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MODEL 353

USERS MANUAL

Operator, Installation &
Programming Instructions

37403531 REV A   FEBRUARY 1982

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MODEL 353

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TP 114 12-80 B

─WARNING─

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the operators manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

JANUARY 1, 1981   APPROVED, CLASS A

Note: Must be used with shielded data cables only.

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INTRODUCTION

The Model 353 printer is a high quality product with many features to help you perform your job more efficiently. Some of the more significant features of the printer are:

- 200 CPS, "Data Processing" Printing
- 50 CPS "Multipass" Printing
- Fanfold Form or Cut Sheet Form Handling
- Serial or Parallel Data Input
- 3 Digit Liquid Crystal Display

- Forward or Reverse Paper Motion
- Pin Addressable Graphics
- Demand Document Capability
- Self-Test Capability
- Audible Alarm

The printer is lightweight, easy to install and operate, and compatible with both EIA and ANSI standards.

In addition to the many standard features built into your Model 353, there are many options and accessories that may be added to your printer to provide additional capabilities.

This manual provides the necessary information to install, program, operate, and maintain your Model 353 printer.

20171

Introduction

I

CONTENTS

Operators Information

II
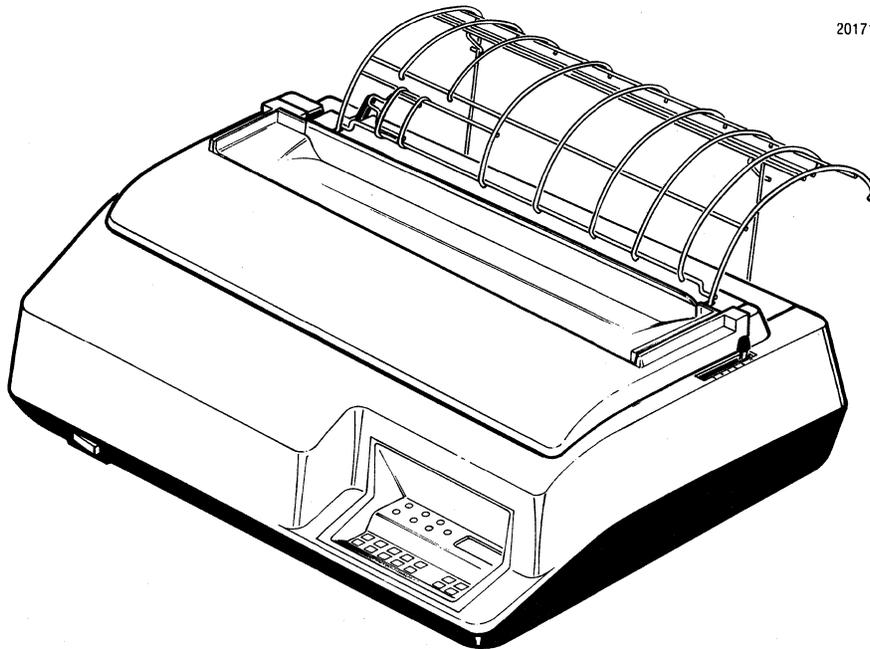
SECTION 1
CONTROLS AND INDICATORS

1.1 GENERAL

As the operator of the Model 353 printer, you will be printing a variety of jobs. The controls and indicators provide the communications path between you and the printer. Using the controls and indicators you set-up the printer to print a specific form, sheet, etc. All operator controls and indicators are located on either the printer mechanism or the control panel.

1.2 PRINTER MECHANISM CONTROLS AND SWITCHES

Figure 1-1 illustrates the printer mechanism controls and switches with which an operator should be familiar. A brief description of each control and switch is provided below.

POWER SWITCH—When placed in the ON position, applies power to the printer circuits.

COVER INTERLOCK SWITCH—A safety feature which automatically stops the printer when the top cover is opened.

FORMS LEVER—The forms lever can be set to any one of three positions: LOAD, SHEET or FORMS.

---NOTE---
Ensure the carriage is at the extreme left margin before moving the forms lever.

Load—In this position either fanfold forms or cut sheet forms can be loaded into the printer.

Sheet—In this position the printer is set-up to handle cut sheet (non-tractor type) forms.

Forms—In this position, the printer is set-up to handle continuous fanfold forms.

PAPER EMPTY SWITCH—Detects a paper empty condition, automatically stopping the printer and sounding the audio alarm.

PRINT HEAD ADJUSTMENT LEVER—Adjusts the print head in or out for optimum print quality.

AUDIO ALARM—Sounds a one second tone on a paper empty condition, fault condition, receipt of a BEL code, or when the **SET TOF** switch, **ENTER** key, or **CLEAR** key is pressed.
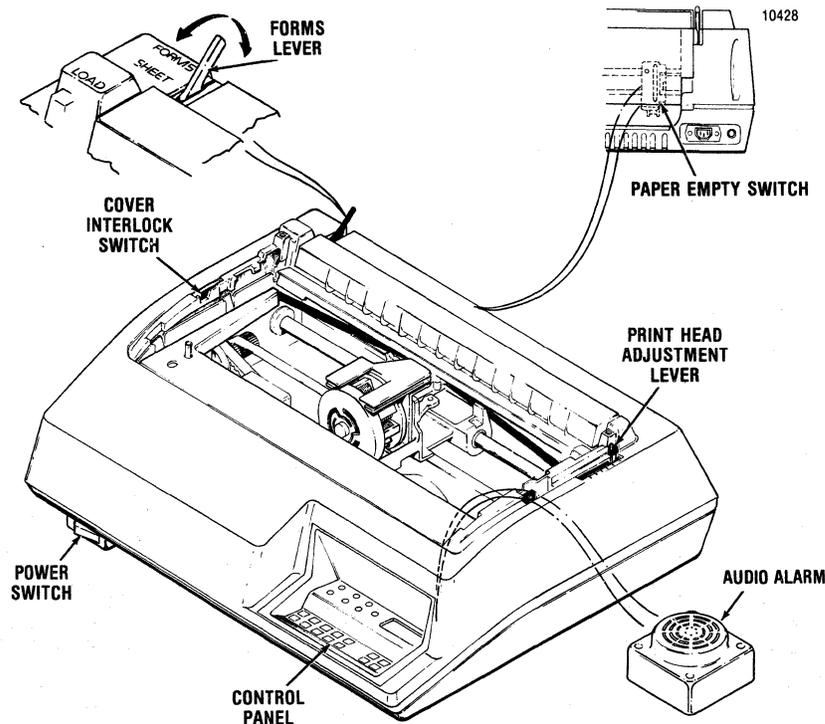

Figure 1-1 Printer Mechanism Controls and Switches

1.3 CONTROL PANEL SWITCHES AND INDICATORS

The control panel switches set specific features in the printer. All switches are membrane switches which are activated by lightly pressing the switch. Figure 1-2 illustrates the control panel switches and indicators and a brief description of each switch and indicator is provided below:

CONTROL PANEL SWITCHES

ON LINE Depending on the printer interface the **ON LINE** switch performs one of two functions as described below.

Parallel Interface—Alternately selects or deselects the printer as indicated by the **ON LINE** and **SELECT** indicators.

Serial Interface—Alternately places the printer on line or local as indicated by the **ON LINE** indicator.

SET TOF Sets the current print line as the top of form.

MULTIPASS Starts or stops multipass printing as indicated by the **MULTIPASS** indicator. Multipass printing will always be bidirectional on power-up of the printer. Unidirectional multipass printing has to be designated by escape sequence once the printer is selected.

```
─────────── NOTE ───────────
The MULTIPASS switch is inhibited, if the printer is in
the graphics mode.
```

CUT SHEET MODE Places the printer either in or out of the cut sheet mode as indicated by the **CUT SHEET** indicator.

PAPER FWD Advances fanfold paper forward in steps of 1/120 an inch and cut sheet forms in steps of 1/108 an inch. If the switch is pressed for longer than 1/2 second, paper moves forward until the switch is released.

PAPER REV Performs the same function as the **PAPER FWD** switch except it moves paper in the reverse direction.

```
─────────── NOTE ───────────
Fanfold forms should not be reversed more than one
half inch as paper handling problems may occur.
```

CUT SHEET INSERT When in the cut sheet mode, loads the sheet into the printer.

OVRD TEST The **OVRD TEST** performs one of two functions as described below:

OVERRIDE FUNCTION—When the printer has automatically deselected on a paper empty condition, holding the **OVRD TEST** switch depressed and selecting the printer (see note below) allows the printer to continue printing to the end of the form.

TEST FUNCTION—When the printer is deselected and loaded with paper, pressing the **OVRD TEST** switch activates the self-test feature. Test data is continuously printed as long as the switch is pressed. Refer to paragraph 4.3 for the self-test feature.

10461
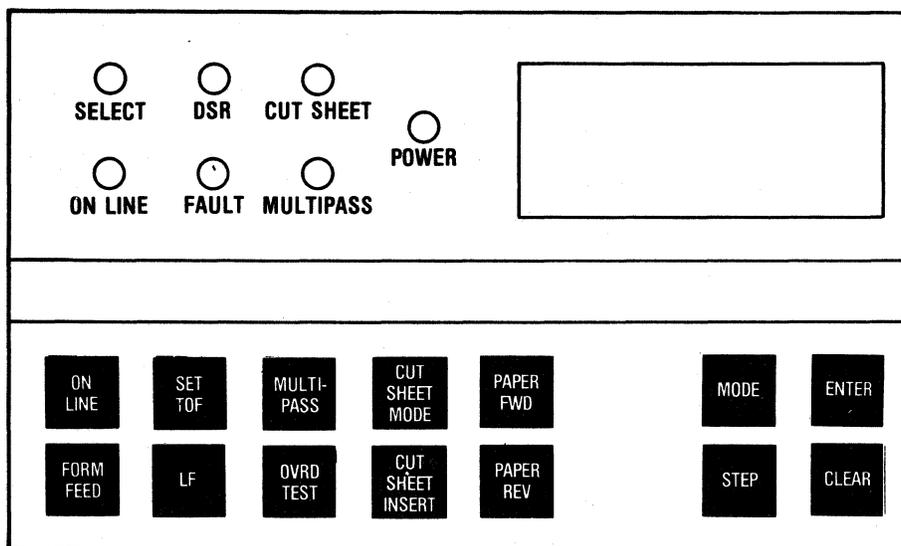
Figure 1-2 Control Panel Switches and Indicators

> **— NOTE —**
> *If the serial interface is used the **OVRD TEST** switch selects and deselects the printer following a paper empty condition. The printer remains on line in this condition.*

LF Advances the paper forward one line. If the switch is pressed for longer than ½ second, line feeds are repeated until the switch is released.

FORM FEED Advances the form to the next top of form.

CONTROL PANEL INDICATORS

> **— NOTE —**
> *When any of the following indicators are lit, that particular function is selected.*

SELECT—The **SELECT** indicator performs one of two functions as described below:

Parallel Interface—**SELECT** indicator follows the **ON LINE** indicator.

Serial Interface—**SELECT** indicator is controlled by the **OVRD TEST** switch. When lit, printer is selected and printing can occur. When extinguished, printer is deselected and no printing can occur.

DSR—Indicates the state of the modem Data Set Ready (DSR) line. Indicator is lit if DSR signal line is at +V or not connected to the data set.

CUT SHEET—Indicates the printer is in the cut sheet mode.

POWER—Indicates power is applied to printer circuits.

MULTIPASS—Indicates the multipass feature is enabled.

FAULT—Indicates a paper empty condition or printer malfunction.

ON LINE—Indicates the printer is on line.

CONTROL PANEL KEYBOARD AND DISPLAY—Located to the right of the control panel is a 4 switch keypad and liquid crystal display (LCD). A brief description of the keypad is provided below. A detailed description of the operation and function of the keypad and display is provided in Section 2.

MODE Increments the display through the available features.

STEP Steps to the next available selection within a feature.

ENTER Enters the displayed feature as the current configured feature.

CLEAR Clears the current displayed feature to the feature stored in the permanent memory.

SECTION 2
SELECTING PRINTER FEATURES/CONFIGURATIONS

2.1 GENERAL

This section provides step-by-step procedures for the selection of specific printer features and configurations using the control panel keypad and display. The section is divided into the operation keypad and display, description and selection of printer features, description and selection of configuration modes, and the Centronics factory settings. Simplified tear-out operator reference cards defining all the features and configurations are provided at the end of this section.

2.2 OPERATING THE KEYPAD AND DISPLAY

Figure 2-1 illustrates the 4-key keypad and display. Following the illustration is a detailed description of each key and the display.
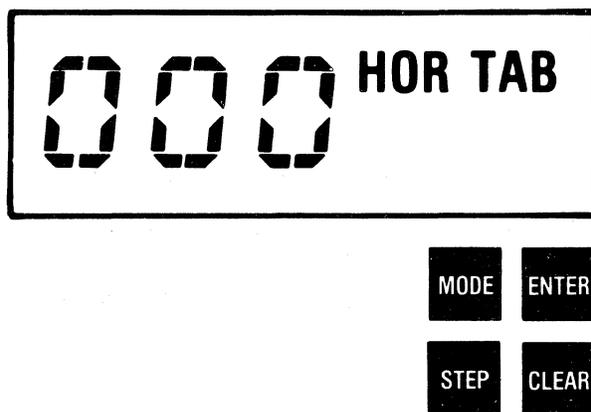
Figure 2-1 Keypad and Display

DISPLAY—The three digit liquid crystal display (LCD) displays the features and configurations. The LCD is blank during normal operation of the printer. The legends for the specific features and the sequence in which they are displayed are as follows:

LEGEND	FEATURE
HOR TAB	HORIZONTAL TAB
VER TAB	VERTICAL TAB
FORMS L	FORMS LENGTH
CPI	CHARACTERS PER INCH
LPI	LINES PER INCH
COUNTRY	COUNTRY CHARACTER SET
AUTO LF	AUTOMATIC LINE FEED
VER MAR	VERTICAL MARGIN
ALARM	AUDIO ALARM
MEMORY	MEMORY
CONFIG	CONFIGURATION

MODE The **MODE** key increments the LCD through the printer features. When pressed after powering up the printer, the **MODE** key causes the first feature "**HOR TAB**" to display on the LCD. To increment the display to the next feature the **MODE** key is pressed again. The displayed feature on the LCD is the current operating feature.

STEP The **STEP** key steps the display to the next available selection within a feature.

ENTER The **ENTER** key is pressed when the displayed feature is to be entered as the current operating feature.

CLEAR The **CLEAR** key, when pressed, clears certain displayed features to the feature stored in the permanent memory.

2.3 DESCRIPTION/SELECTION PRINTER FEATURES

The following paragraphs provide a description of the printer features and how to verify, clear, and enter a feature. When a printer is first installed and powered-up, the factory settings are the features selected (refer to paragraph 2.5). The configuration feature is described in detail in paragraph 2.4.

FEATURE—HORIZONTAL TAB

The Model 353 has 218 possible horizontal tab stops, one for each column. Tab stops are associated with column numbers, not physical positions on the form. Therefore, changing characters per inch (CPI) changes the physical position of tab stops.

```
000  HOR TAB
```

HORIZONTAL TAB SELECTION

000 to 218

| MODE | ENTER |
| STEP | CLEAR |

TO VERIFY HORIZONTAL TABS

1. Press **MODE** key until "**HOR TAB**" legend is visible.

2. Press **STEP** key to increment the display until the first set horizontal tab position is encountered.

3. To locate additional set tabs press the **STEP** key again to increment the display to the next set tab. Repeat this procedure until the display returns to 000.

4. To set new horizontal tabs clear the existing tabs and set new tabs as described below.

TO CLEAR HORIZONTAL TABS

1. Press the **STEP** key to the horizontal tab position to be cleared.

2. Press the **CLEAR** key to clear the tab.

3. To clear all currently set horizontal tabs press the **CLEAR** key with 000 displayed.

TO ENTER HORIZONTAL TABS

1. Press the **STEP** key to increment the displayed count to the required horizontal tab position.

2. Once the required tab position is displayed press the **ENTER** key to set the horizontal tab.

3. For each additional tab press the **STEP** key to the required position and then press the **ENTER** key.

FEATURE—VERTICAL TAB

The Model 353 has 192 vertical tab stops which are set and cleared similar to horizontal tabs. Vertical tabs are associated with specific line numbers, not physical positions on the form. Therefore, changing lines per inch (lpi) changes the physical position of vertical tabs.

VERTICAL TAB SELECTION

000 to 192

MODE	ENTER
STEP	CLEAR

TO VERIFY VERTICAL TABS

1. Press **MODE** key until **"VER TAB"** legend is visible.

2. Press **STEP** key to increment the display until the first set vertical tab position is encountered.

3. To locate additional set tabs press the **STEP** key again to increment the display to the next set tab. Repeat this procedure until the display returns to 000.

4. To set new vertical tabs clear the existing tabs and set new tabs as described below.

TO CLEAR VERTICAL TABS

1. Press the **STEP** key to the vertical tab position to be cleared.

2. Press the **CLEAR** key to clear the tab.

3. To clear all currently set vertical tabs press the **CLEAR** key with 000 displayed.

TO ENTER VERTICAL TABS

1. Press the **STEP** key to increment the displayed count to the required vertical tab position.

2. Once the required tab position is displayed press the **ENTER** key to set the vertical tab.

3. For each additional tab press the **STEP** key to the required position and then press the **ENTER** key.

FEATURE—FORMS LENGTH

Forms may be from 1 to 192 lines in length. Form length is defined in lines, not physical units. Therefore, changing the lines per inch (lpi) changes the form length. To determine your form length, measure the length of the form in inches, then multiply the length of your form by the selected lpi.

FORMS LENGTH = FORM LENGTH IN INCHES × SELECTED LPI

Table 2-1 below lists some of the selectable form lengths.

TO VERIFY FORM LENGTH
1. Press **MODE** key until "FORMS L" legend and current form length is displayed.

2. To change the current form length perform the procedure described below.

TO ENTER FORM LENGTH
1. Press the **STEP** key to increment the display to the required form length.

2. Press the **ENTER** key to set the new form length.

$$\begin{array}{|c|} \hline 00\ l\ \text{FORMS L} \\ \hline \end{array}$$
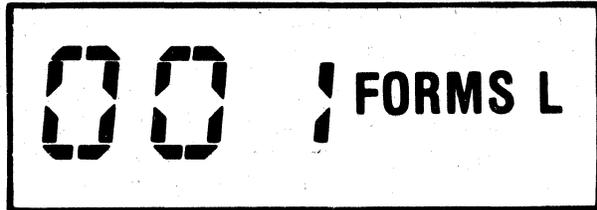
FORM LENGTH SELECTION

001 to 192

| MODE | ENTER |
| STEP | CLEAR |

Table 2-1 Selectable Form Lengths

FORM LENGTH	LINES PER INCH SELECTED				
INCHES	3	4	6	8	12
3	9	12	18	24	36
4	12	16	24	32	48
6	18	24	36	48	72
7	21	28	42	56	84
8	24	32	48	64	96
11	33	44	66	88	132
12	36	48	72	96	144
14	42	56	84	112	168

FEATURE—CHARACTERS PER INCH

Characters per inch (cpi) determines the width of printed characters as well as their spacing. Changing cpi is only allowed at the start of a line. The feature is used to save paper as a higher cpi prints more characters per line.

