is operated from a 117 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. The start winding is in series with 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

2.19 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.

ARRANGEMENT 1

READER AUTO	KBD LOCAL	PRINTER LOCAL	READER LOCAL	PUNCH LOCAL	PUNCH ON	PAPER ADVANCE
----------------	--------------	------------------	-----------------	----------------	-------------	------------------

(Left-Side Pushbuttons)

LOCAL RETURN	INTRPT	PROCEED	HERE IS	KBD EOL	ALARM	PTR EOL
-----------------	--------	---------	------------	------------	-------	------------

(Right-Side Pushbuttons)

ARRANGEMENT 2

INTRPT	PROCEED		HERE IS		READER AUTO	PAPER ADVANCE
--------	---------	--	------------	--	----------------	------------------

(Left-Side Pushbuttons)

LOCAL RETURN		OUT OF SERVICE	ERROR	KBD EOL	PAPER ALARM	PTR EOL
-----------------	--	-------------------	-------	------------	----------------	------------

(Right-Side Pushbuttons)

KBD LOCAL	PRINTER LOCAL	READER LOCAL	PUNCH LOCAL	PUNCH ON	
--------------	------------------	-----------------	----------------	-------------	--

(Center Pushbuttons)

ARRANGEMENT 3

PUNCH ON	PUNCH LOCAL	READER LOCAL	PRINTER LOCAL	KBD LOCAL		PAPER ADVANCE
-------------	----------------	-----------------	------------------	--------------	--	------------------

(Left-Side Pushbuttons)

LOCAL RETURN	INTRPT	HERE IS	PROCEED	KBD EOL	PAPER ALARM	PTR EOL
-----------------	--------	------------	---------	------------	----------------	------------

(Right-Side Pushbuttons)

Note: Center pushbuttons are not used in arrangements 1 and 3.

Figure 5 - Control Panel Arrangements

TABLE A
CONTROLS DESCRIPTION

CONTROL (Figure 5)	ARRANGE- MENT NO.	EQUIPPED WITH		DESCRIPTION
		KEY	LAMP	
READER AUTO	1, 2	YES	YES	When this key is depressed and lamp is on, the reader may be controlled by certain control characters. Reader and typing unit must both be on-line, or off-line when key is depressed and Data Set Ready lead must be turned on. If any of these conditions are not met the lamp extinguishes.
KBD LOCAL	1, 2, 3	YES	YES	When lamp is on, keyboard is in local mode. When lamp is off, keyboard is on-line. Operation of the switch transfers the mode.

TABLE A
CONTROLS DESCRIPTION (continued)

CONTROL (Figure 5)	ARRANGE- MENT NO.	EQUIPPED WITH		DESCRIPTION
		KEY	LAMP	
PRINTER LOCAL	1, 2, 3	YES	YES	When lamp is on, typing unit is in local mode. When lamp is off, typing unit is on-line. Depressing the switch transfers the mode.
READER LOCAL	1, 2, 3	YES	YES	When lamp is on, reader is in local mode. When lamp is off, the reader is on-line.
PUNCH LOCAL	1, 2	YES	YES	When this key is depressed the lamp lights and the reperforator is enabled for local operation. When reperforator is on-line, lamp is extinguished. Reperforator can receive signals from transmitting devices which are in the same mode if PUNCH ON lamp is on. Operation of the switch transfers the mode.
PUNCH ON	1, 2, 3	YES	YES	The reperforator is unblinded when this lamp is on. Operation of this switch, or detection of control characters unblind the punch.
PAPER ADVANCE	1, 2, 3	YES	NO	When this key is held depressed the typing unit feeds out paper until the key is released. This key has no effect on line signals.
LOCAL RETURN	1, 2, 3	YES	NO	When this key is momentarily depressed it causes the local typing unit typebox carriage to return for starting a new line. This key has no effect on line signals.
INTRPT	1, 2, 3	YES	NO	When key is momentarily depressed, it causes a timed spacing signal (BREAK) to be sent to the line. It has no effect on sending set.

TABLE A
CONTROLS DESCRIPTION (continued)

CONTROL (Figure 5)	ARRANGE- MENT NO.	EQUIPPED WITH		DESCRIPTION
		KEY	LAMP	
PROCEED	1, 2, 3	YES	YES	When this key is depressed, the lamp lights and transmission from the keyboard is enabled. The lamp will light when the Clear to Send (CB) lead is on, or optionally after receipt of ACK character. The lamp will extinguish on receipt of NAK character or interrupt signal. If extinguished by NAK character, ACK or manual operation of the PROCEED key will relight the lamp. If extinguished because an interrupt has been received only operation of the PROCEED key will relight this lamp. The lamp is extinguished at the end of the call.
HERE IS	1, 2, 3	YES	NO	When key is momentarily depressed, it activates the set answer-back causing a stored series of up to 20 characters, such as set identification, to be transmitted.
KBD EOL	1, 2, 3	NO	YES	This lamp lights when the electronic character counter reaches its pre-selected count. Operation of the return extinguishes the lamp.
ALARM	1	YES	YES	When this lamp is on it indicates a paper-low condition or a parity error. Operation of switch clears a parity error alarm, but only replacing the paper will extinguish the lamp for a low-paper alarm.
PTR EOL	1, 2, 3	NO	YES	This lamp lights when the typing unit typebox reaches a preset position.
PAPER ALARM	2, 3	NO	YES	Lamp lights when paper is out. Replenishing paper moves signal and extinguishes lamp.
OUT OF SERVICE	2	YES	YES	When this lamp is on, the set will not respond to a data call. Operation of the switch extinguishes the lamp.
ERROR	2	YES	YES	Lamp lights when a parity error is received. Operation of the switch extinguishes the lamp.

