TECHNICAL MANUAL

OPERATION AND MAINTENANCE INSTRUCTIONS

ORGANIZATIONAL MAINTENANCE

TELETYPEWRITER SET AN/UGC-136AX

PART NUMBER 01-01275

E-Systems, ECI Division

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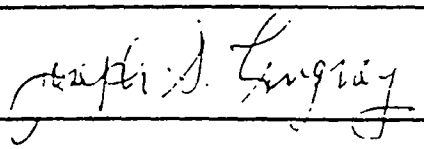

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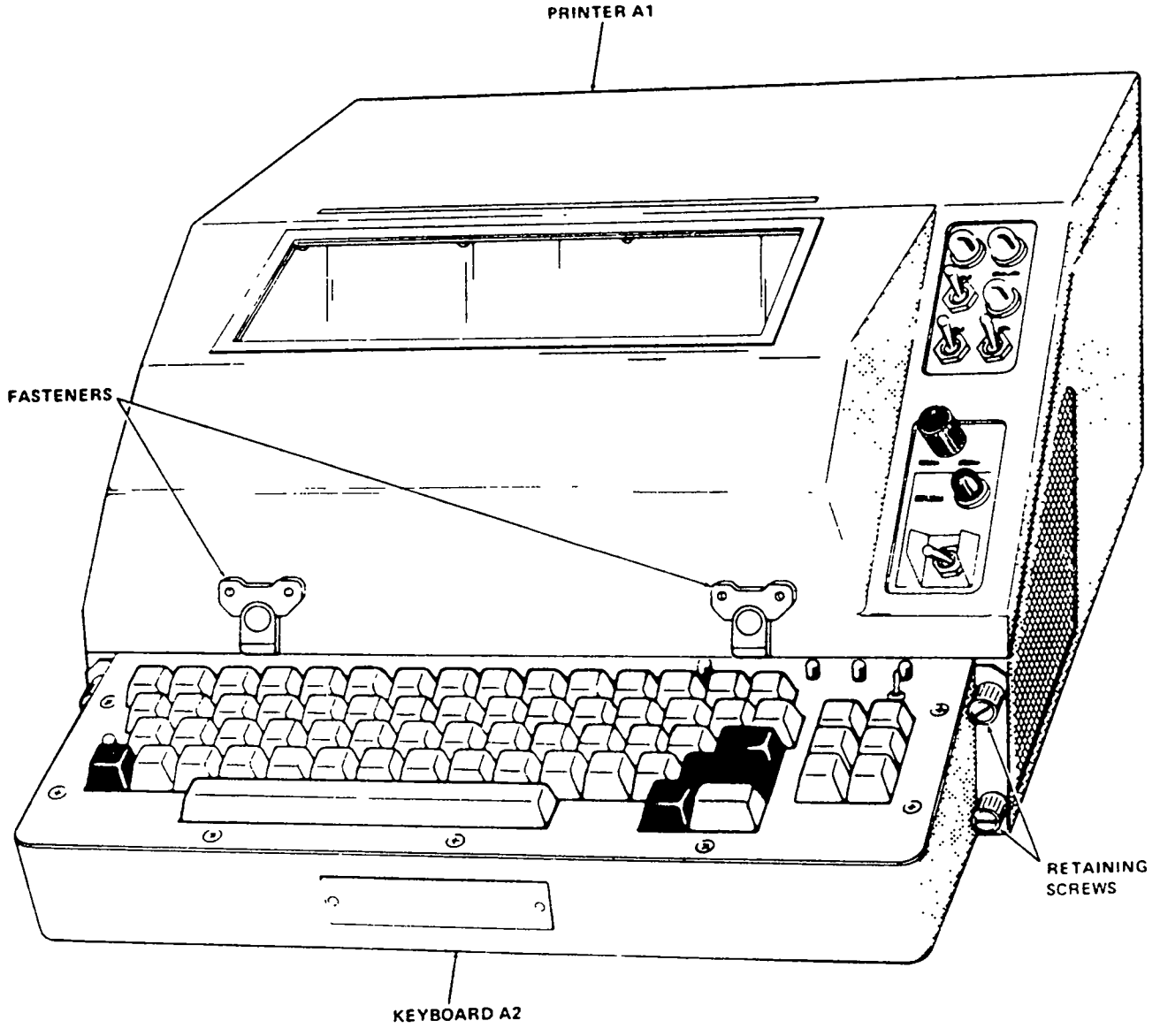


Figure 1-1. Teletypewriter Set, AN/UGC-136AX

CHAPTER 1

GENERAL INFORMATION AND SAFETY PRECAUTIONS

1-1. SAFETY PRECAUTIONS. Standard safety precautions are to be observed when the modules are removed from the case for testing. The following warnings and cautions are applicable to Teletypewriter Set AN/UGC-136AX, and are contained in this manual:

WARNING

When using alcohol for cleaning, adequate ventilation must be provided. Avoid inhalation of the fumes and prolonged skin contact. (para 4-3)

WARNING

Wear protective eye gear when using pressurized air. (para 4-3)

WARNING

Death or injury may occur if the power cable safety ground wire is not connected to a suitable AC receptacle safety ground return. Also, an additional safety ground strap must be connected to E1 ground stud at the rear of the Keyboard Printer. (table 5-3, para 8-7.2)

WARNING

Voltages as high as 115 volts are contained in the equipment discussed in this manual. Use standard safety precautions when the modules of this unit are removed from the case. Disconnect the power cable at J1 (figure 6-3, View B) before making any test connections, or before working inside the chassis. (para 6-4)

WARNING

The carton weighs 79 lbs complete. To prevent injury to personnel or damage to equipment, two persons are required for lifting and carrying. (para 8-3)

WARNING

The Keyboard Printer weighs approximately 65 pounds. To avoid injury to personnel, two persons are required for lifting, carrying and installing the Keyboard Printer. (para 8-7)

CAUTION

To avoid bending left margin sensing tab, move printhead to center of machine before removing ribbon cassette. Press space bar and RPT key (28, figure 2-3) to move carriage. (table 2-7)

CAUTION

Use extreme care while turning the timing disc to avoid bending its edges. (para 6-3.2)

CAUTION

Connector pins can be easily bent and equipment damaged if modules are not carefully removed and replaced. (para 6-4.2)

CAUTION

The logic modules contain static sensitive devices. Care must be exercised to prevent electrostatic discharge which may damage the devices. (para 6-4.2)

CAUTION

Do not move the printhead mechanism back away from the platen when the printhead is located at the left margin. Always move the printhead horizontally to a location in center of platen before moving printhead away from platen. This procedure must be adhered to in order to avoid damage to the left margin sensing tab. (para 6-4.5)

CAUTION

Connector pins on the underside of the Power Supply module can be bent and damaged if care is not exercised when removing and replacing this unit. (para 6-4.6)

CAUTION

Exercise care when removing locknut as it is under spring pressure. (para 6-4.9)

CAUTION

When performing steps i through n, exercise extreme caution so as not to damage ribbon connector or bend left margin sensor plate on carriage assembly. (para 6-4.9)

1-2. INTRODUCTION. This manual contains operation and maintenance instructions for Teletypewriter Set AN/UGC-136AX (hereinafter referred to as Keyboard Printer), and is intended for use by operator and organizational maintenance personnel. This chapter contains the equipment description, reference data, equipment supplied, equipment and publications required but not supplied, and field and factory change information.

1-2.1. Scope. This technical manual describes the Keyboard Printer (figure 1-1). The manual provides procedures for operator and organizational maintenance personnel for startup, operation, shutdown, preventive maintenance checks and services, troubleshooting, adjustment, removal, and cleaning of the equipment. This manual is

effective upon receipt. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.

1-2.2. Applicability Data. This manual is applicable to the Keyboard Printer, manufactured by E-Systems, ECI Division, part number 01-01275.

1-3. EQUIPMENT DESCRIPTION. The Keyboard Printer, shown in figure 1-1, is intended to be used by an operator to transmit, receive, and compose/edit messages. The messages are sent to and received from other stations on the communications network. The Keyboard Printer can be operated at any location that provides access to the communications network and meets the power and environmental requirements. The Keyboard Printer is easily installed in a standard 19-inch rack as explained in chapter 8 and does not require any external supporting equipment.

1-3.1. Capabilities. The Keyboard Printer prints data at 120 characters per second. It can transmit and receive data at rates from 50 to 2400 baud into the message store and operates in switch-selectable International Telegraph Alphabet-2 (ITA-2) or International Telegraph Alphabet-5 (ITA-5) American Standard Code for Information and Interchange (ASCII) codes. An internal random-access memory (RAM) message store module, with a capacity of 19,998 characters, provides a complete message composition and editing capability using a standard four-row MIL-STD-1280 Type I, Class 1 keyboard, and six control keys. Received messages may be stored in the RAM for later printout. Messages may also be composed off-line (using the Keyboard) and stored for future transmission. Messages in storage can be recalled and edited, which permits adding, deleting, or overwriting by character or by line. Safeguards in the firmware prevent accidental deletion or overwriting of stored messages. Additional features provide a status review of messages in storage, recording of message numbers and line numbers, priority routines, and error indication.

1-3.2. Limitations. The Keyboard Printer is capable of storing 40 messages or 19,998 characters. If 40 messages or 18,998 characters are contained in memory, a forced delete operation will take place upon receipt of the next message. The forced delete operation will inform the operator that a message is being deleted and then print the deleted message if it has not been previously printed. The Keyboard Printer contains built in test equipment (BITE) to insure proper operation of the print mechanism.

1-4. REFERENCE DATA. Reference data for the Keyboard Printer is listed in table 1-1.

1-5. EQUIPMENT, ACCESSORIES AND DOCUMENTS SUPPLIED. Table 1-2 provides a list of all equipment, accessories and documents supplied with the Keyboard Printer.

1-6. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED. Table 1-3 provides a list of the equipment and publications required but not supplied to operate, test and troubleshoot the Keyboard Printer.

1-7. FIELD AND FACTORY CHANGES. Table 1-4 is provided at the end of this chapter to record field changes and factory changes.

Table 1-1. Reference Data

Item	Characteristic
Manufacturer	E-Systems Inc., ECI Division
Type	Teletypewriter Set AN/UGC-136AX
Model	01-01275-001
Repairable Identification Code (RIC)	58138816
Power input	115 VAC, 60 Hz, 250 watts maximum
Environmental characteristics	
Humidity	Up to 95%
Ambient temperature	0° to 50°C
Functional Characteristics	
Code sets	ITA-2 or ITA-5 (ASCII)
Character font	7 by 9 matrix
Character spacing	10 per inch horizontal, 6 per inch vertical
Line length	80 characters for ITA-5
	69 or 80 characters for ITA-2
Print speed	120 characters per second
Message storage capacity	19,998 characters
Paper type	Single-ply or multi-ply
Paper size	Standard roll teletype paper (either 8-1/2 or 8-7/16 inches wide; diameter up to 5.0 inches)
Ribbon	Cassette type
Copy capability	Original plus two copies

Table 1-1. Reference Data-Continued

Item	Characteristic
Functional operating modes	
Receive mode	The Keyboard Printer is on-line to receive data in memory and print, or receive in memory for later printout.
Compose and edit mode	The Keyboard Printer functions as an electric typewriter entering data into memory for later editing and/or transmission.
Transmit mode	The Keyboard Printer transmits data directly from keyboard entry or from memory.
Local teletype	The Keyboard Printer operates as a standard typewriter when not placed in either the transmit or compose mode.
Signal characteristics	
Signal type	Serial asynchronous
Signal level	±6-volt (bipolar operation) data and control, TTL external control
Signal speeds (Baud rate)	50, 75, 100, 110, 150, 200, 300, 600, 1200, and 2400 baud rates (switch-selectable)
Mark/space sense	Either +6V or -6V (switch-selectable)
Signal distortion	
Transmitted signal	Transmit accuracy greater than 1 percent for all baud rates. Transmitted signal distortion less than 2 percent of an element at any speed.
Received signals	The Keyboard Printer accurately prints received data, provided early and late (bias) distortion does not exceed 48 percent of a signal element at any speed.
Parity	Odd, even or none (refer to table 2-6).

Table 1-2. Equipment, Accessories and Documents Supplied

Quantity per equipment	Nomenclature	CID	Overall dimensions			Weight (lbs)
			Height (in./cm)	Width (in./cm)	Depth (in./cm)	
1	Teletypewriter Set AN/UGC-136AX	TBD	8.5/ 21.59	15.75/ 40	22.5/ 57.15	65 (uncrated) 79 (crated)
1	EE161-HA-OMI-010/ E110 UGC-136AX Technical Manual	N/A				

Table 1-3. Equipment and Publications Required But Not Supplied

SCAT code	Category	Recommended equipment	Alternate	Test parameters	Applications
4212	Voltmeter	Digital Voltmeter (DVM) 8600A-01 FSCM 89536	None	0 to 1200 Vac 0 to ±1200 Vdc 0 to 20 megohms	Troubleshooting or Corrective maintenance
	Instruction Manual	Operating & Service Manual, Digital Voltmeter (DVM) 8600A-01	N/A	N/A	Reference
	Retaining Ring Pliers	Waldes Truanc model no. 22	Equiv.	N/A	Corrective maintenance
	Insertion Tool	3M model no. 3522	Equiv.	N/A	Corrective maintenance
	Connector	MS3116F14-5SW	None	N/A	Power Connector J1
	Connector	M24308/3-3	None	N/A	Signal Connector J2

Table 1-4. Record of Field and Factory Changes

Change number	Nomenclature	Description

CHAPTER 2

OPERATION

2-1. INTRODUCTION. This chapter describes the controls and indicators for the Keyboard Printer and provides instructions for operation of the equipment. The information consists of descriptions of individual controls and indicators, and procedures for equipment turn-on, operation, and turnoff.

2-2. CONTROLS AND INDICATORS. The controls and indicators are shown in figures 2-1, 2-2, and 2-3. Descriptions of the controls and indicators shown in these figures are provided in tables 2-1, 2-2, and 2-3.

2-2.1. Keyboard Printer Control Panel. Figure 2-1 shows the Keyboard Printer Control Panel and identifies all controls and indicators. Table 2-1 describes the functions of the Control Panel controls, indicators and audible alarm.

2-2.2. Configuration Control Panel. The configuration controls are located on the front of the Printer chassis, and are accessible by releasing the two cover fasteners on the front panel and lifting the front cover to its full open position. These controls set the Keyboard Printer to a specific configuration. The configuration controls are shown in figure 2-2, and are listed with their functions in table 2-2.

2-2.3. Keyboard and Message Memory Controls. Controls and indicators required for normal operation of the printer, message memory, and line communications facilities are grouped together on the Keyboard for ease of operation. The four-row MIL-STD-1280, Type I, Class 1 Keyboard and the special keys are shown in figure 2-3. The message store controls consist of a cluster of six special keys on the right of the Keyboard, together with the EXIT/ENTER key as shown in figure 2-3. These keys control printing and transmitting from store, and manipulation of the compose and edit capabilities with the INSRT, DLTE and LINE edit keys. Table 2-3 describes the functions of the Keyboard, message controls and indicators.

2-3. OPERATING PROCEDURES. Operating instructions for the Keyboard Printer are given in table 2-4. These instructions are divided into the areas of preliminary startup, turn-on, performance check, modes of operation, turnoff procedures, and emergency turnoff procedures. Figure 2-5 is an operator's flow diagram which aids the operator in the use of table 2-4. The solid lines will lead the operator through the normal operating modes. Dash lines are used to indicate alternate actions or special operations that the operator may choose to exercise. The following paragraphs contain information concerning the procedures in table 2-4.

2-3.1. Preliminary Startup. Table 2-4, steps 1 through 4, contain the Keyboard Printer preliminary startup procedure.

2-3.2. Turn-on. Table 2-4, step 5, contains the Keyboard Printer turn-on procedure.

2-3.3. Performance Check. When the Keyboard Printer is turned ON, the microprocessor initiates a performance check of the printed circuit modules, controls and print mechanism to ensure they are operational. The BITE test, table 2-4, step 6, checks proper performance of the print mechanism.

2-3.4. Operation. The Keyboard Printer is capable of operation as a standard typewriter. It can receive, store in memory, and print messages. It can also receive and store in memory while operating in another mode (e.g. compose, edit, or transmit). The Keyboard Printer permits transmitting messages from the Keyboard or from memory. A compose mode, an edit mode, and memory query function are also provided. The following paragraphs are a functional description of the Keyboard Printer modes of operation, which include local keyboard; receive, store in memory, and print messages; receive and store in memory while operating in another mode (e.g. compose and edit, or transmit); transmit messages (from Keyboard or memory); compose messages; edit messages; and memory status.

2-3.4.1. Local keyboard mode. The Keyboard Printer keyboard (figure 2-3) is similar to that of a typewriter. In ITA-2 it is not necessary to press the figures (US/FIGS) key for numerals; the figures function will automatically be inserted when a number key is depressed. Conversely, the letters (DEL/LTRS) key need not be depressed when going from numbers to letters; the letters function will automatically be inserted when a letter character key is depressed. The SHIFT key is used when punctuation or symbols located on the numeral keys are desired. Some of the keys and symbols have no ITA-2 equivalent and are unusable when the ITA CODE control switch (figure 2-2) is in the ITA-2 position; when one of these keys is pressed, the ERROR light will illuminate and will go out when a correct (ITA-2) key is pressed. Table 2-5 lists the functional differences between the Keyboard Printer keyboard and that of a Teletype keyboard when the ITA CODE control switch is in the ITA-2 position. The Keyboard Printer will be in the local keyboard mode, table 2-4, steps 7 and 8, unless placed in another mode by the operator. As function or operator actions are completed, the terminal is returned to the local keyboard mode.

2-3.4.2. Receive modes. The Keyboard Printer is always on line to receive data and can be operated in any of the following receive modes: Receive, print, and store in memory - used when received messages need to be printed and stored when they are received; receive and store in memory, where messages may be printed later - used when it is desirable to operate the Keyboard Printer in the compose/edit or transmit mode without being interrupted; receive and print - used when it is not necessary to store received messages after they have been printed. All messages received and stored in memory are assigned message numbers from 129 through 255. When the received message cannot be stored in memory, due to lack of room, a forced delete operation takes place. Refer to table 3-1 for priority of deletion of messages. Table 2-4, steps 9 through 11, contain procedures for the receive, print, and store in memory operation, and steps 12 and 13 contain procedures for the receive and store in memory operation. Step 14 is the procedure for printing but not storing received messages.

2-3.4.3. Transmit mode. Transmitting messages from the Keyboard Printer can be accomplished in two ways, directly from the keyboard or from memory. Table 2-4, steps 15 through 18, contain procedures for keyboard transmission, and steps 19 through 21 contain procedures for transmitting from memory. Steps 22 and 23 contain procedures for manually terminating transmissions from memory.

2-3.4.4. Compose mode. Messages can be composed (cut) from the Keyboard. These messages will be stored in memory, assigned message numbers from 1 through 127, and can be edited, printed (with or without line numbers), and then transmitted. Two

conditions can exist that require a deletion of some of the messages in memory before the compose/edit mode can be used. If the memory contains 40 messages or 18,998 characters, the equipment will be inhibited from entering the compose/edit mode. Messages must be deleted to enter the compose/edit mode. If memory status indicates that less than the amount of memory needed to compose the message is available, then a deletion of data in memory must take place. If the operator composes a message consisting of more characters than memory is available, the message will overflow memory and wrap around. Table 2-4, steps 24 through 38, contains procedures to be followed when composing messages.

2-3.4.5. Edit mode. Messages in memory, whether received or composed, can be recalled for editing. Editing may be done by an entire message, a single line, or a single character. Additionally, the message may be printed with line numbers to assist in locating the area to be edited. The three edit mode capabilities are: The message edit mode which allows the printing of the message with line numbers and the deletion of the entire message, the line edit mode which allows the deletion of a line, an insertion of a line, or the replacement of a line, and the character edit mode which allows the deletion of characters, the insertion of characters, or the replacement of characters within a line. Table 2-4, steps 39 through 70, contain procedures to be used when editing messages.

2-3.4.6. Clearing memory. The memory can be cleared by opening the Keyboard Printer cover and placing the AUTO PRINT/NORM/MASTER CLEAR switch (10, figure 2-2), located on the Configuration Control Panel, to the MASTER CLEAR position, by turning the machine off, or by deleting individual messages as described in table 2-4, steps 40 through 45 or 74.

2-3.4.7. Querying memory status. Table 2-4, steps 71 and 72, contain procedures for determining contents and status of messages in memory as well as the memory storage capability (in number of characters) available. An example of a status printout is shown in figure 2-6.

2-3.4.8. Manual termination of a received message. The procedure for manually terminating a received message that did not include a valid end-of-message sequence is described in table 2-4, step 73.

2-3.4.9. Continuous transmission of a stored message. The procedure for continuously transmitting a stored message is described in table 2-4, steps 75 and 76.

2-3.4.10. Override mode. The procedure for entry to the override mode during transmit and compose operations is described in table 2-4, steps 77 and 78. The override mode allows the operator to compose a message and/or transmit it without using carriage return and line feed special characters.

2-3.4.11. ITA-2 line length. The procedure for entry to the 80/69-character line ITA-2 mode during transmit and compose operations is described in table 2-4, steps 79 and 80.

2-3.4.12. Letters and figures functions. Letters and figures functions are automatically inserted by the Keyboard Printer when typing number and letter characters. Letters and figures functions can be manually inserted in compose, edit, or Keyboard transmit mode by depressing the DEL/LTRS or US/FIGS key (4 or 5, figure 2-3).

2-3.4.13. Bell function. The bell function may be used by pressing CTRL and BEL keys in all modes of operation. The receipt of a message containing a bell function will cause an audible tone and light the BELL lamp (6, figure 2-1). The BELL lamp may be extinguished by use of the RESET switch (9). Additionally, the volume control for the audible bell tone is located on the print mechanism. To lower the volume, turn knob counterclockwise; to increase the volume, turn knob clockwise.

2-3.4.14. End-of-line alarm. In the compose and edit modes, an end-of-line alarm will sound on the 65th character (69 character lines) or on the 76th character (80 character lines).

2-3.4.15. Message store active light. When the MSG ST ACT light (9, figure 2-3) is illuminated, it indicates that a message(s) has been stored in memory. When flashing, it indicates only 1000 characters of storage capacity remains, or an overflow condition exists.

2-3.5. Turnoff. To turn the Keyboard Printer off, set the POWER switch (1, figure 2-1) to the OFF position.

2-3.6. Emergency Turnoff. To turn the equipment off in an emergency, set the POWER switch (1, figure 2-1) to the OFF position.

NOTE

When the POWER switch is set to the OFF position, all data in the message store memory is cleared.

2-4. KEYBOARD PRINTER CHARACTERS. The Keyboard Printer characters are either International Telegraph Alphabet-2 (ITA-2) or International Telegraph Alphabet-5 (ITA-5) American National Standard Code for Information and Interchange (ASCII). The selection of the mode of operation is determined by the setting of the ITA CODE switch (2, figure 2-2) on the Configuration Control Panel. The ITA-2 and ITA-5 characters are shown in table 2-8 and figure 2-8.

2-5. OPERATOR MAINTENANCE. Operator maintenance is limited to replacement of paper, ribbon cassette, control panel lamps, and general cleanliness of the Keyboard Printer. Table 2-7 contains the procedures for replacing paper, ribbon cassette and control panel lamps. Figure 2-7 illustrates the paper feed mechanism.

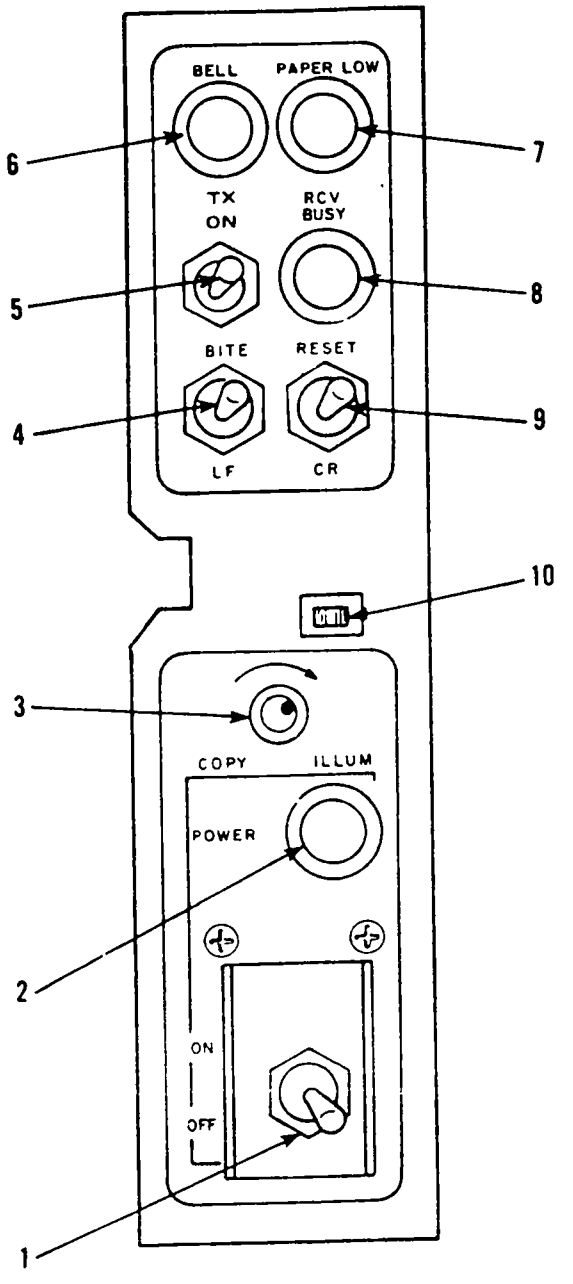


Figure 2-1. Keyboard Printer Control Panel, Operating Controls and Indicators

Table 2-1. Keyboard Printer Control Panel, Operating Controls and Indicators

Index no. figure 2-1	Control or indicator	Function
1	POWER switch (circuit breaker)	Two-position circuit breaker. When set to ON, Keyboard Printer is energized. All control logic is reset when switch is moved from OFF to ON. When set to OFF, Keyboard Printer is deenergized and the memory is cleared of all information. Power supply overload condition will cause the circuit breaker to trip, breaking the circuit, which will also erase the memory of all stored information. To reset, the switch must be set to OFF, then back to ON.
2	POWER indicator	Indicates power is on and circuit breaker is closed.
3	COPY ILLUM (potentiometer)	Varies intensity of copy illumination lamps. This control also allows the lamps to be turned off.
4	BITE/LF switch (momentary, center off)	BITE position - Initiates self-test routine, performs lamp test while switch is depressed, and prints full character set at high speed. (See figure 2-4.) LF position - Causes Keyboard Printer to perform a local line feed.
5	TX ON switch	Enables keying of the Transmitter.
6	BELL indicator	Indicates that a bell character has been received from the external communication lines.
7	PAPER LOW indicator	Flashes when paper needs to be added.
8	RCV BUSY indicator	Indicates open circuit or space condition; off during mark condition on receive line.

Table 2-1. Keyboard Printer Control Panel, Operating Controls and Indicators -Continued

Index no. figure 2-1	Control or indicator	Function
9	RESET/CR switch (momentary, center off)	RESET position - Resets BELL light, external BELL line, and PAPER LOW light, terminates BITE. CR position - Causes Keyboard Printer to perform a local carriage return.
10	Safety interlock switch	Prevents the Keyboard Printer from printing while the cover is open. The local line feed (LF) and carriage return (CR) switches are still active and can be actuated when the cover is open. Characters received while the cover is open will be stored in the message store memory and will be printed after the cover has been closed. The safety interlock switch can be placed in a locked position, which will allow printing while the cover is open. This is done by pressing the switch slightly to the left and raising it to its detent position. To unlock the switch, simply press down on it to remove it from its detent position.

In addition to the above listed switches and lights, the following audible alarms inform the operator of Keyboard Printer operations:

	End-of-line alarm (bell)	• Bell rings in compose/edit operation when the 65th printable character from the beginning of line is entered (69 character lines). • Bell rings in compose/edit operation when the 76th printable character from the beginning of line is entered (80 character lines). • Receipt of bell character.

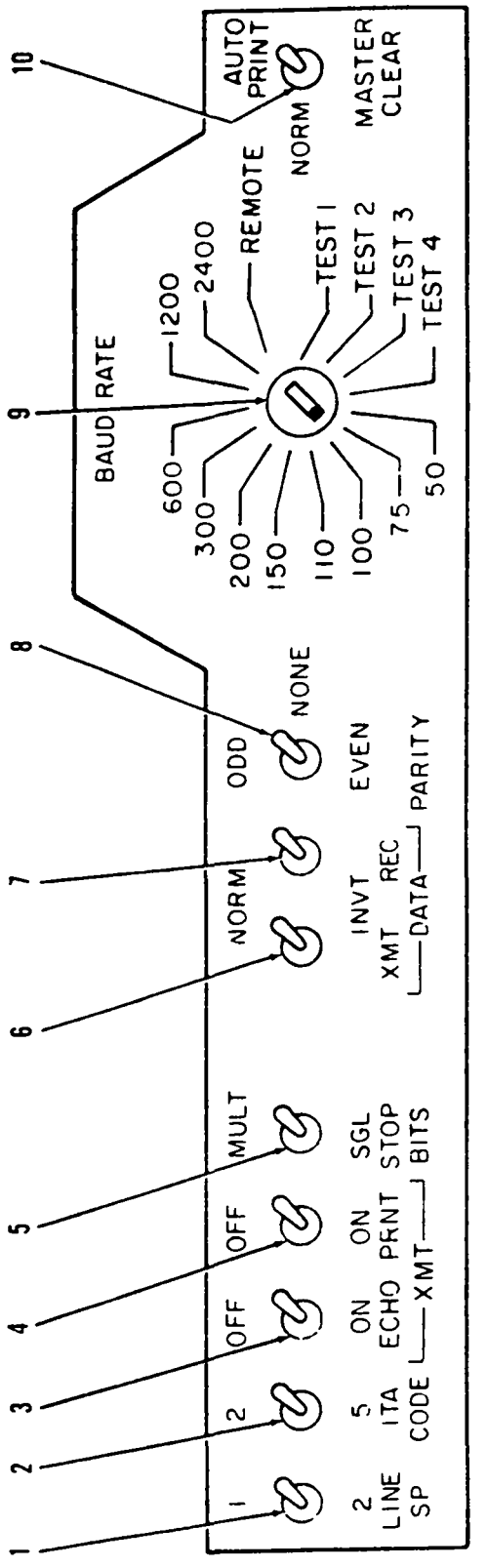


Figure 2-2. Configuration Control Panel, Operating Controls

Table 2-2. Configuration Control Panel, Operating Controls

Index no. figure 2-2	Control	Function
1	LINE SP switch (toggle)	When set to 1, causes one line space for every line feed function received. When set to 2, causes two line spaces for every line feed function received.
2	ITA CODE switch (toggle)	When set to 2, places Keyboard Printer in ITA-2 configuration. When set to 5, places Keyboard Printer in ITA-5 (ASCII) configuration. **NOTE** Non-valid ITA-2 characters entered on the Keyboard while in the ITA-2 configuration will not be printed, stored in memory, or transmitted, and will result in lighting of the Keyboard ERROR lamp (3, figure 2-3). The ERROR lamp is turned off when the next valid ITA-2 key is pressed.
3	XMT ECHO switch (toggle)	Affects handling of received messages when Keyboard Printer is in a transmit mode of operation. In the OFF position, all messages received while actively transmitting are printed, stored in memory and assigned message numbers. In the ON position, all messages received while actively transmitting are assumed to be echoed messages and are printed, but are not stored or assigned message numbers.

Table 2-2. Configuration Control Panel, Operating Controls-Continued

Index no. figure 2-2	Control	Function
4	XMT PRNT switch (toggle)	In the OFF position, the Keyboard Printer will not print transmitted messages or data. In the ON position, activates the Keyboard Printer and allows the operator to see, character by character, what is being transmitted from either memory or the Keyboard. If the PRINT ENABLE switch (10, figure 2-3) is in the PRINT ENABLE position, messages received during transmit/print operation take priority. Printing of the transmitted message will then be interrupted until received messages have been printed, at which time the Keyboard Printer will resume printout of the transmitted message. Otherwise, received messages will be stored in memory.
5	STOP BITS switch (toggle)	Selects the minimum number of stop bits that are received and transmitted. In the SGL position, allows serial data to be received and transmitted with the minimum number of stop bits of one. In the MULT position, allows serial data to be received and transmitted with the minimum number of stop bits of: two stop bits if ITA CODE switch is set to 5 (ASCII). one and a half stop bits if ITA CODE switch is set to 2.
6	DATA XMT switch (toggle)	Selects the mark/space sense of the transmit data line. In NORM position, mark is a logic high and space is a logic low. In INVT position, mark is a logic low and space is a logic high.

Table 2-2. Configuration Control Panel, Operating Controls-Continued

Index no. figure 2-2	Control	Function
7	DATA REC switch (toggle)	Selects the mark/space sense of the receive data line. NORM/INVT functions operate same as explained in DATA XMT (index no. 6).
8	PARITY switch (toggle)	ODD, EVEN, or NONE positions select the type of parity that is checked and transmitted. Its function depends on the position of the ITA CODE switch. Table 2-6 shows the data parity configuration for these switch settings. The ITA CODE switch is only active in the ITA-5 configuration. In the ITA-2 configuration, the switch is not used.
9	BAUD RATE switch (rotary)	Positions 50, 75, 100, 110, 150, 200, 300, 600, 1200, 2400 select transmit and receive data rate. REMOTE position - Allows the baud rate to be set remotely at 50, 75, 1200, or 2400. Position TEST 1 allows the BITE test message to print continuously when the BITE (4, figure 2-1) switch is pressed. (TEST 2, TEST 3, and TEST 4 positions are presently not used.)
10	AUTO PRINT/NORM/ MASTER CLEAR switch (toggle)	AUTO PRINT position - Received messages are printed and not stored. NORM position - Received messages are printed and stored in memory (printing depends on PRINT ENABLE switch (10, figure 2-3) position on keyboard). MASTER CLEAR position - Initiates a power on sequence which performs a self test of the unit, prints out the configuration message and clears the memory.

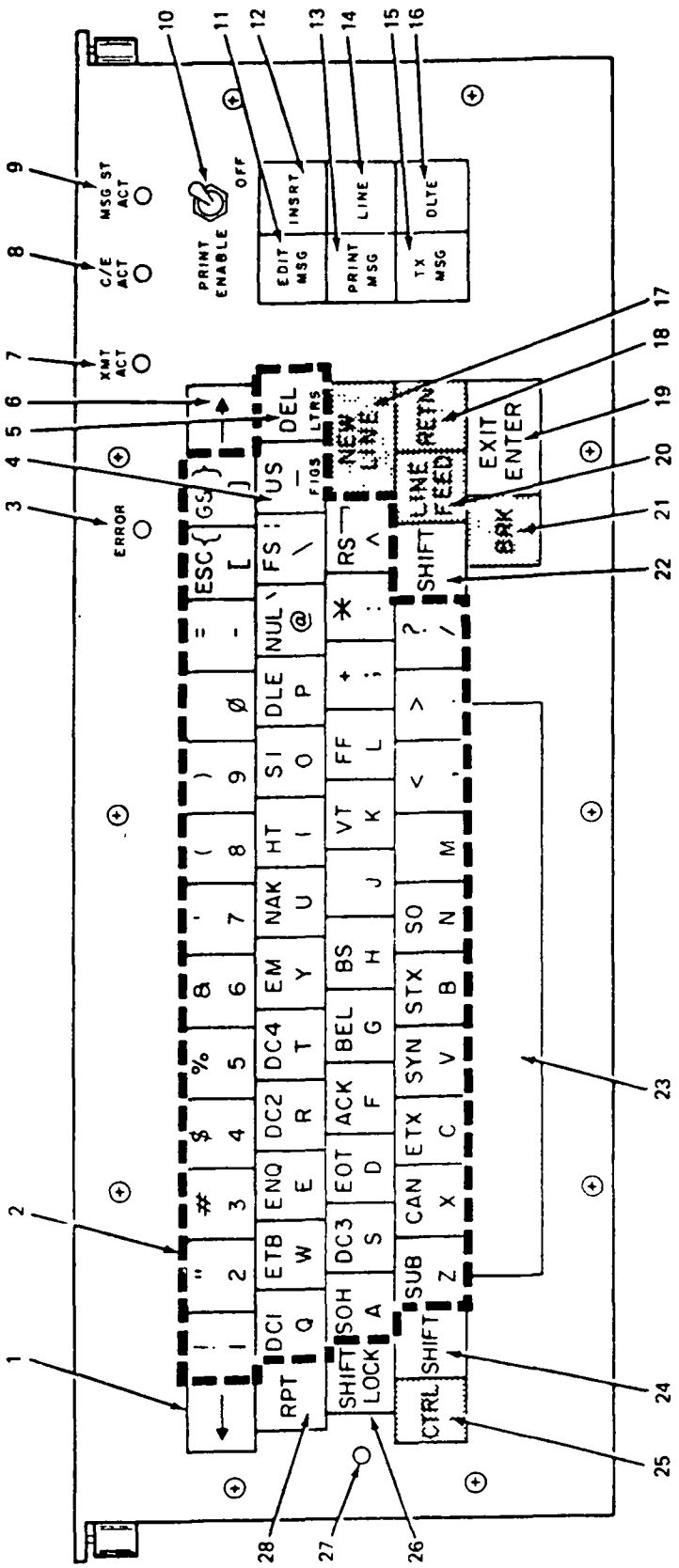


Figure 2-3. Keyboard, Operating Controls and Indicators

Table 2-3. Keyboard, Operating Controls and Indicators

Index no. figure 2-3	Control or indicator	Function
1	← key	Moves carriage left one character position each time pressed (back spaces).
2	Message character keys	Message character keys are standard ITA-5 design using QWERTY layout.
3	ERROR indicator	Indicates that while in ITA-2 mode, an ITA-5 (ASCII) key has been pressed.
4	US/-/FIGS key	Used to shift from letters to figures when in the ITA-2 configuration. However, not normally used as the Keyboard Printer automatically shifts from letters to figures when a figure key is pressed.
5	DEL/LTRS key	Used to shift from figures to letters when in the ITA-2 configuration. However, not normally used as the Keyboard Printer automatically shifts from figures to letters when a letter key is pressed.
6	→ key	Moves carriage right one character position when in character edit mode.
7	XMT ACT indicator	Indicates that the transmit mode is active.
8	C/E ACT indicator	Indicates that the compose or edit mode is active.
9	MSG ST ACT indicator	Lit when there is message store activity. Flashes when there is an overflow condition or less than 1000 characters are left in message store.
10	PRINT ENABLE/OFF switch (toggle)	In the PRINT ENABLE position, received messages are printed and stored in memory.

Table 2-3. Keyboard, Operating Controls and Indicators-Continued

Index no. figure 2-3	Control or indicator	Function
10-continued	PRINT ENABLE/OFF switch (toggle) -continued	In the OFF position, received messages are stored in memory and will be printed when the switch is returned to the PRINT ENABLE position. Not active in Auto Print mode.
11	EDIT MSG key	Enables compose/edit modes.
12	INSRT key	Enables inserting of characters or lines.
13	PRINT MSG key	Enables printing of a stored message. In the compose/edit mode, prints messages stored in memory with line numbers. Also used to initiate memory status message.
14	LINE key	Enables the printing and editing of a line.
15	TX MSG key	When pressed, followed by pressing EXIT/ENTER key, puts Keyboard Printer on line to transmit from the keyboard. When pressed followed by a message number, then EXIT/ENTER, will transmit the identified message stored in memory.
16	DLTE key	Enables the deletion of characters, lines, or messages.
17	NEW LINE key	Provides the standard end-of-line function (2 carriage returns and 1 line feed) on a single key.
18	RETN key	Performs a carriage return.
19	EXIT/ENTER key	Used to enter commands into the Keyboard Printer and to enter a particular mode of operation. When used with the CTRL or SHIFT key it terminates the present mode of operation.

Table 2-3. Keyboard, Operating Controls and Indicators-Continued

Index no. figure 2-3	Control or indicator	Function
20	LINE FEED key	Performs a line feed.
21	BRK key	Puts continuous "space" condition on the transmit data line.
22	SHIFT key	Shifts carriage from upper case to lower case characters and, if pressed when in lower case (shift lock), causes Keyboard Printer to be shifted back to upper case. Not normally used in ITA-2 except for some punctuations. May be used instead of the CTRL key to EXIT the the compose/edit or transmit modes.
23	Space bar	Moves carriage to right one space.
24	SHIFT key	Same as index no. 22.
25	CTRL key	Puts keyboard in Control mode of operation. Must be depressed when desired control key is pressed.
26	SHIFT LOCK key	Sets keyboard for lower case type until SHIFT key is pressed.
27	Shift Lock indicator	Illuminates when keyboard is shifted to lower case.
28	RPT key	Initiates repeat of last key code which was depressed and continues until RPT key is released.

Figure 2-4. Print Test Pattern

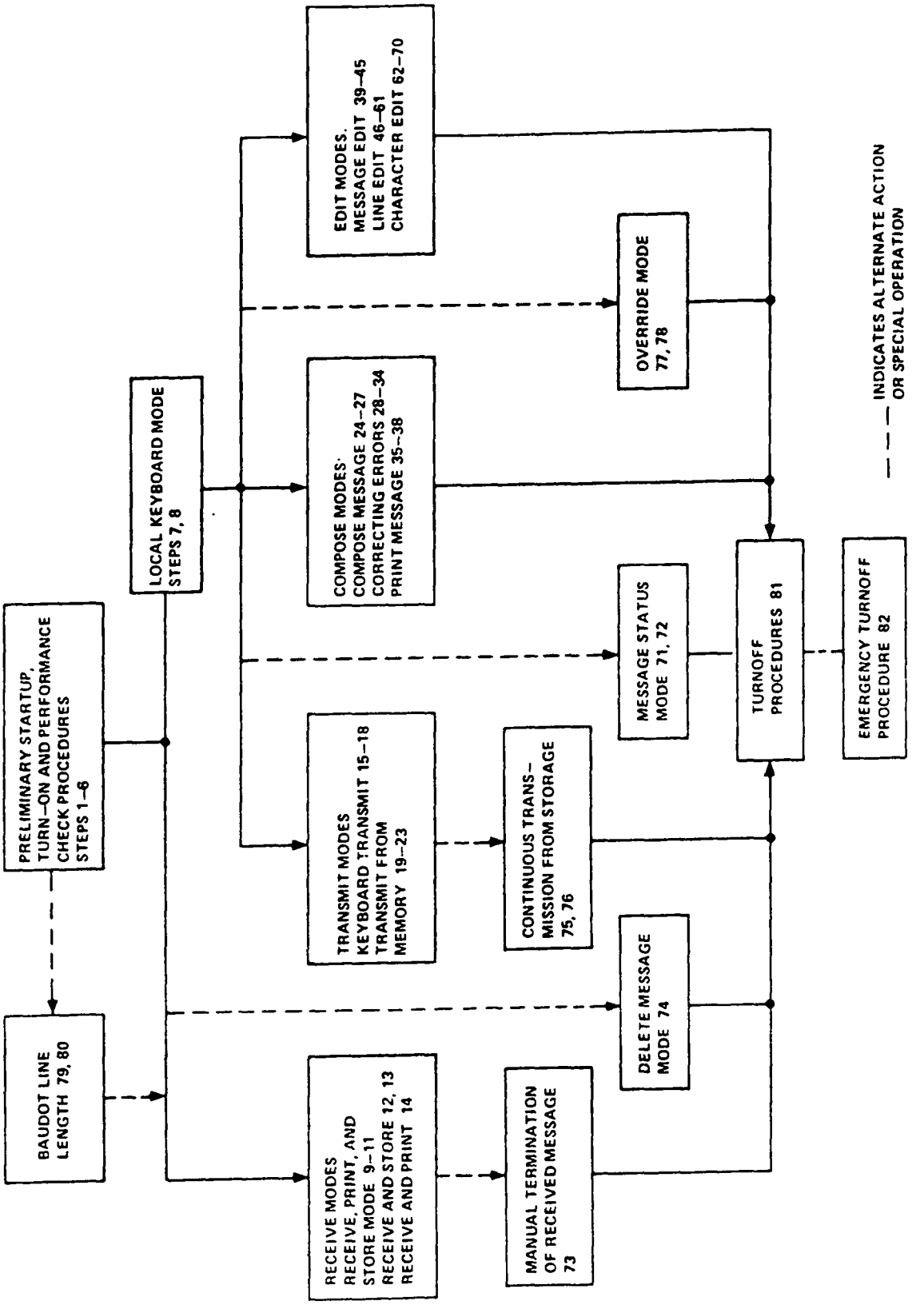


Figure 2-5. Operator's Flow Diagram

Table 2-4. Operating Instructions

Step	Procedure	Indication/comments
	PRELIMINARY STARTUP	
1	Check POWER switch (1, figure 2-1) is in OFF position.	
2	To open cover turn two cover fasteners 1/2 turn CCW and disengage cover fasteners from their catches on front of Keyboard Printer cover, raise cover to latch-open position	Check paper supply. Replace if necessary. Check to see if ribbon cassette is firmly in place.
3	Refer to the Ship systems manual for switch settings and set configuration controls/switches (1-10, figure 2-2) as necessary.	Settings are based on specific system requirements.
4	Release cover latch, close Keyboard Printer cover by engaging two cover fasteners with their catches and turning 1/2 turn CW. Place cover fastener handles in up position to prevent noise.	
	TURN-ON	
5	Set POWER switch (1, figure 2-1) to ON.	Observe following sequence of events: POWER indicator (2, figure 2-1) illuminates. Shift lock (27, figure 2-3) and RCV BUSY (8, figure 2-1) indicators remain off. All other indicators illuminate for about one second. Indicators deactivate in following sequence: end-of-line alarm, BELL and PAPER LOW indicators (6 and 7, figure 2-1).