TO VERIFY CHARACTERS PER INCH

1. Press the **MODE** key until the "CPI" legend and current cpi value is displayed.

2. To change the current cpi value perform the procedure described below.

TO ENTER CHARACTERS PER INCH

1. Press the **STEP** key to increment the display to the required cpi value.

2. Press the **ENTER** key to set the new cpi value.

I 0   CPI

CHARACTERS PER INCH SELECTION

MODE ENTER
STEP CLEAR

LCD	SELECTION
10	10
12	12
13.2	13.2
15	15
16.5	16.5

FEATURE—LINES PER INCH

Lines per inch (lpi) determines the spacing between lines, not the height of printed characters. Changing lpi also changes vertical margins.
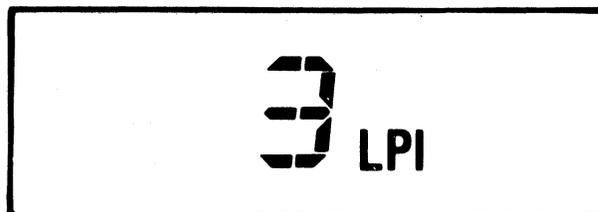
TO VERIFY LINES PER INCH

1. Press the **MODE** key until the "LPI" legend and current lpi value is displayed.

2. To change the current lpi value perform the procedure described below.

TO ENTER LINES PER INCH

1. Press the **STEP** key to increment the display to the required lpi value.

2. Press the **ENTER** key to set the new lpi value.

3 LPI

LINES PER INCH SELECTION

MODE ENTER
STEP CLEAR

LCD	SELECTION
3	3
4	4
6	6
8	8
12	12

FEATURE—COUNTRY CHARACTER SET

This feature allows the Model 353 to print eight different international character sets. The standard is a 7×8 dot matrix set of 96 US ASCII characters.

TO VERIFY COUNTRY CHARACTER SET
1. Press the **MODE** key until the "COUNTRY" legend and current country character set is displayed.

2. To change the character set perform the procedure described below.

TO ENTER COUNTRY CHARACTER SET
1. Press the **STEP** key to increment the display to the required country character set.

2. Press the **ENTER** key to set the new country character set.
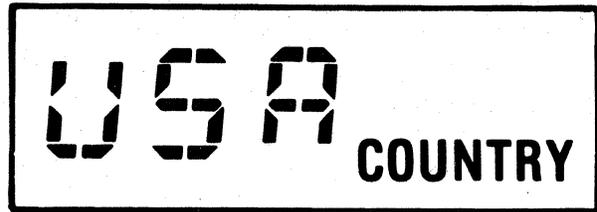
USA COUNTRY

COUNTRY CHARACTER SET SELECTION

MODE ENTER

STEP CLEAR

LCD	SELECTION
USA	USA
FR	FRANCE
UK	UNITED KINGDOM
GER	GERMANY
ITL	ITALY
S/F	SWEDEN/FINLAND
D/N	DENMARK/NORWAY
ESP	SPAIN

FEATURE—AUTO LINE FEED

If the auto line feed feature is enabled, a line feed is performed on receipt of a carriage return (CR) code or at the end of printing a line. If the CR code is the first character in the buffer the carriage return code is ignored.

TO VERIFY AUTO LINE FEED
1. Press the **MODE** key until the "AUTO LF" legend and current line feed selection is visible.

2. To change the line feed selection perform the procedure described below.

TO ENTER AUTO LINE FEED
1. Press the **STEP** key to the required line feed setting. Display will switch between "1" and "0".

2. Press the **ENTER** key to enter the new line feed selection.

AUTO LF

AUTO LINE FEED SELECTION

MODE ENTER

STEP CLEAR

LCD	SELECTION
1	ENABLED
0	DISABLED

FEATURE—VERTICAL MARGINS

The vertical margin feature specifies the top and bottom margins on the form. The following must be true to set vertical margins:
$1 \leq$ top margin $<$ bottom margin $\leq$ form length.
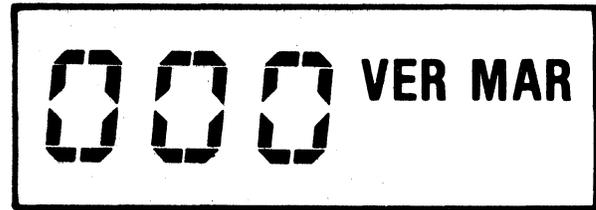
TO VERIFY VERTICAL MARGINS
1. Press **MODE** key until "VER MAR" legend is displayed.

2. Press the **STEP** key until the current top margin is displayed.

3. To verify the bottom margin press the **ENTER** key, then press the **STEP** key which will increment the display to the bottom margin.

4. To set new vertical margins clear the existing margins and set new margins as described below.

TO CLEAR VERTICAL MARGINS
1. To clear vertical margins press the **CLEAR** key with 000 displayed which sets the top margin to line 1 and the bottom margin to the form length.

TO ENTER VERTICAL MARGINS
1. Press the **STEP** key to increment the display to the required top margin.

2. Press the **ENTER** key.

3. Press the **STEP** key to increment the display to the required bottom margin.

4. Press the **ENTER** key which causes 000 to be displayed. Top and bottom margins are now entered.

VERTICAL MARGIN SELECTION

000 to 192

MODE ENTER
STEP CLEAR

FEATURE—AUDIO ALARM

The audio alarm, when enabled, sounds a one second tone on a paper empty condition, fault condition, receipt of a BEL code, or setting the top of form, or pressing the **ENTER** or **CLEAR** keys.

TO VERIFY AUDIO ALARM
1. Press the **MODE** key until the "ALARM" legend and current audio alarm selection is visible.

2. To change the audio alarm selection perform the procedure described below.

TO ENTER AUDIO ALARM
1. Press the **STEP** key to the required audio alarm setting. Display will switch between "1" and "0".

2. Press the **ENTER** key to enter the new audio alarm selection.

```
                          ┌─────────────────┐
                          │   ▮             │
                          │   ▮    ALARM    │
                          └─────────────────┘
```

AUDIO ALARM SELECTION

MODE	**ENTER**
STEP	**CLEAR**

LCD SELECTION
1   ENABLED
0   DISABLED

FEATURE—MEMORY

The Model 353 contains two memories: a permanent memory which stores the selected features and configurations when the printer is powered down and an operating memory which contains the present operating features and configurations.

When the memory feature is entered the "MEMORY" legend is visible and the display is blank. By pressing the **ENTER** key the operator can store the present operating features and configurations into the permanent memory.

The operator can also recall the features and configurations in the permanent memory by pressing the **CLEAR** key. This will copy the permanent memory into the operating memory.

```
                          ┌─────────────────┐
                          │                 │
                          │     MEMORY      │
                          └─────────────────┘
```
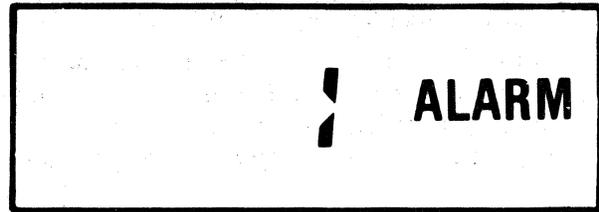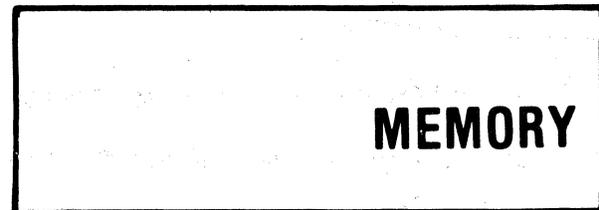
NOTE
NUMERIC DISPLAY IS BLANK IN THE MEMORY FEATURE.

MODE	**ENTER**
STEP	**CLEAR**

2.4 CONFIGURATION FEATURE

The last feature in the sequence is the configuration feature. There are a total of fifteen configurations which are basically the operating set-up features and are not intended to be changed frequently. Once the configuration feature is entered the **CONFIG** legend is displayed. However, there are no legends for individual configuration selections. The individual configurations and their function codes are displayed in the following sequence:

FUNCTION CODE	CONFIGURATION
—	Baud Rate
1	Serial/Parallel
2	Data Bits
3	Parity
4	Buffer Status
5	Printer Status
6	Reverse Channel Polarity
7	Reserved
8	Reserved
9	Inverted Data Strobe
10	Inverted Data Bit 8
11	Bit 8 Control
12	703/ANSI
13	Prime on Select
14	Prime on Delete
15	Print on Paper Motion
16	Page Mode Enable

---NOTE---
Function codes 7 and 8 will appear on the display but are reserved.

ENTERING THE CONFIGURATION FEATURE—To enter into the configuration feature the **OVRD TEST** switch is pressed anytime the printer features (**HOR TAB, VER TAB**, etc) are displayed. The **CONFIG** legend and current baud rate (first available configuration) is then displayed. The **MODE** and **STEP** keys are then used to choose the available selections within a configuration just as in selecting printer features.

EXITING THE CONFIGURATION FEATURE—To exit the configuration feature the configurations can be stepped through using the **MODE** key until the last configuration, Page Mode, is displayed. Pressing the **MODE** key again causes the configuration feature to be exited and the first printer feature **HOR TAB** to be displayed.

A second way of exiting the configuration feature is to press the **ON LINE** switch while the configuration feature is selected. This causes the display to become blank and the configuration feature is exited.

The following paragraphs provide a description of the configurations and how to verify, clear, and enter a configuration. When a printer is first installed and powered up, the factory settings are the configurations selected (refer to paragraph 2.5).

CONFIGURATION—BAUD RATE

Baud rate is the speed at which data is transmitted to and from the printer. A large selection of baud rates is available to communicate with the many different systems.

TO VERIFY BAUD RATE SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. The **CONFIG** legend and current baud rate selection is now displayed.

3. To change the baud rate perform the procedure described below.

TO ENTER BAUD RATE SELECTION

1. Press the **STEP** key to increment the display to the desired baud rate.

2. Press the **ENTER** key to enter the desired baud rate.

```
960  CONFIG
```
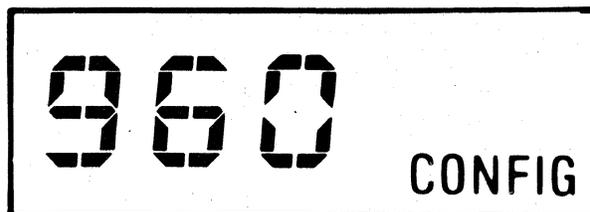
BAUD RATE SELECTION

LCD	SELECTION
5	50
7	75
11	110
13	134.5
15	150
30	300
60	600
120	1,200
180	1,800
200	2,000
240	2,400
360	3,600
720	7,200
960	9,600
192	19,200

MODE ENTER
STEP CLEAR

CONFIGURATION—SERIAL/PARALLEL SELECTION

This set-up feature selects the configuration in which the printer will receive characters.

TO VERIFY SERIAL/PARALLEL SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "1" and current serial/parallel selection is displayed.

3. To change the serial/parallel selection perform the procedure described below.

TO ENTER SERIAL/PARALLEL SELECTION

1. Press the **STEP** key to increment the display to the required serial/parallel selection. Display will toggle between "1" and "0".

2. Press the **ENTER** key to set the required serial/parallel selection.

```
1  0  CONFIG
```
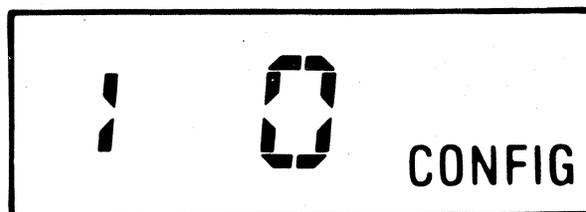
SERIAL/PARALLEL SELECTION

LCD	SELECTION
1	SERIAL
0	PARALLEL

MODE ENTER
STEP CLEAR

CONFIGURATION—DATA BITS

This set-up feature selects the serial character length.

TO VERIFY DATA BIT SELECTION
1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "2" and current data bit selection is displayed.

3. To change the data bit selection perform the procedure described below.

TO ENTER DATA BITS SELECTION
1. Press the **STEP** key to increment the display to the required data bit selection.

2. Press the **ENTER** key to enter the required data bit selection.
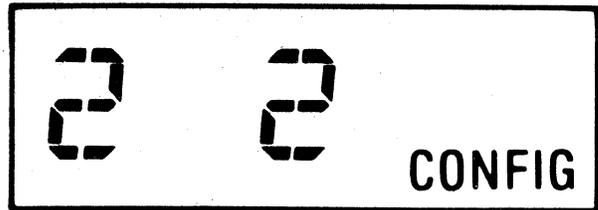
DATA BIT SELECTION

LCD	SELECTION
0	5 BITS
1	6 BITS
2	7 BITS
3	8 BITS

MODE	ENTER
STEP	CLEAR

CONFIGURATION—PARITY

Parity allows the serial data to be monitored and thus verifies correct data. If an error in transmission occurs, the printer detects the error and prints @.

TO VERIFY PARITY SELECTION
1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "3" and current parity selection is displayed.

3. To change the parity selection perform the procedure described below.

TO ENTER PARITY SELECTION
1. Press the **STEP** key to increment the display to the required parity selection.

2. Press the **ENTER** key to set the required parity selection.
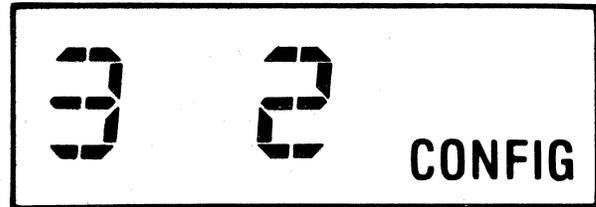
PARITY SELECTION

LCD	SELECTION
0	NONE (Disabled)
1	ODD
2	NONE
3	EVEN

MODE	ENTER
STEP	CLEAR

CONFIGURATION—BUFFER STATUS

This set-up feature selects the configuration to report the buffer status while in serial communications. The status is indicated by one of four selections; reverse channel (RC), data terminal ready (DTR), transmitted data (X-ON/X-OFF), and no status returned. Table 2-2 below indicates the buffer status for each configuration.

TO VERIFY BUFFER STATUS SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "**4**" and current buffer status is displayed.

3. To change the buffer status selection perform the procedure described below.

TO ENTER BUFFER STATUS SELECTION

1. Press the **STEP** key to increment the display to the required buffer status selection.

2. Press the **ENTER** key to set the required buffer status.

CONFIG

BUFFER STATUS SELECTION

LCD	SELECTION
0	NONE
1	REVERSE CHANNEL
2	DTR
3	X-ON/X-OFF

MODE ENTER

STEP CLEAR
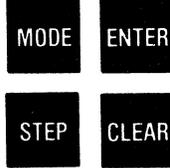
Table 2-2 Buffer Status

CONFIGURATION	STATUS	INDICATION
BUFFER STATUS	BUFFER FULL	REVERSE CHANNEL
	BUFFER EMPTY	Dependent on the selection of reverse channel polarity.
BUFFER STATUS	BUFFER FULL	DTR Active High
	BUFFER EMPTY	DTR Active Low
BUFFER STATUS	BUFFER FULL	X-OFF
	BUFFER EMPTY	X-ON
BUFFER STATUS	BUFFER FULL	NONE
	BUFFER EMPTY	NONE

CONFIGURATION—PRINTER STATUS

This set-up feature selects the configuration to report the printer status while in serial communications. The status is indicated by one of four selections; reverse channel (RC), data terminal ready (DTR), transmitted data (X-ON/X-OFF), and no status returned. Table 2-3 below indicates the printer status for each configuration.
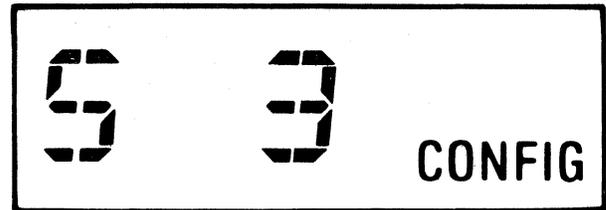
TO VERIFY PRINTER STATUS SELECTION
1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "5" and current printer status is displayed.

3. To change the printer status selection perform the procedure described below.

TO ENTER PRINTER STATUS SELECTION
1. Press the **STEP** key to increment the display to the required printer status selection.

2. Press the **ENTER** key to set the required printer status.

5   3   CONFIG

PRINTER STATUS SELECTION

| MODE | ENTER |
| STEP | CLEAR |

LCD	SELECTION
0	NONE
1	REVERSE CHANNEL
2	DTR
3	X-ON/X-OFF

Table 2-3 Printer Status

CONFIGURATION	STATUS	INDICATION
PRINTER STATUS	SELECT	REVERSE CHANNEL
	DESELECT OR PAPER EMPTY	Dependent on the selection of reverse channel polarity.
PRINTER STATUS	SELECT	DTR Active High
	DESELECT OR PAPER EMPTY	DTR Active Low
PRINTER STATUS	SELECT	X-ON
	DESELECT OR PAPER EMPTY	X-OFF
PRINTER STATUS	SELECT	NONE
	DESELECT OR PAPER EMPTY	NONE

CONFIGURATION—REVERSE CHANNEL POLARITY

This set-up feature sets the busy state of reverse channel polarity at either active low or active high.

TO VERIFY REVERSE CHANNEL POLARITY SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "6" and current reverse channel polarity selection is displayed.

3. To change the reverse channel polarity selection perform the procedure described below.

TO ENTER REVERSE CHANNEL POLARITY SELECTION

1. Press the **STEP** key to increment the display to the required reverse channel polarity selection.

2. Press the **ENTER** key to set the required reverse channel polarity selection.

CONFIGURATION—INVERTED DATA STROBE

This configuration selects the level (normal or inverted) of data strobe which transfers the incoming parallel data into the printer.

TO VERIFY INVERTED DATA STROBE SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "9" and current inverted data strobe selection is displayed.

3. To change the inverted data strobe selection perform the procedure described below.

TO ENTER INVERTED DATA STROBE SELECTION

1. Press the **STEP** key to increment the display to the required inverted data strobe selection.

2. Press the **ENTER** key to set the required inverted data strobe selection.

6 1 CONFIG

REVERSE CHANNEL POLARITY SELECTION

MODE ENTER
STEP CLEAR
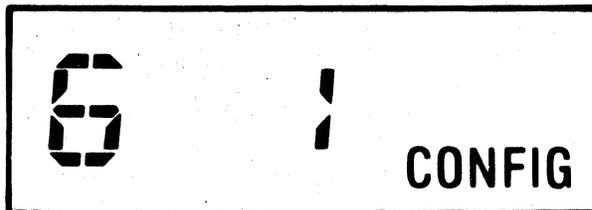
LCD	SELECTION
0	ACTIVE LOW
1	ACTIVE HIGH

9 0 CONFIG

INVERTED DATA STROBE SELECTION

MODE ENTER
STEP CLEAR
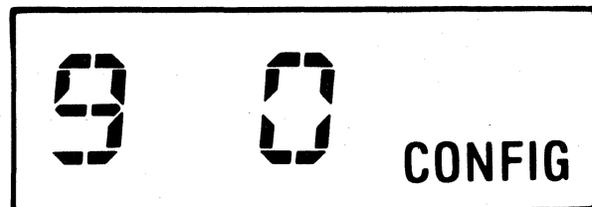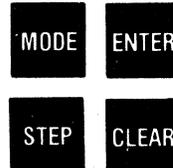
LCD	SELECTION
0	NORMAL
1	INVERTED

CONFIGURATION—INVERTED DATA BIT 8

This feature sets bit 8 to select the alternate character set or to be ignored.