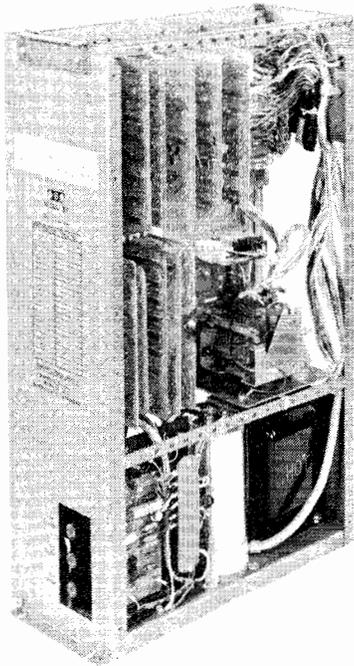


Figure 6 - Electrical Service Unit

2.20 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.

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

G. Table

2.22 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.

2.23 Three optionally available tables may be obtained: A double-compartment table and two single-compartment tables which differ primarily in overall depth dimension (Figure 11).

H. Electrical Service Unit

2.24 The electrical service unit (Figure 6) 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 eleven card connectors. A set of circuit cards selected for a given operable arrangement provides the logical operations for the set (Table B). The cards mount into the card connectors.

2.25 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, and copy-lights, etc. An interface connector provides a signal interchange point which conforms with the EIA RS-232B standard.

2.26 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.

2.27 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.

2.28 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.

TABLE B

CIRCUIT CARD SETS

Cards in Keyboard Send-Receive Unit	Quantity
Mode Control (100 wpm or 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

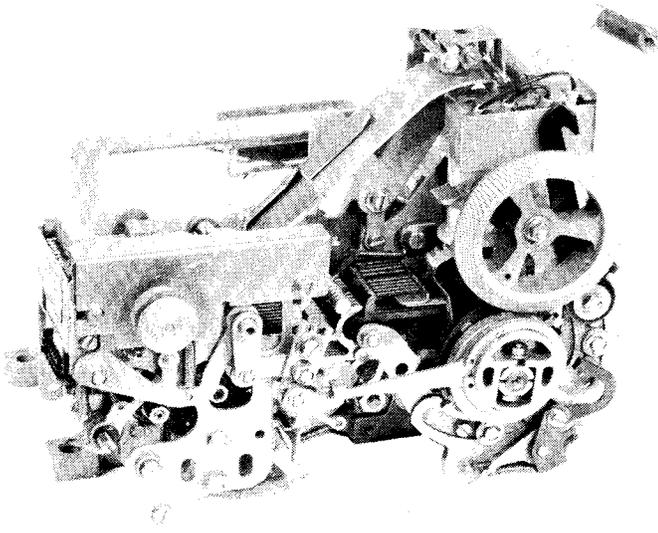


Figure 7 - Reperforator Unit

REPERFORATOR-TRANSMITTER MODULE COMPONENTS

A. Reperforator Unit

2.29 The reperforator unit (Figure 7) is an electromechanical device that converts data received serially into corresponding perforations in tape. It uses a single magnet selector similar to that used in the typing unit (2.04).

2.30 The unit is a nontyping reperforator that provides fully-perforated tape. It is equipped with a manual interfering tape feed-out mechanism to simplify tape loading. The reperforator unit also includes a power backspace mechanism which may be operated locally or on-line. This device permits backspacing tape to eliminate erroneous data by overpunching with delete characters.

B. Reader Unit

2.31 The reader unit (Figure 8) is an electromechanical device used to convert perforations in tape into corresponding parallel electrical data.

2.32 The reader is equipped with a manual control lever, tight-tape and tape-out alarm sensors, and the reader step feature. The control lever has three positions: RUN (operating position); STOP (off position); and FREE (tape threading position).

C. Electrical Service Unit

2.33 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 (Table B), interconnecting control and power cables, and a control panel.

2.34 The control panel (Figure 9) provides six pushbutton and indicator lamp positions for operating the reperforator and reader units (Table C).

D. Motor Units

2.35 The RT module includes two motor units. One is used to drive the reperforator and is identical to the typing unit motor unit (2.17). The reader unit is driven by a synchronous-type motor developing 1/50 hp and operating at a speed of 1800 rpm.

E. Tape Module Cabinet

2.36 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 for holding punched chad.

