CENTRONICS
CENTRONICS
CENTRONICS
CENTRONICS

MODEL 702/703
PRINTER

37400591 REV C   AUGUST 1980

CENTRONICS
CENTRONICS
CENTRONICS
CENTRONICS

OPERATORS MANUAL

TABLE OF CONTENTS

SECTION 1
GENERAL INFORMATION

1.1 DESCRIPTION

The Models 702/703 are high-speed, bidirectional, impact printers that use dot matrix techniques for character generation. Each printer is completely self-contained, composed of mechanical, electro-mechanical components and a logic printed circuit board (PCB). The printed circuit board uses microprocessor technology to minimize components and increase reliability.

Maximum throughput is achieved with bidirectional printing that seeks the shortest path to the next line of characters when printing successive lines of data. Print head and paper movement is controlled by stepper motors.

The standard printer uses a 7 × 7 dot matrix and 64 upper case ASCII characters for character generation. Character sets of 64, 96, 128, 160 or 192 are also available. The major differences between the Model 702 and 703 are the print speed and paper slew rate. These differences are shown in paragraph 1.2 Specifications.

This manual provides the necessary information to install, operate and maintain the printer. This information includes site considerations, set-up procedures, operating instructions and operator-level maintenance.

00771
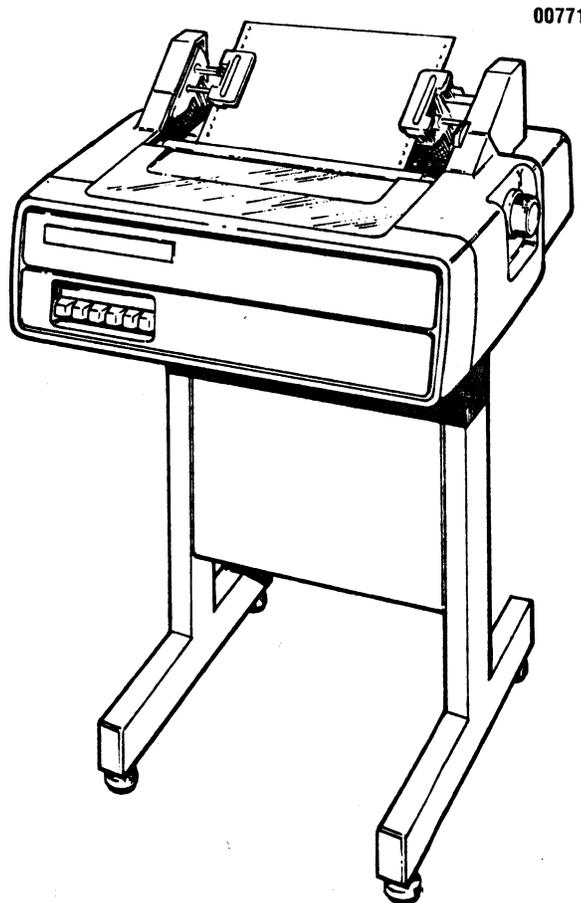
Figure 1-1 Model 702/703 Printer

1.2 SPECIFICATIONS

DATA INPUT

Data Format	7/8 bit ASCII parallel, TTL levels
Input Code	64 character ASCII
Buffer	One line character buffer
Input Gating	Data Strobe is normally gated with acknowledge of previous character.

PRINTING

Printing Method	Impact, character by character, bidirectional
Dot Matrix	Standard: 7 x 7
	Optional: 5 x 7, 7 x 9, 9 x 7, and 9 x 9
Print Format	Standard: 10 characters per inch
	Optional: 12 or 15 characters per inch
Print Speed	MODEL 703—180 cps (7 x 7 dot matrix)
	—165 cps (9 x 7 dot matrix)
	MODEL 702—120 cps (7 x 7 dot matrix)
	—110 cps (9 x 7 dot matrix)
Character Set	Standard: 64 character ASCII
	Optional: 64, 96, 128, 160 and 192 character sets
Number of Copies	Prints original and up to five carbon copies

PAPER ADVANCE

Vertical Format	6 lines per inch
Paper Entry	Rear and Bottom Feed
Paper Slew Rate	MODEL 703—15 inches per second (ips)
	MODEL 702—8 inches per second (ips)
Auto Line Feed	Automatic line feed on carriage return (Disabled by option)
Paper Feed	Rear or Bottom tractor feed
	17.3 inches (439 mm) maximum paper width
	13.2 inches (335 mm) maximum print width
Paper Specifications	Refer to paragraph 2.6 for detailed specifications

PHYSICAL-ENVIRONMENTAL-ELECTRICAL

Height	9.0 inches (229 mm)
Depth	19.5 inches (495 mm)
Width	25.0 inches (635 mm)
Weight	75 lbs. (34 kg)
Temperature	Operating: 40° to 100°F (4° to 38°C)
	Storage: −35° to 130°F (−37° to 54°C)
Humidity	Operating: 20% to 90% (No condensation)
	Storage: 5% to 95% (No condensation)
Input Voltage/Frequency	115 VAC +10%, −15%; 60 Hz ±1 Hz
	230 VAC +10%, −15%; 50 Hz ±1 Hz
Power Cord Length	12 feet (3.7 m)

1.3 PRINCIPLES OF OPERATION

Figure 1-2 is a pictorial block diagram of the Model 702/703 printers, illustrating the relationship of the electrical and mechanical components to the logic board.

The printer contains a "microprocessor" that controls printer operations. Under program control the microprocessor, located on the main logic board, controls the receiving of parallel data and monitors the control panel. Also, the microprocessor initiates movement of the print head,

carriage and paper, and monitors feedback from the limit switches, video system, optional electronic vertical format unit, and paper empty switch to effect proper execution of these commands. It maintains a record of the position of the print head at all times, provides printer status information to the attached devices, and performs other housekeeping functions.

Basically, all printer functions can be grouped into one of three categories: (1) character printing, (2) paper motion, and (3) auxiliary functions.
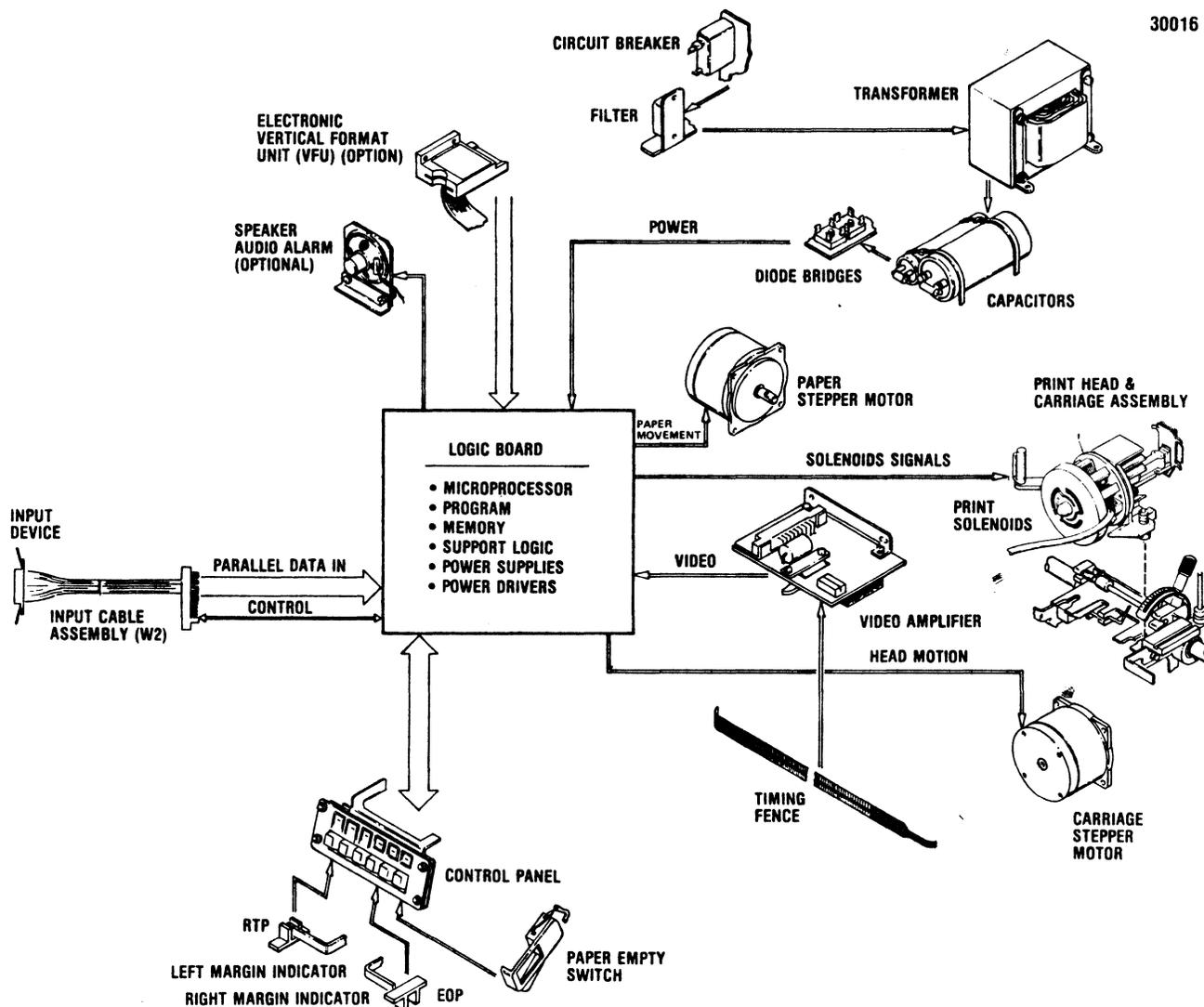
Figure 1-2 Pictorial Block Diagram

CHARACTER PRINTING—Characters are printed by selectively activating the print wires aligned in a vertical column in the print head. As the head moves across the paper, the appropriate print wires are momentarily activated, driving them against the ribbon, paper and platen to form the specified dot pattern.