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
5	continued	Configuration message, based on control switches, will be printed. If configuration message is not printed, recheck paper supply and ensure cover is latched. A typical configuration message follows: READY C/E=19998 F9 F3 02 D8 (Refer to figure 3-3.)
	PERFORMANCE CHECK	Performance checks are automatically performed each time the Keyboard Printer is turned on.
6	Press BITE/LF switch (4, figure 2-1) to the BITE position.	Initiates self-test routine, performs lamp test while switch is pressed; prints full character set at high speed. Compare printout with figure 2-4. Test message will stop automatically after approximately 33 seconds. Activating the RESET/CR switch (9, figure 2-1) causes the test message to stop.
	LOCAL KEYBOARD MODE	Keyboard Printer is in local keyboard mode except when placed in the transmit, compose/edit, print or status modes.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
7	Set PRINT ENABLE switch (10, figure 2-3) to OFF position.	All characters typed on the Keyboard will be printed but not stored in memory. If the Keyboard Printer is connected to an active circuit, any received messages will be stored in memory and printed when the PRINT ENABLE switch is placed in the PRINT ENABLE position or if the Keyboard Printer performs a force delete operation to make room for more received characters.
8	Set PRINT ENABLE switch (10, figure 2-3) to PRINT ENABLE position.	Any characters received while the PRINT ENABLE switch was in the OFF position will now be printed. All characters typed on the keyboard will be printed but not stored in memory. If the Keyboard Printer is connected to an active circuit, any received messages will be printed when they are received. If characters are received from the data line during the local keyboard mode, the Keyboard will not function. If an EOM sequence is not received, operator may terminate message by pressing and holding the CTRL key (25, figure 2-3) and the 6 key. The incoming message will be terminated in the message store. Characters entered at the Keyboard will now be printed.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
	RECEIVE MODES	
	Receive, Print and Store	
9	Check switches on Configuration Control Panel for proper settings (step 3).	Keyboard Printer is always on line to receive data.
10	Set AUTO PRINT/NORM/MASTER CLEAR switch (10, figure 2-2) to NORM.	
11	Set PRINT ENABLE (10, figure 2-3) switch to PRINT ENABLE.	MSG ST ACT indicator (9, figure 2-3) will illuminate when characters are stored in memory. RCV BUSY indicator (8, figure 2-1) will flash when characters are received. Incoming messages will be printed when they are received, stored in memory, and assigned message numbers from 129 through 255. Received messages are assigned the next sequential message number, based on a valid end of message sequence and a valid start of message sequence. The end of message sequence is 2 or more carriage returns (CR), 1 or more line feeds (LF) and 4 N's. The start of message sequence is the next printable character except the sequence RDY. A printable character is any character except: carriage returns (CR), line feeds (LF), letters (LTRS), figures (FIGS), null, space or delete (DEL) character.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
11	continued	The memory capacity is 19,998 characters, or 40 messages. When the memory has 18,998 characters, or 40 messages in store, the MSG ST ACT indicator will start to flash and initiate a forced delete operation to prevent the memory from overflowing. "FORCED DELETE MSG NR ___." will be printed when the messages are deleted. Refer to paragraph 2-3.4.2.)
	Receive and Store	
12	Set PRINT ENABLE switch (10, figure 2-3) to OFF position.	MSG ST ACT indicator (9, figure 2-3) will illuminate when characters are received into the memory. RCV BUSY indicator will flash as characters are received. Incoming messages will be stored in memory and assigned message numbers from 129 through 255. Messages will not be printed unless an overflow condition starts (i.e. 1000 characters remaining in memory or 41st message is received), or PRINT ENABLE switch is placed in PRINT ENABLE position.
13	Set PRINT ENABLE switch in PRINT ENABLE position.	Messages received while PRINT ENABLE switch was OFF will be printed.
	Receive and Print	
14	Set AUTO PRINT/NORM/MASTER CLEAR switch (10, figure 2-2) to AUTO PRINT position.	Received data will be printed when received but not stored. Any erroneous entry will cause the Keyboard Printer to respond by printing ??.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
	TRANSMIT MODES	
	Keyboard Transmit Mode	
15	Check switches on Configuration Control Panel for proper settings (step 3).	
16	Press TX MSG key (15, figure 2-3).	
17	Press EXIT/ENTER key (19, figure 2-3). Type message on Keyboard.	XMT ACT indicator (7, figure 2-3) will illuminate. Keyboard is on-line for direct message transmission. Characters will be printed as they are entered from the Keyboard if XMT PRNT switch (4, figure 2-2) is ON.
18	To exit transmit mode, press and hold SHIFT key (24, figure 2-3) or CTRL (25, figure 2-3) key then press EXIT/ENTER key (19, figure 2-3).	XMT ACT indicator (7, figure 2-3) extinguished and "EXIT" is printed.
	Transmit From Memory Mode	
19	Press TX MSG key (15, figure 2-3).	
20	Type number of message to be transmitted on the Keyboard.	
21	Press EXIT/ENTER key (19, figure 2-3).	XMT ACT indicator (7, figure 2-3) will illuminate indicating message is being transmitted from memory. Message will be printed character-by-character as it is transmitted if XMT/PRNT switch (4, figure 2-2) is ON. XMT ACT light (7, figure 2-3) will extinguish when transmission is completed. Keyboard Printer automatically exits the transmit mode. If BREAK is printed, check configuration switches: DATA XMT and REC (6 and 7, figure 2-2).

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
22	To terminate transmissions from memory, press and hold SHIFT or CTRL key (24 or 25, figure 2-3).	
23	Press EXIT/ENTER key (19, figure 2-3).	Transmission will be terminated. XMT ACT (7, figure 2-3) indicator will extinguish and EXIT is printed.
	COMPOSE MODE	
	Composing Message	
24	Set PRINT ENABLE switch (10, figure 2-3) in the OFF position if composition is desired without being interrupted by a received message.	Any received message will be stored in memory and numbered for later printout. If AUTO PRINT/NORM/MASTER CLEAR switch (10, figure 2-2) is in the AUTO PRINT position, received messages will be printed when they are received.
25	Press EDIT MSG key (11, figure 2-3).	
26	Press EXIT/ENTER key (19, figure 2-3).	C/E ACT indicator (8, figure 2-3) will illuminate. A "C" followed by message number 1 through 127 will be printed (e.g. C1).
27	Using Keyboard, type message.	Message prints out and is entered in memory. If enough memory is not available for message, excess will overflow and wrap around.
	CORRECTING ERRORS	
28	Position printhead over incorrect character/figure by using the backspace (◄—) key (1).	Individual characters will be erased as ◄— key is depressed.
29	Type over error(s).	Incorrect character/figure will be corrected in memory.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
30	Type remaining characters to complete the line of text.	
31	To delete entire line being typed, press DLTE key (16, figure 2-3).	Entire line that was being typed is deleted from memory.
32	Using Keyboard, retype correct line.	
33	Press PRINT MSG key (13, figure 2-3) to print composed message with line line numbers.	Composed message will print out with line numbers: L1 THE QUICK BROWN . . . . L2 THE LAZY DOG . . . . .
34	To exit compose mode, press and hold CTRL or SHIFT key (25 or 24, figure 2-3) and press EXIT/ENTER key (19, figure 2-3).	C/E ACT indicator (8, figure 2-3) extinguished. EXIT is printed.
	PRINT MESSAGE	
35	To print a message without line numbers, exit compose mode as described in above step 34.	
36	Press PRINT MSG key (13, figure 2-3).	
37	Using Keyboard, type message number (e.g. 3).	
38	Press EXIT/ENTER key (19, figure 2-3).	Composed message will be printed. To print out any messages that were received while in the compose mode, perform step 13.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
	EDIT MODE	Messages may be edited by: 1. Specifying message to be edited (message may be deleted in its entirety at this point). 2. Specifying the line to be edited (entire line may be deleted, replaced or additional lines inserted at this point). 3. Specifying characters within the line to be deleted, inserted or corrected by use of the ◄— and —► keys.
	Message Edit	
39	To enter the edit mode, press EDIT MSG key (11, figure 2-3).	
40	Set PRINT ENABLE switch (10, figure 2-3) in the OFF position (if operator does not want to be interrupted by a received message). If a received message is desired to be printed when it is received, place the PRINT ENABLE switch to the PRINT ENABLE position.	Any messages received during editing activity will be stored in memory and numbered for later print out.
41	Using Keyboard, type message number to be edited (e.g. 1).	
42	Press EXIT/ENTER key (19, figure 2-3).	Keyboard Printer will print CE followed by the message number (e.g. CE1).
	NOTE The Keyboard Printer is now in the edit mode and any of the following editing operations can be performed: print message, delete message, line edit mode, and character edit. To exit edit mode, press and hold SHIFT key (24, figure 2-3) and press EXIT/ENTER key (19, figure 2-3).	

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
43	To print message, press PRINT MSG key (13, figure 2-3).	Selected message will print out with line numbers in the left margin.
44	To delete message, press DLTE key (16, figure 2-3).	As a safeguard against inadvertent loss of messages, the printer will respond with DELETE ?? If the message has not been printed it will be printed prior to deletion.
45	Press Y key for YES, or N key for NO.	If response is YES, then message is deleted from memory. C/E ACT lamp goes out and EXIT is printed. If operator response is NO, then message will remain in memory. C/E ACT lamp goes out and EXIT is printed.
	Line Edit	
46	To perform only Line Edit function, press LINE key (14, figure 2-3).	
47	Using Keyboard, type line number to be edited.	
48	Press EXIT/ENTER key (19, figure 2-3).	Line number and line will print.
49	To delete this line, press DLTE key (16, figure 2-3).	Line will be deleted and the remaining lines will be automatically renumbered.
50	To insert new line at beginning of message, press LINE key (14, figure 2-3), type 0, press EXIT/ENTER key (19, figure 2-3).	
51	Press INSRT key (12, figure 2-3), and type a new line. Press NEW LINE key (17, figure 2-3).	New line is placed in memory, remaining lines are renumbered. If enough memory is not available to store the new data, the new data will overflow and wrap around.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
51	continued	Inserts end-of-line function (2 carriage returns (CR), and 1 line feed (LF)).
52	Type any additional lines required by pressing NEW LINE key (17, figure 2-3) after each new line(s) is typed.	Inserts end-of-line function (2 carriage returns (CR), and 1 line feed (LF)).
53	To insert a new line at other places in the message, press LINE key (14, figure 2-3) and type preceding line number.	
54	Press EXIT/ENTER key (19, figure 2-3), INSRT key (12, figure 2-3), type new line and press NEW LINE key (17, figure 2-3).	Line number and line will print. New line is placed in memory and remaining lines renumbered. Inserts end-of-line function (2 carriage returns (CR), and 1 line feed (LF)).
55	Type any additional lines required by pressing NEW LINE key (17, figure 2-3) after each new line(s) is typed.	Inserts end-of-line function (2 carriage returns (CR), and 1 line feed (LF)). Replacing a line is a combination of DELETE and INSERT operations.
56	To replace a line, press LINE key (14, figure 2-3), type line number to be deleted. Press EXIT/ENTER key (19, figure 2-3).	Line number and line will print out.
57	Press DLTE key (16, figure 2-3).	Line called out deleted from memory.
58	Press INSRT key (12, figure 2-3). Type in new line or lines.	New line prints out and is inserted in memory.
59	Press NEW LINE key (17, figure 2-3).	Inserts end-of-line function (2 carriage returns (CR) and 1 line return (LF)).

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
59	continued	Lines may be reviewed in a message by specifying a line (steps 46, through 48) followed by line feed. Next line will be printed each time the LINE FEED key (20, figure 2-3) is pressed.
60	To initiate character edit operation, specify the line to be edited (perform steps 46 through 48).	Line number and line will be printed.
61	Press EXIT/ENTER key.	Printhead will move to left margin.
	Character Edit	
62	To delete a character, locate the printhead over the character to be deleted, using either ⟶ or ⟵ key (1 or 6).	Characters will be printed as ⟶ key is pressed.
63	Press the DLTE key (16, figure 2-3).	Character is deleted and * is printed. In the character edit mode, activation of the ⟶ or ⟵ keys positions the printhead to the character to be inserted, deleted or corrected. DO NOT use the space bar to locate character during character edit.
64	To insert a character, locate printhead over the insert point using ⟶ or ⟵ key (1 or 6).	
65	Press INSRT key (12, figure 2-3).	∧will be printed.
66	Type in new character(s).	New character(s) are inserted. Characters to the right are moved to the right each time a character is inserted. If enough memory is not available to add the new characters, the memory will overflow and wrap around.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
67	To replace or overwrite a character, locate the printhead over the character to be replaced using the ◄— or —► key (1 or 6).	
68	Type the correct character.	Correct character will be inserted in memory.
69	To exit the character edit mode, press the EXIT/ENTER key (19, figure 2-3).	Line will be printed as corrected. Additional lines, characters may now be edited in the message by specifying another line as described in steps 46 through 69.
70	To exit the edit mode (when the message has been corrected), depress and hold the SHIFT or CTRL key (24 or 25). Depress the EXIT/ENTER key (19, figure 2-3).	EXIT is printed. Keyboard Printer is now in the local keyboard mode.
	MESSAGE STATUS MODE	
71	Depress PRINT MSG key (13, figure 2-3).	
72	Depress the S key (2, figure 2-3).	A printout will follow stating either EMPTY, or a status message will be printed. An example is shown in figure 2-6.
	MANUAL TERMINATION OF A RECEIVED MESSAGE	
73	Depress and hold the CTRL key (25, figure 2-3), and depress the 6 key.	Message will be terminated in memory and Keyboard becomes active again.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
	DELETE MESSAGE MODE	
74	Depress the DLTE key. Type message number, depress ENTER. Press Y for Yes or N for No.	As a safeguard against inadvertent loss of messages, the Keyboard Printer will respond with DELETE ??. If the message has not been printed it will be printed prior to deletion.
	CONTINUOUS TRANSMISSION FROM STORAGE	
75	Depress and hold the CTRL key (25, figure 2-3) and depress the 0 (number) key (2, figure 2-3).	"Cont, Msg XMIT" will be printed. Any message transmitted from storage will be continuously transmitted. XMT ACT lamp will go out EXIT will be printed. To terminate a message transmission, depress and hold the CTRL or SHIFT key. Depress EXIT.
76	To exit the Keyboard Printer from the "Cont, "Msg XMIT," depress and hold the CTRL key (25, figure 2-3) and press 0 (number) key (2, figure 2-3).	"Normal Mode" will be printed. Any message transmitted from storage will not be continuously transmitted.
	OVERRIDE MODE	
77	Depress and hold CTRL key (25, figure 2-3) and press 9 (number) key (2, figure 2-3).	"Override Mode" will be printed. No CR/LF characters required at end of each line.
78	To exit the Keyboard Printer from the "Override Mode", depress and hold CTRL key (25, figure 2-3) and press 9 (number) key (2, figure 2-3).	"Normal Mode" will be printed. This forces the operator to enter a CR/LF at the end of each line typed in order to continue message composition or transmission.

Table 2-4. Operating Instructions-Continued

Step	Procedure	Indication/comments
	BAUDOT LINE LENGTH	
79	Depress and hold CTRL key (25, figure 2-3) and press 8 (number) key (2, figure 2-3).	"80 CHAR LINE BAUDOT MODE" will be printed (ITA-2 MODE).
80	To exit the Keyboard Printer from the 80 char Baudot line mode, depress and hold CTRL key (25, figure 2-3) and press 8 (number) key (2, figure 2-3).	"69 CHAR LINE BAUDOT MODE" will be printed (ITA-2 MODE).
	TURNOFF	
81	To turn Keyboard Printer off, set the POWER switch (1, figure 2-1) to the OFF position.	POWER indicator (2, figure 2-1) extinguishes.
	EMERGENCY TURNOFF	
82	To turn the Keyboard Printer off in an emergency, set the POWER switch (1, figure 2-1) to the OFF position.	POWER indicator (2, figure 2-1) extinguishes.

```
P
MSG 1          C                P                  400
MSG 2          C                P            T     451
MSG 129        C          R     P                  345
MSG 130                   R     P                  6844
MSG 131                   R                        1785
C/E = 10173
```

Note that MSG 1, 2, and 129 were changed; 129 through 131 were received. All messages except 131 have previously been printed and MSG 2 has been printed and transmitted but is still retained in memory. C/E = 10173 indicates the amount of storage capacity remaining in characters.

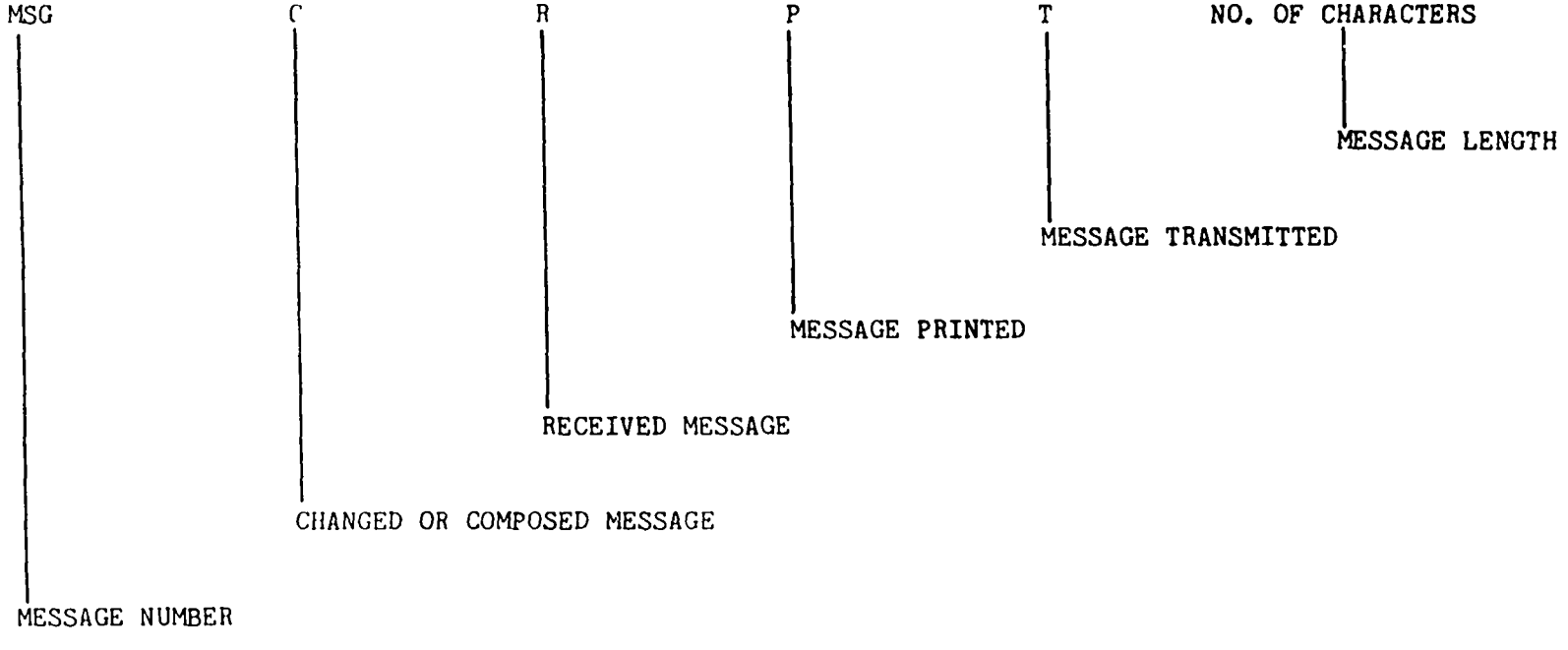


Figure 2-6. Sample Message Status Printout

Table 2-5. Keyboard Printer and Teletype Functional Differences

Teletype function	Keyboard Printer function
LTRS	LTRS (DEL key) or CTRL + SI (O key)
FIGS	FIGS (US key) or CTRL + SO (N key)
BLANK	CTRL + NUL (to right of 0 key)
BELL	CTRL + BEL (G key)
2 CR 1 LF	NEW LINE key
#	SHIFT + 3 key

Table 2-6. Data Parity Configuration

ITA code	Parity	Notes
2	None	No parity accepted or transmitted in ITA-2 mode.
5	Odd	Odd parity checked and transmitted.
5	Even	Even parity checked and transmitted.
5	None	No parity checked; parity bit exists but will not be set/reset to produce valid parity.

NOTE: Odd/even refers to the number of 1s in the word (excluding start and stop bits).

Table 2-7. Operator's Maintenance Actions

Step	Procedure
	NOTE It is not necessary to turn off the Keyboard Printer power to change paper. Messages received while the cover is open will be stored in the memory and will be printed after the paper has been loaded, the cover closed, and the RESET/CR switch (9, figure 2-1) pushed to the RESET position.
	NOTE Carriage shaft lever (figure 6-2) is normally set to the most rearward position for single-ply paper, and should be moved forward for multi-ply paper. Carriage shaft lever may be adjusted for desired print contrast.
	PAPER REPLACEMENT (Refer to Figure 2-7):
1	Release the two cover fasteners (figure 1-1) and raise the cover to the lock-in position.
2	Move the paper roll locking lever forward to release the paper roll.
3	Remove the paper roll and spindle from the paper storage tray by lifting straight up.
4	Remove the spindle from the old roll and install spindle in the new roll.
5	Install the paper in the storage tray with the paper being unwound from the bottom.
6	Lock the paper roll in place by moving the paper roll locking lever back to the lock position.
7	Feed the paper between the platen and paper guide. Pull out about one foot of paper to align paper in the assembly.
8	Momentarily depress the BITE/LF switch (4, figure 2-1) to LF position so that the paper is fed through to the front of the unit.
9	Lift the plastic retaining plate assembly and place the paper underneath it so that it exits toward the rear.
10	Place the retaining plate assembly back to the normal position and depress the local BITE/LF switch (4, figure 2-1) to LF position to see that the paper is feeding properly. Tear off the excess paper evenly, close the cover, and engage two cover fasteners.

Table 2-7. Operator's Maintenance Actions-Continued

Step	Procedure
	RIBBON CASSETTE REPLACEMENT:
11	Release the two cover fasteners (figure 1-1) and raise the cover to the lock-in position.
	CAUTION To avoid bending left margin sensing tab, move printhead to center of machine before removing ribbon cassette. Press space bar and RPT key (28, figure 2-3) to move carriage.
12	Unlock the cassette by pulling up the latch at the top of the cassette.
13	Lift the cassette upward to remove.
14	Replace with new cassette.
15	Push down on latch to lock cassette in place.
16	Close the cover and engage two cover fasteners.
	NOTE The cassette should be disposed of in a proper manner, observing any applicable security regulations.
	LAMP REPLACEMENT (Control Panel and Print Mechanism Module only)
17	Unscrew lens on Control Panel (figure 2-1) or Print Mechanism (figure 6-2).
18	Remove lamp from lens on Control Panel or unseat lamp from socket in Print Mechanism.
19	Replace the new lamp in the lens on Control Panel or install new lamp in socket on Print Mechanism and reinstall the lens.
	NOTE Lamps on the Keyboard are not replaceable by the operator because of internal solder connections.

Table 2-8. ITA-2 Characters

Letters	Figures	Letters	Figures	Letters	Figures
A	-	J	'	S	BELL
B	?	K	(	T	5
C	:	L	)	U	7
D	$	M	.	V	;
E	3	N	,	W	2
F	!	O	9	X	/
G	&	P		Y	6
H	#	Q	1	Z	"
I	8	R	4		

NON-PRINTING CHARACTERS

- BLANK (NUL)
- SPACE
- CARRIAGE RETURN
- LINE FEED
- FIGURES (SO)
- LETTERS (SI)

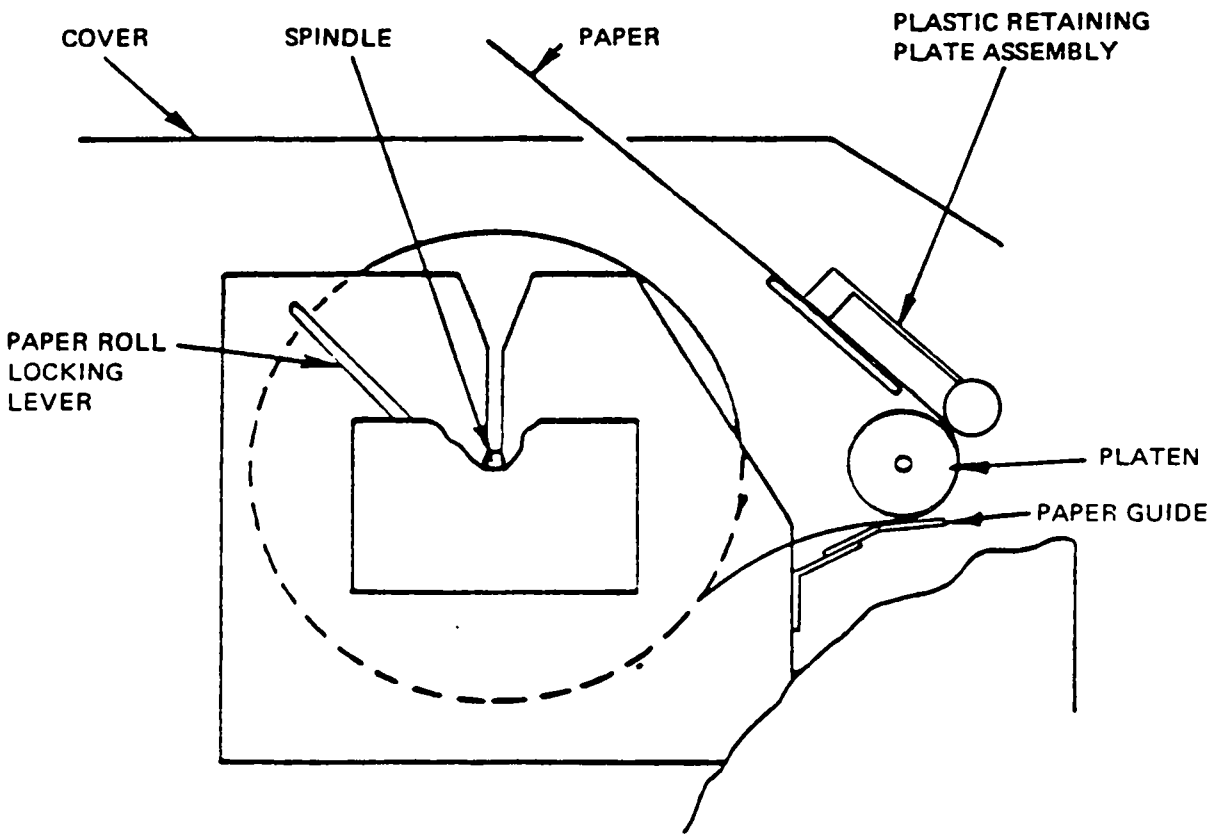


Figure 2-7. Paper Feed Mechanism (End View)

	NUL	DLE	SP	0	@	P	`	p
	SOH	DC1	!	1	A	Q	a	q
	STX	DC2	"	2	B	R	b	r
	ETX	DC3	#	3	C	S	c	s
	EOT	DC4	$	4	D	T	d	t
	ENQ	NAK	%	5	E	U	e	u
	ACK	SYN	&	6	F	V	f	v
(Note)	BEL	ETB	' (APOS)	7	G	W	g	w
	BS	CAN	(	8	H	X	h	x
	HT	EM	)	9	I	Y	i	y
(Note)	LF	SUB	*	:	J	Z	j	z
	VT	ESC	+	;	K	[	k	{
	FF	FS	,	<	L	\	l	|
(Note)	CR	GS	-	=	M	]	m	}
	SO	RS	.	>	N	^	n	~
	SI	US	/	?	O	_	o	◇

Note: NON-PRINTING CHARACTERS (except in test message)

Figure 2-8. ITA-5 (ASCII) Characters

CHAPTER 3

FUNCTIONAL DESCRIPTION

3-1. INTRODUCTION. This chapter provides the functional description of the Keyboard Printer. The functional description is provided at three levels; overall, major and block diagram.

3-2. OVERALL LEVEL (figure 3-1). The overall functions of the Keyboard Printer are power distribution, compose/edit, transmit, receive, and BITE. When the Keyboard Printer is energized the logic power, interface power, lamp/motor power, and power-on BITE select are distributed to the necessary circuits. A modified BITE is performed to insure proper operation of the control circuits. The power-on BITE also identifies the configuration the equipment is presently in and the available memory. The compose/edit function is selected by control keys from the Keyboard. A Keyboard interrupt is generated and the key character is converted into an eight-bit data word for processing. The compose/edit function can access memory to create or change messages via the system data bus. The transmit function is selected by control keys on the Keyboard and provides transmission of data directly from the Keyboard or from memory. The data is converted from a transistor-to-transistor logic (TTL) parallel format and transmitted in a bipolar serial format at the baud rate selected at the configuration control panel and transmitted to the receiving station. The receive function provides for the reception of serial bipolar data from a sending station and converts it to a TTL parallel format. The received data is transferred via the system data bus for storage in memory. The received data will also be printed if the proper controls are selected on the Keyboard Printer. The BITE function tests for proper operation of the internal circuits of the Keyboard Printer. The BITE operation reads from memory and exercises the printing function to ensure proper operation.

3-3. MAJOR FUNCTIONAL LEVEL. The major functional level description will provide information concerning each of the four major functions and their subfunctions. Each description is supported by a functional block diagram.

3-4. POWER DISTRIBUTION FUNCTION (figure 3-2). The power distribution function develops and distributes the operating power for the Keyboard Printer. It also performs self test, configuration message print out, and interrupt enable operations. The following paragraphs provide descriptions of each of the operations of the power distribution function.

3-4.1. Power Development and Distribution. The Power Supply module receives a primary power input of 115 Vac, 60 Hz from the power filter. The Power Supply module rectifies the primary power input to produce the ±5, +12, ±12 RD, +28 and the +50 Vdc sources. The +5 Vdc is routed to all the logic circuits where it is used for the TTL logic devices. The +12 Vdc is also used as a source of power for logic operations in some of the logic modules. The ±12 VdcRD are used as the source voltages for the bipolar converters which convert the TTL logic signals to bipolar logic signals and the bipolar to TTL logic signals. The +28 Vdc is routed to the Control assembly and the Print Mechanism where it is used for lamp illumination. The +28 Vdc is also used in Print Mechanism for driving the motors. The +50 Vdc is routed to the Print Mechanism and is used as the power source for the firing of the printhead.

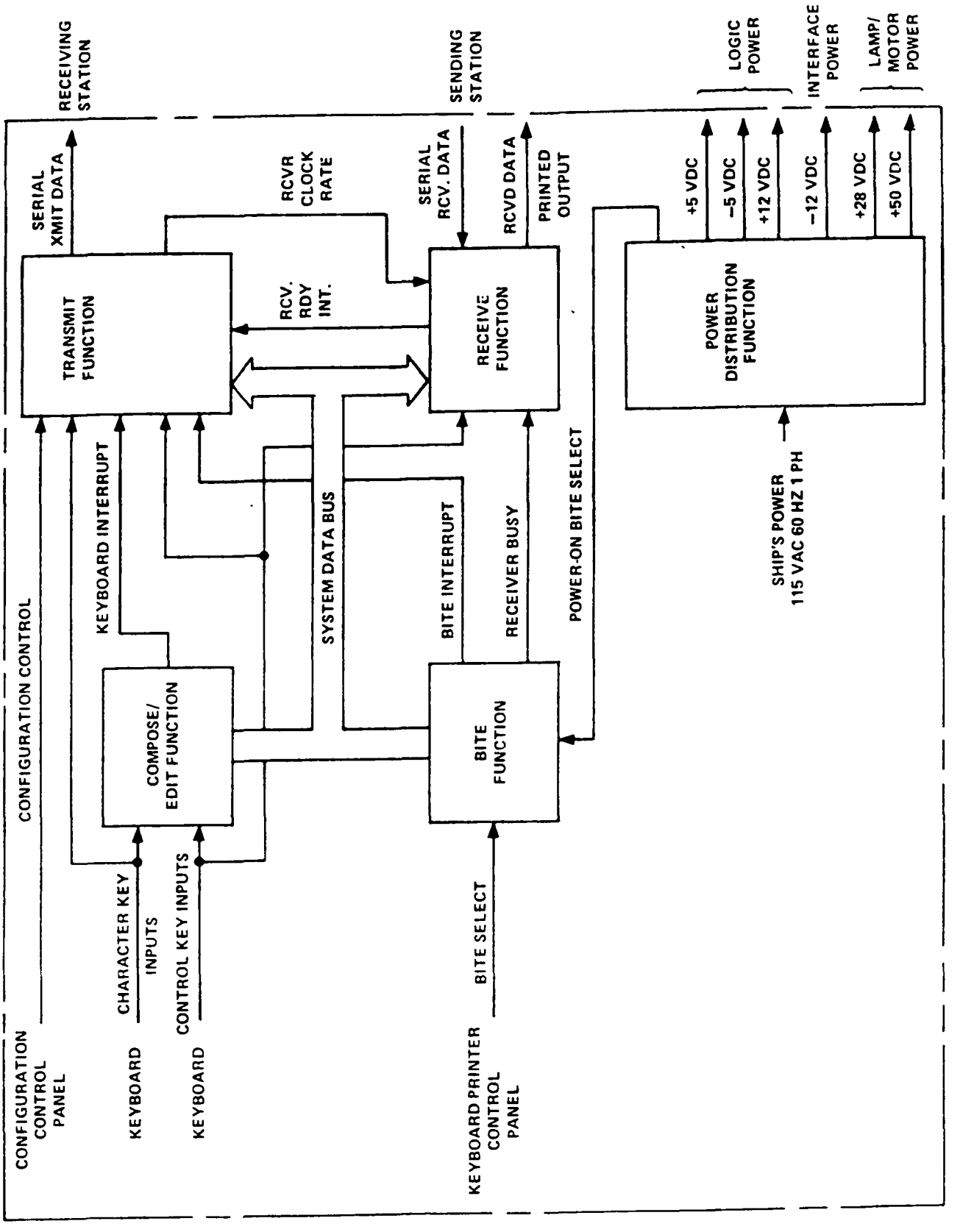


Figure 3-1. Overall Functional Block Diagram

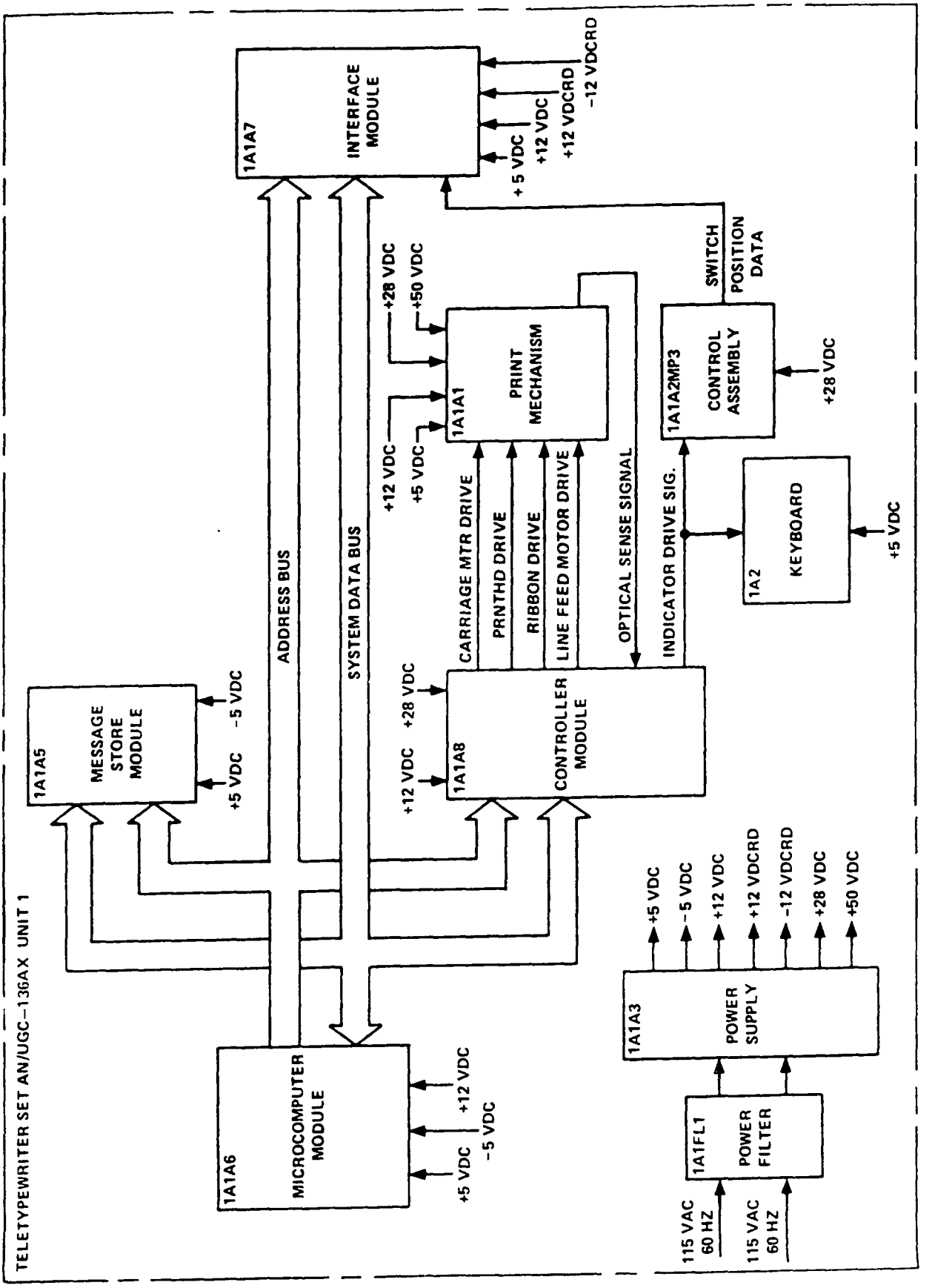
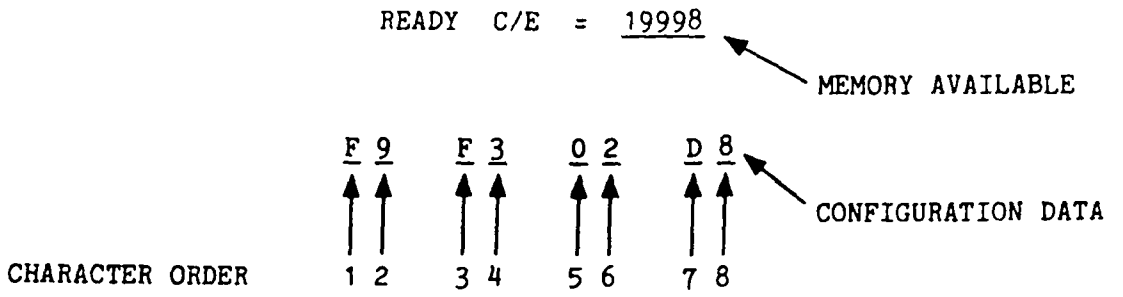


Figure 3-2. Power Distribution, Functional Block Diagram

3-4.2. Power-On Sequence. The power-on sequence begins when the dc voltages reach their operating level. The +5 Vdc applied to the Microcomputer module initiates the sequence by causing the resetting of all critical storage elements within the Keyboard Printer. After the microprocessor in the Microcomputer module has been reset, it will query the read only memory (ROM) to obtain the first set of instructions. The first set of instructions for the microprocessor will be to perform the self test operation. The self test operation begins by the microprocessor loading onto the address bus the code for selecting the Controller module. The Microcomputer module then loads the data onto the system data bus which is received and processed by the Controller module. The data received by the Controller module is stored in latches and used to light indicators on the Control assembly and Keyboard. The Microcomputer module will then generate the proper codes and load them onto the address bus for selecting the Interface module information. The Microcomputer module will then read, via the system data bus, the Control assembly switch position data contained in the Interface module. As each step of the self test operation is completed the indicators are turned off until all the indicators have been sequentially extinguished. The self test operation also checks the contents of the random access memories (RAM's) and the ROM's. The Microcomputer module generates codes for addresses for memory locations. Memory data is then loaded onto the system data bus by the Microcomputer module and routed to the selected locations in memory. After all the selected locations contain data the Microcomputer module reads the data and a comparison is performed between the data that was written into memory and the data read from memory.

3-4.3. Configuration Message Print Out. At the completion of the self test operation the switch and RAM data are stored and analyzed. The results of the analysis is a printed configuration message (figure 3-3). The configuration message contains a coded description of the configuration and the amount of unused memory. The printing of the configuration message is initiated by the Microcomputer module (figure 3-2). Data necessary to move the carriage assembly and print is first output to the Controller module. The carriage data word is output to the Controller module via the system data bus. Carriage motor phase signals are output to the Print Mechanism module and converted to signals which drive the carriage motor. Several carriage data words are required to move the carriage to the left margin. Each time the carriage motor is stepped, an optical sensor on the Print Mechanism module transmits a signal to the Controller module. The Controller module produces an interrupt signal to request the next carriage data signal from the Microcomputer module. When the carriage is in the correct position, character data is then accessed from memory and output to the Controller module on the system data bus. A printhead drive pulse is output to the Print Mechanism module, which activates the printhead solenoids to print the first column of dots. The carriage assembly is moving as the character is printed, and optical sensors located on the Print Mechanism module continue to transmit signals to the Controller module. These signals cause the next column of printhead data to be sent to the Print Mechanism module to activate the printhead solenoids and print the second column of data. The Controller module also sends interrupts to the Microcomputer module via the system data bus, which results in carriage data words being output to the Controller module to continue to drive the carriage motor. This sequence is repeated until all characters on a line have been printed. Whenever characters are being printed, the ribbon drive motor is also running to advance the ribbon. Data is output from the Microcomputer module to the Controller module via the system data bus. A current driver activates a voltage regulator which drives the ribbon motor on the Print Mechanism. After a line of characters has been printed, a line feed data word is routed to the Controller module from the Microcomputer module via the system data bus. The signals are converted to high current levels to drive the line feed motor on the Print Mechanism.