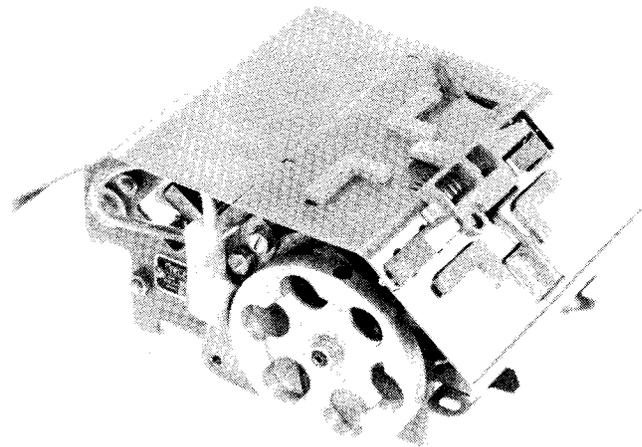
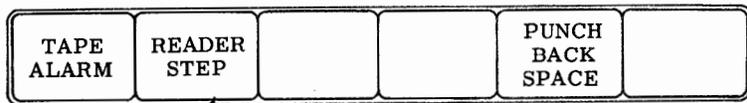
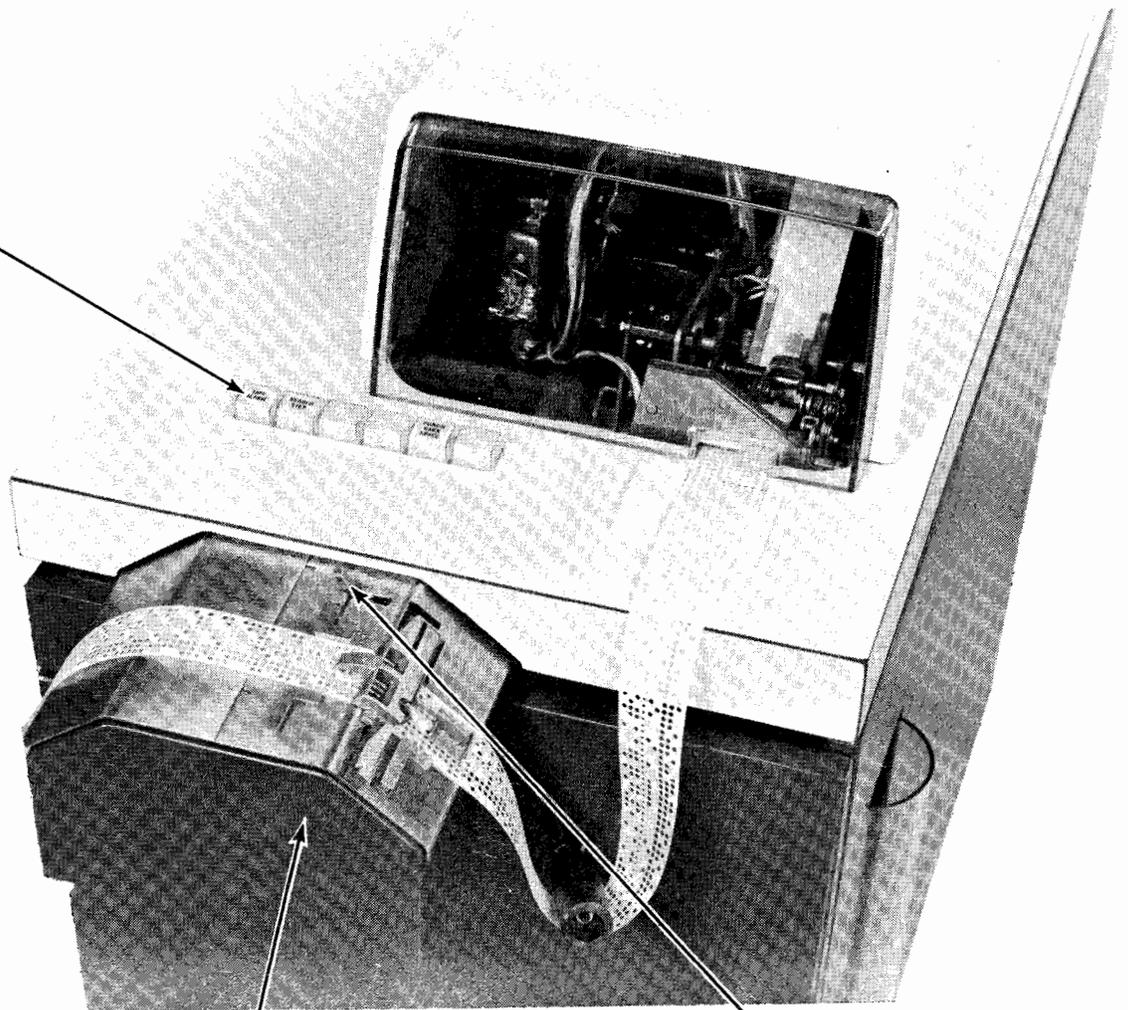


Figure 8 - Reader Unit



RT Module Control Panel

CONTROL
PANEL



READER
UNIT

CONTROL LEVER
(RUN-STOP-FREE)