TO VERIFY INVERTED DATA BIT 8 SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "**10**" and current inverted data bit 8 selection is displayed.

3. To change the inverted data bit 8 selection perform the procedure described below.

TO ENTER INVERTED DATA BIT 8 SELECTION

1. Press the **STEP** key to increment the display to the required inverted data bit 8 selection. Display will switch between "**0**" and "**1**".

2. Press the **ENTER** key to set the required inverted data bit 8 selection.

```
 1 0 0          CONFIG
```

INVERTED DATA BIT 8 SELECTION

| MODE | ENTER |
| STEP | CLEAR |
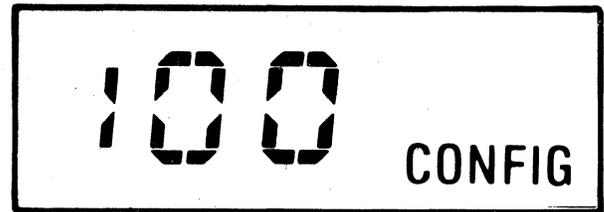
LCD SELECTION
0   NORMAL
1   INVERTED

CONFIGURATION—BIT 8 CONTROL

This feature controls bit 8 in the printer. If set to Escape Control of bit 8, bit 8 is controlled by ESC 3, ESC and/or SO/SI and is used for character set selection.

TO VERIFY BIT 8 CONTROL SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "**11**" and current bit 8 control selection is displayed.

3. To change the bit 8 control selection perform the procedure described below.

```
 1 1 1          CONFIG
```

BIT 8 CONTROL SELECTION

| MODE | ENTER |
| STEP | CLEAR |

LCD SELECTION
0   IGNORE BIT 8
1   NORMAL CONTROL
2   ESCAPE CONTROL
3   NORMAL CONTROL

TO ENTER BIT 8 CONTROL SELECTION

1. Press the **STEP** key to increment the display to the required bit 8 control selection.

2. Press the **ENTER** key to set the required bit 8 control selection.

CONFIGURATION—703/ANSI

This set-up feature selects the configuration in which control codes are interpreted. Some control codes are acknowledged in 703 mode only, some in the ANSI mode and others in both the 703 and ANSI mode. (See Tables 10-1 and 10-2).

TO VERIFY 703/ANSI SELECTION
1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "12" and current 703/ANSI selection is displayed.

3. To change the 703/ANSI selection perform the procedure described below.

TO ENTER 703/ANSI SELECTION
1. Press the **STEP** key to increment the display to the required 703/ANSI selection.

2. Press the **ENTER** key to set the required 703/ANSI selection.

703/ANSI SELECTION

LCD	SELECTION
0	703
1	ANSI

MODE ENTER

STEP CLEAR

CONFIGURATION—PRIME ON SELECT

When prime on select is enabled and the printer is selected, the print head is returned to the left margin and input buffer cleared.

TO VERIFY PRIME ON SELECT SELECTION
1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "13" and current prime on select selection is displayed.

3. To change the prime on select selection perform the procedure described below.

TO ENTER PRIME ON SELECT SELECTION
1. Press the **STEP** key to increment the display to the required prime on select selection. Display will switch between "0" and "1".

2. Press the **ENTER** key to set the required prime on select selection.

PRIME ON SELECT SELECTION

LCD	SELECTION
0	DISABLED
1	ENABLED

MODE ENTER

STEP CLEAR

CONFIGURATION—PRIME ON DELETE

When prime on delete is enabled and a delete code (DEL) is received, the print head is returned to the left margin and the input buffer cleared.

TO VERIFY PRIME ON DELETE SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "14" and current prime on delete selection is displayed.

3. To change the prime on delete selection perform the procedure described below.

TO ENTER PRIME ON DELETE SELECTION

1. Press the **STEP** key to increment the display to the required prime on delete selection. Display will switch between "0" and "1".

2. Press the **ENTER** key to set the required prime on delete selection.

```
1 4 0        CONFIG
```

PRIME ON DELETE SELECTION

| MODE | ENTER |
| STEP | CLEAR |

LCD	SELECTION
0	DISABLED
1	ENABLED

CONFIGURATION-PRINT ON PAPER MOTION

Print on paper motion can be configured one of three ways. An example of each is shown below:

DATA SENT: A ◄LF► B ◄LF► C ◄CR

1. Paper motion does not cause print

◄LINE FEED►
◄LINE FEED►
ABC

2. Paper motion causes print with carriage return

A
B
C

3. Paper motion causes print without carriage return

A
  B
    C

TO VERIFY PRINT ON PAPER MOTION SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "15" and current print on paper motion selection is displayed.

3. To change the print on paper motion selection perform the procedure described below.

```
1 5 2        CONFIG
```

PRINT ON PAPER MOTION SELECTION

| MODE | ENTER |
| STEP | CLEAR |

LCD	SELECTION
0	PAPER MOTION DOES NOT CAUSE PRINT
1	PAPER MOTION CAUSES PRINT WITH CR
2	PAPER MOTION CAUSES PRINT WITH NO CR
3	PAPER MOTION DOES NOT CAUSE PRINT

TO ENTER PRINT ON PAPER MOTION SELECTION

1. Press the **STEP** key to increment the display to the required print on paper motion selection.

2. Press the **ENTER** key to set the required print on paper motion selection.

CONFIGURATION—PAGE MODE ENABLE

The page mode configuration, when enabled, allows the printer to receive up to 4096 characters after a "STX" code and before an "ETX" code including control codes without going busy. The page mode is used for graphics data or a high speed page dump.

TO VERIFY PAGE MODE SELECTION

1. Enter into the configuration mode by pressing the **OVRD TEST** switch on the control panel.

2. Press the **MODE** key until the function code "16" and current page mode selection is displayed.

3. To change the page mode selection perform the procedure described below.

TO ENTER PAGE MODE SELECTION

1. Press the **STEP** key to increment the display to the required page mode selection. Display will switch between "0" and "1".

2. Press the **ENTER** key to set the required page mode selection.

```
 16 1           CONFIG
```

PAGE MODE SELECTION

MODE	ENTER
STEP	CLEAR
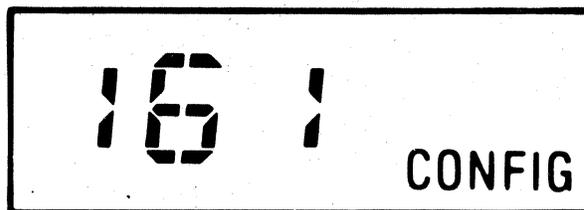
LCD	SELECTION
0	DISABLED
1	ENABLED
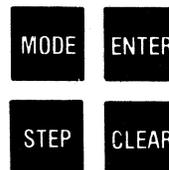
2.5 FACTORY SETTINGS

The printer is shipped from Centronics with the following features/configurations selected.

Table 2-4 Factory Settings

FEATURE	SELECTION
Horizontal Tab	16 Tabs Spaced Every 8 Characters
Vertical Tab	11 Tabs Spaced Every 6 Lines
Forms Length	66 Lines
Characters Per Inch	10 CPI
Lines Per Inch	6 LPI
Country Character Set	USA
Auto Line Feed	Disabled
Vertical Margin	Top Margin—Line 1; Bottom Margin—Line 66
Alarm	Enabled
CONFIGURATION	**SELECTION**
Baud Rate	9600 Baud
Serial/Parallel	Parallel
Data Bits	7 Data Bits
Parity	None
Buffer Status	X-ON/X-OFF
Printer Status	X-ON/X-OFF
Reverse Channel Polarity	Active High
Inverted Data Strobe	Normal
Inverted Data Bit 8	Normal
Bit 8 Control	Normal
703/ANSI	703 Compatible
Prime on Select	Disabled
Prime on Delete	Disabled
Print on Paper Motion	Print With No Carriage Return
Page Mode	Enabled

OPERATOR REFERENCE CARD
PRINTER FEATURES

```
000 HOR TAB
```

```
MODE  ENTER
STEP  CLEAR
```

KEYPAD AND LCD

FEATURE	STEP	ENTER	CLEAR	NOTES
HORIZONTAL TAB `000 HOR TAB`	000-218	Press STEP key to the required horizontal tab position, then press ENTER key.	Press STEP key to horizontal tab position to be cleared, then press CLEAR key. To clear all current horizontal tabs press CLEAR key with 000 displayed.	Position of horizontal tabs change when changing characters per inch (cpi).
VERTICAL TAB `000 VER TAB`	000-192	Press STEP key to the required vertical tab position, then press ENTER key.	Press STEP key to vertical tab position to be cleared, then press CLEAR key. To clear all current vertical tabs press CLEAR key with 000 displayed.	Position of vertical tabs change when changing lines per inch (lpi).
FORMS LENGTH `001 FORMS L`	001-192	Press STEP key to the required forms length, then press ENTER key.	Entering new form length clears previous form length.	Form length changes when changing lines per inch (lpi).
CHARACTERS PER INCH `10 CPI`	LCD SELECTION 10 10 cpi 12 12 cpi 13.2 13.2 cpi 15 15 cpi 16.5 16.5 cpi	Press STEP key to the required CPI selection, then press ENTER key.	Entering new CPI selection clears previous selection.	Changing CPI is only allowed at the start of a line.
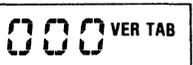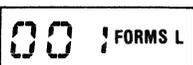
OPERATOR REFERENCE CARD
PRINTER FEATURES

```
 ꓱ LPI
```

MODE ENTER
STEP CLEAR

KEYPAD AND LCD

FEATURE	STEP	ENTER	CLEAR	NOTES
LINES PER INCH `ꓱ LPI`	**LCD SELECTION** 3 — 3 Lines per Inch 4 — 4 Lines per Inch 6 — 6 Lines per Inch 8 — 8 Lines per Inch 12 — 12 Lines per Inch	Press STEP key to required LPI selection, then, press ENTER key.	Entering new LPI selection clears previous selection.	Changing lpi changes form length, position of vert. tabs & clears vert. marg.
COUNTRY `USA COUNTRY`	**LCD SELECTION** USA — USA FR — France UK — United Kingdom GER — Germany ITL — Italy S/F — Sweden/Finland D/N — Denmark/Norway ESP — Spain	Press STEP key to the required country selection, then press ENTER key.	Entering new country selection clears previous selection.	
AUTO LINE FEED `! AUTO LF`	1 = Enabled 0 = Disabled	Press STEP key to either enable (1) or disable (0) auto line feed, then press ENTER key at required selection.	Entering new auto line feed selection clears previous selection.	If enabled performs action selected in print on paper motion configuration.
VERTICAL MARGIN `000 VER MAR`	000-192	REFER TO SECTION 2, MODEL 353 USERS MANUAL.		
AUDIO ALARM `! ALARM`	1 = Enabled 0 = Disabled	Press STEP key to either enable (1) or disable (0) audio alarm, then press ENTER key at required selection.	Entering new audio alarm selection clears previous selection.	Alarm sounds for 1 second.
MEMORY `MEMORY`	REFER TO SECTION 2, MODEL 353 USERS MANUAL.			Display is blank in memory feature.

OPERATOR REFERENCE CARD
PRINTER CONFIGURATIONS

```
┌─────────────────┐
│   5   CONFIG    │
└─────────────────┘
```

[MODE] [ENTER]
[STEP] [CLEAR]

KEYPAD AND LCD

CONFIGURATION	STEP	ENTER	CLEAR
BAUD RATE `960 CONFIG`	**LCD SELECTION** 5 50 7 75 11 110 13 134.5 15 150 30 300 60 600 120 1,200 180 1,800 200 2,000 240 2,400 360 3,600 720 7,200 960 9,600 192 19,200	Press [STEP] key to the required Baud Rate selection, then press [ENTER] key.	Entering new Baud Rate selection clears previous selection.
SERIAL/PARALLEL `1 0 CONFIG`	1 = SERIAL 0 = PARALLEL	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.
DATA BITS `2 2 CONFIG`	0 = 5 BITS 1 = 6 BITS 2 = 7 BITS 3 = 8 BITS	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.
PARITY `3 2 CONFIG`	0 = NONE 1 = ODD 2 = NONE 3 = EVEN	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.
BUFFER STATUS `4 3 CONFIG`	0 = NONE 1 = REVERSE CHANNEL 2 = DTR 3 = X-ON/X-OFF	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.

OPERATOR REFERENCE CARD
PRINTER CONFIGURATIONS

$5\,2$ CONFIG

| MODE | ENTER |
| STEP | CLEAR |

KEYPAD AND LCD

CONFIGURATION	STEP	ENTER	CLEAR
PRINTER STATUS $5\,3$ CONFIG	0 = NONE 1 = REVERSE CHANNEL 2 = DTR 3 = X-ON/X-OFF	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.
REVERSE CHANNEL POLARITY $6\,1$ CONFIG	0 = ACTIVE LOW 1 = ACTIVE HIGH	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.
7 CONFIG	-RESERVED-		
8 CONFIG	-RESERVED-		
INVERTED DATA STROBE $9\,0$ CONFIG	0 = NORMAL 1 = INVERTED	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.
INVERTED DATA BIT 8 10.0 CONFIG	0 = NORMAL 1 = INVERTED	Press [STEP] key to the required selection, then press [ENTER] key.	Entering new selection clears previous selection.

OPERATOR REFERENCE CARD
PRINTER CONFIGURATIONS

```
 ! ! !
        CONFIG
```

MODE ENTER

STEP CLEAR

KEYPAD AND LCD

CONFIGURATION	STEP	ENTER	CLEAR
BIT 8 CONTROL ! ! ! CONFIG	**LCD SELECTION** 0 IGNORE BIT 8 1 NORMAL 2 ESCAPE CONTROL 3 NORMAL	Press STEP key to the required selection, then press ENTER key.	Entering new selection clears previous selection.
703/ANSI ! 20 CONFIG	**LCD SELECTION** 0 703 1 ANSI	Press STEP key to the required selection, then press ENTER key.	Entering new selection clears previous selection.
PRIME ON SELECT ! 30 CONFIG	**LCD SELECTION** 0 DISABLED 1 ENABLED	Press STEP key to the required selection, then press ENTER key.	Entering new selection clears previous selection.
PRIME ON DELETE ! 40 CONFIG	**LCD SELECTION** 0 DISABLED 1 ENABLED	Press STEP key to the required selection, then press ENTER key.	Entering new selection clears previous selection.
PRINT ON PAPER MOTION ! 52 CONFIG	**LCD SELECTION** 0 PAPER MOTION DOES NOT CAUSE PRINT 1 PAPER MOTION CAUSES PRINT WITH CR 2 PAPER MOTION CAUSES PRINT WITH NO CR 3 PAPER MOTION DOES NOT CAUSE PRINT	Press STEP key to the required selection, then press ENTER key.	Entering new selection clears previous selection.
PAGE MODE ! 6 ! CONFIG	**LCD SELECTION** 0 DISABLED 1 ENABLED	Press STEP key to the required selection, then press ENTER key.	Entering new selection clears previous selection.

SECTION 3
PAPER LOADING/RIBBON REPLACEMENT

3.1 GENERAL

This section details the procedures for loading paper, replacing the ribbon, and adjusting the print head for optimum print quality. Two types of paper, either continuous fanfold forms or cut sheet forms, can be installed in the printer. A forms design guide detailing the specifications of both forms is defined in paragraph 3.6.

NOTE

The following procedures are performed from the front of the printer.

3.2 INITIAL LOADING, FANFOLD FORMS

The following procedures describe the first time loading of either single part or multi-part fanfold forms once the printer is installed. Refer to Figure 3-1 and perform the following steps:

1. Move the forms lever to the "LOAD" position.

2. Pull the head adjustment lever towards front of printer to its maximum position.

3. Unsnap and lift the rear cover from the printer.

4. Locate the left and right pin feed tractors.

5. Loosen the left pin feed tractor locking lever and slide the tractor to the leftmost position. Tighten the locking lever to secure the tractor.

6. Place the forms to be installed slightly behind the printer.

7. Open the left and right tractor paper guides.
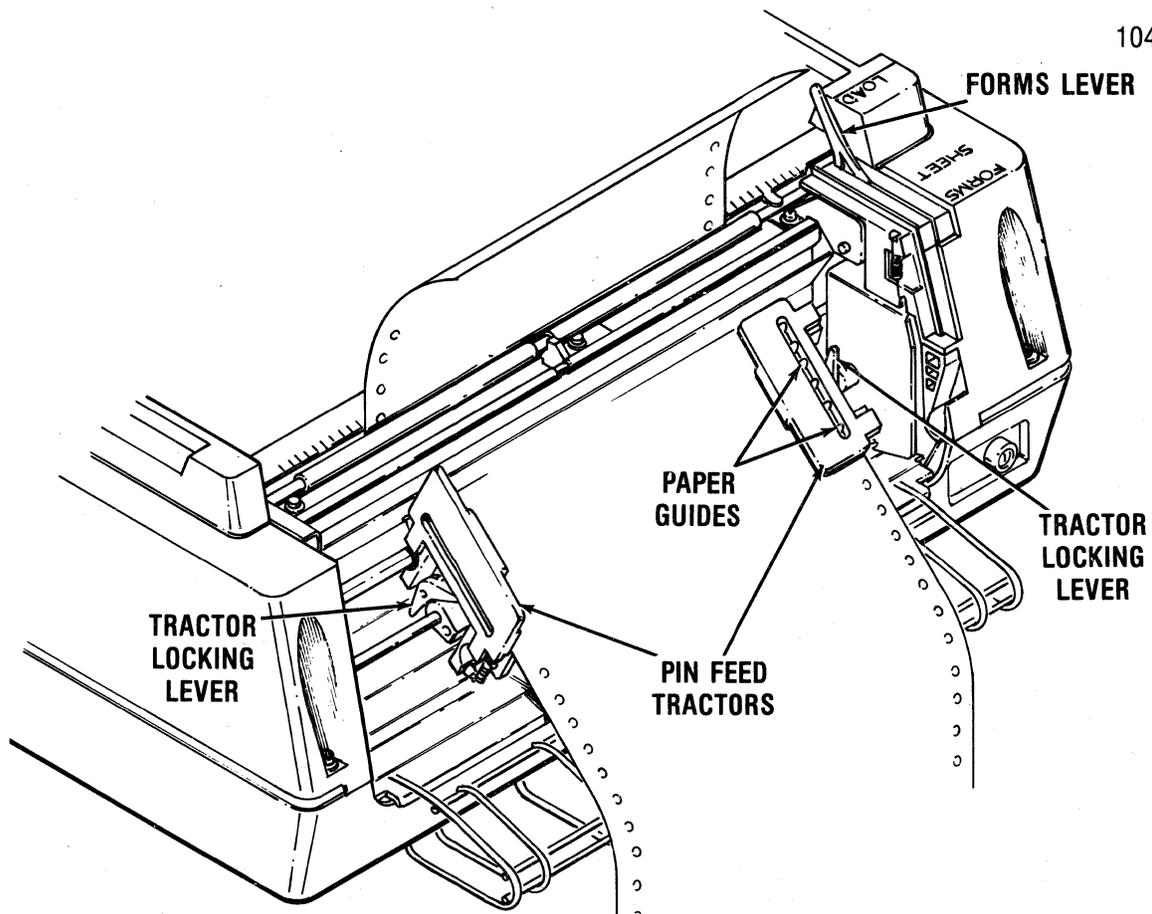
Figure 3-1 Loading Fanfold Forms

8. Install the forms onto the drive pins of the left pin feed tractor and close the left tractor paper guide.

9. Loosen the tractor locking lever on the right pin feed tractor and slide the tractor left or right to accomodate the forms width. Once adjusted, tighten the locking lever to secure the tractor.

