NCR

System Operation

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Address correspondence to:

Technical Education/Publications
NCR Corporation
3325 Platt Springs Road
West Columbia, S.C. 29169
U.S.A.

System Operation

Contents

Overview

Release

The information in this *System Operation* book applies to Release 3.01 of the 16-bit and Release 1.01 of the 32-bit operating system based on UNIX.

Audience

The audiences for this book are the:

- Application End User
- Application Developer
- System Support Personnel

Application End User

The application end users are either application users or office procedures analysts.

The application users are the data entry clerk who enters information for subsequent use and the requestor who causes stored information to be output to the terminal or printer through a previously prepared application program.

The office procedures analysts are personnel who are knowledgeable in the business and office procedures utilized by the place of business. The procedures analyst uses application generator programs to create various data analysis and manipulating functions such as entry, query, update, and reporting for clerical and executive users.

Friendly menu and lead-through interfaces are provided so that an application end user does not need computer experience, a programming background, or a specific knowledge of the operating system.

Application Developer

The application developer is a member of the programming staff who uses the application generation tools and high-level languages. The application developer has both a direct interface to the operating system and a menu-driven interface for help information.

The application developer is expected to have a thorough knowledge of the operating system and is expected to be familiar with the *User Reference Manual*.

System Support Personnel

The system support personnel are persons who use date capture, program trace, and support tools to analyze and isolate problems. A system support person may be customer data processing management personnel, system analysts, or NCR system support personnel. The system support person has a choice of direct interface to the operating system, a menu-driven interface for help information screens, and menu-driven interface for maintenance and diagnostics processes.

The system support personnel are expected to have a thorough knowledge of the operating system and are expected to be familiar with the *User Reference Manual* and the *Superuser Reference Manual*.

Content

This book provides you with general information about the system and your jobs.

Peripheral Operation

The Peripheral Operation section provides a convenient reference for the operations of the peripherals on the system. The operations include those functions that would normally be performed on a daily basis after the system is installed.

Each chapter describes the basic operating procedures for a particular type of peripheral. These operating procedures include operating information about the controls and switches, installation procedures for various forms, ribbons, type fonts, and magnetic medias, cleaning procedures where applicable, and problem recovery procedures.

General Information

The General Information section describes the file system, system start up, and menu operations.

Procedures

The Procedures sections describe your specific jobs.

Terminals

Screen Control Keys

The following chart lists various functions that can be performed by a display terminal. The chart lists the function and then lists the particular key or sequence of keys which perform the function for the particular terminal.

A hyphen (-) between the key names indicates that the keys must be held down simultaneously. For example, CTRL-H means to hold two keys down at the same time; the Control key and the H key.

A comma (,) between the key names indicates that the keys should be pressed sequentially. For example, ESC,1 means to press the Escape key, release it, and then press the 1 key.

	7900	7901-0101	7910-0102	7930	WorkSaver*
Backspace	CTRL-H	BS	←	CTRL-H	BACKSPACE
Erase to end of line	ESC,K	ESC,K	ESC,K	ESC,K	BOUND,K
Erase to end of page	ESC,k	ESC,k	ESC,k	ESC,k	BOUND,k
Repeat	REP	REP	REP	N/A	N/A
Delete	RUB	RUB	RUB	DEL	DELETE
Move cursor UP	↑	↑	↑	↑	↑
Move cursor DOWN	↓	↓	↓	↓	↓
Move cursor RIGHT	→	→	→	→	→
Move cursor LEFT	←	←	←	←	←
Screen erase	CTRL-Screen Erase	CTRL-I	▽ -I	CTRL-I	Supershift-L
Function 1	ESC,1	ESC,1	ESC,1	ESC,1	BOUND,1
Function 2	ESC,2	ESC,2	ESC,2	ESC,2	BOUND,2
Function 3	ESC,3	ESC,3	ESC,3	ESC,3	BOUND,3
Function 4	ESC,4	ESC,4	ESC,4	ESC,4	BOUND,4
Function 5	ESC,5	ESC,5	ESC,5	ESC,5	BOUND,5
Function 6	ESC,6	ESC,6	ESC,6	ESC,6	BOUND,6
Function 7	ESC,7	ESC,7	ESC,7	ESC,7	BOUND,7
Function 8	ESC,8	ESC,8	ESC,8	ESC,8	BOUND,8
BREAK	BREAK	BREAK	⊘	CTRL-BREAK	MARK
Terminate Line	NL	NL	↵	RETURN	RETURN
HOME	HOME	CTRL-A	▽ -⊙	CTRL-A	SCROL UP
File Separation	CTRL-,	CTRL-\	▽ -4	CTRL-\	BOUND-,

N/A = not applicable

*The WorkSaver requires a terminal emulation software package that permits it to emulate one of the other terminals listed in this chart.

NCR 7900 Terminal

Brightness   Contrast   Volume   Power
Control   Control   Control Switch
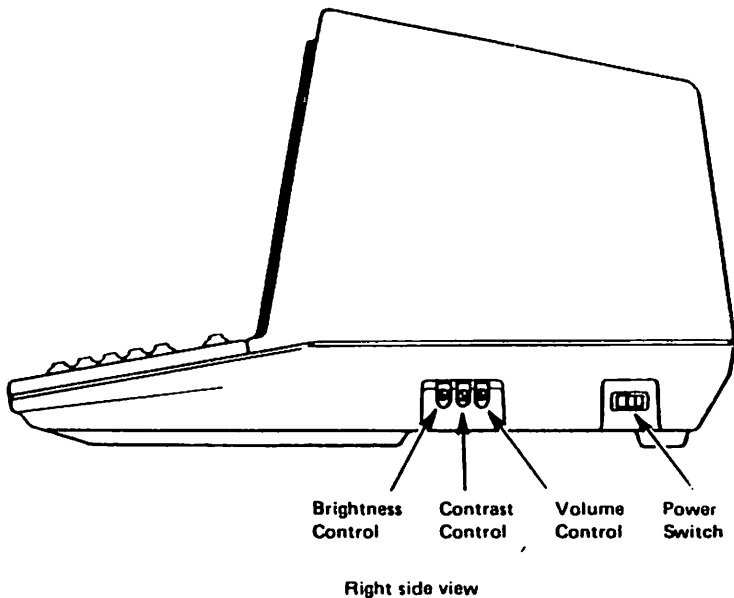
Right side view

Controls And Switches

POWER SWITCH

The power switch (rocker type) is located to the rear of the cabinet base on the right side. The switch turns the power on and off. When the unit is first turned on, a tone sounds (if the volume is up) and the status line displays a message (INT) indicating that the terminal is running initial machine diagnostics. The terminal is ready for use when RDY or ONL is displayed on the left of the status line.

BRIGHTNESS CONTROL

The brightness control is used to alter the intensity of the display on the screen.

CONTRAST CONTROL

The contrast control is used to soften or sharpen the contrast between the light and dark areas on the screen.

VOLUME CONTROL

The volume control is used to change the loudness of both the tone produced when the keys are pressed (key click) and the tone produced when an error condition occurs (error tone).

Status Line

The status line is a terminal generated horizontal line that displays status information in reverse video across the bottom of the terminal screen. The status line displays information about the status of the terminal and includes modes of operation, communication data, and error status. During actual operation the only status information that should be displayed on the status line is:

- Communication status (ONL)
- Wrap/roll mode status (ROL)
- Baud rate
- Carrier status (CARR)
- Half/full duplex status (FDX)
- Parity status (P-S)
- Transmission status (CNV)

Mode Control Keys

There are five separate function keys located above the main keyboard group. These keys are used by the operator to control the operating mode of the terminal from the keyboard.

FUNCTION	ROLL	PRINTER	AUTO LINE FEED	LOCAL

All mode control keys are dual-action keys. For example, the LOCAL key permits the operator to switch alternately between the Local and Online modes (if a line is established), and the ROLL key permits the operator to switch alternately between the Wrap and Roll modes.

FUNCTION Key

The FUNCTION key causes the terminal to enter the Function mode. The FUNCTION key is pressed, followed by a key which causes a unique ASCII code to be placed on the communication line. When the FUNCTION key is pressed, followed by a valid key, the terminal generates and transmits an STX code, the relative key code (specifying the special function), and the corresponding terminal code sequence. When the terminal is in the Function mode, a flashing FUNC is displayed on the status line (line 25). The Function mode can be terminated by pressing the FUNCTION key a second time.

ROLL Key

The ROLL key causes the wrap/roll mode status displayed on the status line to switch from ROL to WRP.

When the terminal is in the roll mode, ROL is displayed on the status line (line 25). The home position of the cursor in the roll mode is the leftmost position on line 24. When the roll mode is entered, the cursor remains in the same position and any displayed data is not changed. New data is displayed on the last data line (line 24) and, as each new line is filled, the previous data moves up one line. This removes the top line from the screen and leaves the bottom line blank, creating a rolling effect similar to the paper feed action of the typewriter. When an attempt is made to move the cursor down from the last line by pressing either the NEW LINE key, the LINE FEED key, or the Cursor Down key, each data line of the display moves up by one and the last line fills with space codes. The roll mode can be terminated by pressing the ROLL key again, thereby causing the terminal to enter the wrap mode.

When the terminal is in the wrap mode, WRP is displayed on the status line. The home position of the wrap mode is the leftmost position of the top line (line 1). When the wrap mode is entered, the cursor remains in the same position and any displayed data is not changed. As each new line is entered, the cursor moves down one line until the entire screen is full. When the end of the last data line (line 24) is reached, the cursor wraps around to the home position of the top line. Data entered after this occurs writes over previous data displayed on the screen. Any attempt made to move the cursor down from the last line by pressing either the NEW LINE key, the LINE FEED key, or the Cursor Down key, causes the cursor to wrap around to the home position on line 1.

PRINTER Key

The PRINTER key causes the terminal to enable or disable the printer interface. When the terminal has enabled the printer interface, PRT is displayed on the status line (line 25).

AUTO LINE FEED Key

The AUTO LINE FEED key causes the terminal to automatically perform a line feed whenever it receives a carriage return code from either the keyboard or the

communication line, or when the cursor advances past the end of the line. When the auto line feed mode is enabled, the message AUTO is displayed on the status line (line 25).

LOCAL Key

The LOCAL key causes the terminal to switch between the local (offline) mode and the online mode.

In the local mode, the terminal stays online but does not transmit data. Data, consisting of 255 characters, can be received and displayed when the terminal is returned to the online mode. When the terminal is in the local mode, LOC is displayed on the status line (line 25).

In the online mode, the terminal is ready to transmit and receive data. When the terminal is in the online mode, there are two possible displays on the status line: ONL if a line is established, or RDY if a line is not yet established.

NCR 7901 Terminal
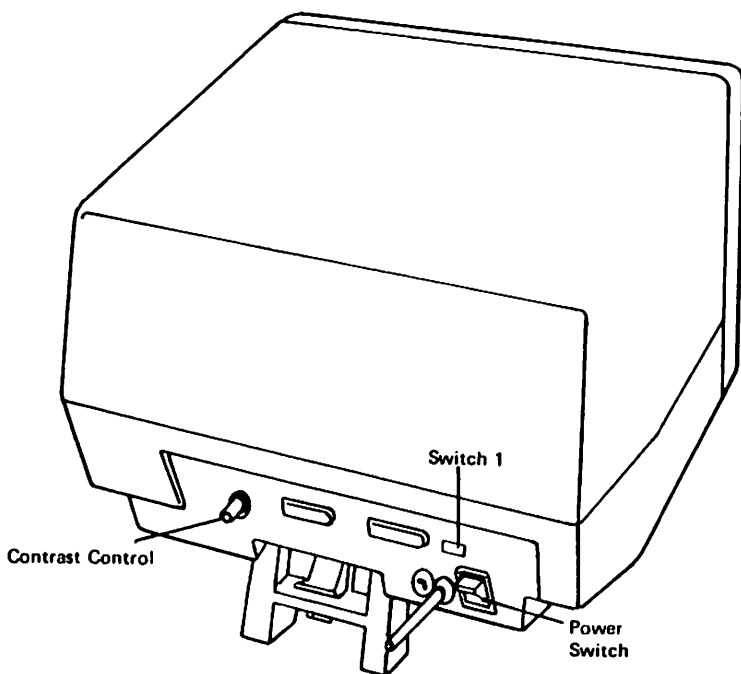
Controls and Switches

POWER SWITCH

    The power switch (rocker type) is located on the back of the cabinet base. The switch turns the power on and off. When the unit is first turned on, a tone sounds indicating that the terminal has successfully completed initial start-up diagnostics.

CONTRAST CONTROL

    The contrast control is located on the back of the cabinet base. The contrast control is used to increase and decrease the contrast between the light and dark areas on the screen.

SWITCH 1

    Switch 1 is located on the back of the cabinet base and consists of eight slide switches. The slide switches can be pushed up or down. In the following examples, the black area of the switch indicates whether the switch is pushed up or down.

SWITCH 1
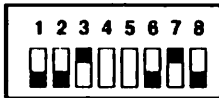
| 1 2 3 4 5 6 7 8 | Required for normal operation |

SWITCH 1

| 1 2 3 4 5 6 7 8 | ROLL mode |

SWITCH 1

| 1 2 3 4 5 6 7 8 | WRAP mode |
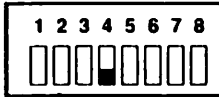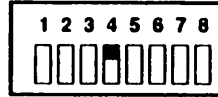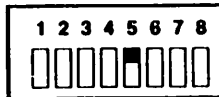
SWITCH 1

| 1 2 3 4 5 6 7 8 | Auto line feed disabled |

SWITCH 1
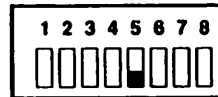
| 1 2 3 4 5 6 7 8 | Auto line feed enabled |

ROLL/WRAP MODE

When the terminal is in the roll mode, the home position of the cursor is the leftmost position on line 24. When the roll mode is entered, the cursor remains in the same position and any displayed data is not changed. New data is displayed on the last data line (line 24) and, as each new line is filled, the previous data moves up one line. This removes the top line from the screen and leaves the bottom line blank, creating a rolling effect similar to the paper feed action of the typewriter. When an attempt is made to move the cursor down from the last line by pressing either the NEW LINE key, the LINE FEED key, or the Cursor Down key, each data line of the display moves up by one and the last line fills with space codes.

When the terminal is in the wrap mode, the home position is the leftmost position of the top line (line 1). When the wrap mode is entered, the cursor remains in the same position and any displayed data is not changed. As each new line is entered, the cursor moves down one line until the entire screen is full. When the end of the last data line (line 24) is reached, the cursor wraps around to the home position of the top line. Data entered after this occurs writes over previous data displayed on the screen. Any attempt made to move the cursor down from the last line by pressing

either the NEW LINE key, the LINE FEED key, or the Cursor Down key, causes the cursor to wrap around to the home position on line 1.

AUTO LINE FEED

The AUTO LINE FEED causes the terminal to automatically perform a line feed whenever it receives a carriage return code from either the keyboard or the communication line, or when the cursor advances past the end of the line.

Screen Positioning

The NCR 7901 has a two-position tilt screen that permits the operator to raise or lower the screen angle to eye level.

To adjust the screen, press tab A and pull the stand out to lower the screen angle. Press tab B and push the stand to the locked position to raise the screen angle.

Press Tab "B" and Push Stand to Lowered Position

Press Tab "A" and Pull Stand to Upright Position
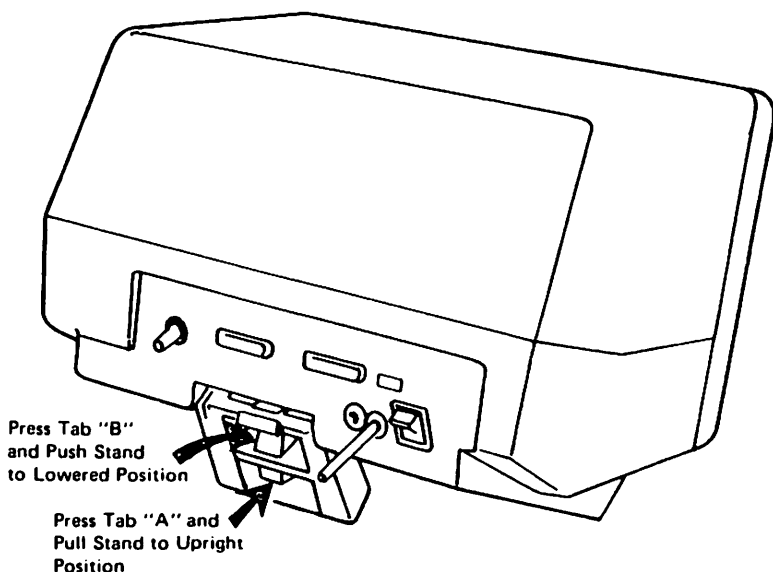
NCR 7910 Terminal
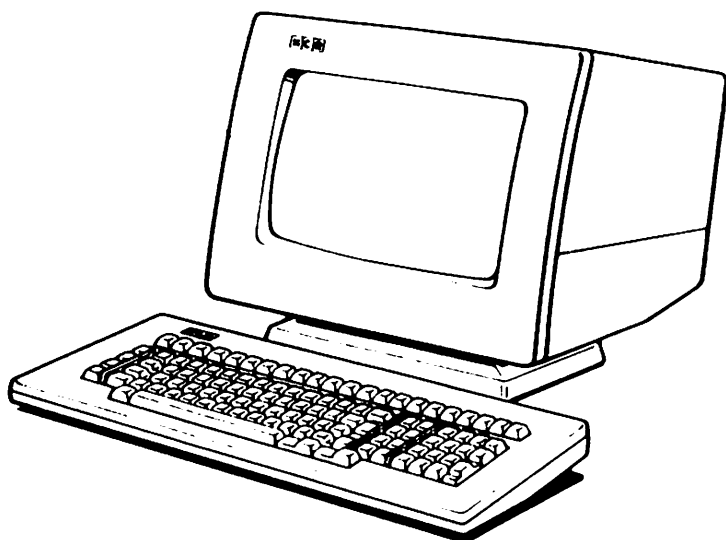
Controls and Switches

POWER SWITCH

The power switch (rocker type) is located at the back of the terminal on the left side. The switch is marked with a "1" on the top and a "0" on the bottom. To turn the terminal on, press the portion of the switch marked with the "1". To turn the terminal off, press the portion of the switch marked with the "0". The terminal is ready for use when the display screen lights up.

BRIGHTNESS CONTROL

The brightness control is used to alter the intensity of the display on the screen. This is done by pressing and holding the BRIGHTNESS key in combination with the CURSOR UP or CURSOR DOWN key (the key with an arrow pointing up or down).

CONTRAST CONTROL

The contrast control is used to soften or sharpen the contrast between the light and dark areas on the screen. This is done by pressing and holding the CONTRAST key in combination with the CURSOR UP or CURSOR DOWN key.

Brightness

Set-Up ⎤ ⎡Contrast   ⎡Copy

Alarm⅃ ⅃ Status Line
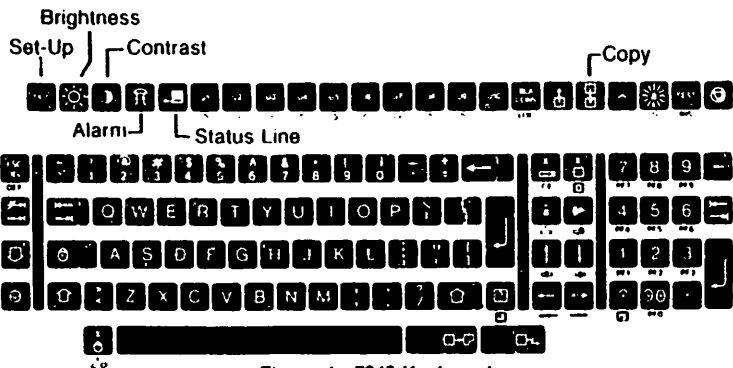
Figure 1   7910 Keyboard

ALARM CONTROL

The alarm control is used to adjust the loudness of the alarm tone on the keyboard. This is done by pressing and holding the ALARM key in combination with the CURSOR UP or CURSOR DOWN key.

KEYCLICK CONTROL

The keyclick control is used to adjust the keyclick sound that is made when the keys are pressed. This is done by pressing and holding the SHIFT key in combination with the ALARM key and the CURSOR UP or CURSOR DOWN key.

SAVING THE BRIGHTNESS, CONTRAST, ALARM, AND KEYCLICK SETTINGS

After you have made your display and keyboard settings, the new settings can be saved in permanent terminal memory. After each adjustment has been made, press and release the SET-UP key, press and release the COPY key, and press and release the SET-UP key again.

Status Line

The status line is the area at the bottom of the display screen (line 25) used to provide the operator with status and error messages. There are four possible types of status lines available to the operator:

- Primary Status Line — Used for normal operating information or error messages.
- Secondary Status Line — Used for detailed terminal status.
- User Status Line — Used for current host application status.
- Blank Status Line — Used to suppress status line display.

Each time the STATUS LINE key is pressed, the status line currently displayed is replaced by another status line. The STATUS LINE key does not change the operating mode of the terminal in any way; it only displays the four types of status lines available.

NCR 7930 Terminal
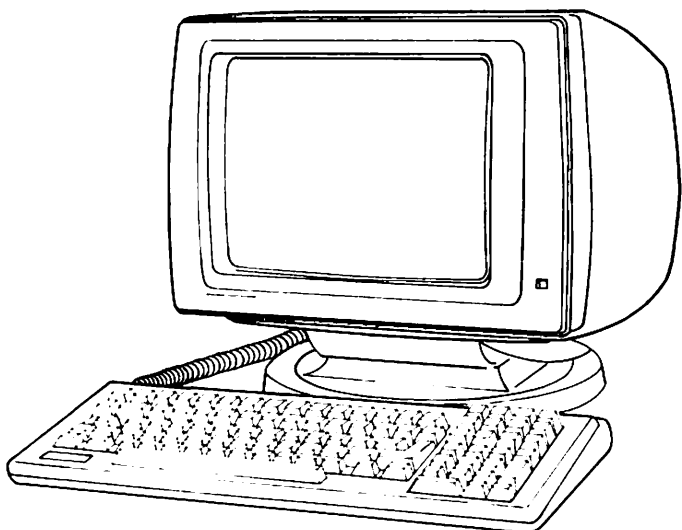
Controls and Switches
POWER SWITCH

    The power switch (rocker type) is located at the rear of the monitor next to the power cord receptacle. The switch turns the power on and off. When the unit is first turned on, a tone sounds and the status line displays a message (PASS) indicating the terminal has run its initial machine diagnostics successfully. The terminal is ready for use when CONV is displayed on the left side of the status line.

CONTRAST CONTROL

    Controlling the contrast either softens or sharpens the contrast between the light and dark areas of the screen. For the NCR 7930 terminal, controlling the contrast also controls the brightness of the terminal. To increase screen contrast, press the SHIFT key and the CURSOR UP key. To decrease screen contrast, press the SHIFT key and the CURSOR DOWN key. Each time an increase or decrease keystroke is done, the contrast is adjusted a preset amount. Repeat these keystrokes until the contrast is adjusted properly.

KEYBOARD HEIGHT CONTROL
>   On the left and right sides of the detachable keyboard are
located the keyboard height control thumb wheels. To raise
the height of the keyboard, turn each thumb wheel toward
the front of the keyboard. To lower the height of the
keyboard, turn the thumb wheels toward the rear of the
keyboard.

Screen Positioning
The viewing angle of your monitor can be adjusted. To raise
the viewing angle, grasp the lower corners of the monitor and
pull up and forward. To lower the viewing angle, grasp the lower
corners of the monitor and push down and backward. The
monitor is mounted on a swivel and can also be rotated to the
left or the right.

Status Line
The status line is a terminal generated horizontal line that
displays status information in reverse video across the bottom
of the terminal screen. The status line displays information
about the status of the terminal and includes modes of
operation, communication data, and error status. During actual
operation, the only status information that should be displayed
on the status line is:

- Communication status (CONV)
- Wrap/Roll mode status (ROL)
- Baud rate
- Carrier status (CD)
- Cursor position (row number, column number)
- Parity
- Terminal mode (7901+)

While the terminal can emulate any one of five terminal
types, the terminal is to be configured for the 7901+ mode
(model 7901 with operable function keys) when communicating
with the system. Information regarding the other
configurations is found in the *NCR 7930 User's Guide* book that
describes the terminal in more detail.

Mode Control Keys
Mode control keys are used by the operator to control the
operating mode of the terminal from the keyboard. The mode
control keys are described for the 7901+ configuration.

MODE key

The MODE key causes the terminal to switch between the conversation mode and the local mode.

In the conversation mode, the terminal is ready to transmit and receive data. When the terminal is in the conversation mode, CONV is displayed on the status line.

In the local mode, the terminal is operational but does not transmit data on the communication line. When the terminal is in the local mode, LOC is displayed on the status line.