CHARACTER ORDER NO. 1

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
0	0	0	0	0	PARITY ENABLE = NONE PARITY SENSE = ODD ITA CODE SWITCH = 2 STOP BITS SWITCH = SGL
1	0	0	0	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = ODD ITA CODE SWITCH = 2 STOP BITS SWITCH = SGL
2	0	0	1	0	PARITY ENABLE = NONE PARITY SENSE = EVEN ITA CODE SWITCH = 2 STOP BITS SWITCH = SGL
3	0	0	1	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = EVEN ITA CODE SWITCH = 2 STOP BITS SWITCH = SGL
4	0	1	0	0	PARITY ENABLE = NONE PARITY SENSE = ODD ITA CODE SWITCH = 5 STOP BITS SWITCH = SGL
5	0	1	0	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = ODD ITA CODE SWITCH = 5 STOP BITS SWITCH = SGL
6	0	1	1	0	PARITY ENABLE = NONE PARITY SENSE = EVEN ITA CODE SWITCH = 5 STOP BITS SWITCH = SGL

Figure 3-3. Configuration Message Format (Sheet 1 of 11)

CHARACTER ORDER NO. 1-Continued

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
7	0	1	1	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = EVEN ITA CODE SWITCH = 5 STOP BITS SWITCH = SGL
8	1	0	0	0	PARITY ENABLE = NONE PARITY SENSE = ODD ITA CODE SWITCH = 2 STOP BITS SWITCH = MULT
9	1	0	0	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = ODD ITA CODE SWITCH = 2 STOP BITS SWITCH = MULT
A	1	0	1	0	PARITY ENABLE = NONE PARITY SENSE = EVEN ITA CODE SWITCH = 2 STOP BITS SWITCH = MULT
B	1	0	1	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = EVEN ITA CODE SWITCH = 2 STOP BITS SWITCH = MULT
C	1	1	0	0	PARITY ENABLE = NONE PARITY SENSE = ODD ITA CODE SWITCH = 5 STOP BITS SWITCH = MULT
D	1	1	0	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = ODD ITA CODE SWITCH = 5 STOP BITS SWITCH = MULT
E	1	1	1	0	PARITY ENABLE = NONE PARITY SENSE = EVEN ITA CODE SWITCH = 5 STOP BITS SWITCH = MULT
F	1	1	1	1	PARITY ENABLE = ODD/EVEN PARITY SENSE = EVEN ITA CODE SWITCH = 5 STOP BITS SWITCH = MULT

Figure 3-3. Configuration Message Format (Sheet 2 of 11)

CHARACTER ORDER NO. 2

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	BAUD RATE SWITCH POSITION
0	0	0	0	0	50
1	0	0	0	1	75
2	0	0	1	0	100
3	0	0	1	1	110
4	0	1	0	0	150
5	0	1	0	1	200
6	0	1	1	0	300
7	0	1	1	1	600
8	1	0	0	0	1200
9	1	0	0	1	2400
A	1	0	1	0	REMOTE
B	1	0	1	1	BLANK
C	1	1	0	0	TEST 1
D	1	1	0	1	TEST 2
E	1	1	1	0	TEST 3
F	1	1	1	1	TEST 4

CHARACTER ORDER NO. 3

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
C	1	1	0	0	BRK KEY = BRK REMOTE BAUD 2 = DSBL
D	1	1	0	1	BRK KEY = BRK REMOTE BAUD 2 = DSBL
E	1	1	1	0	BRK KEY = BRK REMOTE BAUD 2 = ENBL
F	1	1	1	1	BRK KEY = BRK REMOTE BAUD 2 = ENBL

Figure 3-3. Configuration Message Format (Sheet 3 of 11)

CHARACTER ORDER NO. 4

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
0	0	0	0	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ZERO
1	0	0	0	1	TX ECHO = ON PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ZERO
2	0	0	1	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ZERO
3	0	0	1	1	TX ECHO = ON PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ZERO
4	0	1	0	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ZERO
5	0	1	0	1	TX ECHO = ON PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ZERO
6	0	1	1	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ZERO
7	0	1	1	1	TX ECHO = ON PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ZERO
8	1	0	0	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ENBL

Figure 3-3. Configuration Message Format (Sheet 4 of 11)

CHARACTER ORDER NO. 4-Continued

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
9	1	0	0	1	TX ECHO = ON PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ENBL
A	1	0	1	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ENBL
B	1	0	1	1	TX ECHO = ON PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = NORM REMOTE BAUD 1 = ENBL
C	1	1	0	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ENBL
D	1	1	0	1	TX ECHO = ON PRINT XMIT DATA SWITCH = DSBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ENBL
E	1	1	1	0	TX ECHO = OFF PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ENBL
F	1	1	1	1	TX ECHO = ON PRINT XMIT DATA SWITCH = ENBL AUTO PRINT SWITCH = AUTO PRINT REMOTE BAUD 1 = ENBL

CHARACTER ORDER NO. 5

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
0	0	0	0	0	LOCAL CR = NO CR LOCAL LF = NO LF BITE SWITCH = NOT ACTIVE ENGLISH = NOT ACTIVE

Figure 3-3. Configuration Message Format (Sheet 5 of 11)

CHARACTER ORDER NO. 5-Continued

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
1	0	0	0	1	LOCAL CR = CR ACTIVE LOCAL LF = NO LF BITE SWITCH = NOT ACTIVE ENGLISH = NOT ACTIVE
2	0	0	1	0	LOCAL CR = NO CR LOCAL LF = LF ACTIVE BITE SWITCH = NOT ACTIVE ENGLISH = NOT ACTIVE
3	0	0	1	1	LOCAL CR = CR ACTIVE LOCAL LF = LF ACTIVE BITE SWITCH = NOT ACTIVE ENGLISH = NOT ACTIVE
4	0	1	0	0	LOCAL CR = NO CR LOCAL LF = NO LF BITE SWITCH = BITE ACTIVE ENGLISH = NOT ACTIVE
5	0	1	0	1	LOCAL CR = CR ACTIVE LOCAL LF = NO LF BITE SWITCH = BITE ACTIVE ENGLISH = NOT ACTIVE
6	0	1	1	0	LOCAL CR = NO CR LOCAL LF = LF ACTIVE BITE SWITCH = BITE ACTIVE ENGLISH = NOT ACTIVE
7	0	1	1	1	LOCAL CR = CR ACTIVE LOCAL LF = LF ACTIVE BITE SWITCH = BITE ACTIVE ENGLISH = NOT ACTIVE
8	1	0	0	0	LOCAL CR = NO CR LOCAL LF = NO LF BITE SWITCH = NOT ACTIVE ENGLISH = ENGLISH ACTIVE
9	1	0	0	1	LOCAL CR = CR ACTIVE LOCAL LF = NO LF BITE SWITCH = NOT ACTIVE ENGLISH = ENGLISH ACTIVE

Figure 3-3. Configuration Message Format (Sheet 6 of 11)

CHARACTER ORDER NO. 5-Continued

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
A	1	0	1	0	LOCAL CR = NO CR LOCAL LF = LF ACTIVE BITE SWITCH = NOT ACTIVE ENGLISH = ENGLISH ACTIVE
B	1	0	1	1	LOCAL CR = CR ACTIVE LOCAL LF = LF ACTIVE BITE SWITCH = NOT ACTIVE ENGLISH = ENGLISH ACTIVE
C	1	1	0	0	LOCAL CR = NO CR LOCAL LF = NO LF BITE SWITCH = BITE ACTIVE ENGLISH = ENGLISH ACTIVE
D	1	1	0	1	LOCAL CR = CR ACTIVE LOCAL LF = NO LF BITE SWITCH = BITE ACTIVE ENGLISH = ENGLISH ACTIVE
E	1	1	1	0	LOCAL CR = NO CR LOCAL LF = LF ACTIVE BITE SWITCH = BITE ACTIVE ENGLISH = ENGLISH ACTIVE
F	1	1	1	1	LOCAL CR = CR ACTIVE LOCAL LF = LF ACTIVE BITE SWITCH = BITE ACTIVE ENGLISH = ENGLISH ACTIVE

CHARACTER ORDER NO. 6

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
0	0	0	0	0	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = ONE PRINT ENABLE = ON

Figure 3-3. Configuration Message Format (Sheet 7 of 11)

CHARACTER ORDER NO. 6-Continued

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
1	0	0	0	1	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = ONE PRINT ENABLE = ON
2	0	0	1	0	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = ONE PRINT ENABLE = ON
3	0	0	1	1	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = ONE PRINT ENABLE = ON
4	0	1	0	0	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = TWO PRINT ENABLE = ON
5	0	1	0	1	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = TWO PRINT ENABLE = ON
6	0	1	1	0	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = TWO PRINT ENABLE = ON
7	0	1	1	1	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = TWO PRINT ENABLE = ON
8	1	0	0	0	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = ONE PRINT ENABLE = OFF
9	1	0	0	1	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = ONE PRINT ENABLE = OFF

Figure 3-3. Configuration Message Format (Sheet 8 of 11)

CHARACTER ORDER NO. 6-Continued

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
A	1	0	1	0	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = ONE PRINT ENABLE = OFF
B	1	0	1	1	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = ONE PRINT ENABLE = OFF
C	1	1	0	0	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = TWO PRINT ENABLE = OFF
D	1	1	0	1	RESET SWITCH = RESET PAPER LOW DETECTOR = LOW LINE SPACE SWITCH = TWO PRINT ENABLE = OFF
E	1	1	1	0	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = TWO PRINT ENABLE = OFF
F	1	1	1	1	RESET SWITCH = RESET PAPER LOW DETECTOR = OK LINE SPACE SWITCH = TWO PRINT ENABLE = OFF

CHARACTER CODE NO. 7

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
C	1	1	0	0	COVER = CLOSED SECOND STEP = SEC STP
D	1	1	0	1	COVER = OPEN SECOND STEP = SEC STP
E	1	1	1	0	COVER = CLOSED SECOND STEP = NO SEC STP

Figure 3-3. Configuration Message Format (Sheet 9 of 11)

CHARACTER CODE NO. 7-Continued

HEXIDECIMAL CODE	BINARY CODE 2^7	2^6	2^5	2^4	CONDITIONS PRESENT
F	1	1	1	1	COVER = OPEN SECOND STEP = NO SEC STP

CHARACTER ORDER NO. 8

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
0	0	0	0	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = RUN LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = NOT DECEL
1	0	0	0	1	SYNC INPUT = SYNC FAN = RUN LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = NOT DECEL
2	0	0	1	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = OFF LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = NOT DECEL
3	0	0	1	1	SYNC INPUT = SYNC FAN = OFF LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = NOT DECEL
4	0	1	0	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = RUN LEFT BRAKE = LFT BRK MOTOR = NOT DECEL
5	0	1	0	1	SYNC INPUT = SYNC FAN = RUN LEFT BRAKE = LFT BRK MOTOR = NOT DECEL
6	0	1	1	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = OFF LEFT BRAKE = LFT BRK MOTOR = NOT DECEL

Figure 3-3. Configuration Message Format (Sheet 10 of 11)

CHARACTER ORDER NO. 8-Cor inued

HEXIDECIMAL CODE	BINARY CODE 2^3	2^2	2^1	2^0	CONDITIONS PRESENT
7	0	1	1	1	SYNC INPUT = SYNC FAN = OFF LEFT BRAKE = LFT BRK MOTOR = NOT DECEL
8	1	0	0	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = RUN LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = DECEL
9	1	0	0	1	SYNC INPUT = SYNC FAN = RUN LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = DECEL
A	1	0	1	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = OFF LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = DECEL
B	1	0	1	1	SYNC INPUT = SYNC FAN = OFF LEFT BRAKE = $\overline{\text{LFT BRK}}$ MOTOR = DECEL
C	1	1	0	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = RUN LEFT BRAKE = LFT BRK MOTOR = DECEL
D	1	1	0	1	SYNC INPUT = SYNC FAN = RUN LEFT BRAKE = LFT BRK MOTOR = DECEL
E	1	1	1	0	SYNC INPUT = $\overline{\text{SYNC}}$ FAN = OFF LEFT BRAKE = LFT BRK MOTOR = DECEL
F	1	1	1	1	SYNC INPUT = SYNC FAN = OFF LEFT BRAKE = LFT BRK MOTOR = DECEL

Figure 3-3. Configuration Message Format (Sheet 11 of 11)

3-4.4. Interrupt Enable. During the power-on sequence, all interrupts except the programmable timer and motor clock interrupt signals are disabled by the mask latches on the Microcomputer module. Following the power on sequence, the microprocessor accesses an instruction from memory and enables these latches. Normal operation of the Keyboard Printer can take place, and any interrupts from the Keyboard or Interface module will be detected.

3-5. COMPOSE/EDIT FUNCTION (figure 3-4). The Compose/Edit function is initiated by the operator depressing the EDIT MSG key and the EXIT/ENTER key. This action will generate a keyboard interrupt signal (KBINTC) from the Keyboard. The KBINTC is routed to the Microcomputer module where it is detected by the microprocessor. Each depression of a key will generate a KBINTC. After the KBINTC has been detected and processed by the microprocessor the Keyboard eight-bit data word (KBD0-KBD7) is read via the system data bus. The eight-bit data word contains the edit function operational code. The Microcomputer module will process the code and establish the edit mode of operation. After the edit mode has been entered, the operator will select the data in memory to edit or compose a new message for entering into memory. As the Microcomputer module processes the data from the Keyboard it is sent, via the system data bus, to the Message Store module. The data is entered into the location of memory corresponding to the information on the address bus. The address bus is generated from the Microcomputer module. The Microcomputer module performs a memory write operation using the memory write command (MEMWC). After the editing or composing operation is completed the Microcomputer module will perform a memory read operation by generating the memory read command (MEMRC). The information is read from the Message Store module to the Microcomputer module, via the system data bus. The Microcomputer module then selects the Controller module by issuing the proper code on the address bus. The Microcomputer module initiates an input/output write command (IOWC) and routes the data from the Message Store module to the Controller module via the system data bus. The Controller module processes the information and generates the appropriate printhead drive code to print the character. The ribbon drive, line feed motor drive, and carriage motor drive signals are also generated along with the printhead drive and routed to the Print Mechanism. The Print Mechanism prints the composed/edited information contained in the Message Store module.

3-6. TRANSMIT FUNCTION (figure 3-5). The transmit function is initiated by the operator depressing the TX MSG key and the EXIT/ENTER key on the Keyboard. Each depression of a key will generate a keyboard interrupt command (KBINTC). The KBINTC is routed to the Microcomputer module where it is detected and processed. After the KBINTC has been processed the Microcomputer module will read the keyboard eight-bit data word (KBD0-KBD7). The first word will contain the code for the transmit message operation. The Microcomputer module will process this code and establish the operation. If the operator intends to transmit a message already contained within the Message Store module he will key in the message number. The Microcomputer module will process the message number and then read from the Message Store module the message for transmission. If the operator intends to transmit directly from the Keyboard he will key in the message from the Keyboard. The Microcomputer module will read and process each eight-bit data word as it is generated. The Microcomputer module will then apply the location code to the address bus selecting the area of the Message Store module where the data is to be stored. The Microcomputer module generates a memory write command (MEMWC) and the data is transferred from the Microcomputer module to the Message Store module, via the system data bus, where it is written into memory. To transmit, the Microcomputer module must read the data from memory. The address bus contains the location code where the data is to be read from. This along with the memory read command (MEMRC) allows the

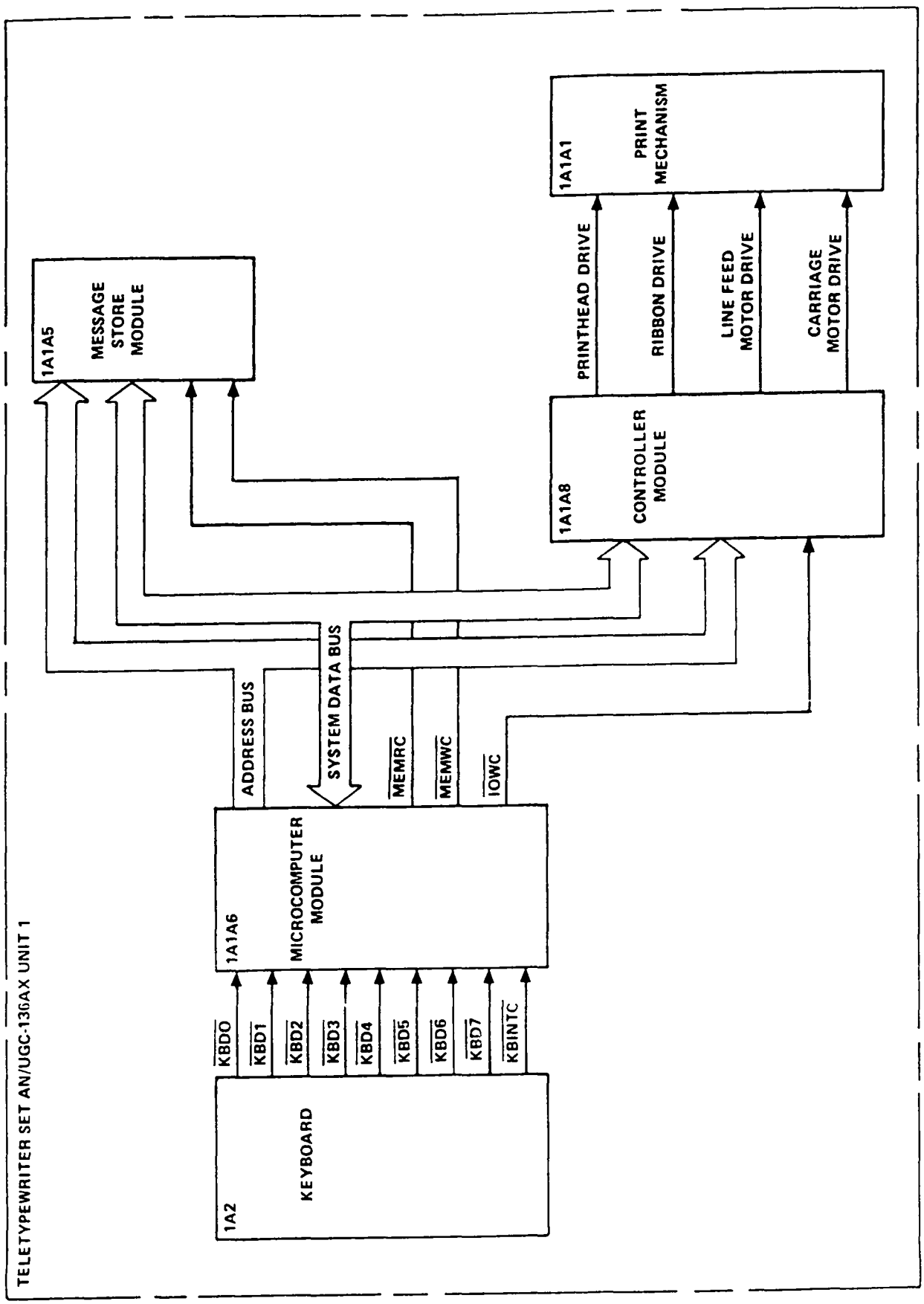


Figure 3-4. Compose/Edit, Functional Block Diagram

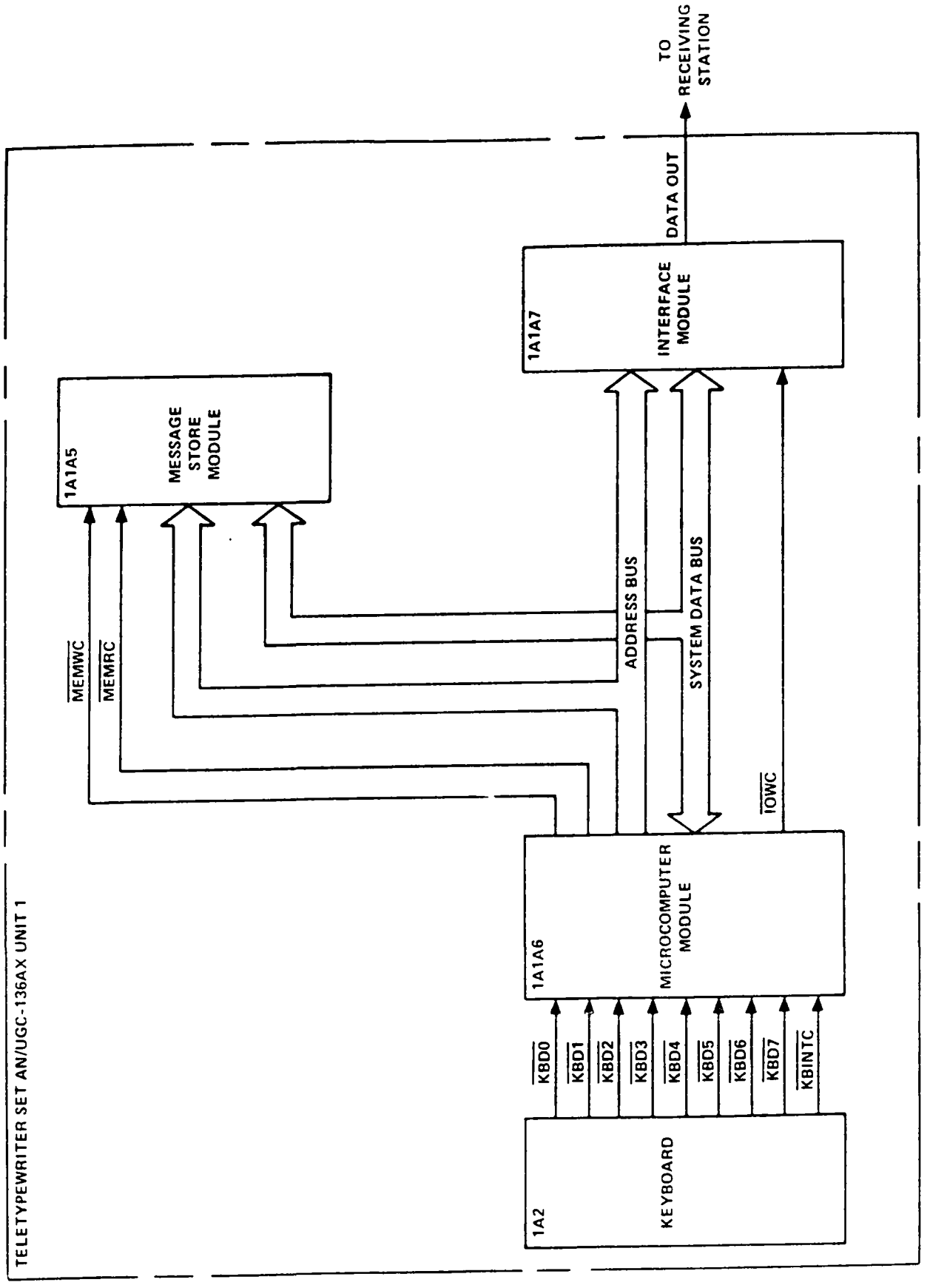


Figure 3-5. Transmit, Functional Block Diagram

Microcomputer module to read the data from memory via the system data bus. The Microcomputer module then generates an input/output write command (IOWC) which is routed to the Interface module. The address bus contains the location code which allows the Interface module to read the IOWC. The Microcomputer module then transfers each character, as it is read from the Message Store module to the Interface module via the system data bus. The Interface module converts the parallel-formatted data word into a serial format. The serially-formatted data word is then converted into a bipolar signal and transmitted on-line to a receiving station. The transmit cycle continues until all the data in the Message Store module has been read and transmitted.

3-7. RECEIVE FUNCTION (figure 3-6). The receive function begins when data is received from a sending station by the Interface module. The Interface module will then generate an interrupt (MINT4C) which is routed to the Microcomputer module. The Microcomputer module detects the interrupt and initiates the receive function. The Microcomputer module generates an input/output read command (IORC) which is routed along with the address bus to the Interface module. The address bus contains the proper selection code for the Interface module. The Interface module then loads the received data onto the system data bus for transfer to the Microcomputer module. After the data is transferred the Microcomputer module will generate a memory write command (MEMWC) along with the address bus. The address bus contains the proper selection code for the Message Store module. The Microcomputer module transfers the received data, via the system data bus, to the Message Store module for storage in memory. If insufficient memory is available for storing the received data a forced delete operation will take place. During a forced delete operation the Microcomputer module will delete messages in the Message Store module until sufficient memory is available. For the priority of deletion of messages in memory, refer to table 3-1. This process of receiving and storing data continues until the complete received message is stored in memory. If the Keyboard Printer is in a autoprint configuration the Control assembly applies an autoprint command (AUTOPRC) to the Microcomputer module. The Microcomputer module generates the memory read command (MEMRC) along with the address bus containing selection code for the Message Store module. The received data is then transferred from the Message Store module to the Microcomputer module. The Microcomputer module then routes the input/output write command (IOWC) and address bus to the Controller module. The address bus contains the selection code for the Controller module. The received data is then transferred to the Controller module from the Microcomputer module. The Controller module processes the received data and generates the corresponding printhead drive signal for each of the characters in the message. The Controller module routes the printhead drive signals to the Print Mechanism along with the ribbon drive, LF motor drive, and carriage motor drive signals.

3-8. BITE FUNCTION (figure 3-7). The BITE function is initiated by the operator setting the BITE/LF switch to the BITE position. The Control assembly routes the BITE command (BITEC) to the Keyboard, Interface module, and Controller module. The BITEC prevents the Keyboard from being operated until completion of the BITE. The BITEC inhibits receiving and transmitting operations in the Interface module until completion of the BITE. The BITEC is also routed to the Controller module where it is held in a latch. The Microcomputer module queries the Controller module periodically for Control assembly switch position. This is accomplished by the Microcomputer module generating an input/output read command (IORC) along with the address bus. The address bus contains the selection code for the Controller module. The data representing the Control assembly switch positions is loaded onto the system data bus and transferred to the Microcomputer module. The Microcomputer module will process the data and perform the BITE operation. The program for the BITE

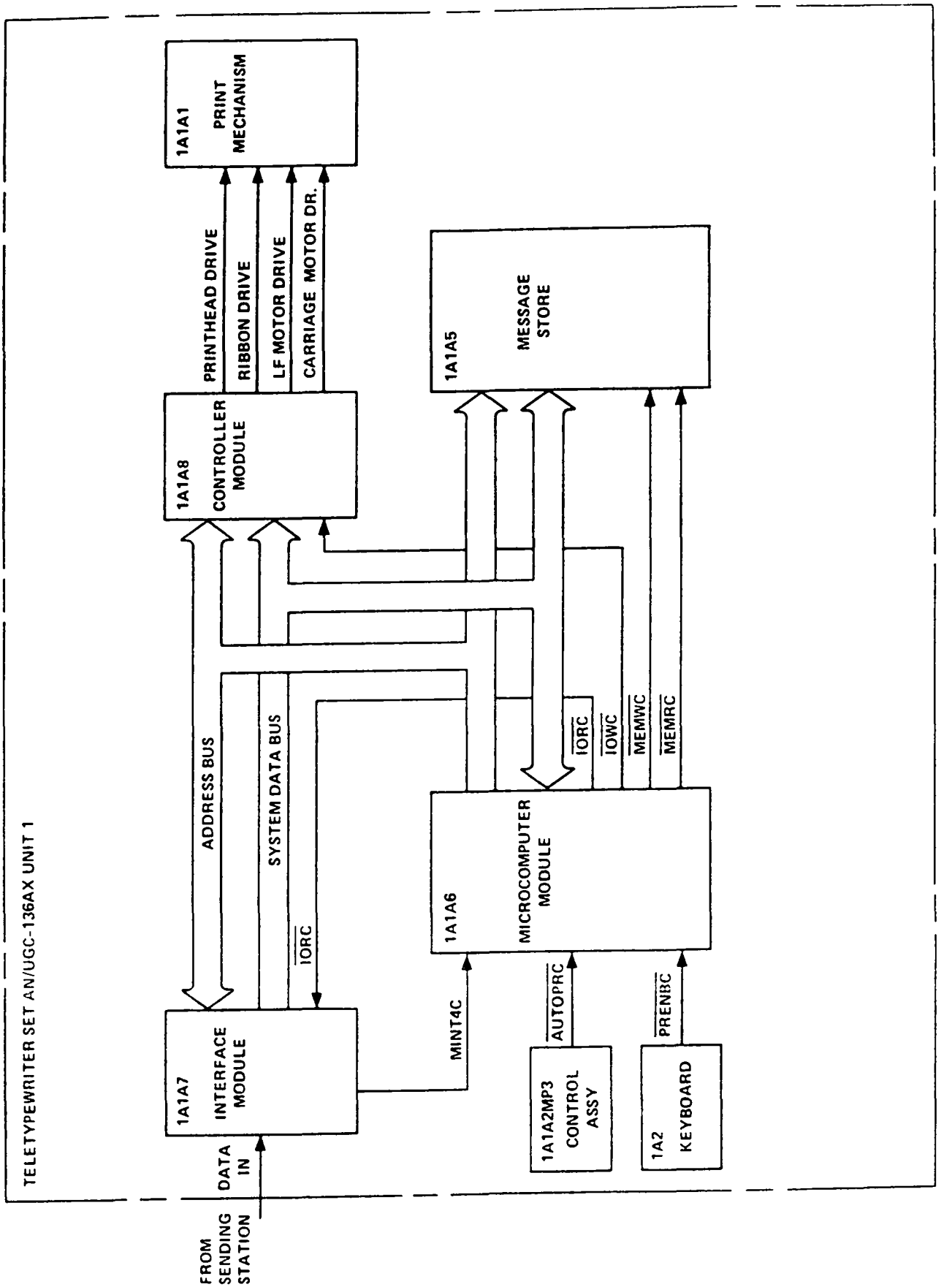


Figure 3-6. Receive, Functional Block Diagram

Table 3-1. Priority for Deletion of Stored Messages

Priority	Description
1	Oldest received messages that have been printed.
2	Oldest received messages that have not been printed. Messages to be deleted are printed then annotated as having been deleted.
3	Received messages that have been edited and printed.
4	Received messages that have been edited and not printed. Messages to be deleted are printed then annotated as having been deleted.
5	Messages that have been composed and printed.
6	Messages that have been composed and not printed. Messages to be deleted are printed and annotated as having been deleted.
7	Messages being transmitted. Transmission will be terminated.
8	Message being received. Message store will be completely clear at the end of received data.

operation is contained within the Interface module. The memory read command ($\overline{\text{MEMRC}}$) is generated by the Microcomputer module and routed along with the address bus, containing the proper selection code, to the Interface module. The BITE program is then transferred, via the system data bus, to the Microcomputer module. The Microcomputer module generates the input/output write command ($\overline{\text{IOWC}}$) which is routed along with the address bus to the Controller module. The BITE program, consisting of character code and printing information, is transferred, via the system data bus, to the Controller module. The Controller module will process the character codes and printing information and route the printhead drive, ribbon drive, LF motor drive, and carriage motor drives to the Print Mechanism. The Print Mechanism will print the print test pattern (figure 2-4) in less than 35 seconds if the equipment is operating properly.

3-9. BLOCK DIAGRAM LEVEL. This section contains block diagram functional descriptions of all Keyboard Printer modules. Since the Microcomputer module is the hub of operations within the Keyboard Printer, it is described first, followed by Interface, Message Store, Controller, Print Mechanism, Keyboard, and Power Supply modules.

3-10. MICROCOMPUTER MODULE A1A6 (figure 3-8). The Microcomputer module accomplishes all main processing functions and terminal activities for the Keyboard Printer as described in the following paragraphs.

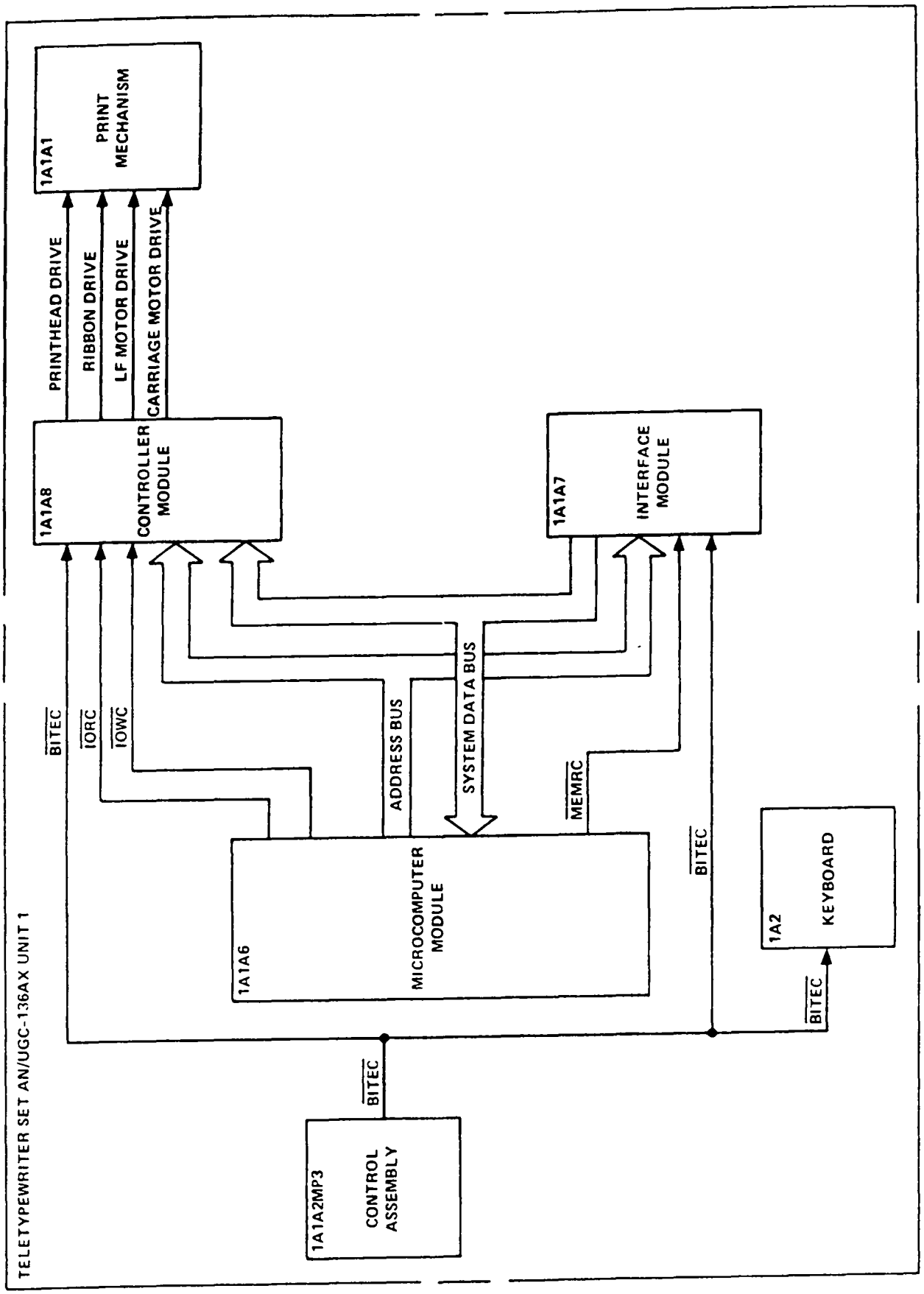


Figure 3-7. BITE, Functional Block Diagram

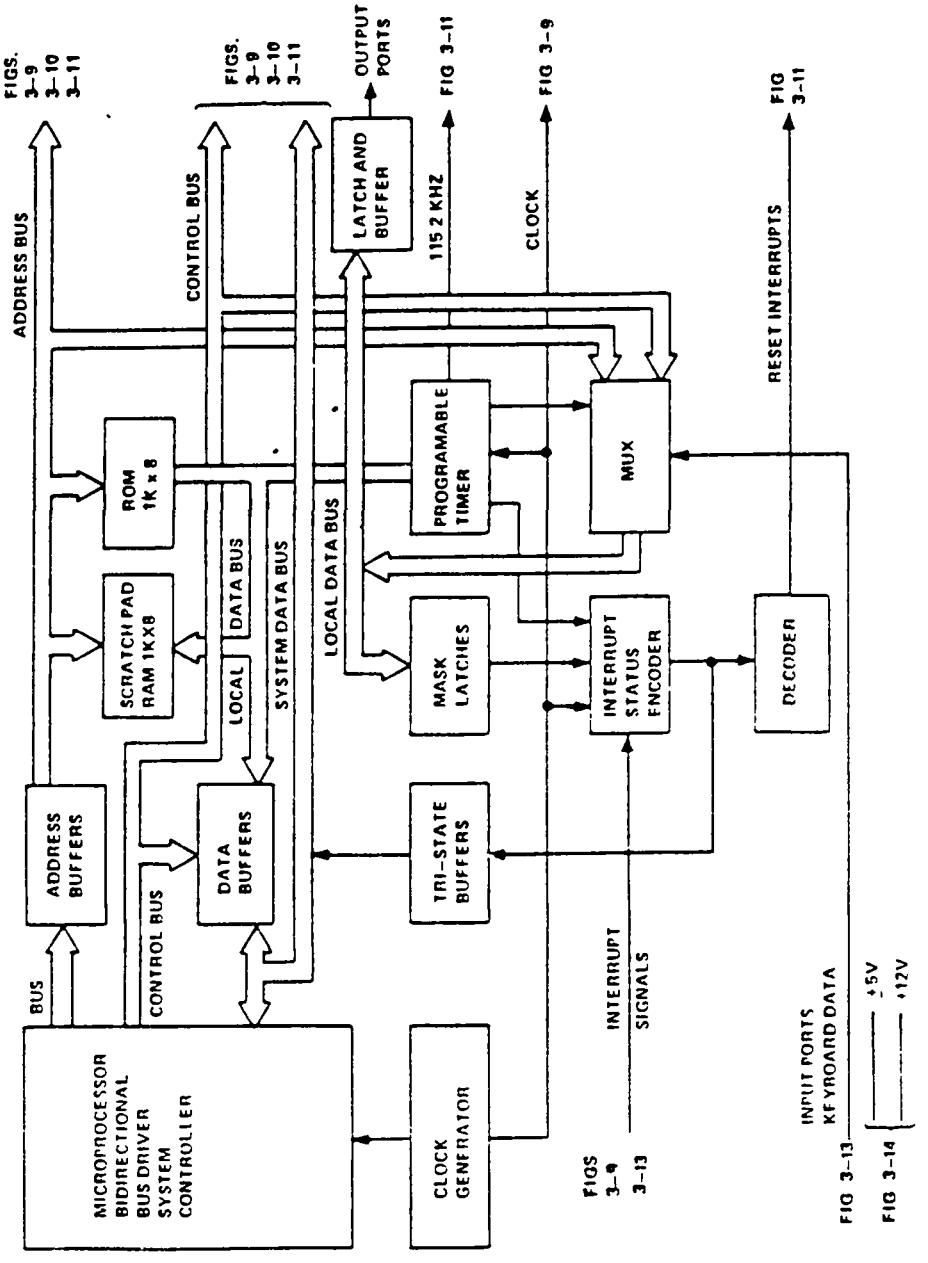


Figure 3-8. Microcomputer Module (A1A6), Functional Block Diagram

3-10.1. Main Processing and Control. Main processing and control of all Keyboard Printer activities are performed by the microprocessor and support components on the Microcomputer module. The microprocessor is supported by a clock generator and a bidirectional bus driver system controller, hereinafter referred to as system controller. The clock generator provides the necessary synchronization and timing of the microprocessor clock outputs for the Microcomputer and Interface modules. The system controller decodes microprocessor status data to provide read, write, and interrupt acknowledge signals.

3-10.2. Bus Buffering and Address Decoding. Buffering and decoding of the various data buses are as follows:

3-10.2.1. System data bus. The bidirectional system data bus is buffered by the system controller.

3-10.2.2. Local data bus. The local data bus is buffered and bused to/from the system data bus using tri-state bidirectional buffers.

3-10.2.3. Address bus. The address bus is buffered at the microprocessor output and addresses memory functions on the Microcomputer, Interface, Message Store and Controller modules.

3-10.2.4. Control bus. This bus controls data flow to and from the system data bus and the local data bus. This is done by address decoding and gating in conjunction with the appropriate read/write signals.

3-10.3. Interrupt Structure. The Microcomputer module uses an eight-level vectored interrupt scheme. A six-bit latch is loaded from the local data bus to enable/disable (mask) the interrupts. When an interrupt becomes active, a logic low is input to the microprocessor. The interrupt lines are gated with the mask latches and clocked into a status holding latch. This latch also applies the outputs to a priority encoder which encodes the eight input lines. The three output lines are latched when the microprocessor recognizes the interrupt request from the encoder. The microprocessor reads the three bits from the latch, through tri-state buffers, which are gated onto the system data bus. A reset instruction is executed by the microprocessor, which acknowledges receipt of the interrupt and generates a logic low reset pulse to reset the interrupting circuit.

3-10.4. Programmable Timer. The programmable timer consists of four 4-bit synchronous counters driven by a 1.8432 MHz clock. The last two counters in the chain can be preset with any 8-bit value from the local data bus using an OUT instruction. Interrupts of 139 microseconds up to 35.6 milliseconds are possible by presetting the counter and are used for real time control of internal functions.

3-10.5. Read-Only and Random-Access Memories. There are 1024 bytes of ROM which contain microprocessor instructions. There are also 1024 bytes of RAM (scratch pad memory) which are used by the microprocessor for storing variables.

3-10.6. Input/Output Ports. An unlatched 8-bit input port receives data from the Keyboard. Input can be read onto the local data bus instruction. One 8-bit output port provides Keyboard and Control Assembly indicator signals.

3-11. INTERFACE MODULE A1A7 (figure 3-9). The Interface module controls the transmit and receive data interface between the Keyboard Printer and the external interface. This module is addressed by the microprocessor (Microcomputer module),

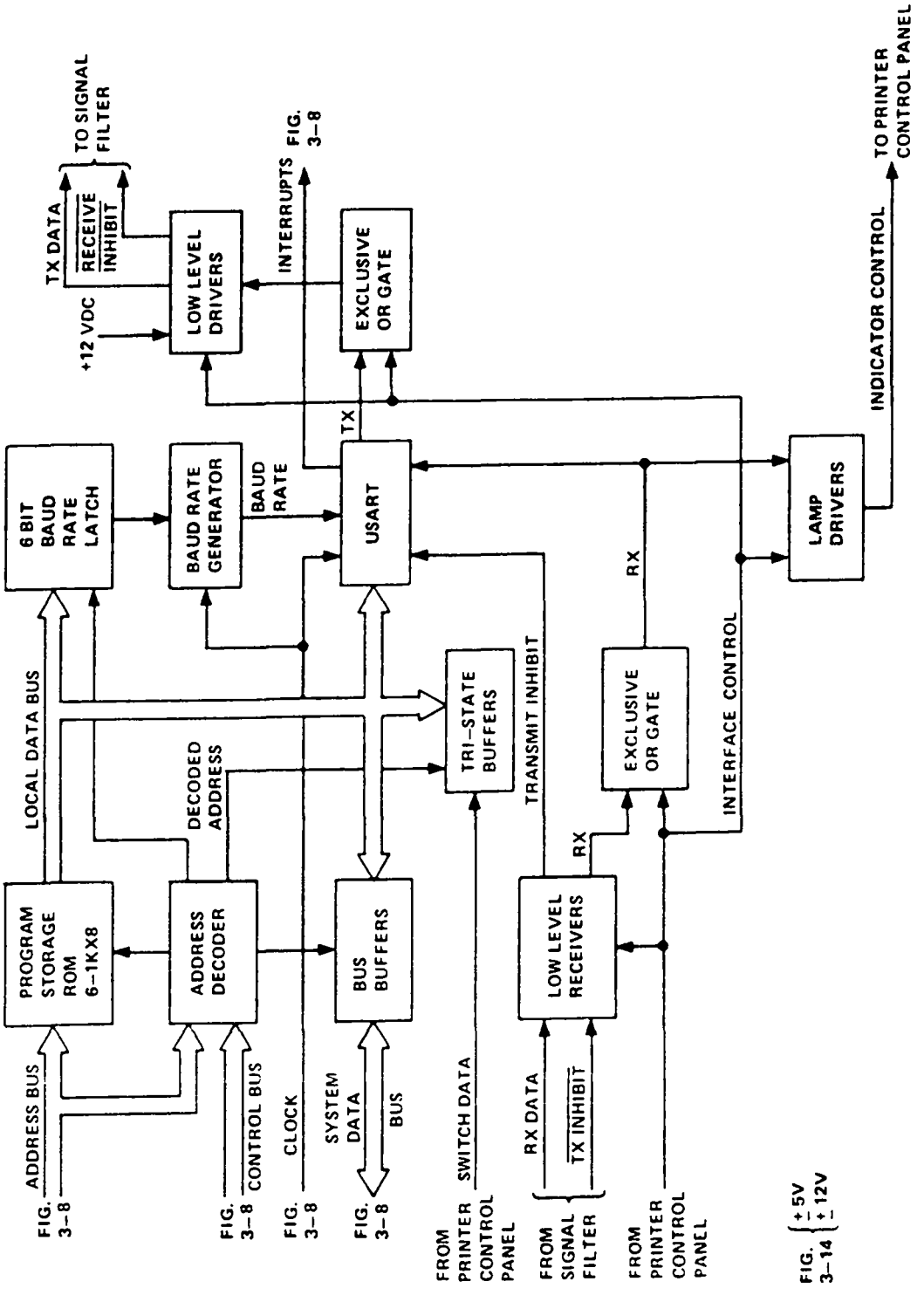


Figure 3-9. Interface Module (A1A7), Functional Block Diagram

to input switch data (baud rate, parity, ITA-2, or ITA-5), for controlling the data transfer. It generates interrupts for data transmission/reception to the microprocessor, which then establishes the correct data structure for receiving and transferring data on the communicating line.