Figure 9 - RT Module Controls

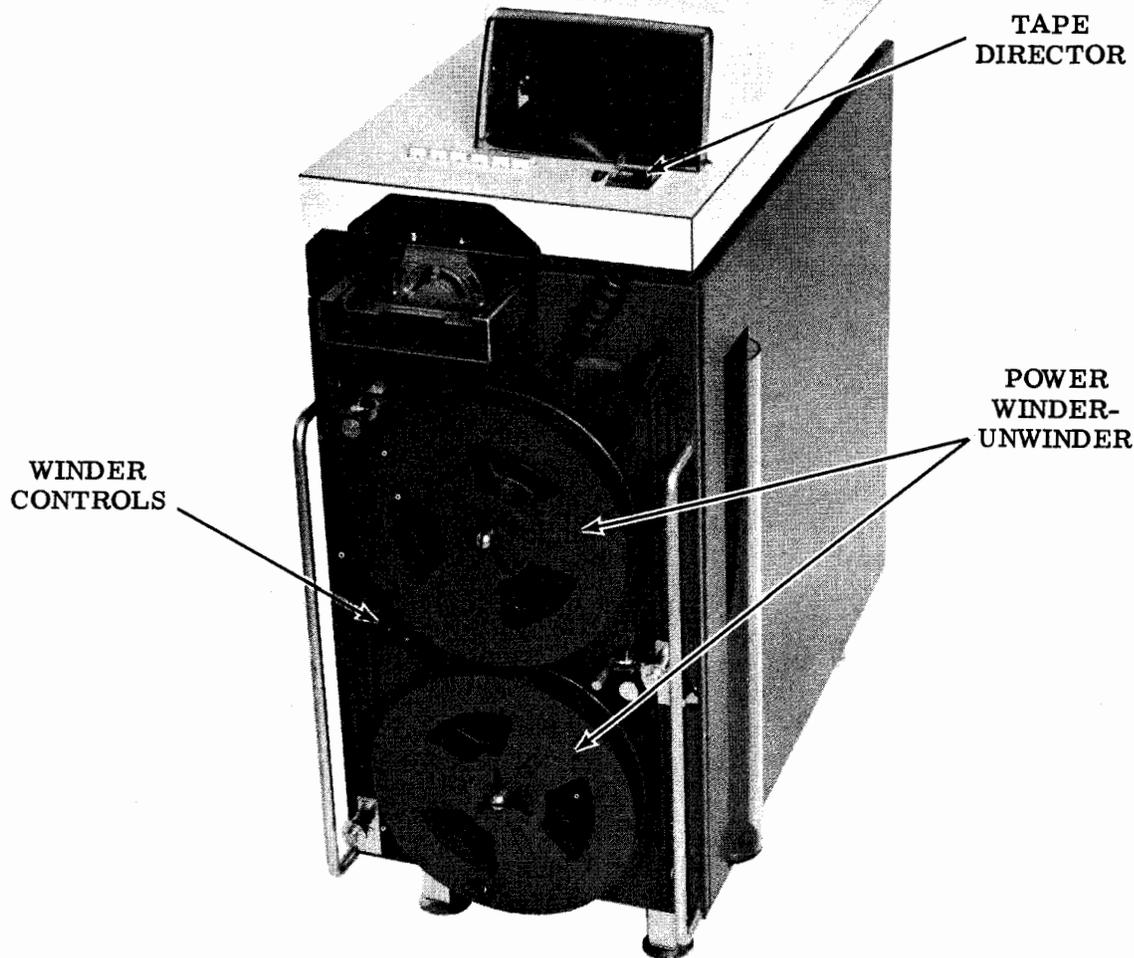


Figure 10 - Tape Handling Accessories

2.37 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.

2.38 The cabinet includes a reperforator base and a mounting plate for installing the reperforator unit and motor unit. A tape supply container with an 8 inch diameter supply reel, a low-tape alarm switch, and connecting cable are included with the reperforator base.

2.39 The cabinet door encloses the electrical service unit compartment. The door may be optionally equipped with either one power tape winder or a combination of a winder and unwinder. A switch is provided on the door to control the tape winders (Figure 10).

ACCESSORIES

A. Answer-Back Assembly

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

2.41 The mechanical 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.

TABLE C
RT MODULE CONTROLS

CONTROL	DESCRIPTION
TAPE ALARM	This indicator lights whenever the tape in the nontyping reperfector is tight, twisted, bunched, or out; it will also light if the reader tape is out or tight.
READER STEP	This key advances the tape through the reader unit one character each time the key is depressed.
PUNCH BACKSPACE	This key backspaces the tape in the reperfector one character each time the key is depressed.
RUN-STOP-FREE	This control lever on the reader unit permits normal operation of the unit in the RUN position and turn-off in the STOP position. In the FREE position, the feed wheel is free and tape may be pulled through the unit without opening the tape lid. When the automatic reader start feature is activated, transmission can occur with the control lever in the RUN or STOP position, but not in the FREE position.