The print commands to the print wires are developed by programmable read-only memories (PROM's). To extract print information, the microprocessor addresses a PROM memory location for each column within a character.

As shown in Figure 1-3, the print head is attached to the carriage assembly, which in turn is attached to a rotating carriage drive belt. The carriage is driven in the forward or reverse direction by the carriage stepper motor which rotates the carriage drive belt clockwise (forward direction) or counterclockwise (reverse direction).

PAPER MOTION—Paper can be moved manually by pushing in and rotating the platen knob, or automatically by any of three paper motion commands: line feed, vertical tab and form feed.

Paper is advanced one line by momentarily activating the paper stepper motor, which applies torque to the tractor unit drive gears. When using the tractor unit with the electronic vertical format option, vertical tab and form feed operations are accomplished by activating the paper stepper motor until the prescribed amount of paper movement, programmed into the microprocessor, has been accomplished.

The electronic vertical format option allows vertical tab, form feed and bottom of form operations to be controlled electronically by data memory. The memory can be loaded either locally through

20104
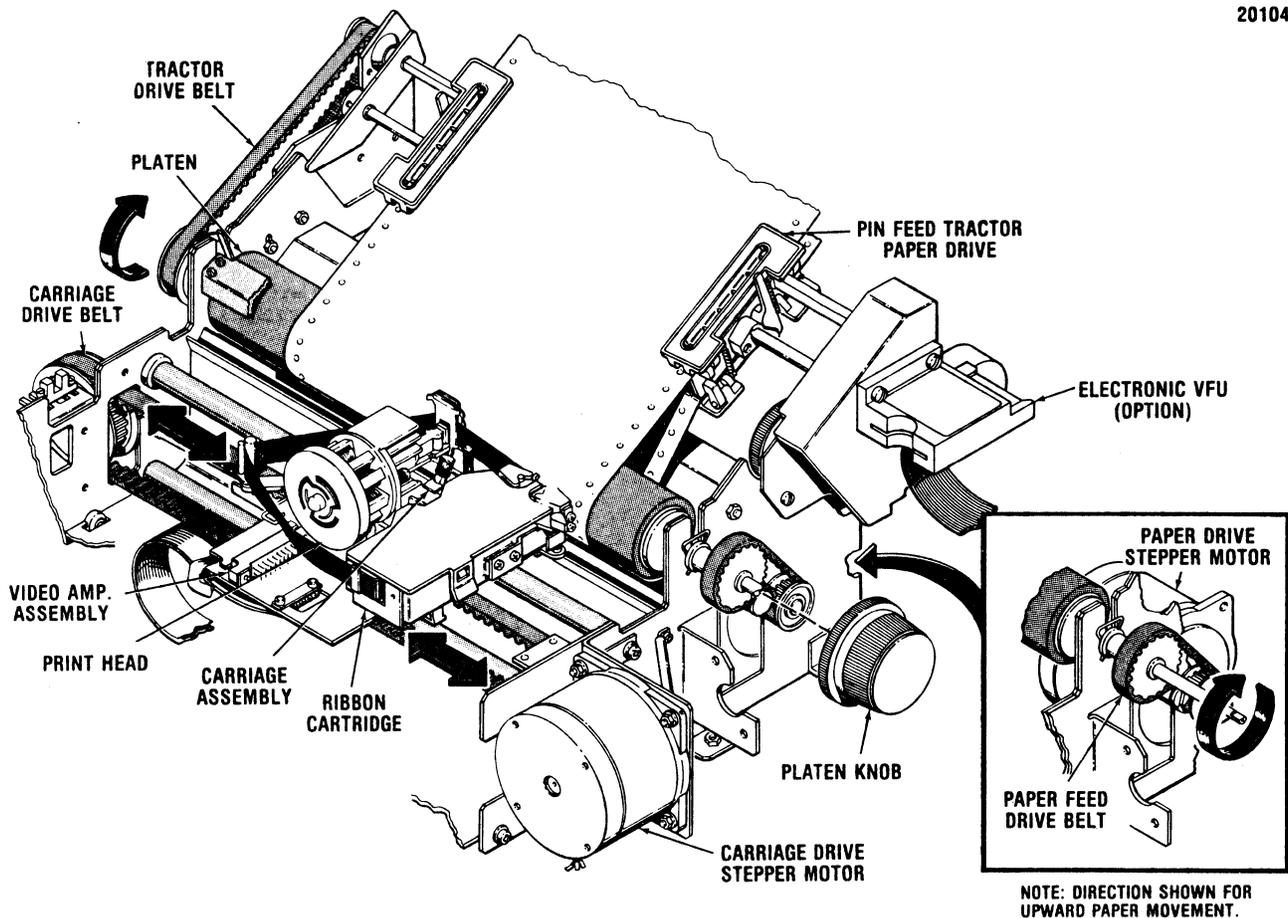
Figure 1-3 Character Printing/Paper Motion

a hand-fed paper tape reader or remotely through the reader by the operator each time the printer is powered-up or when a format change is required. The memory holds the "tape image" which is electronically "rotated" as paper is advanced.

If the electronic vertical format option is not used, then a vertical tab operation moves paper 1 inch (6 line feeds) and a form feed operation moves paper 11 inches or 12 inches, as prescribed by the customer. This feature is preset in the option PROM, and also determines forms control if the electronic vertical format option is installed but memory is not loaded.

SPECIAL FUNCTIONS—As a standard feature, the printer contains automatic motor control which applies a holding current to the stepper motors when no data is received.

Also a standard feature, the printer has a self-test capability which is activated by pressing the OVERRIDE switch while the printer is *deselected*. The printer automatically prints out both characters sets and the hexadecimal equivalent for each of the 32, 8-bit locations in the option PROM.

An optional audio alarm is available for alerting the operator of a special condition. An audible tone from a speaker is sounded by software command (bell code—07 hex) or by a paper empty condition.

In addition to printable character codes, the printer also recognizes certain special control codes. Refer to paragraph 3.4 for a list of these control codes and the actions performed upon receiving these codes.

1.4 SELECTABLE/OPTIONAL FEATURES
The standard printer may be equipped with various selectable/optional features to provide additional capabilities in the printer. The features available are as follows:

SELECTABLE FEATURES
Auto Line Feed on Carriage Return Disabled—On detection of a carriage return (CR) control code, previously received data will be printed, but a line feed (LF) will not be performed.

Inhibit Prime on Select—The feature prevents the logic and buffer from being reset when the printer is selected.

Inhibit Prime on Delete—This feature prevents a delete code (Octal 177) from resetting the print buffer. It allows the delete code to be used as a pad character.

Inverted Data Strobe—This feature inverts the negative-going data strobe to an active high for control function definition and data loading.

Non-Gated Data Strobe—This feature allows the printer to accept data before the previous character is acknowledged.

Escape Control of Bit 8—This feature enables the software sequence of ESC (Octal 033), Numeric 3 (Octal 063), and ESC (Octal 033), Numeric 4 (Octal 069) to control the active state of bit 8.

Automatic Print on Paper Motion Command—This feature generates a carriage return on receipt of a line feed (LF), vertical tab (VT) or top of form (TOF) command, causing the line of data to be printed before the paper motion command is performed.

Data Bit 8 Address—(A) Secondary character set can be accessed by bit 8 high or low. (B) Single elongated character can be controlled by bit 8 high or low. (*Only (A) or (B) can be selected.*)

OPTIONAL FEATURES
Character Sets—Optional 64, 96, 128, 160 or 192 character sets are available in upper/lower case, international or special symbols. Selection of an alternate character set is done by bit 8. The character sets are available in 5×7, 7×7, 7×9, 9×7, and 9×9 dot matrix.

Condensed Print—Optional 12 or 15 characters per inch condensed print is available in place of the standard 10 character per inch density.

Electronic Vertical Format Unit—The optional 2 or 12 channel electronic vertical format unit (EVFU) allows vertical tabs and form feed operations to be controlled by data memory that stores "tape image" which is electronically rotated as paper is advanced. If the EVFU is not used in the printer, then the printer automatically performs an 11 inch form feed and a 1 inch vertical tab at 6 lines per inch.

Audio Alarm—This option generates an audible alarm approximately 2 seconds in duration in response to a BELL code (Octal 007) or a paper empty condition.

6/8 LPI—This option allows, by operator selection, printing at 6 lines per inch or 8 lines per inch.

Elapsed Time Indicator (ETI)—An optional indicator showing up to 1000 hours of print time before it has to be reset, is available to the user.

1.5 ACCESSORIES
The following printer accessories are available.

RIBBON CASSETTE (37740008-2001)—Throwaway longlife ribbon cassettes containing 70 yards of ribbon are available to the user.

UNIVERSAL PRINTER STAND (81100000-6070)—The printer stand provides a rigid pedestal for mounting the printer and allows for bottom or rear paper loading.

FORMS RECEIVING TRAY (65008166-6002)—The forms receiving tray collects and neatly stacks forms exiting from the rear of the printer. NOTE: The forms receiving tray is standard when the printer stand option is chosen.

QUIETIZED CABINET—The quietized cabinet is specifically designed to absorb noise from the interior of the printer and along the paper path. This accessory enables users to operate their printers in a low noise level work environment.

FRONT FEED UNIT (63703215-6001)—The front feed unit allows users to handle ledger cards and cut forms in either single or multipart form.

PRINTER EXERCISER (66000100-4001)—The printer exerciser is a self-contained unit used for the off-line testing of the printer with parallel interface. The unit includes 19 switch selected test controls and a 10 ft. cable.

PRINTER MINI-EXERCISER (6600310-4001)—The mini-exerciser is a self-contained unit and includes an integral connector with two switches to control line length and different character formations. In combination the two switches produce four test sequences.

PRINTER MINI-II EXERCISER (66003107-5001)—A self-contained, hand held off-line tester that tests the parallel printer. The Mini-II is programmable by front panel switches. A 43 inch cable is provided with the unit.