AUTO LINE FEED key

The AUTO LINE FEED key causes the terminal to automatically perform a line feed whenever it receives a carriage return code from either the keyboard or the communcation line, or when the cursor advances past the end of the line. When the auto line feed mode is enabled, the message ALF is displayed on the status line.

SETUP key

Pressing the SETUP and SHIFT keys simultaneously starts a menu-driven configuration procedure. Through this procedure the user can either view or edit the general or communication parameters of the terminal. Detailed information on the setup procedure is found in the *NCR 7930 User's Guide* book.

AUX key

The AUX key enables and disables the AUX port on the back of the terminal. When the AUX port is enabled, data is transmitted on the communication line (EIA port) and the AUX port. When enabled, AUX is displayed on the status line of the display. The AUX port can be enabled while the terminal is in the LOC mode.

ROLL key

The ROLL key causes the wrap/roll mode status of the terminal to switch from roll to wrap or wrap to roll. The roll status is indicated by ROLL displayed in the status line. The wrap status is indicated by the absence of ROLL in the status line.

When the terminal is in the roll mode, the home position of the cursor is the leftmost position on line 24. When the roll mode is entered, the cursor remains in the same position and any displayed data is not changed. New data is displayed on the last data line and, as each new line is filled, the previous data moves up one line. This removes the top line from the screen and leaves the bottom line blank,

creating a rolling effect similar to the paper feed action of the typewriter. When an attempt is made to move the cursor down from the last line by pressing either the RETURN key or the CURSOR DOWN key, each data line of the display moves up by one, and the last line fills with space codes. The roll mode can be terminated by pressing the ROLL key again, thereby causing the terminal to enter the wrap mode.

When the terminal is in the wrap mode, the home position of the wrap mode is the leftmost position of the top line. When the wrap mode is entered, the cursor remains in the same position and any displayed data is not changed. As each new line is entered, the cursor moves down one line until the entire screen is full. When the end of the last data line is reached, the cursor wraps around to the home position of the top line. Data entered after this occurs writes over previous data displayed on the screen. Any attempt made to move the cursor down from the last line by pressing either the RETURN key or the CURSOR DOWN key causes the cursor to wrap around to the home position on line 1.

PRINT key

The PRINT key causes the terminal to enable or disable the printer interface. When the terminal has enabled the printer interface, PRINT LOCAL is displayed on the status line.

In the CONV (coversation) mode, pressing the PRINT key transmits the displayed screen of data to a printer connected to the auxiliary (AUX) port on the back of the terminal.

XMIT key

Pressing the XMIT key transmits data when the terminal is in the PAGE, message (MSG), or FORM modes. These terminal modes are not applicable to the 7901+ terminal configuration.

FUNC key

The FUNC (Function) key causes the terminal to enter the Function mode. The FUNC key is pressed, followed by a key which causes a unique ASCII code to be placed on the communication line. When the FUNC key is pressed followed by a valid key, the terminal generates and transmits an STX code, the relative key code (specifying the special function), and the corresponding termination code sequence. The codes are not displayed on the screen.

The Function mode is disabled after the first data key is pressed or if the FUNC key is pressed a second time. When the terminal is in the Function mode, FUNCTION KEY is displayed on the status line.

NCR 6098/6099 Subsystem

NCR 6098 Subsystem

Subsystem Switches and Indicators

The only operator switches on the NCR 6098 Subsystem are the power switch and the AC Power Breaker. The power switch is located in the upper left corner of the front panel (see Figure 1). The ON and Off positions are marked by a 1 (ON) and a 0 (OFF). An indicator light above the power switch (marked Power) is lit when you turn on the subsystem. When the subsystem is turned on, the disk units start automatically and reach their operating speed in approximately 30 seconds. If the remote power-up capability is being used, the power switch should be left in the On position at all times. When the system Main Unit is turned on, the subsystem is also powered up. The remote power-up capability should be enabled when the subsystem is installed. To enable the remote power-up capability requires an NCR trained technician.

The AC Power Breaker is a rocker type switch located in the lower left corner of the rear panel. Press the top of the breaker to apply power to the subsystem. The breaker should be left in the On position. If the bottom of the breaker is depressed, it indicates that power is removed from the subsystem either because an overload condition occurred in the subsystem or the breaker was manually set to the Off position. If the AC breaker is found in the Off position, press on the upper part of the breaker to move it to the On position. The breaker moves to the Off position if too much power surges in the AC line or if an overload condition occurs in the subsystem. If the breaker moves to the Off position without being touched, move the breaker to the On position. If the breaker moves to the Off position again, contact your NCR trained technician.
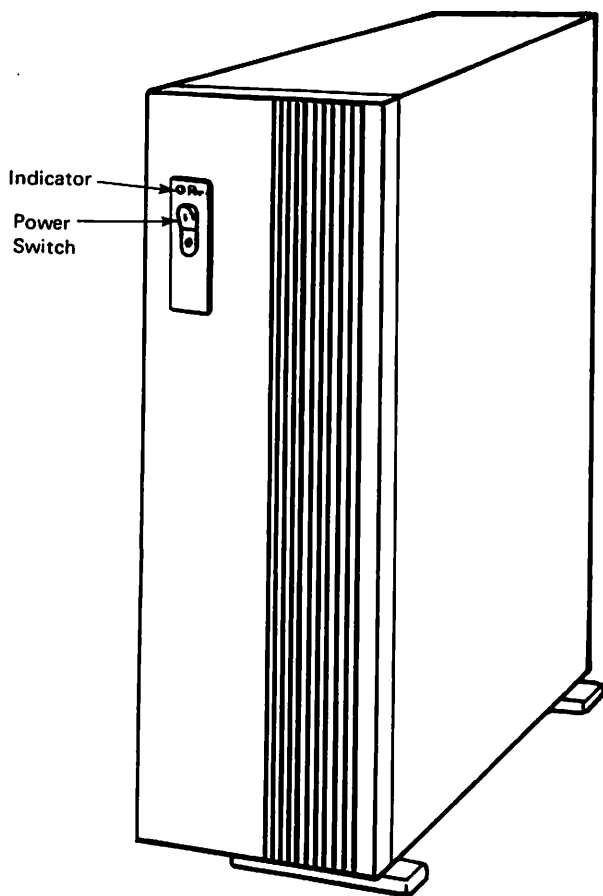
Figure 1   NCR 6098 subsystem

Subsystem Maintenance

The only operator maintenance for the NCR 6098 Subsystem is cleaning and replacing the air filter in the front panel door (see Figure 2). Air flows through the subsystem from front to back, passing through the filter in the front panel before entering the subsystem. The front panel door should be kept closed during operation of the subsystem, so that the air is filtered. No obstructions

should be placed in front of or in back of the subsystem, thereby preventing proper air flow. Air must flow easily through the subsystem to provide cooling for the internal components.

Inspect the filter periodically and either replace it or clean it when it is dirty. Cleaning the air filter is recommended only if a replacement filter is not available. In a normal office environment, air-filter maintenance should be performed every six months. In more harsh conditions,

more frequent maintenance may be required. Perform the following steps to inspect and, if necessary, replace or clean the air filter.

1. Open the front panel door. Remove the retaining bracket over the air filter by pulling the bracket down and then out.
2. Gently remove the air filter from the front panel door, being careful not to damage it. Inspect the air filter for excessive dirt or damage (such as torn areas).
3. If the filter is damaged, discard it and replace it with a new one. Replacement filters are available from your local NCR Field Engineering parts supplier. If the filter is dirty, replace it or clean it. Perform the following steps to clean the filter.

   • Wash the filter in a mixture of warm water and mild detergent.
   • Rinse the filter thoroughly and allow it to dry completely.

CAUTION

Be sure that the air filter is completely dry before installing it in the subsystem. Moisture from the filter can damage the subsystem.

   • Reinstall the air filter in the front door panel.

4. After you have replaced or reinstalled the air filter, replace the retaining bracket and close the front door panel.

NCR 6099 Subsystem

Subsystem Switches and Indicators

The switches and indicators on the front panel of the NCR 6099 Subsystem pertain to each individual disk drive and tape drive. These switches and indicators are described in the disk unit and tape unit descriptions later in this section.

The subsystem does contain an AC Power Breaker that controls the AC power for the entire subsystem. The breaker is located in a recessed opening at the bottom of the rear panel. Beside the opening for the breaker are the labels "0" (indicating off) and "1" (indicating on). Move the handle on the breaker up (towards the "1") to apply power to the subsystem. Normally, the breaker should be left in the On position. The breaker moves to the Off position if too much power surges in the AC line or if an overload condition occurs in the subsystem. If the breaker moves to the Off position without being touched, move the handle to the On position. If the breaker moves to the Off position again, contact your NCR trained technician.

Subsystem Maintenance

There are maintenance procedures for both the disk drive and the tape drive. The disk unit section and the tape unit section contain descriptions of these maintenance procedures. The only maintenance procedure required for the NCR 6099 Subsystem is the cleaning of the air filters in the front panel doors.

Air flows through the subsystem from front to back, passing through the filter in the front panel before entering the subsystem. The front panel door should be kept closed during operation of the subsystem, so that the air is filtered. No obstructions should be placed in front of or in back of the subsystem, thereby preventing proper air flow. Air must flow easily through the subsystem to provide cooling for the internal components.

Inspect the filter periodically and either replace it or clean it when it is dirty. Cleaning the air filter is recommended only if a replacement filter is not available. In a normal office environment, air-filter maintenance should be performed every six months. In more harsh conditions, more frequent maintenance may be required. Perform the following steps to inspect and, if necessary, replace or clean the air filter. Refer to Figure 3 to see the location of the NCR 6099 Subsystem air filters.

Filter Retainer

Filter Retainer

Air Filters
(Left Front Panel)
Detached

Air Filters
(Right Front Panel)
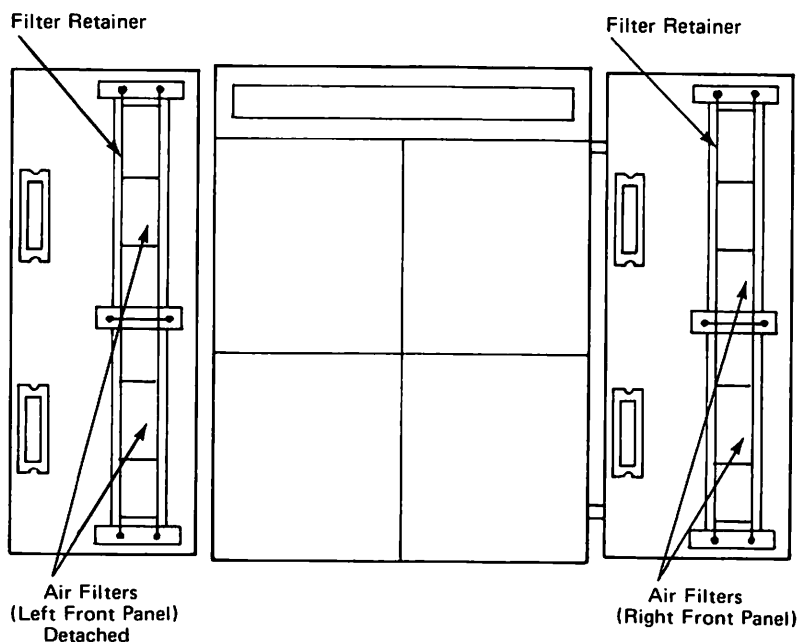
Figure 3   NCR 6099 air filter maintenance

If you do not have any disk drives in the left side of the subsystem, you can skip steps 1 and 2.

1. Open the right front panel, which is a hinged door, and remove the left front panel. The left front panel is connected to the subsystem cabinet with slide clips. Push the slide clips together with your thumb and index finger, and then remove the left front panel.

2. Remove the screws holding the retaining brackets to the front panels. Then remove the brackets.

3. Gently remove the air filters from the front panels, being careful not to damage them. Inspect the air filters for excessive dirt or damage (such as torn areas).

4. If the filter is damaged, discard it and replace it with a new one. Replacement filters are available from your local NCR Field Engineering parts supplier. If the filter

is dirty, replace it or clean it. Perform the following steps to clean the filter.

- Wash the filter in a mixture of warm water and mild detergent.
- Rinse the filter thoroughly and allow it to dry completely.

CAUTION

Be sure that the air filter is completely dry before installing it in the subsystem. Moisture from the filter can damage the subsystem.

- Reinstall the air filter in the front door panel.
5. After you have replaced or reinstalled the air filters, replace the retaining brackets, attach the left front panel to the subsystem cabinet, and close the right front panel.

NCR 6099 Disk Drive

If your NCR 6099 Subsystem does not contain any disk drives, ignore this section of the documentation.

The NCR 6099 Subsystem can contain up to four disk drives. The media and read-write mechanism are contained in a sealed chamber to protect the media from dust and other contaminants. Consequently, there are no removable disks to be installed. The disk drive switches and indicators are shown in Figure 4. The only operator maintenance for the disk drive is replacing or cleaning the air filter. Air filter cleaning is described following the switches and indicators description.
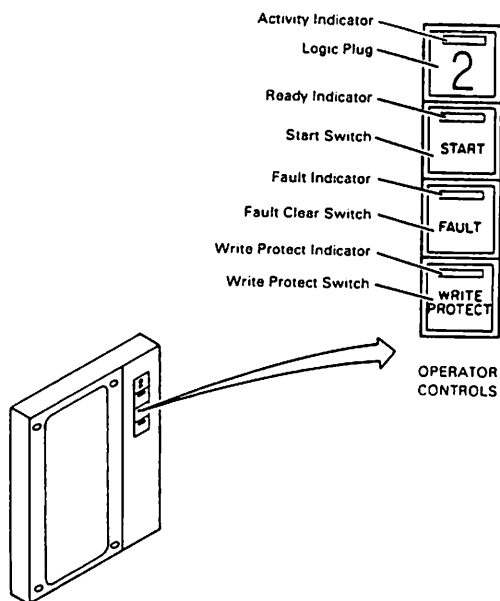
Figure 4　　Disk unit indicators and switches

Disk Drive Switches and Indicators

Logic Plug/Activity Indicator
The logic plug activates switches that establish the logical address of the drive. The number on the front of the activity plug indicates this address. The activity indicator lights up when the disk drive is selected and remains lit until the operation is complete.

START Switch/Ready Indicator
The START switch, which contains the Ready indicator, is used to start and stop the disk drive. If the Ready indicator is extinguished, the disk is not spinning and no read/write activity can take place. Press the START switch to start the disk drive. The Ready indicator flashes until the disk is ready for operation (approximately 30 seconds), at which time it stays lit continuously. To stop the disk, press the START switch

again. The Ready indicator flashes until the disk has stopped spinning (approximately 45 seconds), after which the Ready indicator stays extinguished.

FAULT Clear Switch/Fault Indicator

The Fault indicator is lit by the subsystem when a fault condition occurs on the drive. Press the FAULT switch to attempt to clear the error. The Fault indicator light goes out when the fault condition is cleared. A set of Drive Status indicators behind the air filter show the cause of the fault condition. These indicators are described in the "Disk Drive Status Indicators" section of this chapter.

If pressing the FAULT switch does not turn off the Fault indicator light, stop the disk drive by pressing the START switch. Wait until the Ready indicator has stopped flashing (at least 45 seconds after the START switch is pressed). Restart the disk drive. If the Fault indicator remains lit, stop the disk drive and contact your NCR trained technician.

WRITE PROTECT Switch/Indicator

The WRITE PROTECT switch is used to put the drive in the write- protect mode. In the write-protect mode, the disk can only be read. The indicator in the WRITE PROTECT switch is lit when the disk is in the write-protect mode. Pressing the WRITE PROTECT switch when the indicator is lit returns the disk drive to the read/write mode and extinguishes the indicator light.

Disk Drive Status Indicators

When the Fault indicator light is lit, indicating a fault error condition, you can examine the Drive Status indicators to determine the cause of the error. The Drive Status indicators are located behind the drive air filter. To view them, open the subsystem cabinet door and carefully remove the air filter. Do not damage the filter. Figure 5 shows the position of the Drive Status indicators. Figure 6 shows the meaning of the Drive Status indicators.
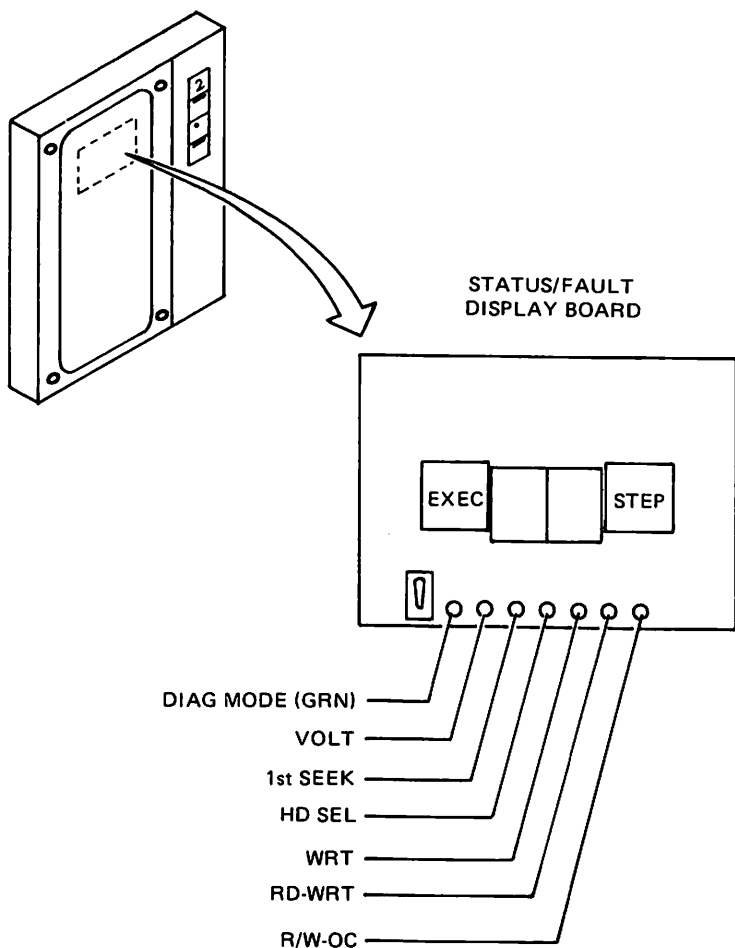
Figure 5   NCR 6099 disk drive status indicators

The Drive Status indicators are turned off by pressing the FAULT switch on the front panel. If pressing the FAULT switch does not turn off the Fault indicator light, stop the disk drive by pressing the START switch. Wait until the Ready indicator has stopped flashing (or at least 45 seconds after the START switch is pressed). Restart the disk drive. If the Fault indicator remains lit, stop the disk

drive and contact your NCR trained technician.

INDICATOR	MEANING	STATUS CONDITION
DIAG MODE	Diagnostic Mode	The drive is in the diagnostic mode (used with the drive diagnostics)
VOLT	Voltage Fault	Below normal voltage
1st SEEK	First Seek Fault	The drive failed first seek or load
HD SEL	Head Select	No heads were selected or multiple heads were selected
WRT	Write	A write fault occurred
RD.WRT	Read and Write	Read and write conditions existed simultaneously
R/W.OC	Read/Write Off Cyl.	An off-cylinder condition occurred during a read or write operation

Figure 6   Meaning of NCR 6099 disk drive status indicators

The other buttons near the Drive Status indicators are for the use of an NCR trained technician only. Do not use these buttons; otherwise, damage to the drive, the media, or your data on the media can result.

Disk Drive Maintenance

The only operator maintenance required for a disk drive in the NCR 6099 Subsystem is cleaning the air filter. Inspect the air filters periodically and either replace them or clean them when they are dirty. Cleaning a filter is recommended only when a replacement filter is not available. In a normal office environment, air-filter maintenance should be performed every six months. In more harsh conditions, more frequent maintenance may be required. Figure 7 shows the location of the disk drive air filter. Perform the following steps to inspect and, if necessary, replace or clean the air filter.
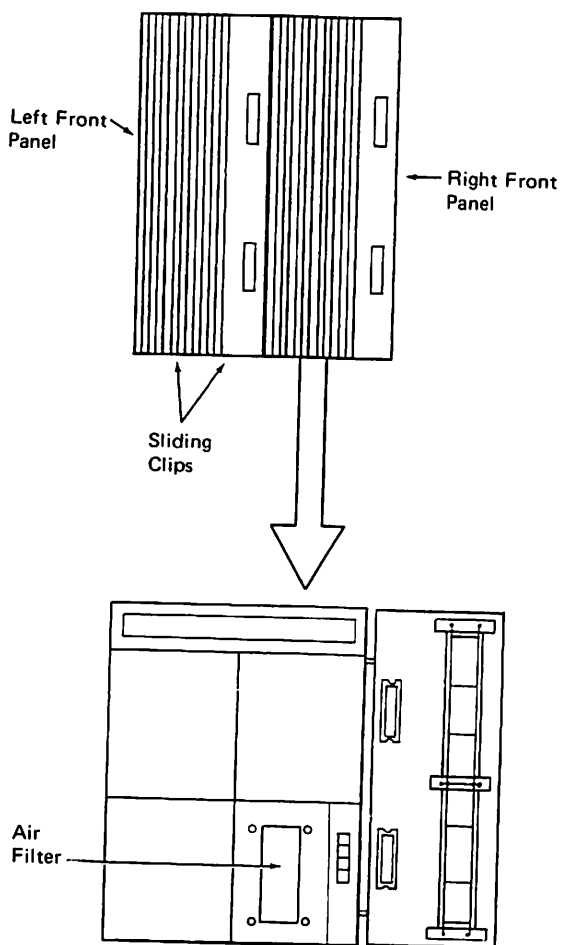
Figure 7   Disk unit air filter inspection

1. Open the right front panel, which is a hinged door, to expose the disk drive.
2. Gently remove the air filter from the disk drive, being careful not to damage it. Inspect the filter for excessive dirt or damage (such as torn areas).
3. If the filter is damaged, discard it and replace it with a

new one. Replacement filters are available from your local NCR Field Engineering parts supplier. If the filter is dirty, replace it or clean it. Perform the following steps to clean the filter.

- Wash the filter in a mixture of warm water and mild detergent.
- Rinse the filter thoroughly and allow it to dry completely.

CAUTION

Be sure that the air filter is completely dry before installing it in the subsystem. Moisture from the filter can damage the subsystem.

- Reinstall the air filter in the disk drive and close the front door panel.

NCR 6099 Tape Drive

If your NCR 6099 Subsystem does not contain any tape drives, ignore this section of the documentation.

The NCR 6099 subsystem tape drive is a half-inch, reel-to-reel tape drive. The tape drive provides automatic loading of tapes. If the automatic loading procedures can not be used, manual loading procedures are available. Operator maintenance consists of cleaning the air filter for the tape drive and cleaning the tape path components.

Tape Drive Switches and Indicators

All the switches, except the POWER switch, are touch-sensitive (pressure-sensitive) switches, each with an associated indicator light. Refer to Figure 8 to see the location of the tape drive switches and indicators.

Top Cover
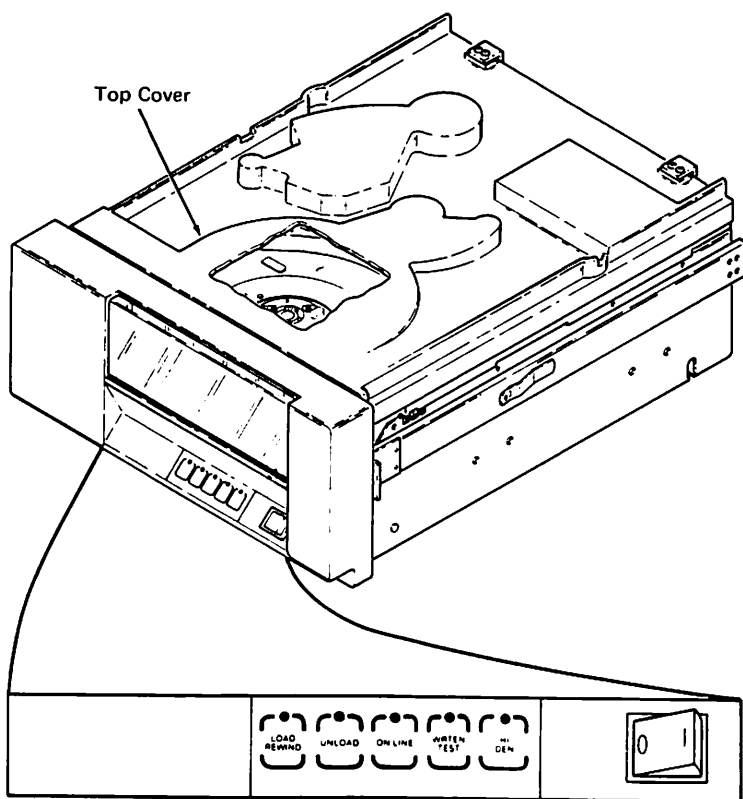
Figure 8   Reel Streaming Tape Drive fron panel indicators and switches

POWER Switch/Indicator

The POWER switch is used to turn AC power to the tape drive on and off. The ON and OFF positions are marked by a 1 (ON) and a 0 (OFF). When the tape drive is turned on, power-up diagnostics for the tape drive are initiated and the Power indicator is lit.

