COMMON SYSTEMS MESSAGE PRINTER SD-94865-01
DESCRIPTION, OPERATING PROCEDURES, AND MAINTENANCE

CONTENTS PAGE

*Trademark of Western Electric Company.

1. GENERAL

1.01 This section describes the common systems message printer (CSMP), its operating procedures, and its maintenance. The CSMP can replace the 1A message ticketer used on automatic number identification (ANI) trouble ticketer frames and can also replace the 15RO (receive only) and 28RO-type teletypewriters (TTY) and associated distributors.

1.02 Whenever this section is reissued, the reason(s) for reissue will be stated in this paragraph.

2. DESCRIPTION

A. General

2.01 The CSMP is contained on a standard mounting plate, 6 inches high and 23 inches wide, as shown in Fig. 1. It consists of a printer, model SJ079-4, manufactured by Practical Automation Inc and a BELLPAC housing containing the circuit packs. One of the circuit packs, designated SH-5, supplies the ac and dc power to the unit. Other circuit packs function as a microprocessor and as interface and control circuits. The circuit packs are connected to the external circuit (eg, ANI trouble ticketer frame or TTY control circuit) via connectorized cable. The primary functions of the CSMP are to read, translate, and print data. All functions are under direct program control using a microprocessor.

B. Printer

2.02 The printer, shown in Fig. 2 and 3, is a dot matrix type printer weighing approximately 8.5 pounds. Its approximate dimensions are 4.5 inches high, 12 inches wide, and 10 inches deep. The printer is connected to the BELLPAC housing

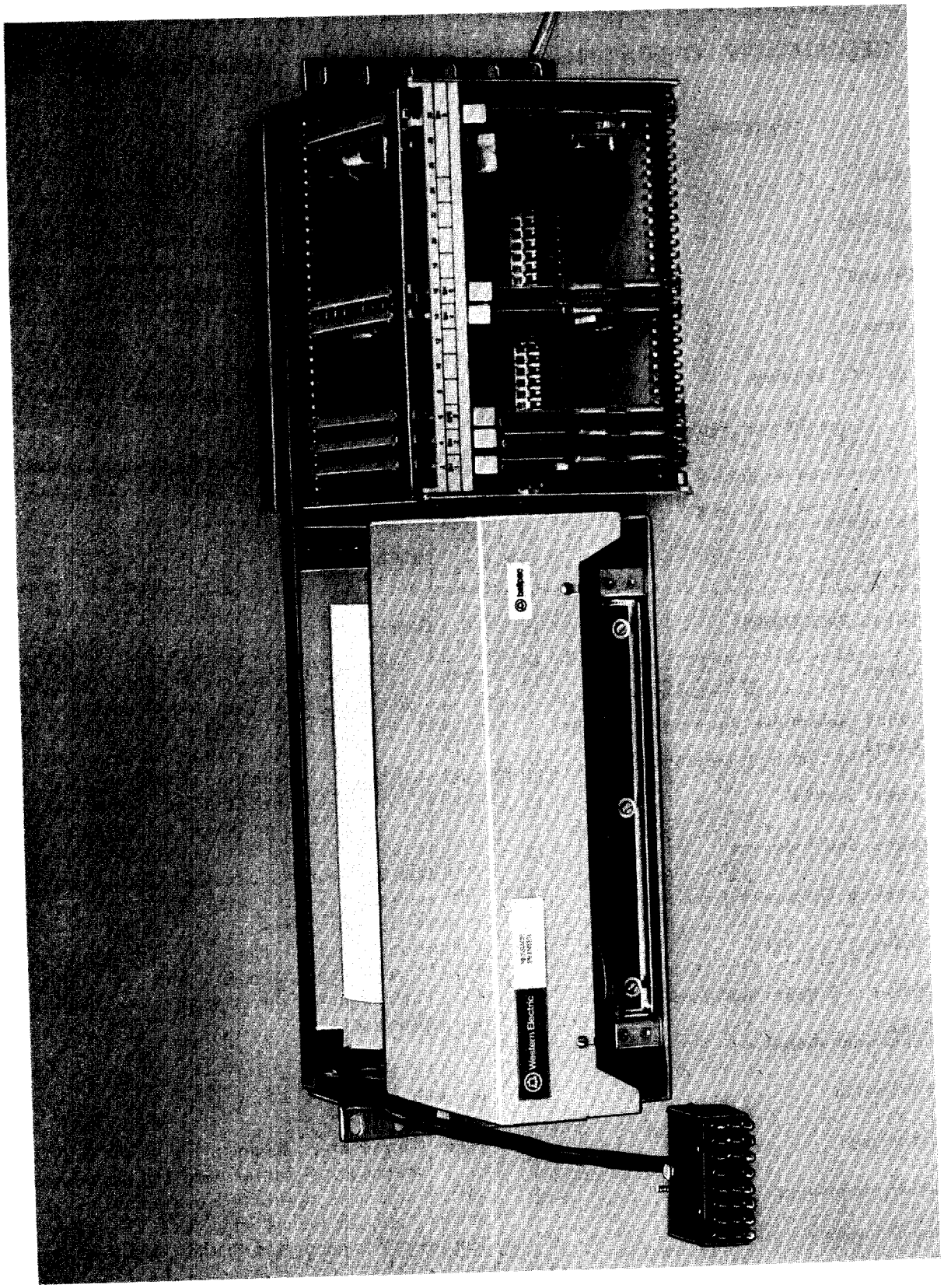

Fig. 1—Common Systems Message Printer

via connectorized cable. The message is printed on 8.5 inches wide paper.

Character Format

2.03 Each character is software defined by a series of five vertical ranks of seven dots. This array forms all possible Baudot characters.

2.04 The setting of the option switch (located on circuit pack SH-4) determines the size of the printed character, either enhanced or unenhanced.