TOOL KIT (63002399-6001)—A tool kit containing all the necessary tools (screwdrivers, nut drivers, pliers, etc.) to maintain the printer is available to the user.

1.6 TECHNICAL DOCUMENTATION
The following technical documentation documents the Models 702 and 703 printers in detail. Contact the Customer Service Department at Centronics for these publications.

UNPACKING/REPACKING INSTRUCTIONS (37407827-9001)—The unpacking/repacking instructions are attached to the outside of the shipping container and provides all the necessary information to unpack the printer.

TECHNICAL MANUALS (Model 702—37400550-9001, Model 703—37400450-9001)—The technical manual is used by qualified field service personnel. The manual contains detailed information on printer theory of operation, maintenance, adjustments and removal/replacement procedures. A print set containing schematics, assembly and wiring diagrams for all printed circuit boards is also contained in the manual.

ILLUSTRATED PARTS MANUALS (Model 702—37400552-9001, Model 703—37400452-9001)—The illustrated parts manual contains illustrations and lists of materials detailing all assemblies and sub-assemblies down to a piece part level. The manual also contains a numerical index, listing every part contained in the printer in numerical order and reference to a figure and index number to show the location of the part.

TECHNICAL INTERFACE MANUALS—A technical manual covering in detail the optional interface boards is available to the user. The specific manual will be shipped with the installed interface board.

ACCESSORIES ORDER FORM
MODEL 702/703/704

CDCC PART NO.	ACCESSORY DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL PER ITEM
63701381-5001	Acoustic Cover		$ 40.00	
81100000-6070	Print Stand (unassembled)		150.00	
65008166-6001	Forms Receiving Tray		38.00	
37740008-2003	"7-Meg" Ribbon Cassette		178.08/doz.	
63002399-6001	Tool Kit		56.00	
37400591-9001	Operators Manual (702/703)		9.00	
37400701-9001	Operators Manual (704)		9.00	
37400591-9001	Operators Manual (704-11/12)		9.00	
37400453-9001	704-11/12 Addendum		N/C	
37400550-9001	Technical Manual (702)		35.00	
37400450-9001	Technical Manual (703)		35.00	
37400700-9001	Technical Manual (704)		35.00	
37400453-9001	704-11/12 Addendum		N/C	
37400550-9001	Illustrated Parts Manual (702)		20.00	
37400450-9001	Illustrated Parts Manual (703)		20.00	
			SALES TAX	
			ORDER TOTAL	

SHIP TO:

_____( )_____
Dept.   Phone Number

_____
Firm Name

_____
Address

_____
City   State   Zip

_____
Customer Number   Purchase Order Number

_____
Ordered by

BILL TO: (If different from "SHIP TO")

_____( )_____
Dept.   Phone Number

_____
Firm Name

_____
Address

_____
City   State   Zip

_____
Customer Number

_____
Attention of

PAYMENT METHOD:

☐ UPS COD   ☐ CHECK ENCLOSED   ☐ BILL ME
                    (We pay freight)   (Current CDCC
                                                Customers only)

Payment Terms:

For orders less than $100.00:
   Will be shipped UPS COD; unless payment for the full amount of the order, including sales tax, is enclosed.
   With prepayments we pay the shipping costs.

For orders in excess of $100.00:
   Same terms as above; or, if you currently have an account with Centronics, we can bill you.

Prices subject to change without notice.

SECTION 2
INSTALLATION

2.1 PRINTER INSPECTION

Visually inspect the printer for signs of damage received during shipment. Immediately notify the common carrier of any damage.

─────── **NOTE** ───────
Any attempt to operate a damaged printer voids the warranty and may cause further damage.

2.2 SITE CONSIDERATIONS

When selecting a site to install the printer, the following information should be taken into consideration.

PRINTER DIMENSIONS—Refer to Figure 2-1.

00768

TABLE TOP OPERATION

PRINTER STAND OPERATION
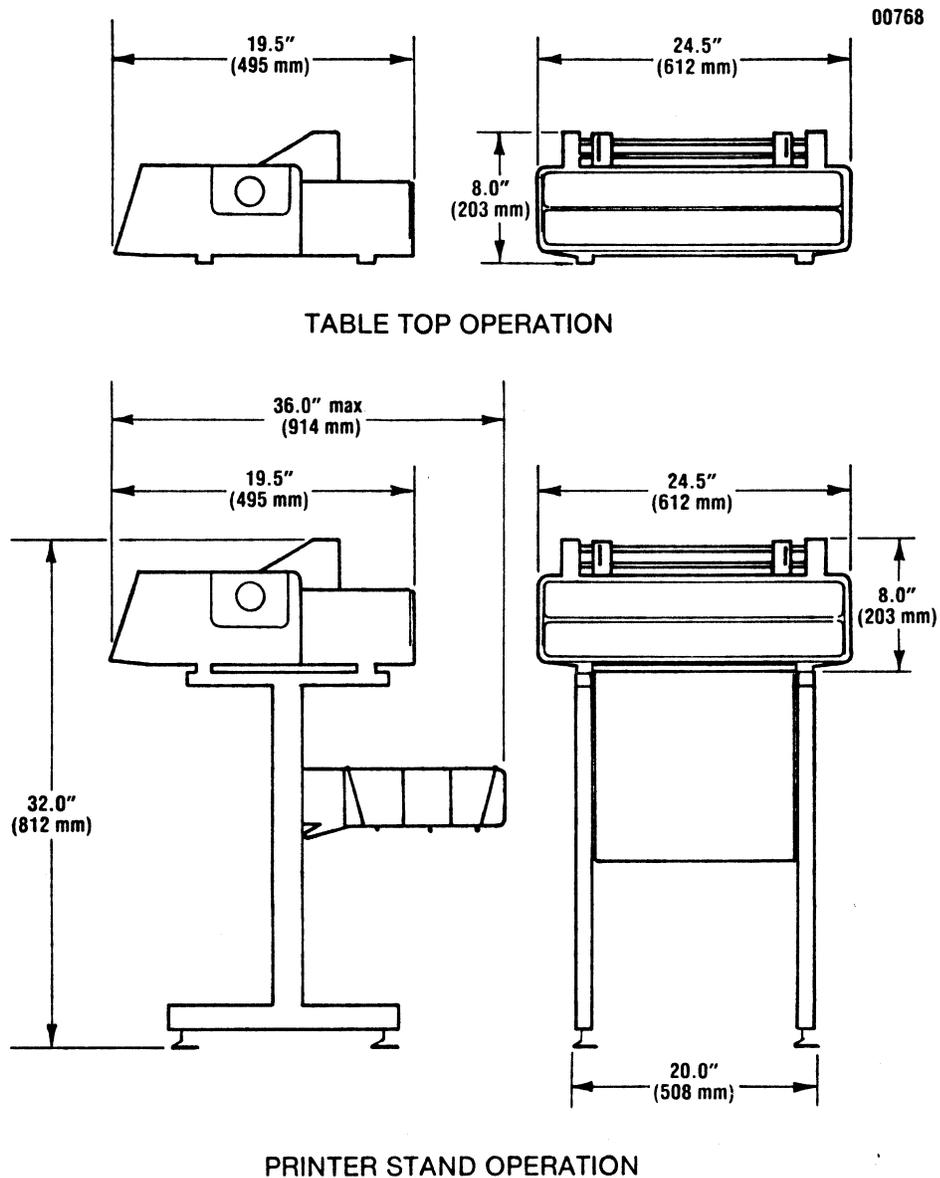
Figure 2-1 Printer Dimensions

WEIGHT
Printer: 75 lbs. (34 kg.)
Stand: 22.5 lbs. (10.2 kg.)

TEMPERATURE
Operating: 40° to 100°F (4° to 38°C)
Storage: −35° to 130°F (−37° to 54°C)

HUMIDITY
Operating: 20% to 90% (No condensation)
Storage: 5% to 90% (No condensation)

ELECTRICAL
115 VAC +10%, −15%; 60 Hz ±1 Hz
230 VAC +10%, −15%; 50 Hz ±1 Hz
Power Cord Length: 12 ft. (3.67 meters)

2.3 SET-UP PROCEDURES

The following procedures detail the set-up of the printer prior to operation at the installation site. Refer to Figure 2-2 and perform the following:

1. Note any discrepancies in general printer appearance.

2. Remove the top cover from the printer and while manually moving the print head from left to right check the following:

   A. Ensure the optics block under the video amplifier does not contact the timing fence.
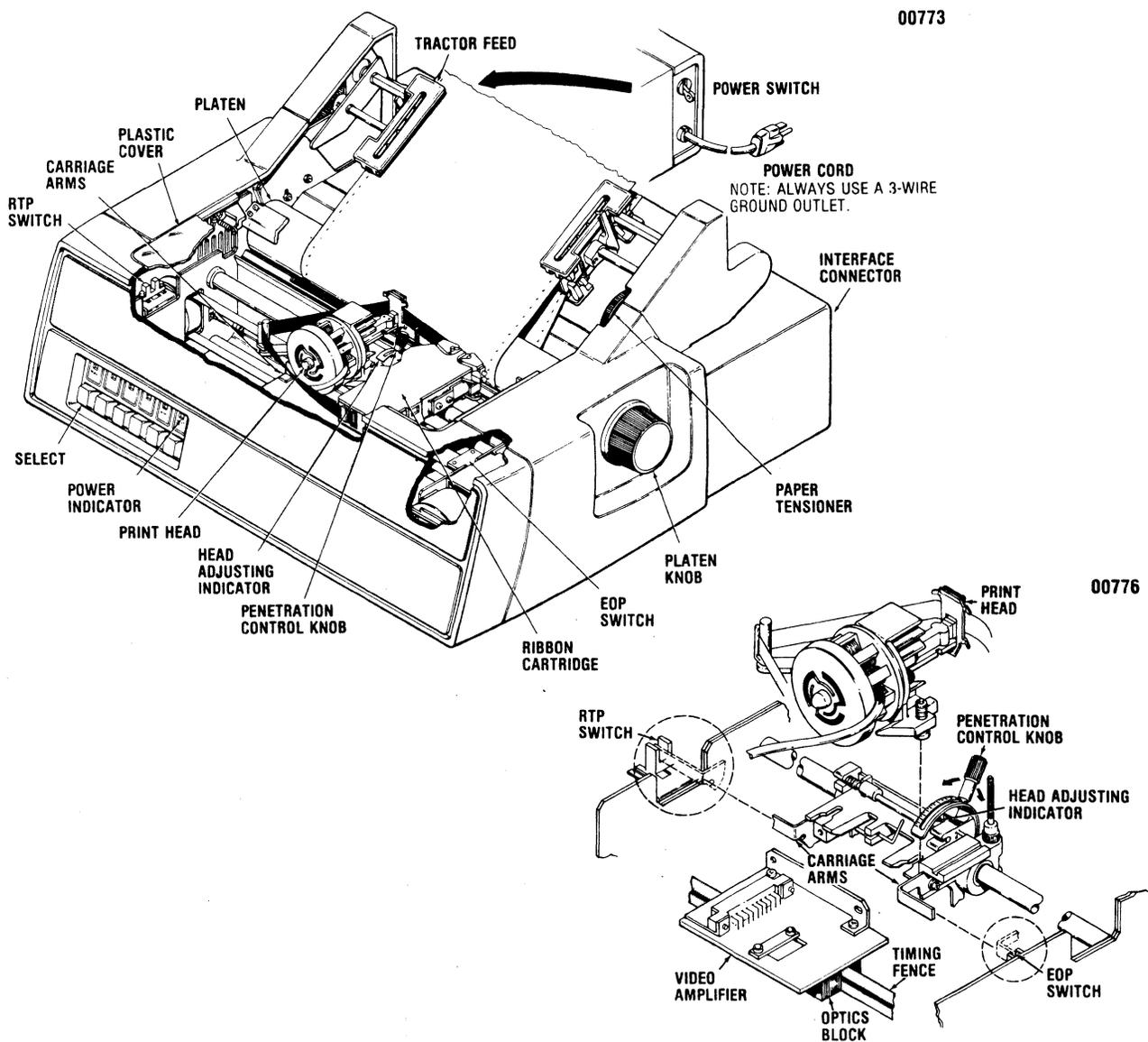
Figure 2-2 Set-Up Procedures

B. Ensure the carriage arms do not contact the ready to print (RTP) and end of print (EOP) switches.

> ――――――――― **NOTE** ―――――――――
> If either of the above two conditions occurs, refer to the adjustment section in the Technical Manual.

3. Loosen penetration control knob, move knob backwards away from platen, and insert ribbon cassette and paper as described in paragraphs 2.4 and 2.5.

4. Check the setting of DIP switch No. 1, Auto Line Feed Enable/Disable, per paragraph 2.7.

HEAD PENETRATION (SINGLE PART FORMS)
1. Move penetration control knob as far forward as possible.

2. Tighten penetration control knob.

HEAD PENETRATION (MULTI-PART FORMS)
1. While manually moving print head across the page, increase print head penetration by moving penetration control knob forward until smudging occurs.

2. Move penetration knob backward just to the point of no smudging.

3. Tighten penetration control knob.

PRINTER POWER/SELECT
1. Plug printer into appropriate A.C. outlet. *Always use a 3-wire grounded outlet.*

2. Ensure power switch on rear of printer is *OFF* and connect printer to desired input device via interface connector.

3. Set power switch to the ON position and check/perform the following:

   A. Ensure SELECT lamp on the operators panel is extinguished.

   B. Press TOP OF FORM switch on operators panel and rotate platen to adjust paper to top of form position.

   C. Depress SELECT switch to enable printer to receive data.

2.4 RIBBON CASSETTE INSTALLATION OR REPLACEMENT
The printer uses a throw-away 70 yard cassette (37740008-2001). To install or replace the cassette, refer to Figure 2-3 and perform the following:

1. Turn power off and remove top cover.

2. Move carriage to center position in printer. Loosen and move penetration control knob away from platen.

3. If replacing existing cassette, move cassette latch towards front of printer and remove cassette, taking care not to damage ribbon shield and guide. Discard the used ribbon cassette.

> ――――――――― **NOTE** ―――――――――
> Insert the ribbon guide card supplied with the new cassette between the ribbon shield and guide.
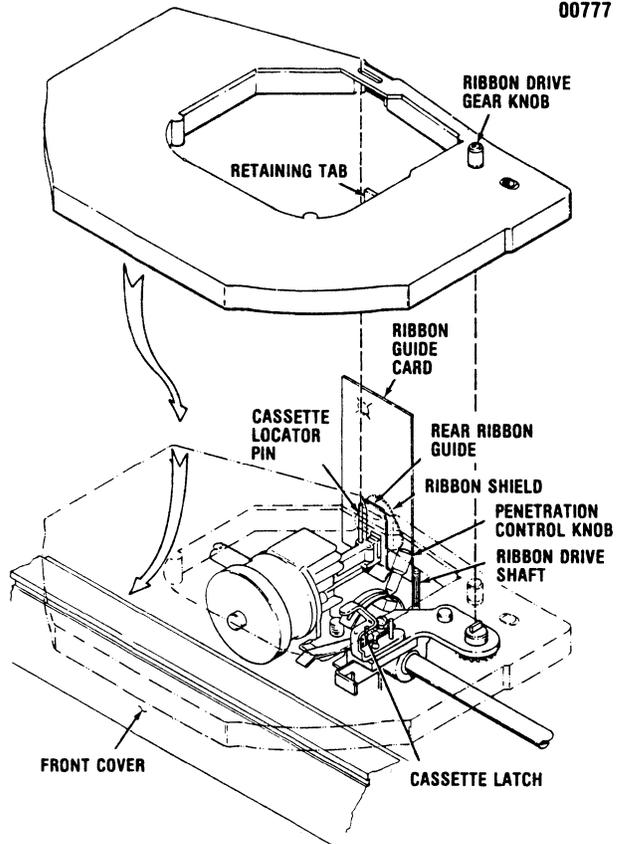
Figure 2-3 Ribbon Cassette Installation or Replacement

4. Hold new cassette above print head and lower it, tipping the rear edge of the cassette downward so that it clears the edge of the front cover.

5. Lower cassette until retaining tab rests on sloping portion of retaining latch with locator pin aligned with slot in cassette and ribbon between rear paper guide and ribbon guide card.

6. Carefully press cassette downward until latch snaps into position above retaining tab. Assure the ribbon is properly positioned between rear guide card and rear ribbon guide.

7. Turn ribbon drive gear knob clockwise several turns to assure proper engagement of cassette with cassette drive gear and to assure proper ribbon movement between rear ribbon guide and ribbon guide card.

8. Remove ribbon guide card, reset penetration control knob and install top cover.

2.5 LOADING PAPER

Paper may be installed two ways in the tractor drive assembly; rear feed or bottom feed. The following procedures detail loading of the paper both ways.

TRACTOR DRIVE, REAR FEED

1. Ensure power is off and remove top clear cover. Refer to Figure 2-4.

2. Loosen and move penetration control knob away from platen.

3. Release tractor feed locking levers, then tilt tractor feed unit back so that tractor feed pins face up.

4. Open paper guides and feed paper underneath tractor assembly and up into left pin feed tractor. Close left paper guide to secure paper. Adjust right pin feed tractor to accomodate paper width. Ensure paper holes are aligned so that top sheet is parallel with top of printer. Close right paper guide.

5. Swing tractor feed unit forward and down. Lift column scale/tear bar. Release paper tensioner by rotating knob upward.

6. Feed paper under platen and rotate platen knob until paper is fed around platen and up between platen and column scale/tear bar to top of pin feed tractors.

7. Open paper guides and align paper so that top of paper is parallel with top of printer. Close paper guides.

8. Adjust pin feed tractors so that first character prints in desired column on paper.

9. When properly adjusted, secure tractor locking levers, lower column scale/tear bar, adjust paper tension with tensioner wheel, and readjust penetration control knob.

10. Replace top clear cover, turn power on and depress PRINT switch to enable printer to receive data.

00760

PAPER GUIDES

COLUMN SCALE/ TEAR BAR

PLATEN

TRACTOR FEED LOCKING LEVER

PAPER TENSIONER

Figure 2-4 Loading Paper, Rear Tractor Drive

TRACTOR DRIVE, BOTTOM FEED

1. Ensure power is off and remove top clear cover. Refer to Figure 2-5.

2. Loosen and move penetration control knob away from platen.

3. Release tractor feed locking levers.

4. Open paper guides and lift column scale/tear bar.

5. Place box of paper underneath printer as shown in Figure 2-5 and feed paper up through bottom of printer between platen and column scale/tear bar up into tractor feed.

6. Once paper is installed, lower column scale/tear bar, close paper guides, set tractor feed locking levers and adjust penetration control knob.

―――――――― NOTE ――――――――
For best results, remove paper from box and ensure paper is centered and fed straight up into printer.