LOAD/REWIND Switch/Indicator

Press the LOAD/REWIND switch to automatically load the tape and advance it to the beginning-of-tape mark (BOT). Pressing this switch with the power on and the tape ready to be loaded causes the tape drive to automatically load the tape. This switch is also used to rewind the tape. If the tape is loaded and is past BOT,

pressing the LOAD/REWIND switch rewinds the tape to BOT. The Load/rewind indicator flashes during tape motion (when the tape is being loaded and when the tape is being rewound). When the tape is positioned at BOT, the Load/rewind indicator is continuously lit.

UNLOAD Switch/Indicator

Press the UNLOAD switch to unload the tape from any position. After you have taken the tape drive off-line (see the ON-LINE switch description), press the UNLOAD switch to unload the tape. The Unload indicator flashes during tape motion. The indicator stops flashing and remains lit when the unload process is complete.

ON-LINE Switch/Indicator

Press the ON-LINE switch either during the tape load sequence or after the tape load sequence is complete to enable the tape drive for read/write operations. When the drive is in the local mode (not on-line), it can not be accessed by the system. The On-line indicator light is lit when the ON-LINE switch has been pressed and BOT is reached. Also, when the drive is in the On-line mode, all other operator switches are disabled.

To unload the tape when the program has finished using it, press the ON-LINE switch. This action puts the tape drive in the local mode and extinguishes the On-line indicator light. The UNLOAD switch can then be used to continue the tape unload process.

WRITE ENABLE/TEST (WRTEN/TEST) Switch/Indicator

The WRTEN/TEST switch is used by the system support personnel to enable the diagnostic test mode. Therefore, the operator should never press this switch. When the WRTEN/TEST switch is pressed, the HI DEN indicator flashes for three seconds or until a diagnostic test is initiated by the system support person. If you accidentally press the WRTEN/TEST switch, wait until the HI DEN indicator stops flashing (approximately three seconds) before pressing any other switch. The WRTEN/TEST indicator light is lit when a write-enable ring is present on the supply reel. When the write-enable ring is present, the drive accepts both read and write commands. If the write-enable ring is not present on the supply reel, the tape can be read only.

Refer to the Magnetic Tape Media section for a description of the write-enable ring.

HIGH DENSITY (HI DEN) Switch/Indicator

The HI DEN switch is used to select the density with which the data is recorded on the tape. The tape drive is capable of reading and recording data at a rate of 1600 characters per inch (cpi), which is considered low density, or 3200 cpi, which is considered high density. When the tape is at BOT and in the local mode (not On-line), press the HI DEN switch to select the high-density mode. The HI DEN indicator is lit when the high-density mode is selected.

To return to the low-density mode, press the HI DEN switch when the tape drive is in the high-density mode and the local mode, and the tape is at BOT.

Magnetic Tape Media

The magnetic tape used in the NCR 6099 Tape Drive must be certified for at least 6250 bits per inch. Magnetic tape is available from NCR under one of the following stock numbers, depending on the length desired.

- 2400 feet - order number 242826
- 1200 feet - order number 242868
- 600 feet - order number 242923

Each reel of tape is supplied with a write-enable ring, which fits in a groove on the back of the tape reel. A tab on the write-enable ring is used to remove the ring from the reel. The write-enable ring must be present on the reel before the tape drive can write on the tape. To protect an important tape from being overwritten, remove the write-enable ring from the reel as soon as the tape is removed from the tape drive.

Automatic Tape Loading

The tape unit in the NCR 6099 Subsystem can automatically load magnetic tapes. The magnetic tape can be mounted on a standard reel; that is, the tape reel does not need a special loading jacket to be used with this tape drive (see Figure 9). For reliable automatic tape loading, the end of the tape should be cut so that it is rounded. The end

of the tape can be cut with such items as scissors, fingernail or toenail clippers, or with a tape crimping tool.

Perform the following steps to automatically load the magnetic tape.

1. Turn on the POWER switch and verify that the Unload indicator is lit (allow for a normal delay of two seconds).
2. Ensure that the tape is wound completely onto the supply reel.
3. Open the front panel door by pressing down on the top (center) of the door(refer to Figure 9).
4. Insert the supply reel into the front of the tape drive. Make sure that the write-enable ring side of the tape is toward the bottom.
5. Close the front panel door.
6. Press the LOAD switch; the access doors are now locked. When the load sequence is complete, the Load indicator stops flashing and remains lit.

Front Panel
Door

Supply
Reel
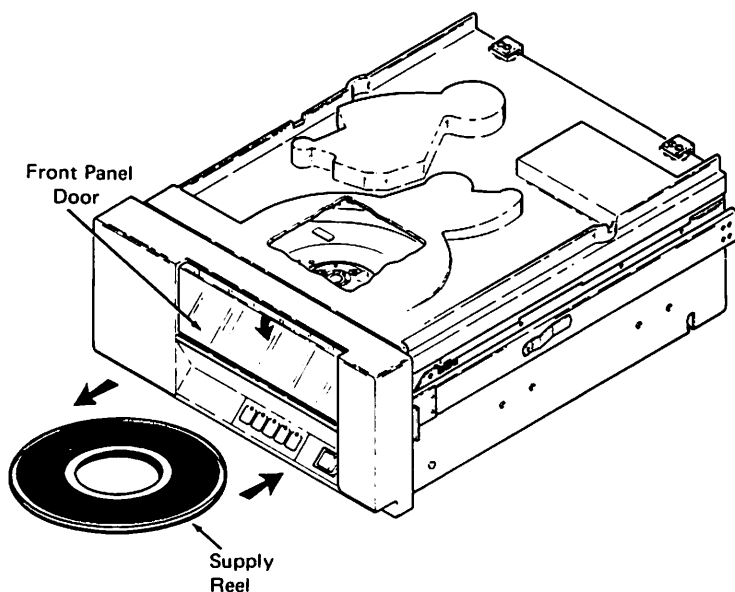
Figure 9   Loading and unloading the tape

Do not attempt to open either the top access door of the subsystem or the front panel door on the tape drive during after the load sequence has begun or while the tape is loaded in the tape drive. Both doors are locked during the load sequence and remain locked until the unload sequence is performed.

Automatic Tape Unloading
When you are ready to unload the tape, make sure that the tape drive is in the local mode (the On-line indicator is extinguished). Perform the following steps to unload the tape.

1. Press the UNLOAD switch.

NOTE: During the unload sequence, the UNLOAD

indicator flashes and the access doors remain locked. When the unload sequence is complete, the UNLOAD indicator stops flashing and remains lit, and the access doors are unlocked.

2. After the Unload indicator stops flashing, open the front panel door.
3. Carefully remove the supply reel.
4. Close the front panel door.

Tape Drive Error Codes

Certain errors can occur during normal tape loading operations. These errors produce error codes, which are displayed on the indicators on the front panel. Refer to Figure 10 for an explanation of the error codes.

Indication	Conditions
All indicators flashing	After four attempts, the tape drive did not successfully complete the load sequence. The tape leader should be checked for damage. If a second attempt at autoloading fails, refer to the "Manual Load" section.
All indicators except LOAD flashing	The BOT marker was not detected within the first 35 feet of tape. The leader must be a minimum of 6 feet in length.
All indicators except UNLOAD flashing	The supply reel was inserted upside down. The bottom of the supply reel is indicated by the presence of an insertable write-enable ring near the inside mounting radius.
All indicators except ON-LINE flashing	A load or unload operation was attempted with the front panel door or the top access door in the open position.
All indicators except WRTEN TEST flashing	A load operation was attempted without inserting a supply reel into the tape drive.

Figure 10   Operator error codes

Manual Tape Loading

If a failure occurs during the automatic tape load, you can manually load the tape by using the following steps. Before starting this procedure, you must make sure that the drive is in the local mode (On-line indicator off) and that the Unload indicator is lit.
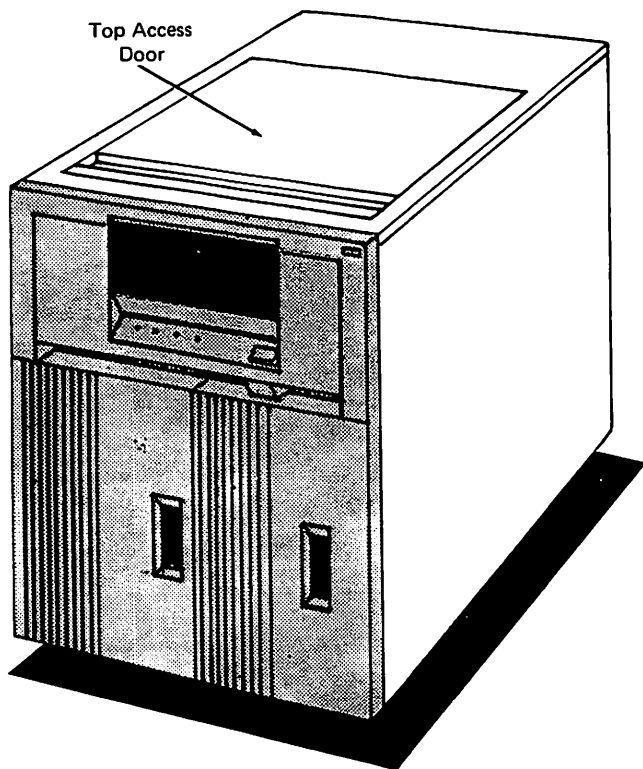
Figure 11   Tape manual loading and unloading

1. Carefully lift the top access door on the subsystem until the spring-loaded latch (located inside the cover, toward the bottom, and on the right side) locks into place. The top access door is shown in Figure 11.

2. Lift up on the left side of the top cover on the tape drive and place the plastic support post in the hole on the left edge of the tape drive.

3. Place the supply reel on the supply hub (refer to Figure 12). Be sure that the supply reel is seated evenly on the supply hub.

4. Press and hold the manual unlock button (located behind the front door panel on the bottom left side of the supply reel opening) and at the same time rotate the supply hub clockwise until the supply reel is locked in place.

5. Thread the tape along the tape path shown in Figure 12.

Top View
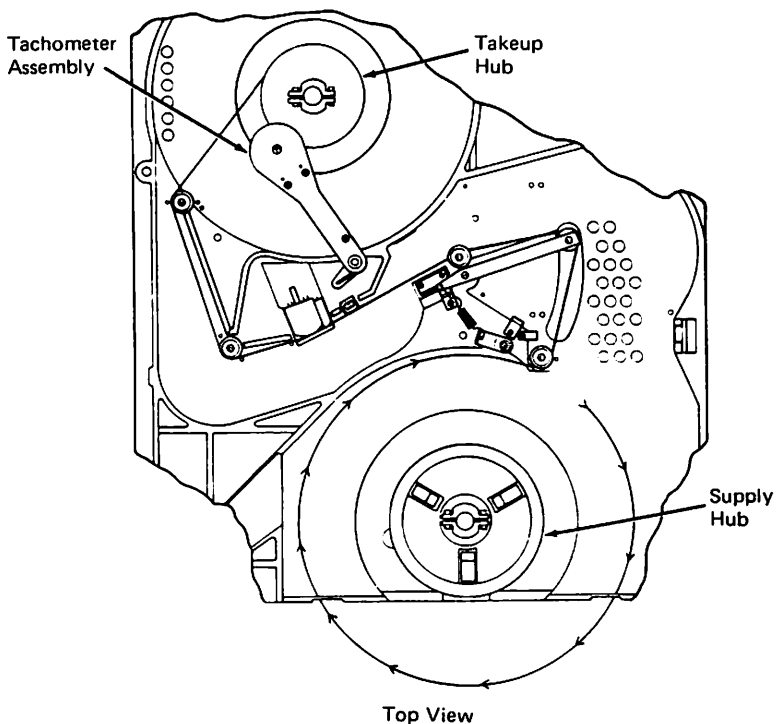
Figure 12   Tape path

6. Carefully move the tachometer assembly away from the

take-up hub.

7. Wrap the tape clockwise around the take-up hub and then move the tachometer assembly back into position against the take-up hub. Check the tape to make sure that it is seated correctly on the guides and threaded properly over the head assembly.

8. Lift up on the top cover of the tape drive, move the plastic safety support post to the back, and then close the door.

9. Use your left hand to slightly lift up the top access door and use your right hand to guide the spring-loaded latch forward along the groove until the latch locks. Carefully close the door.

10. Press and hold the HI DEN switch, then press the LOAD switch. Release both switches. The LOAD indicator should flash for a short time while the drive is searching for BOT. When the LOAD indicator stops flashing and remains lit, the tape drive is ready for use. Before the tape can be accessed, the tape drive must be in the On-line mode.

Manual Tape Unloading

If the tape drive can not complete the rewind/unload sequence, the supply reel must be rewound manually. Refer to Figures 11 and 12, and use the following directions to manually unload the tape. Make sure that the tape drive is not On-line (On-line indicator is not lit) before attempting to manually unload the tape.

1. Carefully lift up the top access door on the subsystem until the spring-loaded latch (located inside the cover, toward the bottom, and on the right side) locks into place. The top access door is shown in Figure 11.

2. Lift up on the left side of the top cover on the tape drive and place the plastic support post in the hole on the left edge of the tape drive.

NOTE: If the top cover is locked, make sure that the tape drive is not On-line (ON-LINE indicator is extinguished). Press the following switches in the sequence shown. Do not hesitate while pressing this sequence of switches. WRTEN, HI DEN, ON-LINE, ON-LINE, HI- DEN.

After pressing the switches in sequence, you should hear the top cover being unlocked. You can then proceed with the manual unload procedure. If the top cover remains locked, perform the preceding sequence. If a second attempt fails to unlock the top cover, contact your NCR trained technician.

3. Rotate the supply reel in a clockwise direction to rewind the tape onto the supply reel.

4. Press the manual unlock button (located behind the front panel door on the bottom left side of the supply reel opening) and at the same time rotate the supply reel counterclockwise until it rotates freely. The supply reel can then be removed from the tape drive.

5. Lift up on the top cover of the tape drive, move the plastic safety support post to the back, and then close the door.

6. Use your left hand to slightly lift up the top access door and use your right hand to guide the spring-loaded latch forward along the groove until the latch locks. Carefully close the door.

Tape Drive Maintenance

The only operator maintenance is routine cleaning of various parts of the tape path in the tape drive, and cleaning or replacing the air filter for the tape drive. Air filter maintenance is described following the tape path cleaning description.

A number of tape drive components along the path that the tape travels require periodic cleaning. The recording head requires cleaning every 2.4 hours of tape movement or once a day, whichever is greater. That is, the head should be cleaned no more often than once a day regardless of the amount of use. The other tape path components should be cleaned weekly. Figure 13 shows the tape path components that require cleaning.

CAUTION

Do not apply cleaner directly from the container to the surface or part to be cleaned, regardless of the instructions on the cleaner label. Always

apply the cleaner to a swab or to a clean, dry, lint-free cloth first, carefully removing any excess cleaner. The tachometer roller and roller guides contain precision bearings. Solvents allowed to run into the bearings will break down the lubricant. Use a tape drive cleaning solution containing Freon TF.
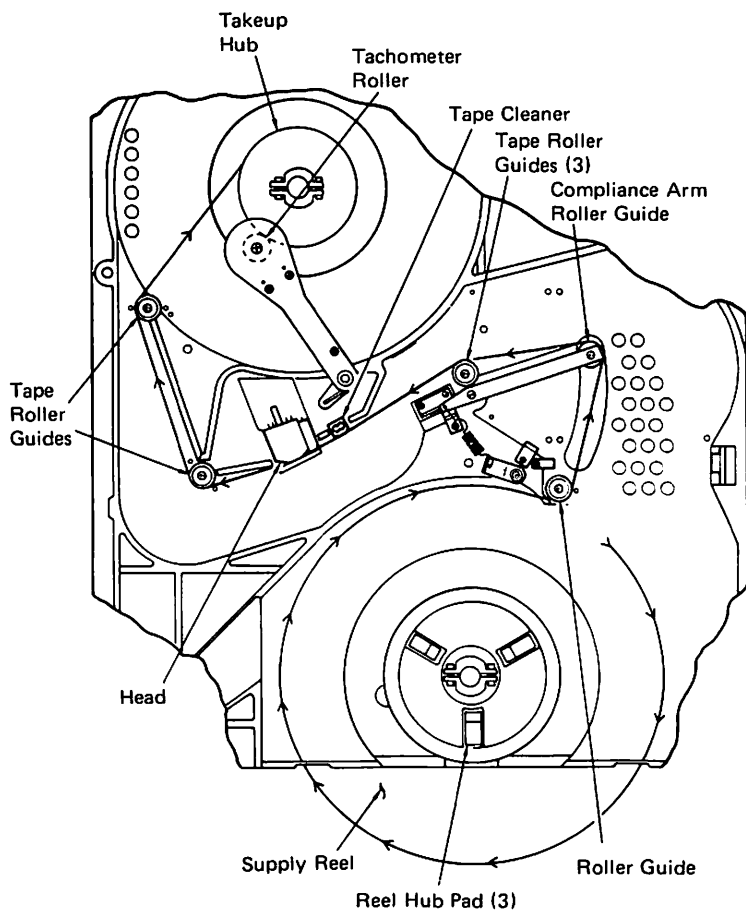
Figure 13   Cleaning the tape path components

Tachometer Roller
> Gently wipe the entire roller surface with a swab moistened with tape drive cleaner. The roller can be rotated by manually turning the take-up hub slowly.

Take-up Hub
> Rotate the hub manually while gently wiping the tape-wrapping surface with a swab or cloth moistened with tape drive cleaner.

Roller Guides
> Rotate each roller and gently wipe the tape contact surface, flanges, and washer with a swab moistened with tape drive cleaner.

Reel Hub Pads
> Wipe the contact surface of each pad with a swab or cloth moistened with tape drive cleaner and remove any debris from around the pad.

CAUTION

> Make sure you do not use materials that are rough or abrasive when cleaning the recording heads. Rough or abrasive materials can scratch sensitive surfaces of the head and cause permanent damage to both the head and the media. Also, other cleaners, such as alcohol-based types, can cause read/write errors.

Recording Head
> Wipe the surface of the recording head and attached erase bar with a swab or cloth moistened with tape drive cleaner. Pay close attention to the recessed areas while cleaning.

Tape Cleaner
> Carefully wipe each blade along its length with a swab moistened with tape drive cleaner. Remove the accumulated oxides from the recessed area between the blades.

Make sure that the tape drive is completely free of any tape drive cleaner residue before attempting to load a magnetic tape in the tape drive. Also, prevent the tape drive

cleaner from coming into direct contact with the magnetic tape. Tape drive cleaner is formulated to remove oxide from the tape path components. It removes the oxide from a magnetic tape just as well, thereby damaging the tape and any data recorded on the affected areas of the tape.

The air filter for the tape drive should be cleaned periodically (at least once every six months), depending on the cleanliness of the room the subsystem is in. Perform the following steps to remove and clean the tape drive air filter.

1. Remove the air filter from inside the air duct opening at the lower left of the tape drive front panel (refer to Figure 14).
2. Clean the air filter with low pressure compressed air or with a vacuum cleaner which allows you to vent the exhaust air through the hose. Use no water when cleaning this air filter. If the air filter is damaged (such as a torn area), contact your source of NCR Field Engineering parts to obtain a replacement filter.
3. Reinstall the air filter.
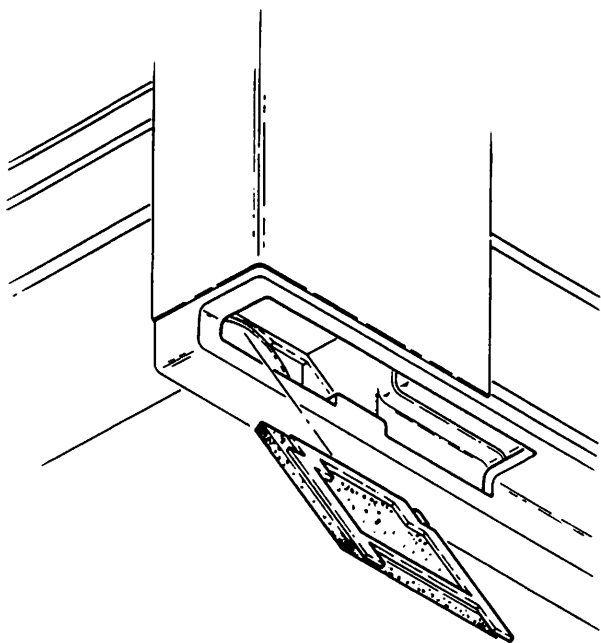
Figure 14   Air filter cleaning

NCR 6430 Band Line Printer
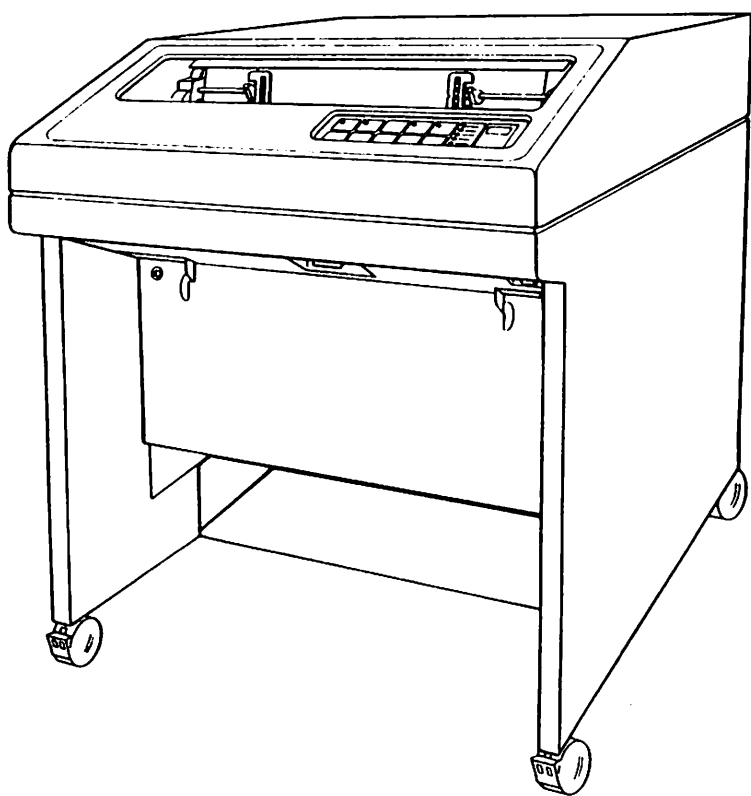
Controls and Indicators

The NCR 6430 Band Printer has controls at these locations. The power switch in Figure 1 is located on the underside of the printer cabinet underneath the control panel. The control panel in Figure 2 is located on the front of the cabinet. The dotted line in Figure 2 shows that portion of the control visible to the operator when the lid is closed. Controls outside the dotted line are accessible when the printer cover is open.
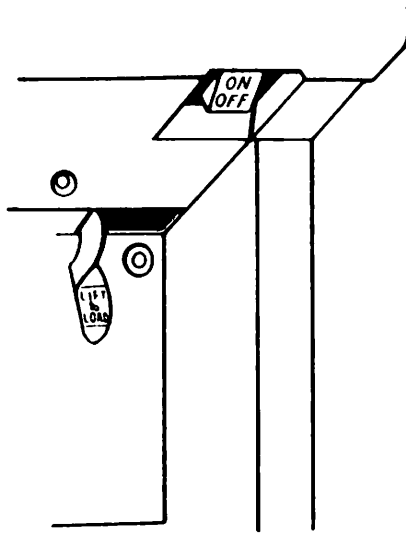
Figure 1   Power switch
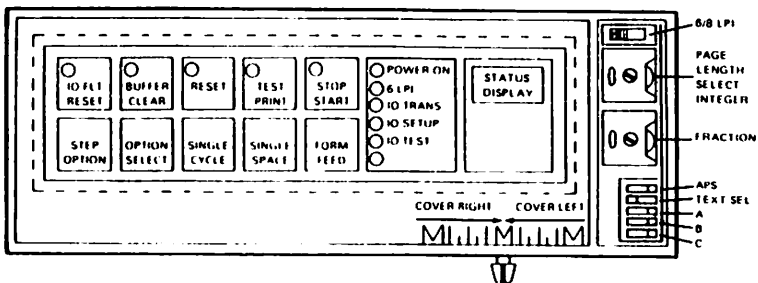
Figure 2   Control panel

POWER SWITCH

The power On-Off switch applies ac power to the printer. Press this switch on the side marked ON-I to turn the printer on. The red Power On light on the control panel should illuminate at this time.