3-11.1. ROM Memory. Program storage is contained in six 1K x 8 ROMs. The ROM outputs are routed over the local data bus, which is buffered from the system data bus. The buffers are tri-state devices and are connected to allow bidirectional data flow on both the local data bus and the system data bus. Direction of data flow is maintained by the control bus.

3-11.2. Communication Interfaces. All serial data transfers are under control of the microprocessor, which is located on the Microcomputer module. Serial data transfer is accomplished via a pro-grammable USART, a programmable baud rate generator, and a six-bit baud rate latch. The communication functions are performed under interrupt control. The USART generates interrupts to the microprocessor for each character of data received, or whenever it needs another character to transmit.

3-11.3. Receive Data. Low level bipolar data (±6 Vdc) is received by a line receiver and converted to TTL levels. The data signals are routed to an exclusive OR gate which is used to invert the polarity of all incoming data, depending upon the position of the configuration control DATA REC switch. This data is then routed to the USART, converted to parallel form, and input to the microprocessor via the system data bus. The microprocessor retrieves data from the USART and stores it in the Microcomputer module scratch pad RAM.

3-11.4. Transmit Data. Parallel transmit data received from the microprocessor is input to the USART via the system data bus, serialized, and output to an exclusive OR gate. The exclusive OR gate is connected to the configuration control DATA XMIT switch, which allows the transmitted data to be inverted. It is then gated to line drivers which convert the TTL levels to bipolar ± 6 Vdc.

3-11.5. Control Signals. The interface control signals (transmit inhibit and receive inhibit) are low level signals. The transmit inhibit input signal is input to the Microcomputer module via the USART and system data bus to temporarily halt the Keyboard Printer's data transmission. The receive inhibit signal is an output which is used to temporarily halt the external terminal from sending data.

3-11.6. Switch and Lamp Control. The microprocessor has access to the Configuration Control Panel switches (figure 2-2) via the Interface module. These switches are: BAUD RATE, PARITY, STOP BITS, ITA CODE, XMT ECHO, and XMT PRNT. The settings of these switches are read onto the local data bus (figure 3-9) and output to the system data bus by addressing the respective input ports. The Interface module contains three lamp drivers capable of illuminating the BELL, PAPER LOW, and RCV BSY indicators on the Keyboard Printer Control Panel.

3-12. MESSAGE STORE MODULE A1A5 (figure 3-10). The Message Store module is under complete control of the Microcomputer module. It consists of 3 - 2K x 8 ROM chips for program storage and 36 4K x 1 RAM chips for character storage.

3-12.1. ROM. The ROM holds program instruction codes for message store operations. To read these instructions, the microprocessor issues from memory a read command which is decoded to select the addressed ROM. The addressed ROM places the instruction on the output local data bus to the I/O buffers and on to the system data bus. The instruction is then read by the Microcomputer module.

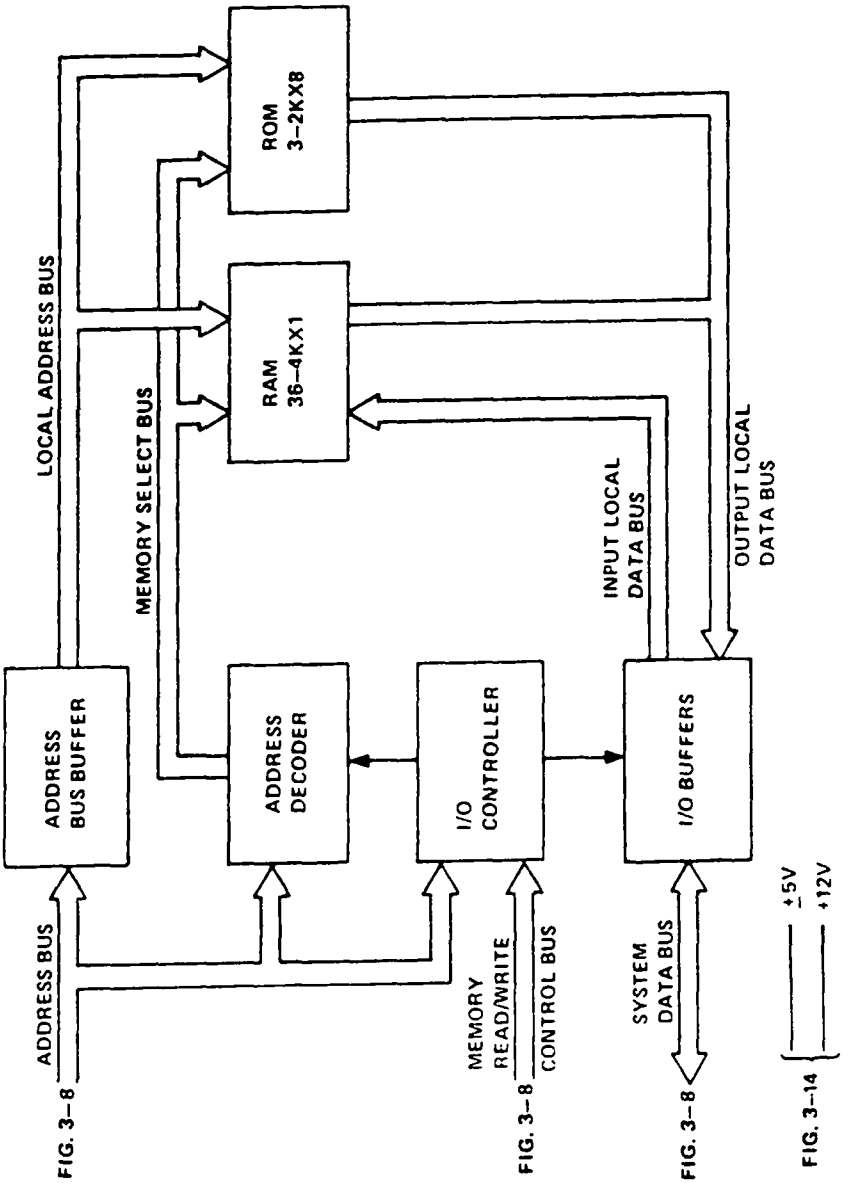


Figure 3-10. Message Store Module (A1A5), Functional Block Diagram

3-12.2. RAM. The microprocessor can read or write data from or into the Message Store module RAM chips by issuing a memory read or write command. The command is passed through the I/O controller to the address decoder, which selects the appropriate RAM chips. The selected RAM chips then either store the data or read the data. Stored data from the system data bus is sent to the RAM via the I/O buffer and input to the local data bus. It is then written into the RAM memory. Output data (read) is passed through the I/O buffers to the system data bus to the Microcomputer module.

3-13. CONTROLLER MODULE A1A8 (figure 3-11). The Controller module performs printhead fire control, character font control, and motor control; interprets switch and optical sensor states; and detects fan failure.

3-13.1. Printhead Fire Control. The motor interrupt and printhead fire control signal is derived optically from the timing disc on the Print Mechanism module and is applied to a comparator circuit on the Controller module. The fire control signal is then sent to the printhead logic circuits, which generate a 400-microsecond pulse. This pulse enables the outputs of the character font ROM, which are then applied to the Print Mechanism module.

3-13.2. Character Font. The seven most significant address bits that address the 2K x 8 character font ROM are output by the Microcomputer module and stored in a 7-bit latch. The remaining four bits are supplied by a 4-bit up/down counter. The output of the character font ROM determines which pins are to be driven.

3-13.3. Switch and Sensor Interface. All optical sensor outputs from the Print Mechanism module are sensed by voltage comparators, and these signals (except printhead fire control) are sent to the Microcomputer module via the system data bus. The states of seven control switches are also sensed on the Controller module. These inputs are applied to the Microcomputer module (figure 3-8) via the system data bus. The bus buffer allow the Microcomputer module to read the reset, bite, print enable, line space, local carriage return, local line feed switches and the paper low detector, timecount, sync, left brake, fan, start/stop, and cover open detector signals.

3-13.4. Motor Control. The majority of the circuitry on the Controller module (figure 3-11) is dedicated to controlling the speed of the carriage motor, stepping the line feed motor, and controlling the printhead drive. All carriage motor control functions are based on a motor interrupt to the Microcomputer module, which then responds with an instruction step to maintain a one-to-one relationship between the motor interrupt and the instruction step. This assures that the Microcomputer module always knows the position of the carriage. The method used for controlling the speed of the carriage motor is to step it up to a rate, (R) steps per second, and then not allow the microprocessor to step the motor any faster. This is accomplished by the start-stop logic. The line feed motor is under control of the Microcomputer module and is stepped six times for each line feed. The ribbon drive motor is also under direct control of the Microcomputer module and is turned on whenever print operations are being performed. Proper phasing of the carriage and line feed motors is performed by two digital phase generators.

3-13.5. Fan Fail Detect. The fan fail detect is a temperature sensing circuit, continually monitored by the Microcomputer module. Insufficient air flow over a temperature-sensitive voltage comparator will cause the printer to print FAN OFF prior to shutting the power supply down.

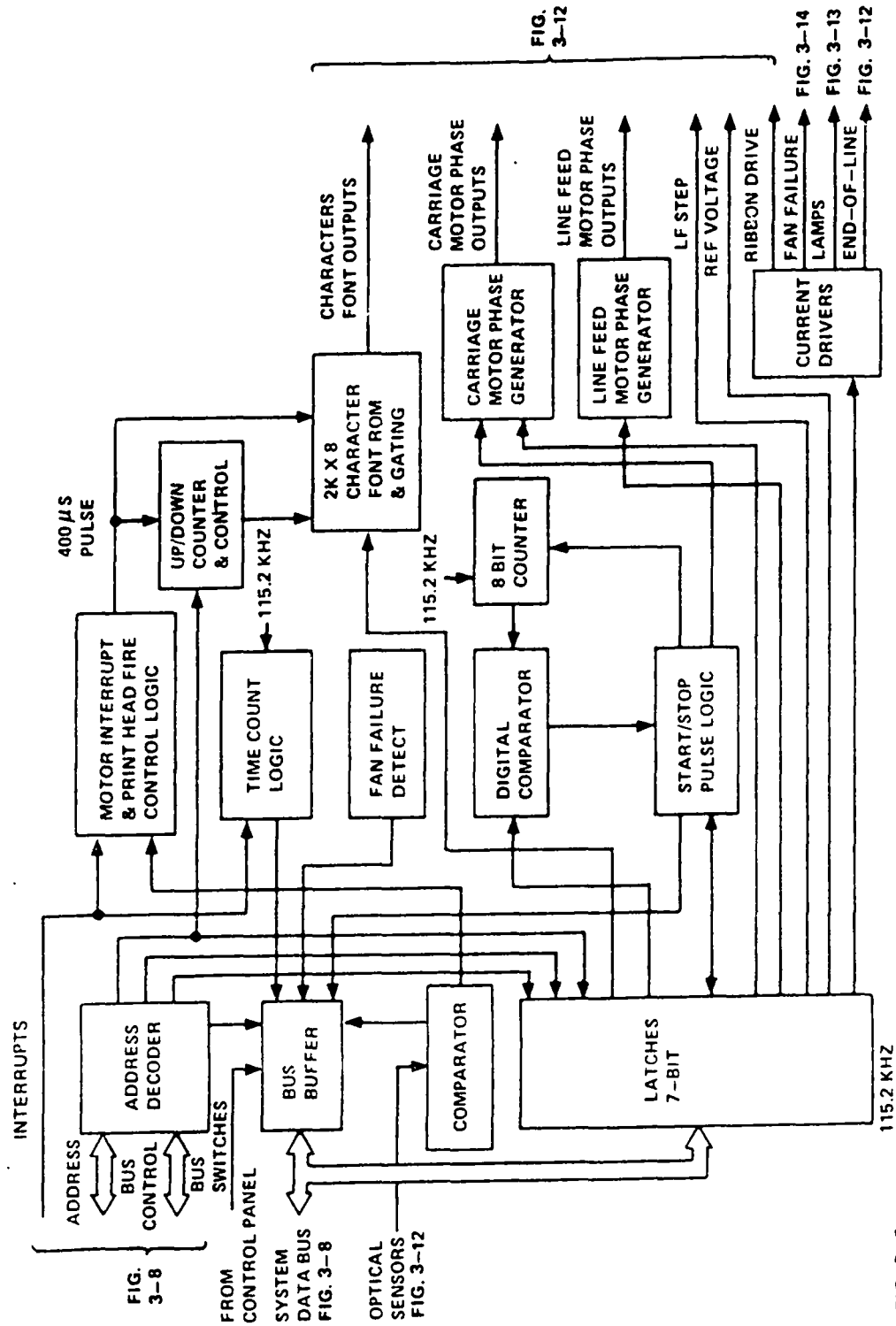


Figure 3-11. Controller Module (A1A8), Functional Block Diagram

3-14. PRINT MECHANISM MODULE A1A1 (figure 3-12). The Print Mechanism module consists of several functional subassemblies mounted on a single chassis which can be disconnected and removed from the main chassis of the Keyboard Printer.

3-14.1. Pin Driver Module. The Pin Driver module contains seven solenoids that drive the print wires. The print wires impact the ribbon, which strikes the paper to form the dots which make up the character matrix. The Pin Driver module provides the required current to the solenoids in response to the character font input from the Controller module.

3-14.2. Motor Driver Module. The Motor Driver module contains drive circuits for the carriage motor, line feed motor, and ribbon motor, and provides reference voltages to the Pin Driver module.

3-14.2.1. Carriage motor phase. Each phase of the four-phase stepper motor, which moves the printhead carriage, is powered by a chopper-type drive circuit. This circuit receives its input and reference voltage control from the Controller module and is used to step the carriage motor at both normal and high speed as the reference voltage is increased.

3-14.2.2. Line feed motor circuits. These circuits provide the appropriate power to drive the four-phase stepper motor, which advances the paper past the printhead. Line feed signals are supplied to the line feed motor phase circuits from the Controller module. The line feed motor power switch is turned on when the line feed motor is stepping and is turned off when the motor is motionless.

3-14.2.3. Ribbon motor drive. This circuit provides a regulated dc output to the ribbon drive motor in response to inputs from the Controller module.

3-14.3. Paper Feed. Paper is fed between the retaining plate assembly and platen by a line feed motor. The paper feed mechanism is shown in figure 2-7. The line feed motor (figure 3-12) is stepped six times for each line of print in response to input signals from the Motor Driver module.

3-14.4. Carriage Assembly. Seven printhead wires are electromechanically activated by solenoids. During the print cycle, each solenoid cell is addressed and pulsed with a high current from the Pin Driver module. This, in turn, drives the associated printhead wire against the ribbon which strikes the paper. The carriage assembly also contains the ribbon feed motor which drives a removable ribbon cassette. The ribbon feed motor (dc) runs continuously whenever the Keyboard Printer is printing.

3-14.5. Carriage Motor and Timing Disc Assembly. The carriage motor and timing disc assembly contains a stepper motor used to move the carriage and the timing disc. The timing disc provides information to the Microcomputer module on the number of degrees the stepper motor has moved. Optical sensors are mounted on the carriage motor and timing disc assembly. As the timing disc rotates, pulses are generated by the light sensors. These pulses are then input to the Microcomputer module and Controller module, which determine the exact position of the carriage assembly and the exact point to energize the printhead solenoids.

3-14.6. Paper Detector. An optical source/detector assembly, mounted under the platen, detects the presence or absence of paper on the platen. The assembly consists of a light source and a detector, sensitive to the amount of reflected light. White paper will reflect more light into the detector than the darker platen. The

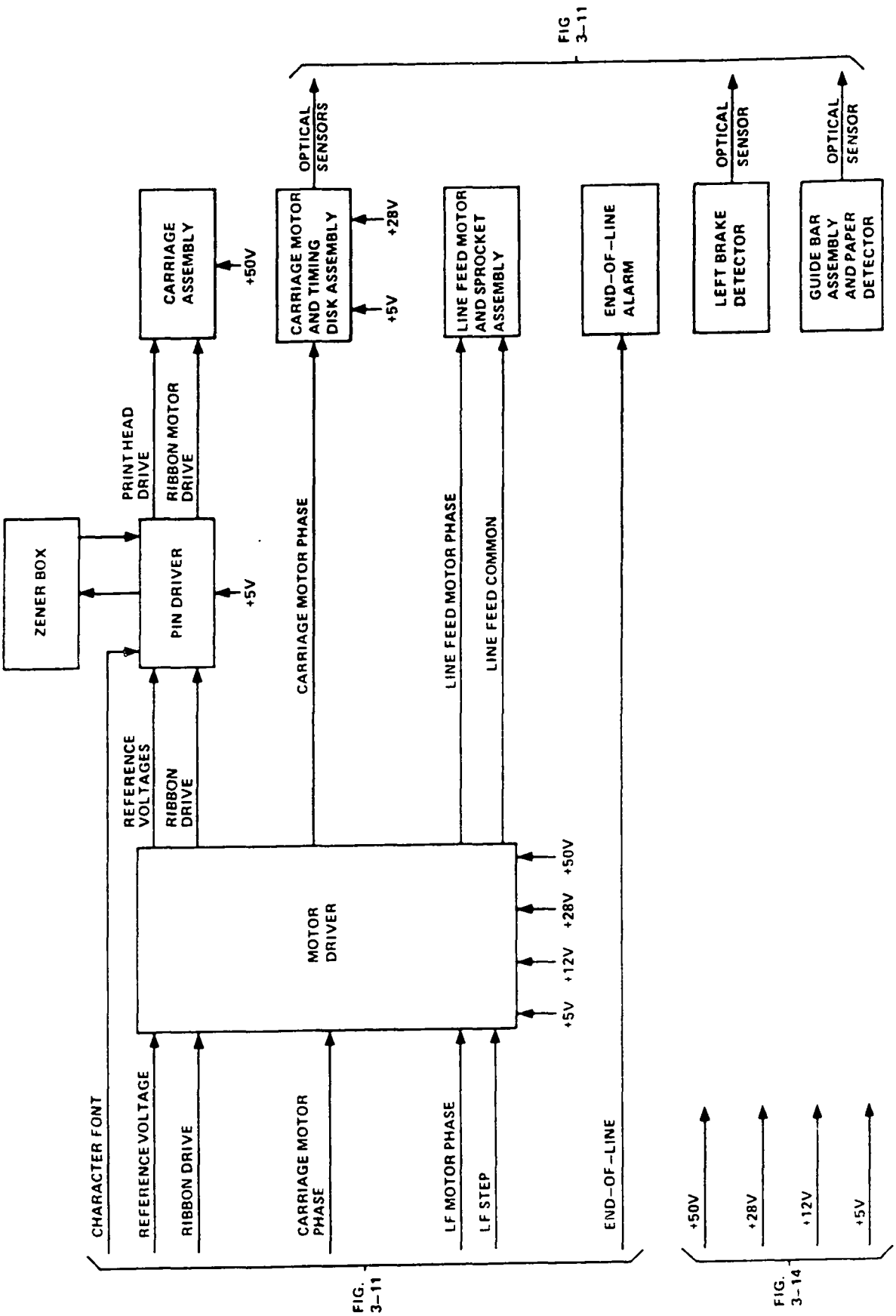


Figure 3-12. Print Mechanism Module (A1A1), Functional Block Diagram

resulting signal is sent to the Controller module. This data is then input to the Microcomputer module.

3-14.7. Audible End-of-Line Alarm. An audible end-of-line alarm, mounted on the Print Mechanism module, is activated on the 65th (69 characters to the line) or 76th (80 characters to the line) character of a line and is controlled from the Controller module.

3-14.8. Copy Lamps. Two copy lamps, mounted on the Print Mechanism module, are used to illuminate the paper. The intensity is controlled by a potentiometer located on the Keyboard Printer Control Panel.

3-14.9. Left Brake Detector. An optical sensor mounted on the Print Mechanism module detects when the carriage assembly is approaching the left margin. The signal is sent to the Controller module. This data is then input to the Microcomputer module.

3-14.10. Zener Box. The Zener box located on the Print Mechanism contains two Zener diodes, CR1 and CR2. Zener CR1 provides a balance between the +28V and +50V, the latter voltage which is used by the pin driver circuits. Zener CR2 provides a voltage limit to the pin driver circuits.

3-15. KEYBOARD A2 (figure 3-13). The Keyboard consists of the keyswitch assembly and the Keyboard Logic module. The keyswitch assembly has five indicators and all keyboard switches physically mounted on it. The alphanumeric keyswitches are wired in an 8 x 8 matrix. Depressing one key results in an X line and a Y line selection, which is then encoded by the Keyboard Logic module. The function of the Keyboard Logic module is to detect a key depression, interrupt the microprocessor, and output a data code representing the key depressed. The Keyboard Logic module incorporates two-key rollover protection, whereby, when a second key is depressed, a new key code will not be output to the microprocessor until the first key is released. The five 5-volt indicators on the Keyboard are used to indicate status of the Keyboard Printer to the operator, i.e., ERROR, XMT ACT, C/E ACT, MSG ST ACT, and shift lock. See figure 2-3 for the location and table 2-3 for description of these indicators.

3-16. POWER SUPPLY (figure 3-14). The Power Supply consists of chassis mounted components and Power Supply module A1A3.

3-16.1. Chassis Mounted Components. The 115-vac input power enters the Keyboard Printer at J1 and passes through a chassis mounted RFI filter to the circuit breaker which also functions as the power switch for the Keyboard Printer. The switched 115 vac power from the switch is routed to the Power Supply module.

3-16.2. Power Supply Module A1A3. The Power Supply module consists of a voltage regulator electronic component assembly in a shielded enclosure. It provides six (6) regulated dc output voltages to the Keyboard Printer. All dc output voltages are current limited and isolated from the AC input voltage. In addition, a phase shifter 115 vac output, referenced to the input power line, is provided for the chassis-mounted fan.

3-16.2.1. Voltage regulation. The 115 vac input voltage is rectified by a full-wave bridge to produce a nominal 155 vdc level which is filtered and applied to a

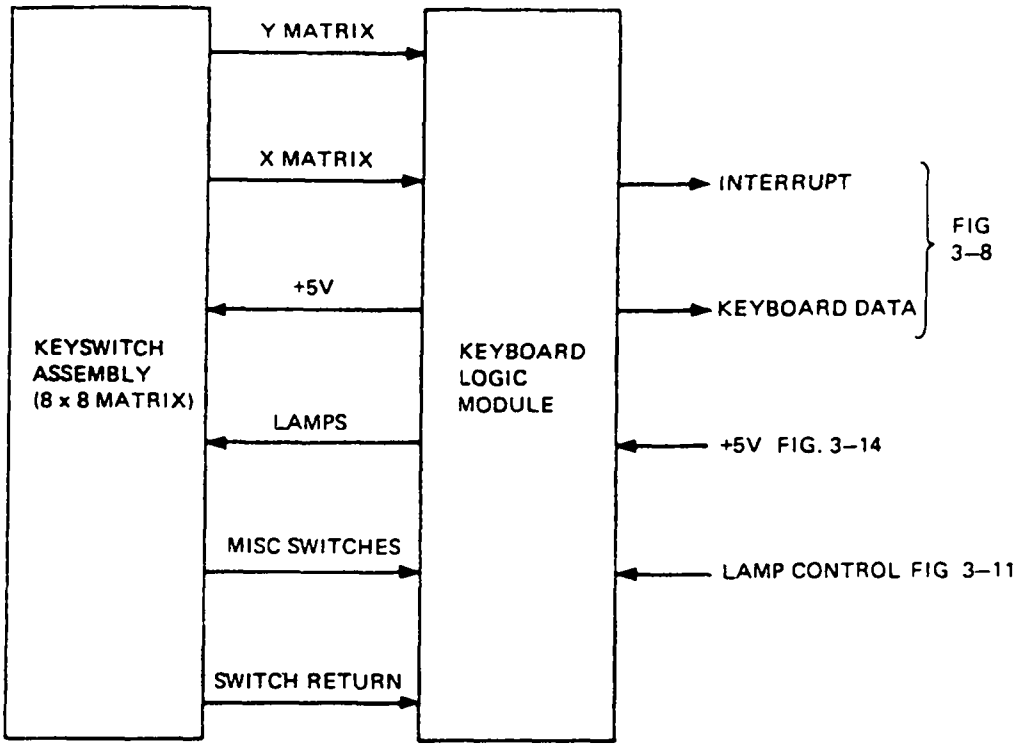


Figure 3-13. Keyboard (A2), Functional Block Diagram

transistor converter. The transistor converter is a pulsewidth-modulated half-bridge configuration operated at a fixed frequency of 60 kHz. The converter transformer has three secondary windings producing 60 kHz pulsewidth-modulated output voltages that are rectified and filtered by inductor-capacitor filters to provide the dc output voltages required by the Keyboard Printer. The rectified and filtered output of one winding produces the +5-volt output which is fed back to the control circuit where it is compared with a reference dc voltage. The difference between the feedback and reference voltages is amplified and applied to a pulsewidth modulator, which controls the pulsewidth of the 60 kHz drive signal to the half-bridge converter transistors so that the output voltage is regulated at +5 volts. The output of a second center-tapped winding on the converter transformer is rectified and filtered to produce dc voltages of +28 volts and +56 volts. The +28-vdc output is provided as a direct output. The +56 volts is applied to a series regulator to produce the +50 volt output. The +50 volt regulator is referenced to the +28 volt output and regulates at 22 volts above the +28 volt bus. Semiregulated voltages of $\pm$16 volts dc are produced by rectifying and filtering the output of a third center-tapped converter transformer winding. Integrated circuit regulators are used to provide regulated +12 vdc, -12 vdc and -5 vdc outputs from the $\pm$16 volts.

3-16.2.2. Protection circuits. Each of the six dc output voltages are individually protected from damage by a short circuit or current overload. The +5-, +12- and -5-volt outputs are also protected from overvoltage. If an overvoltage occurs on these outputs, the Power Supply module shuts off and remains off until input power is removed, the cause of the overvoltage is corrected, and power is

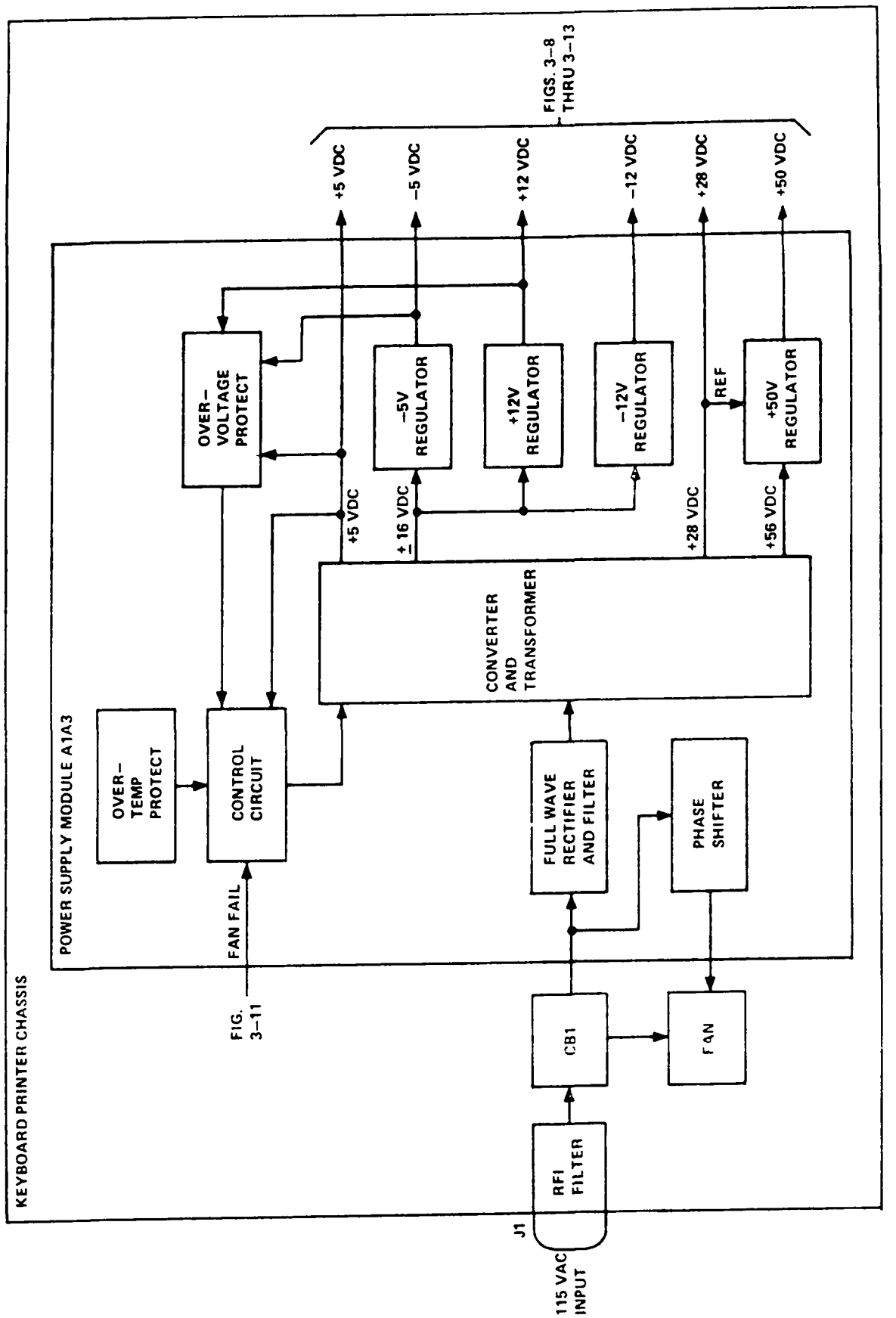


Figure 3-14. Power Supply, Functional Block Diagram

reapplied. A control input signal from the fan fail detector circuit located on the Controller module also shuts off the Power Supply module in the manner of an overvoltage condition if there is a fan failure detected. Overtemperature protection is also incorporated by means of a thermistor sensor located on the heat sink in the vicinity of the converter transistors. When the heat sink temperature reaches the maximum safe level, the Power Supply module shuts off until the temperature decreases by approximately 10°C before turning on again.

3-16.2.3. Minimum voltage and current. The Power Supply module does not turn on until the input voltage reaches 85 vac. The +5-volt output must be loaded with 2 amperes minimum and the +28-volt output must be loaded with 1 ampere minimum in order for the Power Supply module output voltages to remain in regulation.

CHAPTER 4

SCHEDULED MAINTENANCE

4-1. INTRODUCTION. This chapter contains preventive maintenance procedures for the Keyboard Printer to be accomplished on a scheduled basis. Included is a scheduled maintenance action index and procedures required to inspect and clean the equipment.

NOTE

The scheduled maintenance instructions in this manual are intended to duplicate those furnished in the Planned Maintenance System (PMS). In case of conflicts, the PMS documentation takes precedence. Such conflicts should be reported immediately on the user comment sheet in accordance with the maintenance procedures for this manual.

4-2. SCHEDULED MAINTENANCE ACTION INDEX. A list of scheduled maintenance actions is contained in table 4-1. The periodicity column gives the scheduled interval for performance of these procedures. The periodicity symbols are as follows:

INTERVAL	SYMBOL
Daily	D
Weekly	W
Monthly	M

The maintenance action column lists the maintenance action which corresponds to the periodicity symbol in column 1, and the reference column states the number of the table that contains the procedure listed in column 2.

4-3. PREVENTIVE MAINTENANCE PROCEDURES. Procedures required to clean and inspect the Keyboard Printer are contained in tables 4-2, 4-3, and 4-4. Lubrication of the Print Mechanism Module is given in table 4-4. Upon completion of preventive maintenance procedures, perform the Performance Verification Instructions listed in table 5-3.

WARNING

When using alcohol for cleaning, adequate ventilation must be provided. Avoid inhalation of the fumes and prolonged skin contact.

Wear protective eye gear when using pressurized air.

Table 4-1. Scheduled Maintenance Action Index

Periodicity	Maintenance action	Reference
D & W	Cleaning	Tables 4-2, 4-3
M	Air Filter Cleaning	Table 4-4
M	Lubrication	Table 4-4
D	Inspection	Table 4-2

Table 4-2. Daily Preventive Maintenance Procedures

Type maintenance	Material required	Level personnel	Procedures
Inspect Ribbon Cassette	Cassette	ET/RMSN	Inspect visually. If the characters are not discernible, replace ribbon cassette in accordance with table 2-7.
Inspect Paper Roll	Paper Roll	ET/RMSN	Inspect visually. If paper roll is low, replace in accordance with table 2-7.
Test Panel Indicators	Lamps	ET/RMSN	Turn on equipment, if indicators fail to illuminate, replace lamps in accordance with table 2-7.
Test Print Mechanism Module Lights	Lamps	ET/RMSN	Adjust copy illumination control (COPY ILLUM). Replace faulty lamp in accordance with table 2-7.
Verify Configuration Panel Switch Settings	None	ET/RMSN	During turn-on procedure the printout should be used to verify the switch positions (table 2-4, steps 3 through 5). If printout is incorrect, refer to Chapter 5.

Table 4-2. Daily Preventive Maintenance Procedures-Continued

Type maintenance	Material required	Level personnel	Procedures
Verify Blower Operation	None	ET/RMSN	Feel for air flow from vent at right side of Keyboard Printer. If there is no air flow, refer to Chapter 5.
Verify Print Function	None	ET/RMSN	Set the BITE switch to ON, printout shall conform to figure 2-4. If printout is incorrect, refer to Chapter 5. If print contrast is poor, adjust carriage shaft lever (figure 6-2).

Table 4-3. Weekly Preventive Maintenance Procedures

Type maintenance	Material required	Level personnel	Procedures
Clean Platen or Paper Roller	Alcohol type TT-I-735, Lintless Cloth or Brush	ET/RMSN	Clean platen or paper rollers with alcohol on lintless cloth or brush.
Clean Margin Sensor and Paper Low Sensor	Alcohol type TT-I-735, Lintless Cloth or Brush	ET/RMSN	Wipe clean with alcohol on lintless cloth or brush.

Table 4-4. Monthly Preventive Maintenance Procedures

Type maintenance	Material required	Level personnel	Procedures
Clean Print Mechanism	Vacuum Cleaner	ET/RMSN	Vacuum paper dust from the print mechanism and inside the front cover.
Clean Exterior Case	Lintless Cloth	ET/RMSN	Wipe with dry lintless cloth.
Clean Switches	Bristle Brush	ET/RMSN	Clean with soft bristle brush.
Clean Air Filter	Water and soap	ET/RMSN	Remove and wash with hot soapy water. Blow dry with low pressure (25 PSI) air (paragraph 6-4.14).
Clean and lubricate Carriage Shaft	Machine Oil type MIL-M-6085 and Lintless Cloth	ET/RMSN	Wipe the carriage shaft clean with a lintless cloth. Apply several drops of MIL-type light machine oil. Move carriage left and right to distribute oil on carriage shaft. Wipe excess oil off shaft with a lintless cloth.
Clean printhead guide bar	Alcohol type TT-I-735, Lintless Cloth	ET/RMSN	Wipe clean with alcohol on lintless cloth.

CHAPTER 5

TROUBLESHOOTING

5-1. INTRODUCTION. This chapter provides organizational level troubleshooting procedures. The information is supported by fault logic diagrams.

5-2. TROUBLESHOOTING INDEX. Table 5-1 is a troubleshooting index.

5-3. RELAYS AND LAMPS. No relays are used in the Keyboard Printer. Lamps used are identified in table 5-2.

5-4. TROUBLESHOOTING. When a Keyboard Printer fault occurs, the method of troubleshooting is to perform the Performance Verification Instructions listed in table 5-3. These instructions will reference fault isolation diagrams, figures 5-2 through 5-14, which contain specific troubleshooting procedures. The fault isolation diagrams lead the maintenance personnel to a module or chassis-mounted components.

5-5. PERFORMANCE VERIFICATION. Performance verification consists of preliminary and operational checkout instructions. The performance verification instructions are listed in table 5-3. Preliminary instructions in preparing and applying electrical power to the Keyboard Printer are provided in table 5-3 The successful completion of the performance verification instructions will ensure that the Keyboard Printer is functioning properly. If a malfunction does occur, reference is provided to the troubleshooting and fault isolation instructions. After any malfunction is corrected, repeat all operational instructions.

5-6. MODULE LOCATIONS. The physical location of the modules of the Keyboard Printer are identified in figure 6-2.

5-7. POWER SUPPLY MODULE TEST POINTS. The test point locations and measurements of the Power Supply module (figure 5-1) can be accessed only with the cover removed. Table 5-4 provides references for test point measurements.

5-8. KEYBOARD MALFUNCTIONS. Any Keyboard malfunction and/or damage impairing its operation is the responsibility of higher level maintenance. Replace Keyboard with a spare (para 6-4.1). Refer to figure 5-3 for troubleshooting procedures.

5-9. REAR PANEL CONNECTORS. Table 5-5 provides information for both the power and signal interface connectors, J1 and J2 respectively.

5-10. PROTECTIVE DEVICES. The only protective device contained within the Keyboard Printer is the POWER ON/OFF circuit breaker CB1, located on the Keyboard Printer Control Panel. CB1 will open when the current drawn by the Keyboard Printer exceeds 7 amps.

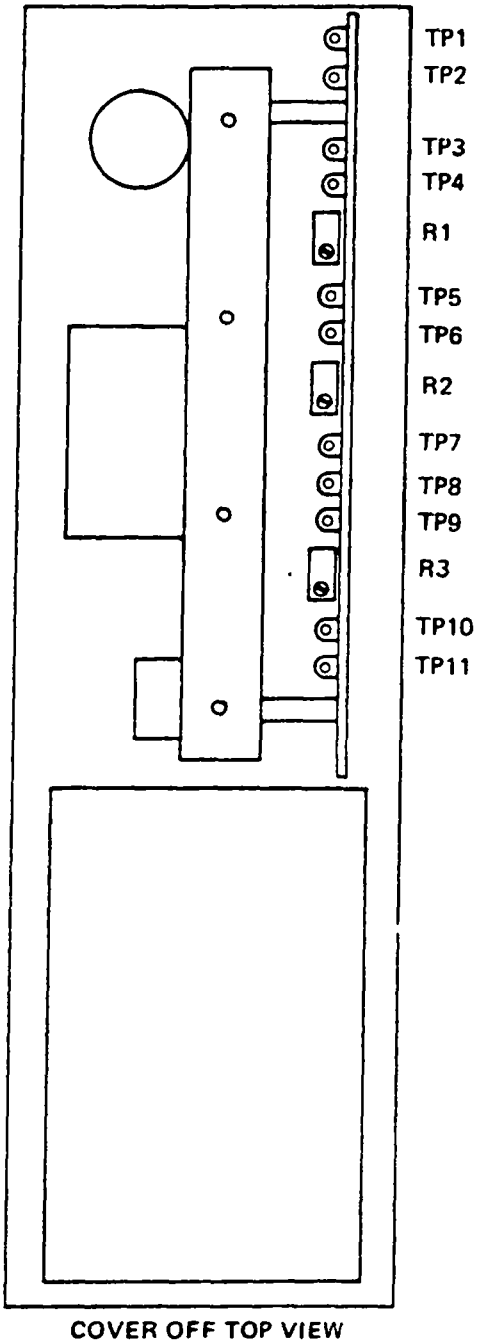


Figure 5-1. Power Supply Test Point Location

Table 5-1. Troubleshooting Index Teletypewriter Set AN/UGC-136AX

Functional area	Fault isolation diagram	Functional description paragraph	Alignment/ adjustment paragraph
BITE Inoperative	Figure 5-8	3-8	6-2, 6-3.2
Carriage Assembly Margin Alignment	Figure 5-7	3-14.5	None
Configuration Message Printout	Figure 5-7	3-4.3	None
Copy Illumination	Figure 5-11	3-4.1	None
End-of-Line Alarm	Figure 5-6	3-14.7	None
Garbled Print	Figure 5-14	3-7	None
Keyboard	Figure 5-3	3-15	None
Keyboard and Control Panel Lamps	Figure 5-5	3-4.1	None
Missing Dot	Figure 5-10	3-14.1	None
Paper Feed and Ribbon Advance	Figure 5-9	3-14.3, 3-14.4	None
Power	Figure 5-4	3-4.1	None
Power on sequencing	Figure 5-2	3-4.1.1	None
Receive	Figure 5-12	3-7	None
Transmit	Figure 5-13	3-6	None

Table 5-2. Indicator Lamp Index

Reference designation	Functional name	Energizing voltage	Troubleshooting diagram (fig. no.)
1A1A1DS1	COPY ILLUMINATION	28 Vdc	5-5
1A1A1DS2	COPY ILLUMINATION	28 Vdc	5-5
1A1A2A3DS1	BELL	28 Vdc	5-5
1A1A2A3DS2	PAPER LOW	28 Vdc	5-5
1A1A2A3DS4	RCV BUSY	28 Vdc	5-5
1A1A2A3DS5	POWER	28 Vdc	5-5

Table 5-3. Performance Verification Instructions

Instruction	Performance standard	Reference
	WARNING	
	Death or injury may occur if the power cable safety ground wire is not connected to a suitable AC receptacle safety ground return. Also, an additional safety strap must be connected to E1 ground stud at the rear of the Keyboard Printer. (para 8-7.2)	
1. Preliminary		
a. Set POWER switch on Keyboard Printer control panel to OFF.	POWER lamp not illuminated.	Figure 2-1
b. Check input power ac with DVM.	Keyboard Printer is not connected to facility electrical power.	
c. Check power input source at J1.	115 Vac, 60 Hz	Facility electrical connection power input.
d. Release the two cover fasteners on front of the Keyboard Printer cover and raise cover to latch-open position.	Cover open to latch-open position.	
e. Check Keyboard Printer for proper installation of modules.		Figure 6-2
f. Remove all obstructions from keyboard.		
g. Check paper supply and install new roll of paper as required.	Paper supply properly installed.	Table 2-7, steps 1 through 10
h. Check ribbon cassette.	Ribbon cassette properly installed.	Table 2-7, steps 11 through 16

Table 5-3. Performance Verification Instructions-Continued

Instruction	Performance standard	Reference
i. Check configuration control panel switches.		Table 2-4, step 3
j. Check belts for proper operation.	Move carriage manually left and right and observe all belts for proper movement, e.g., no interference, damage or slipping.	Paragraph 6-4.8, .9 .10
k. Connect Keyboard Printer to facility power and signal cables.		Facility electrical connection power input and signal cables
l. Close cover and secure fasteners.		
2. Set POWER switch to ON.	All lamps light for about one second except the RCV BUSY and the shift lock light remains off.	Figures 2-1, 2-3, 5-4, 5-5
	Audible end-of-line alarm sounds.	Figure 5-2
	End-of-line alarm turns off.	Figure 5-2
	BELL indicator turns off.	Figure 5-2
	PAPER LOW indicator turns off.	Figure 5-2
	All keyboard indicators turn off.	Figure 5-2
	Carriage assembly aligns to left margin.	Figure 5-2
	Configuration message is printed. Ref para 3-4.3	Figure 5-2

Table 5-3. Performance Verification Instructions-Continued

Instruction	Performance standard	Reference
	NOTE	
The printhead automatically moves four spaces to the right of the last character in a configuration message. This permits the operator to review the text. The printhead automatically returns four spaces to the left when printing resumes.		
3. Check for fan operation, or "FAN OFF" Msg printed.	Feel air flow from vent on right side of Keyboard Printer	Paragraphs 3-13.5, 6-3.3, Figure 5-4
4. Perform BITE test. (table 2-4, step 6)	All indicator lamps and end-of-line alarm are turned off.	Figure 5-8
	Test message is printed within 35 seconds.	Paragraph 6-2.1, Figure 5-8
	End-of-line alarm is turned on at end of first printed line of test message. Remaining indicators are turned off when last line of test message is ready for printing.	Figure 5-8
RCV BUSY lamp will remain ON if Keyboard Printer not installed in communications system.		
5. Perform visual inspection of test message.	Test message shall contain all 128 ITA-5 characters on 49 lines of 80 characters per line in a rolling pattern.	Figures 2-4, 5-9, 5-10
6. Check copy lamps operation.	Lamp illumination will vary from off to full on by COPY ILLUM potentiometer.	Figure 5-11 Table 2-7 (steps 17-19)