00761
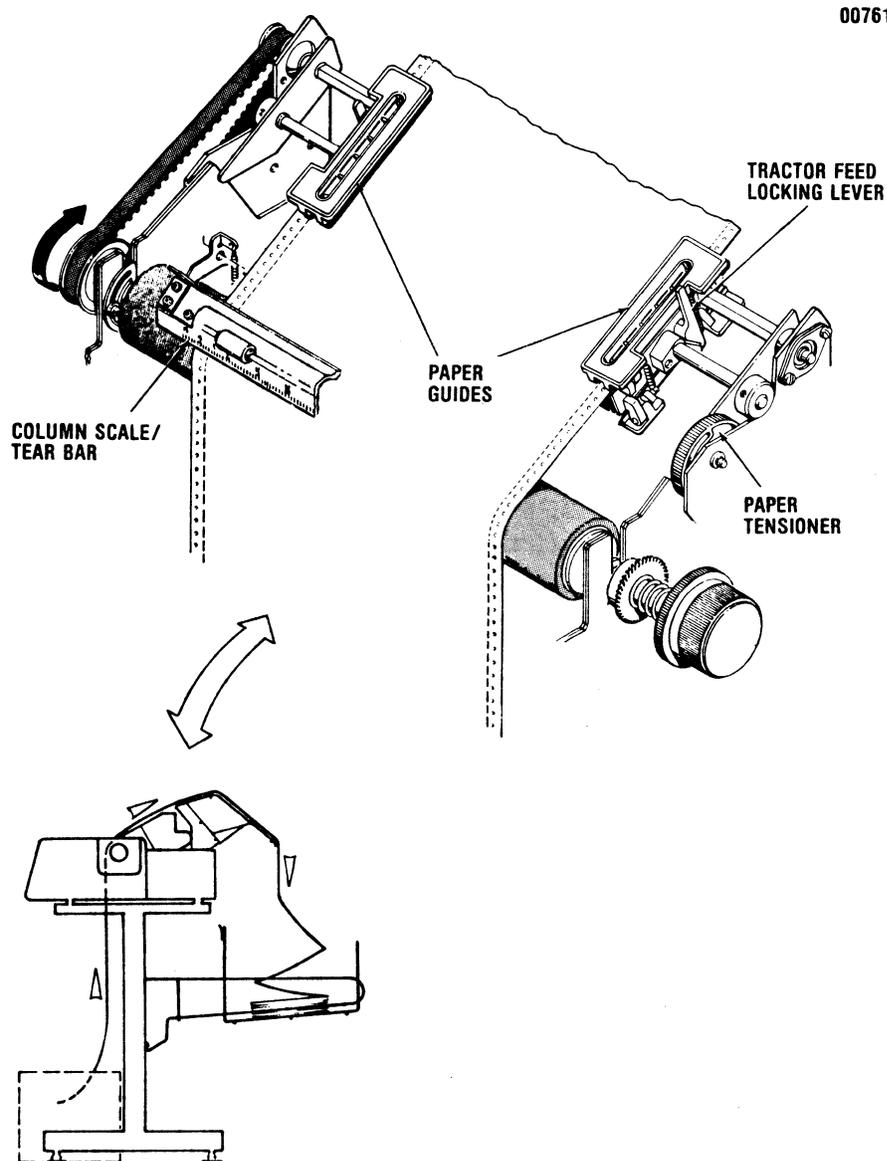
Figure 2-5 Loading Paper, Bottom Tractor Feed

2.6 PAPER SPECIFICATIONS

Acceptable paper is continuous fan-fold, edge perforated paper conforming to the specifications illustrated in Figure 2-6.
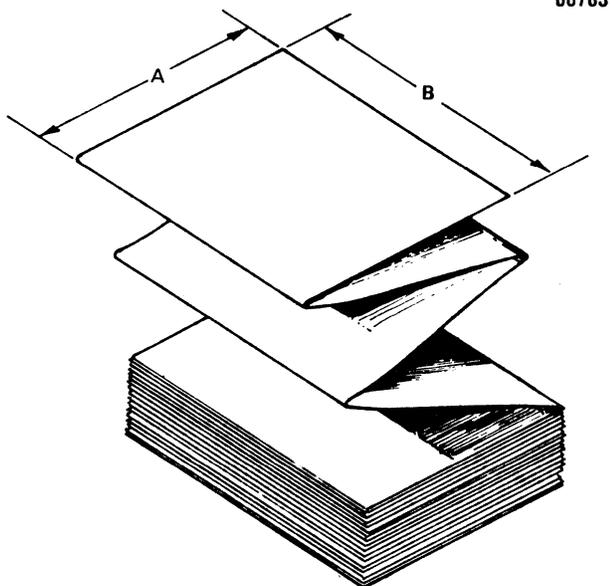
00763

Figure 2-6 Paper Specifications, Tractor Drive

PAPER SPECIFICATIONS, TRACTOR DRIVE

A. FORM LENGTH: 3.0" to 14.0" (75 mm to 355 mm); [11" (279 mm) is recommended]
B. PAPER WIDTH: 12.1" (307 mm) maximum

(Other Specifications not Illustrated)

FORM THICKNESS: 0.030" (0.75 mm) maximum
PAPER WEIGHT: Single-Part Form—15 to 20 lb
Multi-Part Form (5-part maximum)—Original-12 to 15 lb
Copies-9 to 12 lb (last copy 15 lb)
Carbon Paper-7½ lb with medium hardner

2.7 DIP SWITCH SETTING, AUTO LINE FEED

The auto line feed is enabled or disabled by DIP NO. 1, switch 3, on the operator's panel. Figure 2-7 details the setting of the switch.

2.8 SELF-TEST

The self-test feature is activated by depressing the OVERRIDE switch while the printer is *deselected.* The printer automatically prints out both character sets and the hexadecimal equivalent for each of the 32, 8-bit locations in the option PROM.
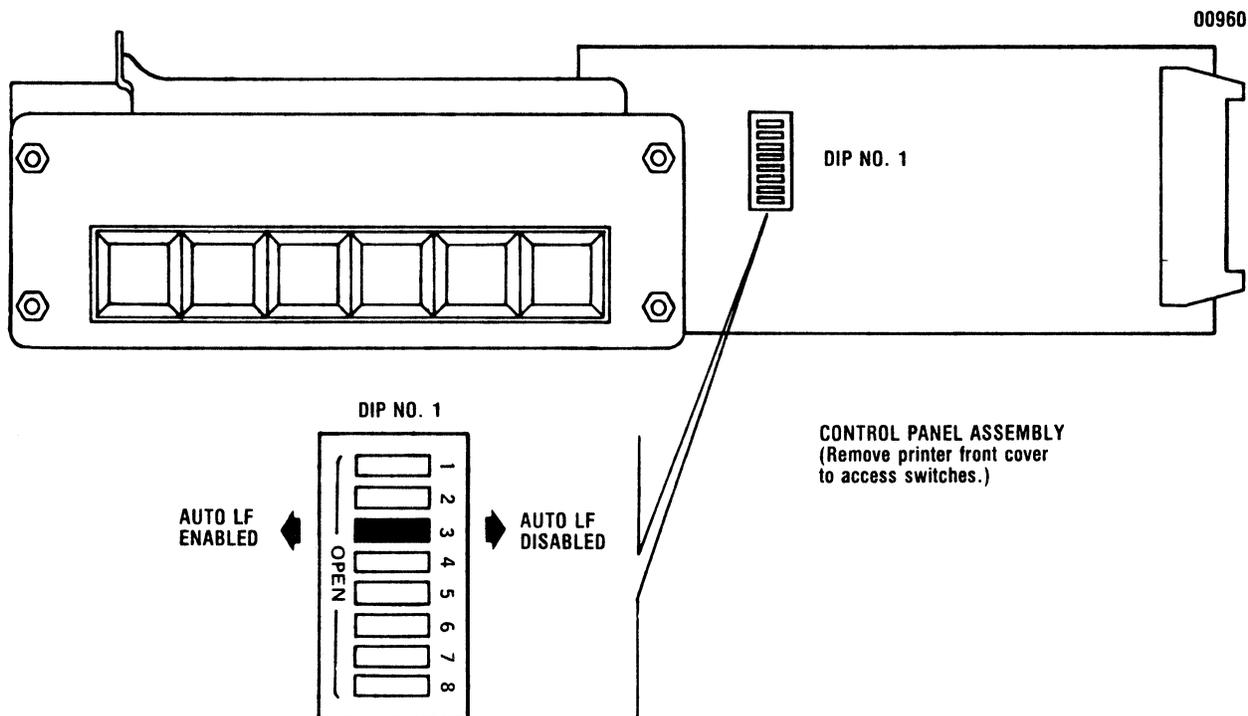
00960

Figure 2-7 DIP Switch Setting, Auto Line Feed

SECTION 3
INTERFACE INFORMATION

3.1 PRINTER INTERFACE CONNECTIONS

A 36-pin connector (Amphenol 57 Series) located in the rear of the printer provides the means for connecting the printer to the input device. The pin-outs of the printer interface connector are shown below.

PIN	SIGNAL
1	DATA STROBE
2	DATA BIT 1
3	DATA BIT 2
4	DATA BIT 3
5	DATA BIT 4
6	DATA BIT 5
7	DATA BIT 6
8	DATA BIT 7
9	DATA BIT 8
10	ACKNOWLEDGE (ACKNLG)
11	BUSY
12	PAPER OUT (PE)
13	SELECT (SLCT)
14	GROUND
15	OSCILLATOR (OSCXT)
16	GROUND
17	CHASSIS GROUND
18	+5V
19	TWISTED PAIR GROUND
20	TWISTED PAIR GROUND
21	TWISTED PAIR GROUND
22	TWISTED PAIR GROUND
23	TWISTED PAIR GROUND
24	TWISTED PAIR GROUND
25	TWISTED PAIR GROUND
26	TWISTED PAIR GROUND
27	TWISTED PAIR GROUND
28	TWISTED PAIR GROUND
29	TWISTED PAIR GROUND
30	INPUT PRIME RETURN
31	INPUT PRIME
32	FAULT
33	GROUND
34	NOT USED
35	NOT USED
36	NOT USED

3.2 INTERFACE DRIVERS AND RECEIVERS

Figure 3-1 details the voltage range for the interface drivers and receivers. The interface receivers are terminated by 1k ohm resistors to +5V.
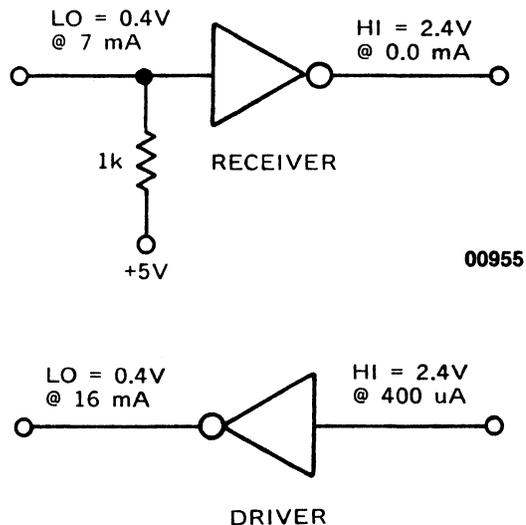
All input/output signals are TTL compatible

Figure 3-1 Interface Drivers and Receivers

3.3 INTERFACE INPUT/OUTPUT SIGNALS

DATA STROBE (Host Generated)—This negative going pulse is used to transfer the incoming data into the printer logic. The pulse duration must be a minimum of 1.0 microsecond.