B. Paper Handling Accessories

2.42 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 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.

2.44 An optional 50 foot capacity tape storage bin and tape director is also available for use with the RT module.

C. Tape Handling Accessories

2.43 The tape module may be equipped with a power winder or winder-unwinder combination (Figure 10). These devices operate at speeds of up to 1200 wpm and have a 1000 foot tape capacity. Separate control switches are provided. The single reel winder and the top of the dual winders is used for reader tape winding. The lower winder is used to wind tape from the reperfector. With both winders available, the lower winder can provide fast reel to reel re-winding or power unwinding from a message reel to the reader unit.

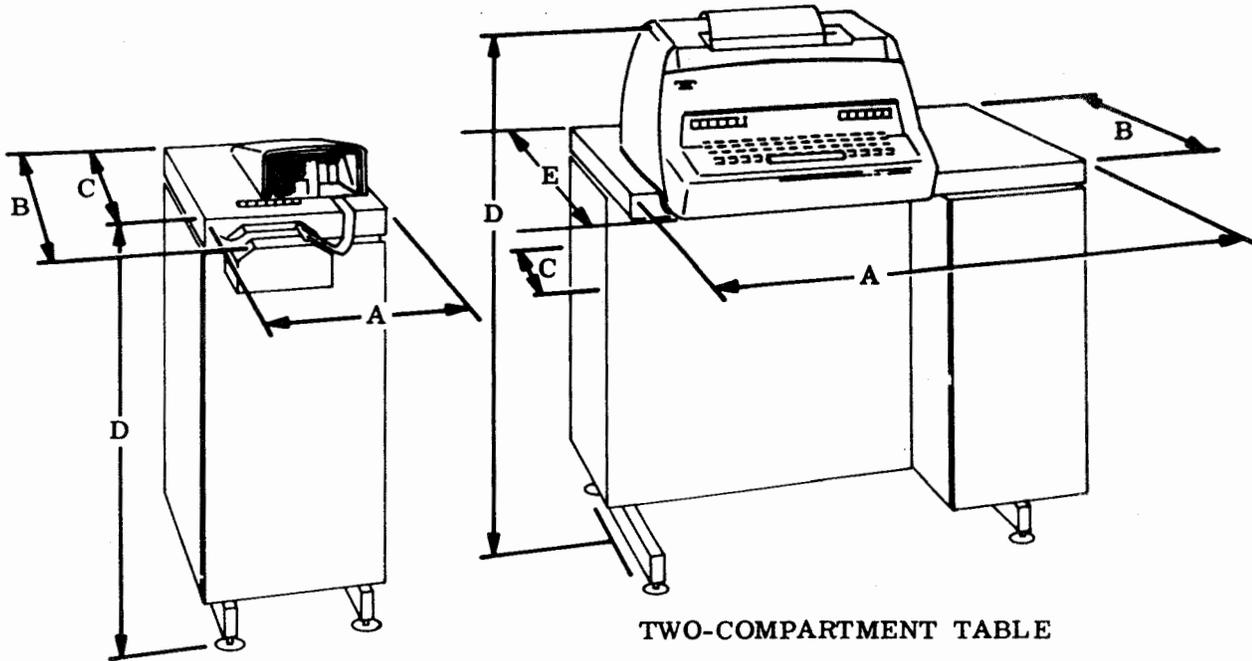
3. TECHNICAL DATA

3.01 Electrical and Environmental Characteristics

- (a) Power 117 volts ac + 10%, 60 Hz ± 0.45 Hz, 15 ampere fused circuits, single phase (3-wire)
- (b) Ambient temperature From 40⁰ F to 110⁰ F
- (c) Ambient relative humidity From 0 to 95 percent
- (d) Power consumption 550 watts

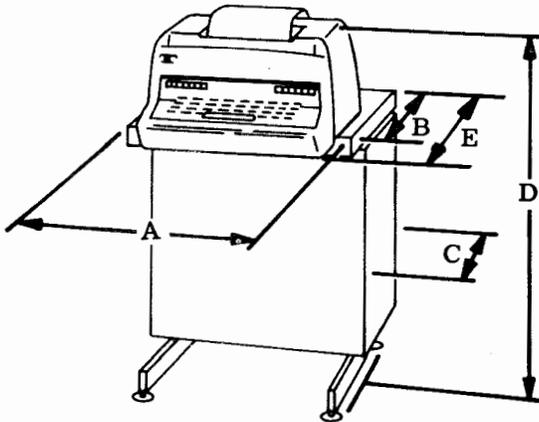
3.02 Physical Characteristics

- (a) Dimensions See Figure 11
- (b) Weight 325 pounds

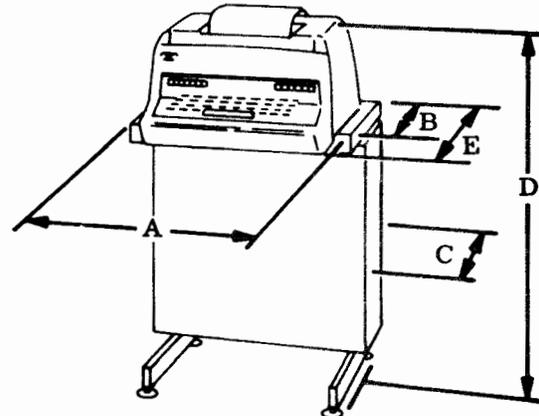


RT MODULE CABINET

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	22	32-1/2	22-1/2	22-1/2
B	23-25/32	27-3/4	27-3/4	21-1/2
C	19-19/32	14-1/2	14-1/2	8-5/8
D	26-1/2	36	36	36
E	-	31-3/4	31-3/4	24-3/4