Table 5-3. Performance Verification Instructions-Continued

Instruction	Performance standard	Reference
7. Transmit a message from the system to the Keyboard Printer to check the Receive mode.	RCV BUSY lamp blinking and message received and printed by the Keyboard Printer without error.	Paragraph 3-7 Figures 5-12, 5-14 and Ship System Manual
8. Transmit a message from the Keyboard Printer to the system to check the Transmit mode. (table 2-4, steps 15 through 18)	Message will be transmitted as typed on Keyboard.	Paragraph 3-6 Figures 5-13, 5-14

Table 5-4. Power Supply Test Point Measurements

Test point	Measurement	Adjust
1	+50V	None
2	+28V	None
3	GND	None
4	+2.5 ±.01V	R1
5	+1.01V	None
6	+5 ±.01V	R2
7	+5V	None
8	-12V	None
9	+12 ±.05V	R3
10	-5V	None
11	+24V	None

Table 5-5. Rear Panel Connectors and Signal Interface Information

Connector	Function
J1 Power Connector (five-pin, male receptacle connector) Pin — Signal A — 115 VAC B — 115 RTN C — GND (chassis) D — Not used E — Not used	Connects Keyboard Printer to AC power source.
J2 Signal Connector (25-pin, male receptacle connector) Pin — Signal 1 — RXD1/RXDV28 2 — TXD1/TXDV28 3 — TX1NH1C 4 — RCV1NH1C 5 — BELLV28 6 — RBRS1 7 — RBRS2 8 — RBRSS 9 — STCS-2 10 — STCS-1 11 — STC-2 12 — STC-1 13 thru 23 — Not used 24 — IORTN 25 — Chassis GND	Through signal cable, provides signal interface or input/output signals between Keyboard Printer and other equipment. Receive Data Transmit Data Transmit Inhibit Receive Inhibit External Bell Remote Baud Rate Select 1 Remote Baud Rate Select 2 Remote Baud Rate Select Status Transmit Switch Transmit Switch Transmit Switch Transmit Switch Not used I/O Return Chassis Ground

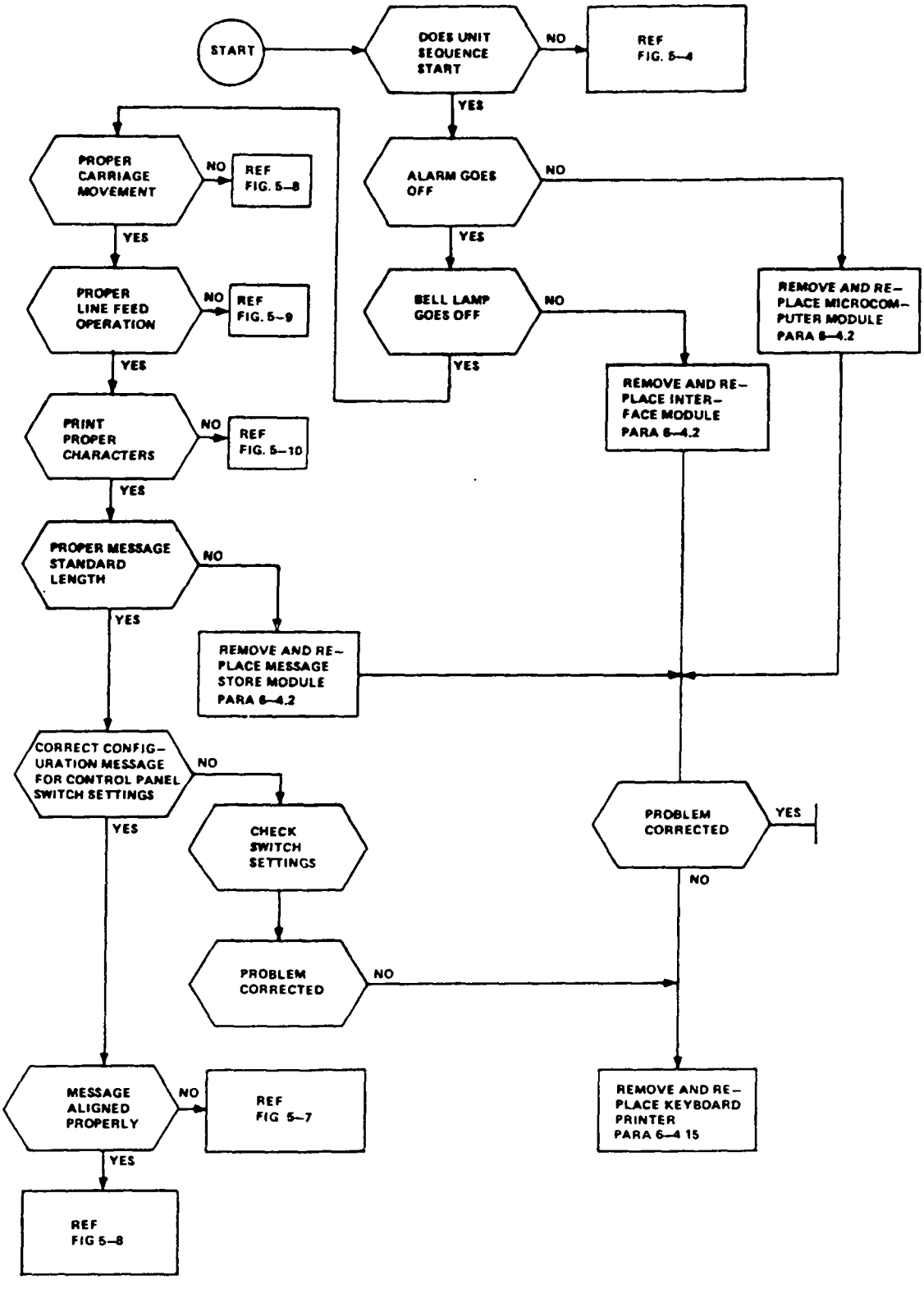


Figure 5-2. Power-On Sequencing, Fault Isolation Diagram

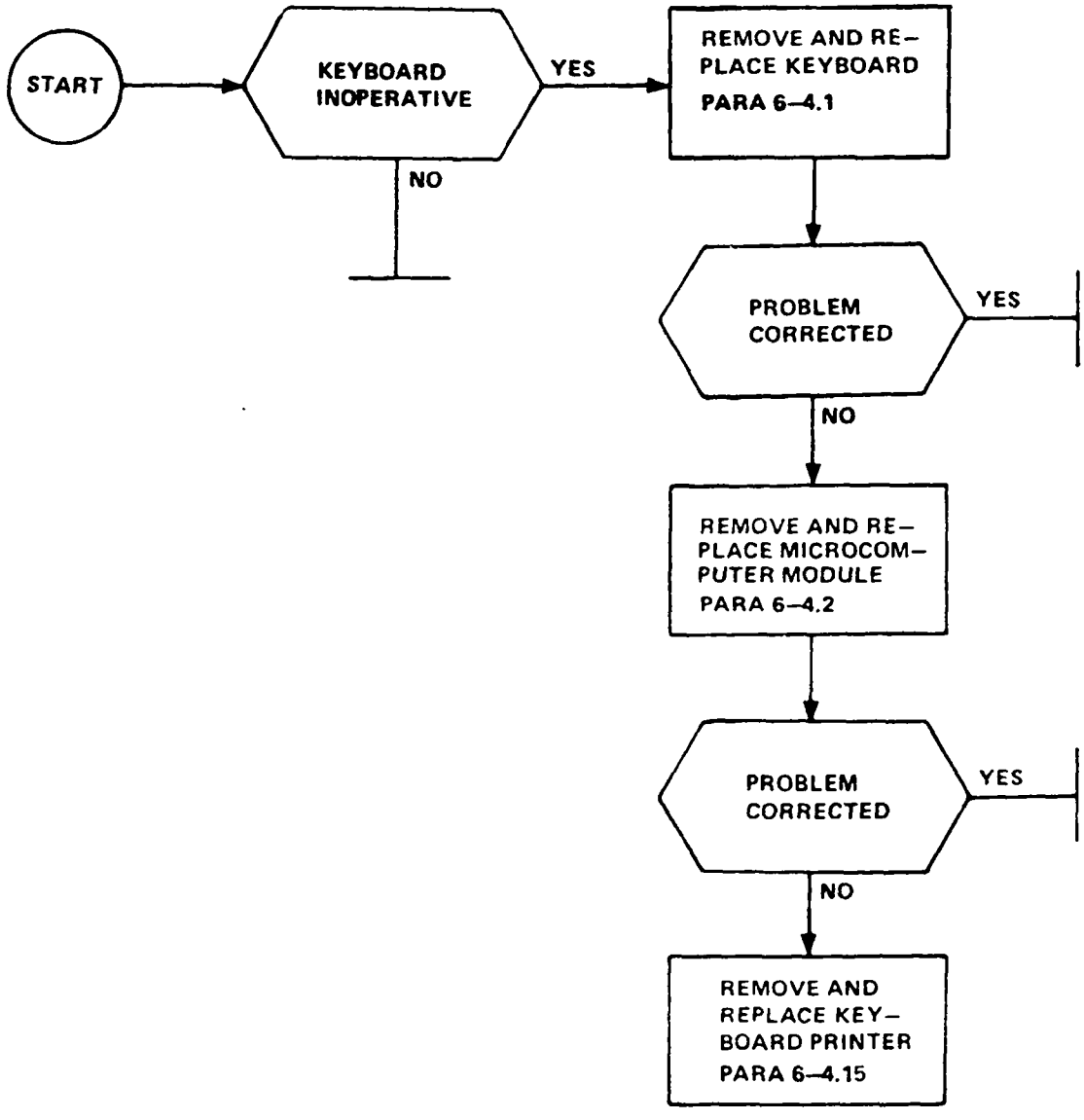


Figure 5-3. Keyboard, Fault Isolation Diagram

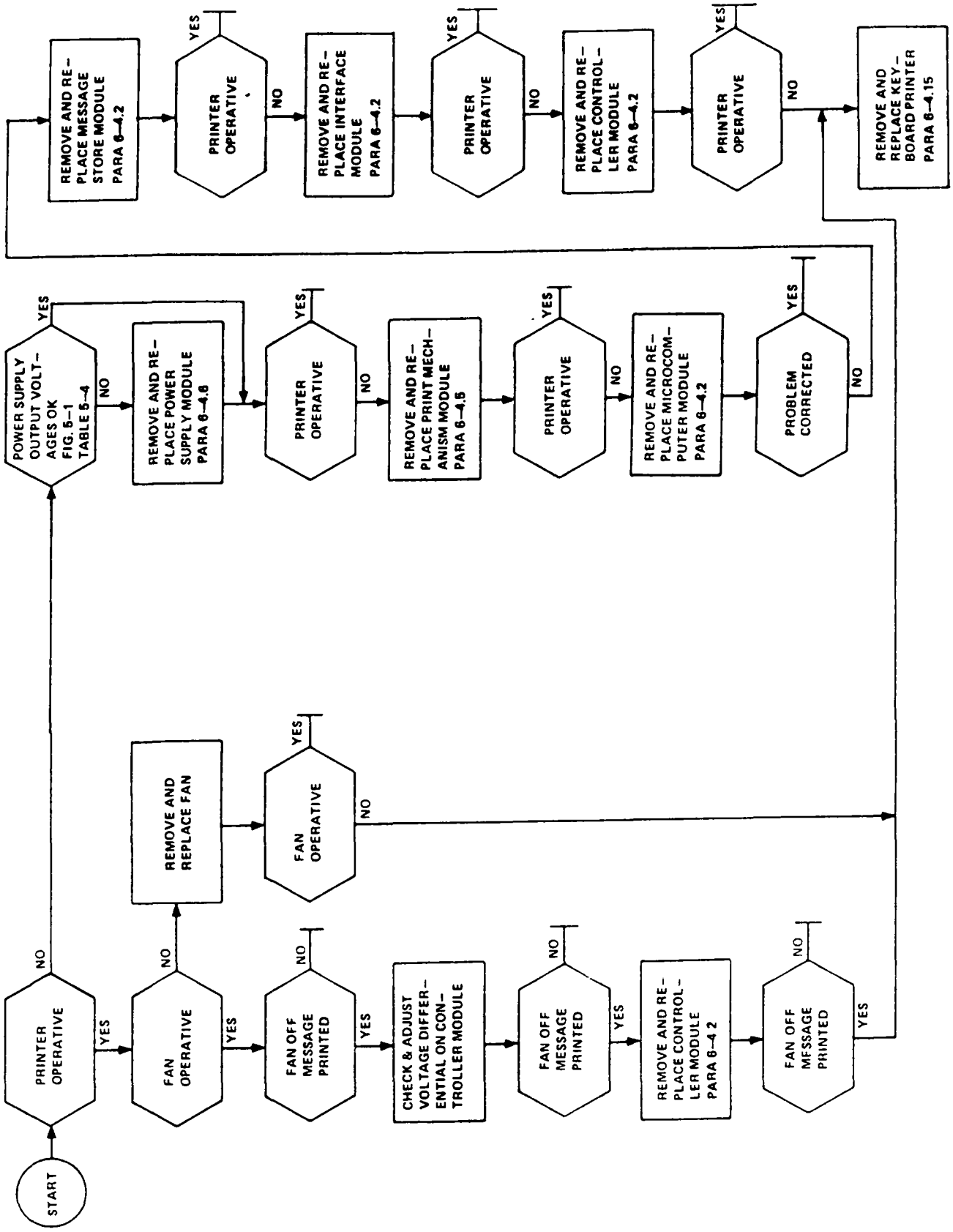


Figure 5-4. Power, Fault Isolation Diagram

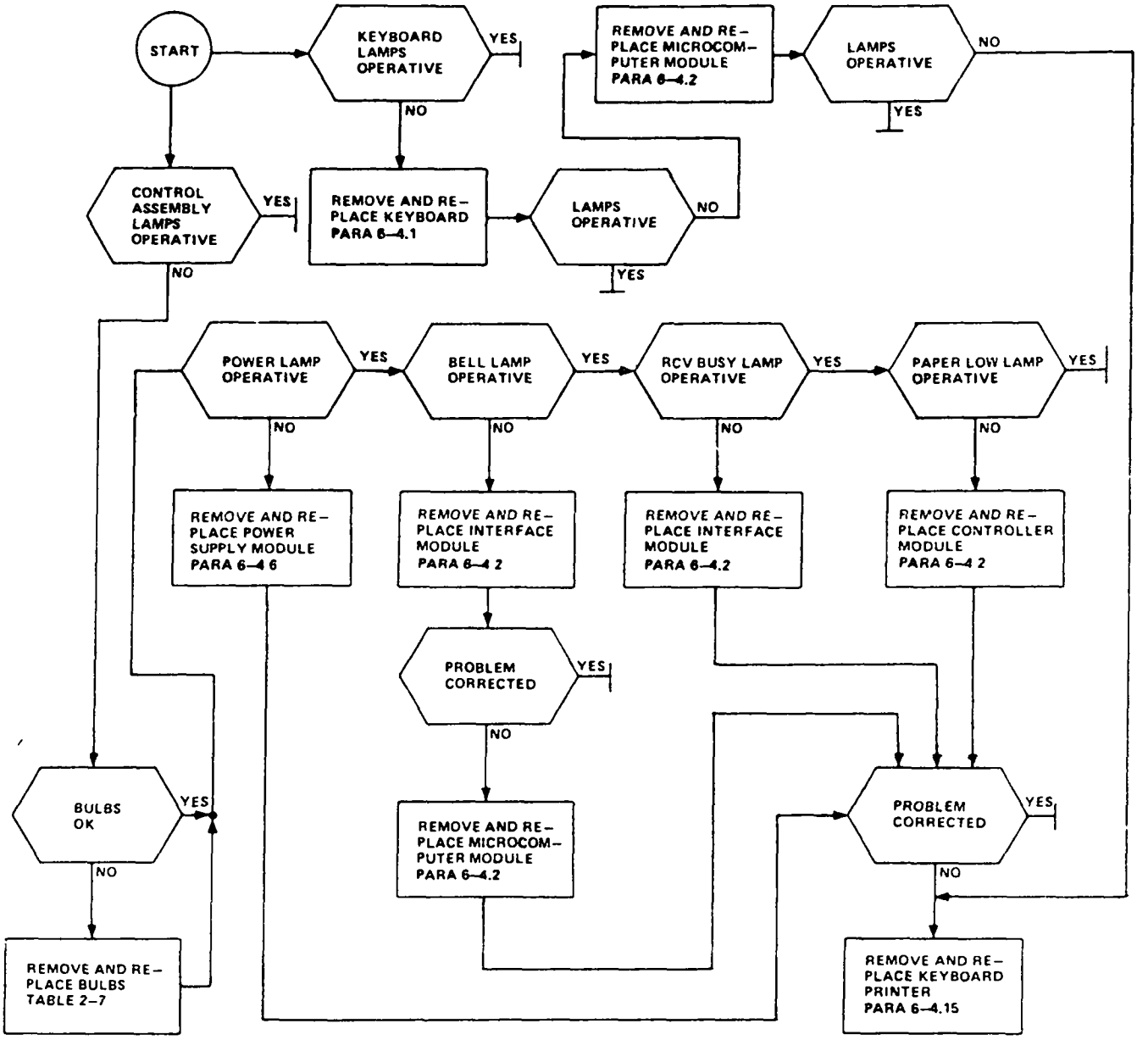


Figure 5-5. Keyboard and Control Panel Lamps, Fault Isolation Diagram

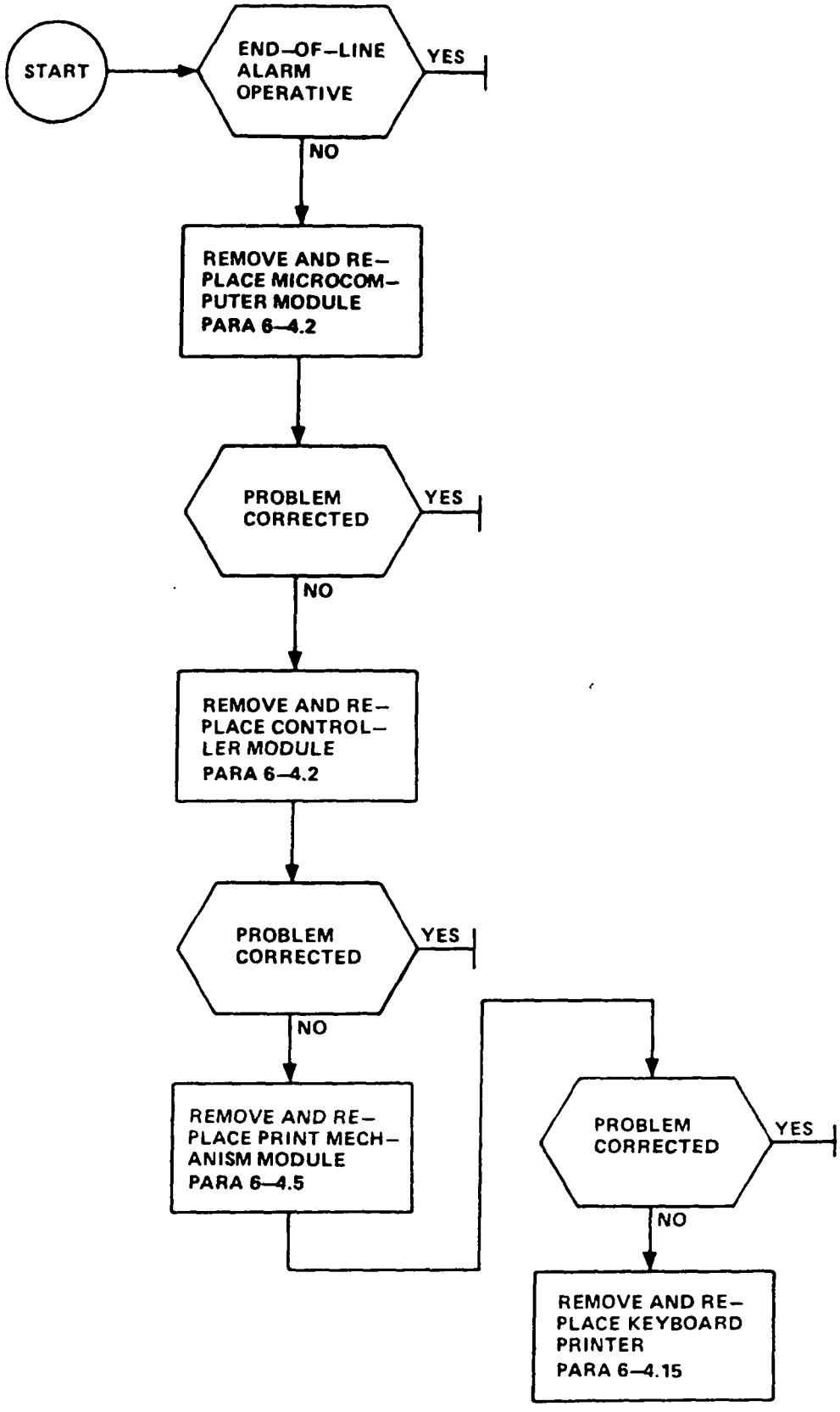


Figure 5-6. End-of-Line Alarm, Fault Isolation Diagram

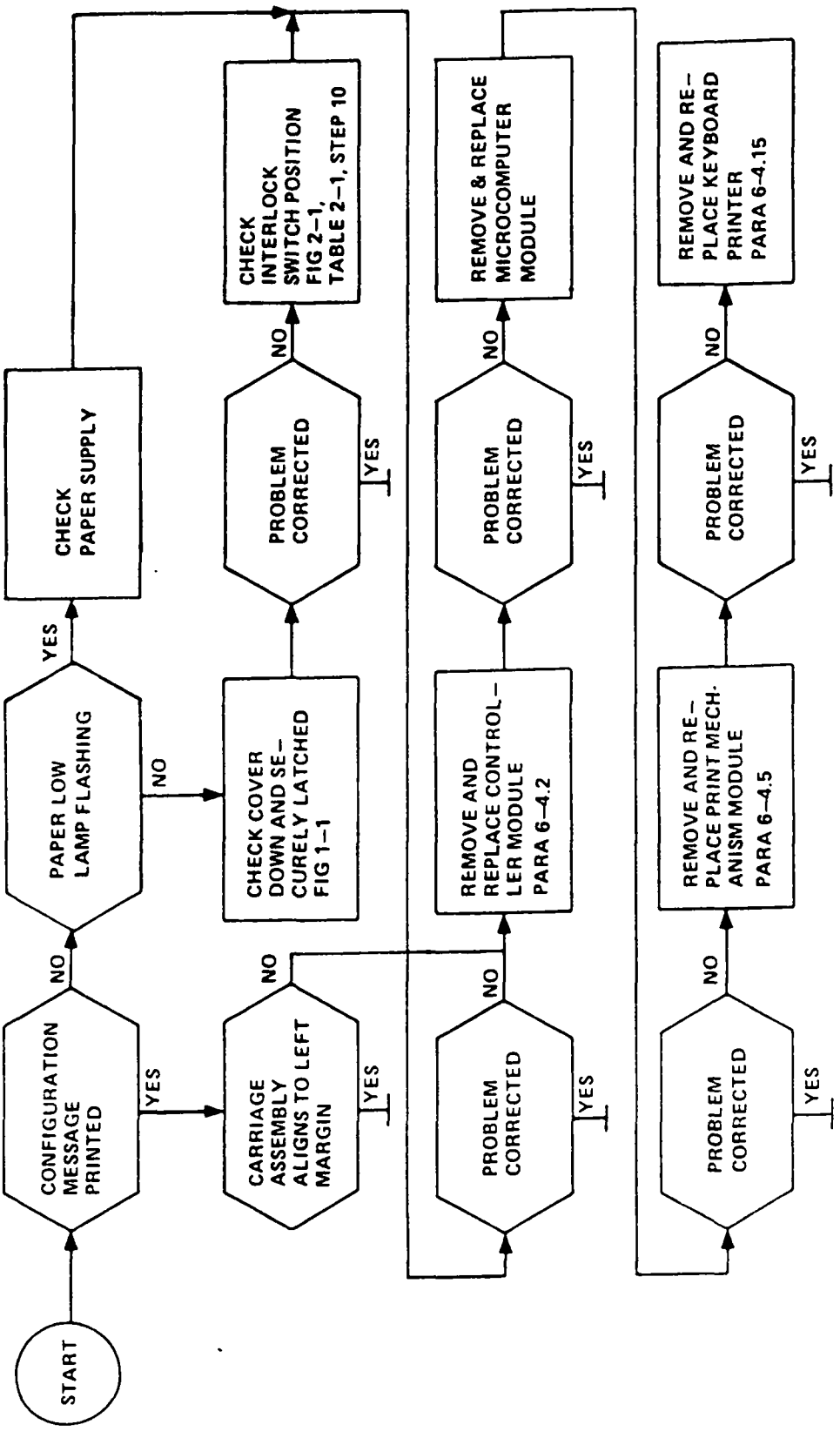


Figure 5-7. Carriage Assembly Margin Alignment and Configuration Message Printout, Fault Isolation Diagram