DATA LINES (Host Generated)—The eight data lines DATA BIT 1–DATA BIT 8 contain the ASCII character data information. Data bit levels are positive true logic. The high logic level of each data line must be settled at least 1.0 microsecond before the leading edge of the strobe pulse and remain at high at least 1.0 microsecond after the trailing edge of the strobe pulse.

INPUT PRIME (Host Generated)—This signal causes the print head to return to the left margin and resets the printer logic on the trailing edge of the signal.

ACKNOWLEDGE (Printer Generated)—This negative going signal is used to verify the transfer of incoming data or to signify the end of a functional operation. Once a code, character or control, is sent to the printer, an acknowledge pulse must be received before a new code can be sent. NOTE: If the NON-GATED DATA STROBE feature is selected, the printer can accept new data before the previous character is acknowledged.

BUSY (Printer Generated)—This high going signal is used to give a positive DC level signal indication during the time when the printer cannot receive data. It is also positive when the paper empty or the fault status line is high.

EXTERNAL OSCILLATOR (Printer Generated)—The external oscillator (OSCXT) is a 90-200 kHz oscillator used for external interface timing.

PAPER EMPTY (Printer Generated)—A high level signal that indicates the printer is out of paper.

SELECT (Printer Generated)—A high level signal indicating the SELECT switch has been depressed or a select code has been received and the printer is ready to accept data.

3.4 HOST-GENERATED CONTROL CODES
Control codes are sent to the printer along with character codes in the input data lines. Control codes are interpreted as instructions by the printer. The following table is a summary of the control codes recognized by the printer.

LINE FEED (LF) CODE—If the printer is in the select mode, receipt of the line feed code will cause immediate advance of one line.

VERTICAL TAB (VT) CODE—If the vertical tab code is received while the printer is selected, the code is processed and then acknowledged. The vertical tab code will not be processed or acknowledged when the printer is deselected.

If VFU data is loaded in the RAM, receipt of a VT code will cause paper to advance to the next sequential vertical tab location. If VFU data is *not* loaded in the RAM, receipt of a VT code will cause paper to advance to a pre-set default VT location. Default VT locations are located at 6-line intervals.

FORM FEED (FF) CODE—If the form feed code is received while the printer is selected, the code is processed and acknowledged. The form feed code will not be processed or acknowledged when the printer is deselected.

If VFU data is loaded in the RAM, receipt of a FF code will cause the paper to advance to the next sequential form feed (top of form) location.

If VFU data is *not* loaded in the RAM, receipt of a FF code will cause the paper to advance to a preset default FF location. Default FF locations are located at 66 or 72-line intervals.

CARRIAGE RETURN (CR) MODE—If the printer is in the select mode and printable characters have been received, receipt of a carriage return code will cause immediate printing. A carriage return code is not acknowledged when the printer is deselected.

MNEMONIC	FUNCTION	OCTAL	DECIMAL	HEXADECIMAL
LF	Line Feed	012	10	0A
CR	Carriage Return	015	13	0D
DC1	Select	021	17	11
DC3	Deselect	023	19	13
VT	Vertical Tab	013	11	0B
FF	Form Feed	014	12	0C
DEL	Delete	177	127	7F
SO	Elongated Characters	016	14	0E
BEL	Audio Alarm	007	05	07

ELONGATED CHARACTER (SO) CODE—If the printer is selected and receives a "SO" code, characters printed from the buffer will be elongated. This mode will be cancelled on receipt of a DEL code, an end of print command, or an input prime.

The number of elongated characters allowed per printable line should not exceed one half the buffer's character capacity.

SELECT (DC1) CODE—Receipt of this code selects the printer, independent of the operator's panel.

DESELECT (DC3) CODE—Receipt of this code deselects the printer, independent of the operator's panel.

DELETE (DEL) CODE—If the DEL code is received when the printer is in the select mode, the printer logic will be reset.

AUDIO ALARM (BEL) CODE—Receipt of this code with the printer in the select mode will cause the optional speaker to generate an audible tone for approximately two seconds.

SECTION 4
OPERATION

4.1 CONTROLS AND INDICATORS

Figures 4-1 and 4-2 illustrate all the controls and indicators on the printer mechanism and operator's panel.

POWER SWITCH—When set to the ON positon, applies power to printer circuits.

PAPER TENSIONER—Adjusts paper tension for proper paper feeding.

PLATEN KNOB—When manually pushed in and turned, adjusts vertical paper position in printer.

PENETRATION CONTROL KNOB—Adjusts print head penetration for optimum print quality.

SELECT LAMP—When lit, indicates printer is selected.

VFU LAMP (Optional)—When lit, indicates optional electronic VFU is properly loaded.

ALERT LAMP—When lit, indicates error condition that is operator correctable, such as paper empty or paper handling malfunction.

POWER LAMP—When lit, indicates power is on.

LINE FEED SWITCH—When depressed, causes paper to advance one line.

TOF SWITCH—When depressed causes paper to advance to top of next form as governed by optional Vertical Format Unit (VFU).
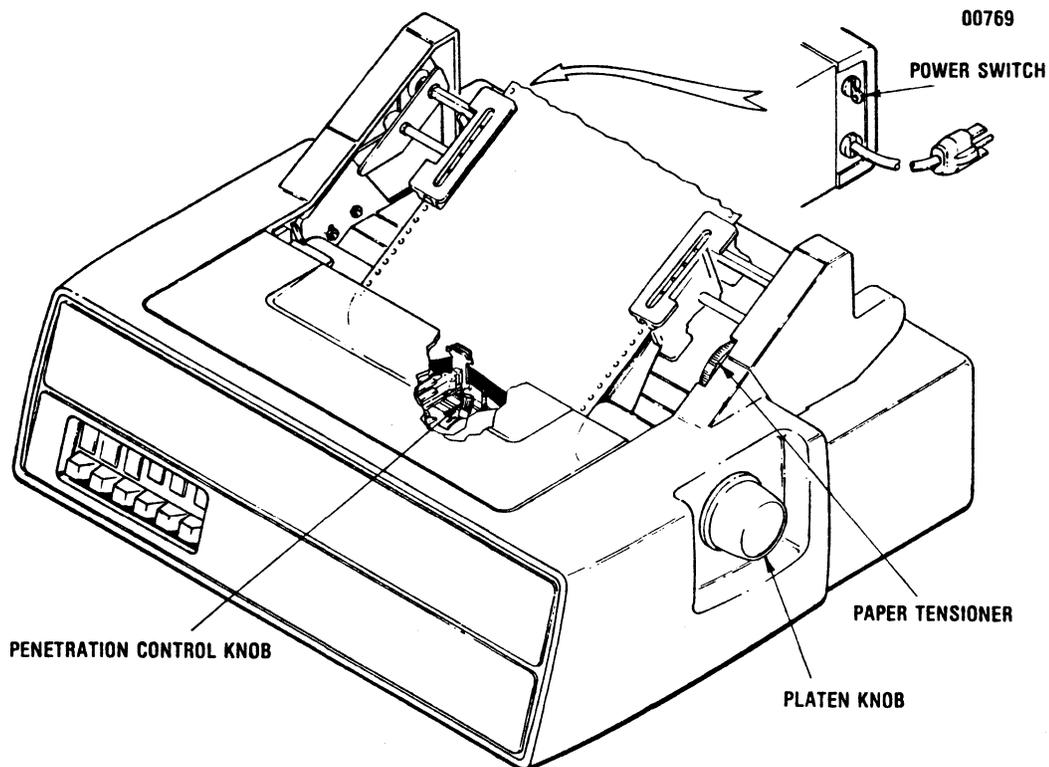
Figure 4-1 Controls, Printer Mechanism

OVERRIDE SWITCH—When depressed and held, after printer deselects on paperout and SELECT switch is momentarily depressed, overrides internal paper out switch and allows last form to be printed. A self test feature can be activated when the OVERRIDE switch is depressed in the deselected mode. The test pattern is composed of the character set(s) and option PROM configuration. Test data is continuously printed out while OVERRIDE switch is depressed and held.

DOUBLE LF SWITCH (Optional)—When depressed, depressing LINE FEED switch or reception of line feed command causes paper to advance two lines.

6/8 SWITCH (Optional)—Permits selection of either 6 or 8 LPI vertical spacing.

SELECT SWITCH—When depressed, selects or deselects printer as indicated by SELECT lamp. If printer is deselected while line of data is being received, printer will not deselect until line of data is printed.

00493
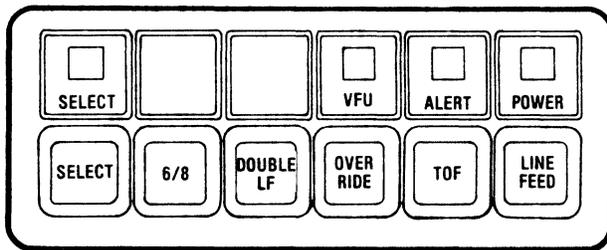
Figure 4-2 Controls and Indicators, Operator's Panel

4.2 OPERATING NOTES

Before operating the printer check the following to ensure proper operation:

1. Always plug printer into a 3-wire grounded outlet.

2. Ensure all covers are closed and secured before operation.

3. Never operate the printer without paper.

4. Avoid leaning on or placing objects on any part of printer. If an object accidentally falls into machine, turn power off and carefully remove object.