2.05 The unenhanced mode requires one energized interval for each of the five rank combinations of print solenoids. The enhanced mode requires two consecutive energized intervals. The enhanced character, although physically only double wide, appears taller and is easier to read.

2.06 The maximum number of characters that can be printed on a single line in the enhanced mode is forty, and in the unenhanced mode, eighty. However, if the enhanced bit is set and a record is received exceeding forty characters, the CSMP software automatically reverts to the unenhanced mode for that record.

Translating Data

2.07 The CSMP hardware, namely the input interface circuit pack (SH-4), accepts "n out of 5" data directly from the connecting circuit. Data input in the form of "1 out of 12" is pretranslated by diode matrix into "n out of 5" data. The microprocessor directs the data to a 128-character memory buffer reserved for data input to the circuit.

2.08 Determination of end-of-message initiates a translation process which creates a dot matrix representation for each character received.

2.09 Character by character, the microprocessor controls the translation of characters from the Baudot format in the input buffer memory to a printable dot matrix format and stores the translated form in a print buffer.

Interactive Control

2.10 The data available signal on the next character flag (NCF) lead from the connecting circuit to the CSMP provides the indication to read data leads. The CSMP provides a similar signal on a UC- lead indicating to the connecting circuit that the character has been read and stored. In response to the UC- lead, the CSMP signal expects the connecting circuit to remove the data available signal, reconfigure the data leads for the next character, and reclose the data available signal if more data is to be read. The interactive control provides for an orderly transfer of data.

Reading Data

2.11 The CSMP can accept 12 level data as would be available from an ANI trouble ticketer frame or 5 level Baudot data as would be delivered to a teletypewriter and associated distributor. Recognizing that data is available, the CSMP proceeds to read in parallel 1/12 or n/5 data leads representing a single character. When a character has been read and stored, the CSMP returns an indication to the connecting circuit to cause the next character to be presented. The connecting circuit removes the data-available indication and the data representing the preceding character, sets up the data representing the succeeding character, and closes the data-available indication to the CSMP.

2.12 Data collection continues in this manner until the connecting circuit stops providing a data-available indication or the connecting circuit provides a definite indication of end-of-message. The method of ending a message depends upon the application.

Printing Data

2.13 Printing includes control of the solenoids (in forming characters), the print head, and the ribbon motor.

2.14 Control of print solenoids involves many operations such as turning the solenoids on and off, timing the on-time, timing between ranks, timing between characters, and printing each rank twice (if the option switch is set in the enhanced mode).

2.15 Functions associated with the print routine, other than printing, include controlling the direction, initial position, margin timing, overall on-time in one direction or the other, and recognizing the head position indication from the printer.