STOP/START SWITCH/INDICATOR

Pressing this switch alternates the printer status from a Ready (online) to a Not Ready (offline) status. When the indicator is off, the printer is in a Not Ready status, it cannot print data from the data source. When the indicator is on, the printer is in the Ready mode and is able to print.

FORM FEED SWITCH

Pressing this switch advances the paper to the TOF (top of form) position. The paper advances only once, even if the switch is held down. This switch is ineffective if the printer is in the Ready state.

SINGLE SPACE SWITCH

Pressing this switch advances the paper one line. For continuous single space line feed, hold the Single Space Switch down. This switch is ineffective if the printer is in the Ready state. Advancing the paper one or more spaces does not change the TOF (top of form) setting.

If the paper throat is open and the Single Space switch is pressed, the paper advances .01 inch and advances the TOF setting by this amount. The paper throat is that area internal to the printer through which the printer forms travel. The paper throat is closed during normal operation and is opened for operator maintenance. If the throat is open, GATE is on the Status Display.

TEST PRINT SWITCH/INDICATOR

Pressing this switch while the printer is in the Not Ready mode prints a test pattern; the indicator on the Test Print switch is on during printing. Press the switch again to stop printing. If the printer is in the Ready mode, this switch is ineffective. If the TEST SEL switch (refer to Figure 2) is on, the printer outputs its current configuration. This configuration data is useful to the NCR Customer Engineer.

RESET SWITCH

Pressing this switch removes a fault code from the Status Display after the fault condition has been corrected. The Reset switch also turns off the alarm after a media fault has been corrected.

SINGLE CYCLE SWITCH

Pressing this switch prints one line of data received from the data source. This one line printing capability permits the operator to set up the printer forms using the actual data source output.

STATUS DISPLAY

This display is a four-character alpha-numeric display which displays the current status of the printer, fault conditions when they occur, and values of options that are available on the printer. Display codes are listed in the "Status Display Codes" section.

6 LPI INDICATOR

This indicator is on when the printer is set for 6 lines per inch printing. If the printer is set for 8 lines per inch printing, the indicator is off.

I/O TRANS INDICATOR

This indicator is on when characters are either received or transmitted across the interface lines. During normal printing, this light comes on periodically when data is sent to the printer.

I/O SETUP INDICATOR

This indicator is on when the configuration switches are set for either operator or customer engineer option setting.

I/O TEST INDICATOR

This indicator is on when the configuration switches are set for internal loopback tests on the printer.

BUFFER CLEAR SWITCH/INDICATOR

The indicator light on the switch is on whenever unprocessed data is in the buffer memory of the printer. Pressing the Buffer Clear switch clears buffer memory and turns the indicator light off. The switch is operative if option 45 (Enable Control Panel Buffer Clear switch) is enabled (refer to the "Options Interface" section). If the option is enabled, the switch is operative only when the printer is in the Not Ready mode.

If the printer goes into the Not Ready mode and interrupts a printing operation, pressing the buffer clear switch deletes data yet to be printed. If the operator wishes to return the printer to the Ready mode, resume printing, and print the file in its entirety, the Buffer Clear switch should not be pressed while the printer is Not Ready.

STEP OPTION SWITCH

This switch is used in conjunction with the Configuration switches to change the value of options that are available

on the printer. These options are described in the "Options Interface" section. During normal operation, this switch is inoperative.

OPTION SELECT SWITCH

This switch works in conjunction with the Configuration switches and the Stop Option switch to change the value of options that are available on the printer. These options are discussed in the "Options Interface" section. During normal operation, this switch is inoperative.

I/O FLT RESET SWITCH/INDICATOR

The indicator comes on when an I/O fault is detected. The operator should observe the Status Display code, record the fault code, and refer to the "Status Display Codes" section for the necessary action. Pressing the switch clears the error and turns the indicator off. This switch is inoperative when testing or selling printer options.

The following controls are accessible when the printer cover is open. These controls are located under a spring-loaded cover to the right of the control panel; the cover opens outward to the right.

PHASING CONTROL

This control prevents partial printing on the outside edges of a printed character. This control should be adjusted while the printer is printing. Move the lever slowly to the right if the right side of each character is not defined. Move the lever slowly to the left if the left side is not defined. Adjustment is usually required when changing to different thickness print forms.

6/8 LPI SWITCH

This 2-position slide switch sets the vertical line spacing to either 6 or 8 lines per inch. The vertical line spacing is 6 lines per inch when the switch is to the left and 8 lines per inch when the switch is to the right. When set to 6 lines per inch, the 6 LPI indicator is on.

APS SWITCH

This rocker-type switch enables or disables the automatic perforation skip (APS) feature. This feature advances the paper automatically to prevent an unpaginated print file from printing over the perforated edges of the fan-folded form. The option is enabled when the switch is on (pushed in on the right); it is disabled when the switch is off (pushed in on the left).

TEST SEL SWITCH

This rocker-type works in conjunction with the TEST PRINT switch to either print the current printer configuration or a test pattern made up of all printer characters. If the TEST SEL switch is off (pushed in on the left), the printer prints a test pattern when the TEST PRINT switch is pushed. If the TEST SEL switch is on, the printer prints the current printer configuration when the TEST PRINT switch is pushed.

A, B, C CONFIGURATION SWITCHES

The A, B, and C rocker switches permit the operator to perform limited tests of the printer and limited configuration of the printer. Various switch settings provide the following functions:

- Horizontal tab set-up
- Operator options set-up
- Internal loopback testing
- Display Printer options

Once the configuration switches select a particular function, switches on the control panel control the function. Each functions and its related ABC switch setting are discussed in the "Options Interface" section. A, B, and C are off (pushed in on the left) for normal operation.

PAGE LENGTH SELECT SWITCHES

These two thumbwheel switches define the length of the form between perforations. The operator should measure the length of the form and then set the switches to match that length. The top wheel represents whole inches, the bottom wheel represents fractional inches. If the forms length measures out to a whole inch, the bottom thumbwheel must be zero.

Switch positions should only be changed with the printer in the Not Ready mode (Start light not on). After a change in switch positions, press the Form Feed switch.

Options Interface

The options interface is the A, B, and C Configuration switches working in conjunction with various control panel switches. The switches permit the operator to test the printer and to make limited changes to its configuration. The A, B, and C switches

are rocker-type switches and are located to the left of the control panel (refer to Figure 2). All switches are off (push in on the left) for normal operation.

Display Operator Options

This function identifies the options enabled on the printer. The A, B, and C switches must be configured according to Figure 3.
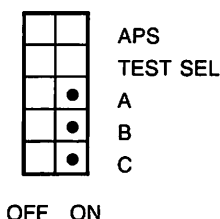

```
  APS
  TEST SEL
●  A
●  B
●  C
OFF  ON

● = down side of switch
```

Figure 3

When the A, B, and C switches are configured properly, a two digit option number is displayed in the two left most positions of the Status Display. If the option is controllable by the operator, or OP is displayed next to the option number. An option displaying a CE is strictly for the NCR Customer Engineer. Pressing the Step Option switch displays the printer option numbers in numerical order with their OP or CE displays; option numbers wrap around themselves when displayed. Option numbers and their meanings are in Figure 4. Option descriptions are in the "Operator Option Set-Up" section. Only options assigned as OP may be changed by the operator using the Operator Option Set-Up function.

01	Reserved
02	Automatic new line on Carriage Return
03	Lower to upper case translation
04	Automatic new line on right margin
05	Shift out/Shift in enable
06	Reserved
07	Invalid control code-substitute character code
08	Invalid control sequence-substitute character code
09	Transmission error-substitute character code
10	Substitute on invalid control code
11	Substitute on invalid control sequence
12	Substitute on transmission error
13	Sound bell on invalid control code
14	Sound bell on invalid control sequence
15	Sound bell on transmission error
16	Halt on invalid control code
17	Halt on invalid control sequence
18	Halt on transmission error
41	Translate on 48 character set band
42	Translate on 64 character set band
43	Translate on 96 character set band
44	Translate on 128 character set band
45	Enable Control Panel Buffer Clear switch
48	Reserved
49	Reserved
50	Reserved
51	Reserved
52	Reserved

Figure 4

Operator Option Set-Up

This function is used by the operator to change one or more printer options that are under the control of the operator. The A, B, and C switches must be configured according to Figure 5.

APS
TEST SEL
A
B
C

OFF   ON
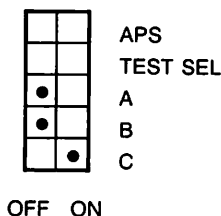
• = down side of switch

Figure 5

When the A, B, and C switches are configured properly, an option number is displayed with its option value each time the Step Option switch is pressed. Option numbers and option values are displayed according to option number order. The option numbers wrap around themselves as the Step Option switch is pressed.

Once the option to be changed is displayed, press the Option Select switch to change the option value. Figure 6 shows the possible option values for each option. Option values wrap around themselves as the Option Select switch is pressed.

Not all options can be changed by the operator, what options the operator is to control is determined at the time of installation. If the operator cannot change the value of an option, the option can only be changed by the NCR Customer Engineer. If there is any question as to what options are available, the operator should perform the Display Operator Options function.

DISPLAYED OPTION NUMBER	DESCRIPTION	DISPLAYED OPTION CHOICES
01	Reserved	
02	Automatic new line on Carriage Return	Y/N
03	Lower to upper case translation	Y/N
04	Automatic new line on right margin	Y/N
05	Shift out/Shift in enable	Y/N
06	Reserved	
07	Invalid control code-substitute character code . .	00-FF
08	Invalid control sequence-substitute character code	00-FF
09	Transmission error-substitute character code . . .	00-FF
10	Substitute on invalid control code	Y/N
11	Substitute on invalid control sequence	Y/N
12	Substitute on transmission error	Y/N
13	Sound bell on invalid control code	Y/N
14	Sound bell on invalid control sequence	Y/N
15	Sound bell on transmission error	Y/N
16	Halt on invalid control code	Y/N
17	Halt on invalid control sequence	Y/N
18	Halt on transmission error	Y/N
41	Translate on 48 character set band	Y/N/NA
42	Translate on 64 character set band	Y/N/NA
43	Translate on 96 character set band	Y/N/NA
44	Translate on 128 character set band	Y/N/NA
45	Enable Control Panel Buffer Clear switch	Y/N
48	Reserved	
49	Reserved	
50	Reserved	
51	Reserved	
52	Reserved	

Figure 6

01 Reserved

02 Automatic Newline on Carriage Return

The printer inserts a newline for every carriage return if this option is enabled. The result would be double spacing.

03 Lower to Upper Case Translation

The printer prints only upper case alphabetic characters if the option is enabled.

04 Automatic Newline on Right Margin

The printer inserts a newline when the right margin is encountered if the option is enabled. The right margin is at the extreme right column is set during horizontal tab set-up. Refer to the "Horizontal Tab Set-Up" section.

05 Shift out/Shift In enable

This option is for printers utilizing the 128 byte area (80-FF Hexadecimal) above the normal ASCII character set (00-7F Hexadecimal). Enable the option if character values exist over 7F Hexadecimal.

06 Reserved

07 Invalid Control Code-Substitute Character Code

This option defines the hexadecimal value of the character to substitute an invalid control code character. Range of values is from 00 to 7F Hexadecimal. This option value is significant only if option 10 is enabled.

08 Invalid Control sequent-substitute Character Code

This option defines the hexadecimal value of the character to substitute an invalid control sequence character. Range of values is 00 to FF Hexadecimal. This option value is significant only if option 11 is enabled.

09 Transmission error-substitute code

This option defines the hexadecimal value of the character printed in the event of a transmission error from the data source. The range of values is from 00 to FF Hexadecimal. This option value is significant only if option 13 is enabled.

10 Substitute on Invalid Control Code

If this option is enabled and an invalid control code is transmitted, the printer substitutes the character value defined in option 7.

11 Substitute an Invalid Control Sequence

If this option is enabled and an invalid control sequence is transmitted, the printer substitutes the character value defined in option 8.

12 Substitute on Transmission Error

If this option is enabled and a transmission error occurs, the printer substitutes the character value defined in option 9.

13 Sound Bell on Invalid Control Code

If this option is enabled and an invalid control code is transmitted, the printer sounds its alarm.

14 Sound Bell on Invalid Control Sequence

If this option is enabled and an invalid control sequence is transmitted, the printer sounds the alarm.

15 Sound Bell on Transmission Error

If this option is enabled and a transmission error occurs, the printer sounds the alarm.

16 Halt on Invalid Control Code

    If this option is enabled and an invalid control code is transmitted, the printer stops printing.

17 Halt on Invalid Control Code Sequence

    If this option is enabled and an invalid control code sequence is transmitted, the printer stops printing.

18 Halt Transmission Error

    If this option is enabled and a transmission error occurs, the printer stops printing.

41 Translate on 48 Character Set Band

    This option defines the character size of the print band to be 48 characters. This option is necessary only if the printer cannot detect the character size of the print band. If this option is Y (yes), options 42, 43, and 44 must be N (no). If the band can be detected by the printer, this option is set NA (not applicable) by the printer.

42 Translate on 64 Character Set Band

    This option defines the character size of the print band to be 64 characters. This option is necessary only if the printer cannot detect the character size of the print band. If this option is Y (yes), options 41, 43, and 44 must be N (no). If the band can be detected by the printer, this option is set NA (not applicable) by the printer.

43 Translate on 96 Character Set Band

    This option defines the character size of the print band to be 96 characters. This option is necessary only if the printer cannot detect the character size of the print band. If this option is Y (yes), options 41, 42, and 44 must be N (no). If the band can be detected by the printer, this option is set NA (not applicable) by the printer.

44 Translate on 128 Character Set Band

    This option defines the character set of the print band to be 128 characters. This option is necessary only if the printer cannot detect the character size of the print band. If this option is Y (yes), options 41, 42, and 43 must be N (no). If the band can be detected by the printer, this option is set NA (not applicable) by the printer.

45 Enable Control Panel Buffer Clear Switch

    This option if enabled makes the control panel buffer clear switch operational. The buffer clear switch clears buffer memory of data yet to be printed. The buffer contains unprinted data should the printer go into the Not Ready mode while printing a file. The switch is operable only when the printer is in the Not Ready mode.

Horizontal Tab Set-Up

This function sets horizontal tabs and a right print margin that are controlled by the application software. The tab settings are maintained for long as the printer remains on; all tabs are reset when the printer is powered off. The A, B, and C switches must be configured according to Figure 7.


```
        APS
        TEST SEL
 ●      A
    ●   B
 ●      C
OFF ON
```
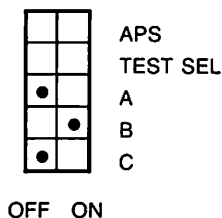
● = down side of switch

Figure 7

When the A, B, and C switches are configured properly, a three digit number is displayed on the right side of the Status Display; this number represents a printer column number. Pressing the Step Option switch increments the column number. Pressing the Option Select switch displays an H (horizontal tab set), an M (right margin set), or a blank (no tab set). If the right print margin tab is not set by the operator, the margin is set automatically to the extreme right print column. Column numbers wrap around themselves when pressing the Step Option switch. The H, M, and blank wrap around themselves when pressing the Option Select switch.

After all tabs are set, return switch B to the off position. All tabs are now programmed into the printer.

Internal Loopback Testing

This function internally tests the printer and can optionally produce a printer test pattern. The A, B, and C switches must be configured according to Figure 8.

```
|_|_|     APS
|_|_|     TEST SEL
|•|_|     A
|•|_|     B
|•|_|     C

OFF  ON
```

• = down side of switch
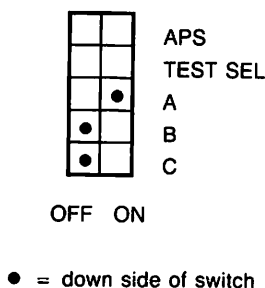
Figure 8

When the switches are configured properly, the letters ILBK (Internal Loopback Without Print) appear in the Status Display. If a test pattern print out is desired, press the Option Select switch; ILBP (Internal Loopback With Print) is displayed. To begin testing, press the Start/Stop switch. To stop testing, press the Start/Stop switch again.

Forms Installation and Alignment

The NCR 6430 Band Line Printer uses continuous forms paper only. The feeding operation is controlled by the program. The supply paper comes from the box and feeds through a slot on the underside of the printer accessible from the front. After printing, paper is ejected out the back of the machine and fan folds into a wire basket.

The characteristics of the paper that the printer can accommodate is the following:

Single Part Forms
    15 to 125 lb sheets
Multiple Part Forms
    Six-part maximum for standard pitch print (10 characters per inch) or 4 part maximum for compressed pitch print (15 characters per inch). The multiple part forms are generally made up of 11.5 lb. sheets with one-time carbon sheets from 7 lbs. to 9 lbs.
Forms Specifications
    The paper width can be from 4.0 to 15.0 inches wide and 8.0 and 14.0 inches long fold-to-fold. The forms must have sprocket holes puches along both margins.

The following procedure should be used for form insertion. Refer to Figure 9.
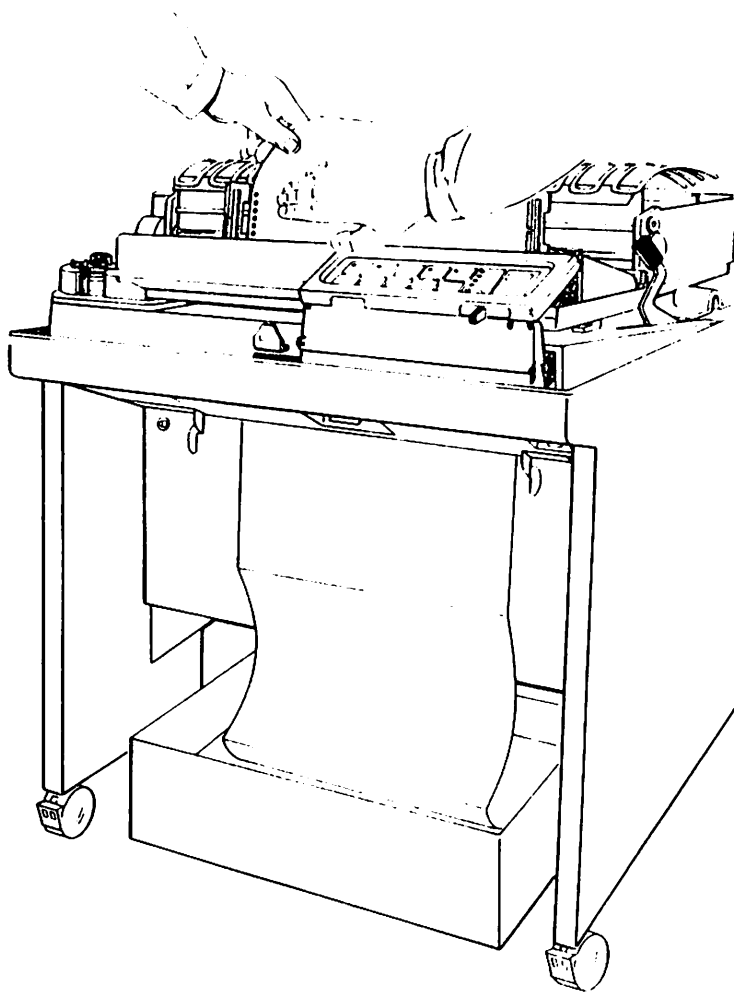
Figure 9   Form insertion

1. Put the printer in a Not Ready status. The printer is Not Ready when the Start/Stop switch indicator is not on.
2. Open the printer cover. The latch to open the cover is on the underside of the front edge of the printer. The front of the cover raises up.

3. Open the paper throat by raising the lever behind the control panel. Open the tractor flaps outward. Pull the ribbon shield towards the front of the printer.

4. Slide the box of paper under the printer from the front. Raise levers on either side of paper feed slot to open lower end of paper throat for paper insertion.

4. If necessary, position the left tractor by pressing down on the tractor lock lever and move them horizontally right or left. Pull up on the tractor lock lever to lock the tractor in place.

5. Raise the two levers on either side of the feed slot to open the lower end of the paper throat. Place the forms container under the printer.

6. Feed the paper up through the paper throat and onto the left tractor feed sprockets. Close the left tractor flap. Position the right tractor as necessary so that the tractor feed sprocket holes of the form. Make sure the form is straight. Put the paper holes on the tractor feed sprocket and close the flap.

7. Press Form Feed switch to advance the paper. Check that the paper is being delivered smoothly. Drape the paper over the wire bail.

   The alarm sounds after feeding the paper because the paper throat was open when the paper advanced. Press the Reset key to stop the alarm.

8. Advance the paper by rotating vertical position knob located on the left end of tractor shaft. Position the first line of print on the zero index mark. 6 LPI index marks are on the left side of the paper throat. 8 LPI marks are on the right side. An alternate method of setting up the first line of print can be used by lining up the notch in each tractor flap with a particular area of the form. These notches are a fixed distance from the first line of print. Once the form is set up, reference can be made to the notches in relation to the form being used.

9. Fine vertical positioning of the paper for TOF (top of form) adjustment can be achieved from the Single Space switch. With the gate open and the Single Space switch pressed, paper advances in .01 inch increments. Paper motion stops when the switch is released.

10. Close the paper throat by lowering the lever behind the control panel.

11. Adjust the page length select switches if necessary (refer to Figure 2). The top thumbwheel switch represents whole

inches, the bottom wheel represents fractional inches. If the thumbwheel switches are changed, press the Form Feed switch to establish these settings internally.

12. Press the Start/Stop switch. If the indicator on the Stop/Start switch comes on, the printer is in the Ready mode. If the indicator does not come one, check the Status Display for a fault code.

Forms Thickness Compensation

To compensate for the forms thickness, a printout must be examined after the forms are installed. If some characters are being clipped on the side move the Phasing Control slide switch in the direction indicated (refer to Figure 2); move the lever to the right of characters are being clipped on the right, or move the lever to the left if characters are being clipped on the left.

Ribbon Cassette Installation

The part number of the ribbon cassette is 198271; be careful when handling the ribbon to prevent permanent ink damage to clothing.

The following steps describe ribbon cassette removed and replacement procedures. Refer to Figure 10.
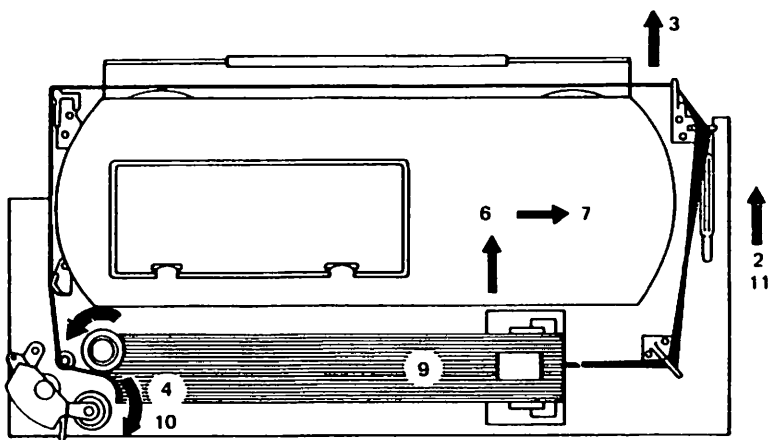
Figure 10

1. Open the printer cover; the cover latch is on the underside of the front edge of the printer. The front of the printer cover raises up.
2. Lift up on the lever behind the control panel; this opens the paper throat.
3. Push the ribbon shield support plate towards the rear of the printer.
4. Pivot the roller assembly outward; this pulls the roller assembly away from the ribbon. The roller assembly is to the left of the cassette. It has a tab on which the operator can push to move it.
5. Move the control panel (not shown in figure) away from the ribbon cassette area. The control panel is moved by holding its top edge and gently pulling towards the front of the printer.
6. Lift up on the right side of the cassette to release the spring-loaded lock. The operator should take a moment and note this unlocked position of the cassette; the new cassette must be in this position before it can be locked down.
7. Pull the ribbon cassette out and to the right. Remove the loop of exposed ribbon from its guides. Discard the old cassette.
8. Starting with the loop of exposed ribbon on the new cassette, install the ribbon around its travel guides. The label on the cassette body must be up.
9. Slide the cassette to the left until it is in the unlocked position. Push down on the right side of the cassette to lock it into place.
10. Return the roller assembly to its rest position against the ribbon. Turn the knob on top of the other roller counter clockwise to remove the slack in the loop of exposed ribbon.
11. Return the control panel to its rest position. Push down on the lever behind the control panel to close the paper throat. Close the printer cover.
12. Press the Start/Stop switch to put the printer in a Ready state; the indicator light comes on to indicate this condition.