5. Turn power off before adjusting print head, replacing ribbon cassette or loading paper.

6. When printer is selected, Line Feed and Top of Form switches on operator's panel are inhibited.

7. Use only a lint-free cloth when cleaning printer surface. Do not use solvents or harsh cleaning agents. A mild detergent solution or desk top cleaner may be used sparingly.

4.3 OPERATING GUIDE

Operation of the printer involves power-up of the printer, deselect mode of operation, select mode of operation and power-down of the printer. The following information describes how to enter into each mode and the functions that can be performed during these modes.

POWER-UP—To power-up the printer, ensure that paper is loaded in the printer, then set POWER switch to the ON position. This illuminates the POWER lamp on the operator's panel and places the printer in the deselect mode of operation.

DESELECT MODE—The printer is deselected by any one of the following actions:

1. Setting the POWER switch to the ON position. (POWER lamp illuminated).

2. Depressing the SELECT switch when the printer is selected.

3. Reception of a DC3 code (octal 023) from the input device while the printer is selected.

When the printer is deselected, the POWER indicator is illuminated and the SELECT and ALERT indicators are extinguished. In this mode of operation, the printer will not receive data from the input device, and allows the following functions to be performed:

1. Select the printer locally by depressing the SELECT switch, or remotely by reception of a DC1 code (octal 021) from the input device.

2. Set the line spacing to 6 or 8 lines-per-inch (LPI) with the 6/8 switch.

3. Establish the top of form position.

4. Perform a local line feed operation by depressing the LINE FEED switch. The paper is advanced one line every time the switch is depressed.

5. Perform a self-test operation.

6. Load VFU data via the optional tape reader.

SELECT MODE—The printer is selected by either one of the following conditions:

1. Reception of a DC1 code (octal 021) from an input device while the printer is deselected.

2. Depressing the SELECT switch when the printer is deselected.

When the printer is selected, the POWER and SELECT indicators are illuminated. In this mode of operation the printer can receive data to generate a printout; advance the paper, load the electronic VFU memory, or deselect the printer (octal 023 code). The printer can also be deselected locally by depressing the SELECT switch.

POWER-DOWN—To power down the printer, deselect the printer and then set the AC POWER switch to the OFF position.

4.4 VERTICAL FORMAT UNIT, OPERATION
The optional Electronic VFU (Vertical Format Unit) used on the printer consists of a data memory which stores a "tape image" that is electronically "rotated" as paper is advanced. This action simulates the rotation of a standard paper tape loop in a mechanical VFU.

The 2 or 12 channel VFU's use the same standard Centronics 12-channel paper tape (P/N 30860002-3001). Generally, the 2-channel VFU is used when the same vertical spacing is required form-to-form. The 12 channel VFU is used when different vertical spacing is required from form-to-form.

LOADING VFU MEMORY—The VFU memory may be loaded either locally through a handfed paper tape reader, or remotely by data input through the printer interface. Downstream loading is also offered as an option by itself. If a fault occurs during loading, the VFU memory sets itself to a preset 11-inch form and 6-line vertical tabs at 6 lines per inch (LPI). The VFU memory can also be present to an optional 12-inch form instead of the 11-inch form.

VFU PAPER TAPE READER—The VFU tape format is illustrated in Figure 4-3. The 2-channel VFU paper tape has channel 1 allocated for top of form, channel 2 for vertical tabs, and channel 1 and 2 combined for bottom of form. The 12-channel VFU paper tapes is the same except that channels 2 to 12, are allocated for different vertical spacing requirements. The 12-channel VFU has the ability, under code control from the computer, to switch between channels or skip a designated number of lines.
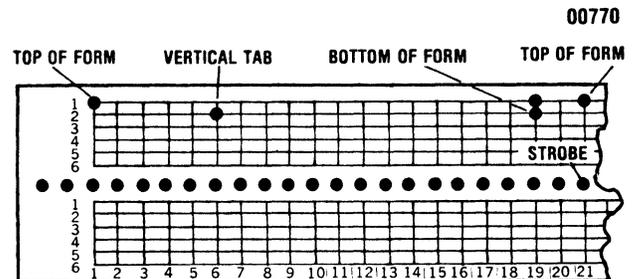
Figure 4-3 EVFU Tape Format

Tape Punching—Observe the following rules when punching a paper tape:

1. Use only a standard Centronics 12-channel format tape.

2. Tape must have a 3″ unpunched leader prior to the first line of data to allow operator to pull tape through reader.

3. Each sprocket on tape corresponds to one line on paper.

4. The first and last line of data on tape must indicate top of form (channel 1). Data loading begins with the first top of form and terminates with the second top of form (which is not loaded). Data loading also terminates if memory capacity (140 lines) is exceeded.

5. Do not punch a hole in both channels 1 and 2 at the same time unless a bottom of form indication is desired.

6. The number of lines between bottom of form and top of form must be *less* than the number of lines of a page.

Tape Reader Use—to use the tape reader, deselect the printer and perform the following:

1. Load tape in reader as shown in Figure 4-4. Channel 1 is the left most channel when facing the front of the reader.

2. Firmly grasp tape leader and pull it through the reader smoothly and consistently. Do not allow tape to back up during loading.

3. VFU data must be read twice. The first pass loads the data, the second pass verifies it. Both passes cannot be contained on one tape. Data must be passed through reader twice or until data is verified.

4. If the data from both passes is not identical, the VFU treats the second pass as the first and waits for another. If the printer is selected without first loading the VFU, a standard (11 or 12 inch) form is assumed with vertical tabs every six lines. When data is verified, the VFU indicator on the control panel (third from right) lights.

5. To change the VFU format, simply follow steps 1 through 4 to read in the new program tape.
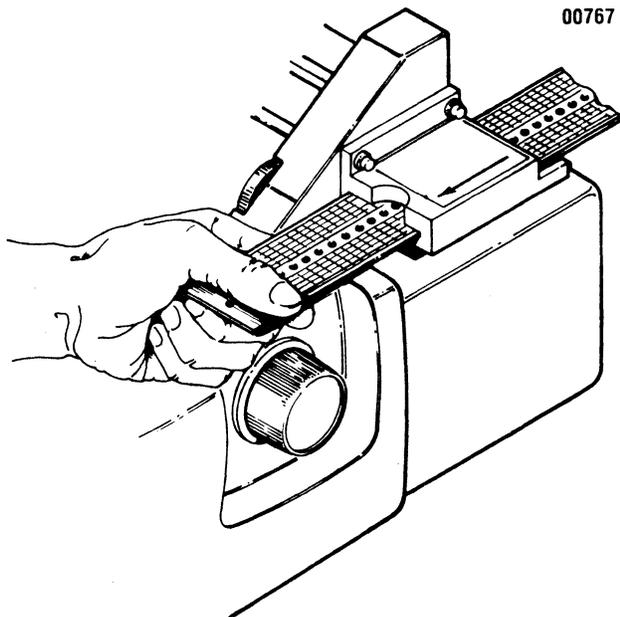
Figure 4-4 Loading Paper Tape

LOADING VIA INTERFACE (Downstream Loading)—Loading the VFU memory via the interface is accomplished in the same manner for the 2 or 12 channel VFU. The sequence for downstream loading is initiated by sending a "Start Load" code (octal 035) followed by two bytes per line, and terminated by a "Stop Load" code (octal 036).

The following data format must be used to load the 2 or 12-channel VFU via the interface (refer to Figure 4-5).

The channel data for the first line is made up of bytes 1 and 2 after the start load code; the second line is made up of bytes 3 and 4 after the start load code, etc. See note for Top of Form.
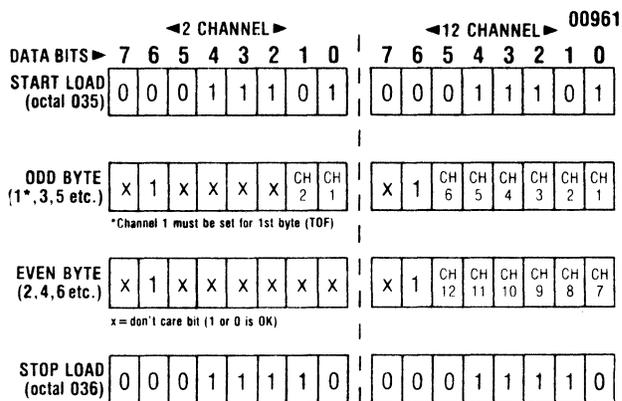
Figure 4-5 EVFU Data Input Format

> **NOTE**
>
> Top of Form (TOF) function requires that channel 1 be set in the first byte after the Start Load (octal 035). Also, the last two bytes prior to the Stop Load (octal 036) have channel 1 set to make the downstream loading format simulate paper tape loading. These last two bytes are not recognized as part of the VFU format.

Excess data (data above maximum memory capacity) cause a fault condition that deselects the printer and causes a visual indication on the control panel. All data after a second TOF code appearing in the middle of the data stream is ignored until a stop code (octal 036) appears.

Table 4-1 is an example of the data input for an 11-inch form with vertical tabs every six lines. The example gives the byte structure for a 12-channel VFU, but is valid for the 2-channel VFU because the extraneous bits are disregarded by the VFU memory.