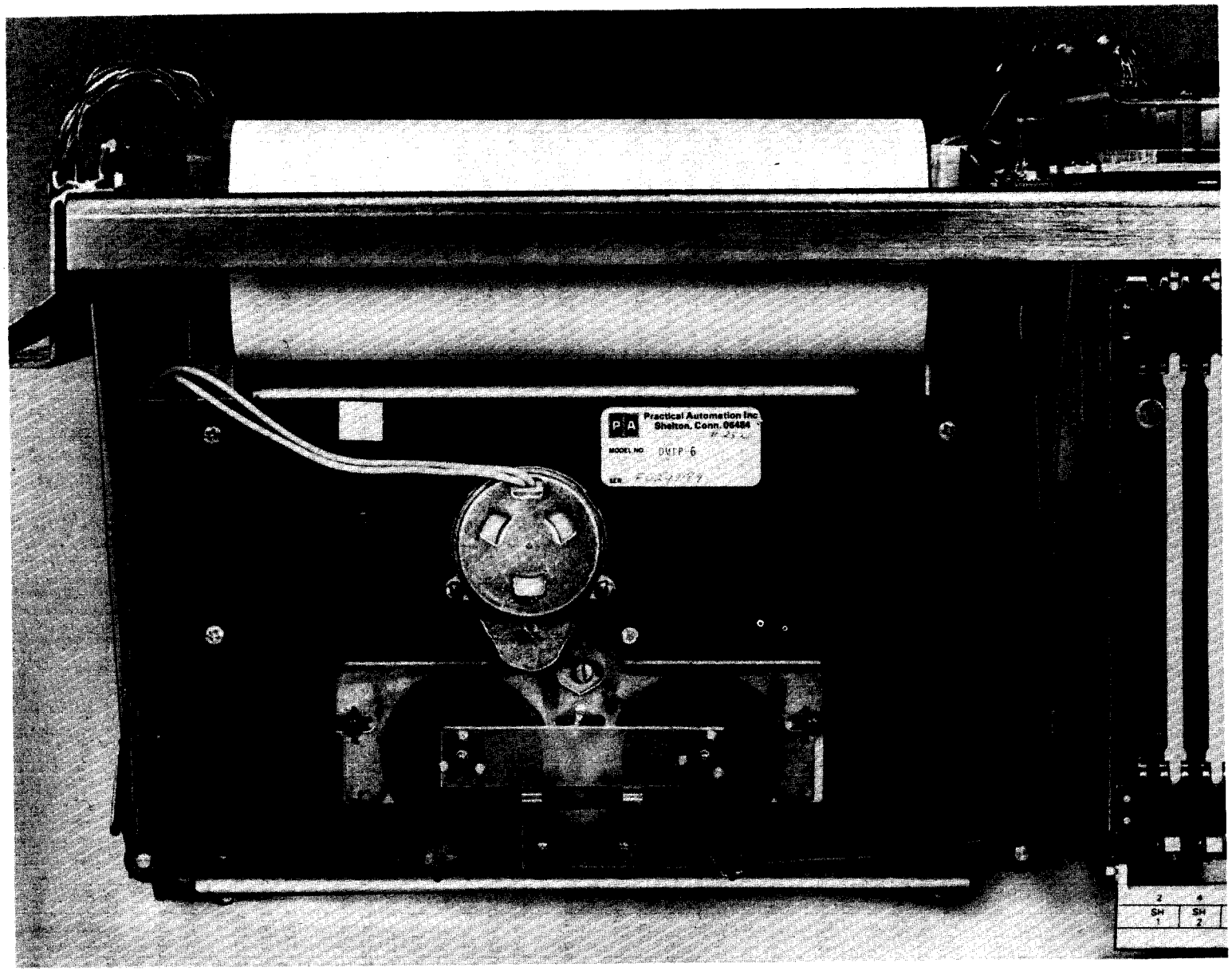

Fig. 2—Printer—Top View—Cover Removed

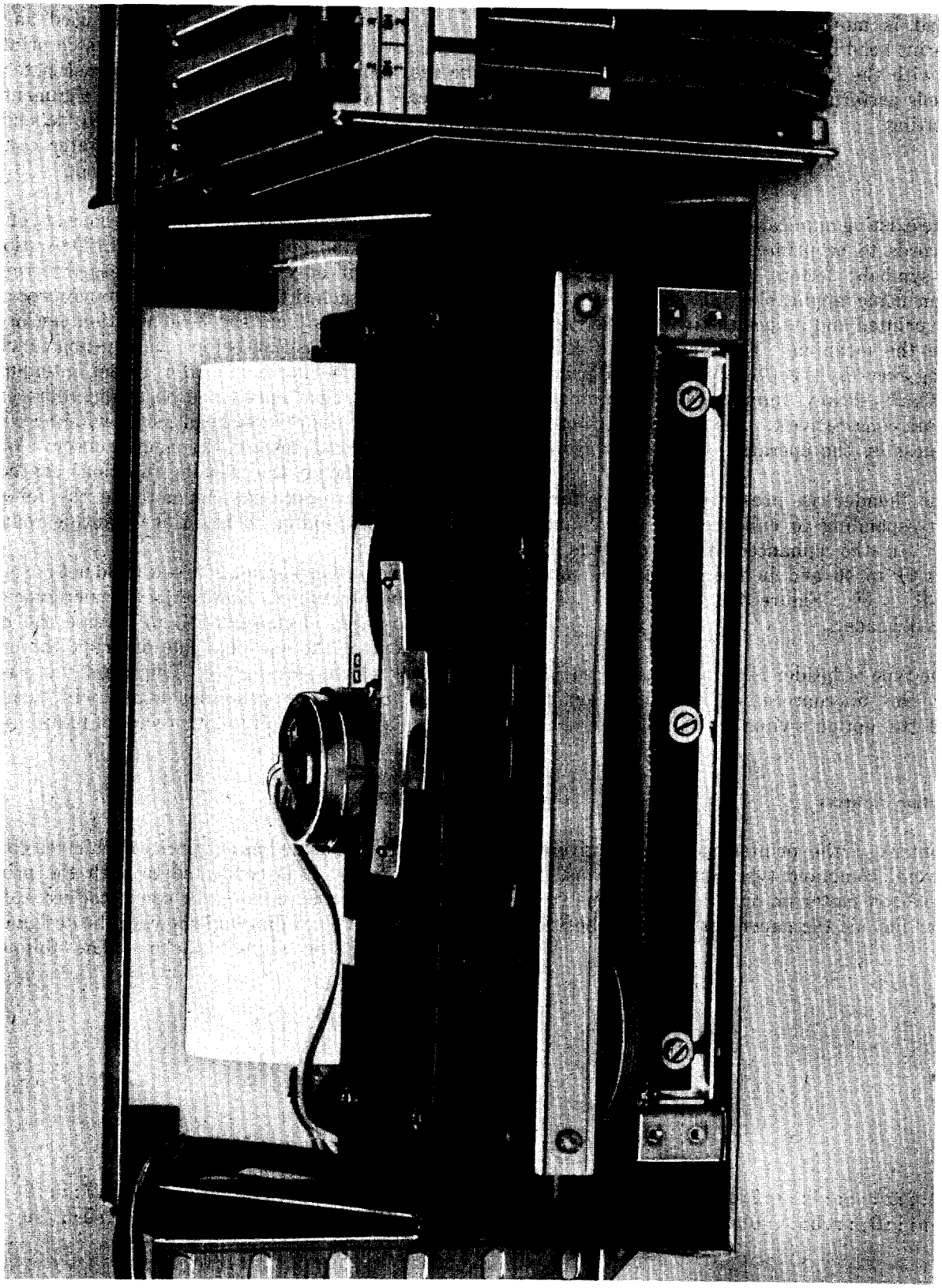

Fig. 3—Printer—Front View—Cover Removed

2.16 The ribbon motor is on whenever the print head is moving. After a line is printed and the print head has returned home, the program proceeds with the line feed function. The number of line feeds performed is determined by the option switch setting.

Header

2.17 The existing applications of the CSMP submit records to be printed which may be in the form of symbols, letters, or numbers, requiring translation using applicable BSP references. The character printed and its position within the record determine the meaning. Therefore, as an aid in translating records, the CSMP provides a printed header which simply numbers the columns of printed data consecutively. The header is printable upon request by the operation of the HD switch.

2.18 The header is presented in two forms corresponding to enhanced or unenchanced printing. In the enhanced mode, columns are numbered 01 to 40 and in the unenhanced mode, columns 01 to 80. Figure 4 is an example of an unenhanced header.

2.19 The type of header is automatically provided by the microprocessor depending on the setting of the option switch.

Head Position Sensors

2.20 Control of the printer mechanism involves several command type controls such as line feed and ribbon motor on or off. Indications from the printer include the paper-out and head position signals.