Ribbon Roller Installation

The part number of the ribbon roller set (2 rollers) is 7044689576. The following steps describe ribbon roller removal and replacement procedures. These steps are applicable for either the front or back roller. Refer to Figure 11.
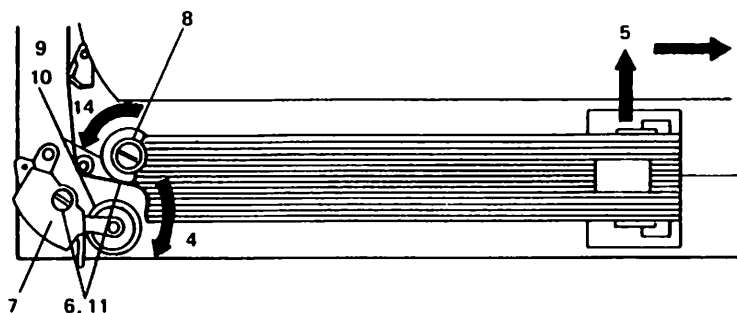
Figure 11

1. Put the printer in the Not Ready mode by pressing the Start/Stop switch. The indicator on the switch should be off.
2. Open the printer cover; the cover latch is on the underside of the front edge of the printer. The front of the printer cover raises up.
3. Move the control panel (not shown in the figure) by pulling gently on the top of the panel towards the front of the printer.
4. Pivot the roller assembly outward; this pulls the roller assembly away from the ribbon. The assembly has a tab on which the operator can push to move it.
5. Lift up on the right side of the ribbon cassette to unlock the cassette. Do not remove the cassette, but slide it to the right about one inch to expose the print rollers.
6. Remove the threaded locking cap on the top of the roller. The cap has screw-type threads and has a slot on the top large enough for a coin to start it turning. Continue at step 7 for front roller removal. Proceed to step 8 for the removal of the back roller.
7. This step applies to the front roller: remove the shaft support. The shaft support fits over the threaded post of the locking knob and the top end of the roller shaft. The shaft support lifts straight up.
8. This step applies to the back roller: remove the ribbin-tensioning knob from the top of the roller. The knob lifts straight up. The operator should note that the knob has two keys on the bottom which fit into a keyway on the roller when it is installed. Continue at step 9.
9. Remove the print roller by lifting it straight up. The operator should note the keyway on the bottom of the roller. This keyway must align with drive keys when the new roller is installed.

10. Install the new roller. Turn roller slowly on shaft making sure key and keyways align.

    For the front roller, install the shaft support over the threaded lock-down post and the top end of the roller shaft.

    For the back roller, install the ribbon-tensioning knob on top of the shaft. The keys of the knob must align with the keyway on the roller.

11. Install locking cab and tighten with a coin.

12. Slide ribbon cassette to the left and lock it down.

13. Return front roller assembly to its rest position. It and the rear roller should be pinching the ribbon.

14. Turn the ribbon-tensioning knob counterclockwise to remove the slack in the exposed loop of ribbon.

15. Return the control panel to its rest position.

16. Press the Single Space switch or the Form Feed switch. Besides advancing forms, either of these switches activate the ribbon drive motor. Observe the ribbon to insure proper travel when the switch is pushed.

17. Close the printer cover. Put the printer in the Ready mode by pressing the Start/Stop switch; the indicator light should be on.

Print Band Installation

The following steps describe print band removal and replacement procedures. Refer to Figure 12.
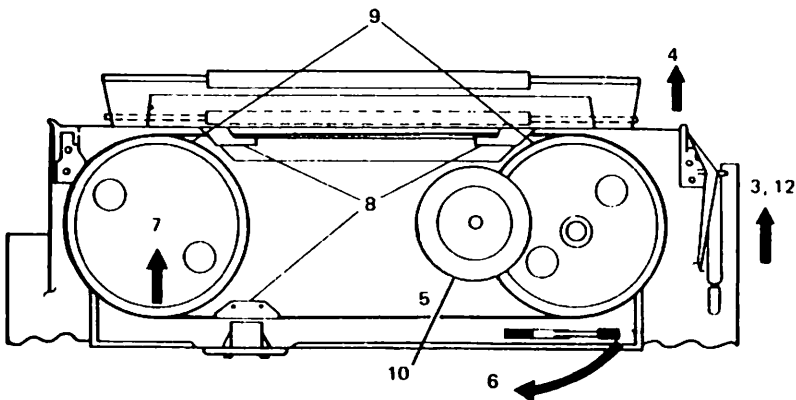
Figure 12

1. Put the printer in the Not Ready mode by pressing the Start/Stop switch. The indicator on the switch shold be off.
2. Open the printer cover. The cover latch is on the underside of the front edge of the printer. The front of the printer cover raises up.
3. Lift up on the lever behind the control panel to open the paper throat.
4. Push the ribbon shield support towards the back of the printer.
5. Open the print band cover. The print band cover holds the plastic reference cards normally visible through the printer cover window. Lift the cover up from the back; the cover opens towards the front of the printer.
6. The steel print band travels around two pulleys on either side of the printer. Locate the lever directly in front of the right pulley; move it up and to the left to release the tension on the band.
7. Lift off the print band.
8. Install the new band around the pulleys; the band must go between the ribbon and the platen, and the top edge of the band must be against the band guides.
9. Center the band on each pulley and apply partial tension with the lever to keep the belt from slipping. Move the lever to the right to apply tension.
10. Rotate the flywheel in a clockwise direction while increasing the band tension slowly. Continue increasing pressure while rotating the flywheel until the lever is at its position of maximum tension.
11. Close the print band cover.
12. Push down on the lever behind the control panel to close the paper throat. Close the printer cover.
13. Press the Start/Stop switch to put the printer in the Ready mode; the indicator light on the switch should be on.

Ribbon Shield Replacement

The part number of the ribbon shield is 7044689598. The following steps describe ribbon shield removal and replacement procedures. Refer to Figure 13.
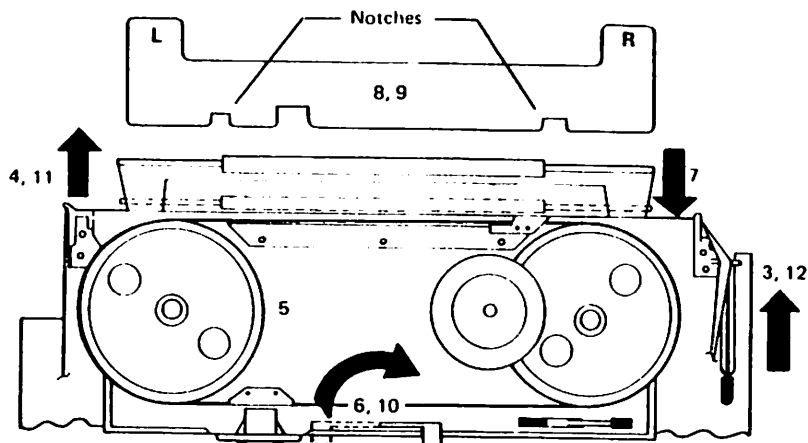
Figure 13

1. Put the printer in the Not Ready status by pressing the Start/Stop switch; the indicator on the light should be off.
2. Open the printer cover. The cover latch is on the underside of the front edge of the printer. The front of the printer cover raises up.
3. Lift up the lever behind the control panel to open the paper throat. For better visibility, lift up the two levers (not shown) on the underside of the printer. These levers are normally lifted for forms installation.
4. Push the ribbon shield support plate towards the back of the printer.
5. Open the print band cover. The print band cover holds the plastic reference cards normally visible through the printer cover window. Lift the cover up from the back and open it towards the front of the printer.
6. A small lever is located in the center of the print band compartment towards the front of the printer. Move the lever from left to right to release the ribbon shield clamp located at the bottom of the paper throat.
7. Pull the ribbon shield support plate gently towards the front of the printer.
8. The ribbon shield is visible immediately behind the ribbon shield support plate. The operator should first look down the paper throat and observe the location of the shield presently in place. After this is done, remove the ribbon shield by lifting it up and out of the paper throat.

9. Install the new ribbon shield in the open clamp. Within the clamp are two metal guides on either side. These guides are to align with the outer notches on the ribbon shield. Observe left and right sides of the ribbon shield with the L and R letters punched into the shield. Once the shield is in the clamp, try moving the shield left and right to feel the two shield notches align with the clamp guides. The shield must be behind the ribbon shield support plate. The shield must be seated completely in the shield clamp.

10. Close the ribbon shield support clamp. Move the clamp lever from right to left. Make sure that ribbon shield is not bowed in the clamp and that it is free of the ribbon support plate.

11. Push the ribbon support plate towards the back of the printer. Close the print band cover.

12. Push down on the lever behind the control panel to close the paper throat. Close the printer cover.

13. Press the Start/Stop switch to put the printer in the Ready mode; the indicator light on the switch should be on.

Cleaning

The operator should clean the printer if paper dust or dirt build-up accumulates. The following steps describe the internal cleaning procedures.

1. Turn the printer power switch off. The Power On indicator should be off.

2. Perform steps 2 through 6 in the "Print Band Installation" section to remove the print band.

3. Use a soft bristle nozzle attachment on a vacuum cleaner and a small, soft bristled brush to remove all paper dust, ribbon list, etc. from the print band path and all exposed components.

4. Clean the print band with denatured alcohol.

5. Perform steps 7 through 10 in the "Print Band Installation" section to install the band.

6. Turn the printer power switch on. The Power On indicator should be on.

7. Press the Start/Stop switch to put the printer in the Ready mode; the indicator light on the switch should be on.

Status Display Codes

The Status Display codes notify the operator of a printer status or fault. For the printer faults which are correctable, a corrective action entry is supplied.

All the display codes are not listed; only these codes meaningful to the operator are listed. If a code cannot be cleared or if a code appears which is not listed perform the following steps:

- Record the error as soon as it occurs
- Attempt to reset the printer by powering it off for a few seconds, and then back on using the On/Off switch
- If the code cannot be cleared, notify the NCR Customer Engineer

DISPLAY	FAULT/STATUS	CORRECTIVE ACTION
BAND	Type of band not detected	Check band installation. Retry.
BMSE	Band motor speed error	
BSE	Band sync error	
CR>5	More than 5 consecutive carriage returns	Probable data source error
DOVF	Data overflow error	Maximum line length exceeded, possible I/O error
FRMS	Paper not moving (paper jam)	Remove paper jam. Close gate/band cover
GATE	Paper throat is open	
ICC	Invalid control code	
ICS	Invalid control sequence	
IHT	Invalid horizontal tab load	
ILBK	Internal Loopback Without Print	
ILBO	I/O line buffer overflow (right margin)	

ILBP	Internal Loopback With Print	
ILCD	Invalid control code	Possible data source problem
INIT	Invalid code executed	Monitor for reoccurance
ITRN	I/O transmission error	
OOP	Out of paper	Replace paper
NFLT	Normal status; no faults	
NUTS	Printer band not up to speed	
NVER	Option store error	Press I/O FLT to continue. Check option settings.
PAGE	A combination of 6 and 8 LPI lines has occurred which was not compatible with one selected page length.	Possible data source error
PMTN	Paper motion cycle in process	
PRNT	Print cycle in progress	
RIB	Ribbon not moving	Inspect for cause of jam
VFER	Fractional thumbwheel doesn't match vertical pitch	Change vertical pitch or fractional thumbwheel switch setting. Feed one sheet with the Form Feed switch.

NCR 6442 Matrix Line Printer
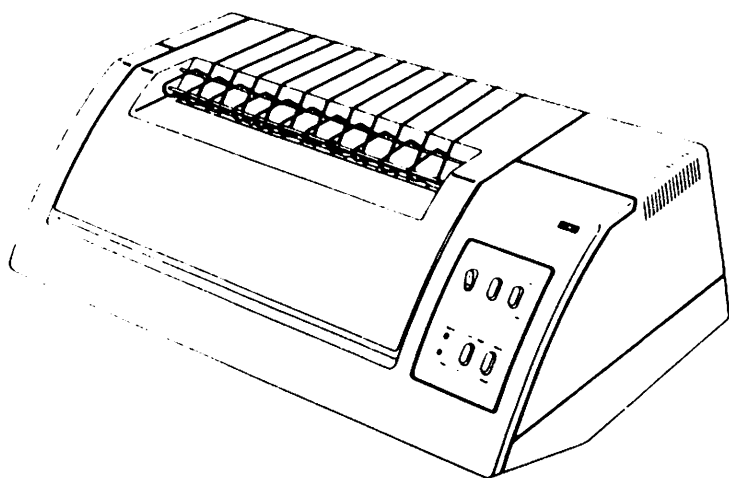
Controls and Indicators

The NCR 6442 Matrix Line Printer has two control panels. The control panel shown in Figure 1 is situated on the front of the cabinet. The second control panel shown in Figure 2 is only accessible to the operator when the lid is opened.
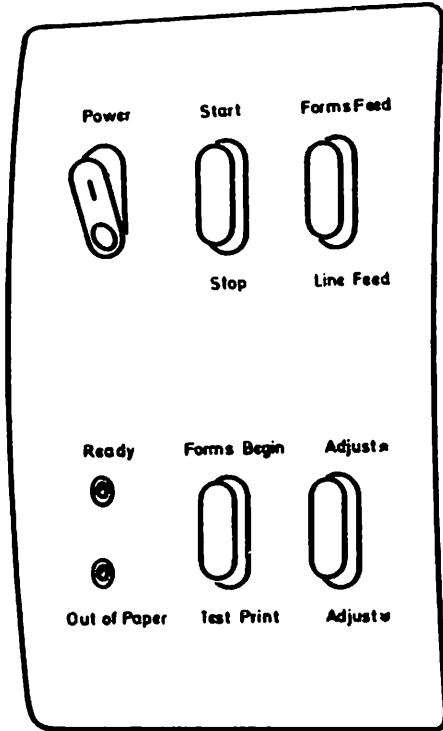
Figure 1   Control panel

POWER SWITCH

The Power switch is positioned at the upper left corner of the control panel (Figure 1). Setting this switch to "1" applies power to the printer and turns the indicator lamp on; moving it to "0" turns power off. Every time the unit is turned on and the printer lid is already closed, the print head carrier returns to the left hand margin and a power-up self check is performed.

START/STOP SWITCH

Pressing the upper end of this two-way switch (Start), puts the printer into the Ready (online) state and the Ready indicator lamp is turned on. The printer is now ready for data loading and printing.

When the lower end of the switch (Stop) is pressed, the printer goes into the Not Ready (offline) state and the indicator lamp is turned off. This function permits the operator to stop or disable printing. The printer can be set to the Ready (online) state again by pressing the Start side of this switch.

FORMS FEED/LINE FEED SWITCH

The Forms Feed/Line Feed switch is a two-way push button switch (Figure 1) that can only operate in the Not Ready state of the printer. The line feed operation advances the paper by the distance of one line as defined by the 6/8 LPI switch. The forms feed operation advances the paper to the next form top as defined by the variable form length control.

FORMS BEGIN/TEST PRINT SWITCH

The Forms Begin/Test Print switch is a two-way push button switch (Figure 1), that when pressed, sets the electronic forms length counter to the number of lines indicated by the variable form length control, located on the left side printer frame (Figure 2) and synchronizes the electronics with the actual start of the form. Before operating this switch, the printer must be set to the Not Ready state by pressing the Stop side of the Start/Stop switch. Pressing the Forms Begin switch sets the printer to the Ready state.
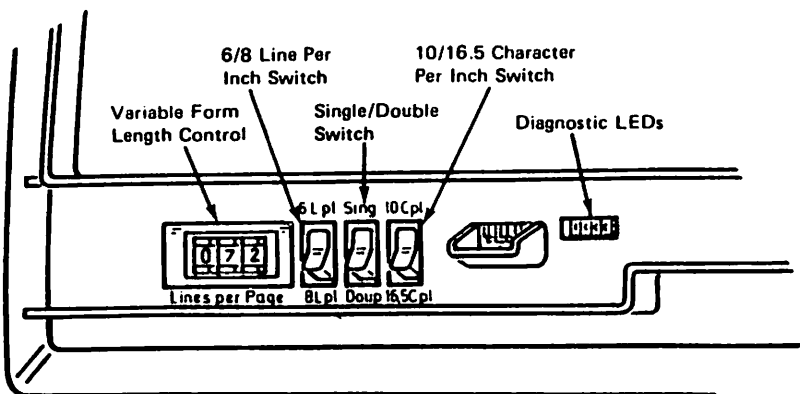
Figure 2   Vertical forms control switches

When the Test Print side of this switch is momentarily pressed, the print head carrier moves to the nearest line end, to the right or left, and prints a line of characters having the pattern ETNAIV alternating with one space followed by a line advance. This operation is repeated as long as the switch is depressed and paper is present.

ADJUST SWITCH

With the printer in the offline state, the Adjust two-way push button switch (Figure 1) advances the paper a small amount and permits the operator to adjust the form after insertion or misalignment to the first line.

Depressing this switch causes the printer to move the form forwards or backwards in a micro-stepping mode without changing the line counter content. By pressing this switch longer than ½ second the form is moved constantly at a very low speed, that is 1/12 inch per second.

6/8 LINES PER INCH SWITCH

The operator has the ability to select the line spacing of either 6 lines per vertical inch by pressing the 6 LPI side of this switch, or 8 lines per vertical inch by pressing the lower (8 LPI) side of the switch (Figure 2).

READY INDICATOR

The Ready indicator is a green lamp that, when lit, indicates that the printer is in a Ready state.

When this indicator is off, this signifies:

- The printer power is off.
- An out-of-paper condition has been detected.
- The printer did not successfully pass the power-up diagnostic routines.
- The printer is in an offline state and not ready.

OUT-OF-PAPER INDICATOR

If an out-of-paper condition is detected, printing is not stopped but the condition is signalled to the system. The Out-of-Paper indicator is a red lamp that, when illuminated, indicates the end of form. The out-of-paper condition is detected and the lamp is illuminated when the actual end of paper is 120 mm (4.75 inch) before the print station.

SINGLE/DOUBLE SWITCH

The Single/Double switch determines the length of the line spaces. When the Sing (single) side of the switch is pressed (Figure 2), the paper is fed one line at a time. With the Doub

(double) side of the switch pressed, all line feed operations advances the paper two lines instead of one.

10/16.5 CPI SWITCH

The print density can be selected by the operator by activating the 10/16.5 CPI switch. With the 10 CPI side pressed, (Figure 2), 10 characters per horizontal inch are printed, resulting in a maximum line length of 132 columns per line. Pressing the 16.5 CPI side of this switch causes a print of 16.5 compressed characters per inch, that is a maximum line length of 218 columns per line, to be printed.

VARIABLE FORM LENGTH CONTROL

The Variable Form Length control shown in Figure 2 is manually set to the forms length as defined by the number of print lines contained on each form from top to bottom (21-136 lines).

After the forms are aligned to the first line, the line counter can be synchronized with the selected forms length by pressing the Forms Begin switch.

Forms Installation and Alignment

The NCR 6442 Printer is designed for easy insertion of the paper by providing large openings on the cover and on the rear of the machine (Figure 3). The paper entry is located on the rear bottom cover. The exit is situated one inch above the print station on the front side.

The printer is provided with a continuous forms feeder which can handle continuous forms paper only. The feeding operation is controlled by the program. The supply paper is put in a paper basket, and after printing is ejected to the back of the machine.

To cut forms without perforation, a tear bar is provided along the front of the printer lid. The tear bar is located one inch above the print line, therefore the paper must be advanced before it is torn off.

The printer is able to handle a range of paper sizes within the following limits.

- Width 4 inches to 15 inches
- Length 3.5 inches to 17 inches
- Fold Length 7 inches to 17 inches

The following procedure should be used for form insertion.

1. Tilt the printer lid to the back, thereby deactivating the printer.
2. Open the tractor flaps on the forms feeder.
3. Release the tractor fasteners.
4. Adjust the tractors horizontally.
5. Align the left margin of the tractor to the edge guide. Make sure that the first character of the printed line is not closer than 15 mm (0.6 in.) to the edge of the paper.
6. Retract the print head by moving the paper thickness adjustment lever on the inner left side frame to the head retract position (Figure 4).
7. Push the paper supply under the printer — align the paper package centrally under the rear part of the printer.
8. The first form is moved through the opened back door into the cabinet and into the tractors.
9. Adjust the position of the right tractor so that with the paper straight and the feed holes over the tractor pins, the paper is properly tensioned. Make sure that the last character position of the printed line is not closer than 15 mm (0.6 in.) to the right hand edge of the paper.
10. Close the tractor flaps.
11. Adjust the form to the first line of the next performated page border to align with the front edge of the platen by pressing the Line Feed/Forms Feed or Adjust switches.
12. Select the number of lines per page on the Variable Form Length Control switches and synchronize the line counter with the Forms Begin switch.
13. Select the single or double line spacing by activating the Sing/Doub switch.
14. Select the vertical line spacing by pressing one side of the 6/8 LPI switch.
15. Set the forms thickness compensation to the desired position, according to the thickness of the form.
16. Close the back door.
17. Close the printer lid.
18. Press the Start switch to bring the printer into the Ready state.
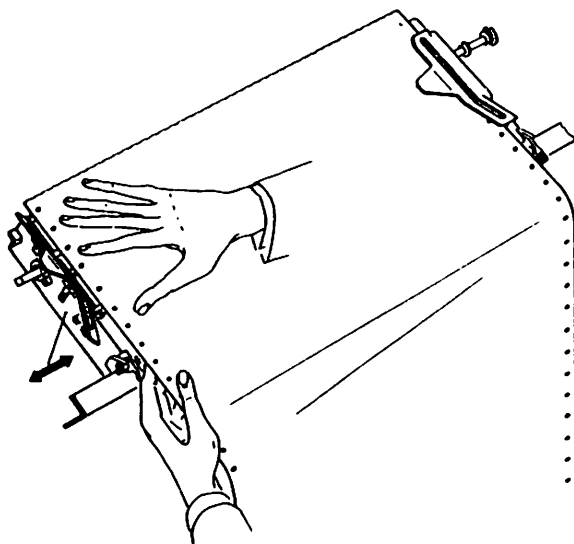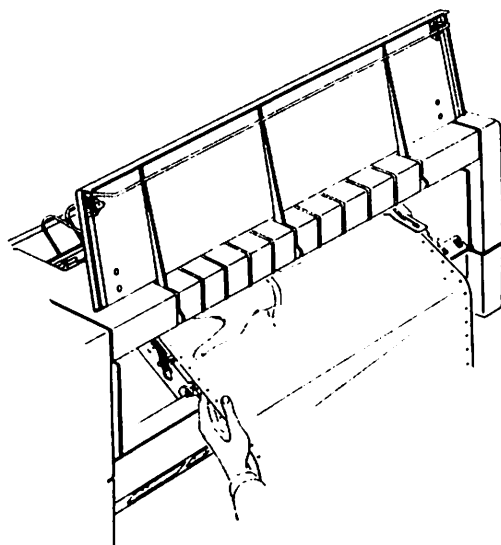
Figure 3   Forms insertion

Forms Thickness Compensation

The forms thickness compensation (Figure 4) adjusts the clearance between the print head and the platen, as required by the paper thickness. The distance between the print head and the paper has to be adjusted manually to the desired position giving the best print quality (one of eight), by activating a mechanical lever on the left side of the frame.

The possible positions of the forms thickness compensation lever are numbered to provide a reference. The numbers do not have a direct relationship to the number of copies.
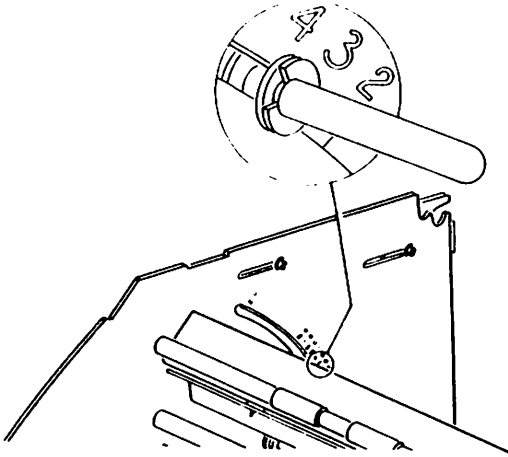
Figure 4   Forms thickness compensation

Ribbon Installation

The NCR 6442 Printer uses a new long life ink cartridge (Figure 5) with re-inking device so that a cassette life of 10 million characters can be achieved in normal applications. To replace a worn ribbon, the complete cassette must be replaced. The cassette is mounted on the carrier by a snap-in mechanism.