Figure 11 - 37 ASR Set Dimensions

- (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
 - Purpose Provides the Electronic Industries Association (EIA) interface
 - Type 25-conductor plug
 - Length 6 feet

3.03 Set Internal Power Supply

- (a) Multivoltage power supply
 - Output voltages Nominal + 12.5 volts
7 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 copyrights)

4. OPERATION

GENERAL

4.01 The operation of the set is described in terms of the interface leads controlling both the sending and receiving devices and the communications channel (Figure 12).

4.02 As an example of a switched network application, the description of establishing and terminating a call applies to a set operating with telephone facilities.

PERIPHERAL INTERFACE

4.03 The following four leads (Figure 12) are used by the ASR set logic to prepare the set to receive data.

- (1) Receiver Selectable: This is an indication from the typing unit or reperforator to set logic that the receiving device is selectable, ie, there is no condition, such as paper-out, which disqualifies it to receive a message. A receiver not selectable indication is an alarm condition which will cause a call already in progress to be disconnected.
- (2) Receive Message: This is a command from set logic to the receiving device to prepare for receiving a message. This would include, for example, starting the typing unit motor.
- (3) Receiver Ready: This is an indication by a selectable receiver, in response to Receive Message, that operations preliminary to receiving have been performed. For example, if the typing unit motor was started on receipt of Receive Message, Receiver Ready would be indicated when the motor reached operating speed.
- (4) Receiver Serial Data: The serial data on this lead is at set logic voltage and current levels. Logic zero is a space and logic one is a mark.

4.04 The following 13 leads (Figure 12) are used by the ASR set logic to prepare the set to transmit data:

- (1) Message Available: This is an indication by the transmitting device to set logic that it is ready to send a message. Once the set logic has responded, this indication is binding on the set.
- (2) Send Message: This lead is used by set logic to acknowledge Message Available. It starts any preliminary operations required to prepare the set to transmit data.
- (3) Sender Ready: This lead is used by the transmitting device to acknowledge Send Message and to indicate that preliminary transmitting operations have been completed and that the set is ready to produce a character.

(4) **Present Character:** This signal to the transmitting device acknowledges Sender Ready and directs the transmitter to place a character on the parallel signal buss input to set logic.

(5) **Character Available:** This signal to set logic acknowledges Present Character and indicates the transmitter is displaying a character on the parallel signal input to set logic. The character output must be sampled within the operation of this lead by the transmitter.

(6) **Parallel Data:** This is a set of eight leads on which characters are bussed in parallel from the transmitting device to the transmitter distributor for serialization.

CHANNEL INTERFACE

4.05 The channel interface signals conform to EIA Specification RS-232B and are listed, along with the name, purpose, and pin number of each lead, in Table D. The leads which have designations beginning with A are ground leads. Interface leads which have designations beginning with B are data leads. Interface leads which have designations beginning with C are control leads.

4.06 The data leads are positive (+) or high for spacing signals and negative (-) or low for marking signals. A positive (high) voltage on a control lead means it is on, and a negative (low) voltage means it is off.

LOCAL OPERATION

A. Device Selection

4.07 The particular transmitting or receiving device to be used in local operation is selected by depressing the corresponding button on the control panel (Tables A and C). The selected pushbutton lamp will light to indicate the selection of local operation.

4.08 The reperforator unit has two controls: PUNCH LOCAL and PUNCH ON. For local operation, PUNCH ON must be lighted to enable the reperforator to receive data.

B. Motor Control

4.09 The typing unit, reader unit, and reperforator unit motors are started by selection of PRINTER LOCAL, READER LOCAL, and PUNCH LOCAL, respectively.

C. Message Exchange

4.10 The transmitting device selected presents Message Available to the send control logic. If the send control can obtain sending priority, it generates a Send Message response.

4.11 When the transmitting device is properly conditioned, it initiates a Send Ready signal. At this time, provided no tabbing is in process and the local transmitting distributor is conditioned, the send control turns on the Present Character lead.

4.12 The transmitting device responds with Character Available. This results in serialization of the data in the local transmitter distributor.

4.13 At the selected receiving device, no alarm condition exists and Receiver Selectable was initiated. The receive control logic initiates the Receive Message command. When it is ready, the properly conditioned receiving device responds with Receiver Ready. With Receiver Ready on, the selected receiving device can receive the serial data from the local transmitting distributor.