2.21 Sensors are positioned at each end of the print head carriage. One is used as the home position detector, the end from which printing begins, and the other is used as the crash detector, the end of a line of print. The assignment of home and crash positions is reversed depending upon the mode of printing. The printer can be wired to print in the data or text mode.

2.22 The head position sensors consist of an LED and a photocell, with the LED positioned to emit light on the photocell unless interrupted by a flag attached to the head. The microprocessor uses the signals from the head position sensors to confirm home position before the printing function begins. If the home indicator is not interrupted at the beginning of a print routine, the microprocessor will activate the reverse head motor winding which drives the head toward the home sensor. When the head is home, the printing functions can begin and the microprocessor can activate the forward head motor winding to begin the printing routine.

2.23 The crash position sensor should not normally be interrupted. However, if the microprocessor or the related electronics fail to reverse the head movement at the end of a line of print, the crash detector will be interrupted. This results in a reset signal to the microprocessor which will turn off motor direction signals in the process of reinitializing itself.

C. BELLPAC Housing

2.24 This housing has a capacity of thirteen circuit packs. It is connected to both the printer and the external circuit via connectorized cables. Figure 5 is a block diagram showing the designation of each of the circuit packs. The following

```
0:::0::::1::::1::::2::::2::::3::::3::::4::::4::::5::::5::::6::::6::::7::::7::::8
1:::5::::0::::5::::0::::5::::0::::5::::0::::5::::0::::5::::0::::5::::0::::5::::0
```

Fig. 4—Unenchanced Header

paragraphs give a brief description of the function of each circuit pack.

Printer Interface (SH-1)

2.25 This circuit pack serves as an interface with the printer mechanism. It contains separate drive circuits for each of the seven print head solenoids. The ribbon motor and print head motor are operated through relays on this circuit pack. The paper advance solenoid is driven by this circuit pack and the LFC switch, when operated momentarily, will cause a single line feed. Holding the LF switch operated causes a multiple line feed.

2.26 If this circuit pack is plugged in under power, it generates a negative reset pulse.

Printer Control (SH-2)

2.27 This circuit pack provides the communications path between the CPU (CPS-3) and the printer interface (SH-1). It contains six major circuits.

2.28 The CPU interface circuit connects to three I/O ports under program control. One port, A, is spare. Port B transfers the character rank data to circuit pack SH-1. Port C is divided into two 4-bit ports. The input port monitors the printer status, while the output port controls the printer functions.

2.29 The rank latch and gate circuit presents character rank patterns to the B port output. Seven bits, corresponding to the seven print solenoids, are gated to the printer interface (SH-1) when the eighth bit sets the rank latch to gate IC2. Drive to the solenoids is removed when the 7-bit pattern is removed or if the rank latch is reset. The green (PR) LED indicates that the rank gate is enabled.

2.30 An interrupt request circuit is used to drive the timer counter at the interrupt rate.

2.31 The printer status monitor and alarm circuit has three functions. It monitors the printer for the presence of paper, correct head position sensor current, and motor ac power. If any of these conditions are absent, the red (PB) LED lights. A paper-out condition will also light the red (ALM) LED steadily. An alarm condition causes the ALM indicator to flash. The alarm is retired by operating the reset switch on the CPU (CPS-3).

2.32 The reset circuit generates a positive reset pulse when this circuit pack is plugged in under power.

2.33 The sanity timer and auto restart circuit provide an auto restart if there is a print head crash or if the sanity timer fails to receive sanity timer pulses (indicating a loss of program control). A pulse failure flashes the ALM indicator until the reset switch on the CPU (CPS-3) is operated.

Central Processor Unit (CPS-3)

2.34 This unit contains the microprocessor, the system controller, the system clock, RAM, ROM, selective circuits, and bus drivers. All of the system control and timing signals are generated, transmitted, and received by this unit. The control and interface circuits maintain the proper sequence of events required for any processing action. These circuits respond to signals generated on, and external to, the CPU.

2.35 The 8-bit microprocessor uses a data input/output port which consists of eight bidirectional data leads called the data bus. The 16-bit port labeled A-0 to A-15, called the address bus, provides for addressing memory and other peripheral devices.

2.36 The microprocessor must perform its functions based on clock pulses. The clock generator and driver and the associated crystal produce clock pulses of two pulses (01 and 02). The microprocessor runs in step with the 2-phase clock and synchronizes all system functions.

2.37 There are 1K bytes of static RAM on-board. This memory occupies address space 4000H-43FFH. A socket (x2) allows a 2K or 4K ROM or PROM to be inserted. This memory occupies address space 0000H-07FFH (2K) or 000-H-0FFFH (4K). Lead PMS is connected to AB11 when using a 4K ROM/PROM.

2.38 Bus drivers are buffer/driver circuits used between the microprocessor buses and the CPU unit buses. These circuits provide the voltage and current levels required by the buses.