10. Install the forms onto the drive pins of the right pin feed tractor and close the paper guide.

11. Turn the printer power on and hold the **LF** switch depressed which loads the forms into the printer.

12. Release the **LF** switch at the desired print position.

13. Press the **SET TOF** switch to set the current print line as the top of form.

14. Place the forms lever in the "FORMS" position.

15. Perform the print head impression adjustment per paragraph 3.8.

16. Install the rear cover retaining tabs into the body cover slots and snap the top closed.

17. Press the **ON LINE** switch to enable the printer to receive data.

3.3 RELOADING FANFOLD FORMS

The Model 353 prints until the last fanfold form passes through the paper empty switch on the left pin feed tractor. When out of paper, printing stops, the **FAULT** indicator lights, the audio alarm sounds and the printer deselects. To reload fanfold forms perform the following steps:

— NOTE —

*To move the last form through the printer on a paper empty condition hold the **OVRD TEST** switch depressed and select the printer which allows the printer to print the last form. DO NOT TURN POWER OFF TO RELOAD FORMS.*

---

1. Move the forms lever to the "LOAD" position.

— NOTE —

Before performing step 2 note the position of the head adjustment lever. If installing the same form as previous, return the lever to this postion once the form is installed.

---

2. Pull the head adjustment lever towards the front of the printer to its maximum position.

3. Unsnap and lift the rear cover from the printer.

4. Open the left and right tractor guides and load the forms onto the drive pins of the tractors.

5. Close the tractor guides.

6. Hold the **LF** switch depressed, which loads paper up into the printer.

7. Release the **LF** switch at the desired print position.

8. Place the forms lever in the "FORMS" position.

9. If a different form thickness is installed perform the print head impression adjustment.

10. Install the rear cover retaining tabs into the body cover slots and snap the top closed.

11. Press the **ON LINE** switch to enable the printer to receive data.

3.4 INITIAL LOADING, CUT SHEET FORMS

The Model 353 is designed to allow semi-automatic insertion of cut sheet forms and documents. The following procedure describes the first time loading of either single or multi-part cut sheet forms once the printer is installed. Refer to Figure 3-2 and perform the following steps:

1. Unsnap the top portion of the rear cover and place in the open position and slide the left/right pin feed tractors to the extreme left/right positions. Once the tractors are positioned snap the rear cover closed.

2. Turn the printer power on and enable the cut sheet mode by pressing the **CUT SHEET MODE** switch on the control panel.

3. Set the form length for the cut sheet using the keypad and display (See Section 2).

4. Move the forms lever to the "LOAD" position.

5. Pull the head adjustment lever towards the front of the unit to its maximum position.

6. Insert the bottom edge of the cut sheet form between the rollers on the column scale and the paper drive roller until the mechanical stops prevent further insertion.

7. Slide the cut sheet form left or right until the left edge of the form aligns with the right edge of the cut sheet load indicator.

8. Place the forms lever in the "SHEET" position.

9. Press the **CUT SHEET INSERT** switch on the control panel which loads the cut sheet form into the printer.

10. Perform the print head impression adjustment per paragraph 3.8.

11. Press the **ON LINE** switch to enable the printer to receive data.

01106

PRINT HEAD ADJUSTMENT LEVER
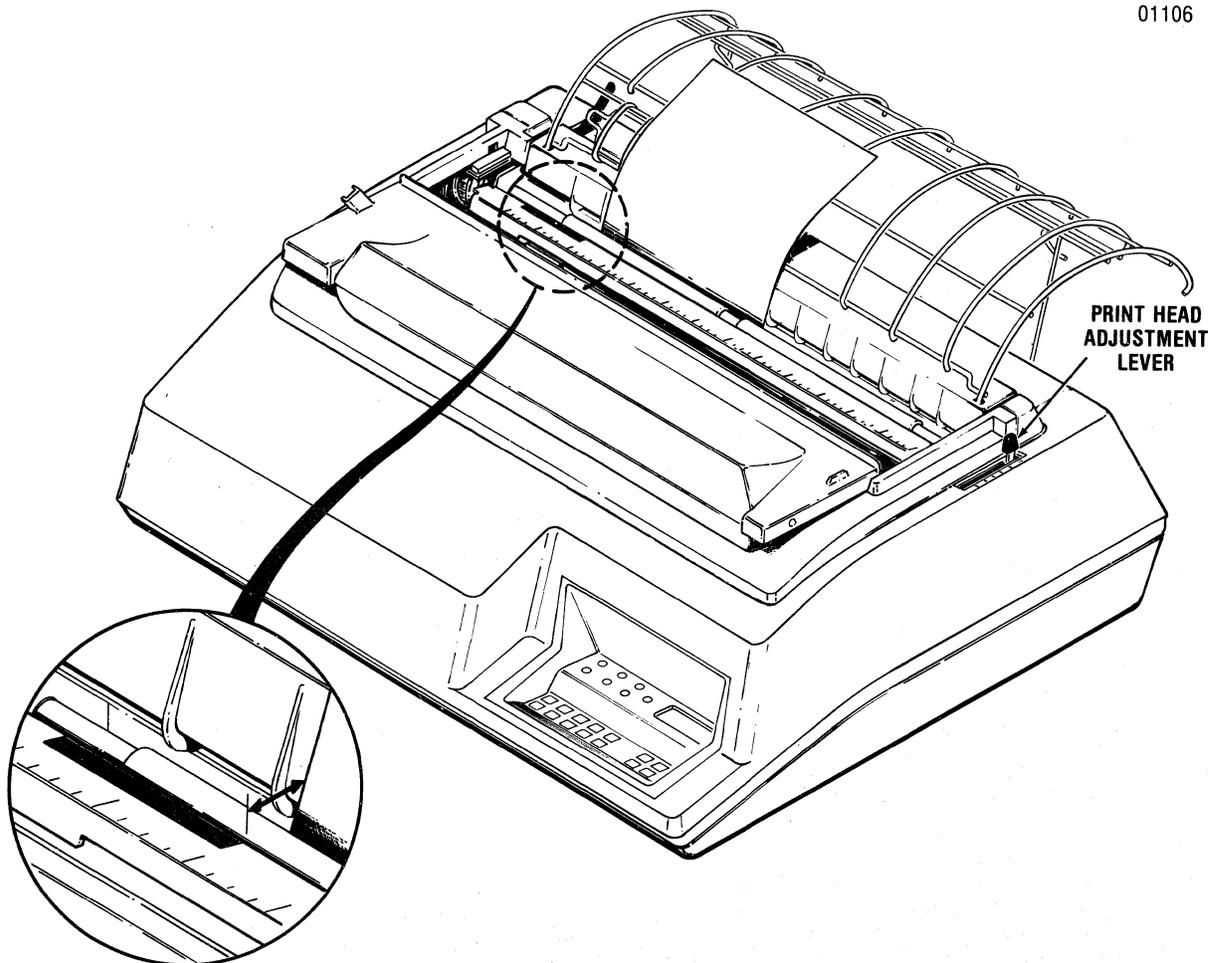
Figure 3-2 Loading Cut Sheet Forms

3.5 RELOADING CUT SHEET FORMS

In the cut sheet mode the Model 353 prints the cut sheet form, moves the form through the printer, and then deselects. To insert additional forms refer to Figure 3-2 and perform the following steps:

NOTE

Before performing step 1 note the position of the head adjustment lever. If installing the same form as previous return the lever to this position once the form is installed. DO NOT TURN POWER OFF TO RELOAD FORMS.

---

1. Pull the head adjustment lever towards the front of the printer to its maximum position.

2. Insert the bottom edge of the cut sheet form between the rollers on the column scale and the paper drive roller until the mechanical stops prevent further insertion.

3. Slide the cut sheet form left or right until the left edge of the form aligns with the right edge of the cut sheet load indicator.

4. Place the forms lever in the "SHEET" position.

5. Press the **CUT SHEET INSERT** switch on the control panel which loads the cut sheet form into the printer.

6. If a different size form is installed perform the print head impression adjustment per paragraph 3.8.

7. Press the **ON LINE** switch on the control panel to enable the printer to receive data.

3.6 FORMS DESIGN

Figures 3-3 and 3-4 detail information on fanfold forms and cut sheet forms design. The forms should conform to the specifications, if not, paper handling problems may occur.

3.0 in (7.6 cm)
to
15.0 in (38.1 cm)

0.156 ± 0.005 in DIA
(4.0 ± 0.1 mm)

3.0 in (7.6 cm)
to
15.5 in (39.4 cm)

0.5 ± 0.005 in
(12.7 ± 0.05 mm)
NON-ACCUMULATIVE
OVER 5 INCH LENGTH

0.25 in ± 0.03 in (6.4 ± 0.7 mm)
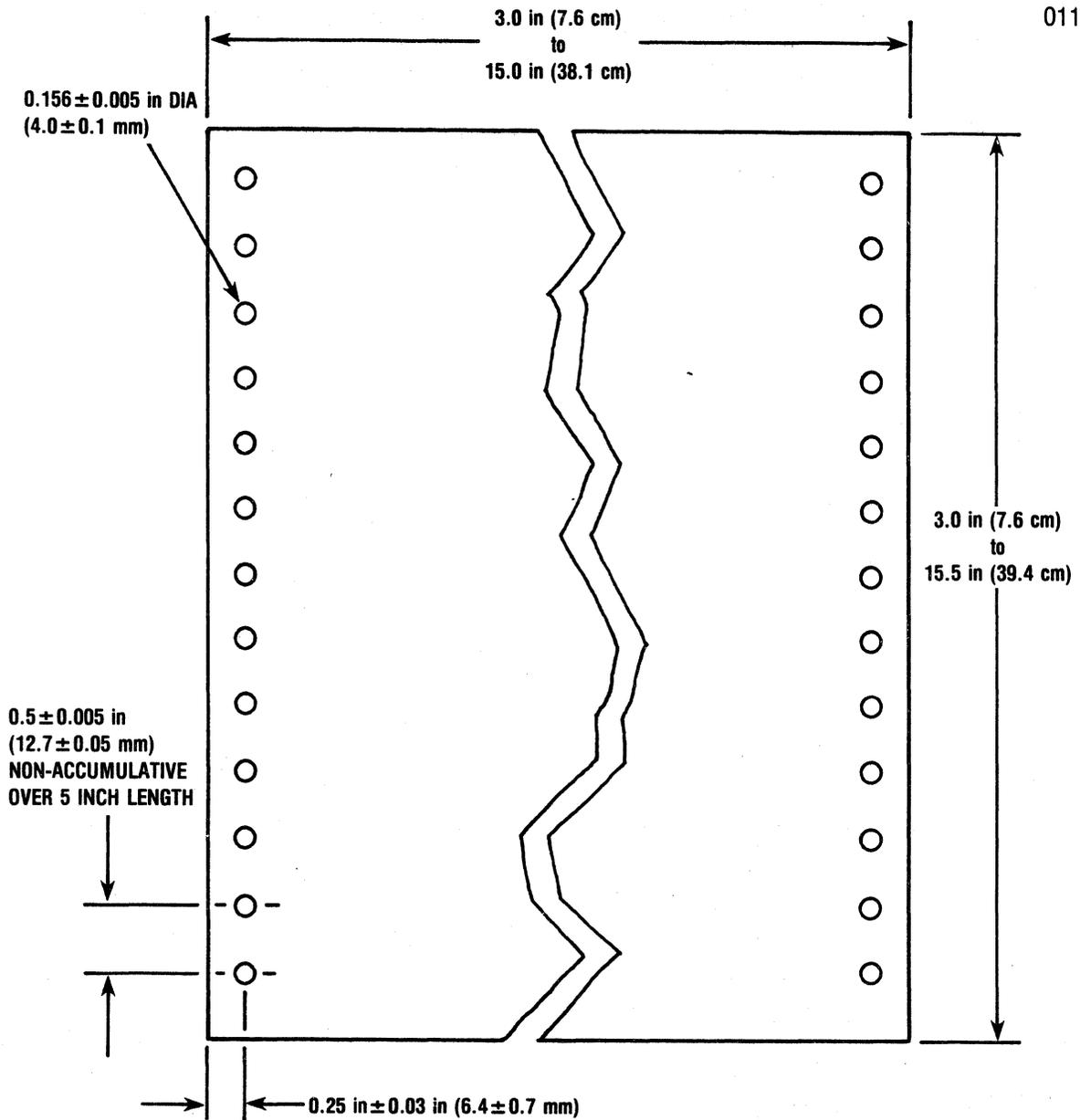
NOTES

1. Forms should be crimped for improved paper handling.

2. Form thickness should not exceed .0204 in. (0.52 mm).

3. Crimps must be spaced a minimum of 2.0 in. (508 mm) along both edges of the forms and not within 0.5 in. (12.7 mm).

4. Metal staples cannot be used.

5. Thickness:
   Single Part—0.010 in (0.25 mm) maximum
   Multi-Part—0.0204 in. (0.52 mm) maximum, up to six part with carbon.

6. Weight:
   Single Part—15-20 lb. bond (56 g/m² to 75 g/m²)
   Multi-Part—

Ply	Paper	Carbon
2	15 lb (56 g/m²) bond	#7 (16.5 g/m²) tissue
3	15 lb (56 g/m²) bond 12 lb (45 g/m²) bond	#7 (16.5 g/m²) tissue
4-6	12 lb (45 g/m²) except last copy 15 lb (56 g/m²)	#7 (16.5 g/m²) tissue

Figure 3-3 Fanfold Form Design

4.0 in (10.1 cm)
to
12.0 in (30.5 cm)

3.0 in (7.6 cm)
to
15.5 in (39.4 cm)
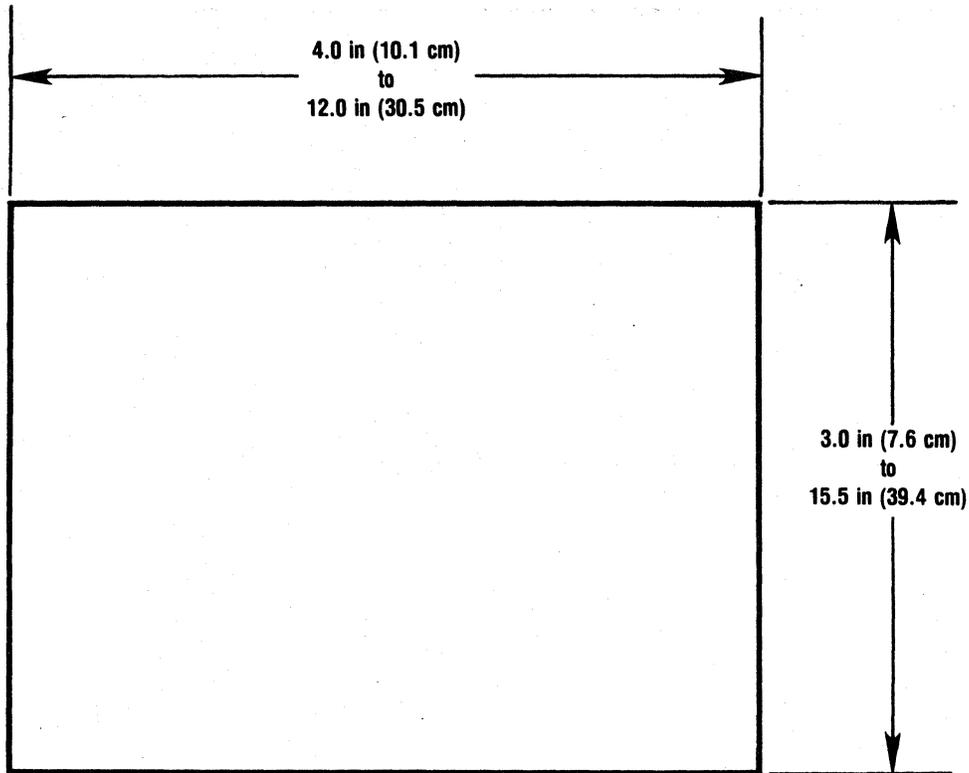
NOTES

1. Multi-part forms may be glued on the top or bottom.

2. Stapled forms may not be used.

3. Split forms with each side containing a different thickness or number of sheets are not recommended.

4. On multi-part forms, use 12 lb (45 g/m²) as first copies with heaviest copy last.

6. On multi-part forms over four parts, use a 5 lb (12 g/m²) carbon tissue.

7. Thickness/Weight
Single Part—20 lb paper (70 g/m²) minimum
Multi-Part—0.024 in (0.52 mm) maximum

Ply	Paper	Carbon
2	15 lb (56 g/m²) bond	#7 (16.5 g/m²) tissue
3	15 lb (56 g/m²) bond 12 lb (45 g/m²) bond	#7 (16.5 g/m²) tissue
4-6	12 lb (45 g/m²) except last copy 15 lb (56 g/m²)	#7 (16.5 g/m²) tissue

Figure 3-4 Cut Sheet Forms Design

3.7 RIBBON CASSETTE REPLACEMENT

The Model 353 contains a "clean hands" long life ribbon cassette. To replace the cassette refer to Figure 3-5 and perform the following steps:

1. Lift the top cover up and off the printer.

2. Unsnap the top portion of the rear cover and place in the open position.

3. Ensure the print head is at the extreme left margin.

4. Place the forms lever in the "LOAD" position.

5. Lift the column scale into the up position.

NOTE

Before performing step 6 note the position of the head adjustment lever. Once the new ribbon cassette is installed return the lever to this position.

---

6. Pull the head adjustment lever towards the front of the printer to its maximum position.

7. Remove the ribbon guide from the front of the print head by squeezing together the two tabs at the top of the ribbon guide and lifting upward.

8. Lift the used ribbon cassette and attached ribbon guide up and out of the printer.

9. Snap the two left and two right retaining tabs of the new ribbon cassette into the four slots on the left and right side frames.

10. Install the new ribbon guide by squeezing together the two tabs at the top of the guide and pushing the guide downward onto the front of the print head.

11. Pull the ribbon tab off the top of the ribbon cassette.

12. Rotate the ribbon drive gear knob counter-clockwise several turns to ensure the ribbon is feeding properly.

13. Place the column scale in the down position and move the forms lever to the type of form (SHEET or FORMS) being printed.