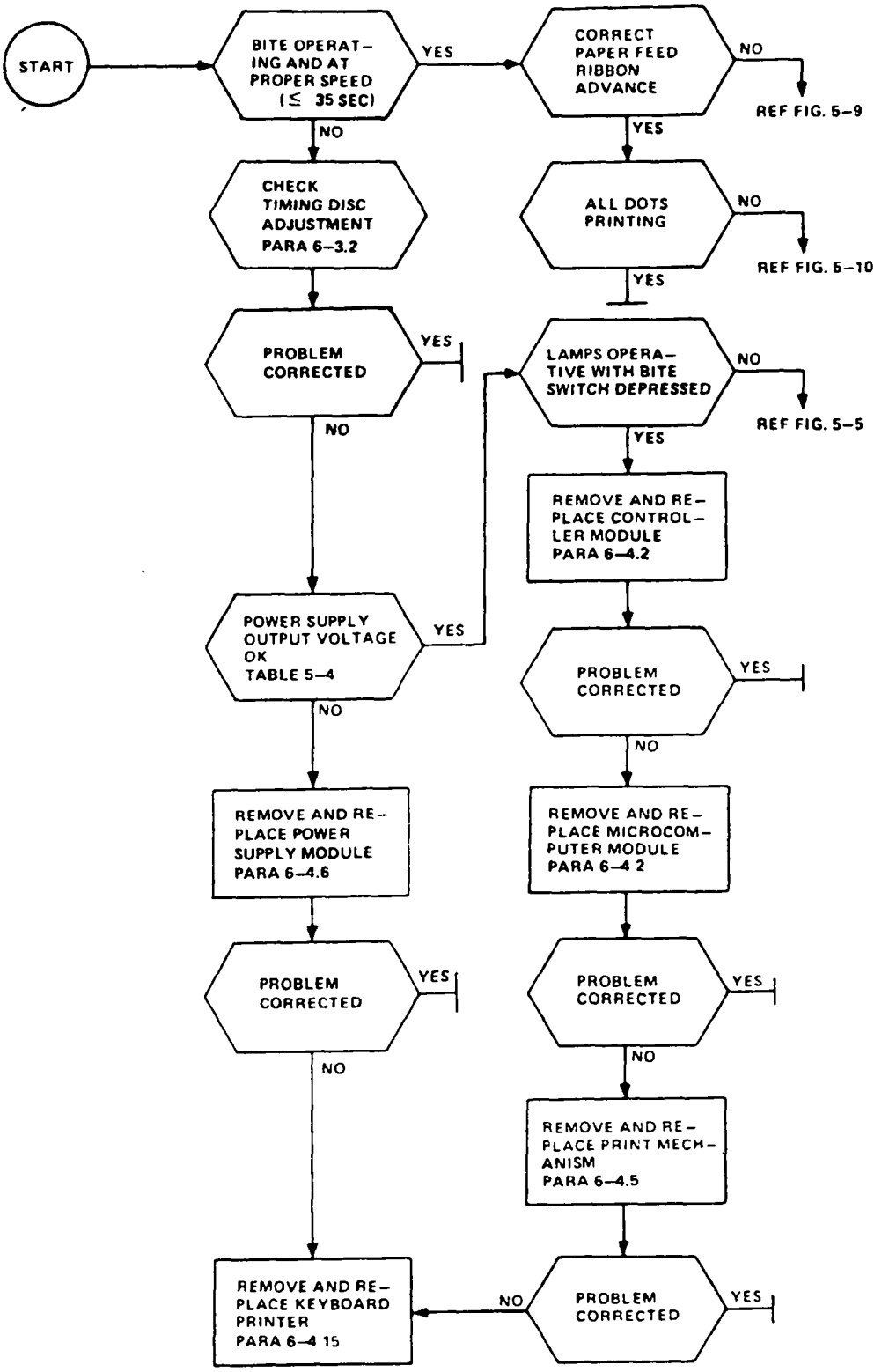


Figure 5-8. BITE, Fault Isolation Diagram

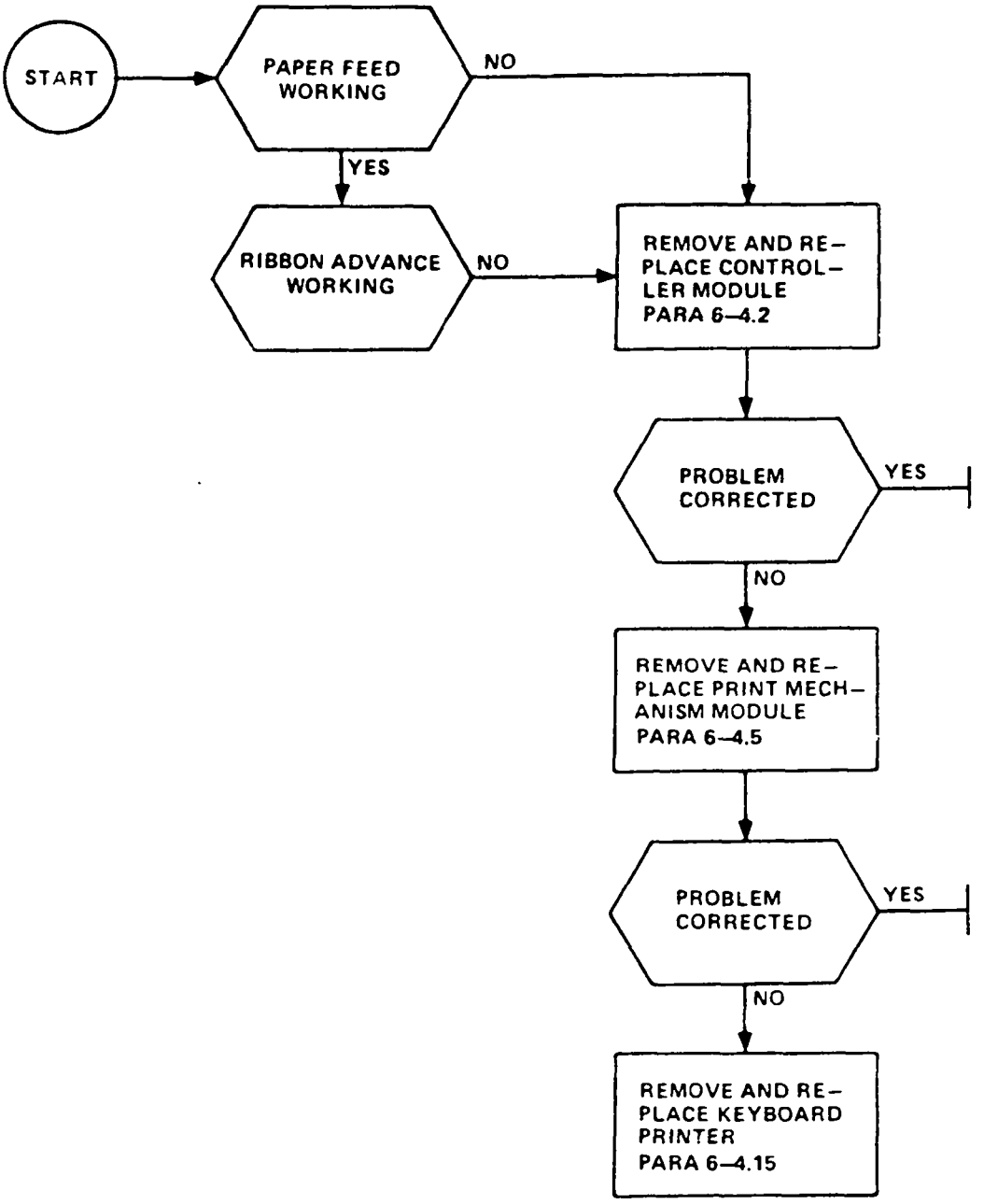


Figure 5-9. Paper Feed and Ribbon Advance, Fault Isolation Diagram

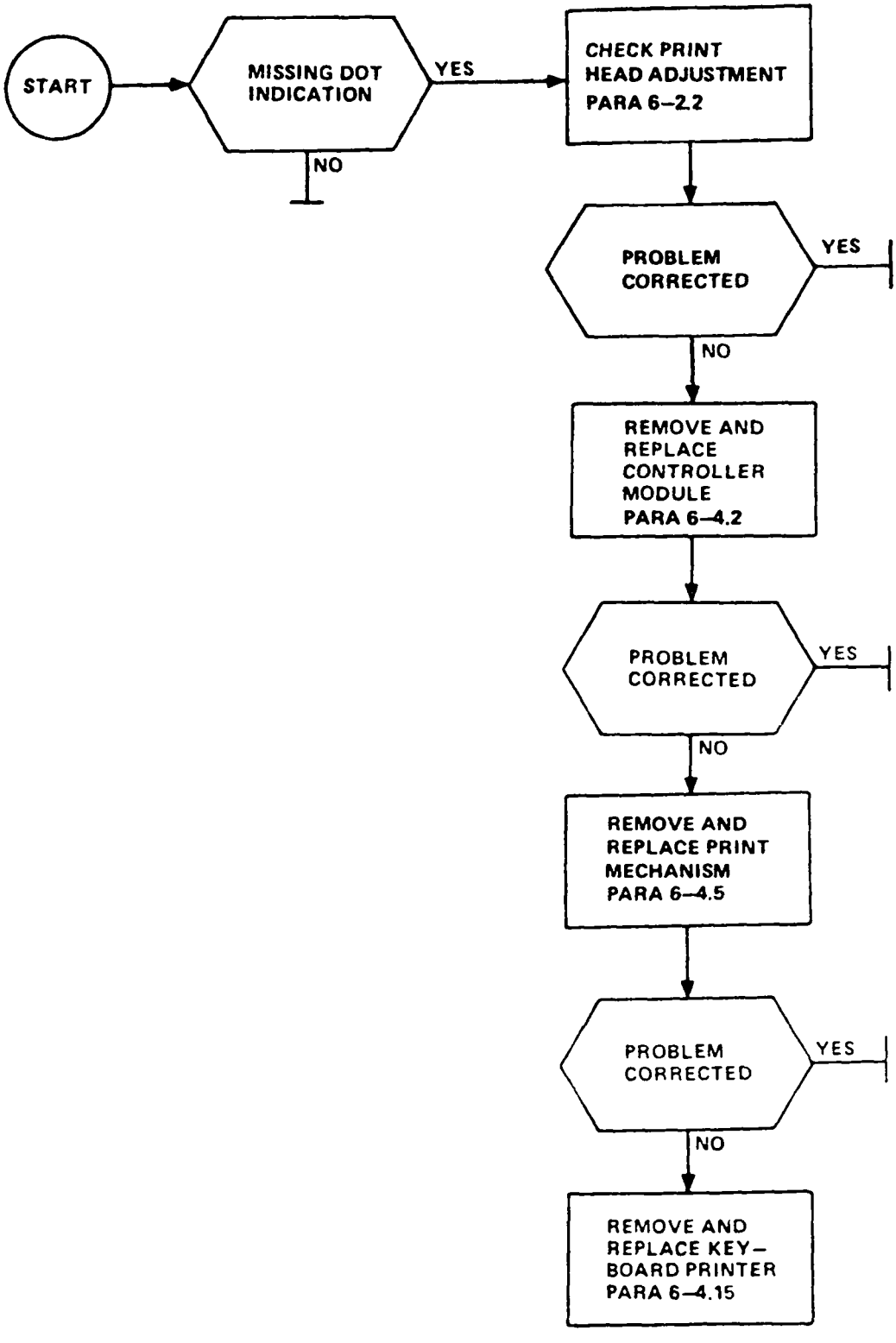


Figure 5-10. Missing Dot, Fault Isolation Diagram

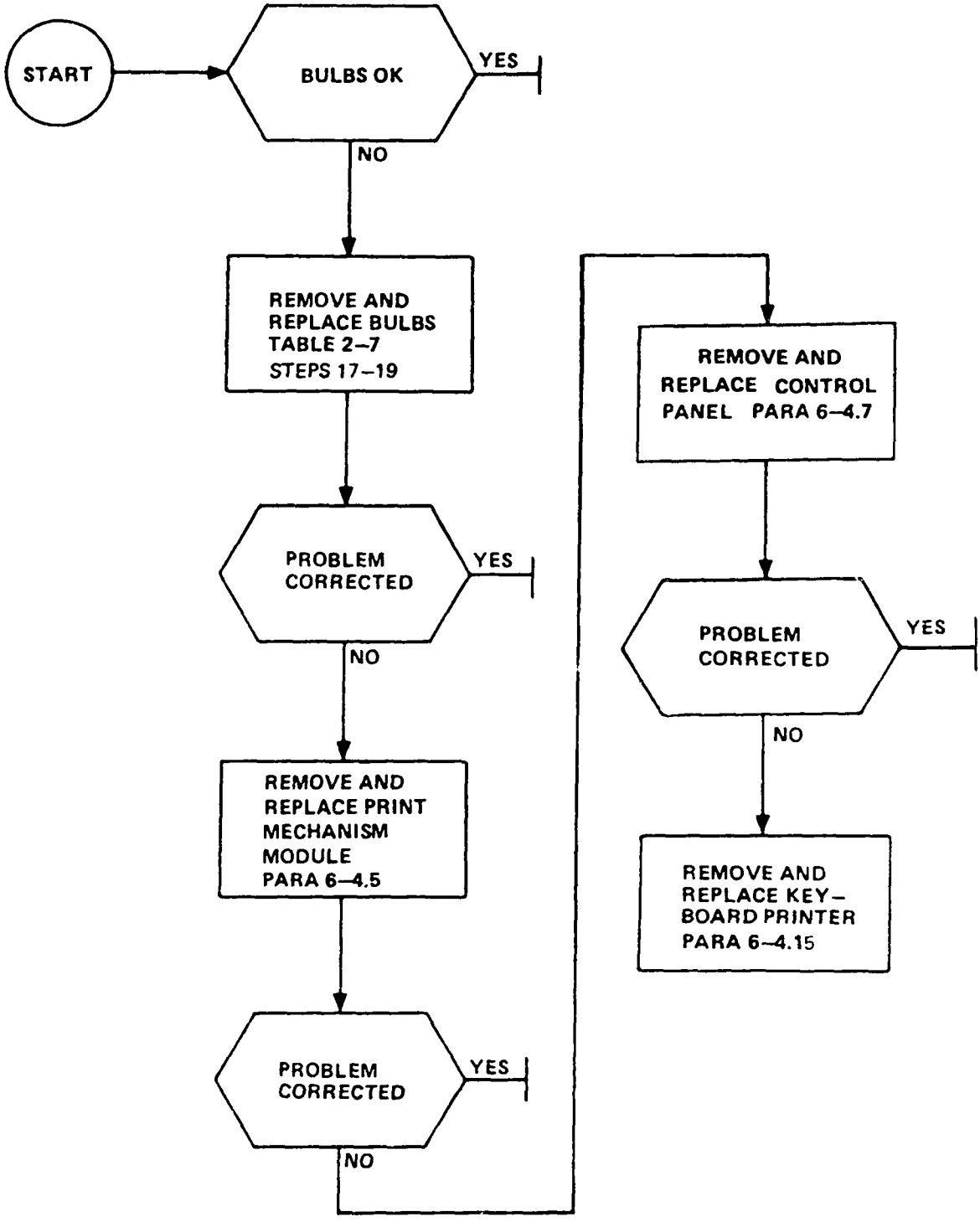


Figure 5-11. Copy Illumination Lamps, Fault Isolation Diagram

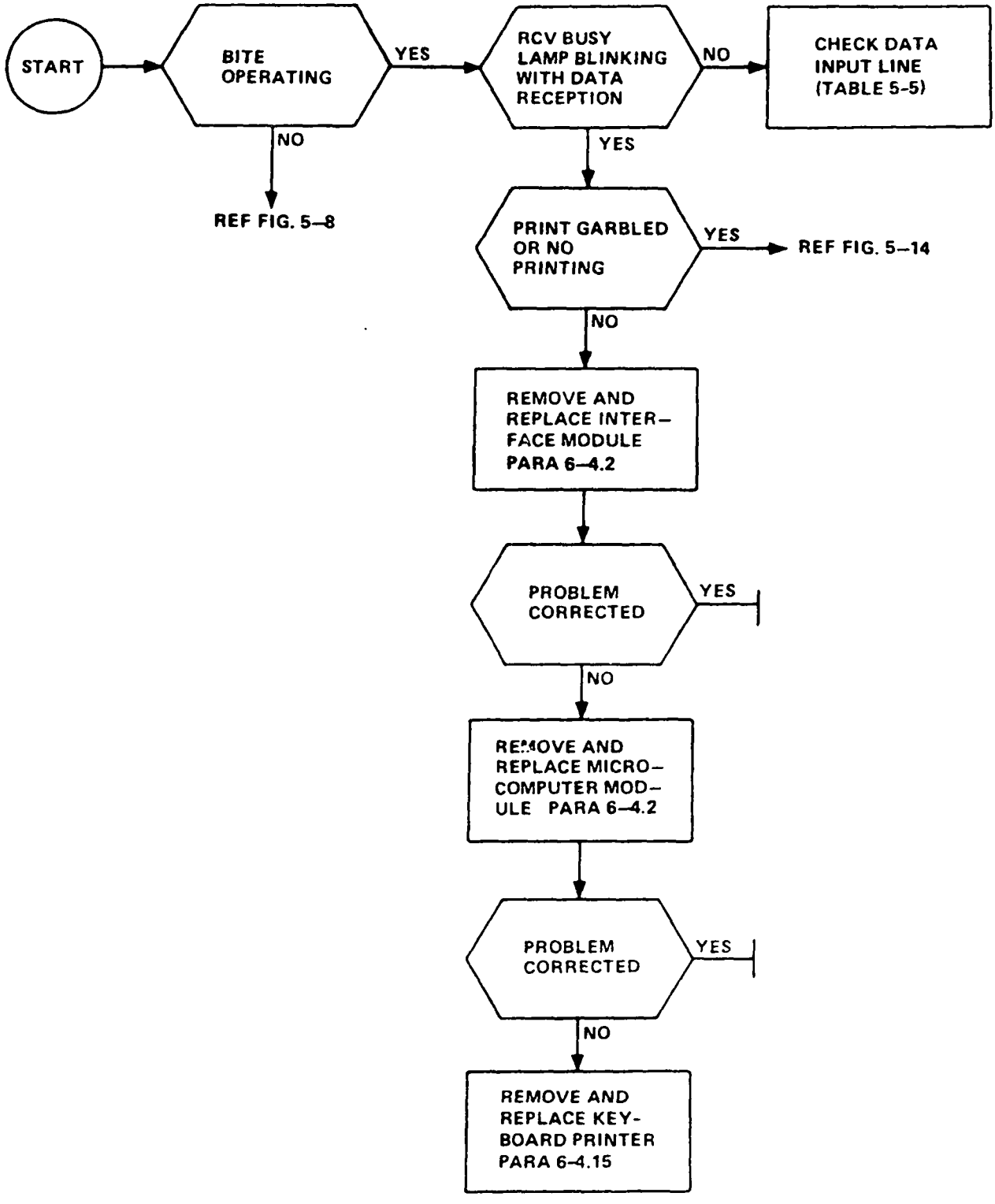


Figure 5-12. No Receive, Fault Isolation Diagram

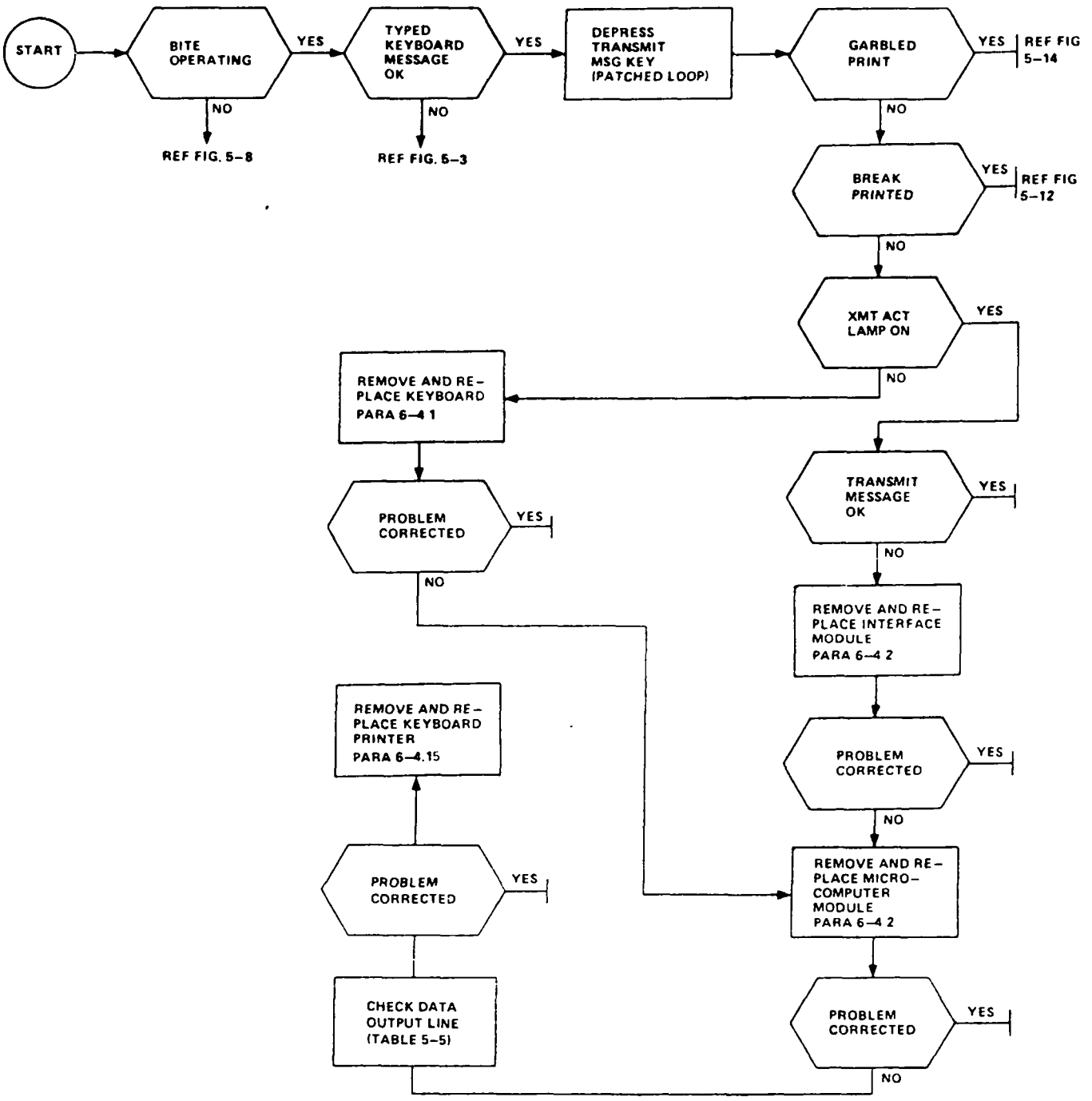


Figure 5-13. No Transmit, Fault Isolation Diagram

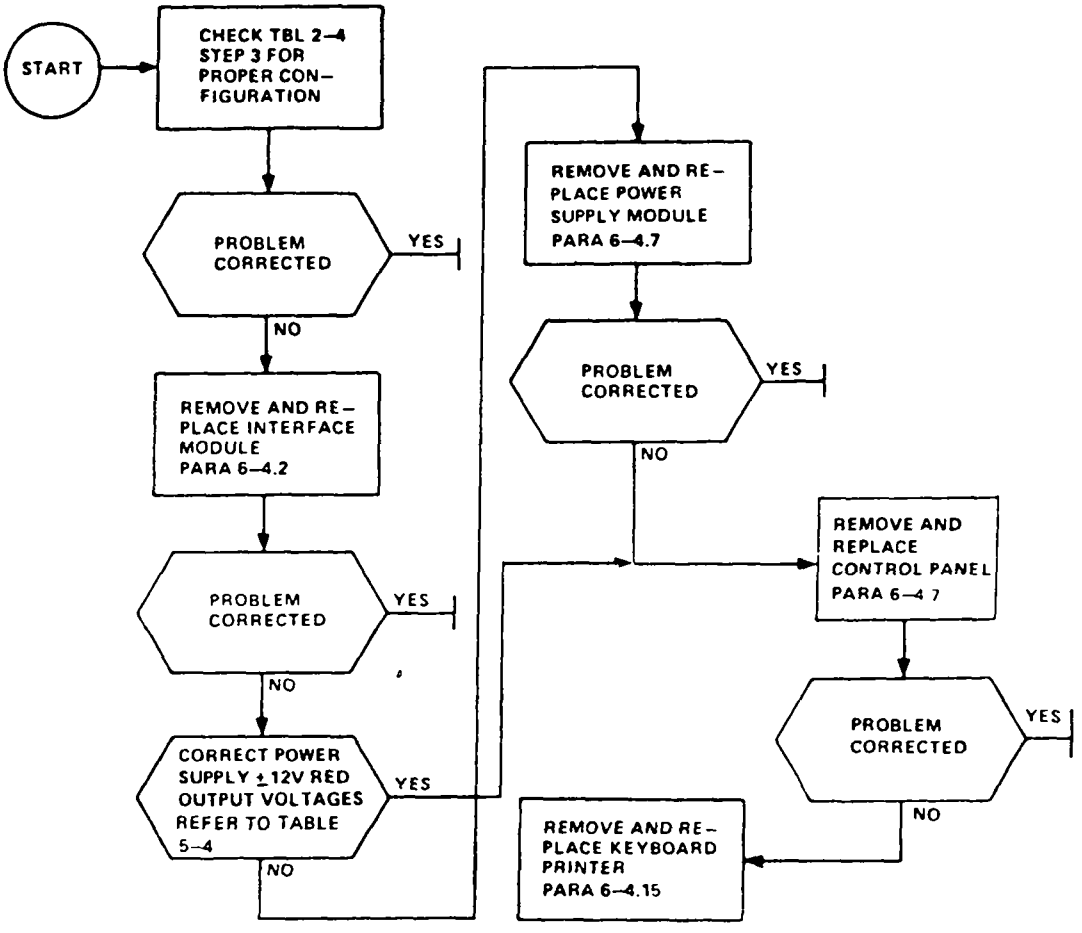


Figure 5-14. Garbled Print, Fault Isolation Diagram

CHAPTER 6

CORRECTIVE MAINTENANCE

6-1. INTRODUCTION. This chapter contains adjustment, alignment, removal, and replacement procedures for organizational maintenance.

6-1.1. Setscrews. The two setscrews in the idler pulley housing (figure 6-5, view C) are secured with Locktite. Prior to removing these setscrews, apply heat to the area, then attempt to tighten setscrews to break Locktite loose before removing setscrews. Apply Locktite to these setscrews before tightening during reassembly. The single setscrew in the carriage drive pulley (figure 6-6, View B) does not require Locktite. All of these setscrews should be torqued to 3 to 5 inch-pounds when tightening.

6-1.2. Special Tools, Test Equipment and Materials Required. Refer to table 1-3 for special tools and test equipment required for organizational level maintenance.

Section I.

ADJUSTMENTS AND ALIGNMENTS

6-2. ADJUSTMENT. Adjustment procedures are provided for the BITE (paragraph 6-2.1.) and for the printhead (paragraph 6-2.2.).

6-2.1. BITE. When the BITE test pattern runs longer than 35 seconds, perform the following steps until the test pattern does not exceed 35 seconds. Then return to instruction 4 of the Performance Verification Instructions, table 5-3.

a. Clean and lubricate the entire carriage bar per table 4-4.

b. Check BITE test pattern time. If time still exceeds 35 seconds, continue with step c.

c. Adjust the timing disc as follows:

(1) Loosen the locking screw on the center face of the timing disc assembly (figure 6-1). Do not remove.

(2) Initiate BITE test pattern.

(3) Adjust the timing by turning, CW or CCW, the timing disc adjusting screw (figure 6-1). Adjust for smooth even operation in both forward and reverse carriage travel.

d. Recheck BITE test pattern time. If time still exceeds 35 seconds, proceed to paragraph 6-3.2 and align the timing disc.

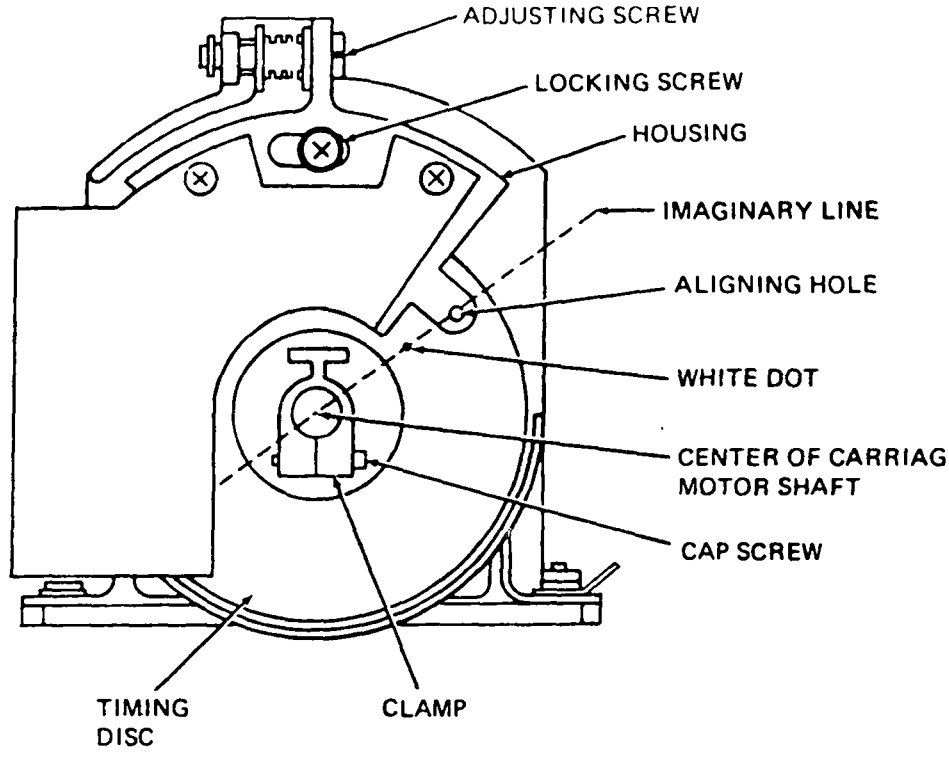


Figure 6-1. Timing Disc Adjustment

6-2.2. Printhead.

a. Remove Print Mechanism module (paragraph 6-4.5).

b. Remove ribbon cassette, and position carriage assembly at center of platen.

c. Push carriage shaft lever (figure 6-6, View B) towards rear of Print Mechanism module as far as it will go.

d. Measure clearance between printhead and platen (with paper). Clearance should be .016-inch. If not, loosen three screws securing carriage assembly (figure 6-6, View B), use a 0.016-inch shim between printhead and platen (with paper) to provide required clearance, and tighten the three screws.

e. Move carriage assembly to within approximately 1 inch of right end of platen (avoid roller area at end of platen), and measure clearance between printhead and platen. Note this clearance.

f. Repeat step e. with carriage assembly within approximately 1 inch of left end of platen.

g. The clearance at each end of the platen, as measured in steps e. and f., should be within $\pm$0.005 inch of each other. This determines the parallelism of the platen and carriage shaft. If parallelism is not within 0.005 inch, adjust carriage shaft as follows.

(1) Remove three carriage shaft retaining screws and flat washers securing carriage shaft retaining plate at left side of Print Mechanism module

(figure 6-6, View B), but leave retaining plate mounted on end of carriage shaft.

(2) With printhead at left end of platen as in step f., rotate carriage shaft retaining plate (figure 6-6, View B) clockwise or counterclockwise to obtain required clearance at left end of platen (within ±0.005 inch of clearance measured at right end of platen).

(3) Note that there are six screw holes in the carriage shaft retaining plate. There are only three matching holes in the chassis of the Print Mechanism module. Rotate carriage shaft retaining plate the least distance clockwise or counterclockwise to line up three of the plate holes with the three chassis holes. The parallelism of ±0.005 inch should be maintained.

(4) Secure carriage shaft retaining plate with three screws and flat washers.

(5) Recheck clearance at both right end and left end of platen to ensure that clearances are ±0.005 inch of each other. If not, repeat step (1) through this step as necessary to obtain required parallelism.

(6) Recheck clearance between printhead and platen (with paper). Clearance should be .016-inch.

(7) Move carriage assembly toward left end of platen until left edge of detector stop clears left edge of left margin sensor (figure 6-2).

(8) Carefully move carriage assembly, as necessary, until timing disc is aligned as shown in figure 6-1.

(9) Adjust left margin sensor, if necessary, so that left edge of detector stop is just clear of left margin sensor.

6-3. ALIGNMENT. Proper belt alignment is necessary for smooth carriage operation to insure no interference results. Correct timing disc alignment is critical for correct BITE pattern time. Perform all of the following after replacement of the carriage assembly belt and/or the carriage motor belt.

6-3.1. Belts.

a. After replacement of either of the two belts, loosen the setscrew in the carriage drive pulley and position the carriage drive pulley (figure 6-6, View B) in the center of the carriage drive pulley shaft, so that the carriage assembly belt does not touch the carriage stepper motor gear. Maintain parallelism of carriage assembly belt to carriage shaft.

b. If necessary, rotate the carriage drive pulley shaft so that the setscrew in the carriage drive pulley will seat on the flat part of the shaft, then tighten the setscrew to a torque of 3 to 5 inch-pounds.

c. Move carriage assembly manually in both directions and observe that carriage assembly belt does not touch carriage stepper motor gear or carriage motor belt.

d. If interference occurs, loosen setscrew, move carriage drive pulley rearward slightly and repeat steps b. and c. until correct alignment of step a. is achieved.

6-3.2. Timing Disc. Remove Print Mechanism as instructed in paragraph 6-4.5.

a. Position carriage assembly so that left edge of the detector stop is located at left edge of left margin sensor as shown in figure 6-2.

b. Do not move carriage assembly while checking for position of white dot on timing disc. The white dot should be positioned on an imaginary line from the center of the carriage motor shaft to the aligning hole as shown in figure 6-1.

c. If the white dot is not present, loosen the cap screw until the clamp on the carriage motor shaft is loose enough to allow the timing disc to be moved.

CAUTION

Use extreme care while turning the timing disc to avoid bending its edges.

d. Gently turn the timing disc until the white dot is present as shown in figure 6-1. Do not allow the motor shaft and carriage assembly to move from the position achieved in step a. above.

e. With the white dot positioned, gently and slowly tighten the cap screw on the clamp. Ensure the clamp is positioned at the end of the carriage motor shaft.

f. Move carriage assembly left and right and check for timing disc interference with the housing.

g. If interference is detected, the timing disc must be moved slightly inward or outward to eliminate interference. Repeat steps a. through f. above until proper alignment and no interference results.

h. Perform BITE adjustment per paragraph 6-2.1.

6-3.3. Fan-off Activation Alignment Procedures. If the fan is inoperative, the Keyboard Printer will print the FAN OFF message and then proceed to shut itself down. Cycling the power switch to OFF and then to ON will restore the Keyboard Printer to normal operation. If FAN OFF message is printed again, perform the following alignment check on the Controller module (A1A8, figure 6-2):

a. Connect test point J1 to ground.

b. Connect DVM positive lead to test point J3.

c. Connect DVM negative lead to test point J2.

d. Adjust, if necessary, A1A8R1 to 15 $\pm$2 millivolts.

e. If the voltage is correct, refer to figure 5-5.

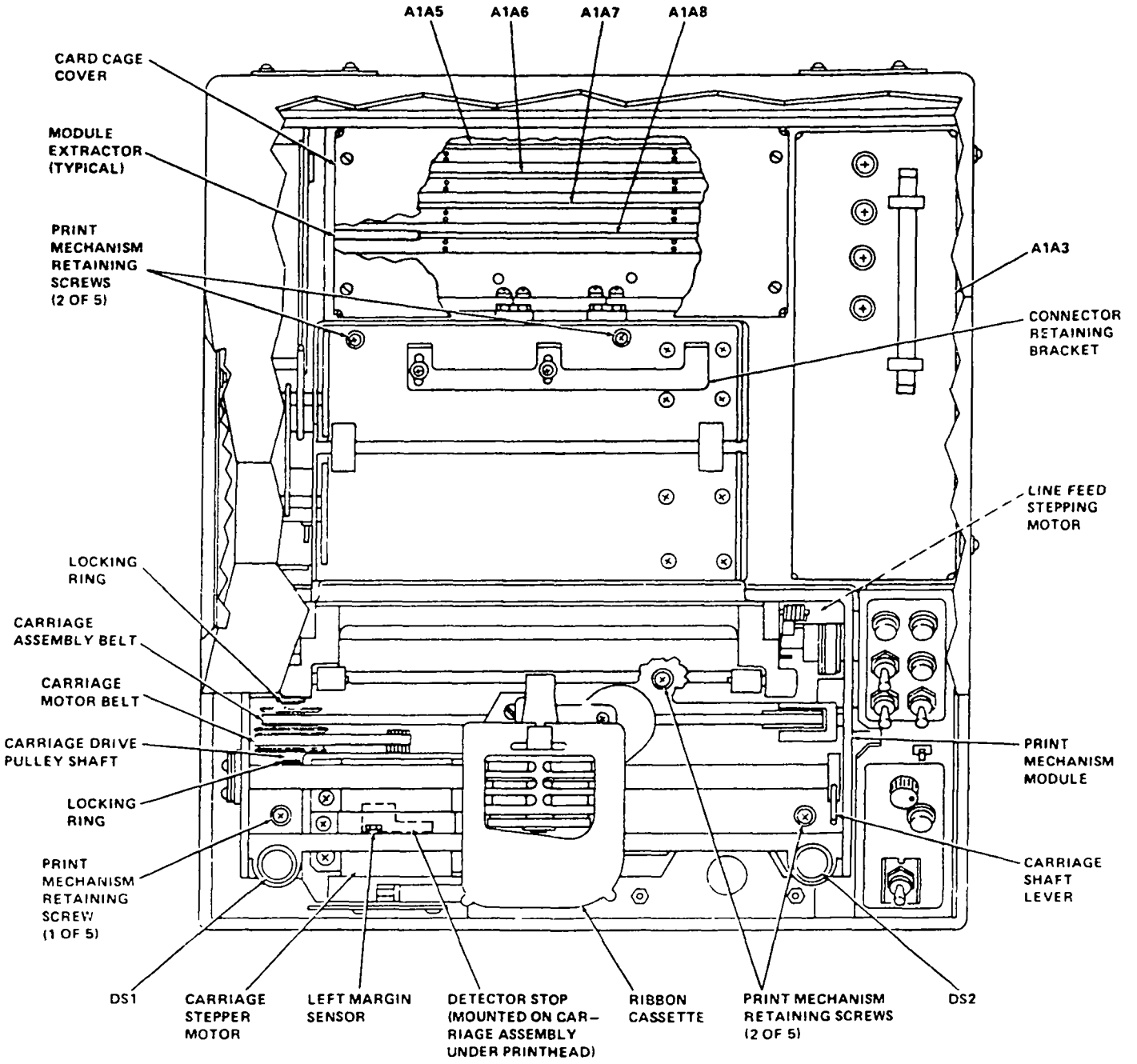


Figure 6-2. Printer, Top View

Section II.

REPAIR

6-4. **REMOVAL AND REPLACEMENT.** Modules found defective during fault isolation shall be replaced by specific instructions provided in the following subparagraphs.

WARNING

Voltages as high as 115 volts are contained in the equipment discussed in this manual. Use standard safety precautions when the modules of this unit are removed from the case. Disconnect the power cable at J1 (figure 6-3, View B) before making any test connections, or before working inside the chassis.

6-4.1. Keyboard. The removal and replacement of the Keyboard (figure 1-1) is accomplished by performing the following steps.

a. Loosen the four retaining screws that secure the Keyboard to the front of the Printer.

CAUTION

Connector pins can be easily bent and equipment damaged if modules are not carefully removed and replaced.

b. Carefully separate the Keyboard from the Printer by pulling the Keyboard straight back with no twisting, keeping the assembly aligned until clear.

c. The Keyboard is replaced by reversing the above steps, using extreme caution in aligning the connectors.

6-4.2. Logic Modules. The four logic modules (A1A5, A1A6, A1A7, and A1A8 figure 6-2) are removed and replaced as follows:

CAUTION

The logic modules contain static sensitive devices. Care must be exercised to prevent electrostatic discharge which may damage the devices.

a. Open cover to lock-in position.

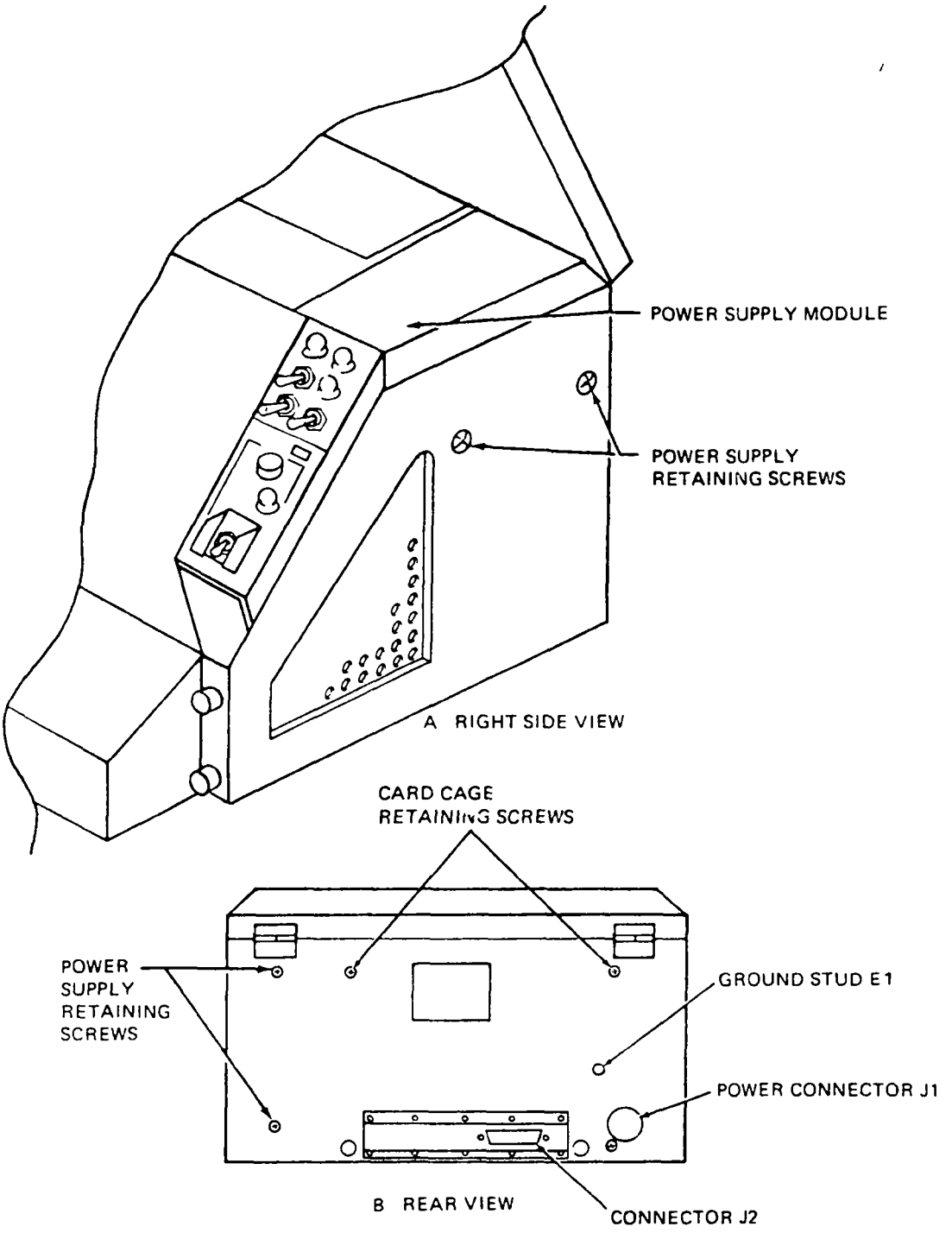


Figure 6-3. Keyboard Printer, Side and Rear Views

b. Loosen four captive slotted screws securing card cage cover (figure 6-2) and remove cover.

CAUTION

Connector pins can be easily bent and equipment damaged if modules are not carefully removed and replaced.

c. Lift up the extractors (one is shown for A1A8 in figure 6-2) at each end of the module to be removed. Apply upward pressure to disengage module from the connector. Caution must be used to apply pressure straight up.

d. Lift the module straight up and out of the card cage assembly.

e. Replacement of the module is accomplished by reversing the above steps.

6-4.3. Paper. Paper is removed and replaced as described in table 2-7, steps 1 through 10, and can be accomplished with the power on.

6-4.4. Ribbon Cassette. The ribbon cassette can be removed and replaced when the Print Mechanism module is either removed or installed in the Keyboard Printer, as described in table 2-7, steps 11 through 16.

6-4.5. Print Mechanism Module. The Print Mechanism module (figure 6-2), removal and replacement steps follow:

a. Open cover to lock-in position.

CAUTION

Do not move the printhead mechanism back away from the platen when the printhead is located at the left margin. Always move the printhead horizontally to a location in center of platen before moving printhead away from platen. This procedure must be adhered to in order to avoid damage to the left margin sensing tab.

b. Carefully move printhead mechanism horizontally to the center of the platen.

c. Remove ribbon cassette, paper roll and spindle. Reference table 2-7.

d. Remove the five screws (figure 6-2) which secure the Print Mechanism module to the Keyboard Printer.

e. Loosen two connector retaining bracket screws (figure 6-2), and slide bracket toward front of module.

f. Grasp tab on each of three connectors, and pull each connector free of its associated card cage connector.

g. Slowly lift the Print Mechanism module straight up and place it on work surface.

h. Replacement of the Print Mechanism module is accomplished by reversing the above steps.

6-4.6. Power Supply Module. Removal and replacement of the Power Supply module (A1A3, figure 6-2) shall be accomplished in accordance with the following steps:

WARNING

Voltages as high as 115 volts are contained in the equipment discussed in this manual. Use standard safety precautions when the modules of this unit are removed from the case. Disconnect the power cable at J1 (figure 6-3, View B) before making any test connections, or before working inside the chassis.

a. Open cover to lock-in position.

b. Remove two panhead screws from right side of Keyboard Printer as shown in figure 6-3, View A.

c. Remove two panhead screws from the rear side of Keyboard Printer (figure 6-3, View B).

CAUTION

Connector pins on the underside of the Power Supply module can be bent and damaged if care is not exercised when removing and replacing this unit.

d. Partially unseat the Power Supply module connector by grasping the rear top edge of the Power Supply module and pulling forward and upward until the Power Supply module unseats itself.

e. Carefully lift the Power Supply module using the removal strap located on top, remove it from the Keyboard Printer, and place it on the work surface.

f. Replacement of the Power Supply module shall be accomplished by reversing the above steps, except eliminate step d.

6-4.7. Control Panels.

a. Remove Keyboard (paragraph 6-4.1).

b. Open cover to lock-in position.

c. Remove Print Mechanism module (paragraph 6-4.5) and set aside.

d. Disconnect connector P6 (figure 6-4) from J6 at front center of Case.

e. Remove three flathead screws on front and three flathead screws on right side that secure two Control panels, and fold out panels as far as cable slack will allow.

f. To free the two Control panels, disconnect wires from bottom of ON/OFF circuit breaker CB1 (figure 6-4) as follows.

Wire no.	CB1 terminal
W1	LINE 1
W2	LINE 2
W3	LOAD 1
W4	LOAD 2

g. Reinstall the Control panels by reversing the above steps. Use sleeving on the wires at CB1 terminals.

6-4.8. Line Feed Belt. Line feed belt removal and replacement shall be attempted only with the Print Mechanism module removed from the Keyboard Printer. The removal and replacement steps follow:

a. Remove the Print Mechanism module (paragraph 6-4.5).

b. Unscrew alarm bell ring (figure 6-5, View B) and remove alarm bell from its bracket on left side of paper tray.

c. Remove paper tray from Print Mechanism module by removing two screws on right side and two screws on left side of paper tray (figure 6-5, View A and B).

d. Loosen four screws holding line feed stepping motor. Slide motor up to release tension on the line feed belt (figure 6-5, View A and E).

e. Remove printhead guide bar retaining screws, two on each side (figure 6-5, View D).

f. Remove the platen shaft locking ring from the right end of the platen shaft (figure 6-5, View A).

g. Move the platen shaft to the left, applying pressure, which will push the left platen shaft bearing from its seat (figure 6-5, View D).

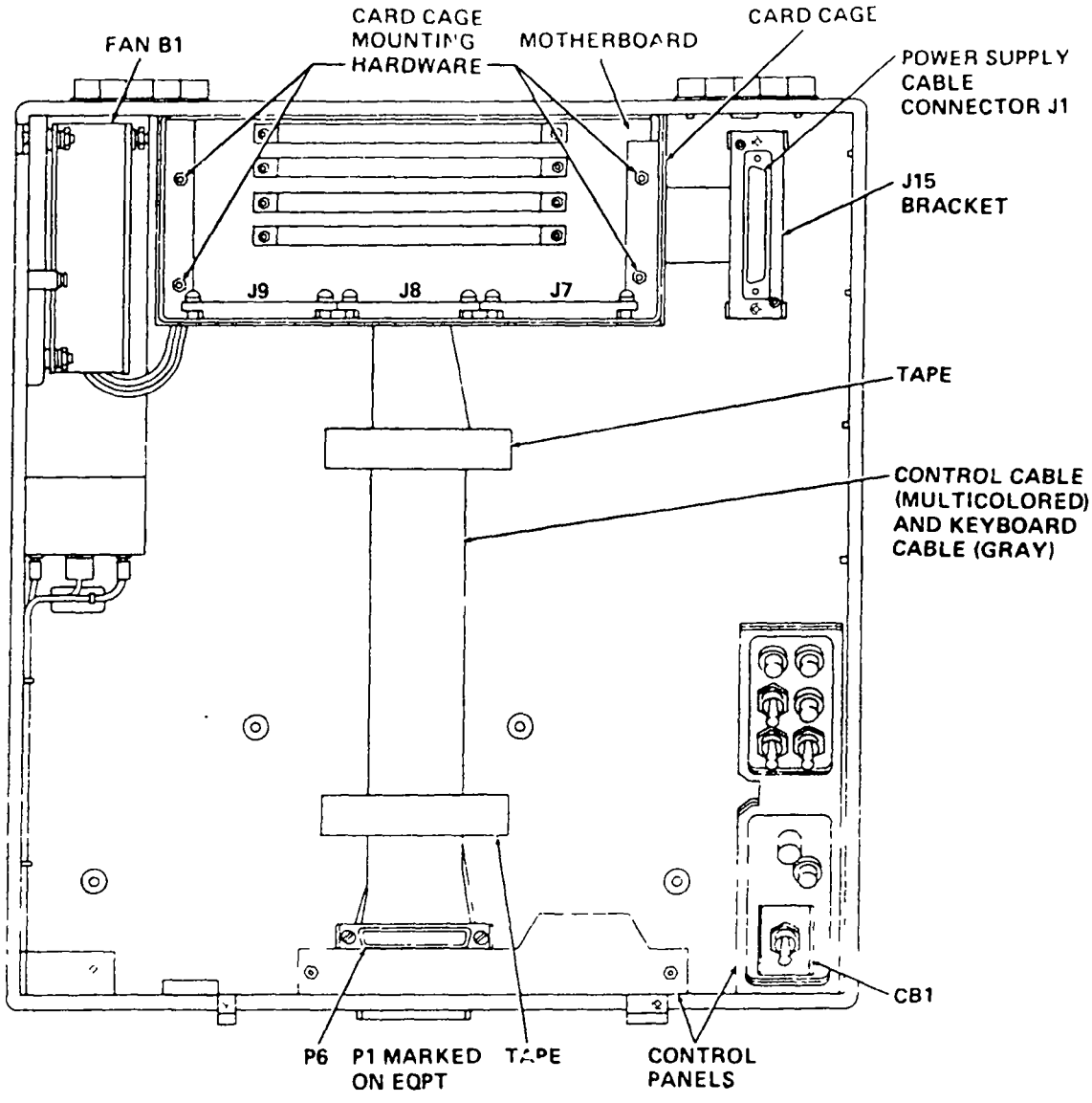


Figure 6-4. Chassis-Mounted Component Location

h. Slide line feed belt (figure 6-5, View E) off of platen shaft pulley and motor pulley, and pass between right end of printhead guide bar and Print Mechanism module frame. Then exit belt from frame hole at line feed stepping motor pulley (figure 6-5, View E).

i. Take new belt and insert it through frame hole at line feed stepping motor pulley (figure 6-5, View E).

j. Carefully raise the right end of the printhead guide bar and slide the belt between it and Print Mechanism module frame (figure 6-5, View E).

k. Pull belt up, loop the lower end over the line feed stepping motor pulley, and loop the upper end of the belt over the platen shaft pulley.

l. Reseat the platen shaft and bearing in the Print Mechanism module frame.

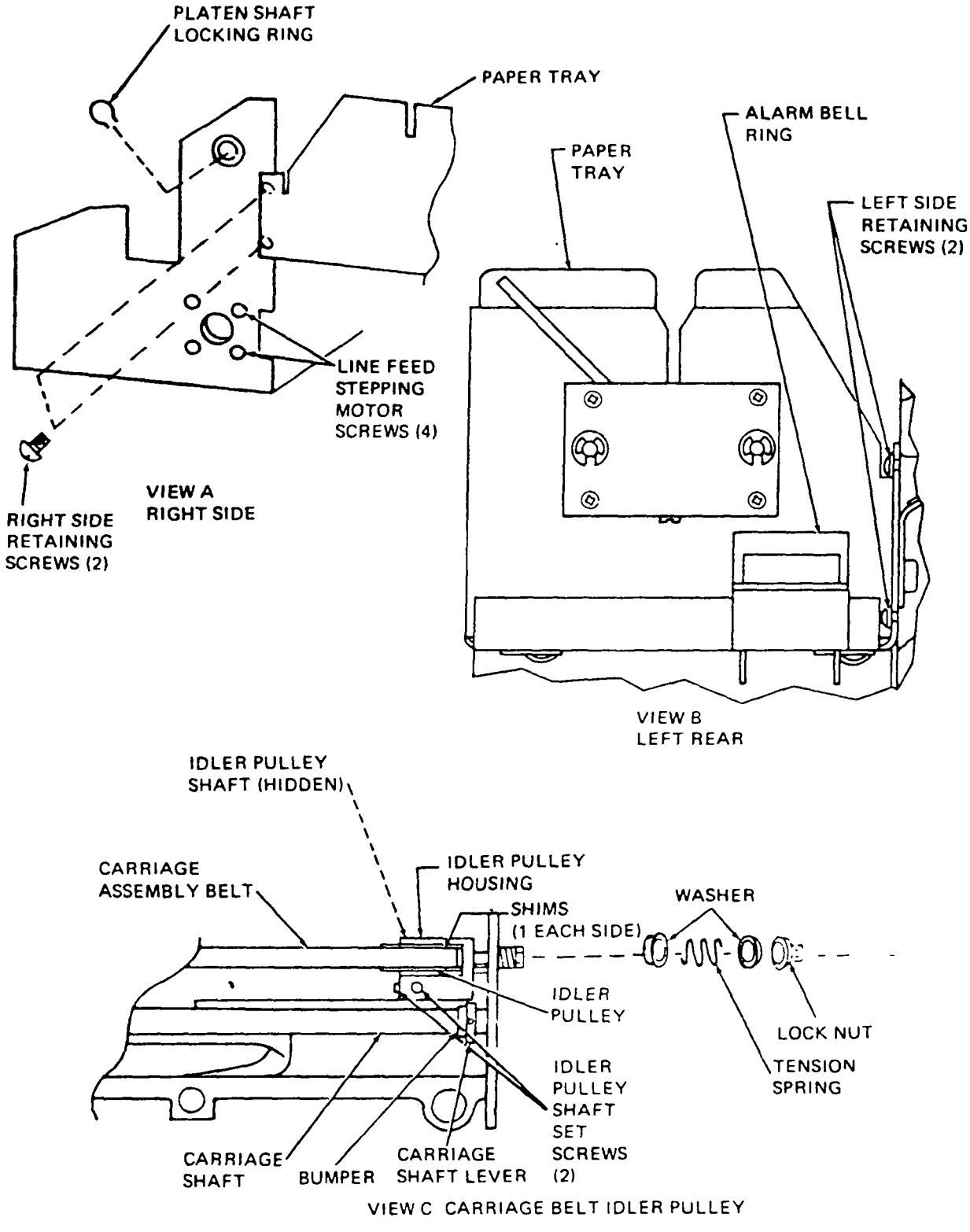


Figure 6-5. Print Mechanism Module, Carriage and Line Feed Belts (Sheet 1 of 2)

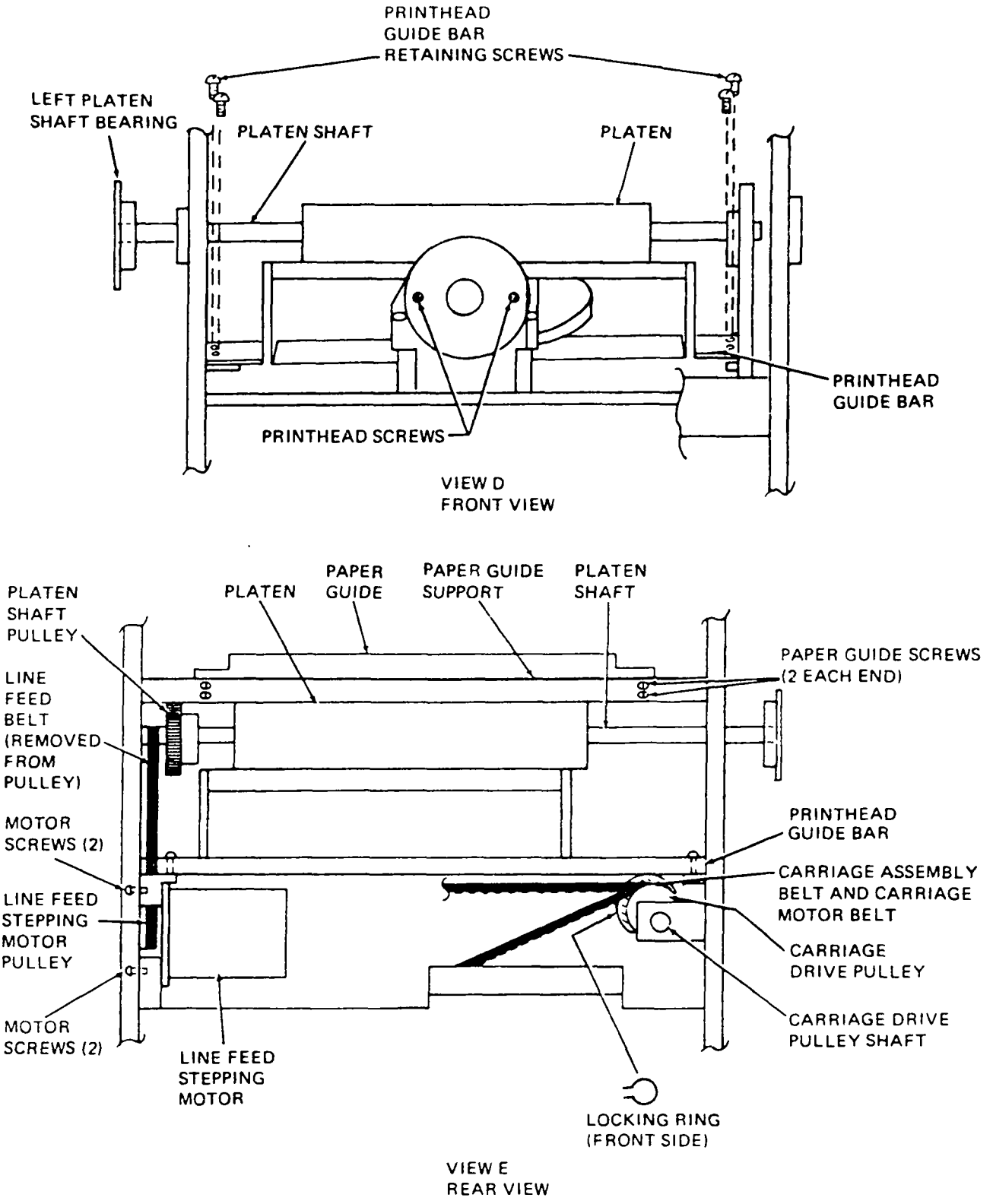


Figure 6-5. Print Mechanism Module, Carriage and Line Feed Belts (Sheet 2 of 2)

m. Replace the locking ring on the right end of the platen shaft (figure 6-5, View A).

n. Replace and tighten four screws which secure the printhead guide bar, two on each side (figure 6-5, View D).

o. Apply downward pressure on line feed stepping motor to tighten the belt to remove any slack and tighten the four motor screws (figure 6-5, View A and E).

p. Rotate the platen manually to check for any binding, proper belt tension (no slack, as in previous step), and tracking on pulleys.

q. Replace the paper tray (step c. above).

r. Replace the alarm bell (step b. above).

s. Replace the Print Mechanism module into the Keyboard Printer (paragraph 6-4.5).

6-4.9. Carriage Assembly Belt. The carriage assembly belt removal and replacement shall be attempted only with the Print Mechanism module removed from the Keyboard Printer. The removal and replacement steps follow:

a. Remove the Print Mechanism module (paragraph 6-4.5).

CAUTION

Exercise care when removing locknut, as it is under spring pressure.

b. Release the tension on the idler pulley housing on the right side of the Print Mechanism module by removing the locknut, tension spring and two washers (figure 6-5, View C).

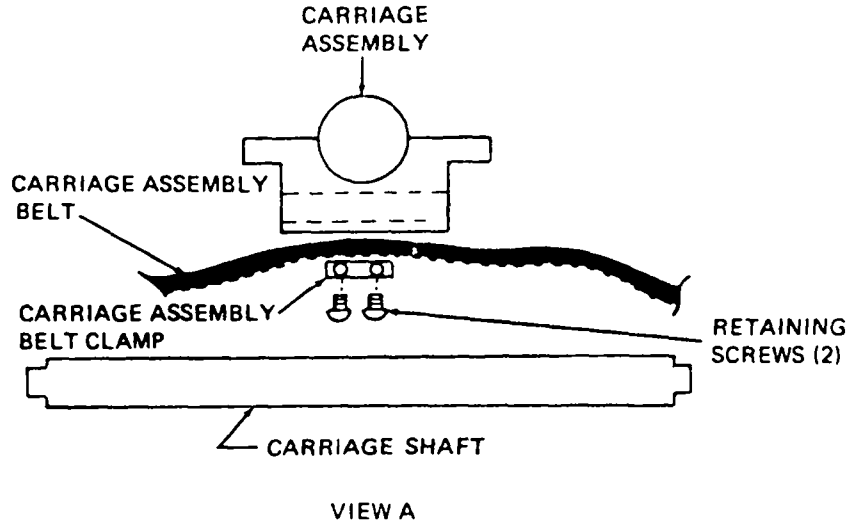
c. Loosen two idler pulley shaft setscrews (figure 6-5, View C), using 1/16" Allen wrench, slide shaft out of idler pulley housing, remove the four thrust washers from the idler pulley, and remove carriage assembly belt from pulley.

d. Loosen four screws holding carriage stepper motor to frame and move to left to release tension on carriage motor belt. Remove carriage motor belt from carriage stepper motor gear (figure 6-6, View B).