LINE OPERATION

A. Device Selection

4.14 Transmitting and receiving devices to be placed on-line are selected by depressing the corresponding pushbutton on the control panel. A nonlighted pushbutton indication means line operation has been selected.

4.15 The typing unit must be selected (PRINTER LOCAL) for line operation if a call is to be established. Once the call is established, the typing unit can be switched to local operation.

4.16 The PUNCH ON lamp must be on to enable the reperforator unit.

4.17 The READER AUTO pushbutton (lighted when depressed) permits on-line control of the reader unit by a remote station sending DC 1 (reader on) and DC 3 (reader off).

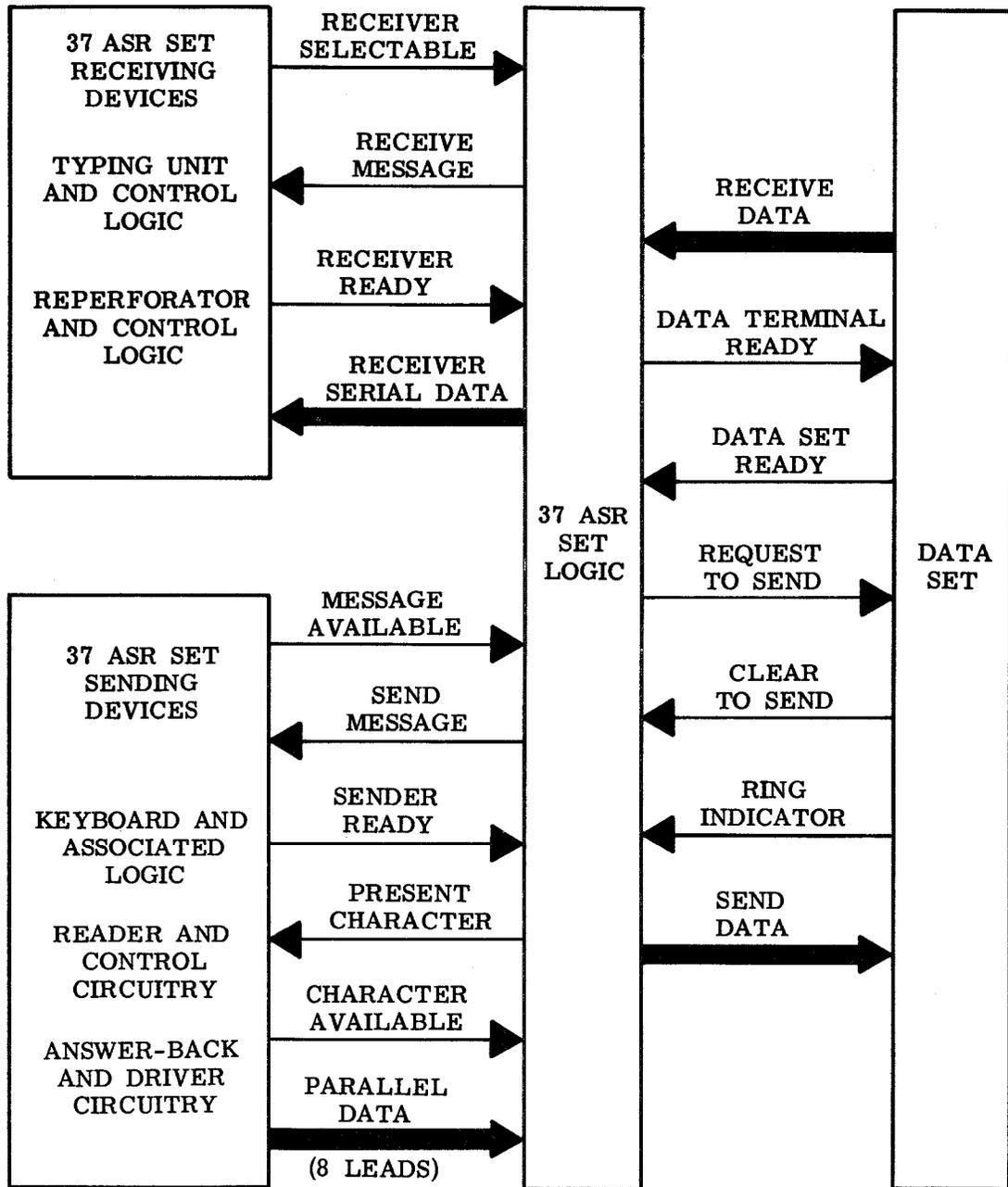


Figure 12 - 37 ASR Set Peripheral and Channel Interface

TABLE D
EIA INTERFACE LEADS

DESIGNATION	NAME	PIN NO.	PURPOSE
AA	Protective Ground	1	To connect ac power service ground to equipment chassis. It is electrically isolated from signal ground.
AB	Signal Ground	7	To provide ground for all signal circuits.
BA	Transmitted Data	2	To carry set output data when the set is in the on-line mode and to remain "marking" when set is in the off-line (local) mode. <u>Note:</u> When equipped with an INTRPT key, this lead will carry a timed "spacing" signal of nominally 500 ms duration each time the key is operated.
BB	Received Data	3	To present incoming data to the set when the set is in the on-line mode. <u>Note:</u> If this lead is grounded at the interface, the set will act as if it were in the "marking" condition.
CA	Request to Send	4	To condition local line interface unit to transmit. This lead is connected permanently on by a strap in the set.
CB	Clear to Send	5	To inform set that local data set is ready to transmit any data presented on BA lead. <u>Note:</u> This lead controls power to the PROCEED lamp and the starting of the answer-back if so equipped.
CC	Data Set Ready	6	To inform the set that local data set is connected to the transmission facility. <u>Note:</u> When this lead is on, it causes set motors to start running.
CD	Data Terminal Ready	20	To inform data set that the set is ready to receive data messages. <u>Note:</u> The set is prepared to receive when: (a) No alarms are present. (b) Set is not in "do not answer" mode, ie, OUT OF SERVICE key not operated. (c) Typing unit is on-line.

4.18 Automatic on-line control of the reperforator is provided by a remote station sending DC 2 (reperforator on) and DC 4 (reperforator off).

B. Channel Establishment

4.19 For stations equipped with telephone facilities, a call is placed and a connection between two stations is established before any teletypewriter data is transmitted. To answer the call, the called station must be in service and have no alarm conditions.

4.20 The calling station dials the call station turning on Ring Indicator. This primes the called station answer-back. Since the Data Terminal Ready lead is normally on (no alarms present), Data Set Ready turns on. This results in Clear to Send turning on and an indication that the connection is established.

C. Message Exchange