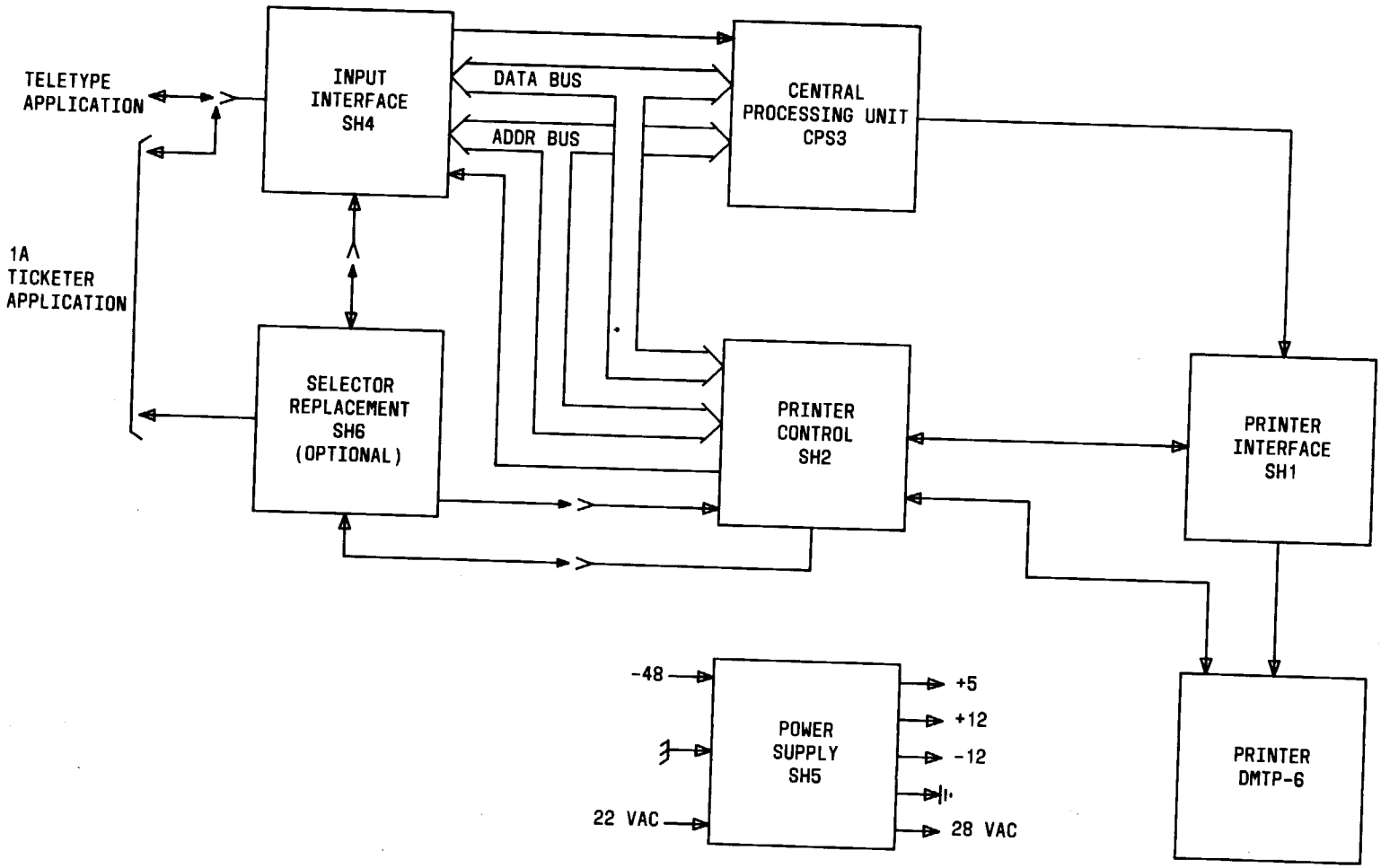

Fig. 5—Block Diagram

Input Interface (SH-4)

2.39 This circuit pack is the input interface between the CPU and an electromechanical circuit like an ANI trouble ticketer or a TTY control. It provides a data path and interactive handshaking control. It accommodates either 12-line ANI trouble ticketer or 5-level Baudot TTY inputs. The handshaking control originates in the CPU program.

Power Supply (SH-5)

2.40 This circuit pack supplies the ac and dc power. A small transformer (T1), connected as an autotransformer with series-aiding windings, converts the office-supplied 22 volts ac into the 28 volts ac required by the printer motors. A range of -45 to -52 volts dc is accepted by this circuit pack and changed by a dc-to-dc converter into +5, +12, and -12 volt dc outputs.

2.41 The outputs are protected against a short circuit. An internal circuit monitors the output power and shuts off the output current when it becomes excessive.

2.42 The red PF indicator lighted signifies that one or more voltages are absent, or that either the CPU circuit pack or printer control circuit pack is removed from its connector. The lighted green PWR indicator signifies a fully powered unit.

Selector Replacement Option (SH-6)

2.43 This circuit pack provides, on an optional basis, a replacement for the 206-type selectors used on the ANI trouble ticketer frame to record the time of day on each printed message.

D. 1A Trouble Ticketer Replacement

2.44 This application provides all the functions of the 1A ticketer and, in addition, all the features of a state of the art printer such as enhanced printing, text or data printing modes, variable line spacing, header, and diagnostic trouble codes.

2.45 The optional selector replacement is described in paragraphs 2.49 and 2.50.

E. Teletypewriter Replacement

2.46 The CSMP replaces not only the TTY but also its associated distributor. The CSMP can accept data in a parallel form and, therefore, has no need for a distributor.

2.47 Applications using a remote recording device to record data in parallel with the home device or to record selected data, as directed by the controlling circuit, can be accommodated by the CSMP. When enabled by the appropriate option switch setting, the CSMP collects a record, translates it into a serial format, and controls the loop to transmit the record to a remote TTY. The CSMP then proceeds with printing the record locally on its own printer, if required. Both 75 and 100 words per minute serial transmissions are selectable on the option switch.

2.48 The replacement of the teletypewriter, used in No. 1 crossbar offices, associated with the maintenance reader and printer circuit (MRP), differs in that the CSMP is cabled directly to the MRP instead of connecting to the TTY control circuit via connectorized cable.

F. Optional Features

ANI Trouble Ticketer Replacement

2.49 This option requires an additional circuit pack designated SH-6 and a different program. The current time, kept in RAM memory, is printed with each record and, on command, by operation of the PT switch. The time is also printed when a reset occurs.

2.50 Correcting the software clock is accomplished by using the time-set switches on the ANI trouble ticketer frame. Momentary operation of the PT switch on SH-6 prints the current time for verification.