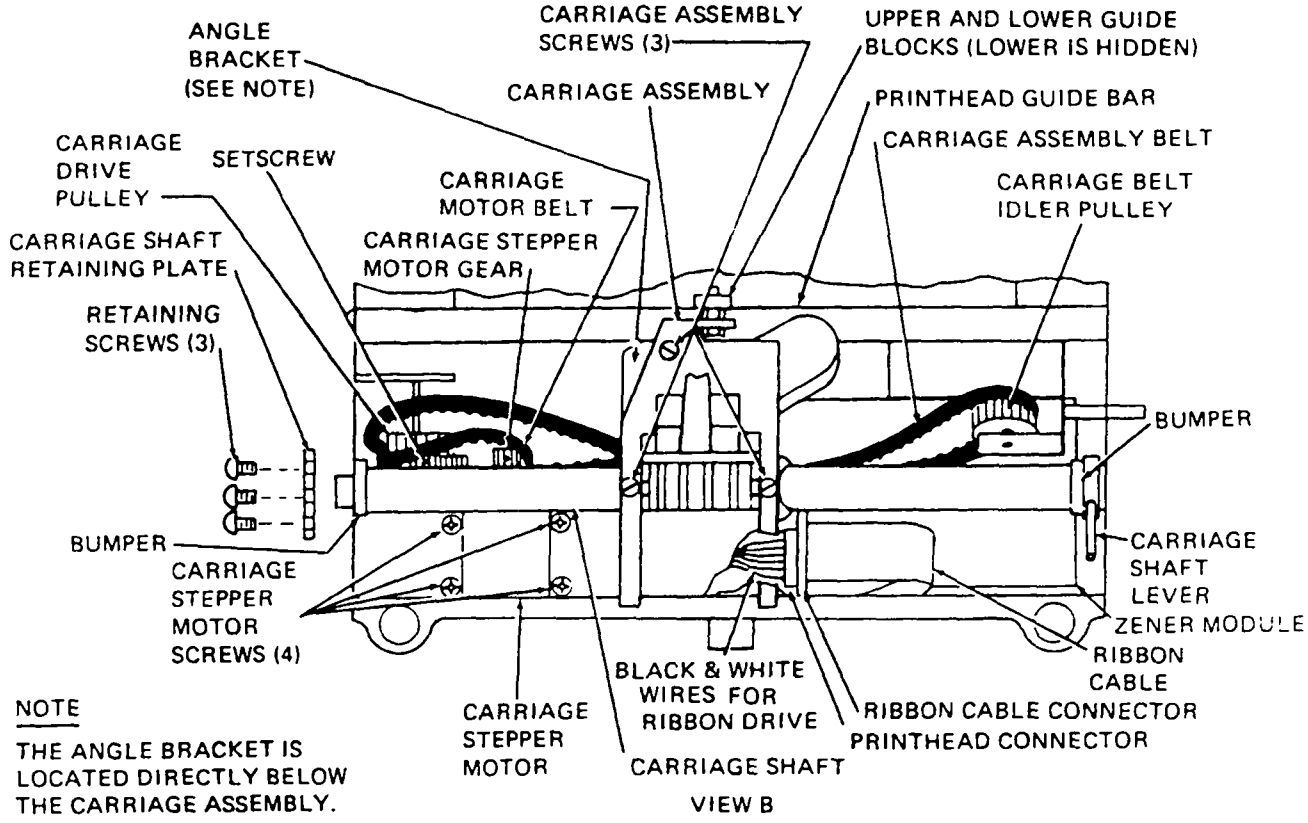
e. Remove two locking rings on the carriage drive pulley shaft (figure 6-2), which is located on left side of the Print Mechanism module.

f. Loosen setscrew located on carriage drive pulley (figure 6-6, View B) and slide pulley shaft to the front of the Print Mechanism module.

g. Remove carriage motor belt and carriage assembly belt from carriage drive pulley (figure 6-6, View B).



VIEW A



NOTE

THE ANGLE BRACKET IS LOCATED DIRECTLY BELOW THE CARRIAGE ASSEMBLY.

VIEW B

Figure 6-6. Printhead Carriage Belt Mechanism

h. Refer to figure 6-6, View B, and locate angle bracket under carriage assembly. Remove two panhead screws and flat washers securing rear of angle bracket to chassis, remove one flathead screw and one panhead screw securing front of angle bracket to chassis, and remove angle bracket.

CAUTION

When performing steps i through n, exercise extreme caution so as not to damage ribbon connector or bend left margin sensor plate on carriage assembly.

i. Remove ribbon cable connector from Zener module by removing the two retaining screws on the ribbon cable connector, using a long screwdriver through access hole on right end of frame and lay the ribbon cable connector back to the right side of the Print Mechanism module (figure 6-6, View B). Note position of upper and lower guide blocks (figure 6-6, View B), on front of carriage assembly.

NOTE

Before removing the carriage shaft retaining plate in the following step, mark one of the three used screw holes in the plate (there are six different holes) with reference to its corresponding screw hole in the frame of the Print Mechanism module. When reinstalling the plate, align the two marked holes. This is necessary for proper alignment of the carriage shaft and carriage assembly.

j. Remove three screws and the carriage shaft retaining plate located on the left side of the Print Mechanism module (figure 6-6, View B). Leave the three screws in their holes in the plate.

k. Carefully slide left bumper toward carriage assembly and then slide the carriage shaft to the left while holding the carriage assembly to the middle of the Print Mechanism module. Loosen carriage shaft lever setscrew and remove lever and curved washer. Remove right bumper from carriage shaft. Slide the carriage shaft to the left and remove left bumper from carriage shaft, then set carriage shaft aside.

l. While holding the carriage assembly, tilt rearward and carefully remove carriage assembly from the Print Mechanism module. The lower guide block is spring loaded. Be careful not to bend the left margin sensing tab.

m. While still holding carriage assembly, rotate upside down and remove the carriage assembly belt clamp by removing the two retaining screws (figure 6-6, View A).

n. Remove defective belt and replace with new belt. Lock new belt in place by replacing the carriage assembly belt clamp.

NOTE

When replacing the carriage assembly into the Print Mechanism module, push down on the lower guide block (figure 6-6, View B), which is under spring tension, and insert under the printhead guide bar. Long side of guide blocks must rest on guide bar.

o. Replace carriage assembly with new belt by reversing the above steps. While performing step d., tighten belt to remove slack. In step c., apply Loctite to the two idler pulley shaft setscrews, and torque setscrews to 3 to 5 inch-pounds. While performing step b., tighten locknut full CW and turn CCW 1/2 turn.

p. Perform belt alignment, paragraph 6-3.1.

6-4.10. Carriage Motor Belt. The carriage motor belt removal and replacement shall be attempted only with the Print Mechanism module removed from the Keyboard Printer. The removal and replacement steps follow:

a. Remove the Print Mechanism module (paragraph 6-4.5).

b. Remove two locking rings on the carriage drive pulley shaft, which is located on left side of the Print Mechanism module (figure 6-2).

c. Release the tension on carriage assembly belt by loosening the locknut on the idler pulley housing (figure 6-5, View C).

d. Loosen four screws holding carriage stepper motor to frame, and move left to release tension on the carriage motor belt. Remove carriage motor belt from carriage stepper motor gear (figure 6-6, View B).

e. Loosen the setscrew located on the carriage drive pulley, and slide shaft to front of Print Mechanism module.

f. Remove carriage assembly belt and defective carriage motor belt. Install new carriage motor belt, then carriage assembly belt.

g. Reverse above steps to restore mechanism to operating conditon. While performing step d., tighten belt to remove slack. While performing step c., tighten locknut full CW and turn CCW 1/2 turn.

h. Perform belt alignment (paragraph 6-3.1).

6-4.11. Printhead. Remove and replace the printhead as follows.

a. Remove ribbon cassette from printhead.

b. Move printhead to far right. Disconnect printhead connector from carriage assembly (figure 6-6, View B) by unscrewing printhead connector retaining screws located under carriage assembly.

c. Carefully cut the lacing ties to release the printhead cable from the carriage assembly frame.

d. Disengage the two twisted black and white wires, using an insertion tool, from the printhead connector (figure 6-6, View B) as follows:

(1) White wire from connector position 19.

(2) Black wire from connector position 9.

e. Remove the two printhead screws and flat washers (figure 6-5, View D).

f. Remove the printhead from the carriage assembly frame, being careful with the wire cable.

g. Replace the defective printhead with a new one by reversing the above steps.

6-4.12. Fan. Removal and replacement of the fan is as follows.

a. Open cover to lock-in position.

b. Remove Print Mechanism module (paragraph 6-4.5).

c. Remove Power Supply module (paragraph 6-4.6).

d. Loosen four captive slotted-head screws securing card cage cover (figure 6-2), and remove cover.

e. On each of four modules in card cage, lift up extractors at each end of module, and lift module straight up.

f. On rear of Keyboard Printer (figure 6-3, View B), remove two panhead screws and flat washers securing card cage to rear of chassis.

g. In right rear corner of chassis (figure 6-4), remove two panhead screws and half-moon floating bushings securing J15 bracket. Do not remove J15 from bracket. Ensure the shims under the J15 bracket are in place before replacing the bracket.

h. Inside card cage (figure 6-4), three connectors (J7, J8, and J9) are fastened to front surface of card cage. These three connectors are part of three short cables that connect to mating connectors on the motherboard at the bottom of the card cage. Disconnect the three short cables from the motherboard connectors by pressing outward on the extractor at each side of each motherboard connector. The mating connector on the short cable will come free from its motherboard connector. (When reinstalling, it is not necessary to position the extractors. Simply mate each short cable connector with its motherboard connector, and press down on the short cable connector.

i. Inside card cage, remove card cage mounting hardware (figure 6-4), consisting of four nuts, lockwashers, and flat washers, from mounting studs.

j. Work card cage free of motherboard and set card cage aside. Motherboard is not attached to card cage.

k. Lift right side (J15 end) of motherboard up and remove spacer that fits over the two mounting studs at that end. The spacer is normally positioned between the bottom of the motherboard and the wires connected to J15.

l. Lift up front edge of motherboard as far as cable slack will allow for access to connectors on bottom.

m. On bottom of motherboard, disconnect multicolored ribbon cable connector P6 from its mating connector on motherboard, and disconnect gray-colored ribbon cable connector P5 from its mating connector on motherboard.

n. Hold motherboard to one side to obtain access to terminals on TB1 on bottom of chassis.

o. On TB1, remove screws securing W2 (red), W3 (green), and W4 (yellow) wires from fan B1 (figure 6-4) at left rear of chassis. Three sets of power supply wires will also come free.

p. Remove four nuts, lockwashers, and flat washers securing fan B1 to side of chassis, and lift out fan.

q. Place new fan in position, with wires at bottom of chassis, and secure with four nuts, lockwashers, and flat washers. Connect power supply wires and fan wires to TB1 as listed below. Only four of the six terminals of TB1 are used. (The terminal at each end of TB1 is not used.) Terminal 1 of TB1 is next to the rearmost (unused) terminal.

Fan wires	Power Supply wires	TB1 terminals
W2 (red)	W13, W14	2
W3 (green)	W12	3
W4 (yellow)	W15, W16	4

r. Install motherboard by reversing steps m, l, and k above. Gray-colored ribbon cable goes under the cable going to J2 at the bottom rear of the chassis. When repeating step k, be sure that the spacer at J15 end of motherboard is placed on top of the wires going to J15, but under the motherboard.

s. Install card cage and its inside mounting hardware (steps j and i above), but do not tighten nuts securely. Leave nuts loose for alignment of card cage with motherboard connectors in following steps.

t. Secure card cage to rear of chassis with two panhead screws and flat washers (figure 6-3, View B) as in step f above.

u. Install Controller module A1A8 (61-40351-001) in its slot in card cage (figure 6-2), and press down to engage with motherboard connector. Close extractors to secure A1A8 in place.

v. Tighten two rear nuts inside card cage to align motherboard with card cage, then remove A1A8 and tighten two front nuts inside card cage.

w. Perform procedures in steps h, g, and e through a.

6-4.13. Lamp Replacement. To replace lamps on the Control Panel or Print Mechanism module, refer to table 2-7, steps 17 through 19. Replacement of Keyboard lamps is not performed at this level of maintenance.

6-4.14. Air Filter. Removal and replacement of the air filter (figure 6-7) shall be accomplished by the following steps:

a. Remove the eight screws which secure the filter element to the left rear side of the Keyboard Printer (figure 6-7).

b. Remove the air filter cover frame.

c. Remove the air filter element.

d. Replace the air filter after cleaning by reversing the above steps.

6-4.15. Keyboard Printer. Removal and replacement of the Keyboard Printer shall be accomplished by direction of the PCO. See Chapter 8.

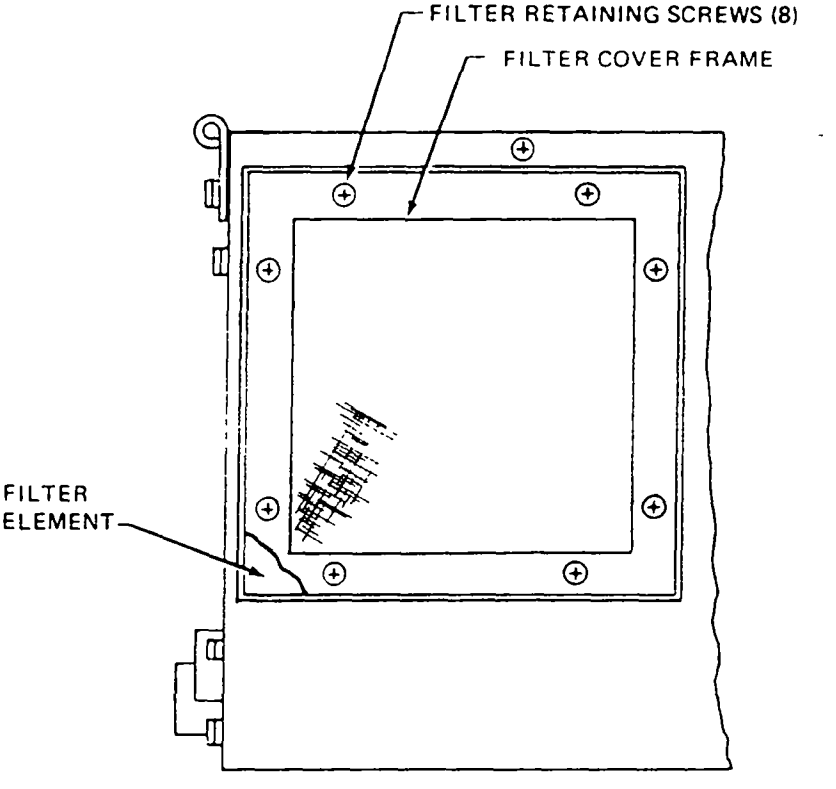


Figure 6-7. Chassis, Side View

CHAPTER 7

PARTS LIST

7-1. INTRODUCTION. With reference to illustrations, this parts list for Teletypewriter Set AN/UGC-136AX lists and identifies the locations of all organizational repair parts, including attaching hardware. All mechanical parts which are not provisioned but are required to be removed to service the organizational replacement parts, are included in the parts list and identified in the respective parts location diagram. A list of common item descriptions is not applicable for the organizational manual. This chapter shall include the following:

a. Interchangeability.

b. List of major components.

c. Parts list.

d. List of attaching hardware.

e. List of manufacturers.

f. Parts location illustrations.

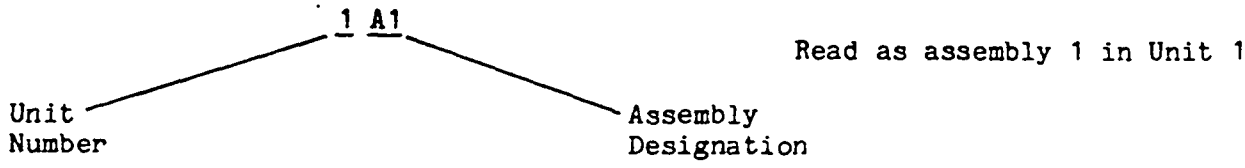
7-2. INTERCHANGEABILITY. In general, the assemblies and parts installed at the time the end item(s) was manufactured are listed and identified in the manual. When an assembly or part (including vendor items) which is different from the original is installed during the manufacture of later items, series, or blocks, all assemblies and parts are listed (and "Usable on" coded). However, when the original assembly or part does not have continued application (no spares of the original were procured or such spares are no longer authorized for replacement), only the preferred assembly or part is listed. Also, when an assembly or part is installed during modification, and the original does not have continued application, only the preferred item is listed. Interchangeable and substitute assemblies and parts, subsequently authorized by the Government, are not listed in this manual; such items are identified by information available through the Interchangeable and Substitute (I & S) Data Systems. Refer to T. O. 00-25-184. When a standard size part can be replaced with an oversize or undersize part, the latter parts, showing sizes are also listed. Repair Parts Kits and Quick Change Units are listed when they are available for replacement.

7-3. LIST OF MAJOR COMPONENTS. Table 7-1 is a listing of the major components included in Teletypewriter Set AN/UGC-136AX. The assemblies are listed by reference designations in numerical order. Thus, when the complete reference designation of a part is known, this table will furnish the identification of the assembly in which the part is located.

Table 7-1. Teletypewriter Set AN/UGC-136AX, List of Major Components

Unit number	Qty.	Name or nomenclature	Page number
1	1	Teletypewriter Set AN/UGC-136AX	7-6
1A1	1	Teleprinter	7-6
1A2	1	Keyboard-Transmitter, Teletypewriter	7-11

7-3.1. Column 1, Unit Number. The numbering method of assigning reference designations has been used to identify assemblies. An example of this numbering method is illustrated by the following:



7-3.2. Column 2, Quantity. This column lists the quantity of components used in this set.

7-3.3. Column 3, Name or Nomenclature. This column contains either the official name or nomenclature of the unit together with the type number of the unit or the name or nomenclature annotated on the release production drawing.

7-3.4. Column 4, Page Number. This column lists the number of the first page of the parts listing for the major component.

7-4. PARTS LIST. Table 7-2 lists all assemblies and their organizational maintenance parts in numerical sequence by reference designation, including attaching parts. Maintenance parts for each assembly are listed alphanumerically by class or part following the assembly designation. Table 7-2 provides the following information: (1) complete reference designation of each assembly, subassembly, and part, (2) reference to explanatory notes, (3) noun name and brief description, and (4) identification of the parts location illustration which pictorially locates the part.

7-4.1. Column 1, Reference Designation. The parts list is divided and arranged by major assemblies in numerical sequence (e.g., assembly A1 with its subassemblies,

parts, etc., precedes assembly A2 with its parts). A1 parts attached to the assembly are listed first in alphanumerical order, followed by subassemblies with parts, also listed in alphanumerical order as follows:

Assembly	A1	Subassembly	A1A1
(Assembly Parts)	A1AT1		A1A1AT1
	A1B1		A1A1B1
	A1C1		A1A1C1
	A1CR1		A1A1CR1
	Etc.		A1A1R1

MP numbers are assigned to mechanical parts subject to replacement, such as handles, slides, etc. These numbers are constructed using the item number on the engineering drawing.

7-4.2. Column 2, Notes. Parts variations within each article are identified by a letter and a number symbol in the Notes column of table 7-2. The absence of a symbol in the Notes column indicates that the part is used on all articles covered by this technical manual.

7-4.3. Column 3, Name and Description. This column contains the item name, descriptive data and military part number of the item. Non military parts include physical or electrical characteristics. Identical attaching parts that are used five times or more are referenced to the List of Attaching Hardware, table 7-3. Following the description are the manufacturers identification code, part number and the contractor's identification code and control drawing number. Attaching hardware, with quantity is identified by the assigned letter code from table 7-3; e.g., C(4) would be the third listed piece of attaching hardware in which four pieces are used.

7-4.4. Column 4, Figure Number. This column lists the figure number of the parts location illustration (located at the end of the chapter), which shows the physical location of the part.

7-5. LIST OF ATTACHING HARDWARE. Table 7-3 contains a list of attaching hardware used in five or more applications. Table 7-3 provides the following information: (1) Letter Code, and (2) Name and Description.

7-5.1. Column 1, Letter Code. This column lists an alpha entry indicating the position of the attaching part in the listing.

7-5.2. Column 2, Name and Description. This column contains the item name in alphabetic sequence, descriptive data and military part number of the item.

7-6. LIST OF MANUFACTURERS. Table 7-4 contains the name, address, and code number of all manufacturers supplying items for the equipment as referenced in the parts list. This list is in numerical sequence by code number. Code numbers are in accordance with Cataloging Handbooks H4-1 and H4-2.

7-7. PARTS LOCATION ILLUSTRATIONS. Parts location illustrations (figures 7-1 through 7-5), with associated tables 7-5 through 7-13, are located at the end of this chapter. Their purpose is to provide positive and rapid location of parts. Column 4 of table 7-2 references the appropriate illustration which pictorially locates the part in the equipment.

7-8. ABBREVIATIONS AND SYMBOLS. Abbreviations and symbols used throughout this Illustrated Parts Breakdown are in compliance with Military Standard MIL-STD-12D. Nonstandard abbreviations are as follows:

I & S Interchangeable and Substitute

MP Mechanical Parts

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List

Reference Designation	Notes	Name and description	Figure Number (Item)
1		TELETYPEWRITER SET AN/UGC-136AX: Provides pin matrix printing with programmable microprocessor electronics with full message composition editing facilities; mfr 00724 part no. 01-01275-001	7-1
1A1		TELEPRINTER: Provides the printing of data at up to 120 characters per second and accommodates data rates up to 2400 baud received into the internal 20,000 character message store; mfr 00724 part no. 03-04293-001	7-1 (1)
1A1A1		TELEPRINTER SUBASSY: Provides the paper drive and printing mechanism for the teleprinter; mfr 00724 part no. 03-04296-002 (Attaching Parts) B(3) Washer, flat-cres, round 0.219 in. ID, 0.438 in. OD, 0.049 in. thickness, MS15795-808 no. 10. (3)	7-2 (12)
1A1A1A3MP1		PRINTHEAD, PIN MATRIX: 40 to 58 Vdc, 1200 pps; mfr 00724 part no. 69-00472-001 (Attaching Parts) C(2) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-15, no. 4-40 UNC-2A, 3/8 in. lg (2) JACKSCREW ASSEMBLY, MALE: mfr 00779 part no. 87185-1, 00724 dwg 16-01336-002 (2)	7-3 (26)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1A1A4		MOTOR ASSY, LINE FEED: Provides a four phase 5 deg stepping motor, 17 Vdc for the line feed; mfr 00724 part no. 03-04300-001 (Attaching Parts) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-46 no. 8-32 UNC-2A, 0.625 in. lg. (2) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-47 no. 8-32 UNC-2A, 0.750 in. lg. (2) WASHER: Lock-cres, spring, helical, regular (medium) series 0.172 in. ID, 0.293 in. OD, 0.040 in. thickness, MS35338-137 no.8. (4) WASHER: Flat-cres, round 0.188 in. ID, 0.375 in. OD, 0.049 in. thickness, MS15795-807 no.8. (4)	7-3 (25)
1A1A1DS1		LAMP: Incandescent - MIL-L-6363 part no. MS25231-313	7-3 (1)
1A1A1DS2		LAMP: Incandescent - MIL-L-6363 part no. MS24231-313	7-3 (1)
1A1A1MP21		BELT, TIMING: 120 teeth, 24.00 in length, mfr. 02934 part no. 240XL025T4N10 construction, 00724 dwg 28-00125-104 (Attaching Parts) SHAFT: Pulley brack support-shouldered, shoulder no. 10-32 UNF-2A thd by 0.190 in. lg, shaft 0.250 in. OD by 1.04 in. lg. with a 1/4-28 UNF-2A thd 0.500 in. lg one end; mfr 00724 part no. 29-00227-001 NUT: Self-locking, assembled washer - cres, six point self-locking nut with captive washer, 1/4-28 UNF-3B; mfr 15653 part no. HW42-4, 00724 dwg 25-00318-006	7-3 (4)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1A1MP21 (Cont)		SPRING: Helical, compression - cres, 0.480 in. OD, 1/2 in. lg; mfr 84830 part no. LC-059G-1SS, 00724 dwg 42-00103-001 BRACKET: Idler pulley - AL ALY 356-T6 casting per AMS 4260, 0.812 in. wide by 0.812 in. lg by 1.180 in. high OA dim; mfr 00724 part no. 67-04887-001 BEARING, BALL: Annular-flanged, shielded, 0.250 in. bore, 0.500 in. od, 0.1875 in. width, mfr 83086 part no. SFR188LL3DC8K58-274, 00724 dwg 27-00068-005 PULLEY: Flanged-18 tooth, 1/5 pitch, 0.500 in. id, 1.28 in. od overall, 0.400 in width overall; mfr 00724 part no. 39-00388-001 SHAFT: Straight-cres, class 303, cond A, 0.2497 in. od, 0.812 in. lg; mfr 00724 part no. 37-07570-001 SETSCREW: Hexagon, headless, cup point, cres, no. 6-32 UNC-3A, 3/16 in. lg. AN565DC6H3 (3) RING: Retaining-external, basic tapered section type, MIL-R-21248, type 1, class 2, MS16624-4037 (2) PULLEY: Flanged-54 teeth, 0.080 pitch, 0.250 in. id, 1.50 in. od overall, 0.812 in. wide overall, mfr 00724 part no. 39-00386-001 SHAFT: Drive pulley-cres, class 303, cond A, 0.2496 in od by 1.66 in. lg, mfr 00724 part no. 29-00235-001	
1A1A1MP22		BELT, TIMING: 140 teeth, pitch 0.080, belt pitch length 11.200 in, mfr 02934 part no. Mold 80140 112MXL025 A17N10 construction, 00724 dwg 28-00165-001	7-3 (20)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1A1MP22 (Cont)		(Attaching Parts) D(4) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-30, no. 6-32 UNC-2A, 0.500 in. lg (4) BEARING, BALL: Annular-flanged, shielded, 0.969 flange dia, 0.370 in. bore, 0.875 in. od, 0.2812 in. width, mfr 14927 part no. SFR6HHK25L01(3), mfr 83086 part no. SFR63PPDK 25/7, 00724 dwg 27-00068-002 (1) RING, RETAINING: External, basic, tapered section type, MIL-R-21248, type 1, class 2, MS16624-4037 (1)	
1A1A1MP23		BELT, TIMING: 94 teeth, pitch 0.080, belt pitch length 7.520 in, mfr 02934 part no. Mold 80094X1/4XA17N10 construction, 00724 dwg 28-00165-002	7-3 (8)
1A1A1MP40		RIBBON: Cassette - black nylon tape, 16 yards long, 0.0045 thk, 0.52 in. wide, 75 rpm speed mfr 51809 part no. 197939, 00724 dwg 69-00402-001	7-3 (5)
1A1A1XDS1		LIGHT, INDICATOR: For T-3 1/4 miniature bayonet base bulb, screw-in white translucent lens, mounts in a 11/16 in. dia mtg hole, mfr 96312 part no. 52-0410-3195-201, 00724 dwg 14-00122-001	7-3 (2)
1A1A1XDS2		LIGHT, INDICATOR: For T-3 1/4 miniature bayonet base bulb, screw-in white translucent lens, mounts in a 11/16 in. dia mtg hole, mfr 72619 part no. 52-0410-3195-201, 00724 dwg 14-00122-001	7-3 (2)
1A1A2		CHASSIS ASSY, TELEPRINTER: Provides the mounting for the circuit cards, power supply and printer mechanism, mfr 00724 part no. 03-04302-001	7-2 (11)
1A1A2B1		FAN, AXIAL: 1 phase, 115 Vac, 50-60 Hz, 3250 rpm, 110 cfm, mfr 92702, part no. BC2206F-8, mfr 82877 part no. 020027, 00724, dwg 59-00096-002	7-4 (4)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1A2B1 (Cont)		(Attaching Parts) D(4) SCREW, MACHINE: Flat countersunk head, 100 deg, cross recessed, cres, MS24693-C40, no. 6-32 UNC-2A, 2.0 in. lg. (1) SCREW, MACHINE: Flat countersunk head, 100 deg, cross recessed, cres, MS24693-C29, no. 6-32 UNC-2A, 5/8 in. lg. (3) WASHER, LOCK: Cres, spring, helical, regular (medium) series 0.145 in. id, 0.250 in. od, 0.031 in. thickness, MS35338-136, no. 6. (4) NUT, PLAIN HEXAGON: Machine screw, cres, no. 6-32 UNC-2B, 5/16 in. across flats, 7/64 in. thick, MS35649-264 (4)	
1A1A2FL1		FILTER, RADIO FREQUENCY INTERFERENCE: Power, AC, 115 Vac, 47/440 Hz, 5 amp AC opr current, mtd by two no. 6-32NC threaded inserts, provided with MS3113H14C5PW connector, mfr 00724 part no. 08-01091-001 (Attaching Parts) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-26 no. 6-32 UNC-2A, 1/4 in. lg. (2) WASHER, LOCK: Flat, internal tooth, no.6, 0.141 in. id, 0.295 in. od, 0.021 thick, cres, MS35333-71 (2)	7-4 (9)
1A1A2MP3		CONTROL ASSEMBLY: Provides control of power, intensity of copy illumination, self test routine, line feed, keying of UHF Xmtr, resets bell and low paper light, indicates power on, bell character has been received, low paper, and open circuit or space condition, mfr 00724 part no. 03-04285-001	7-4 (7)
1A1A2MP3DS1		LAMP, INCANDESCENT: Single contact midget flanged base, TI-3/4 bulb, 28 Vdc, MIL-L-6363 part no. MS25237-387	7-5 (1)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1A2MP3DS2		LAMP, INCANDESCENT: Single contact midget flanged base, TI-3/4 bulb, 28 Vdc, MIL-L-6363 part no. MS25237-387	7-5 (1)
1A1A2MP3DS4		LAMP, INCANDESCENT: Single contact midget flanged base, TI-3/4 bulb, 28 Vdc, MIL-L-6363 part no. MS25237-387	7-5 (1)
1A1A2MP3DS5		LAMP, INCANDESCENT: Single contact midget flanged base, TI-3/4 bulb, 28 Vdc, MIL-L-6363 part no. MS25237-387	7-5 (1)
1A1A2MP3-XDS1		LIGHT, INDICATOR: MIL-L-3661 part no. LH73/2-LC27WT2	7-5 (2)
1A1A2MP3-XDS2		LIGHT, INDICATOR: MIL-L-3661 part no. LH73/2-LC27WT2	7-5 (2)
1A1A2MP3-XDS4		LIGHT, INDICATOR: MIL-L-3661 part no. LH73/2-LC27WT2	7-5 (2)
1A1A2MP3-XDS5		LIGHT, INDICATOR: MIL-L-3661 part no. LH73/2-LC27GT2	7-5 (3)
1A1A2MP28		FILTER ELEMENT, AIR CONDITIONING: Make from QQ-A-250/8 AL ALY 5052-H32 and RR-W-365 wire fabric type VII, CL 1, 18 x 16 mesh, mounts by 8 0.136 in. dia mtg holes, 5.00 in. by 5.00 in. by 0.09 in. thick oa dim, mfr 00724 part no. 67-04623-002 (Attaching Parts) A(8), C(8)	7-4 (10)
1A1A2MP29		FILTER, AIR CONDITIONING: Modified, make from mfr. 50472 part no. QE1709, modify by drilling 8 0.136 in. dia mtg holes around frame, mfr 00724 part no. 95-00280-001	7-4 (2)
1A1A3		POWER SUPPLY: Provides regulated and protected input/output isolated DC voltage to the keyboard printer and a chopped 28 Vac output for fan drive, mfr 00724 part no. 03-04350-001	7-2 (9)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1A3 (Cont)		(Attaching Parts) D(4) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-32, no. 6-32 UNC-2A, 3/4 in. lg. (4)	
1A1A4		Not Used.	
1A1A5		CIRCUIT CARD ASSY: 20K message store provides three 2K by 8 ROM chips for program storage and thirty-six 4K by 1 RAM chips for character storage, mfr 00724 part no. 61-40227-001	7-2 (3)
1A1A6		CIRCUIT CARD ASSY, MICROCOMPUTER: Provides main processing and control of all keyboard printer activities, mfr 00724 part no. 61-40353-001	7-2 (4)
1A1A7		CIRCUIT CARD ASSY-INTERFACE, LOW LEVEL: Provides the control for the transmit and receive data interface between the keyboard printer and the external interface, mfr 00724 part no. 61-40358-001	7-2 (5)
1A1A8		CIRCUIT CARD ASSY-CONTROLLER: Provides printhead fire control, character font control, and motor control, interprets switch and optical sensor states, and detects fan failure, mfr 00724 part no. 61-40351-001	7-2 (6)
1A1MP2		COVER ASSY-TELEPRINTER: Provides access to all plug-in modules, circuit cards, test points, and chassis replaceable parts, mfr 00724 part no. 03-04289-001 (Attaching Parts) D(4) SCREW, MACHINE: Pan head, cross recessed, cres, MS51957-28, no. 6-32 UNC-2A, 3/8 in. lg. (4) SPACER: Cres per QQ-S-766, class 304, condition 2B, finish annealed, 0.005 in. thk, 0.50 in. width, 2.50 in. lg. mtd by two 0.187 in. dia mtg holes 2.00 in. C to C, mfr 00724 part no. 40-00857-001 (AR)	7-2 (1)

Table 7-2. Teletypewriter Set AN/UGC-136AX, Parts List-Continued

Reference Designation	Notes	Name and description	Figure Number (Item)
1A1MP2 (Cont)		SPACER: Cres per QQ-S-766, class 304, condition 2B, finish annealed, 0.010 in. thk, 0.50 in. width, 2.50 in. lg. mtd by two 0.187 in. dia mtg holes 2.00 in. C to C, mfr 00724 part no. 40-00857-002 (AR)	
		SPACER: Cres per QQ-S-766, class 304, condition 2B, finish annealed, 0.015 in. thk, 0.50 in. width, 2.50 in. lg. mtd by two 0.187 in. dia mtg holes 2.00 in. C to C, mfr 00724 part no. 40-00857-003 (AR)	
		SPACER: Cres per QQ-S-766, class 304, condition 2B, finish annealed, 0.020 in. thk, 0.50 in. width, 2.50 in. lg. mtd by two 0.187 in. dia mtg holes 2.00 in. C to C, mfr 00724 part no. 40-00857-004 (AR)	
		RING, RETAINING: External, E, reduced section type, MIL-R-21248 type 1, class 5, MS16633-4025 (1)	
1A1MP7		COVER, TOP, CARD CAGE: Cold roll carbon steel, 22 gage, tin plated, mtd by four no. 6-32 captive screws, 0.83 in. high by 3.802 in. wide by 9.322 in. lg. oa, mfr 00724 part no. 67-05158-001	7-2 (7)
1A2		KEYBOARD TRANSMITTER, TELETYPEWRITER: Provides controls and indicators required for normal operation of the printer, message memory, line communications facilities, and manipulation of the compose and edit capabilities. Mtd by four no. 8-32 UNC-2A radial float captive screws, mfr 00724 part no. 03-04283-001	7-1 (2)

Table 7-3. List of Attaching Hardware

Letter code	Name and description
A	SCREW, MACHINE: PAN HEAD, CROSS RECESSED, CRES, MS51957-18, No. 4-40 UNC-2A, 0.625 in. lg.
B	SCREW, MACHINE: PAN HEAD, CROSS RECESSED, CRES, MS51958-28, 6-40 UNF-2A, 0.375 in. lg.
C	WASHER, FLAT: CRES, ROUND 0.125 in. ID, 0.250 in. OD, 0.022 in. thickness. MS15795-803 No. 4.
D	WASHER, FLAT: CRES, ROUND 0.156 in. ID, 0.312 in. OD, 0.035 in. thickness. MS15795-805 No. 6.

Table 7-4. List of Manufacturers

Code number	Manufacturers name and address
00724	E-Systems Inc ECI Division P O Box 12248 1501 N 72nd St St Petersburg FL 33733
00779	Amp Inc P.O. Box 3608 Harrisburg PA 17105
02934	Uni-Royal Inc Uni-Royal Fiber and Textile Div Administrative Center Winnsboro SC 29180
14927	Kubar Bearings Inc Cambridge MA
15653	Kaynar Mfg Co Inc Kaylock Div 800S State College Blvd P O Box 3001 Fullerton CA 92634
50472	Metal Masters Inc 14410 Nelson Ave City of Industry CA 91744
51809	NCR Corp Systemsmedia Div 9095 Washington Church Rd Miamisburg OH 45342
72619	Dialight Div Amperex Electronic Corp 203 Harrison Pl Brooklyn NY 11237
81349	Military Specifications
82877	E.G. and G. Rotron Inc Custom Div 7 Hasbrouck Ln Woodstock NY 12498
83086	New Hampshire Ball Bearing Inc RT 202 Petersborough NH 03458
84830	Lee Spring Co Inc 30 Main St Brooklyn NY 11201
88044	Aeronautical Stds. Group Department of Navy and Air Force
92702	IMC Magnetics Corp Eastern Div 570 Main St Westbury Long Island NY 11591
96906	MIL Standards

Table 7-5. Teletypewriter Set, AN/UGC-136AX, Parts Location (Figure 7-1)

Index No.	Zone	Description	Qty	*Reference Designation
1	1-D	Teleprinter		A1
2	2-A	Keyboard Transmitter, Teletypewriter		A2

*Reference Designation prefix is 1 unless otherwise stated.

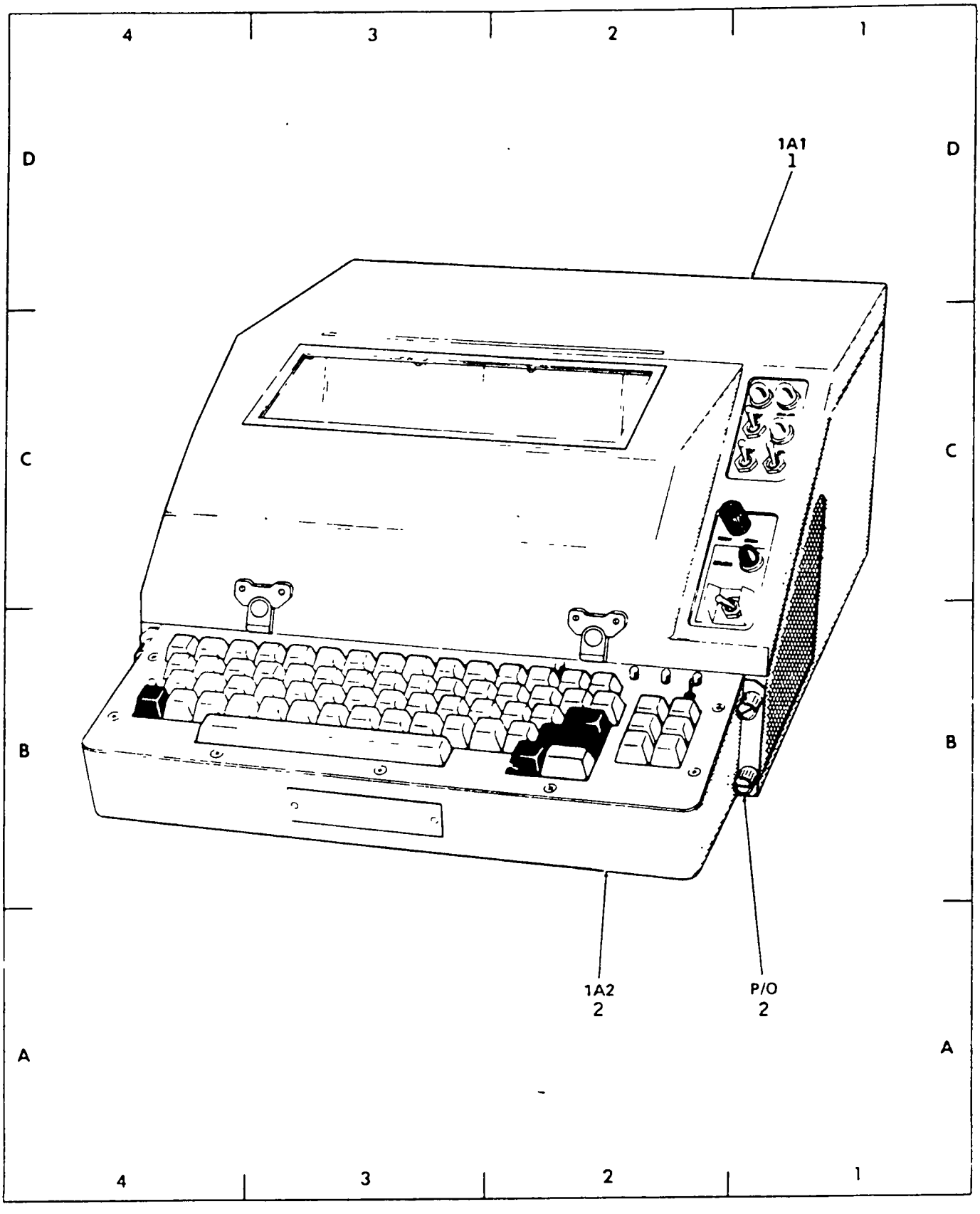


Figure 7-1. Teletypewriter Set, AN/UGC-136AX

Table 7-6. Teleprinter, Parts Location (Figure 7-2)

Index No.	Zone	Description	Qty	*Reference Designation
1	5-D	Cover Assy		MP2
2	4-D	Machine Screw	4	
	4-D	Flat Washer	4	
3	3-D	Circuit Card Assy-Message Storage		A5
4	3-D	Circuit Card Assy-Microcomputer		A6
5	3-D	Circuit Card Assy-Interface		A7
6	3-D	Circuit Card Assy-Controller		A8
7	2-D	Card Cage Cover		MP7
8	2-D	Machine Screw	4	
	2-D	Flat Washer	4	
9	1-C	Power Supply		A3
10	2-A	Machine Screw	3	
	2-A	Flat Washer	3	
11	3-A	Chassis Assy		A2
12	4-A	Teleprinter Subassy		A1
13	5-C	Retaining Ring		
14	5-C	Machine Screw	2	
	5-C	Flat Washer	2	
	5-C	Lockwasher	2	

*Reference Designation prefix is 1A1 unless otherwise stated.

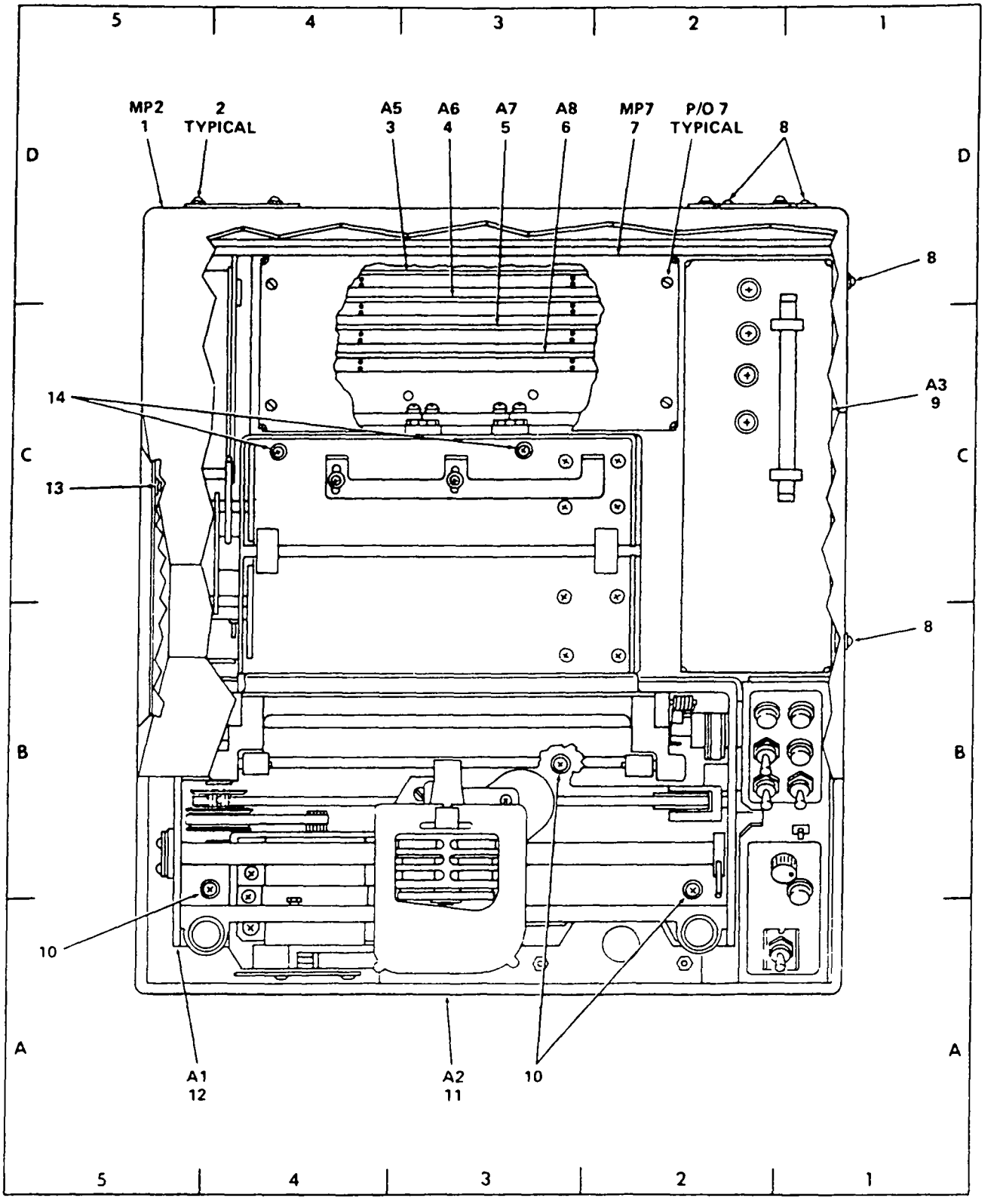


Figure 7-2. Teleprinter

Table 7-7. Teleprinter Subassembly, Parts Location
(Figure 7-3, Sheet 1 of 5)

Index No.	Zone	Description	Qty	*Reference Designation
1	5-B	Incandescent Lamp	2	DS1
	1-B	Incandescent Lamp		DS2
2	5-B	Indicator Light Assembly	2	XDS1
	1-B	Indicator Light Assembly		XDS2

*Reference Designation prefix is 1A1A1 unless otherwise stated.