14. Lift and snap the rear cover closed.

15. Insert the front lip of the top cover under the body cover and close the top cover.
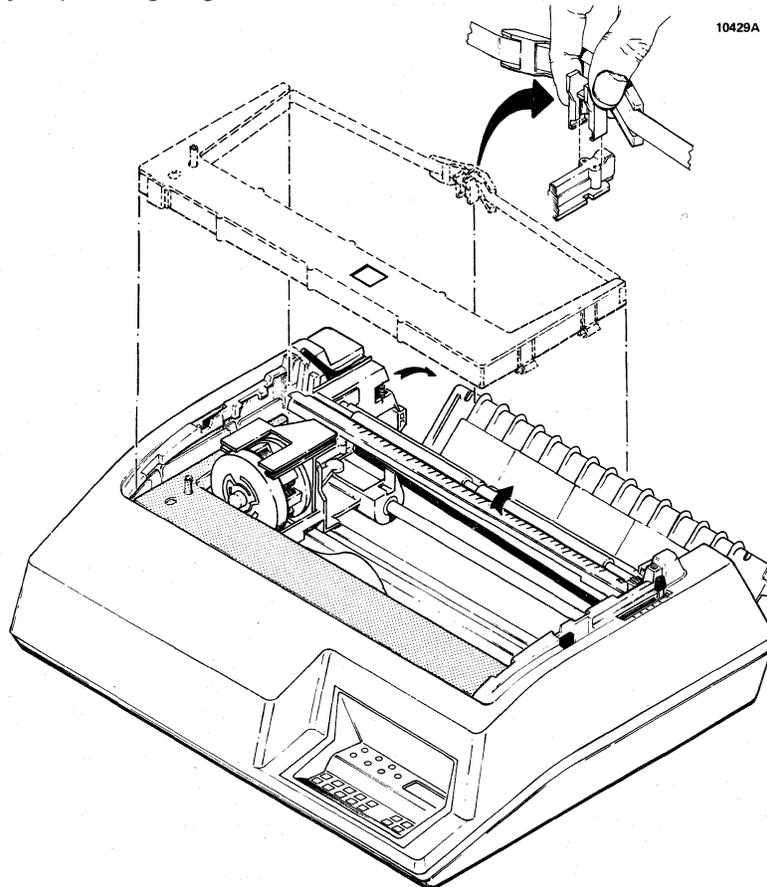
Figure 3-5 Ribbon Cassette Replacement

3.8 PRINT HEAD IMPRESSION ADJUSTMENT

The print head can be adjusted in or out for different form thickness (single part or multi-part) to provide optimum print quality. To adjust the print head, refer to Figure 3-6 and perform the following steps:

1. Lift the top cover up and off the printer.

2. For single part forms set the head adjustment lever back two notches from closed position.

3. For multi-part forms manually move the print head from side to side while moving the head adjustment lever in or out until ribbon smudging or paper rippling occurs, then, move the head adjustment lever back one position.

4. Reinstall the top cover and perform a self-test operation by pressing the **OVRD TEST** switch while the unit is deselected.

5. Check the printout to ensure good clean print quality. If the print is too dark or too light adjust the print head in or out as required.

10431
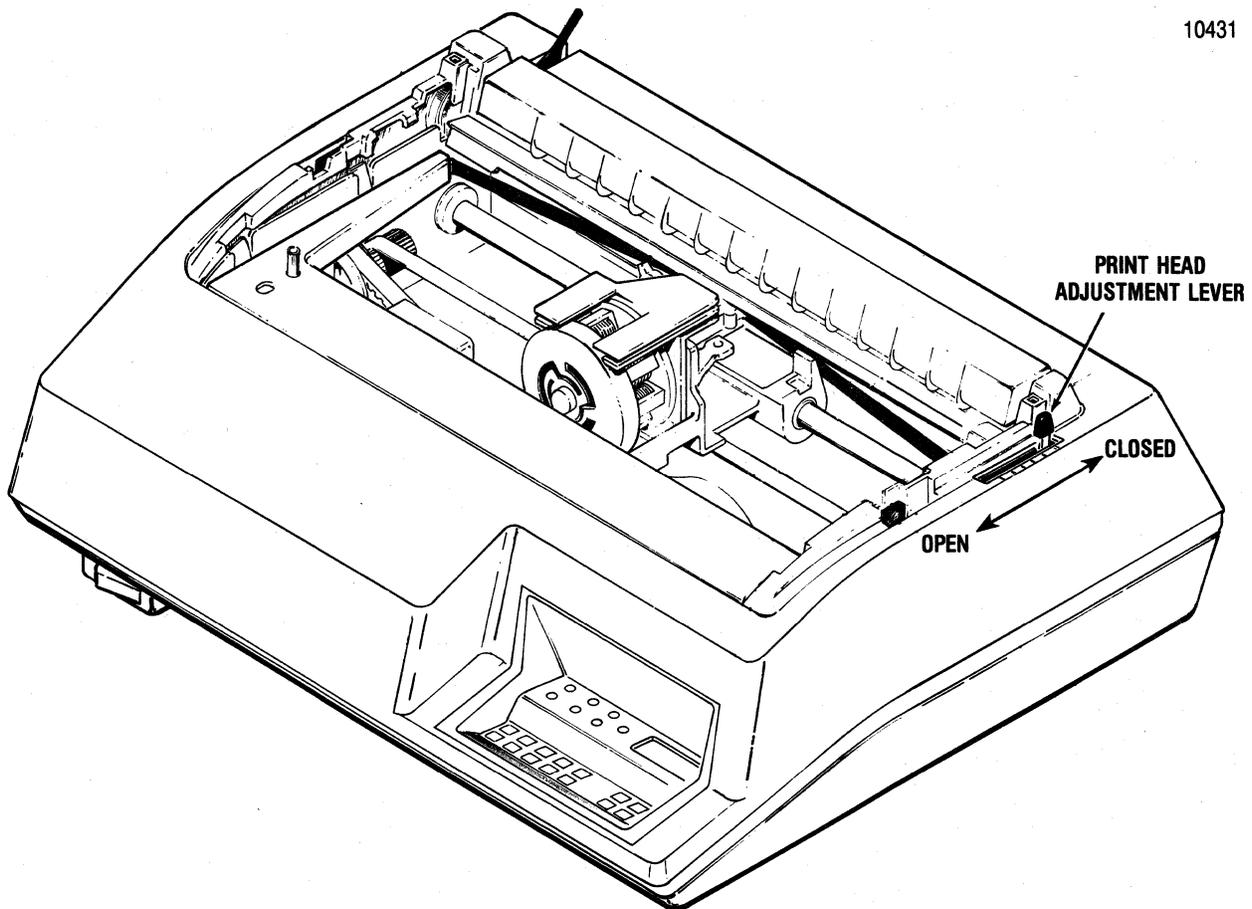
Figure 3-6 Print Head Impression Adjustment

SECTION 4
PRINTER OPERATION

4.1 OPERATING NOTES
Before operating the printer, check the following to ensure proper operation.

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

- Ensure the interface data cable from the printer is connected to the host device.

- Ensure all covers are closed and secured before operating the printer.

- Never operate the printer without paper installed.

- Avoid leaning or placing objects on any part of the printer.

4.2 OPERATING THE PRINTER
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 procedures describe how to enter into each mode and the functions that can be performed while in the mode.

POWER-UP—To power-up the printer ensure that paper is loaded then set the **POWER** switch to the **ON** position. Placing the **POWER** switch in the **ON** position illuminates the **POWER** indicator and places the printer in the deselect mode. On power-up the printer automatically performs the internal self-test operation.

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

1. Setting the **POWER** switch to the **ON** position.

2. Pressing the **ON LINE** switch on the control panel while the printer is selected.

3. Receiving a deselect (DC3) control code from the input device while the printer is selected.

4. Moving the form out of the printer while the printer is selected.

5. Generating a paper empty condition while printing fanfold forms.

When the printer is deselected, the **POWER** indicator is illuminated and the **ON LINE** and **SELECT** indicators are extinguished. In the deselect mode the following functions can be performed.

1. Select the printer, locally, by pressing the **ON LINE** switch or, remotely, be receiving a select (DC1) control code from the host device.

2. Set the current line as the top of form position by pressing the **SET TOF** switch on the control panel.

3. Move the paper in either the forward or reverse direction by pressing either the **PAPER FWD** or **PAPER REV** switch on the control panel.

4. Perform a self-test operation by pressing the **OVRD TEST** switch on the control panel.

5. Move the form to the next sequential top of form by pressing the **FORM FEED** switch.

6. Move the form forward by pressing the **LF** switch.

7. Enter or exit the cut sheet mode as long as fanfold forms are removed.

8. Insert a cut sheet form, if in the cut sheet mode.

9. Check, clear or enter a printer feature or configuration using the keypad and display.

SELECT—The printer is selected by either of the following two methods.

1. Pressing the **ON LINE** switch on the control panel while the printer is deselected.

2. Receiving a select (DC1) code from the host device.

-------------------- **NOTE** --------------------
*When in the serial mode, the **OVRD TEST** switch on the control panel will select or deselect the printer.*

When the printer is selected, the **POWER, ON LINE** and **SELECT** indicators are illminated. In this mode of operation the printer performs the following functions:

1. Receives data from the input device and prints the data.

2. Advances the paper by receiving paper motion control codes from the input device.

3. Loads the electronic Vertical Format Unit (VFU) memory by receiving VFU downstream loading commands from the input device.

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

4.3 SELF-TEST

The printer performs two self-test operations. The first is an internal self-test which is performed on power-up of the printer. The second self-test is performed by the operator pressing the **OVRD TEST** switch while the printer is deselected and loaded with paper.

INTERNAL SELF-TEST—On printer power-up, the internal formatter test indicator is turned on. The formatter performs a check of the RAM, ROM/PROM and non-volatile memory. It also checks the print controller self-test byte in the C-RAM. If no errors are found the internal formatter test indicator is turned off. If an error is found, the audio alarm sounds and an error code is displayed. If an error code is displayed, make note of the code and call for service.

NOTE

The printer cannot be selected when one of these codes are displayed.

OPERATOR SELF-TEST—This self-test feature is activated by pressing the **OVRD TEST** switch on the control panel while the printer is deselected and loaded with paper. The test prints out the entire character set(s) and the selected features and configurations. Test data is continuously printed as long as the **OVRD TEST** switch is held depressed. A sample printout and definition of settings is shown in Figure 4-1.

£à°ç5ñ̃ëuè ̈åUUäöüßòiìáfÐóAæoä !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}˜¿
üé   !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}˜

ALF	FORM	TOP	BOT	BAUD	CTY	STB	B8P	B8C	PPM	BST	PST	PAR	NDB	RC	PSL	PDL	PAG	ANSI
0	066	001	066	9600	USA	0	0	0	2	X	X	E	8	1	1	1	1	1

ALF	FORM	TOP	BOT	BAUD	CTY	STB	B8P	B8C	PPM	BST	PST	PAR	NDB	RC	PSL	PDL	PAG	ANSI
0	066	001	066	9600	USA	0	0	0	2	X	X	E	8	1	1	1	1	1

ALF	FORM	TOP	BOT	BAUD	CTY	STB	B8P	B8C	PPM	BST	PST	PAR	NDB	RC	PSL	PDL	PAG	ANSI
0	066	001	066	9600	USA	0	0	0	2	X	X	E	8	1	1	1	1	1

ALF	FORM	TOP	BOT	BAUD	CTY	STB	B8P	B8C	PPM	BST	PST	PAR	NDB	RC	PSL	PDL	PAG	ANSI
0	066	001	066	9600	USA	0	0	0	2	X	X	E	8	1	1	1	1	1

MENOMIC	FEATURE/CONFIGURATION	MENOMIC	FEATURE/CONFIGURATION
ALF	Automatic Line Feed	BST	Buffer Status
FORM	Form Length	PST	Printer Status
TOP	Top Margin	PAR	Parity
BOTTOM	Bottom Margin	NDB	Number of Data Bits
BAUD	Baud Rate	RC	Reverse Channel
CTY	Country Set	PSL	Prime-on Select
STB	Data Strobe	PDL	Prime on Delete
B8P	Bit 8 Polarity	PAG	Page Mode
B8C	Bit 8 Control	ANSI	Control Code Selection
PPM	Printer on Paper Motion		

Figure 4-1 Self Test Printout

SECTION 5
OPERATOR MAINTENANCE

5.1 PREVENTIVE MAINTENANCE

Although there are no required operator preventive maintenance procedures, it is advisable to periodically inspect and clean the printer area immediately accessible under the top cover.

During paper loading or ribbon replacement, the printer should be inspected for a build up of dried ink, lint, or foreign material. If a build up of material is evident, clean the area with a light bristle brush or lint free cloth.

Table 5-1 below lists the maintenance required on certain areas of the printer. The maintenance may be required more or less frequently depending on the printer application and operating environment.

Table 5-1 Preventive Maintenance

ASSEMBLY	FREQUENCY	MAINTENANCE
Covers	As Required	Clean all the cover assemblies using a mild detergent and a lint-free cloth.
Internal Inspection	Each Ribbon Change	Remove the top cover and visually inspect interior of printer for loose wires, connectors, and hardware, chafing of cables, and worn or damaged parts.
Print Head Assembly	Each Ribbon Change	Using a lint-free cloth gently remove all dried ink from the front of the print head.
Print Head and Carriage	Each Ribbon Change	After removing ribbon, use a light-bristle brush to carefully remove the dust and residue from the print head and carriage assembly.
Carriage Guide Bars	As Required	Move print head to left side of printer. Apply several drops of light lubricating oil to a lint-free cloth and lightly rub carriage guide bars to remove any build up of residue. Move print head to right side of printer and repeat procedure.
Platen Assembly	As Required	Clean platen assembly using a mild detergent.

5.2 TROUBLESHOOTING GUIDE

The troubleshooting guide, Table 5-2 lists some malfunctions which may occur, the probable causes, and the remedies. If the printer remains inoperative after performing the remedies indicated, the printer should be serviced by qualified service personnel.

Table 5-2 Troubleshooting Guide

TROUBLE	PROBABLE CAUSE	REMEDY
Print too light.	Print head adjustment lever improperly adjusted.	Adjust head adjustment lever to desired print quality.
	Worn or defective ribbon.	Replace ribbon cassette.
Cut sheet form does not advance.	Not in cut sheet mode.	Press **CUT SHEET MODE** switch on the operators control panel.
	Forms lever not in cut sheet position.	Move forms lever to the cut sheet position.
Ribbon does not feed properly.	Ribbon twisted or improperly loaded.	Check ribbon cassette replacement procedures.
Printer completely inoperative.	AC input plug not connected.	Connect AC input plug to power source.
	AC input fuse blown.	Check if **"POWER"** indicator is lit. If indicator is not lit, replace AC input fuse.
Power On/Data Sent-printer does not print.	Input cable not connected.	Check that connectors at both ends of data input cable are properly connected to mating connectors.
	Printer not selected.	Press **ON LINE** switch on the operators control panel.

SECTION 6
REMOVAL/REPLACEMENT

6.1 GENERAL

This section details the operator removal/replacement procedures. The covers, print head assembly, and input fuse are all operator replaceable. For detailed removal/replacement procedures of all recommended spare parts refer to the Model 353 Technical Manual.

NOTE

Ensure the power cord is removed from the power outlet before performing any removal/replacement procedures.

6.2 REMOVAL COVER ASSEMBLIES

The following procedures detail the removal of the top, rear, and body covers. To remove the covers, refer to Figure 6-1 and perform the following:

TOP COVER

1. Remove the top cover by lifting the rear edge of the cover up and off the printer.

REAR COVER

1. Unsnap the top portion of the rear cover from the body cover.

2. Lift the rear cover up and off the printer.

BODY COVER

1. Remove the top and rear covers from the printer.

2. Remove the two Phillips head screws at the rear of printer mounting the body cover to the printer base.

3. Loosen the thumb screw mounting the front of the body cover to the printer base.

4. Lift the body cover up and off the printer.

10432
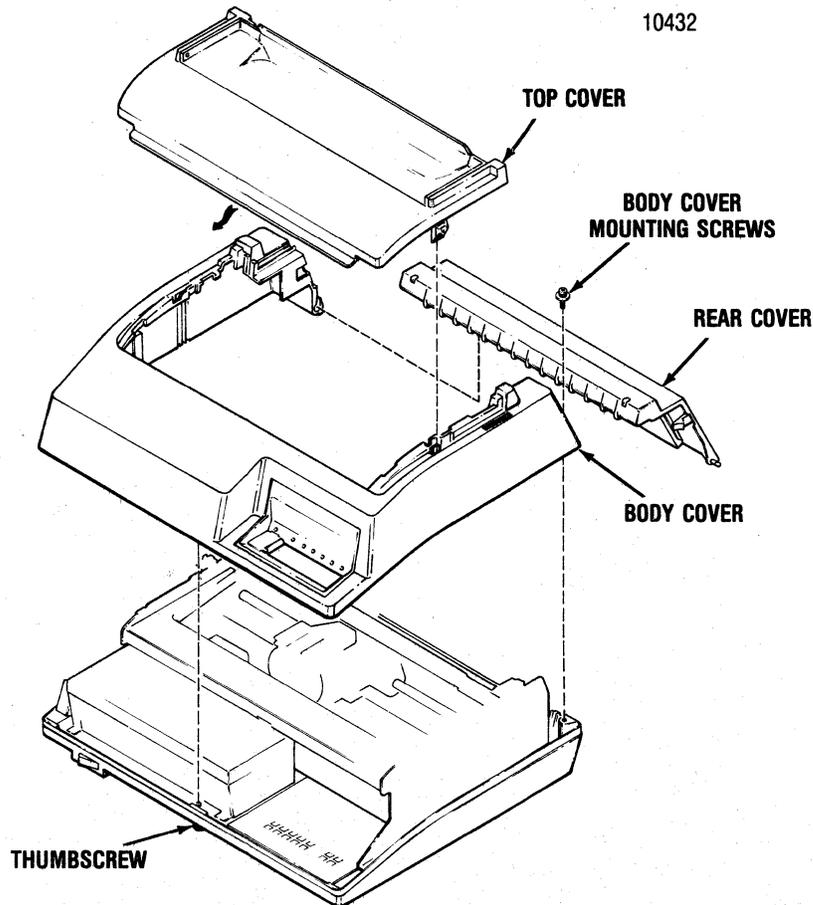
Figure 6-1 Removal Cover Assemblies

6.3 REMOVAL/REPLACEMENT PRINT HEAD ASSEMBLY

To remove and replace the print head assembly, refer to Figure 6-2 and perform the following steps:

1. Remove the top cover by lifting the rear edge of the cover up and off the printer.

2. Unsnap the top portion of the rear cover and place in the open position.

3. Move the forms lever to the "LOAD" position.

4. Lift the column scale to the up position.

5. Pull the head adjustment lever towards the front of the printer to its maximum position.

6. Remove the ribbon guide from the front of the print head by squeezing together the two tabs at the top of the ribbon guide and lifting upward.

7. Remove the print head fingerboard connector.

8. While pulling the print head towards the front of the printer, lift the head up and out of the printer.

9. To replace the print head assembly, reverse steps 1 through 8 above.

10. Ensure the black, numbered cam located on the front of the print head is in position "A" following replacement of the print head.