Printing Modes

2.51 The CSMP offers two modes or printing: data and text. The data mode prints from left to right with characters right side up. The last printed line is at the top of the paper. The text mode prints right to left with characters inverted. When the paper is removed from the printer and inverted, the records are in chronological

order. Figure 6 is an example of ANI records, both data and text, printed in the enhanced mode.

Line Spacing

2.52 Messages are printed on a continuous roll of white paper, 8.5 inches wide. A tear bar permits detaching the paper for analysis of the trouble messages.

2.53 Spacing between lines varies with the setting on the option switch. After printing each record, the CSMP will perform the number of line feeds indicated by the setting on the option switch before accepting a new record. Spacing can be set at 0, 2, 5, or 11.

2.54 Changing the option switch setting must be followed by a reset before the change is executed.

G. Alarms and Indicators

2.55 The CSMP is equipped with LED indicators mounted on the edge of circuit packs. The power supply (SH-5) circuit pack contains a green indicator (PWR) indicating satisfactory power and a red indicator (PF) indicating power failure. The printer control (SH-2) circuit pack contains a red indicator (ALM) indicating an alarm condition, a red indicator (PB) indicating printer busy or paper-out condition, and a green indicator (PR) indicating satisfactory printing is in progress.

Sanity Time-out

2.56 Software provides several checks on hardware to detect inoperative conditions. Software is, in turn, monitored by hardware.

2.57 A hardware dual 4-bit binary counter is advanced with each line clock pulse which

```
0   0    1    1    2    2    3    3    4
1   5    0    5    0    5    0    5    0

**3001190-0551 1--*-9000-60--2800 1-0614**
**5---190-0551 1--*-9000-95--2800 1-0610**
**5---190-0551 1--*-9000-92--2800 1-0610**
**5---190-0551 1--*-9000-95--2800 1-0607**
```

DATA

```
**▶SZ 1-Z 10----0Z-0000-*--------06 1---1**
**1SZ 1-1008Z--E6-0006-*--1155 0-06 1---S**
**Z▶Z 1-1008Z--09-0006-*--1155 0-06 1E00Z**

0   S    0    S    0    S    0    S    1
▶   E    E    Z    Z    1    1    0    0
```

TEXT

```
NOTE THAT THESE ANI RECORDS IN CHRONOLOGICAL ORDER FOR TEXT FORMAT.
(TIME IS RECORDED IN THE LAST FOUR DIGITS OF THE ANI RECORD.)
```

Fig. 6—Printing Modes

occurs every 16 2/3 ms. The software, if sane, provides pulses to clear the counter before time-out occurs. If the software is preoccupied for some reason, the clear pulses it normally produces stop and the counter is advanced by line clock pulses to a point where the binary count from its low 4-bit triggers a reset signal to the CPU. The counter output also enables the high four bits of the counter output to prepare for the event that sanity pulses are not recovered in response to the reset action.

2.58 The reset action also clears the low four bits of the counter so that counting resumes at zero with the expectation that sanity pulses will be present. If sanity pulses are not recovered, or if they stop before a manual reset is performed, the counter is advanced again by line clock pulses. This causes an outpulse from the enabled high four bits which, in combination with other logic, sets alarms and suspends further functions.

Trouble Codes

2.59 The program employs several checks on interactive control of the connecting circuit. These checks are performed repeatedly during the data collection sequence. Three trouble codes are printed:

PRINTER TROUBLE CODE 1—indicating that the next character flag (NCF) was asserted and printer timed out.

PRINTER TROUBLE CODE 2—indicating an input buffer overflow (more than 128 characters were received).

PRINTER TROUBLE CODE 3—indicating a long time-out (connecting circuit has not released).

Paper Monitor

2.60 The printer paper supply should be monitored periodically to avoid a paper-out situation which results in a loss of records or suspension of a test sequence. A red (PB) indicator lights, an alarm sounds, and the CSMP is disabled.

2.61 A red warning flag appears approximately three feet before the end of the roll as an indicator that the paper roll should be replaced.

Printer Reset

2.62 A reset signal to the microprocessor causes it to return to the first program instruction in ROM memory. Following the first instruction are initialization routines to establish known status conditions in all systems and circuits.

2.63 A reset may be manually initiated by operation of the RST switch or automatically initiated due to an abnormal operating condition. Abnormal operating conditions are sanity time-out, diagnostic failure, and head position crash signals from the printer.

3. OPERATING PROCEDURES

A. General

3.01 Table A contains a list of BSPs and their application to a particular system. Switch selectable options are set according to the system using the CSMP. Paragraph 3.02 and Table B contain a more detailed description of these options.

TABLE A

BSP REFERENCE

216-720-101	ITT DESCRIPTION NO. 1 CROSSBAR
216-901-303	ANI ANALYSIS NO. 1 CROSSBAR
216-903-502	TROUBLE TICKETER TESTS NO. 1 CROSSBAR
220-461-101	ITT DESCRIPTION CROSSBAR TANDEM
227-303-301	ANALYSIS - CAMA STEP-BY-STEP
227-500-301	ANALYSIS - ANI STEP-BY-STEP
227-700-301	ANALYSIS - COMMON CONTROL STEP-BY-STEP
227-762-501	TROUBLE TICKETER - TESTS STEP-BY-STEP

TABLE B

OPTION SWITCH SETTING
(NOTE 1)

SWITCH	FUNCTION	STATE (NOTE 2)	APPLICATION
1	PRINT SELECTION	0	ENHANCED
		1	UNENHANCED
2 (MSB) 3 (LSB)	LINE SPACING	00	0 SPACES
		01	2 SPACES
		10	5 SPACES
		11	11 SPACES
4	END OF RECORD METHOD REQUIRED	(YES) 0	MRP & INC TRUNK TEST FRAME
		(NO) 1	ANI TROUBLE TICKETER
5	T SERIAL OUTPUT	0	NO SERIAL OUTPUT
		1	SERIAL OUTPUT
6	T Y SERIAL SPEED	0	100 WPM
		1	75 WPM
7 (MSB) 8 (LSB)	SYSTEM APPLICATION	11	ANI TROUBLE TICKETER
		10	INC TRUNK TEST FRAME
		01	MRP
		00	UNUSED

Note 1: A change in the option switch setting should be followed by operation of the reset switch on the CPU (SH5) circuit pack. The option switch is read only during initialization which occurs following a reset.