4.21 With Clear to Send on, messages may be exchanged when the PROCEED lamp lights. This is done automatically on receipt of the ACK character or manually by depressing the PROCEED pushbutton on the control panel.

4.22 Data transmission can be stopped on receipt of the NAK character (on sets equipped with this feature) or by an interrupt signal. The PROCEED pushbutton must be depressed to complete the message.

4.23 Data is exchanged between the transmitting and receiving sets at different stations using the line transmitter distributors for serialization.

4.24 The data exchange is a half-duplex operation, ie, the transmitted data is copied by the sending station. For sets so equipped, the on-line full-duplex mode of operation may be used to permit simultaneous two-way message exchange.

CHANNEL TERMINATION

4.25 A call may be terminated (PROCEED lamp and motors turn off) by either station using one of these methods: sending EOT or turning off either Data Set Ready or Data Terminal Ready.

SIMULTANEOUS LOCAL-LINE OPERATION

4.26 The set can be used in the local and line modes of operation simultaneously. As an example, the reperforator unit and keyboard may be switched to local and messages processed locally (keyboard to reperforator) and on-line (reader and typing unit).

5. REFERENCES

5.01 The following publications pertain to the 37 ASR Set:

<u>TITLE</u>	<u>NUMBER</u>
<u>ASR SET</u>	
General Description and Operation	574-302-100TC
Installation	574-302-200TC
Troubleshooting	574-302-300TC
Removal and Replacement of Components	574-302-702TC

MOTOR UNIT

Description and Principles of Operation	570-220-100TC
Adjustments	570-220-700TC
Lubrication	570-220-701TC
Disassembly and Reassembly	570-220-702TC

TYPING UNIT

Description and Principles of Operation	574-320-100TC
Adjustments	574-320-703TC
Lubrication	574-320-704TC
Disassembly and Reassembly	574-320-705TC

KEYBOARD AND BASE ASSEMBLY

Description and Principles of Operation	574-321-101TC
Adjustments	574-321-703TC
Lubrication	574-321-704TC
Disassembly and Reassembly	574-321-705TC

ELECTRICAL SERVICE UNIT

Description and Operation	574-322-101TC
---------------------------	---------------

SECTION 574-302-100TC

<u>TITLE</u>	<u>NUMBER</u>
<u>TABLE</u>	
Description and Operation	574-323-101TC
Adjustments	574-323-703TC

ANSWER-BACK UNIT (Early Design)

Description and Principles of Operation	574-325-100TC
Adjustments	574-325-700TC
Lubrication	574-325-701TC

ANSWER-BACK UNIT (Late Design)

Description and Principles of Operation	574-325-101TC
Adjustments	574-325-703TC
Lubrication	574-325-704TC

TYPING UNIT COVER AND PAN

Description and Operation	574-326-101TC
Adjustments	574-326-703TC
Lubrication	574-326-704TC

<u>TITLE</u>	<u>NUMBER</u>
<u>NONTYPING REPERFORATOR</u>	
Description and Principles of Operation	574-329-100TC
Adjustments	574-329-700TC
Lubrication	574-329-701TC
Disassembly and Reassembly	574-329-702TC

TAPE READER

Description and Principles of Operation	592-801-100TC
Adjustments	592-801-700TC
Lubrication	592-801-701TC
Disassembly and Reassembly	592-801-702TC

RT MODULE CABINET

Description and Operation	574-327-100TC
Adjustments	574-327-700TC
Lubrication	574-327-701TC
Disassembly and Reassembly	574-327-702TC