Long periods of high speed, maximum output, may result in the print head operating at high temperatures. To ensure operator comfort and eliminate any possibility of contact with a hot print head, always make a required change of ribbon cassette at start of day.
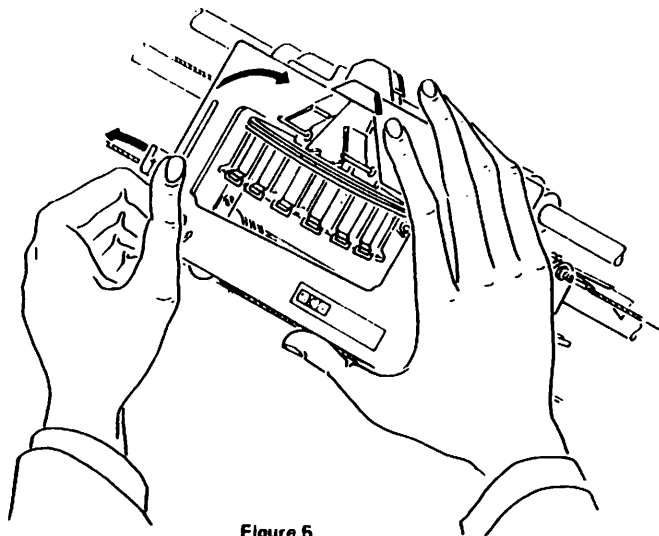
Figure 5

Use the following procedure to replace the ribbon cassette:

1. Open the printer lid to access the ribbon cassette. This disables the printer.
2. Adjust the forms thickness compensation lever to the head retract position.
3. Push the cassette retainer on the left side of the carrier so that the cassette releases. Remove the cassette by lifting it.
4. Install the new cassette. If the ribbon drive stud on the carrier does not immediately engage the opening in the cassette, slowly move the carrier until the cassette can be pushed down. Check that the ribbon is properly aligned over the print head.
5. Push the cassette down until it locks.
6. Reposition the forms thickness compensation lever.
7. Close the printer lid.

Print Head Installation

The print head is designed to have a minimum life of 150 million characters on single part forms. Changing of the print head when required is an operator function.

The procedure for changing a print head is as follows:

1. Tilt the printer lid to the back.

2. Move the form thickness compensation lever to the head retract position.
3. Remove the ribbon cassette.
4. Turn the two print head locks through 90° to the positions shown in Figure 6.
5. Lift the print head off the locating pins and over the fasteners, taking care not to bend the printed circuit board or its connecting pins.
6. Place the new head over the print head locks and locate the printed circuit board pins in the socket.
7. Press the head onto the locating pins.
8. Close the print head locks by rotating them through 90°.
9. Replace the ribbon cassette.
10. Reposition the forms thickness compensation lever.
11. Close the printer lid and test the print function.
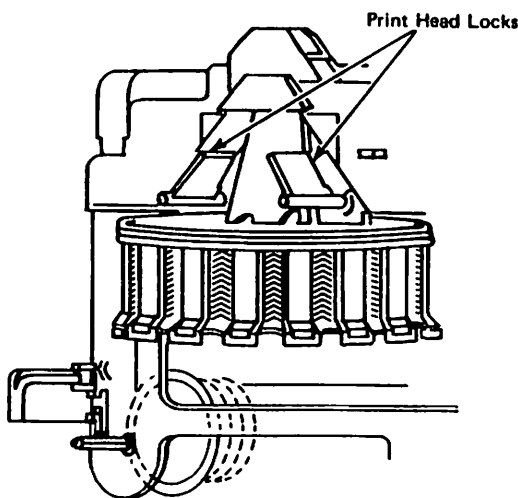
Figure 6   Print head replacement

Cleaning

The operator is expected to keep the unit clean and to prevent accumulation of paper dust and dirt using a soft cloth. Of primary interest is the area around the print station. The printer cabinet should be cleaned as necessary using a general cleaning agent.

Problem Recovery

Many malfunctions of the printer can be corrected by the operator. When a problem cannot be corrected by the operator, a field engineer should be called. The operator should be capable of providing the field engineer with a clear description of the problem and, if possible, with a sample printout which shows the problem in detail.

The following chart can be used to determine the symptoms, the possible causes, and the appropriate action to correct the problem.

Symptoms	Possible Causes	Operator Action
No print	The printer is not powered up.	Connect the power cable to the power source. Switch printer on.
	The printer lid is not closed.	Close the printer lid.
	The Start/Stop switch is in the stop position.	Press the start side of the switch.
Weak print	The ink ribbon is worn.	Replace the ribbon cassette.
	The forms compensation lever is not properly adjusted.	Set the forms compensation lever to get the best print.
Paper skew	The paper supply is not aligned with the paper feed mechanism.	Center the paper supply under the paper guide.
	Tractors incorrectly positioned resulting in wrong paper tension.	Release the tractor locks, re-position tractors and lock them.
	Forms not aligned horizontally in the tractors.	Open one tractor flap and move the form one sprocket hole up or down as required.
	Tractors loose on shaft.	Adjust the tractors to the correct position and lock them.
Incorrect form format relative to perforations	The variable form length control switches incorrectly set for actual page length.	Set the variable form length switches to the correct number of lines per page. Synchronize line counter by pressing Forms Begin switch.

NCR 6411 Matrix Line Printer
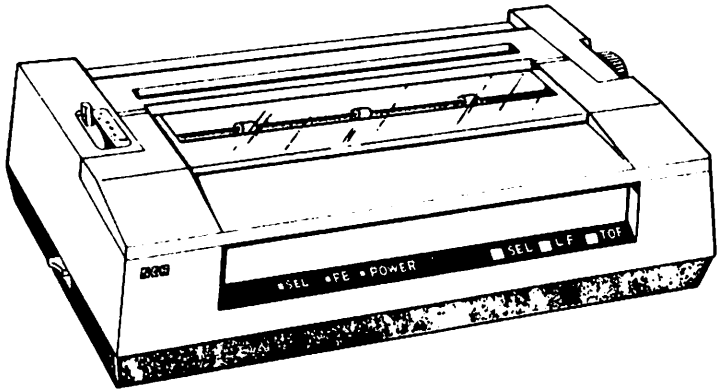
Control and Indicators

The NCR 6411 Matrix Line Printer has controls at three locations. The power switch in Figure 1 is on the lower left side of the printer. The control panel in Figure 2 is on the front of the cabinet. Dual Inline Pin (DIP) switches are internal to the printer and are accessible when the lid is off. The DIP switches have been set at the factory or at the time of installation; switch settings should only be made by trained personnel. DIP switch settings are described in the *TOWER Hardware Service* manual.

Power Switch

On

Figure 1   AC power switch

Paper End
Indicator (Red)

Select
Switch

Top-of-Form
Switch

SEL☐   PE☐   POWER☐   SEL▣   LF▣   TOF▣

Select
Indicator (Green)
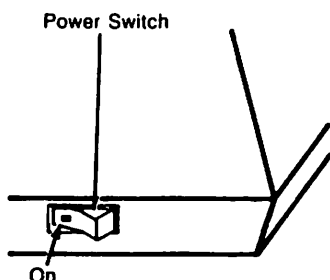
Power
Indicator (Green)

Line Feed
Switch
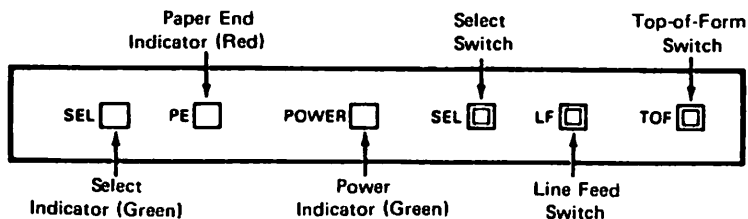
Figure 2   Operator control panel

POWER SWITCH

The power ON-OFF switch applies ac power to the printer. Before applying power to the printer, be sure the top cover is tightly closed. The power switch is located on the lower left side of the printer (refer to Figure 1). Press this switch on the rectangular white mark to turn the printer on. The green POWER indicator on the operator control panel (refer to Figure 2) should illuminate at this time.

SEL (SELECT) SWITCH

Pressing this switch alternates the printer status from a Ready (online) state to a Not Ready (offline) state or from a Not Ready state to a Ready state. When power is applied, the printer becomes either Ready or Not Ready, depending on the DIP switch setting.

To temporarily stop printing, press the LF (Line Feed) switch, keep it depressed, and press the SEL switch. This stops the printer after the current line is printed. To restart the printer, press the SEL switch.

LF (Line Feed) SWITCH

Pressing this switch advances the paper forward one line. For continuous line feed, keep the LF switch depressed.

The printer is able to print the data it receives in hexadecimal. To use this function, press the LF switch while turning the power ON. To disable this function, turn the power switch OFF.

TOF (Top of Form) SWITCH

Pressing this switch advances the paper to the TOF position. The paper advances only once, even if the switch is kept depressed. This switch is ineffective if the printer is in the Ready state.

A test pattern can be printed to show the print capabilities of the printer. While pressing the TOF switch, turn the power switch ON, then release the TOF switch. The printer prints the test pattern, performs a line feed, and prints the pattern again. To stop the test pattern printing, turn the power switch OFF.

SEL (Select) INDICATOR

This indicator (green) illuminates when the printer is in the Ready state.

When the indicator is off, this signifies:

- The printer power is off.
- An out-of-paper condition has been detected.
- The printer did not successfully pass the power up diagnostic routines.
- The top cover of the printer is not closed completely
- The printer is in a Not Ready state

PE (PAPER EMPTY) INDICATOR

This indicator (red) illuminates when the paper end is near. It also illuminates when no paper is present.

When the PE indicator illuminates, the printer is put in the Not Ready state. If the SEL switch is pressed to continue printing, the printer prints one line and returns to the Not Ready state. This override function enables a few additional lines to print after a paper end condition occurs.

POWER INDICATOR

This indicator (green) illuminates when the printer power switch is turned ON.

Forms Installation

The NCR 6411 Matrix Printer is available in four models; two models have a print width of 80 characters, and two models have a print width of 136 characters. The paper that these printers can accommodate is the following:

- NCR 6411 - 8510/8511
  - 80 character print width
  - paper widths from 4.5 inches to 10.0 inches
  - paper thickness from .002 inch to .011 inch
  - copy capability - original with 2 copies
- NCR 6411 - 1550/1551
  - 136-character print width
  - paper widths from 4.5 inches to 15.5 inches
  - paper thickness from .002 inch to .011 inch
  - copy capability - original with 2 copies

The NCR 6411 Matrix Printer provides two paper feed methods: tractor feed for fan-folded paper and friction feed for roll paper and cut sheet paper.

Tractor Feed

Follow these steps to insert fan-folded paper. Turn the power switch to the ON position before installing the paper.

1. Remove or lift the paper cover.
2. Open the paper cutter.
3. Pull the roller shaft toward the front of the printer.
4. Pull the release lever toward the front of the printer (FRICTION position).
5. Lift the paper retainer on the left and right sprocket tractors.

6. Fit the paper sprocket holes on the right and left sprocket tractor pins. If necessary, push back the sprocket levers and move the sprocket tractors as needed to match the paper width. Then pull the sprocket levers forward to lock the sprocket tractors into position (Figure 3).

7. Push down the paper retainers on the left and righ sprocket tractors.

8. Turn the platen knob clockwise, bringing the paper to the front side of the platen.

9. Return the roller shaft to hold the paper against the platen.

10. Push the release lever toward the rear (PIN-FEED position) of the printer for tractor feed operation.

11. Close the paper cutter and the paper cover.

12. Press the SEL switch to put the printer in the DESELECT state.

13. Press the TOF switch to bring the paper to the top of the form.

14. Turn the platen knob clockwise to adjust the print position.
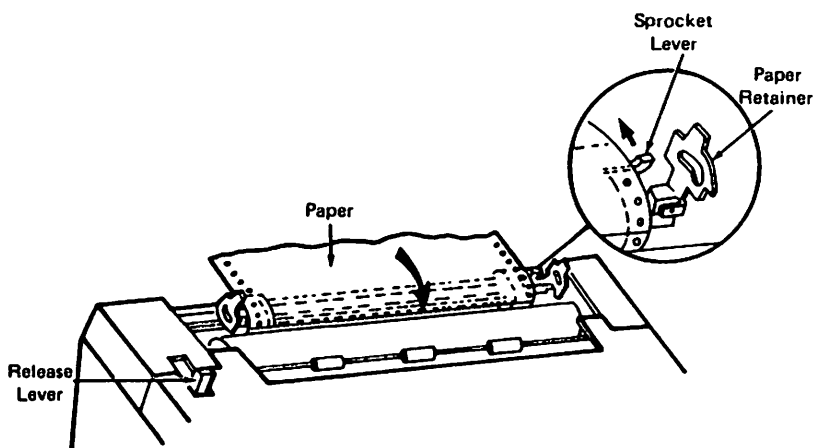
Figure 3   Paper installation (fan-folded paper)

Friction Feed

Follow these steps to insert roll and cut sheet paper (Figure 4). Turn the power switch to On before installing the paper.

1. Open the paper cutter.
2. Pull the roller shaft toward the front of the printer.
3. Move the print head carrier assembly to the left side of the printer.
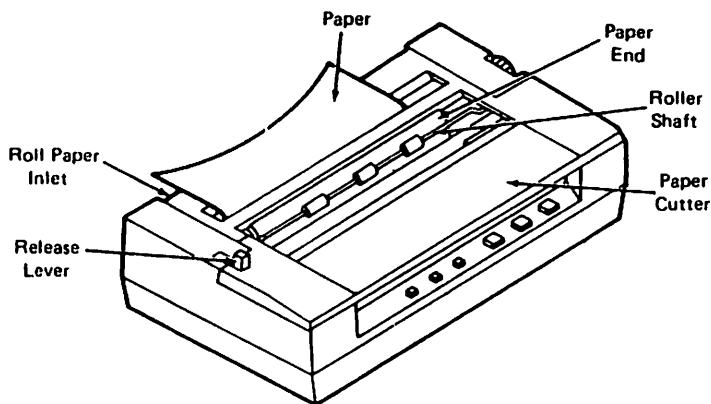
Figure 4   Paper installation (roll or sheet paper)

4. Push the release lever toward the rear of the printer (PIN-FEED position).

5. Insert the paper into the paper inlet on the rear of the paper cover.

6. When the paper end appears on the platen, set the paper properly.

7. Pull the release lever toward the front (FRICTION feed position).

8. Return the roller shaft to hold the paper against the platen.

9. Close the paper cutter.

10. Press the SEL switch to put the printer in the DESELECT state.

11. Press the TOF switch to bring the paper to the top of the form.

12. Turn the platen knob clockwise to adjust the print position.

Forms Thickness Compensation

The NCR 6411 Matrix Printer has a head adjusting lever which adjusts the gap between the print head and the platen. This lever is adjustable to four positions, depending on the thickness of the forms and the number of copies.

When the head adjusting lever is moved fully to the front of the printer, the gap between the print head and the platen is .020 inches to .022 inches. The lever is usually set at this position when a single sheet of paper is used. If more than one sheet of paper is used, adjust the head adjusting lever accordingly (Figure 5).

Head Adjusting Lever

Gap of .032 to .034 inch
Gap of .028 to .030 inch
Gap of .024 to .026 inch
Gap of .020 to .022 inch
(Single Paper)
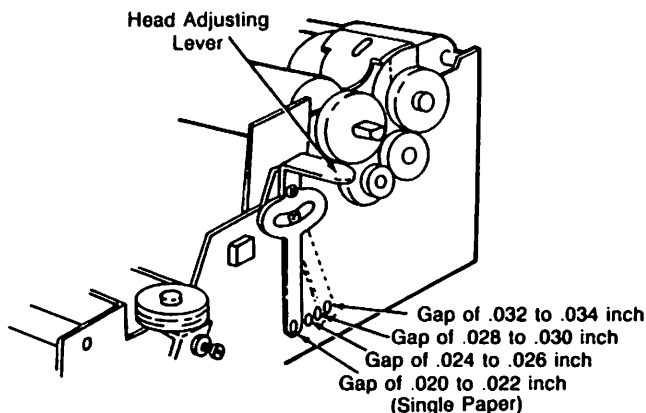
Figure 5   Head adjusting lever

Ribbon Installation

The NCR 6411 Matrix Printer uses a ribbon cassette. Replace the ribbon cassette whenever the ribbon is torn or damaged, or when the characters are printed too lightly. Use the following procedures to replace the ribbon cassette.

1. Turn the power switch OFF.
2. Remove the carrier cover.
3. Carefully move the print head to a position where no roller is fitted on the roller shaft.
4. To remove the ribbon cassette, lift up the cassette while pushing the cassette supporters outward.
5. Turn the cassette drive knob in the direction of the arrow (clockwise) to provide the proper ribbon tension. Refer to Figure 6.
6. To install the cassette, place the ribbon between the ribbon guide plate and the ribbon guide (refer to Figure 7).
7. Be sure that the notches on both sides of the cassette are supported completely by the two cassette supporters.
8. Push the cassette down on the ribbon deck.
9. After the ribbon cassette is in place, turn the cassette drive knob clockwise to make sure the cassette drive gear and the unit ribbon drive gear are locked together properly.
10. Replace the carrier cover.
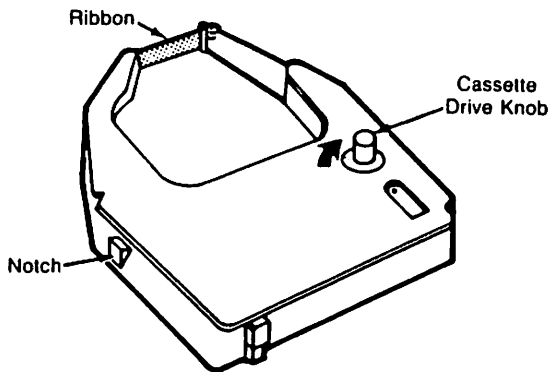
Figure 6   Ribbon cassette
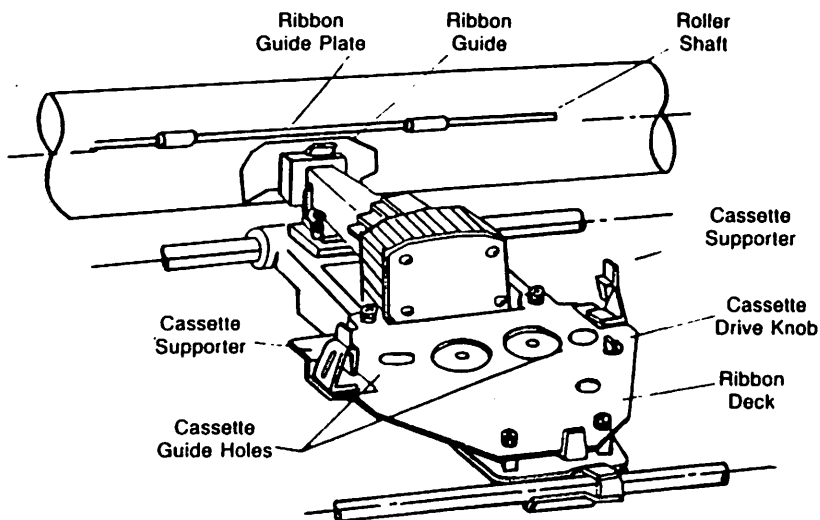
Figure 7   Ribbon deck without ribbon cassette

Print Head Installation

The average life of the print head is about 100 million characters. To replace the print head, use the following procedures.

1. Turn the power switch OFF.
2. Remove the carrier cover.

3. Gently move the print head to a position where no roller is fitted on the roller shaft.
4. Remove the ribbon cassette.
5. Open the left and right head securing levers by moving them outward (Figure 7).
6. To disconnect the head, pull the roller shaft toward the front and carefully lift the head straight up.
7. Push the roller shaft toward the rear and lift the head again to complete the removal.

CAUTION

Be careful not to bend the ribbon guide plate while removing or replacing the print head.

8. To replace the print head, reverse the preceding steps.
9. Replace the carrier cover.

Cleaning

Clean the home position sensor and the print head every 500,000 lines or every year. Use the following cleaning procedures.

- Remove the carrier cover.
- With a brush, remove any paper dust or ribbon particles on or around the home position sensor (located under the carrier cover on the lower left side of the printer). Refer to Figure 8.
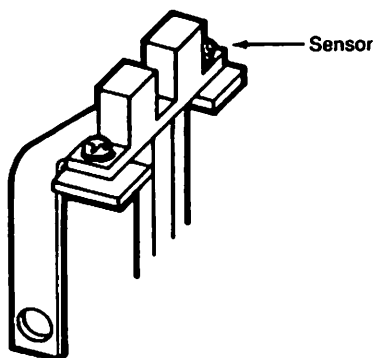
Figure 8   Home position sensor

- To clean the print head, remove the ribbon cassette. Then remove the print head and brush off any paper dust or ribbon particles.
- To clean the cover, use a lint-free cloth with water or a weak soap solution.

Problem Recovery

Many malfunctions of the printer can be corrected by the operator. When a problem cannot be corrected by the operator, a field engineer should be called. The operator should be capable of providing the field engineer with a clear description of the problem and, if possible, with a sample printout which shows the problem in detail.

The following chart can be used to determine the symptoms, the possible causes, and the appropriate action to correct the problem.

Symptoms	Possible Causes	Operator Action
No Print	The printer is not powered up.	Connect the power cable to the power source. Switch printer on.
	Printer cover is not closed.	Close the printer lid.
	Printer is in the Not Ready mode.	Press the SEL switch to ready the printer.
	No data being sent.	Check data source.
Weak or unclear print	Ink ribbon is worn.	Replace the ribbon cassette.
	Head adjustment lever is not properly adjusted.	Adjust head adjustment lever.
	Platen is damaged.	Inspect platen and replace if necessary
	Print head is dirty.	Inspect print head and clean if necessary.
Paper tears or does not feed properly.	The paper supply is not aligned with the paper feed mechanism.	Center the paper supply.
	Tractors incorrectly positioned resulting in wrong paper tension.	Release tractor locks, reposition them and lock them.
	Release lever in wrong position.	Put release lever in the correct position for the feed method used.
	Head adjustment lever is not properly adjusted.	Adjust head adjustment lever.
	Forms not aligned in the tractors.	Open one tractor flap and move the form up or down as required.
Printer slips into the Not Ready	Improper head alignment state.	Check head adjustment lever. Adjust for thickness of forms used if necessary.
Printing occurs, but the carriage does not move.	Obstruction in the carriage path.	Remove obstruction in the carriage path.
Carriage moves, but printing does not occur.	Faulty ribbon cassette.	Replace the ribbon cassette or install correctly.

NCR 6455 Letter Quality Printer

Paper
Speed   Local   Ribbon Indicator   Power   Release
Switch 1 Switch 3 Switch   Switch   Check Indicator   Indicator Lever

Switch 2 Switch 4 Form   Set TOF   Break   Paper   Data   Reset   Form
                    Length Switch   Switch   Indicator Indicator Switch Feed
                    Switch   Switch
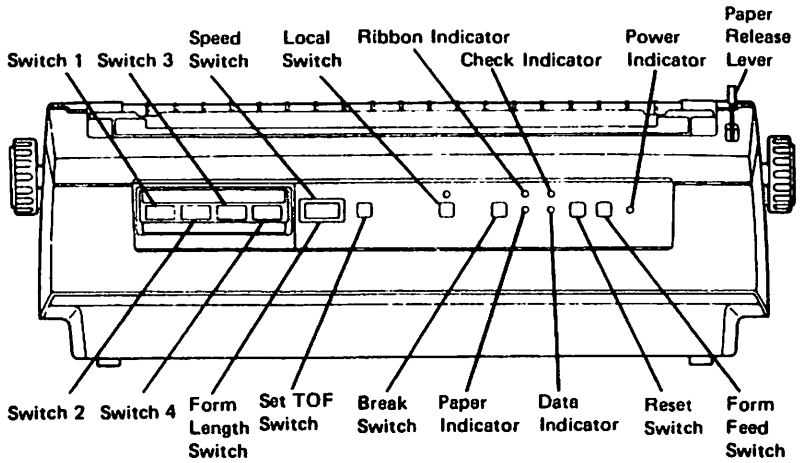
Controls and Indicators

POWER SWITCH

> The power switch is located at the rear of the printer just above the power cord. Press the right side of the switch (the side with the white mark) to power on the printer. The carriage should re-position itself.

FORM FEED SWITCH (FF)

> The Form Feed (FF) switch is located on the operator control panel and causes the paper to advance to the top of the next form when pressed.

RESET SWITCH

> The Reset switch is located on the operator control panel and is used to reset a fault condition when the condition is cleared and this switch pressed.

BREAK SWITCH

> The Break switch is located on the operator control panel and is used on some systems to signal the processor or control unit upon the completion of an operator action.

LOCAL SWITCH

> The Local switch is located on the operator control panel and is used to place the printer online or offline. When the local switch is pressed and the local indicator lights, the printer is offline and unable to print data.

SET TOP OF FORM (TOF) SWITCH

> The Set TOF switch is located on the operator control panel and when pressed sets the present printline as top of form. Also, the value indicated in the Form Length switch is stored as the number of lines on the form.

FORM LENGTH SWITCH

> The Form Length Switch is the two right most thumbwheel switches located on the operator control panel and defines the number of lines contained on a form. These switches must be set before the Set TOF switch is pressed to be effective.