Note 2: State '1' is defined as a nonoperated switch (down). State '0' is defined as an operated switch (up). State '0' corresponds to the "on" designated side of the option switch as printed on the circuit pack.

B. Switch Selectable Applications and Options

3.02 The option switch on circuit pack SH-4 is an 8-bit dip switch which allows the selection of options and defines their applications as described in Table B.

C. Control Switches

3.03 Five control switches are provided. Table C contains a description of the function and location of each switch.

TABLE C

CONTROL SWITCHES

DESIGNATION AND LOCATION	FUNCTION
RLF PRINTER INTERFACE (SH-1)	Rear line feed - operate to feed paper through pressure plate when replacing paper roll.
LF PRINTER INTERFACE (SH-1)	Line feed - momentarily operated for single line feed, held operated for multiple line feed.
PT PRINTER CONTROL (SH-2)	Print test - exercises printer control. If the CSMP replaced a 1A message ticketer and is equipped with the selector option (SH-6 circuit pack), the message printed is "TIME XX:XX". For all other applications of the CSMP, the message "OK" is printed.
HD PRINTER CONTROL (SH-2)	Header - momentarily operate to print a header to identify column number.
RST CENTRAL PROCESSOR UNIT (CPS-3)	Reset - returns program to zero, initializes clock, and synchronizes the control functions of the system controller.

D. Alarms and Indicators

3.04 The CSMP is equipped with five LED indicators. The green indicators, PWR and PR, signify a satisfactory condition while the red indicators, PF, ALM, and PB, signify an unsatisfactory condition.

3.05 Table D contains a list of conditions under which the indicators on the CSMP and the connecting circuit will be lighted and the floor alarms sounded.

E. Removing Equipment From Service

3.06 The CSMP can be removed from service by inserting a make-busy plug into the TTB jack at the ANI trouble ticketer frame, restoring the PTR key at the ITT frame, or blocking operated the MS relay in the maintenance reader and printer (MRP) circuit.

3.07 If the CSMP is remotely located from its connecting circuit, it can be disabled by removing the power supply (SH-5) circuit pack. When the circuit pack is reinserted, the program must be reset to zero by operating the RST switch on the CPU (CPS-3) circuit pack.

F. Loading Paper Roll

3.08 Paper loading is facilitated by a snap-in roll. The paper path is straight and self-guiding.

3.09 Refer to Fig. 7 and use the following procedure for loading the paper roll. No tools are needed. Paper roll is PA (Practical Automation Inc.) Part Number 63-1.

STEP	PROCEDURE

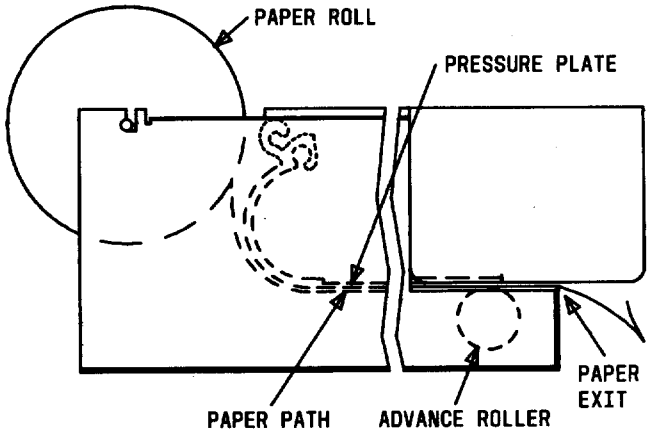

Fig. 7—Loading Paper

1 Remove printer from service.

2 Remove empty roll and spindle.

3 Insert spindle into new paper roll.

4 Unwind about twelve inches of paper and tear or cut the end evenly.

5 Fold the end up and back about two inches, making a sharp crease, square with the edge of the paper.

6 Slip the folded edge under the pressure plate.

7 Hold the RLF switch operated until the paper is between the pressure plate and the advance roller.

8 Hold the LF switch until the paper is advanced past the tear bar.

9 Snap the paper roll spindle firmly into place.

10 Restore the printer to service.

TABLE D

INDICATORS AND ALARMS

CIRCUIT AND INDICATORS		CONDITION					
		VOLTAGE +5,-5,+12,-12	VOLTAGE INTERLOCK	SANITY	PAPER	TIME KEEPING	PRINTING
CSMP (NOTE 1)	PWR	FUNCTIONAL	FUNCTIONAL				
	PF	ONE OR MORE UNSATISFACTORY	UNSATISFACTORY				
	ALM			UNSATISFACTORY	PAPER OUT		
	PB	+12 OR -12V ac UNSATISFACTORY		UNSATISFACTORY	PAPER OUT		
	PR						IN PROGRESS
MRP	MP FLOOR ALARMS	ONE OR MORE DC VOLTAGES OR 22V ac UNSATISFACTORY		UNSATISFACTORY	PAPER OUT		
ANI TBL TKT FR	PA				PAPER OUT		
	TDA FLOOR ALARMS	UNSATISFACTORY				UNSATISFACTORY	
ITT	PALM TA FLOOR	UNSATISFACTORY		UNSATISFACTORY	PAPER OUT		

Note: The alarm indicator ALM flashes during an unsatisfactory parity condition and is lighted steadily during a paper-out condition.