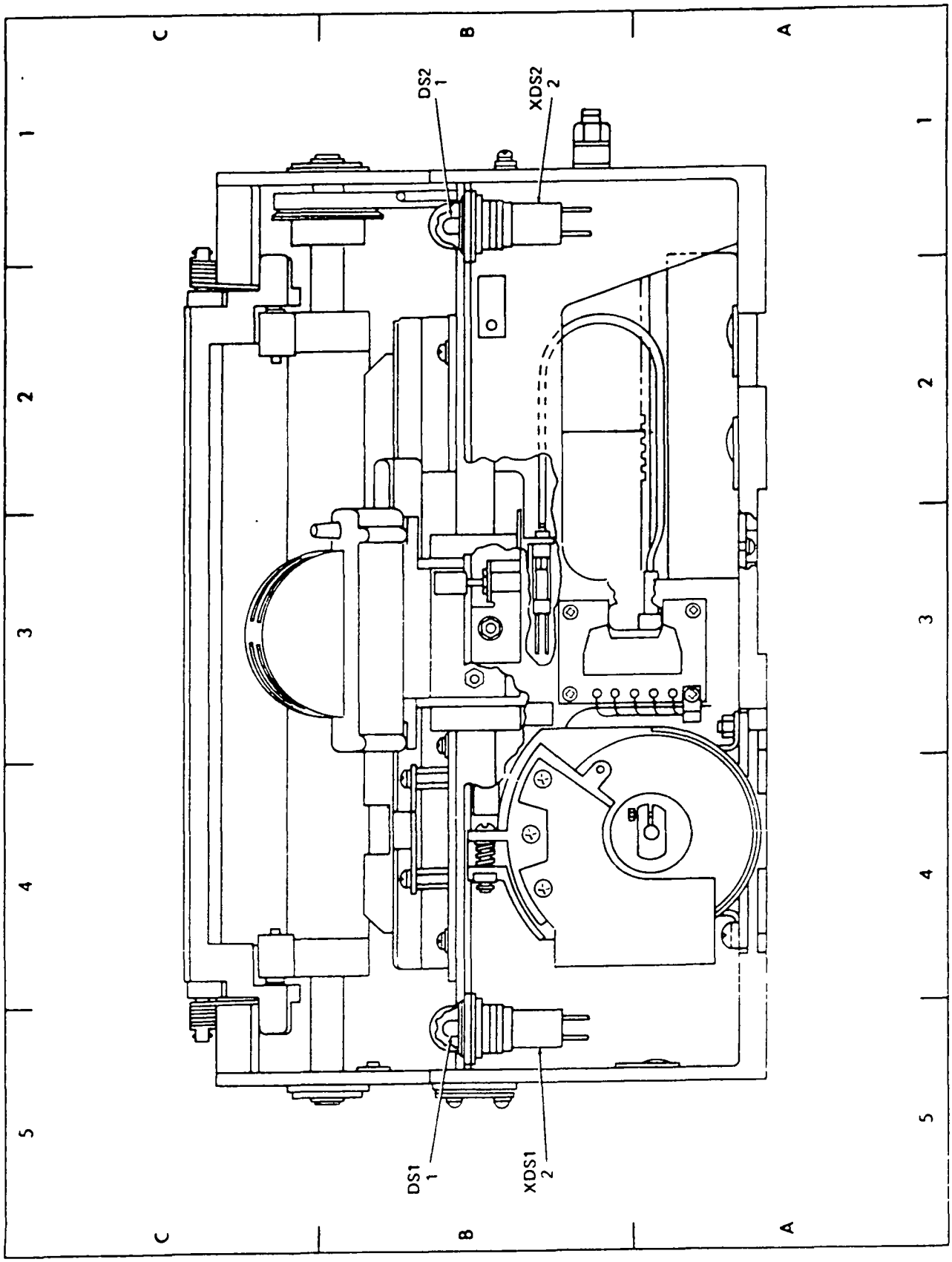


Figure 7-3. Teleprinter Subassembly (Sheet 1 of 5)

Table 7-8. Teleprinter Subassembly, Parts Location
(Figure 7-3, Sheet 2 of 5)

Index No.	Zone	Description	Qty	*Reference Designation
3	2-C	Setscrew	2	
4	1-B	Timing Belt		MP21
5	3-A	Ribbon Cassette		MP40
6	6-B	Retaining Ring	2	
7	6-B	Flanged Pulley		
8	6-B	Timing Belt		MP23
9	6-B	Setscrew		
10	6-B	Bearing	4	
11	6-C	Machine Screw	4	
	6-C	Flat Washer	4	

*Reference Designation prefix is 1A1A1 unless otherwise stated.

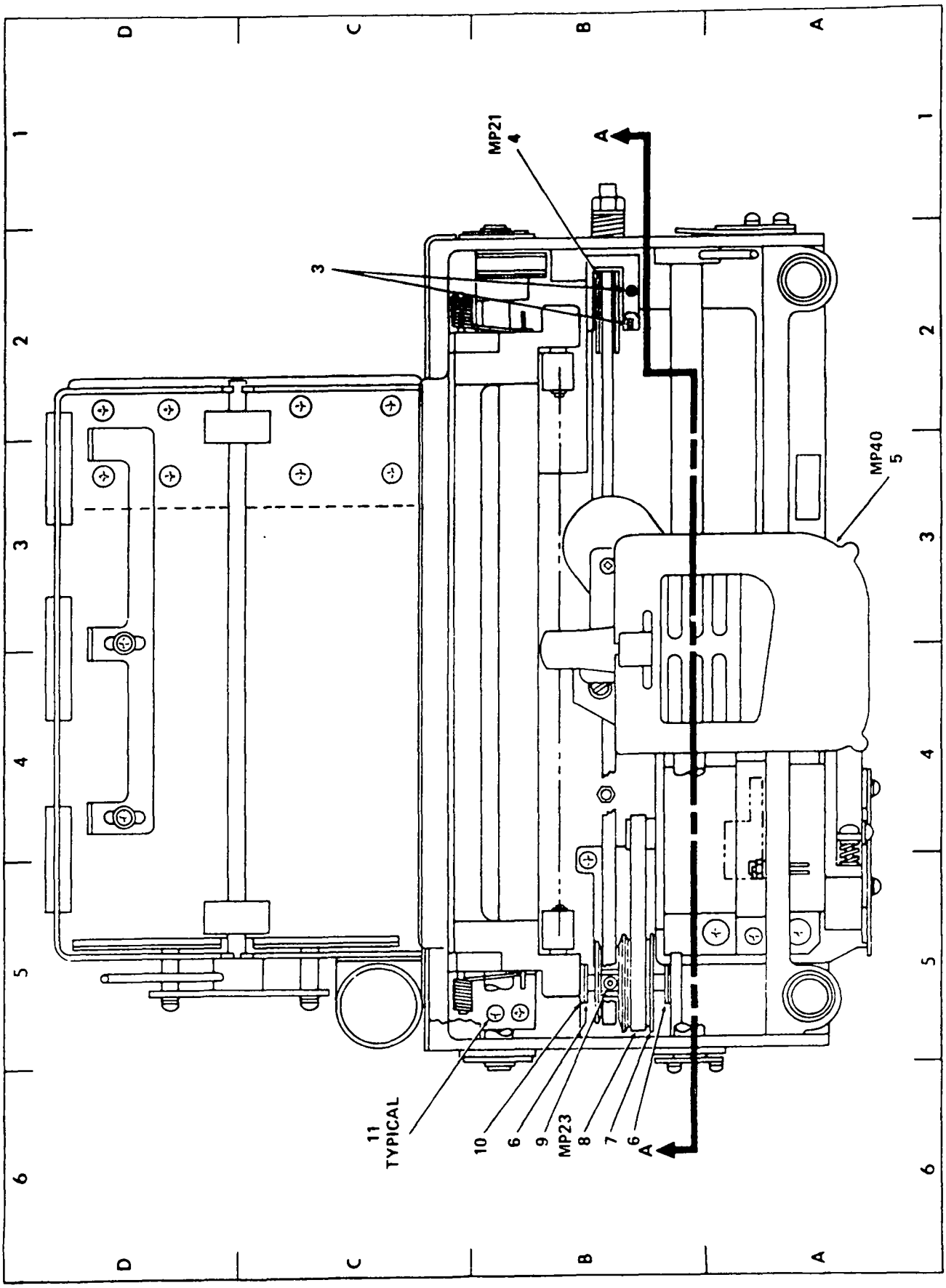


Figure 7-3. Teleprinter Subassembly (Sheet 2 of 5)

Table 7-9. Teleprinter Subassembly, Parts Location
(Figure 7-3, Sheet 3 of 5)

Index No.	Zone	Description	Qty	*Reference Designation
12	2-B	Flanged Pulley		
13	2-B	Idler Pulley Bracket		
14	1-B	Shoulder Washer	2	
15	1-B	Shaft		
16	1-A	Locking Nut		
17	1-A	Spring		
18	2-A	Pin		
19	5-A	Shaft		

*Reference Designation prefix is 1A1A1 unless otherwise stated.

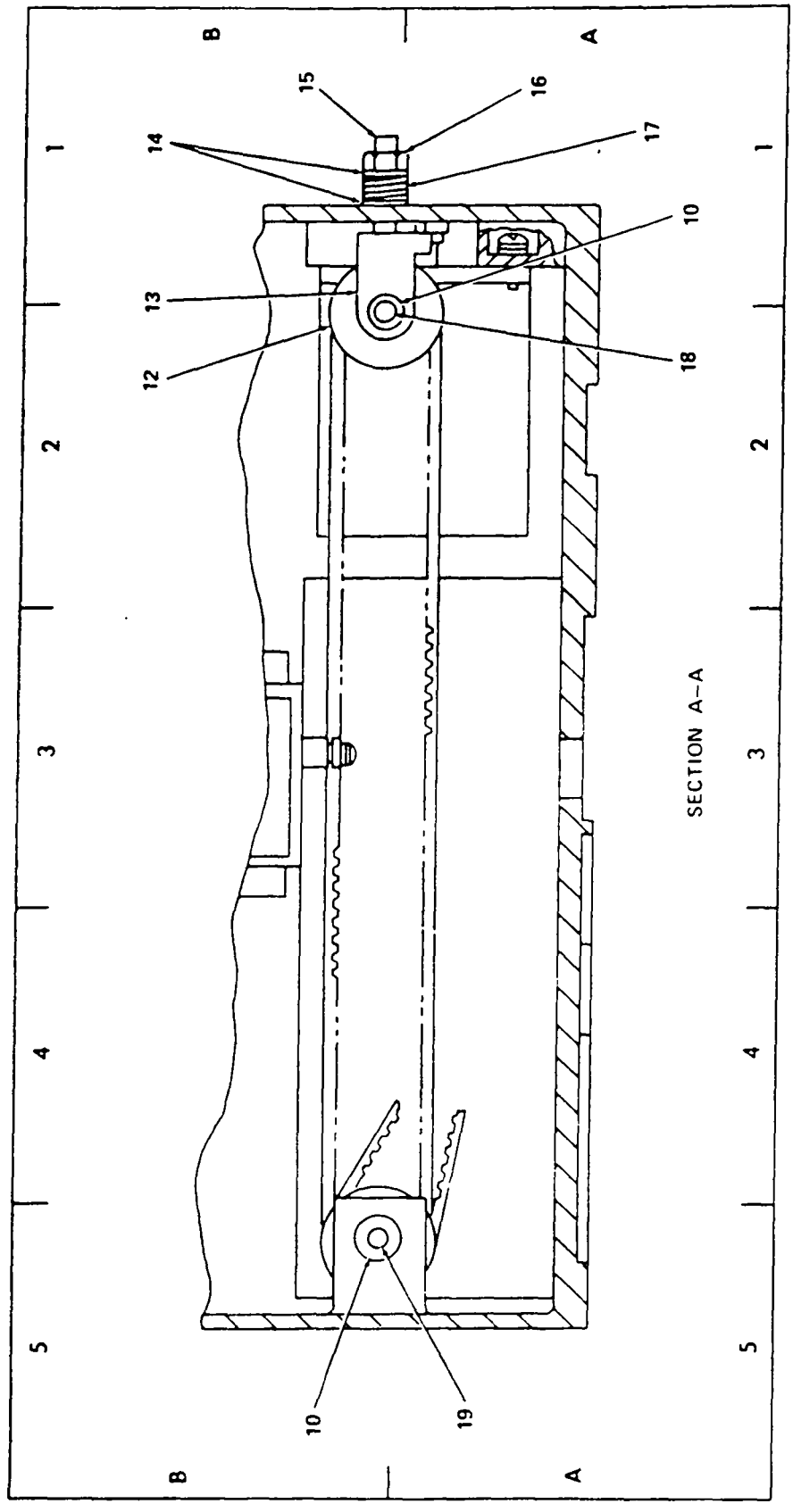


Figure 7-3. Teleprinter Subassembly (Sheet 3 of 5)

Table 7-10. Teleprinter Subassembly, Parts Location
(Figure 7-3, Sheet 4 of 5)

Index No.	Zone	Description	Qty	*Reference Designation
20	4-C	Timing Belt		MP22
21	3-C	Annular Ball Bearing	2	
22	2-C	Retaining Ring	2	
23	2-A	Machine Screw	2	
	2-A	Lockwasher	2	
	2-A	Flat Washer	2	
24	3-A	Machine Screw	2	
	3-A	Lockwasher	2	
	3-A	Flat Washer	2	
25	4-A	Line Feed Motor Assy		A4

*Reference Designation prefix is 1A1A1 unless otherwise stated.

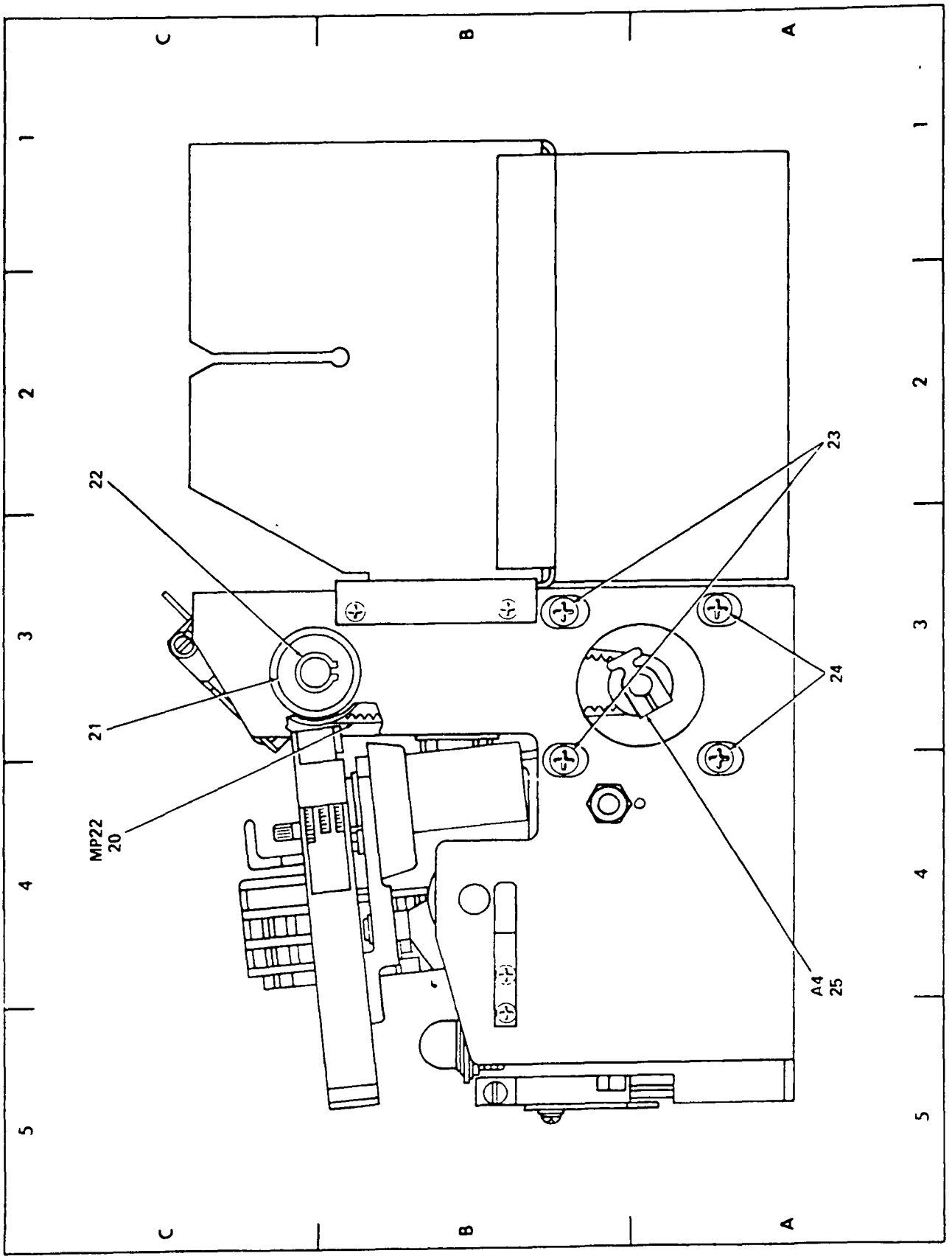


Figure 7-3. Teleprinter Subassembly (Sheet 4 of 5)

Table 7-11. Teleprinter Subassembly, Parts Location
(Figure 7-3, Sheet 5 of 5)

Index No.	Zone	Description	Qty	*Reference Designation
26	2-C	Printhead, Pin Matrix		A3MP1
27	1-B	Machine Screw	3	
	1-B	Flat Washer	3	
28	1-B	Sleeve Bushing		

*Reference Designation prefix is 1A1A1 unless otherwise stated.

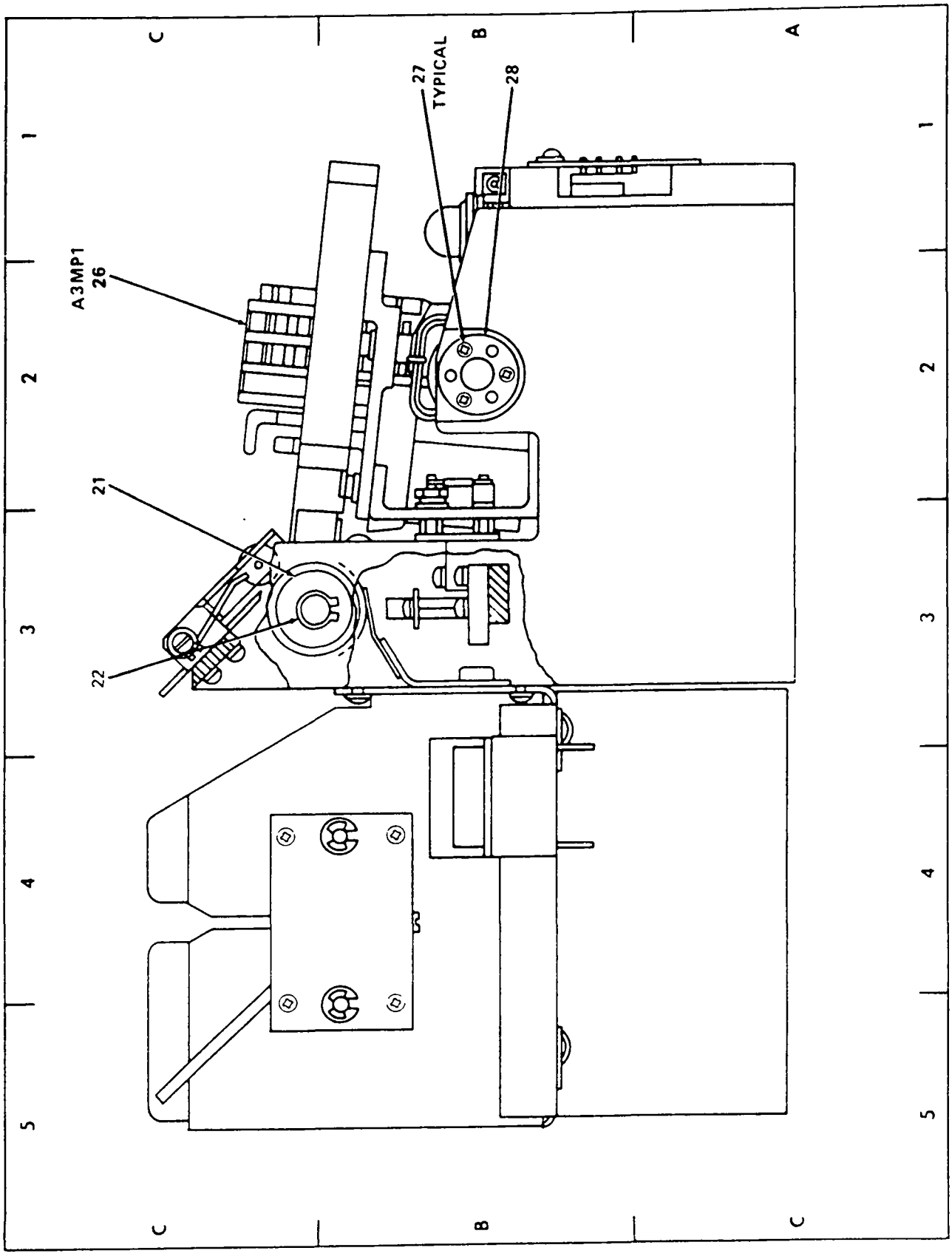


Figure 7-3. Teleprinter Subassembly (Sheet 5 of 5)

Table 7-12. Chassis Assembly, Teleprinter, Parts Location (Figure 7-4)

Index No.	Zone	Description	Qty	*Reference Designation
1	5-D	Machine Screw	8	
2	5-D	Fan Filter		MP29
3	5-D	Machine Screw	3	
	5-D	Flat Washer	3	
	5-D	Lockwasher	3	
	5-D	Hex Plain Nut	3	
4	4-D	Fan		B1
5	4-D	Machine Screw		
	4-D	Flat Washer		
	4-D	Lockwasher		
	4-D	Hex Plain Nut		
6	1-B	Machine Screw	3	
7	2-A	Control Assy		MP3
8	5-B	Machine Screw		
	5-B	Lockwasher		
9	5-C	AC Power Filter		FL1
10	5-C	Element Filter		MP28
11	5-D	Flat Washer	8	

*Reference Designation prefix is 1A1A2 unless otherwise stated.

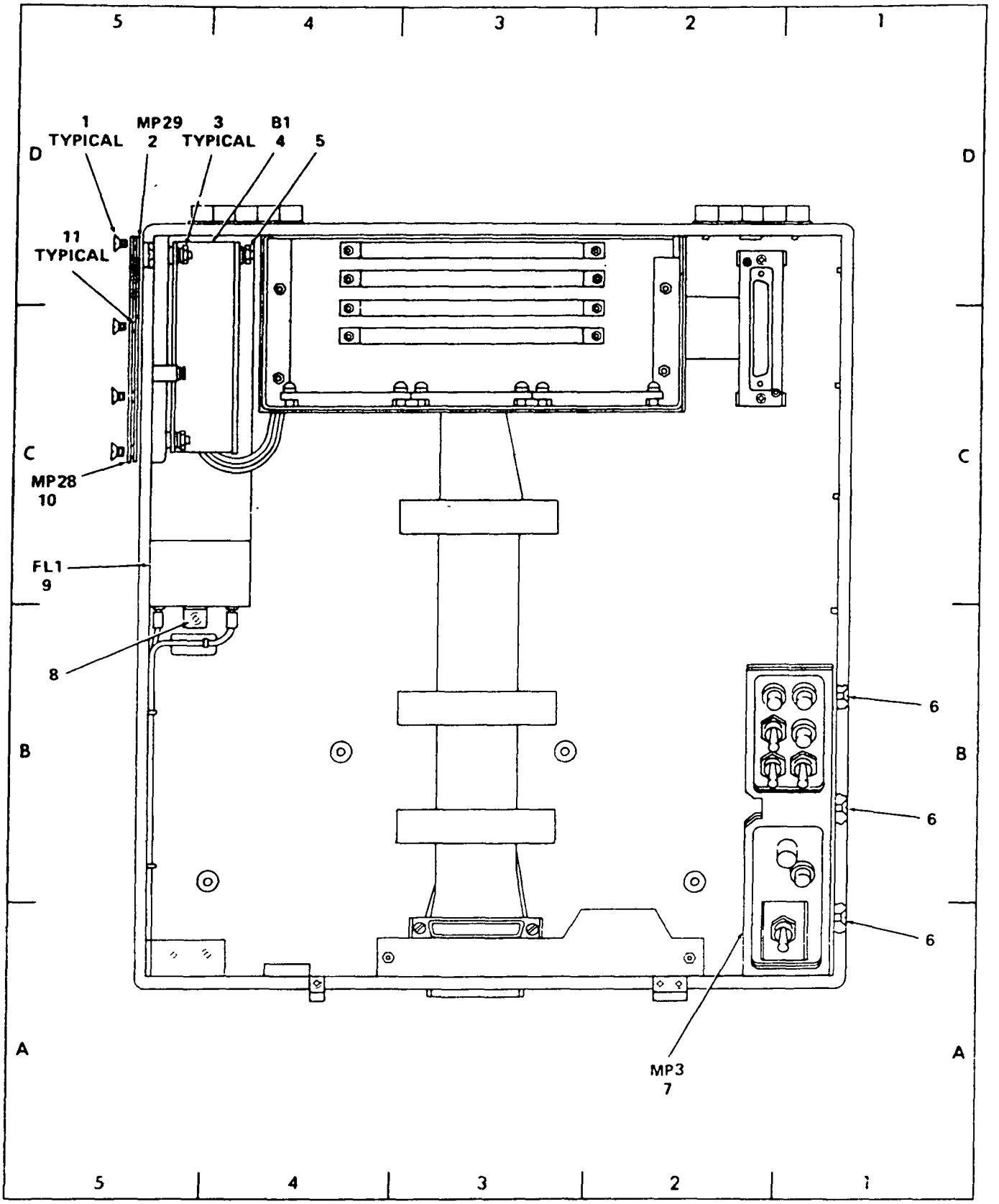


Figure 7-4. Chassis Assembly, Teleprinter

Table 7-13. Control Assembly, Parts Location (Figure 7-5)

Index No.	Zone	Description	Qty	*Reference Designation
1	2-D	Incandescent Lamp	4	DS1
	1-D	Incandescent Lamp		DS2
	2-C	Incandescent Lamp		DS4
	2-B	Incandescent Lamp		DS5
2	2-C	Indicator Light Assembly	4	XDS1
	1-D	Indicator Light Assembly		XDS2
	2-C	Indicator Light Assembly		XDS4
3	2-B	Indicator Light Assembly		XDS5

*Reference Designation prefix is 1A1A2MP3 unless otherwise stated.

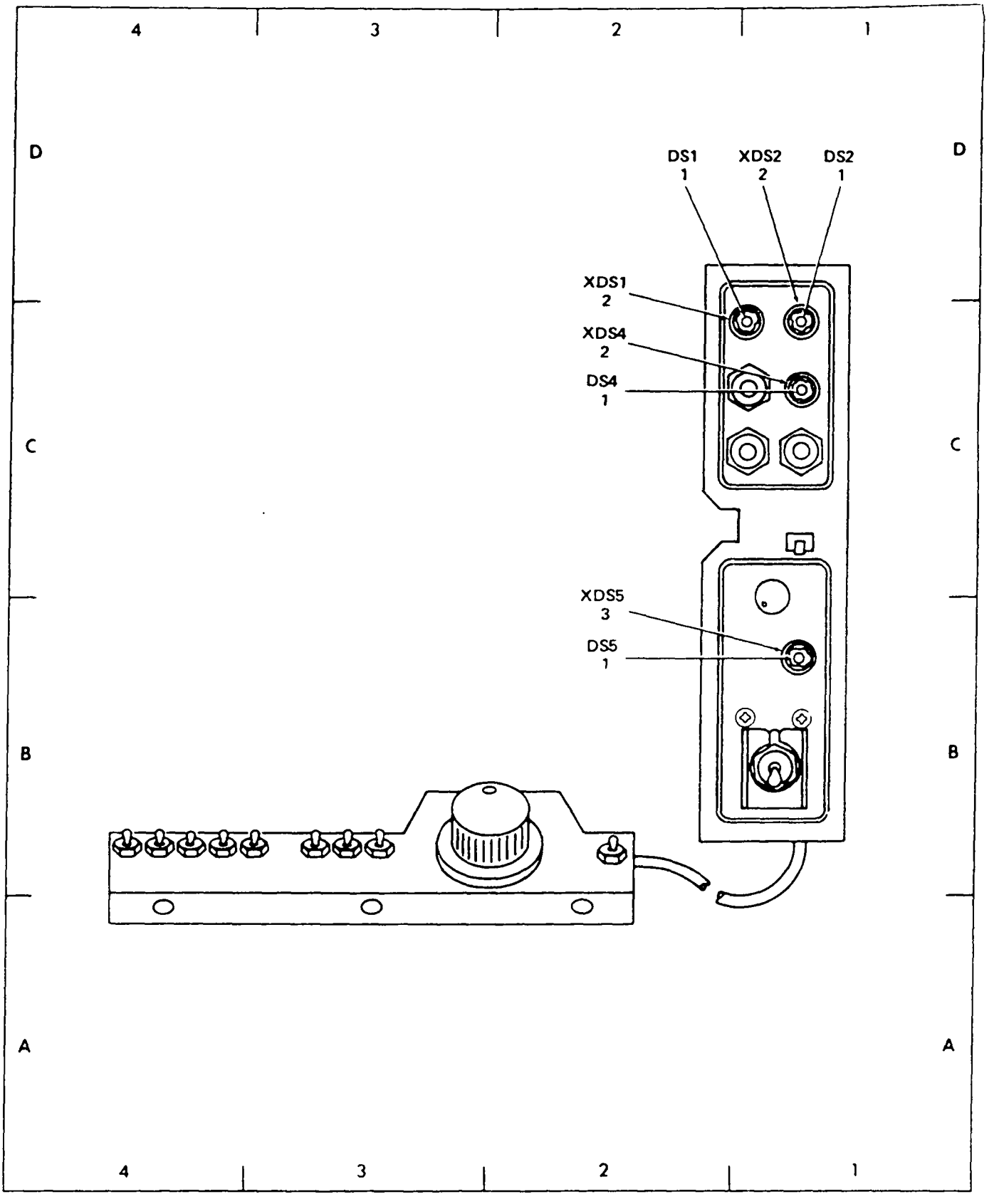


Figure 7-5. Control Assembly

CHAPTER 8

INSTALLATION

8-1. INTRODUCTION. The Keyboard Printer is designed to operate within a communications network. These instructions are applicable to installing the Keyboard Printer at any site where a communication network exists.

8-2. TOOLS AND MATERIALS. There are no special tools required to install the Keyboard Printer.

8-3. UNPACKING. The Keyboard Printer is packed in a Triplewall RSC carton, 1000 lb test, with two inches of 1.6 density polyurethane foam cushioning for all surfaces (figure 8-1). The Keyboard Printer is wrapped in Grade A wrapping paper prior to being placed into the carton. In addition, the printhead and carriage assembly are blocked on both sides with two pieces of polyurethane foam to prevent damage during shipment. Unpack the equipment as follows:

WARNING

The carton weighs 79 lbs complete. To prevent injury to personnel or damage to equipment, two persons are required for lifting and carrying.

NOTE

Exercise care in removing packing and crating materials. Some of these materials can be stored and reused for reshipment of equipment.

a. Cut sealing tape on top of carton and open.

b. Remove top layer of foam and four side cushions.

c. Lift Keyboard Printer out of carton.

d. Retain shipping material for repacking and shipment.

8-4. REPACKING. To repack the equipment use the following procedure:

a. Wrap the Keyboard Printer in Grade A wrapping paper.

b. Place Keyboard Printer in shipping carton.

c. Place four side cushions between Keyboard Printer and carton sides.

d. Place top layer of foam in carton.

e. Close carton and seal with shipping tape.

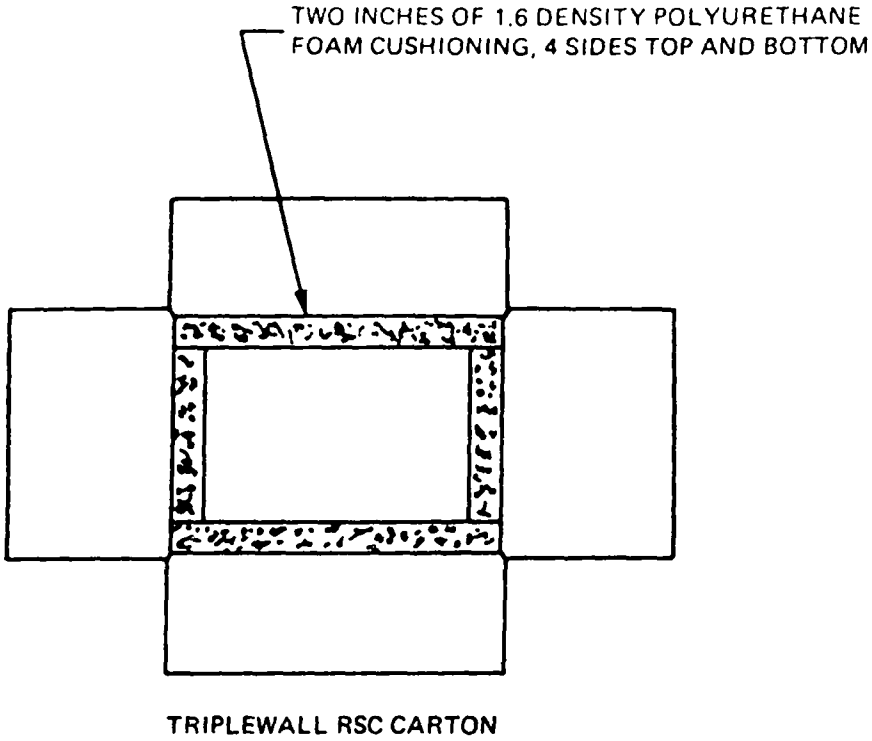


Figure 8-1. Keyboard Printer, Packing Carton

8-5. INSPECTION. Visually inspect the Keyboard Printer to determine if any physical damage was sustained during shipment. Also, check the following:

a. Check the equipment against the packing slip to see if all items were received.

b. Inspect connectors for bent or damaged pins.

c. Verify that control panel components are not broken.

d. Check that all hardware is tight and all screws are in place.

8-6. POWER REQUIREMENTS. The Keyboard Printer requires a source of 115 Vac, 60 Hz, single-phase power.

8-7. INSTALLATION INSTRUCTIONS.

WARNING

The Keyboard Printer weighs approximately 65 pounds. To avoid injury to personnel, two persons are required for lifting, carrying and installing the Keyboard Printer.

8-7.1. Preparation of Foundation. To install the Keyboard Printer, perform the following:

a. Place the Keyboard Printer on a sliding drawer in a standard 19-inch rack. See figure 8-2.

b. Attach Keyboard Printer using 1/4-28 bolts of sufficient length to secure the front of the Keyboard Printer to the drawer. The bolts should contain 1/4-inch flat washers and be inserted through the Keyboard Printer (figure 8-2) into the two holes located on the bottom of the drawer. Fasten using 1/4-28 nuts.

c. Ensure Keyboard Printer POWER switch is OFF.

8-7.2. Interconnections. Perform the following to interconnect the Keyboard Printer:

WARNING

Death or injury may occur if the power cable safety ground wire is not connected to a suitable AC receptacle safety ground return. Also, an additional safety ground strap must be connected to E1 ground stud at the rear of the Keyboard Printer.

a. Verify the power source as 115 Vac, 60 Hz before connecting the power cable to connector J1 (figure 6-3).

b. Connect the signal cable to connector J2 (figure 6-3).

c. Connect safety ground return line to E1 ground stud (figure 6-3).

d. Fill out the Installation Standard Summary sheet.

8-7.3. Servicing. The Keyboard Printer does not require servicing prior to initial operation.

8-7.4. Removal. Perform above interconnections and physical location steps in reverse order to remove the Keyboard Printer.

8-8. INSTALLATION CHECKOUT. Perform the following procedures prior to operating the Keyboard Printer.

8-8.1. Installation Inspection and Pre-energizing Procedures. Perform the following:

a. Ensure Keyboard Printer is properly grounded and input power and control signal connectors are properly connected.

b. Ensure mounting hardware is installed and secure.

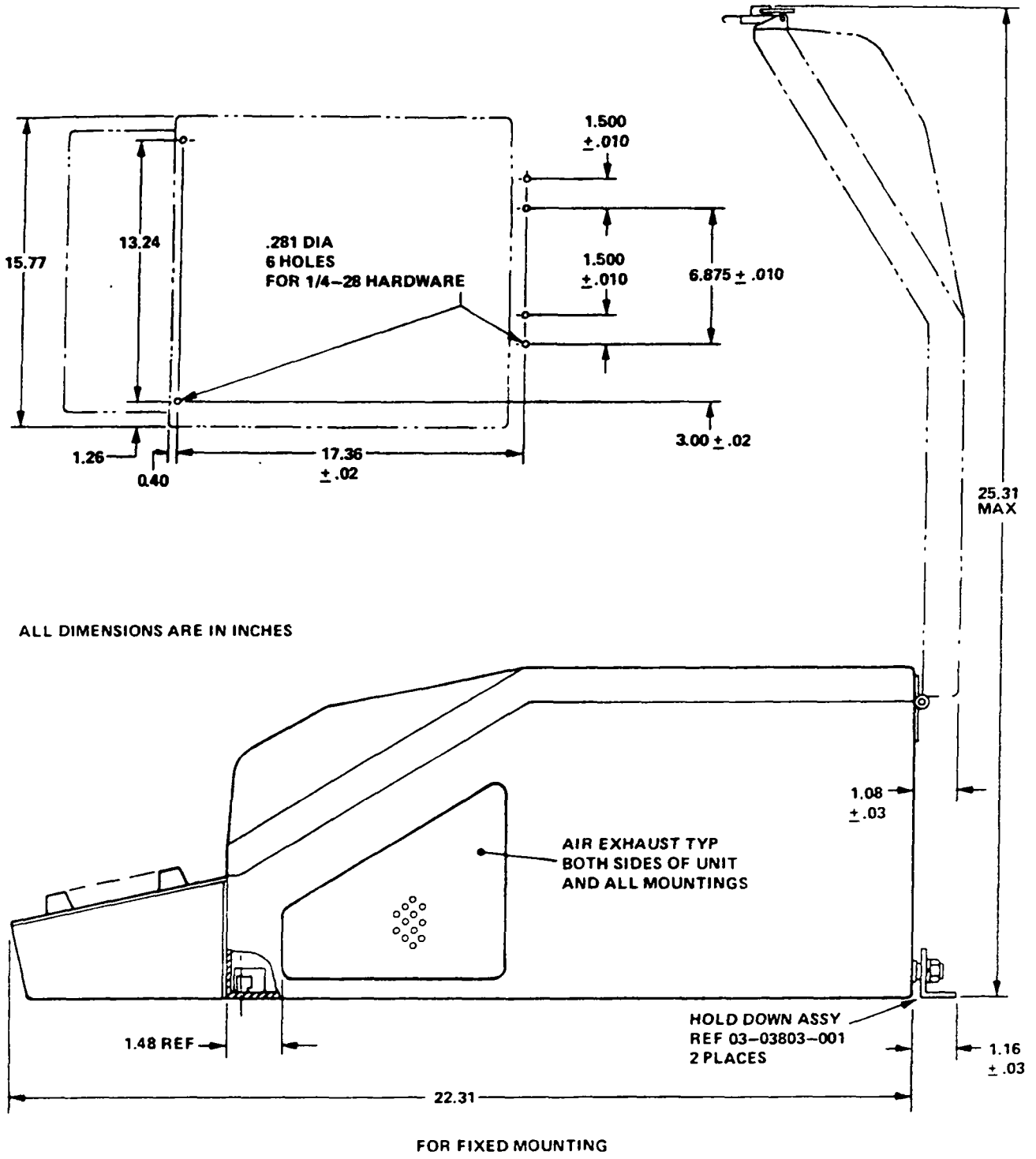


Figure 8-2. Keyboard Printer, Installation Drawing

c. Check configuration control panel (table 2-4, step 1-4), for proper switch settings.

d. Ensure Installation Summary Sheet is complete.

e. Install paper and ribbon cartridge per table 2-7.

8-8.2. Initial Turn-on and Preliminary Test. Perform step 1 of table 5-3.

8-8.3. Installation Verification Test. Perform steps 2 through 8 of table 5-3.

TELETYPEWRITER SET

AN/UGY-136AX

INSTALLATION STANDARDS SUMMARY

Input Voltage 115 ac

Input Frequency 60 Hz
1 phase

Date _____

Serial Number _____

of Model _____

Installed in (ship or station)

_____

Record on this summary sheet the test indications which have been obtained during the installation verification test.

Table 5-3 ( ), Step No. ( )	Ref Std
1	_____ Check
2	_____ Check
3	_____ Check
4	_____ Check
5	_____ Check
6	_____ Check
7	_____ Check
8	_____ Check

GLOSSARY

AC	alternating current
ACT	activate
ASCII	American Standard Code Information Interchange
ASR	automatic-send-receive (teletypewriter)
ASSY	assembly
AUTO	automatic
BITE	built-in test equipment
BRK	break
CB	circuit breaker
C/E	compose/edit
CKT	circuit
CM	centimeter
CR	carriage return
CTRL	control
D	daily
DC	direct current
DVM	digital voltmeter
EMI	electromagnetic interference
EOM	end of message
FSCM	Federal Supply Code for Manufacturers
ILLUM	illumination
INVT	invert
I/O	input/output
IRR	Integrated Radio Room
ITA-2	International Telegraph Alphabet Number Two
ITA-5	International Telegraph Alphabet Number Five
LF	line feed
M	monthly
MIL-STD	military standard
MSG	message
N/A	not applicable
NORM	normal
PCO	procuring contracting office(r)
P-P	peak-to-peak
PRNT	print
PWR	power
RAM	random-access memory
REC	receive
RFI	radio frequency interference
ROM	read-only-memory

GLOSSARY-Continued

RPT	repeat
RTN	return
SGL	single
SP	space
ST	store
TTL	transistor-transistor logic
UHF	ultra high frequency
USART	universal synchronous/asynchronous receiver/transmitter
VAC	volts, alternating current
VDC	volts, direct current
W	weekly
XMT	transmit

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