Table 4-1 Sample of VFU Loading Via Interface
(11" FORM, VT EVERY 6 LINES)

BYTE NO.	BINARY CODE DATA BITS (X 7 6 5 4 3 2 1 0)	HEX CODE	OCTAL CODE	FUNCTION
	0 0 0 1 1 1 0 1	1D	035	START CODE
1	X 1 0 0 0 0 0 0 1	41	101	Line 1 - Top of Form
2	X 1 0 0 0 0 0 0 0	40	100	" 2
3	X 1			" 3
4	X 1			" 4
5	X 1			
6	X 1			" 5
7	X 1			
8	X 1			" 6
9	X 1			
10	X 1			
11	X 1			
12	X 1 0 0 0 0 0 0 0	40	100	
13	X 1 0 0 0 0 0 1 0	42	102	Line 7 - Vertical Tab
14	X 1 0 0 0 0 0 0 0	40	100	
15	X 1			" 8
16	X 1			
17	X 1			" 9
18	X 1			
19	X 1			" 10
20	X 1			
21	X 1			" 11
22	X 1			
23	X 1			" 12
24	X 1 0 0 0 0 0 0 0	40	100	
25	X 1 0 0 0 0 0 1 0	42	102	Line 13 - Vertical Tab
26	X 1 0 0 0 0 0 0 0	40	100	
27	X 1			" 14
28	X 1			
29	X 1			" 15
30	X 1			
31	X 1			" 16
32	X 1			
33	X 1			" 17
34	X 1			
35	X 1			" 18
36	X 1 0 0 0 0 0 0 0	40	100	
37	X 1 0 0 0 0 0 1 0	42	102	Line 19 - Vertical Tab
38	X 1 0 0 0 0 0 0 0	40	100	
39	X 1			" 20
40	X 1			
41	X 1			" 21
42	X 1			
43	X 1			" 22
44	X 1			
45	X 1			" 23
46	X 1			
47	X 1			" 24
48	X 1 0 0 0 0 0 0 0	40	100	
49	X 1 0 0 0 0 0 1 0	42	102	Line 25 - Vertical Tab
50	X 1 0 0 0 0 0 0 0	40	100	
51	X 1	40	100	" 26
52	X 1			
53	X 1			" 27
54	X 1			
55	X 1			" 28
56	X 1			
57	X 1			" 29
58	X 1			
59	X 1			" 30
60	X 1 0 0 0 0 0 0 0	40	100	
61	X 1 0 0 0 0 0 1 0	42	102	Line 31 - Vertical Tab
62	X 1 0 0 0 0 0 0 0	40	100	
63	X 1			" 32
64	X 1			
65	X 1			" 33
66	X 1			
67	X 1			" 34
68	X 1 0 0 0 0 0 0 0	40	100	

BYTE NO.	BINARY CODE DATA BITS (X 7 6 5 4 3 2 1 0)	HEX CODE	OCTAL CODE	FUNCTION
69	X 1 0 0 0 0 0 0 0	40	100	Line 35 - Vertical Tab
70	X 1			
71	X 1			" 36
72	X 1 0 0 0 0 0 0 0	40	100	
73	X 1 0 0 0 0 0 1 0	42	102	Line 37 - Vertical Tab
74	X 1 0 0 0 0 0 0 0	40	100	
75	X 1			" 38
76	X 1			
77	X 1			" 39
78	X 1			
79	X 1			" 40
80	X 1			
81	X 1			" 41
82	X 1			
83	X 1			" 42
84	X 1 0 0 0 0 0 0 0	40	100	
85	X 1 0 0 0 0 0 1 0	42	102	Line 43 - Vertical Tab
86	X 1 0 0 0 0 0 0 0	40	100	
87	X 1			" 44
88	X 1			
89	X 1			" 45
90	X 1			
91	X 1			" 46
92	X 1			
93	X 1			" 47
94	X 1			
95	X 1			" 48
96	X 1 0 0 0 0 0 0 0	40	100	
97	X 1 0 0 0 0 0 1 0	42	102	Line 49 - Vertical Tab
98	X 1 0 0 0 0 0 0 0	40	100	
99	X 1			" 50
100	X 1			
101	X 1			" 51
102	X 1			
103	X 1			" 52
104	X 1			
105	X 1			" 53
106	X 1			
107	X 1			" 54
108	X 1 0 0 0 0 0 0 0	40	100	
109	X 1 0 0 0 0 0 1 0	42	102	Line 55 - Vertical Tab
110	X 1 0 0 0 0 0 0 0	40	100	
111	X 1			" 56
112	X 1			
113	X 1			" 57
114	X 1			
115	X 1			" 58
116	X 1			
117	X 1			" 59
118	X 1			
119	X 1			" 60
120	X 1 0 0 0 0 0 0 0	40	100	
121	X 1 0 0 0 0 0 1 0	42	102	Line 61 - Vertical Tab
122	X 1 0 0 0 0 0 0 0	40	100	
123	X 1			" 62
124	X 1			
125	X 1			" 63
126	X 1			
127	X 1			" 64
128	X 1 0 0 0 0 0 0 0	40	100	
129	X 1 0 0 0 0 0 1 1	43	103	Line 65 - BOF (2-CH. VFU ONLY)
130	X 1 0 0 0 0 0 0 0	40	100	
131	X 1			" 66
132	X 1			
133	X 1 0 0 0 0 0 0 1	41	101	Line 67 - Top of Form
134	X 1 0 0 0 0 0 0 0	40	100	
135	0 0 0 1 1 1 1 0	1E	036	STOP CODE

ELECTRONIC VFU CONTROL CODES—The operation of the electronic VFU is controlled as detailed in Table 4-2.

NOTE

The VFU command is a two-byte sequence; the first byte is octal 037. The second byte is either 'Skip N Lines' or 'Skip to Channel X' determined by bit 4 of the second byte. If bit 4 is a 1, 'Skip N Lines' (15 lines maximum); if bit 4 is a 0, 'Skip to Channel X' (1–12). The format for the second byte follows:

BIT	7	6	5	**4**	3	2	1	0
Skip N Lines	x	x	x	**1**	N_3	N_2	N_1	N_0

BIT	7	6	5	**4**	3	2	1	0
Skip to Ch. X	x	x	x	**0**	C_3	C_2	C_1	C_0

EXAMPLE:
VFU Command (1st byte) 0 0 0 1 1 1 1 1 (octal 037)
Skip 7 Lines (2nd byte) x x x 1 0 1 1 1 (octal 023)
(x in data means 'don't care'; 1 or 0 is OK)

If a command is received to skip to channel X and channel X is not loaded in VFU memory, the printer generates a fault condition, deselects and causes a visual indication on the control panel.

Table 4-2 Electronic VFU Control Codes

FUNCTION	OCTAL	HEX	DESCRIPTION
Line Feed	012	0A	Causes paper to advance by one line. If bottom of form is detected, paper continues to advance to the top of next form. Same as depressing LF switch.
Vertical Tab	013	0B	Causes paper to skip to line indicated by channel 2. If channel 2 is not loaded, paper motion terminates at next top of form in channel 1.
Form Feed	014	0C	Causes paper to skip to line indicated by channel 1. Same as depressing Top of Form switch.
Start Load	035	1D	Indicates that VFU data is to follow.
Stop Load	036	1E	Indicates end of VFU load data. VFU buffer is set to top of form.
VFU Command (1st byte, see note)	037	1F	Indicates that VFU command data is to follow.

SECTION 5
OPERATOR MAINTENANCE

5.1 PREVENTIVE MAINTENANCE

When performing the maintenance on the printer be visually alert for possible problems. Look for loose wires and pins, need for lubrication, loose hardware, chafing of cables and badly worn parts. On an operator level, the following maintenance can be performed.

Table 5-1 Preventive Maintenance

ASSEMBLY	FREQUENCY	CLEAN
Covers	As required	Clean all covers using a mild detergent.
Character Printing Assemblies	6 Months	Clean print area of all paper dust, dirt, etc.
Print Head Assembly	Each Ribbon Change	Using a soft, clean cloth, remove all dried ink from the front of the print head.
Ribbon Cassette Assembly	Each Ribbon Change	Clean ribbon cassette and check for proper ribbon feeding.
Timing Fence	6 months	Clean both sides of timing fence using a soft cloth. *CAUTION: Do not use an organic solvent as this will damage timing fence.*
Platen Assembly	6 Months	Clean platen assembly using a mild detergent.
Column Scale/Tear Bar	6 Months	Clean column scale/tear bar using a mild detergent.
Frames	6 Months	Clean the upper and lower guide bars using a soft clean cloth.

5.2 TROUBLESHOOTING GUIDE

If the printer does not operate properly, refer to Table 5-2 for possible trouble sources before calling for service.

Table 5-2 Troubleshooting Guide

SYMPTOM	ACTION
Printer does not print with POWER switch in ON position.	Check power cord at rear of printer and depress SELECT switch.
Printer does not print, but SELECT lamp is lit.	Ensure interface cable at rear of printer is secure.
Paper skewing.	Position paper feed tractors and secure locking lever.
Ink ribbon tracking problem.	Ensure ribbon is installed as outlined in ribbon installation/replacement procedure.
Poor print quality (e.g., smudging or light print).	Adjust head penetration as outlined in the set-up procedures.
Missing dots in printed character.	Lift front cover and carefully wipe timing fence with clean dry cloth.
Form Feed or vertical tab problem.	Check vertical format unit (optional).
Erratic carriage movement.	Lift front cover and wipe carriage guide bars with clean dry cloth.

READERS COMMENTS

Publications Title __Model 702/703 Printer__

Publications No. __37400591-9001__ Revision __C__ Date __August 1980__

Submitted By: _____

Name _____ Company _____

Address_____State_____Zip_____

The intent of this manual is to provide accurate and meaningful information to help you properly operate and efficiently maintain equipment manufactured by Centronics Data Computer Corp. To this end, we welcome your comments regarding any errors, discrepancies or omissions you may have discovered, or any suggestions for improving the overall manual. This postage-paid form is provided for your convenience. Your comments will be appreciated and should be a useful input at the next revision of this manual.

TECHNICAL OR CLERICAL ERRORS:

(Specify Page Numbers)

_____

_____

_____

_____

_____

_____

_____

_____

SUGGESTIONS FOR IMPROVEMENT:

_____

_____

_____

_____

_____

_____

_____

_____

CEnTROnICS®
data computer corporation
Hudson, New Hampshire 03051
Telephone   (603) 883 - 0111

TP 8-80