10429
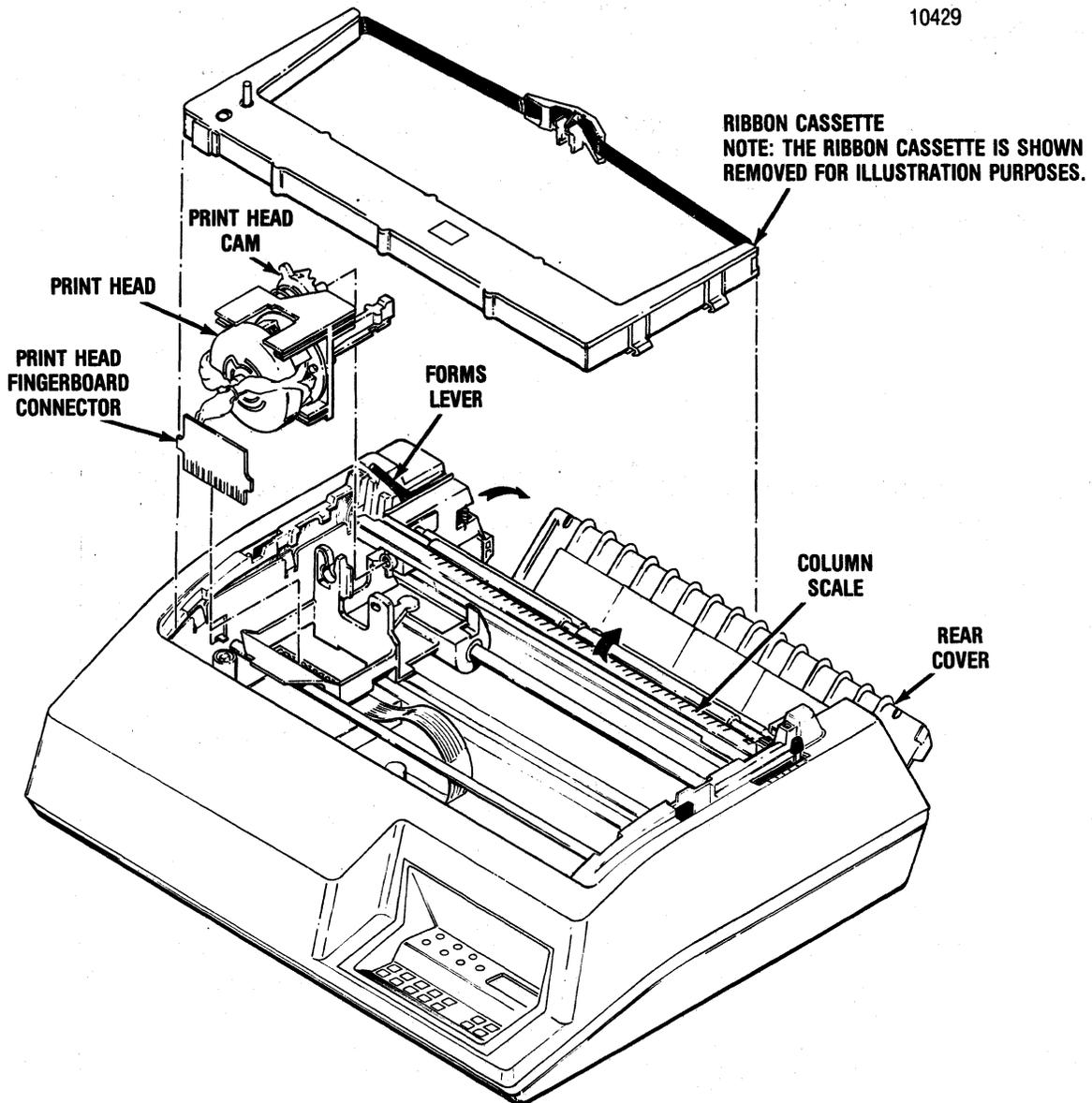
Figure 6-2 Removal Print Head Assembly

6.4 REMOVAL/REPLACEMENT INPUT FUSE

To remove and replace the input fuse, refer to Figure 6-3 and perform the following steps:

1. Locate the input fuse at the left rear of the printer.

2. Using a flat blade screwdriver rotate the fuse holder counterclockwise until loose, then remove the fuse holder and defective fuse.

3. Install new fuse and fuse holder.

01154

FUSE

FUSE HOLDER

```
NOTE
115V — 4A FUSE
230V — 2A FUSE
```
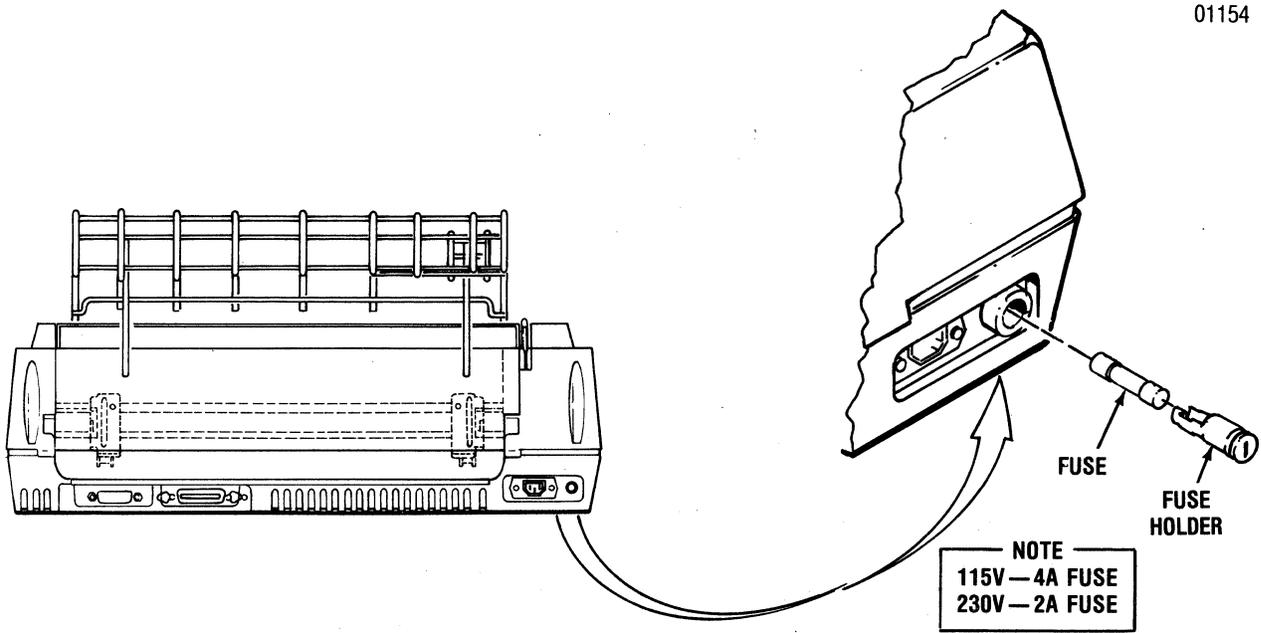
Figure 6-3 Removal Input Fuse

CONTENTS

Installation, Interface and Specifications

III

SECTION 7
INSTALLATION

7.1 GENERAL

This section contains information on installing and setting-up the printer. The Model 353 should be installed in an area that is free from excessive dust and dirt and is easily accessible from all sides.

7.2 PRINTER INSPECTION

After unpacking, visually inspect the printer for signs of damage received during shipment. Immediately notify the common carrier of any damage.

7.3 SITE CONSIDERATIONS

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

PRINTER DIMENSIONS—Refer to Figure 7-1.

PRINTER INSTALLATION SPECIFICATIONS — Refer to the following printer specifications before installing the printer.

WEIGHT
    Printer: 40 lbs.
    Stand: 22.5 lbs.

HUMIDITY
    Operating: 10% to 90% (Non-Condensing)
    Storage: 10% to 95% (Non-Condensing)

TEMPERATURE
    Operating: 50° to 104°F (10° to 40°C)
    Storage: −40° to 160°F (−40° to 71°C)

ELECTRICAL
    115 VAC +10%, −15%; 60 Hz ±1 Hz
    230 VAC +10%, −15%; 50 Hz ±1 Hz
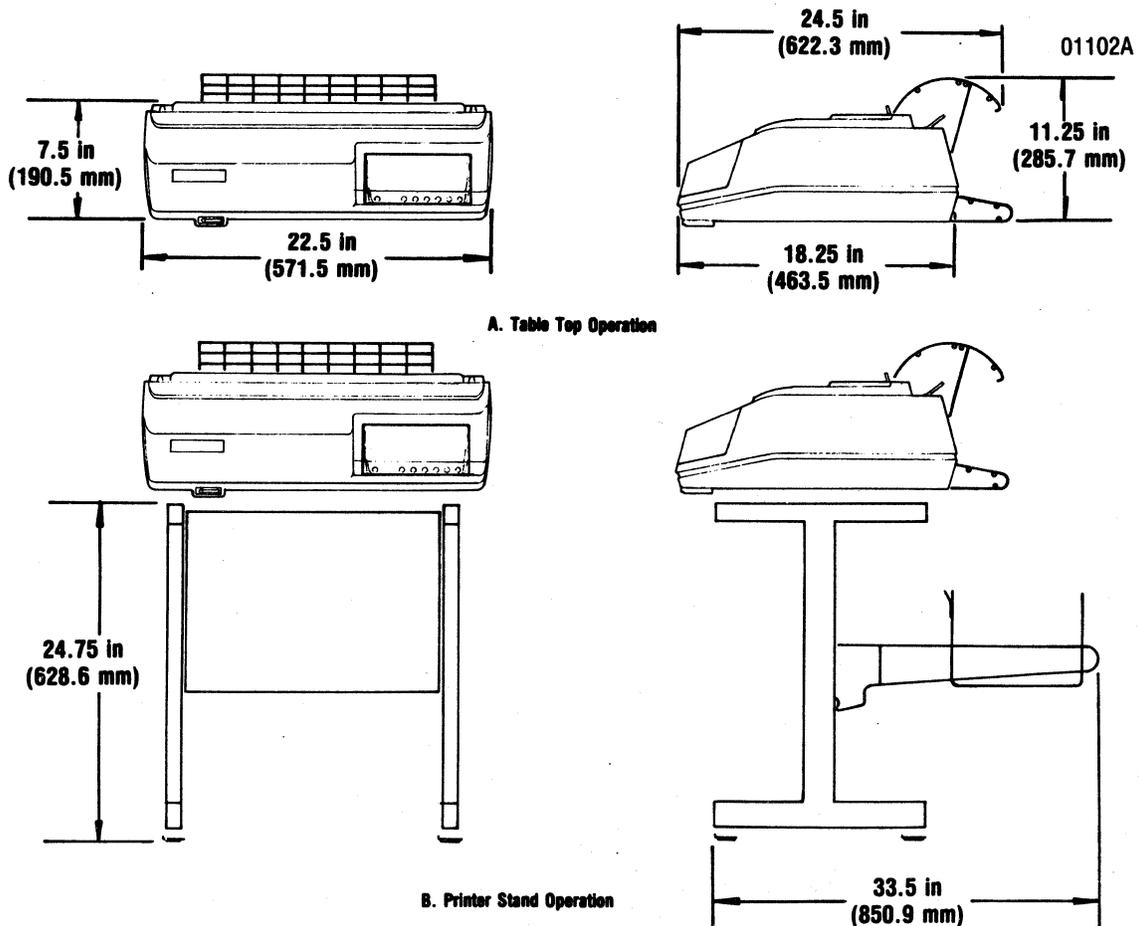
Figure 7-1 Printer Dimensions

7.4 PRINTER SET-UP

The following procedures detail the set-up of the printer prior to operation at the installation site. Refer to Figure 7-2 and perform the following steps.

1. Ensure the power switch is **OFF** and plug the printer into the appropriate power outlet.

> **NOTE**
>
> *Always use a 3-wire grounded outlet.*

2. Using the appropriate shielded data cable (parallel or serial input) connect the printer to the input device.

> **NOTE**
>
> *The data cable should be terminated to chassis ground at either the printer connection or host connection. The illustration below shows the recommended terminating connection on the printer.*

3. Install the form (fanfold or cut sheet) to be printed as described in Section 3.

4. Verify the selection of printer features and configuration as described in Section 2.

5. Set the power switch to the **ON** position and perform a self-test operation by pressing the **OVRD TEST** switch on the control panel.

6. Press the **ON LINE** switch to enable the printer to receive data.

CHASSIS GROUND CONNECTION (LEFT FRAME)
SERIAL INTERFACE CONNECTOR
FORMS LEVER
PRINT HEAD ASSEMBLY
RIBBON CASSETTE
POWER SWITCH
TRACTOR DRIVE ASSEMBLY
PARALLEL INTERFACE CONNECTOR
POWER CORD CONNECTION & AC INPUT FUSE
PRINT HEAD ADJUSTMENT LEVER
CONTROL PANEL

10427
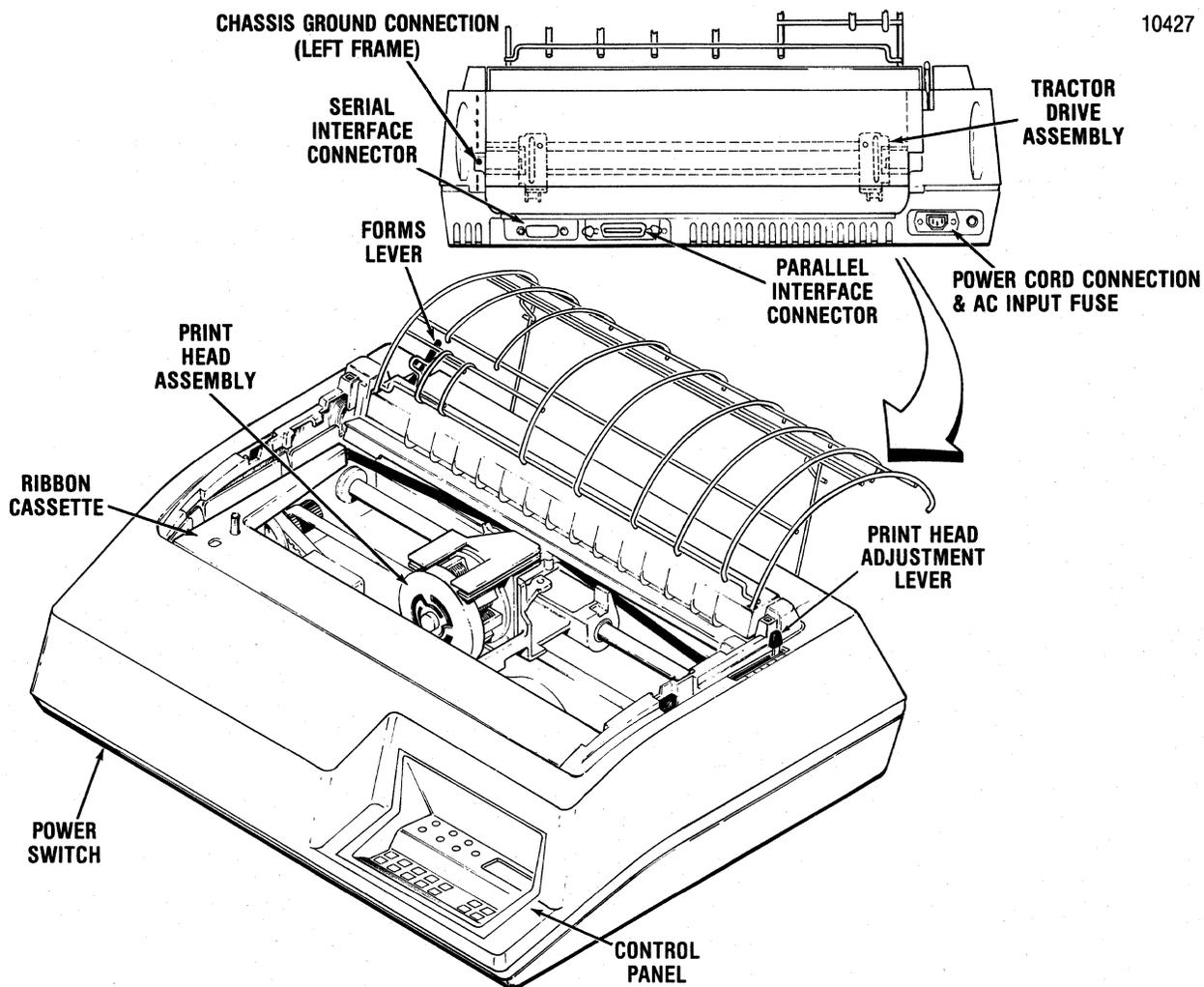
Figure 7-2 Printer Set-Up

SECTION 8
INTERFACE INFORMATION

8.1 GENERAL INFORMATION

The printer is connected to the input device, via the input data cable, for either parallel or serial data input. In the right rear of the printer a parallel interface connection is provided via an Amphenol 57 series 36-pin connector and a serial interface connection via an EIA-RS232C, 25 pin connector. Four unused pins in the serial interface connector are used for the optional current loop connection. The following paragraphs describe the parallel and serial interfaces in detail.

8.2 PARALLEL INTERFACE CONNECTION

The pin-outs of the 36-pin parallel interface connector are listed in Table 8-1. A description of the external and printer generated parallel signals follow the table.

EXTERNAL GENERATED SIGNAL DESCRIPTION—
The following signals are generated by the input device.

DATA STROBE—Data strobe is a negative going pulse used to transfer the incoming parallel data into the printer logic. The pulse duration of the signal must be a minimum of 1.0 microsecond. The leading and trailing edges of data strobe and the input data must be as shown in Figure 8-1.
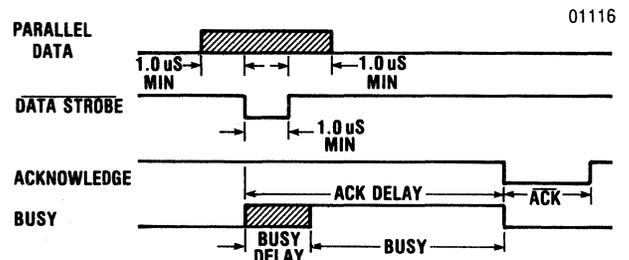
Figure 8-1 Parallel Interface Timing Diagram

Table 8-1 Parallel Interface Connector Pin-Outs

PIN	SIGNAL	PIN	SIGNAL
1	DATA STROBE	19	Twisted Pair Ground
2	Data Bit 1	20	Twisted Pair Ground
3	Data Bit 2	21	Twisted Pair Ground
4	Data Bit 3	22	Twisted Pair Ground
5	Data Bit 4	23	Twisted Pair Ground
6	Data Bit 5	24	Twisted Pair Ground
7	Data Bit 6	25	Twisted Pair Ground
8	Data Bit 7	26	Twisted Pair Ground
9	Data Bit 8	27	Twisted Pair Ground
10	ACKNOWLEDGE	28	Twisted Pair Ground
11	BUSY	29	Twisted Pair Ground
12	PAPER OUT	30	INPUT PRIME RETURN
13	SELECT	31	INPUT PRIME
14	GROUND	32	FAULT
15	Not Used	33	GROUND
16	GROUND	34	Not Used
17	CHASSIS GROUND	35	Not Used
18	+5V	36	Not Used

DATA BITS 1-8—Data bits 1 through 8 contain the ASCII character and control code information. The logic level of each data line must be settled at least 1.0 microsecond before the leading edge of the data strobe pulse and remain at its logic level until at least 1.0 microsecond after the trailing edge of the data strobe pulse.