SPEED SWITCH

> The Speed switch is the left most thumbwheel switch located on the operator control panel and is used to select the transmission speed (baud rate) at which the printer operates. The various settings and speeds are as follows:

Position	Speed
0	110
1	150
2	200
3	300
4	600

Position	Speed
5	1200
6	2400
7	4800
8	9600
9	9600

POWER INDICATOR

The power indicator is illuminated whenever the power switch is on and power is applied to the printer.

CHECK INDICATOR

The check indicator is illuminated whenever the clear plastic silencer hood over the platten is opened or whenever a malfunction is detected. When the platten cover is opened, an alarm sounds for ½ second. The alarm sounds intermittently when a malfunction is detected.

DATA INDICATOR

The data indicator is illuminated when a parity error, framing error, break signal received, buffer overflow, line error, or monitor error is detected. The alarm also sounds for ½ second.

PAPER INDICATOR

The paper indicator is illuminated whenever the printer is out of paper.

RIBBON INDICATOR

The ribbon indicator is illuminated when the ribbon needs to be replaced. The film ribbon may be turned over one time to use the other half of the ribbon. The alarm also sounds for ½ second.

PRINT IMPRESSION SWITCH

The print impression switch is a three-position switch located inside the printer under the top cover toward the front right cover of the printer base (Figure 1). The switch permits the character impression density to be adjusted. The switch positions are labeled as H, M, and L. Position H is used for large type faces or multiple copies. Position M is used for normal print density and average printing. Position L is used for small type faces or graphics.
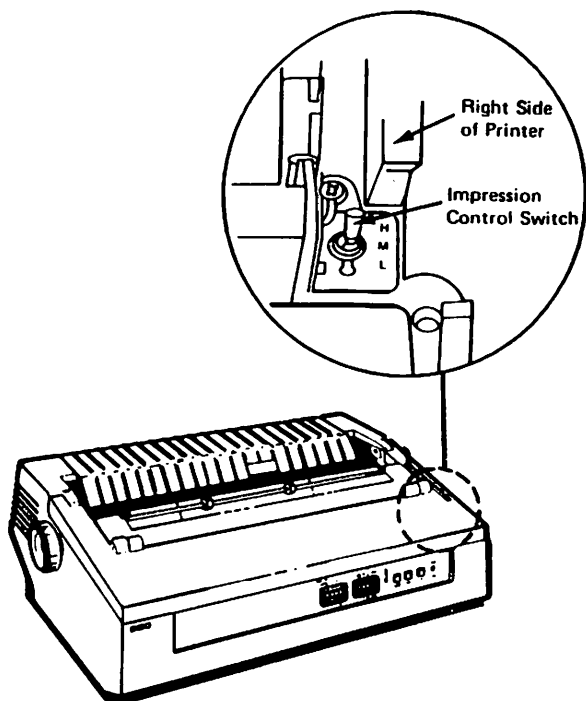
Figure 1   Impression control switch

SWITCH 1

Switch 1 is located on the operator control panel and consists of eight slide switches. If the slide is pushed up, the switch is on. If the slide is pushed down, the switch is off. In the following examples, the black area of the switch indicates whether the switch is pushed up or down.

With Switch 1, all the slide switches except slide switch 2 should be set during installation and not changed. Slide switch 2 permits the FF switch (Form Feed) to function as a form feed switch or as a line feed switch.

SW1
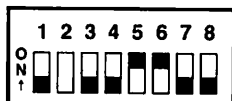
Required switch positions

SW1

Form feed

SW1

| 1 2 3 4 5 6 7 8 | Line feed |
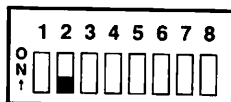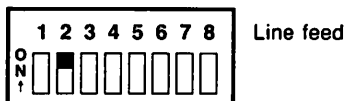
SWITCH 2

Switch 2 is located on the operator control panel and consists of four slide switches labeled 1 through 4. If the slide is pushed up, the switch is on. If the switch is pushed down, the switch is off. In the following examples, the black area of the switch indicates whether the switch is up or down.

Slide switch 4 selects the test print operation. Slide switch 3 should be set during installation and not changed. Slide switch 2 and 1 are set according to the type of thimble installed in the printer.

SW2
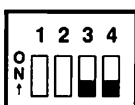
| 1 2 3 4 | Required for normal operation |

SW2
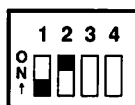
| 1 2 3 4 | BOLD proportional space thimble |

SW2
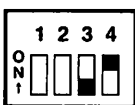
| 1 2 3 4 | Test print operation |

SW2
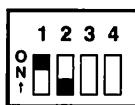
| 1 2 3 4 | KEEPSAKE proportional space thimble |

SW2
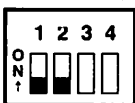
| 1 2 3 4 | Constant pitch thimble |

SW2
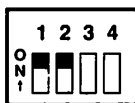
| 1 2 3 4 | EMPEROR proportional space thimble |

SWITCH 3

Switch 3 is located on the operator control panel and consists of four slide switches labeled 1 through 4. If the slide is pushed up, the switch is on. If the slide is pushed

down, the switch is off. In the following examples, the black area of the switch indicates whether the switch is pushed up or down.

Slide switches 2, 3, and 4 are set depending upon the number of character per inch to be printed on a line. Slide switch 1 selects the number of lines to be printed in one inch.

SW3
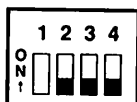
| 1 2 3 4 | 10 character per inch for constant pitch thimble |

SW3
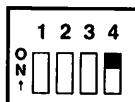
| 1 2 3 4 | 12 character per inch for proportional spacing thimble SW3-2, SW3-3, not used |

SW3

| 1 2 3 4 | 12 character per inch for constant pitch thimble |

SW3
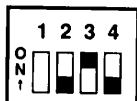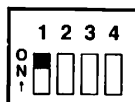
| 1 2 3 4 | 8 lines per inch |

SW3

| 1 2 3 4 | 15 character per inch for constant pitch thimble |

SW3
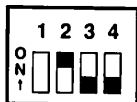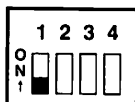
| 1 2 3 4 | 6 lines per inch |

SW3
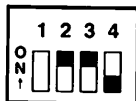
| 1 2 3 4 | 15 character per inch for constant pitch thimble |

SWITCH 4

Switch 4 is located on the operator control panel and consists of four slide switches labeled 1 through 4. If the slide is pushed up, the switch is on. If the slide is pushed down, the switch is off. In the following examples, the black area of the switch indicates whether the switch is pushed up or down.

Slide switches 2, 3, and 4 should be set during installation and not changed. Slide switch 1 provides for an automatic line feed whenever the print buffer is emptied. The print buffer is capable of containing two complete lines of print.

SW4
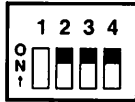
```
┌─────────┐
│ 1 2 3 4 │   Required switch
│O        │   positions for
│N ▮▮▮    │   SW4-2, SW4-3,
│↑ ███    │   and SW4-4
└─────────┘
```

SW4
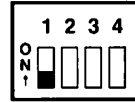
```
┌─────────┐
│ 1 2 3 4 │   Software
│O        │   controlled line
│N ▮      │   feed, disable
│↑ █      │   automatic line
└─────────┘  feed
```

SW4
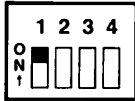
```
┌─────────┐
│ 1 2 3 4 │   Enable
│O        │   automatic line
│N ▮      │   feed
│↑ █      │
└─────────┘
```

Forms Handling Attachment Installation

Four forms handling attachments are currently available for use with the printer; the cut-sheet guide, the bi-directional forms tractor, the single-bin feeder, and the dual-bin feeder. If your printer contains cover inserts as shown in Figure 2, the cover inserts must be removed before installing any of the forms handling attachments. To remove a cover insert, grasp it as shown in Figure 2 and pull it toward the center of the printer. The following sections contain procedures to install each of the forms handling attachments.

CAUTION

The printer POWER switch must be turned OFF when installing or removing any of the forms handlers. The printer or forms handler attachment may be damaged if the cables are connected or disconnected with the printer POWER switch ON.
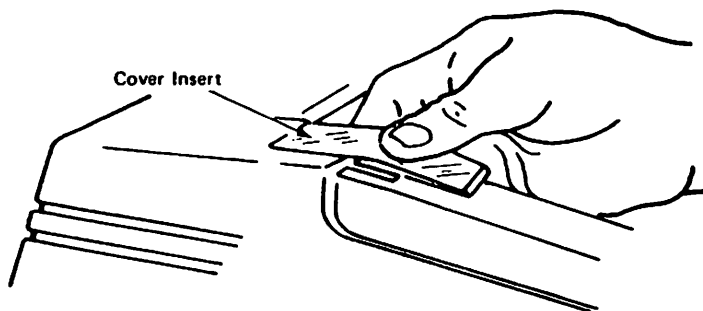
Figure 2   Removing cover inserts

Cut-Sheet Guide

Perform the following steps to install the cut sheet guide (Figure 3).

1. Turn OFF the printer POWER switch.
2. Move the paper release lever to the FRONT position.
3. Open the silencer hood, slide the right hinge pin to the left, and remove the hood (Figure 4).
4. Remove any forms handler attachment currently installed on the printer.
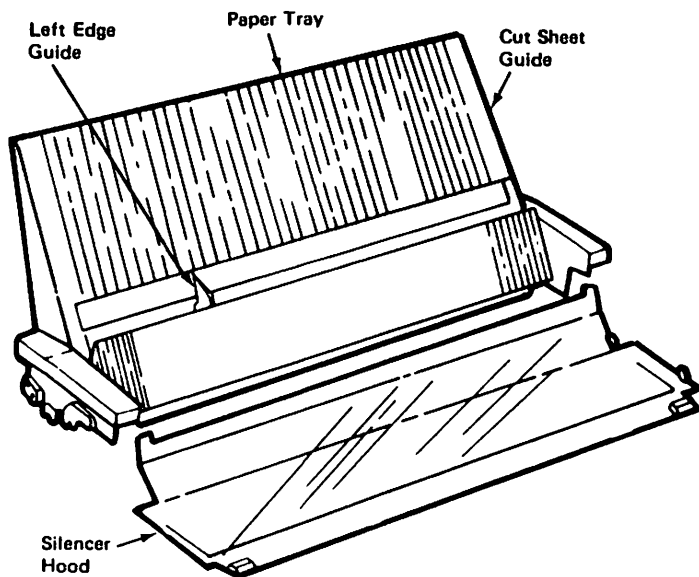
Figure 3   Cut sheet guide components and silencer hood
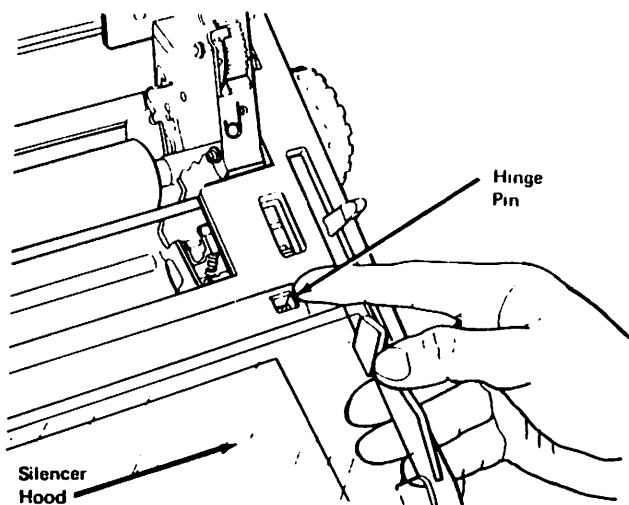
Figure 4   Removing silencer hood

5. Position the cut sheet guide on the printer so that the slots in the cut sheet guide frames engage the Option Stud and Lock Stud on each printer side frame (Figure 5). Apply pressure downward on each side to seat the unit in place.

6. Connect the sensor cable to the option connector at the left rear of the printer. The connector is made to plug-in in only one position. The key slot of the sensor cable must be positioned to align with the key in the option connector (Figure 6).

7. Install the new silencer hood supplied with the cut sheet guide and close the cover.

8. Turn ON the printer POWER switch.

9. Refer to the Form Installation section of this publication and load paper.
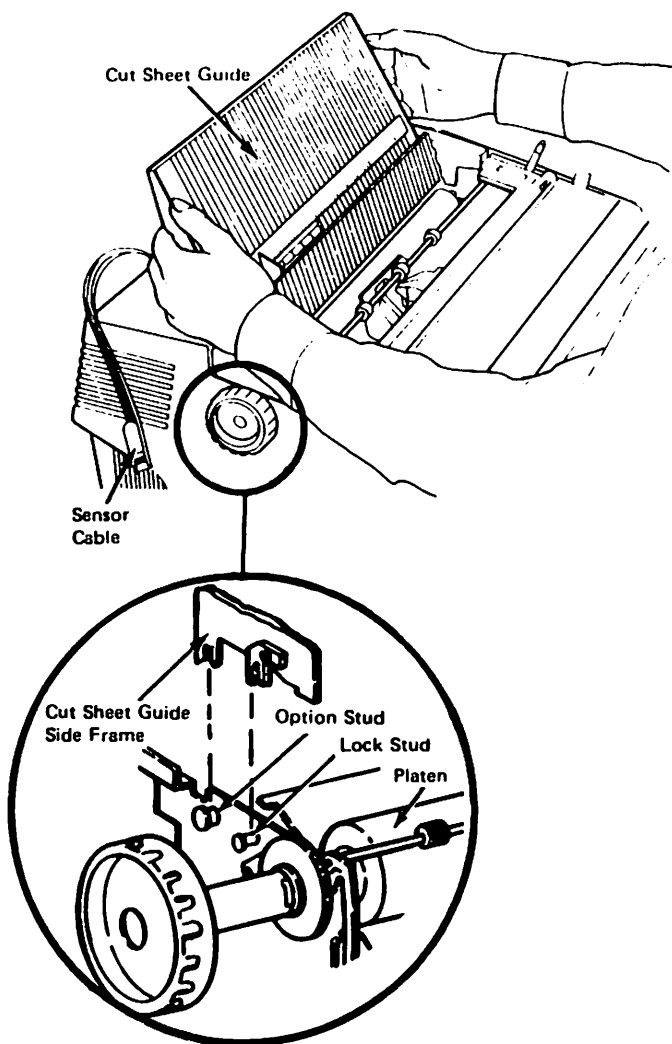
Figure 5   Installing cut sheet guide

Sensor
Cable

Key

Key Slot

Sensor
Cable

Interface
Connector

Option
Connector

Left Rear Corner
of LQP-30 Printer
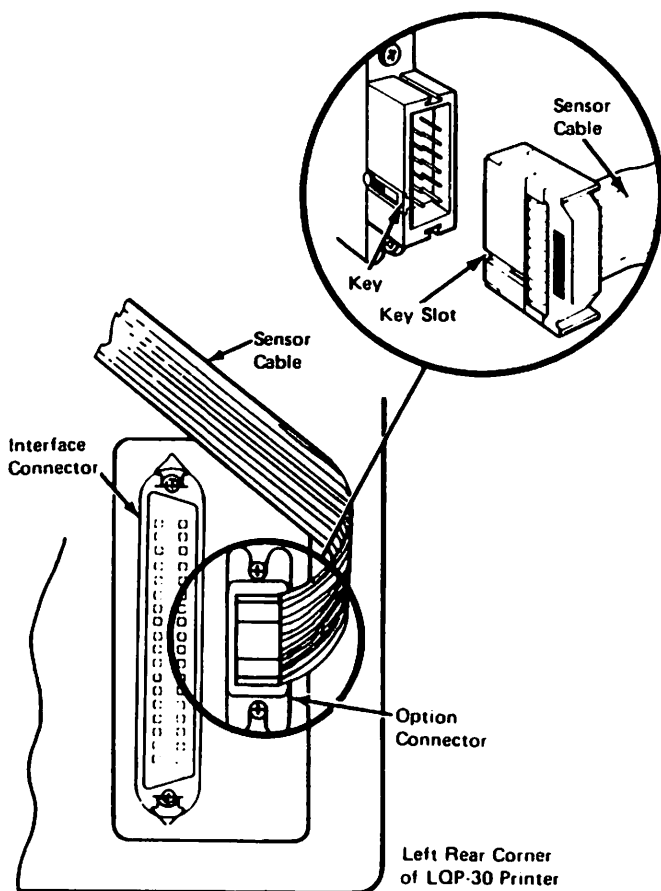
Figure 6   Option connector location

Bi-Directional Forms Tractor

Perform the following steps to install the bi-directional forms tractor (Figure 7).
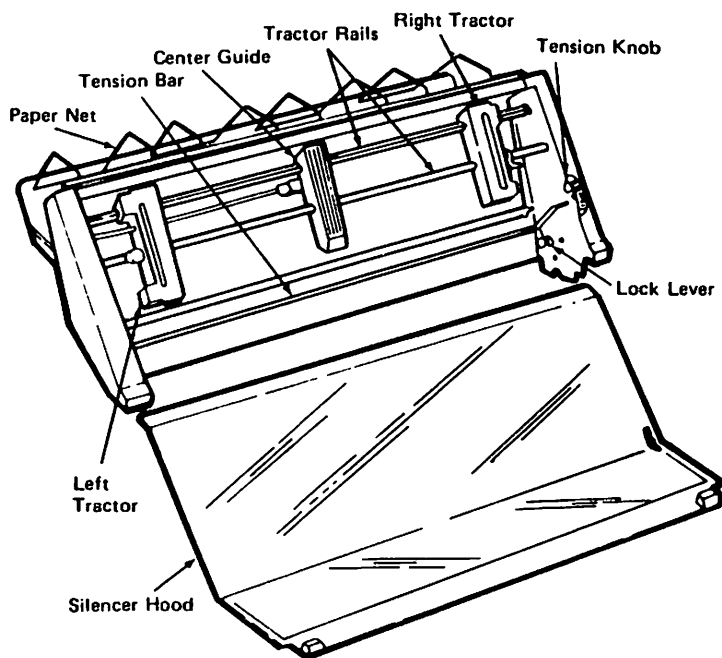
Figure 7   Bi-directional forms tractor

1. Turn OFF the printer POWER switch.
2. Move the paper release lever to the FRONT position.
3. Open the silencer hood, slide the right hinge pin to the left, and remove the hood (Figure 4).
4. Remove any forms handler attachment currently installed on the printer.
5. Position the right and left lock levers toward the rear of the bi-directional forms tractor and position the bi-directional forms tractor on the printer (Figure 8). The slots in the tractor frames fit onto the option and lock studs on the printer side frames.
6. Pull the lock levers forward to latch the bi-directional forms tractor in place (Figure 9).
7. Connect the sensor cable to the option connector at the left rear of the printer. The connector is made to plug-in in only
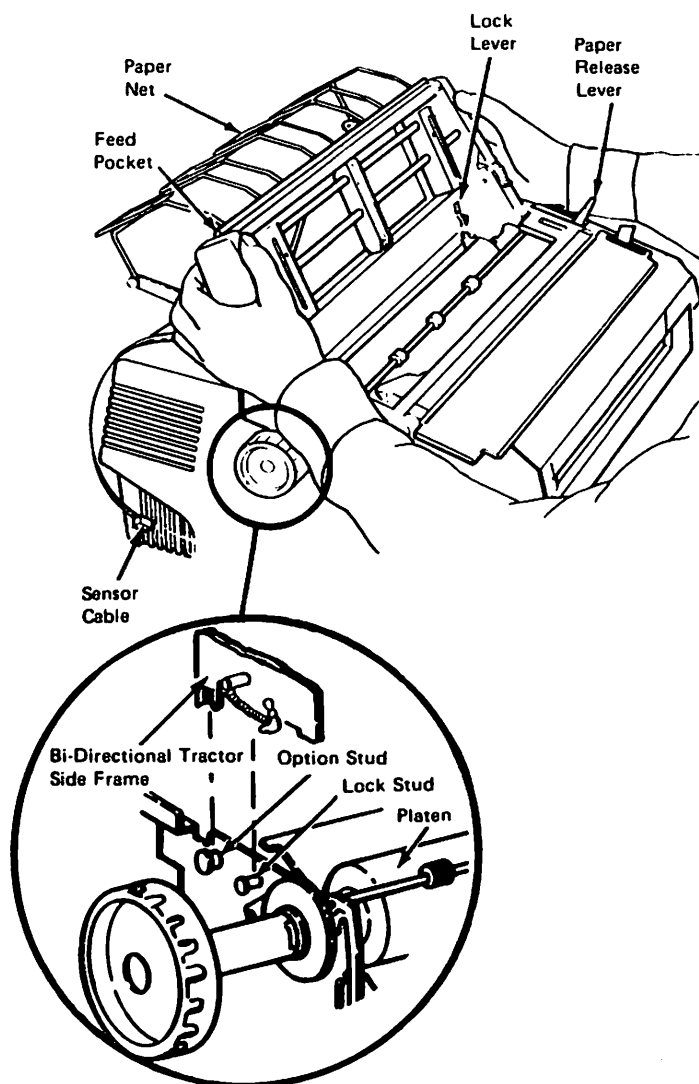
Figure 8   Installing bi-directional forms tractor

one position. The key slot of the sensor cable must be positioned to align with the key in the option connector (Figure 6).

8. Install the new silencer hood supplied with the bi-directional forms tractor and close the cover.
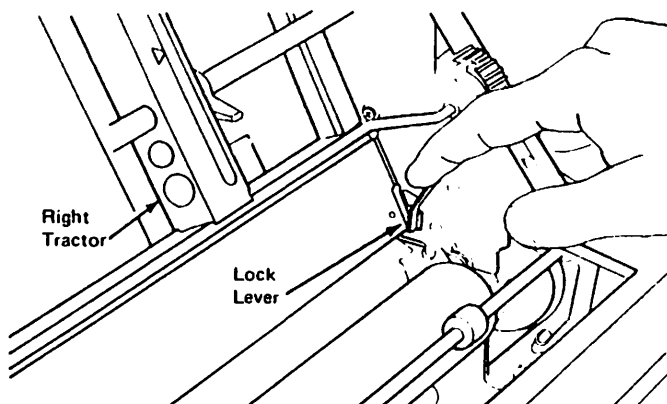
Figure 9   Latching lock levers

9. Turn ON the printer POWER switch.
10. Refer to the Form Installation section of this publication and load paper.

Single-Bin Feeder

Perform the following steps to install the single-bin feeder (Figure 10).

NOTE: The bin feeder option cable must be installed on the printer by NCR Field Engineering before this procedure can be used to install the single-bin feeder.

1. Turn OFF the printer POWER switch.
2. Move the paper release lever to the FRONT position.
3. Open the silencer hood.
4. Remove any forms handler attachment currently installed on the printer.
5. Position the bin feeder to the front of the platen opening, press the left and right latch buttons, rotate the feeder down in back until it is seated on the mounting studs, and release the latch buttons.
6. Connect the bin feeder option cable to the connector at the rear of the bin feeder (Figure 11).
7. Install the top plate and the paper bow on the bin feeder as shown in Figure 10.
8. Move the paper release lever to the CENTER position.

9. Turn ON the printer POWER switch.

10. Refer to the Forms Installation section of this publication and load paper.
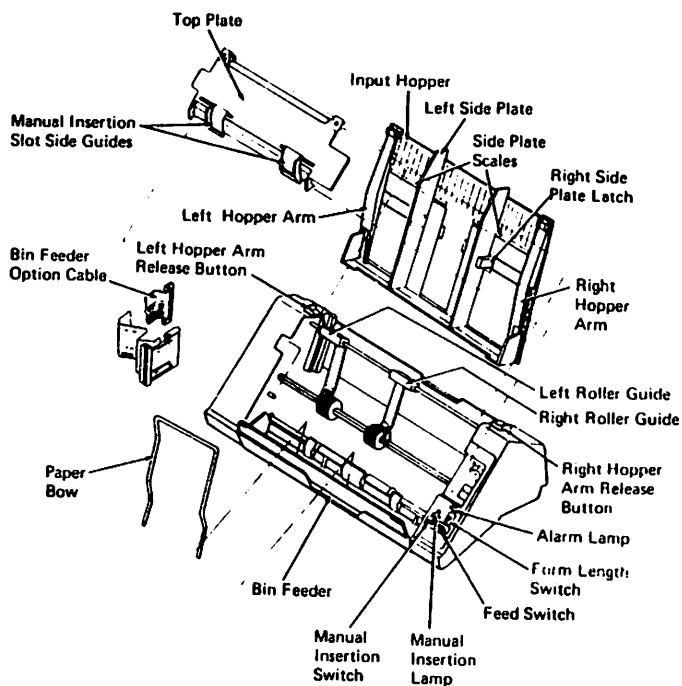
Figure 10   Single-bin feeder

Roller
Guides

Lever Bar

Keyed
Connector
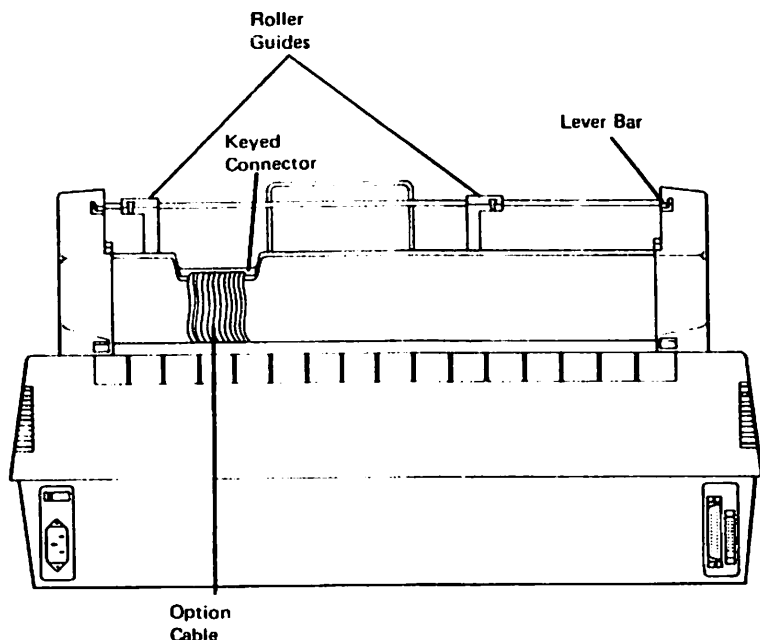
Option
Cable

Figure 11   Single-bin feeder option cable

Dual-Bin Feeder

Perform the following steps to install the dual-bin feeder (Figure 12).