G. Ribbon and Roller Replacement

3.10 Both halves of the ribbon can be used before it is replaced. The inking rollers usually do not have to be replaced until the ribbon is replaced. PA part numbers are B-11-70103 for the ribbon (black, twin spool) and B11-10101 for the inking rollers.

3.11 Refer to Fig. 8 and use the following procedure for inverting the ribbon or replacing both the ribbon and the inking rollers. No tools are needed.

STEP	PROCEDURE

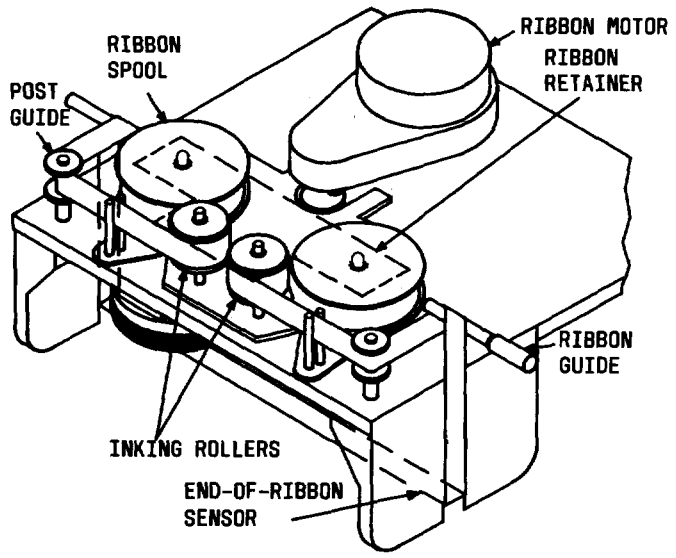

Fig. 8—Replacing Ribbon

1 Remove printer from service.

2 Remove printer cover.

3 Remove ribbon retainer.

4 Remove ribbon spools.

5 Remove and replace inking rollers if ribbon is being replaced.

6 Insert spools or install new spools following ribbon path shown in Fig. 8.

7 Snap ribbon retainer into place.

8 Place cover on printer.

9 Restore printer to service.

H. Adjustment Procedures

3.12 A toothed DACRON* belt drives the print head. If compressed or elongated characters appear at the head-home side margin, the belt tension should be adjusted.

3.13 The only tool needed to adjust the belt tension is a 3-inch screwdriver using the following procedure:

*Registered trademark of E. I. du Pont de Nemours Co.

STEP	PROCEDURE
1	Remove printer cover.
2	Loosen the screw in the top plate behind the ribbon mechanism and to the right of the ribbon drive motor. Loosen only enough to move it forward or backward.
3	Start test printing by operating HD switch.
4	Tap the screw head forward or backward with the screwdriver until all characters are of even width at the head-home margin.
5	Tighten the screw head.
6	Stop test printing.
7	Replace printer cover.

3.14 If the characters are too light or smudged, adjust the platen height, using the 3-inch screwdriver and a 3/16-inch box wrench, as follows:

STEP	PROCEDURE
1	Loosen the three screws under the tear bar.
2	Turn the two hex-head screws, under the printer on the left and right side, counterclockwise and move the platen away from the print head.
3	Start test printing by operating HD switch.
4	Raise the platen by turning the hex-head screws clockwise, alternately, until light printing is seen.
5	Alternately, turn each hex-head screw clockwise until the characters are of even darkness across the page.
6	Tighten the screws under the tear bar.
7	Stop test printing.

4. MAINTENANCE

A. Lubrication

4.01 The head carriage contains a cavity with an oiled felt wick. This is the only lubrication required and should be done periodically (approximately 1 million lines).

4.02 Use Nye 623A synthetic oil or equivalent and apply 4 to 5 drops of oil using a 431A oil gun. The synthetic oil can be ordered from:

William F. Nye, Inc.
P.O. Box G-927
New Bedford, MA 02742

4.03 Refer to Fig. 9 and the following procedure for lubrication.

STEP	PROCEDURE
1	Remove printer from service.
2	Remove printer cover.
3	Remove ribbon retainer.
4	Manually move print head to center of carriage until the print head oil port is directly under the access hole in the plate assembly.
5	Apply 4 to 5 drops of oil.
6	Manually move print head to home-head side.
7	Replace ribbon retainer.
8	Replace printer cover.
9	Restore printer to service.

B. Other Maintenance

4.04 The manufacturer, Practical Automation Inc, will perform all other maintenance of the printer.

4.05 Follow local procedures for the replacement of the printer.

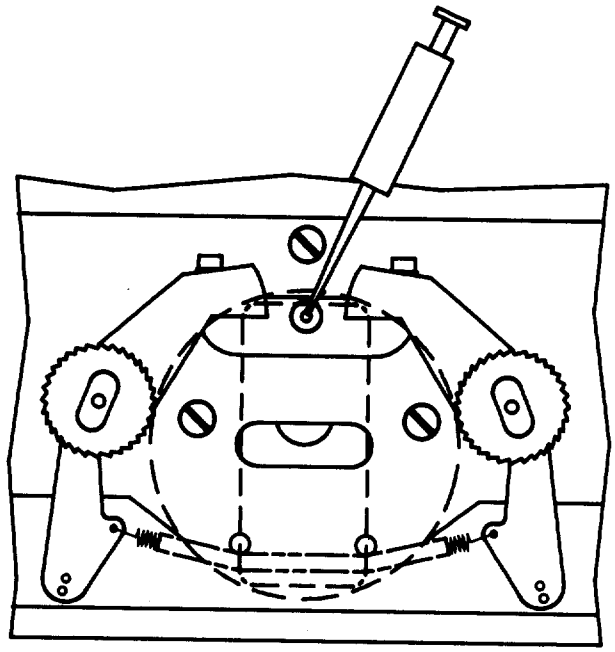

Fig. 9—Plate Assembly