INPUT PRIME—Input prime is an active low signal which causes the print head to return to the left margin and resets the printer logic on the trailing edge of the signal.

```
--------------- NOTE ---------------
Data should not be sent during an Input Prime as
Centronics reserves this sequence for factory testing.
```

PRINTER GENERATED SIGNAL DESCRIPTION—
The following signals are generated by the printer.

ACKNOWLEDGE—Acknowledge is an active low signal used to verify the transfer of incoming data from the input device to printer logic or to signify the end of a functional operation. Once a code is sent to the printer, an acknowledge pulse must be received before a new code can be sent.

BUSY—Busy is an active high signal which inhibits data transmission from the input device. Busy goes active on the trailing edge of acknowledge or when either the paper empty or fault status line is active high.

PAPER EMPTY—Paper empty is a positive-going signal that indicates the printer is out of paper.

SELECT—An active high select signal indicates either the **ON LINE** switch has been pressed or a SELECT code has been received and that the printer is in a ready condition.

8.3 SERIAL INTERFACE CONNECTION
The pin-outs of the 25-pin serial interface connector are listed in Table 8-2. A description of the data set and printer generated signals follow the table.

DATA SET GENERATED SIGNAL DESCRIPTION—
The following signals are generated by the data set.

```
--------------- NOTE ---------------
A +V or Mark condition indicates a voltage greater
than +3 volts. A -V or Space condition indicates a
voltage less than -3 volts.

Signals CLEAR TO SEND, DATA SET READY and
CARRIER DETECT will be interpreted as a logical 1 if
they are not connected to the data set.
```

Table 8-2 Serial Interface Connector Pin-Outs

PIN	EIA SIGNAL NAME	SIGNAL
1	AA	Protective Ground
2	BA	Transmitted Data
3	BB	Received Data
4	CA	Request to Send
5	CB	Clear to Send
6	CC	Data Set Ready
7	AB	Signal Ground
8	CF	Carrier Detect
11	SBA	Reverse Channel
20	CD	Data Terminal Ready
12	----	Host Receive Current Loop +
13	----	Host Receive Current Loop -
14	----	Printer Transmit Status +
15	----	Printer Transmit Status -

RECEIVED DATA—Data source to the printer.

CLEAR TO SEND—A +V will enable X-ON/X-OFF to be transmitted. A -V will disable the transmitter.

DATA SET READY—A +V will allow transmitted data to be accepted by the printer. A -V will not allow data to be accepted.

CARRIER DETECT—A +V will allow transmitted data to be accepted by the printer. A -V will not allow data to be accepted.

PRINTER GENERATED SIGNAL DESCRIPTION—
The following signals are generated by the printer.

TRANSMITTED DATA—Used to indicate the buffer status when in the X-ON/X-OFF mode.

REQUEST TO SEND—This line is +V when in the X-ON/X-OFF mode.

REVERSE CHANNEL—Used for transmitting the printer/buffer status when in the reverse channel mode. The line is normally in a -V condition. When the buffer is full, this line goes to a +V condition until the printer is able to receive data again. The line is held at buffer empty polarity (-V) when in the X-ON/X-OFF or Data Terminal Ready.

DATA TERMINAL READY—This line is held at +V when not used for the status report line.

SECTION 9
SPECIFICATIONS

9.1 MODEL 353 SPECIFICATIONS

SERIAL INPUT

Interface RS-232C

Data Format . . . . 1 START bit, 6, 7, or 8 DATA bits, 1 PARITY bit

Input Code . . . . 96 character ASCII.

Buffer . . . . 4K character buffer.

PARALLEL DATA

Data Format . . . . 6/7/8 bit ASCII parallel.

Input Code . . . . 96 character ASCII.

Buffer . . . . One line character buffer.

Input Gating . . . . Data Strobe is gated with Acknowledge of previous character.

PRINTING

Printing Method . . . . Impact, dot matrix, bidirectional, logic seeking.

Dot Matrix . . . . 7 dots wide by 8 dots high; 9th wire underline.

Print Speed . . . . 200 characters per second—Normal printing.
50 characters per second—Multipass Printing.

Country Character Sets . . . . U.S.A., Great Britian, Sweden/Finland, Norway/Denmark, Germany, Italy, France and Spain.

Horizontal Pitch . . . . Programmable for 5, 6, 6.6, 7.5, 8.25, 10, 12, 13.2, 15 and 16.5 characters per inch.

Maximum Line Length
(varies with horizontal pitch)

5 cpi	66 columns
6 cpi	79 columns
6.6 cpi	87 columns
7.5 cpi	99 columns
8.25 cpi	109 columns
10 cpi	132 columns
12 cpi	158 columns
13.2 cpi	174 columns
15 cpi	198 columns
16.5 cpi	218 columns

PAPER HANDLING

Vertical Pitch . . . . 6 lines per inch

Single Line Feed Time . . . . 30 msec.

Vertical Slew Speed . . . . 8 inches per second.

Forms Length . . . . 1 to 192 lines.

Paper Movement . . . . Bidirectional

9.1 Model 353 SPECIFICATIONS (cont.)

PAPER REQUIREMENTS

Fanfold Forms

Width	3.0 in. (76 mm) to 15.0 in. (381 mm).
Copies	Up to six parts.
Maximum Thickness	0.0204 in. (0.52 mm).

Cut Sheet Forms

Width	4.0 in. (101 mm) to 12.0 in. (305 mm).
Copies	Up to six parts.
Maximum Thickness	0.0204 in. (0.52 mm).

NOTE: For detailed paper specifications, refer to paragraph 3.6, Forms Design.

PHYSICAL/ENVIRONMENTAL/ELECTRICAL

Height	7.5 inches (190.5 mm)
Depth	18.25 inches (463.5 mm)
Width	22.5 inches (571.5 mm)
Weight	40 lbs. (88 kg)
Temperature	Operating: 50° to 104°F (10° to 40°C) Storage: −40° to 160°F (−40° to 71°C)
Humidity	Operating: 10% to 90% (Non-Condensing) Storage: 10% to 95% (Non-Condensing)

Power
220 VAC, +10% −15% of nominal, 50 Hz ±1 Hz

Switcher Power Supply	90 VAC to 128 VAC or 180 VAC to 256 VAC 47 to 63 Hz
Input Current	4A max. at 110 VAC. 2A max. at 220 VAC.

CONTENTS

Programming Information

IV

SECTION 10
PROGRAMMING INFORMATION

10.1 GENERAL

The Model 353 accepts control codes and escape sequences in three modes to control many of its features. The three modes are: control codes acceptable in the 703 mode, control codes acceptable in the ANSI mode, and control codes/escape sequences acceptable in either the 703 or ANSI mode. Using the control codes and escape sequences described in this section, the programmer can control the following features:

- VFU Downstream Loading
- Expanded Print
- Primary Character Set Selection
- Alternate Character Set Selection
- Country Set Selection
- Horizontal Pitch
- Form Length
- Vertical Margins
- Vertical Tabs
- Horizontal Tabs

- Subscript/Superscript
- Page Mode
- Multipass Printing
- RAM Character Set Loading
- Graphics
- Serial Status Reporting
- Underline

10.2 CONTROL CODES

Control codes are sent to the printer along with character codes via the input data lines. These codes are interpreted as instructions by the printer and initiate a specific function. The following paragraphs described the control codes for the Model 353.

703/ANSI CONTROL CODES—The control codes listed in Table 10-1 are accepted and initiate the same function in either the 703 or ANSI mode. Each code is described in detail in the following paragraphs.

Table 10-1 703/ANSI Control Codes

MNEMONIC	DECIMAL	OCTAL	HEXA-DECIMAL	FUNCTION
LF	10	012	0A	One Line Feed Forward
CR	13	015	0D	Print Command
DC1	17	021	11	Select Command
DC3	19	023	13	Deselect Command
VT	11	013	0B	Paper motion to next vertical tab location.
FF	12	014	0C	Paper motion to next top of form location.
DEL	127	177	7F	Resets printer logic, if printer is selected.
BEL	7	007	07	Audio Alarm
HT	9	009	09	Print at next sequential horizontal tab location.
DLE ENQ	16 5	020 005	10 05	Serial Status

Line Feed (LF)—If the printer is on line, receipt of a LF code causes the action selected in the print on paper motion feature. If "paper motion does not cause print" is selected, the printer immediately advances the paper one line on receipt of a LF code. If "print with or without carriage return" is selected, the printer immediately prints the line followed by the paper advance of one line with or without a carriage return.

Carriage Return (CR)—If the printer is selected and printable characters have been received, receipt of a CR code causes immediate printing. Data is accepted by the printer until a CR code or a full buffer of printable characters is received. In either case, the printer automatically prints the received characters. When printing is complete the printer performs an auto line feed, if enabled. If the CR code is the first character in the buffer, the code is acknowledged and ignored. A CR code is not acknowledged while the printer is deselected.

Select (DC1)—Receipt of a select code selects the printer independent of the control panel. If PRIME ON SELECT is enabled, the input line buffer is cleared and the print head is moved to the left margin.

Deselect (DC3)—Receipt of a deselect code deselects the printer independent of the control panel and moves the print head to the left margin.

Vertical Tab (VT)—If the printer is selected, receipt of a VT code causes the paper to advance to the next sequential vertical tab location.

If no vertical tabs are set, the printer performs a form feed.

The VT code is not acknowledged or processed while the printer is deselected.

Form Feed (FF)—If the printer is selected, receipt of a FF code causes the paper to advance to the next sequential top-of-form location.

The form feed code is not acknowledged or processed while the printer is deselected.

DEL—If a DEL code is received while the printer is selected and PRIME ON DELETE is enabled, the input line buffer is cleared and the print head is returned to the left margin.

BEL—Receipt of a BEL code while the printer is selected causes the speaker to generate an audible tone for approximately one second.

Horizontal Tab (HT)—If the printer is selected and horizontal tabs are set, receipt of a HT code causes printing to continue at the next sequential horizontal tab location. If no horizontal tabs are set, or there are no more on the line printed, the HT code is changed to a space. The HT code is not acknowledged or processed while the printer is deselected.

Serial Status (DLE ENQ)—In the serial mode the sequence DLE ENQ requests printer status. The printer responds by sending DLE, status, as defined below.

SERIAL STATUS

BIT	STATE	STATUS
0	High (1)	Paper Out
1	High (1)	Deselected
2	High (1)	Buffer Full
3	High (1)	Parity Error Received since Last Printer Status.

703 CONTROL CODES—The control codes listed in Table 10-2 are accepted in the 703 mode only. Each code is described in detail following the table.

VFU Downstream Loading (GS,RS)—The sequence for downstream loading is initiated by sending a "START LOAD" code (GS-octal 035) followed by two bytes per line, and terminated by a "STOP LOAD" code (RS-octal 036).

The following data format shown in Figure 10-1 must be used to load the 2 channel electronic vertical format unit.

The channel data for the first line is made up of bytes 1 and 2 after the load code; the second line is made up of bytes 3 and 4 after the start code, etc. See NOTE for Top of Form.

— NOTE —

Top of Form function requires that channel 1 be set in the first byte after the start load code. Also, the last two bytes prior to the stop load code 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 data.

Table 10-2 703 Control Codes

MNEMONIC	DECIMAL	OCTAL	HEXA-DECIMAL	FUNCTION
GS	29	035	1D	Start Load—Downstream Loading
RS	30	036	1E	Stop Load—Downstream Loading
US	31	037	1F	VFU Command
SO	14	016	0̸E	Expanded Print
ESC 3	27 51	033 063	1B 33	Select Alternate Character Set
ESC 4	27 52	033 064	1B 34	Select Primary Character Set

◄2 CHANNEL► 00967

DATA BITS► 7 6 5 4 3 2 1 0

START LOAD (octal 035): 0 0 0 1 1 1 0 1

ODD BYTE (1*,3,5 etc.): X 1 X X X X CH2 CH1

*Channel 1 must be set for 1st byte (TOF)

EVEN BYTE (2,4,6 etc.): X 1 X X X X X X

x = don't care bit (1 or 0 is OK)

STOP LOAD (octal 036): 0 0 0 1 1 1 1 0

Figure 10-1 VFU Data Input Format

Excess data (data above the maximum memory capacity) causes a fault condition that deselects the printer, illuminates the FAULT indicator and displays an error code in the LCD. All data after a second Top of Form code appearing in the middle of a data stream is ignored until a stop code appears.

Table 10-3 is an example of the data input for an 11-inch form with vertical tabs every six lines.

VFU Command (US)—The VFU command consists of two bytes of sequential data. The two bytes are an octal 037-US followed by either "Skip N Lines" or "Skip to Channel X" determined by bit 4 of the second byte. If bit 4 is a 1, then "Skip N Lines" (15 lines maximum) is selected; if bit 4 is a 0, "Skip to Channel X" is selected. The format for the second byte follows:

If a command is received to skip a channel other than channel 1 or channel 2, the printer generates a fault condition, deselects the printer, illuminates the FAULT indicator and displays an error code in the LCD.

Expanded Print (SO)—Receipt of a SO code causes the current line to be printed in expanded format, only if the current horizontal pitch is 10, 12, 13.2, 15, or 16.5 characters per inch (cpi). The number of elongated characters printable per line shall not exceed one half the print buffer size.

Select Alternate Character Set (ESC 3)—Receipt of an ESC 3 code while the printer is selected, selects the alternate character set.

Select Primary Character Set (ESC 4)—Receipt of an ESC 4 code while the printer is selected, selects the primary character set.

Table 10-3 Sample VFU Downstream Loading

Left section

BYTE NO.	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	1	41	101	} Line 1 - Top of Form
2	X	1	0	0	0	0	0	0	40	100	
3	X	1									} " 2
4	X	1									
5	X	1									} " 3
6	X	1									
7	X	1									} " 4
8	X	1									
9	X	1									} " 5
10	X	1									
11	X	1									} " 6
12	X	1	0	0	0	0	0	0	40	100	
13	X	1	0	0	0	0	1	0	42	102	} Line 7 - Vertical Tab
14	X	1	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	0	0	0	0	0	0	40	100	} " 12
24	X	1	0	0	0	0	0	0	40	100	
25	X	1	0	0	0	0	1	0	42	102	} Line 13 - Vertical Tab
26	X	1	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	0	0	0	0	0	0	40	100	} " 18
36	X	1	0	0	0	0	0	0	40	100	
37	X	1	0	0	0	0	1	0	42	102	} Line 19 - Vertical Tab
38	X	1	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	40	100	
49	X	1	0	0	0	0	1	0	42	102	} Line 25 - Vertical Tab
50	X	1	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	40	100	
61	X	1	0	0	0	0	1	0	42	102	} Line 31 - Vertical Tab
62	X	1	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	40	100	

Right section

BYTE NO.	7	6	5	4	3	2	1	0	HEX CODE	OCTAL CODE	FUNCTION
69	X	1	0	0	0	0	0	0	40	100	} Line 35 - Vertical Tab
70	X	1	0	0	0	0	0	0	40	100	
71	X	1									} " 36
72	X	1	0	0	0	0	0	0	40	100	
73	X	1	0	0	0	0	1	0	42	102	} Line 37 - Vertical Tab
74	X	1	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	40	100	
85	X	1	0	0	0	0	1	0	42	102	} Line 43 - Vertical Tab
86	X	1	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	0	0	0	0	0	0	40	100	} " 48
96	X	1	0	0	0	0	0	0	40	100	
97	X	1	0	0	0	0	1	0	42	102	} Line 49 - Vertical Tab
98	X	1	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	0	0	0	0	0	0	40	100	} " 54
108	X	1	0	0	0	0	0	0	40	100	
109	X	1	0	0	0	0	1	0	42	102	} Line 55 - Vertical Tab
110	X	1	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	0	0	0	0	0	0	40	100	} " 60
120	X	1	0	0	0	0	0	0	40	100	
121	X	1	0	0	0	0	1	0	42	102	} Line 61 - Vertical Tab
122	X	1	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	0	0	0	0	0	0	40	100	} " 64
128	X	1	0	0	0	0	0	0	40	100	
129	X	1	0	0	0	0	1	1	43	103	} Line 65 - BOF (2-CH. VFU ONLY)
130	X	1	0	0	0	0	0	0	40	100	
131	X	1									} " 66
132	X	1									
133	X	1	0	0	0	0	0	1	41	101	} Line 67 - Top of Form
134	X	1	0	0	0	0	0	0	40	100	
135	0	0	0	1	1	1	1	0	1E	036	STOP CODE

10.3 ESCAPE SEQUENCES

The Model 353 accepts and interprets escape sequences sent to it in either the 703 or ANSI mode. In the escape sequences which follow, the escape character (octal 033) is designated as ESC. The second character in the sequence, if not a terminating character, may be a "[" (octal 133), "(" (octal 050), ")" (octal 051), or "%" (octal 045) depending on the function of the sequence. Numeric parameters are designated as n, n₁, n₂...etc. The graphic characters in the escape sequences shown are from the US ASCII character set illustrated in Figure 10-2. The characters are spaced apart for clarity only.

A numeric parameter is a sequence of ASCII decimal digits (octal 060 through 071). The parameter is interpreted as an unsigned decimal integer, with the most significant digit transmitted first. Leading zeros are allowed, but not necessary. Skipped or unspecified parameters have a value of zero; extra parameters are ignored. Invalid terminators cause the sequence to be ignored. Up to 16 parameters may be inputted with a ";" (octal 073) between each.

```
─────────── NOTE ───────────
Escape sequences must not be sent during an INPUT
PRIME. Centronics reserves this sequence for in-
house testing.
```

01112

CODE	040	041	042	043	044	045	046	047
CHAR	Space	!	"	#	$	%	&	Acute
CODE	050	051	052	053	054	055	056	057
CHAR	(	)	*	+	Comma	Hyphen	Period	Slash
CODE	060	061	062	063	064	065	066	067
CHAR	0	1	2	3	4	5	6	7
CODE	070	071	072	073	074	075	076	077
CHAR	8	9	:	;	<	=	>	?
CODE	100	101	102	103	104	105	106	107
CHAR	@	A	B	C	D	E	F	G
CODE	110	111	112	113	114	115	116	117
CHAR	H	I	J	K	L	M	N	O
CODE	120	121	122	123	124	125	126	127
CHAR	P	Q	R	S	T	U	V	W
CODE	130	131	132	133	134	135	136	137
CHAR	X	Y	Z	[	\	]	^	Underline
CODE	140	141	142	143	144	145	146	147
CHAR	Grave	a	b	c	d	e	f	g
CODE	150	151	152	153	154	155	156	157
CHAR	h	i	j	k	l	m	n	o
CODE	160	161	162	163	164	165	166	167
CHAR	p	q	r	s	t	u	v	w
CODE	170	171	172	173	174	175	176	177
CHAR	x	y	z	{	| Rule	}	~	DEL

Figure 10-2 US ASCII Character Set

COUNTRY SET SELECTION—The Model 353 is capable of printing character sets of eight countries. The escape sequences to select the country character sets are as follows:

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC (A	Select Great Britain Character Set
ESC (B	Select USA Character Set
ESC (2	Select Sweden/Finland Character Set
ESC (3	Select Norway/Denmark Character Set
ESC (K	Select Germany Character Set
ESC (1	Select Italy Character Set
ESC (R	Select France Character Set
ESC (4	Select Spain Character Set

HORIZONTAL PITCH—Horizontal pitch determines the width of printed characters as well as their spacing. Changes to horizontal pitch are only allowed at the start of a line. The following escape sequences set horizontal pitch.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [w	Select 10 cpi Horizontal Pitch
ESC [1 w	Select 10 cpi Horizontal Pitch
ESC [2 w	Select 12 cpi Horizontal Pitch
ESC [3 w	Select 13.2 cpi Horizontal Pitch
ESC [4 w	Select 16.5 cpi Horizontal Pitch
ESC [5 w	Select 5 cpi Horizontal Pitch
ESC [6 w	Select 6 cpi Horizontal Pitch
ESC [7 w	Select 6.6 cpi Horizontal Pitch
ESC [8 w	Select 8.25 cpi Horizontal Pitch
ESC [9 w	Select 15 cpi Horizontal Pitch
ESC [10 w	Select 7.5 cpi Horizontal Pitch

VERTICAL PITCH—Vertical pitch determines the spacing between lines, not the height of printed characters. Changing vertical pitch also clears vertical margins. The following escape sequences set vertical pitch.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [z	Select 6 LPI Vertical Pitch
ESC [1 z	Select 6 LPI Vertical Pitch
ESC [2 z	Select 8 LPI Vertical Pitch
ESC [3 z	Select 12 LPI Vertical Pitch
ESC [5 z	Select 3 LPI Vertical Pitch
ESC [6 z	Select 4 LPI Vertical Pitch

FORM LENGTH—Form length is defined in lines, not physical units. Therefore, changing vertical pitch alters the physical form length. Forms may be from 1 to 192 lines in length. Changing form length clears vertical margins and defines the current line as line one. The following escape sequence sets form length.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [n t	Set form length to n lines. Set top margin to line 1. Set bottom margin to line n. Set current line to line 1.

Example:
ESC [66 t—Sets the form length to 66 lines.

VERTICAL MARGINS—Printing is permitted only on lines within the inclusive top and bottom margins. When form length is changed, these margins are cleared; that is, the top margin is set to line one and the bottom margin is set to the form length. The following must be true to successfully set new vertical margins:

$$1 \le \text{top margin} \le \text{bottom margin} \le \text{form length.}$$

If it is ever the case that the current line is less than the top margin or the current line is greater than the bottom margin, the current line is set to the top margin. For example, a line feed performed at the bottom margin will execute a form feed. The following escape sequence sets vertical margins.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [n r	Set top margin to line n.
ESC [; n r	Set bottom margin to line n.
ESC [n_1; n_2 r	Set top margin to line n_1, and set bottom margin to line n_2.

Example:
ESC [1 r—sets top margin to line 1.

ESC [; 66 r—sets bottom margin to line 66.

The following escape sequence can be sent at one time to set both top and bottom margins.

ESC [1; 66 r—sets the top margin to line 1 and the bottom margin to line 66.

VERTICAL TABS—The printer has 16 vertical tab stops. Vertical tab stops are associated with specific line numbers, not physical positions on the paper. Thus, changing vertical pitch changes the printing position of vertical tabs. The following escape sequences set or clear vertical tab stops.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC J	Select vertical tab stop at current line.
ESC [1 g	Clear vertical tab stop at current line.
ESC [4 g	Clear all vertical tab stops.
ESC [n v	Set vertical tab stop at line n.
ESC [n1; n2...nx v	Set vertical tab stop at line n1, n2,...nx (x $\leq$ 16).

Example:
ESC [4 g—Clears all vertical tabs.

ESC [6; 16; 26; 36 v—Sets vertical tabs at lines 6, 16, 26, and 36.

HORIZONTAL TABS—The printer has 16 horizontal tab stops. Horizontal tab stops are associated with specific character columns. Therefore, changing the horizontal pitch changes the position of horizontal tabs. The following escape sequences set or clear horizontal tabs.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC H	Set horizontal tab stop at current column.
ESC [g	Clear horizontal tab stop at current column.
ESC [0 g	Clear horizontal tab stop at current column.
ESC [2 g	Clear all horizontal tab stops.
ESC [3 g	Clear all horizontal tab stops.
ESC [n u	Set horizontal tab stop at column n.
ESC [n₁; n₂...nₓu	Set horizontal tab stops at columns $n_1, n_2...n_x u$ (u $\leq$ 16).

Example:
ESC [2 g—Clears all set horizontal tabs.
ESC [6; 12; 18; 24; 30 u—Sets horizontal tabs at column 6, 12, 18, 24 and 30.

SELECTION PRIMARY/ALTERNATE CHARACTER SET—Receipt of the SO or SI code while in the ANSI mode performs the function below.

CODE	FUNCTION/COMMENT
SO	Invokes the Alternate Character Set
SI	Invokes the Primary Character Set

REVERSE LINE FEEDS—The printer accepts reverse line feed commands using the escape sequence below in the cut sheet mode only.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [n T	Move n reverse line feeds.

Example: ESC [6 T—Move 6 reverse line feeds.

SUBSCRIPT/SUPERSCRIPT—The printer accepts subscript and superscript commands. The paper movement doesn't necessarily coincide with a half line feed, but is only used to offset by a partial line. If the same command is received more than once, all but the first is ignored. If a standard paper motion command is received while subscript or superscript is active, the print head moves to the base of the next line feed position.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC K	Set subscript
ESC L	Set superscript

UNDERLINE—The printer accepts start and stop underline commands. When a portion of the line is to be underlined, more than one pass of the print head is required. Once the underline is set, all following characters in the data stream are underlined until it is reset.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [4 m	Start underline
ESC [m	Stop underline
ESC [0 m	Stop underline

PAGE MODE—Receipt of a STX (octal 002) code puts the printer into the page mode. In this mode the printer can receive up to 4096 characters (including control codes), without going busy. Once in the page mode printing does not start until an ETX (octal 003) code is received or the buffer is full.

CODE	FUNCTION/COMMENT
STX	Page Mode start
ETX	Page Mode stop

ALTERNATE CHARACTER SET DESIGNATION—

In order to designate the alternate character set, the following escape sequences are used. The designated alternate character set is selected using an ESC 3 code in the 703 mode the SO code in the ANSI mode.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC) 0	Designate Standard Alternate Character Set
ESC) Sp @	Designate the RAM Character Set
ESC) 1	Designate Bidirectional Multipass Character Set
ESC) 2	Designate Unidirectional Multipass Character Set

MULTIPASS PRINTING—The printer is capable of multipass printing. Two passes of the print head per line are made. The multipass character set is one of the alternate character sets. It is designated by the following sequences.

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC) 2	Designate Unidirectional Multipass Character Set
ESC) 1	Designate Bidirectional Multipass Character Set

GRAPHICS—The graphics program is completely controlled by the input device or computer, with the exception of the printer logic forcing a carriage return (CR) when the graphics buffer is full (872 codes). Figure 10-3 illustrates all 64 possible graphic code patterns.

In the graphics mode, a data byte consists of six bits of information representing one column of six adjacent rows. The host offsets the transmitted graphic data by adding 40 octal which puts the data out of the ASCII control code range and into the printable range (octal 040-137). Control codes, transmitted without the offset (plus 40 octal), works the same way in the graphics mode with a vertical pitch of 12 LPI. The escape sequences for underline and horizontal pitch are ignored. Vertical margins are cleared by entering into the graphics mode.

In the graphics mode, if 872 graphic codes are sent in one line, the printer software forces a carriage return. With the automatic line feed enabled, a one-half line feed follows the carriage return. If the auto line feed is disabled, an overprint occurs unless a line feed code is sent after the 872 byte. In the graphics program the software converts the line feed code to a one-half line feed to prepare for the next graphic line.

A graphic line of less than 872 bytes can be terminated by sending a carriage return code. The auto line feed function also applies in this case.

To exit form graphics, another character set must be invoked.

01059

Figure 10-3 Graphic Pin Address Codes

The figure shows an 8-row grid of dot-pattern pin diagrams (rows labeled 1–6 for each cell), each labeled with a decimal and hexadecimal address code:

32D 20H	33D 21H	34D 22H	35D 23H	36D 24H	37D 25H	38D 26H	39D 27H
40D 28H	41D 29H	42D 2AH	43D 2BH	44D 2CH	45D 2DH	46D 2EH	47D 2FH
48D 30H	49D 31H	50D 32H	51D 33H	52D 34H	53D 35H	54D 36H	55D 37H
56D 38H	57D 39H	58D 3AH	59D 3BH	60D 3CH	61D 3DH	62D 3EH	63D 3FH
64D 40H	65D 41H	66D 42H	67D 43H	68D 44H	69D 45H	70D 46H	71D 47H
72D 48H	73D 49H	74D 4AH	75D 4BH	76D 4CH	77D 4DH	78D 4EH	79D 4FH
80D 50H	81D 51H	82D 52H	83D 53H	84D 54H	85D 55H	86D 56H	87D 57H
88D 58H	89D 59H	90D 5AH	91D 5BH	92D 5CH	93D 5DH	94D 5EH	95D 5FH

• = PIN FIRED

Figure 10-3 Graphic Pin Address Codes

RAM CHARACTER SET LOADING

RAM CHARACTER SET LOADING—The Model 353 is able to accept a 96 character downstream loaded character set. In order to load the RAM, the character set data must be preceded by the following escape sequence:

ESCAPE SEQUENCE	FUNCTION/COMMENT
ESC [n x data	Downstream Load RAM Character Set

In the above escape sequence n is a two byte ASCII decimal number indicating the number of characters being loaded up to 96. The first digit is the most significant of the two digits.

Data, in the above sequence, is the ASCII character string containing the dot pattern for the character generator. The length of this string is assumed to be 14 times the number represented by n. Each character being loaded into the character generator is described by 14 bytes. The patterns are conveyed in the least significant 4 bits of each byte and the value of the next three most significant bits shall be a 2. The most significant bit of the byte shall be ignored. The first character loaded is accessed during printing by a 20 Hex (i.e., 4th character pointed to by 24 Hex). Refer to Figure 10-4.

The printer assumes the number of data bytes is 14 times "n" and uses the data inside the string to load the RAM character set. If the sequence is violated and does not match any other control sequence, then the printer deselects and the LCD displays an error code. The 96 allowable characters are addressed during printing by ASCII codes 20 Hex through 7F Hex. Any characters not loaded are defaulted to blank.
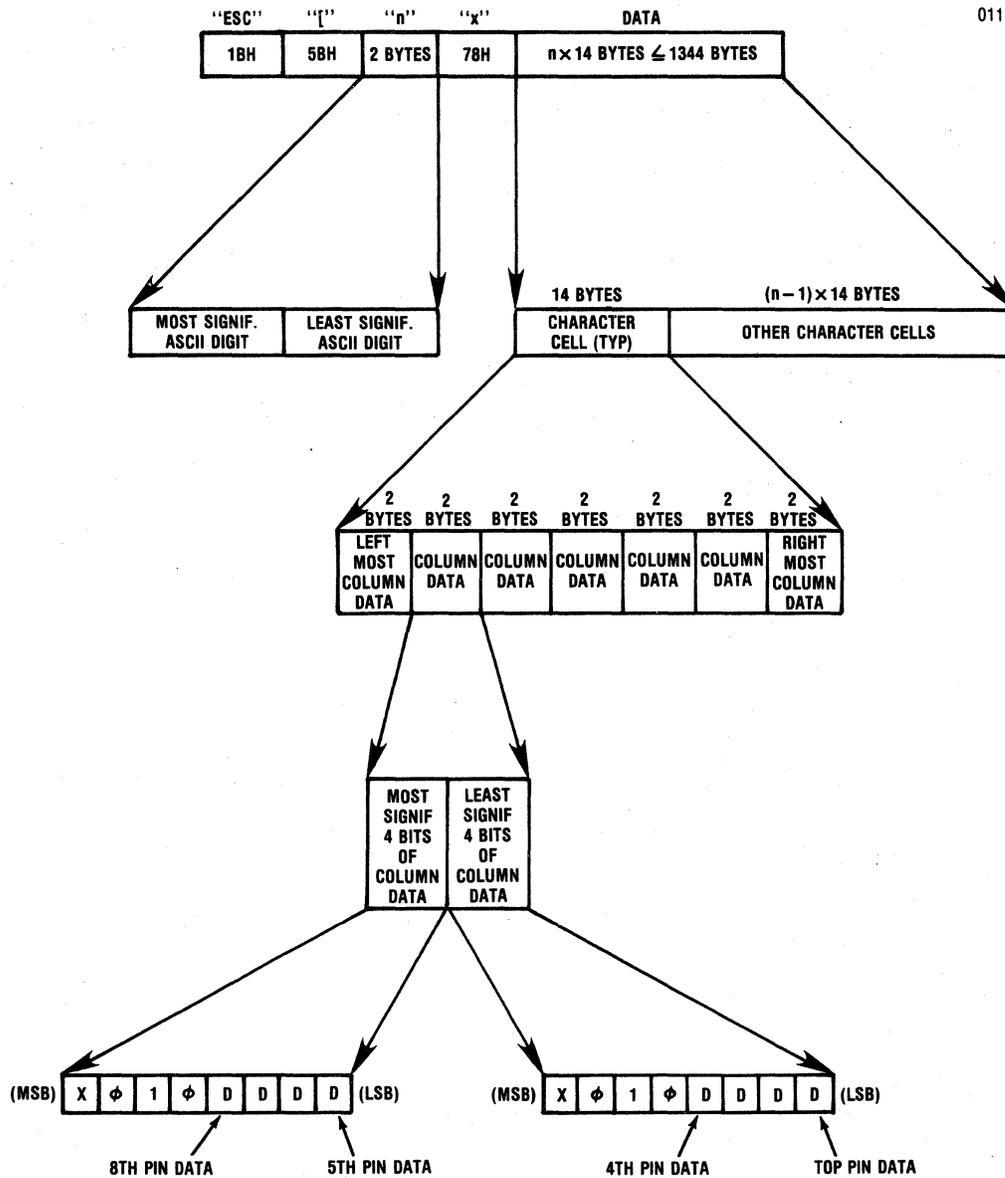
```
              "ESC"      "["       "n"       "x"              DATA
            ┌───────┬────────┬─────────┬────────┬──────────────────────────┐
            │  1BH  │  5BH   │ 2 BYTES │  78H   │  n×14 BYTES ≤ 1344 BYTES │
            └───────┴────────┴─────────┴────────┴──────────────────────────┘
```

```
                                          14 BYTES          (n−1)×14 BYTES
            ┌──────────────┬──────────────┐ ┌──────────────┬──────────────────────┐
            │ MOST SIGNIF. │ LEAST SIGNIF.│ │  CHARACTER   │ OTHER CHARACTER CELLS │
            │ ASCII DIGIT  │ ASCII DIGIT  │ │  CELL (TYP)  │                       │
            └──────────────┴──────────────┘ └──────────────┴──────────────────────┘
```

```
          2       2      2      2      2      2      2
        BYTES   BYTES  BYTES  BYTES  BYTES  BYTES  BYTES
      ┌───────┬──────┬──────┬──────┬──────┬──────┬───────┐
      │ LEFT  │      │      │      │      │      │ RIGHT │
      │ MOST  │COLUMN│COLUMN│COLUMN│COLUMN│COLUMN│ MOST  │
      │COLUMN │ DATA │ DATA │ DATA │ DATA │ DATA │COLUMN │
      │ DATA  │      │      │      │      │      │ DATA  │
      └───────┴──────┴──────┴──────┴──────┴──────┴───────┘
```

```
              ┌────────┬────────┐
              │  MOST  │ LEAST  │
              │ SIGNIF │ SIGNIF │
              │ 4 BITS │ 4 BITS │
              │   OF   │   OF   │
              │ COLUMN │ COLUMN │
              │  DATA  │  DATA  │
              └────────┴────────┘
```

```
(MSB) ┌───┬───┬───┬───┬───┬───┬───┬───┐ (LSB)    (MSB) ┌───┬───┬───┬───┬───┬───┬───┬───┐ (LSB)
      │ X │ φ │ 1 │ φ │ D │ D │ D │ D │                │ X │ φ │ 1 │ φ │ D │ D │ D │ D │
      └───┴───┴───┴───┴───┴───┴───┴───┘                └───┴───┴───┴───┴───┴───┴───┴───┘
       8TH PIN DATA      5TH PIN DATA                   4TH PIN DATA        TOP PIN DATA
```

Table 10-4 Control Escape Sequence to Load RAM Character Set

10.4 PROGRAMMING CONSIDERATIONS

The printer is controlled by the host device which must be programmed to provide the proper instructions to the printer for the desired outputs. The following is a summary of items which should be considered when programming the printer.

- Elongated characters are printed only if the horizontal pitch is 10, 12, 13.2, 15, or 16.5 cpi and are automatically terminated at the end of a line.

- Underline is NOT terminated at the end of a line and continues until a stop underline command (ESC [m) is received.

- Depending on the setting of the 703 ANSI Feature the ESC 3, ESC 4, S0, SI, GS, RS, and US codes are either acknowledged or ignored.

- When the auto line feed after carriage return is disabled, paper is NOT advanced after printing. When in this mode all carriage return (CR) commands should immediately be followed by a line feed (LF) command to prevent overprinting.

CONTENTS

Options and Accessories

V

SECTION 11
OPTIONS AND ACCESSORIES

11.1 GENERAL

The standard printer may be equipped with various options and accessories to provide additional capabilities and easier operation. For easy installation, detailed instructions are provided with each option and accessory.

Purchase orders for options and accessories should be forwarded to:

Centronics Data Computer Corp.
Customer Service Department
1 Wall Street
Hudson, New Hampshire 03051

11.2 OPTIONS

The following options are available:

CURRENT LOOP INTERFACE—A 20 MA current loop capability is provided by an optional plug-in-adapter board.

DATA INPUT CABLES—The data input cables provide the connection from the printer to the input devices. Both serial and parallel input cables are available.

RS232C Input Cable, Male to Male, 10 Ft.

RS232C Shielded Input Cable (FCC Compliance) Male to Male, 10 Ft.

36 Pin Parallel Interface Input Cable, Male to Male, 15 Ft.

20 MA Current Loop Interface Input Cable, Male to 4 Ring Terminals, 10 Ft.

Compatible Adapter EIA RS-449

11.3 ACCESSORIES

The following accessories are available.

UNIVERSAL PRINT STAND—The universal print stand provides a rigid pedestal for mounting the printer. The stand contains a paper basket to catch, fold and stack the printouts. The stand is available unassembled.

RIBBON CASSETTES—Throwaway long life ribbon cassettes containing 70 yards of ribbon and a ribbon guide are available in packages of 4 each.

MODEL 353 TECHNICAL MANUAL—Provides detailed theory of operation, adjustment, and removal/replacement procedures.

MODEL 353 ILLUSTRATED PARTS MANUAL—Provides a detailed breakdown of all printer assemblies down to the piece part level for parts ordering purposes.

READERS COMMENTS

Publications Title ___Model 353 Users Manual_____

Publications No. __37403531-9001___ Revision _____A_____ Date __Feb. 1982_____

List PCP's, if any, received with manual: _____

Name _____ Company _____

Address _____ City _____ 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)

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SUGGESTIONS FOR IMPROVEMENT:

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