NOTE: The bin feeder option cable must be installed on the printer by NCR Field Engineering before this procedure can be used to install the dual-bin feeder.

1. Turn OFF the printer POWER switch.
2. Move the paper release lever to the FRONT position.
3. Open the silencer hood.
4. Remove any forms handler attachment currently installed on the printer.
5. Position bin feeder 1 to the front of the platen opening, press the left and right latch buttons, rotate the feeder down in back until it is seated on the printer, and release the latch buttons.
6. Connect the bin feeder option cable to the connector at the rear of bin feeder 1 (Figure 11).
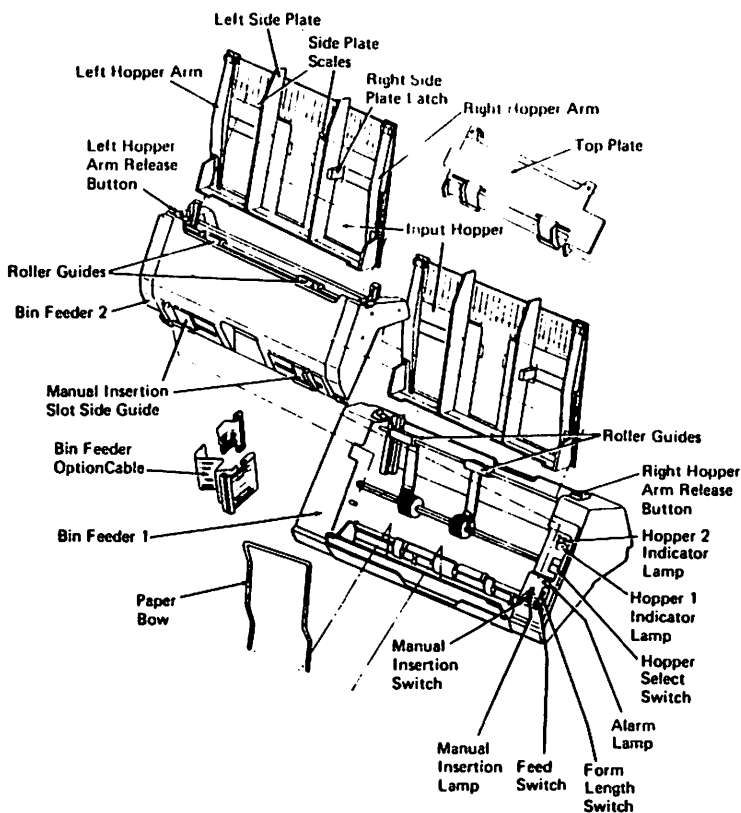
Figure 12   Dual-bin feeder

NOTE: If the top plate is installed on bin feeder 1, remove the top plate before performing step 7 (Figure 12).

7. Position bin feeder 2 on bin feeder 1 and apply pressure to each side of bin feeder 2 at the front to latch the unit in place.
8. Install the paper bow on bin feeder 1 as shown in Figure 12.
9. Move the paper release lever to the CENTER position.
10. Turn ON the printer POWER switch and load paper in the input hoppers of the dual-bin feeder.

Forms Handling Attachment Removal

The forms handling attachments of the printer may be removed by reversing the sequence and procedures of the installation instructions.

Forms Installation

Forms can be fed into the printer in two ways: manually or automatically. Each of these methods is described in the sections that follow.

Manual Load

The manual load method requires loading a sheet of paper into the printer before each page is printed. No special printer attachment is required for this procedure. However, an optional cut-sheet guide may be used to aid in paper loading. Using the cut-sheet guide attachment is also described in the section.

Manual Load Without Cut-Sheet Guide

Perform the following steps to manually load paper in your printer:

1. Move the pressure bail away from the platen by positioning the paper release lever to the CENTER position (Figure 13).
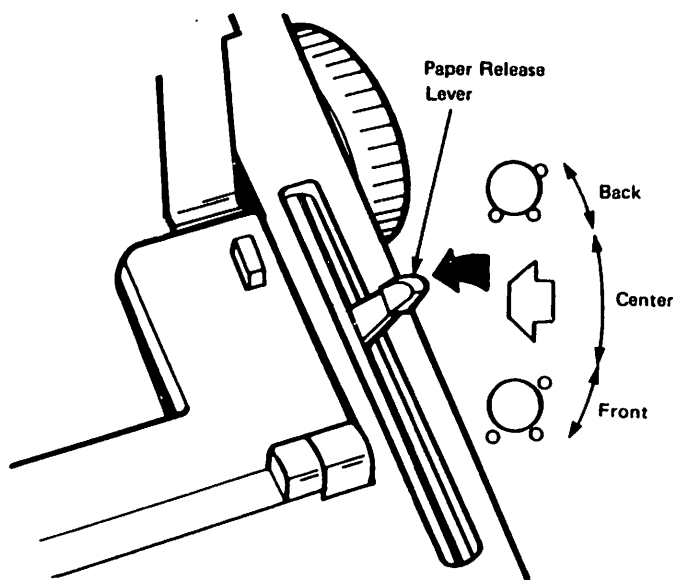
Figure 13   Paper release lever positions

2. Insert a sheet of paper in the printer with the left edge aligned with the small red dot on the cardholder and the line on the top of the print head (Figure 14). Paper should be inserted with the printing side away from you (or toward the rear of the printer).
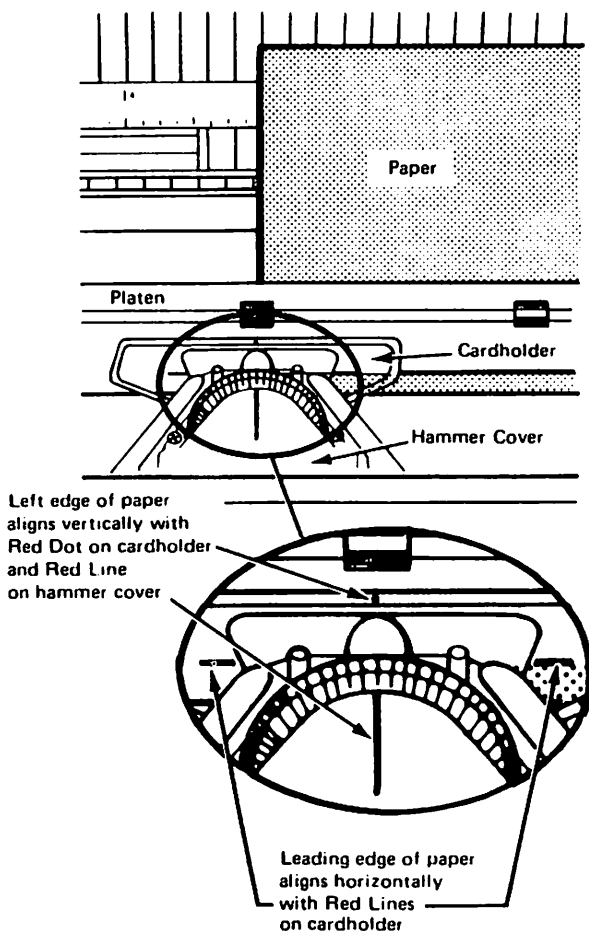
Figure 14   Paper alignment

3. Rotate the top of the platen knob toward the rear of the printer to roll the paper into the printer.
4. To ensure that the paper is straight, you can position the paper release lever to the FRONT position (all the way

toward you). This releases the platen grip to allow you to move the paper freely.

5. One way to straighten paper is to line up the top edge of the paper with the bottom edge. Compare the edges of the paper as shown in Figure 15. If the edges do not align, gently pull the paper into alignment. The left edge of the paper should align with the small red dot on the cardholder.

6. Position the paper release lever to the CENTER position.

7. Rotate the top of the platen knob toward the front of the printer to align the top of the paper with the horizontal red line on the cardholder.

8. The paper is now loaded and ready for printing.
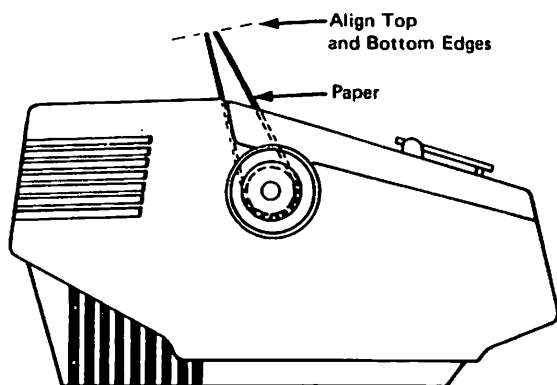
Figure 15   Straighten paper

Manual Load With Cut-Sheet Guide

Perform the following steps to manually load paper in your printer with the optional cut-sheet guide attachment installed:

1. Move the left edge guide to a reading that corresponds to one-half the paper width (Figure 16). This positions the center of the paper at the 0 (zero) position of the scale. For example, set the left edge guide to 4.25 inches for 8.5 inch wide paper.

2. Position the paper release lever to the BACK position.

3. Insert a sheet of paper, aligned with the left edge guide and the print side toward the rear of the printer, into the paper tray of the cut-sheet guide (Figure 17).
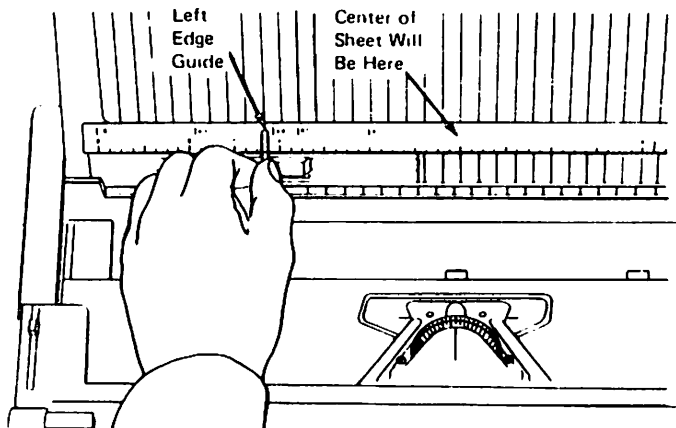
Figure 16   Setting left edge guide
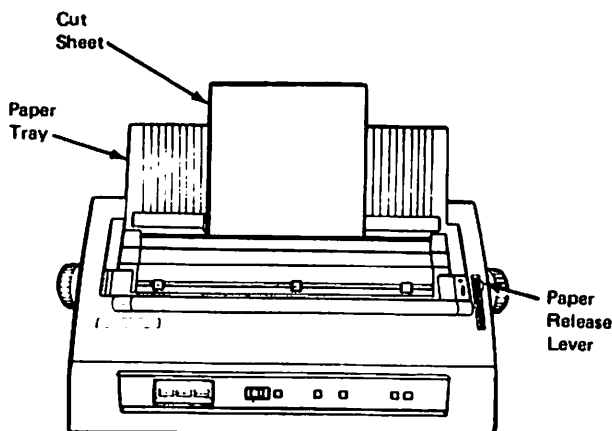
Figure 17   Inserting paper

4. With the paper in position on the paper tray, pull the paper release lever to the CENTER position. The print head is moved to the center of the platen and the paper is automatically fed to the first print line, one inch from the top of the paper.

5. Adjust the three paper bail rollers so that they are equally spaced across the width of the paper when the paper is in the print position (Figure 18).
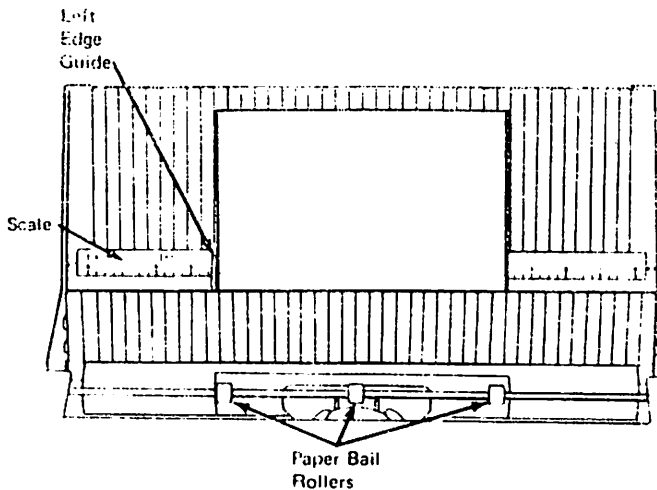
Figure 18   Adjusting paper bail rollers

6. If the paper fails to feed evenly, adjust it by pulling the paper release lever to the FRONT position, aligning the paper manually, then returning the lever to the CENTER position. This procedure should seldom be necessary.

7. Move the paper release lever to the BACK position.

8. The paper is now loaded and ready for printing.

9. Once the cut-sheet guide is set for a specific paper width, additional sheets of the same width can be loaded by performing steps 3, 4, and 7 of this procedure.

Automatic Load

The automatic load method automatically feeds each sheet of paper into the printer before printing and ejects each page after printing. One of the optional paper handling attachments is required for this method of paper loading.

- Bi-directional Forms Tractor
- Single-Bin Feeder
- Dual-Bin Feeder

Loading paper with each of these attachments is described in the following sections.

Bi-Directional Forms Tractor

The following sections provide information on selecting paper, loading paper, removing paper, and clearing paper jams on the bi-directional forms tractor (Figure 19).
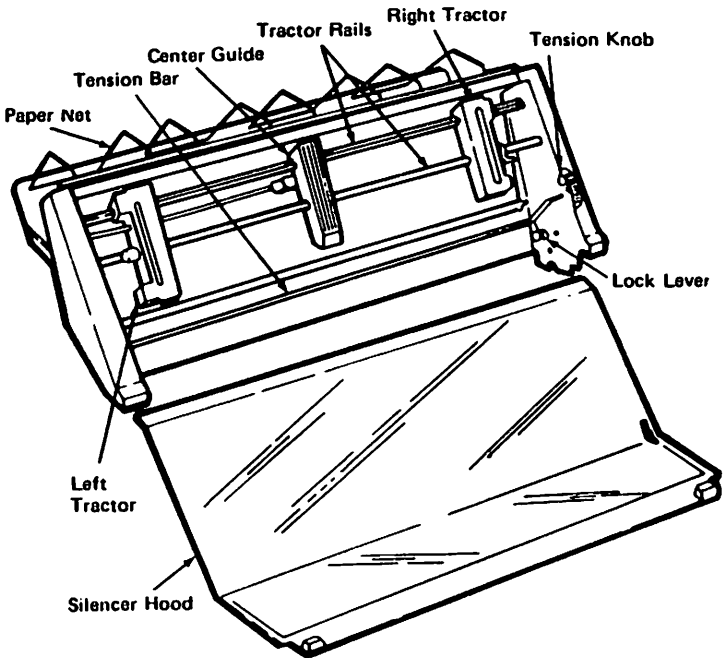
Figure 19   Bi-directional forms tractor

Use the following information to select paper for your bi-directional forms tractor:

- Width   3.0 inches to 16.0 inches
- Length   Continuous form, fan fold (side-sprocket-holes)
- Weight   13 pounds (5 parts maximum)
           10 pounds (6 parts maximum)

Prior to loading forms in the bi-directional forms tractor, the tractors must be set to center the forms on the platen and to the proper width for the forms.

Perform the following steps to set the tractors of the bi-directional forms tractor attachment:

1. Open the silencer hood.
2. Open the top cover of the left tractor, tear off one form from the paper, mark the center of the form, insert the form on the pins of the left tractor, and close the cover (Figure 20).
3. Release the left tractor assembly by turning the tractor lock to the center position (Figure 21).
4. Using the single form and the scale on the silencer hood as guides, position the left tractor (Figure 22) so that the center of the form is aligned with the center of the scale (reading of 68 on 10 CPI scale or 81.5 on 12 CPI scale).
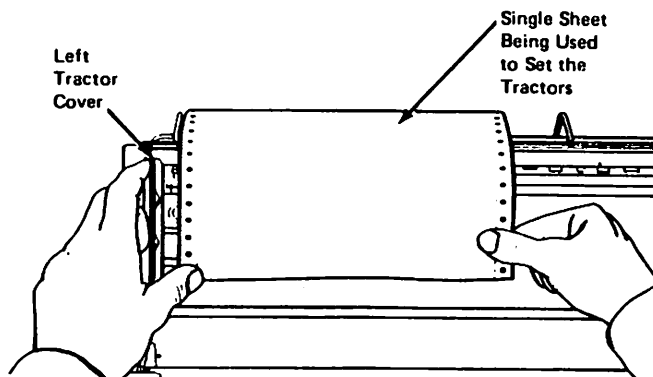
Figure 20   Installing form in left tractor
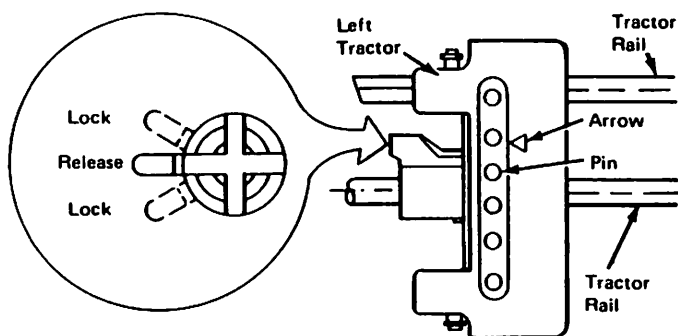
Figure 21   Left tractor
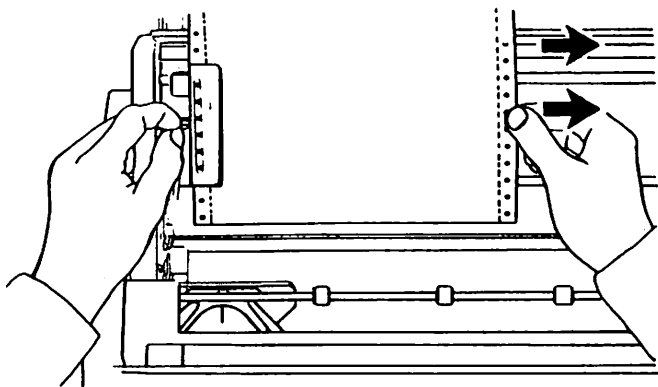
Figure 22   Positioning left tractor

NOTE: This step may also be accomplished by closing the silencer hood and printing a document manually. When instructed to load paper in the printer, position the left tractor so that the perforation on the left side of the form is aligned with the small red dot on the cardholder and the red line on the print head.

5. Set the right tractor assembly so that the pin-to-pin width between tractors matches the hole-to-hole width of the form (Figure 23).

6. Remove the form from the tractors and position the center guide (Figure 19) midway between the tractor assemblies.
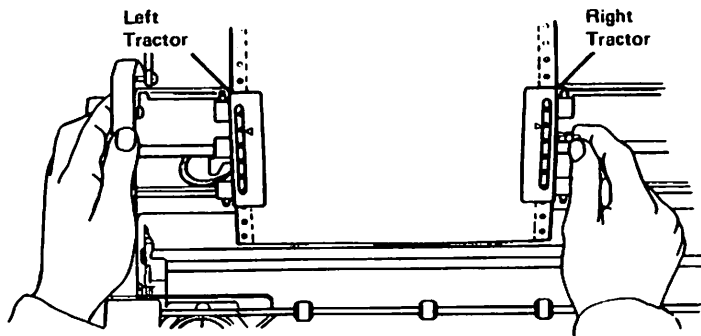
Figure 23   Positioning right tractor

Perform the following steps to load paper in your bi-directional forms tractor. The tractors must be set for the forms being loaded before using this procedure.

1. Move the paper release lever on the printer to the CENTER position and open the silencer hood.
2. Turn the tension knob on the bi-directional forms tractor fully downward (Figure 24).
3. Lift the paper net and allow it to rest on the cover.
4. Lift the paper net slightly and insert the paper, with the print side down, between the paper net and the printer.
5. Insert the paper into the feed pocket so that the pin feed holes at the top of the paper engage the tractor feed pins, turn the platen knob to move the paper through the rear of the tractors, over the tension bar, around the platen, inside the paper bail, and up to the front side of the tractors (Figures 24 and 25). When using single part forms, it is helpful to fold the first sheet over the second to insert the paper.
6. Lower the paper net.
7. Pull the paper release lever to the FRONT position.
8. Open the tractor top covers, align the form feed holes with the tractor feed pins, insert the paper, and close the top covers.
9. Turn the tension knob upward to remove the slack from the paper.
10. Position the three paper bail rollers so that they are equally spaced across the width of the paper and lower the paper bail by hand. The paper release lever is left in the FRONT position.
11. Advance the paper with the platen knob until the perforation at the top of the form is aligned with the red horizontal line on the cardholder.
12. Close the silencer hood.

Paper can be unloaded from the printer when a bi-directional forms tractor is installed by performing the following steps:

1. Press the form feed (FF) switch on the operator control panel to feed the last printed page out of the tractors and tear off the forms at the perforation following the last printed page.

2. Remove the paper from the platen and tractors by turning the top of the platen knob to the front until the paper clears the rear of the tractors.

Tractors

Feed Pocket

Paper Net

Tension Knob

Tension Bar
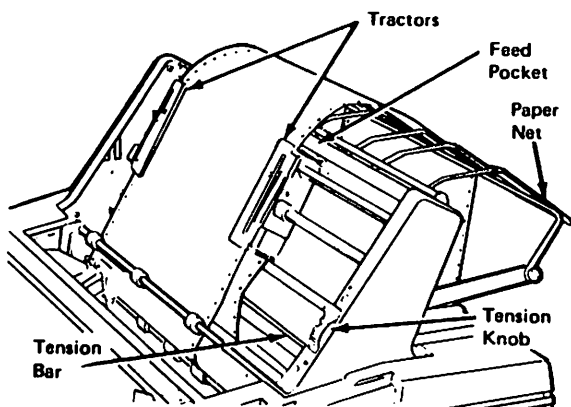
Figure 24   Installing forms

Feed Pocket

Left Tractor

Tension Bar

Silencer Hood

Paper Bail Roller (3-in-line)

Paper Net

Print Side of Forms

Platen

Pressure Rollers
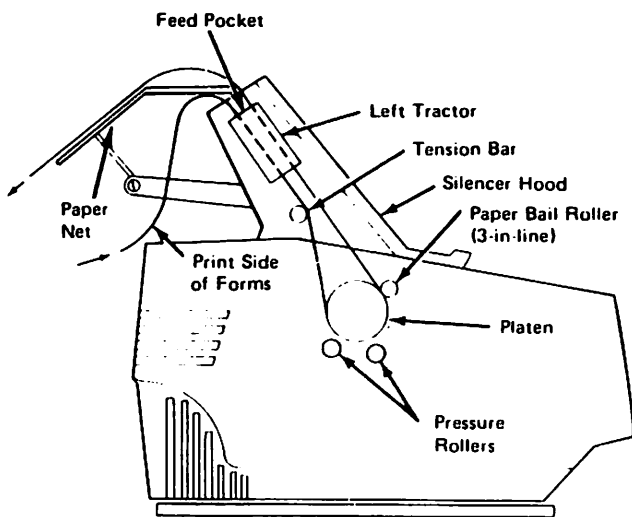
Figure 25   Paper path

Single-Bin Feeder

The following sections provide information on selecting paper, loading paper, removing paper, and clearing paper jams on the single-bin feeder (Figure 26).

Use the following information to select paper for your single-bin feeder:

- Width   Bin: 5.0 inches to 11.7 inches
          Manual: 5.7 inches to 12.2 inches
- Length Bin: 4.3 inches to 14 inches
          Manual: 4.0 inches to 14.0 inches
- Weight 18 pound stock to 24 pound stock
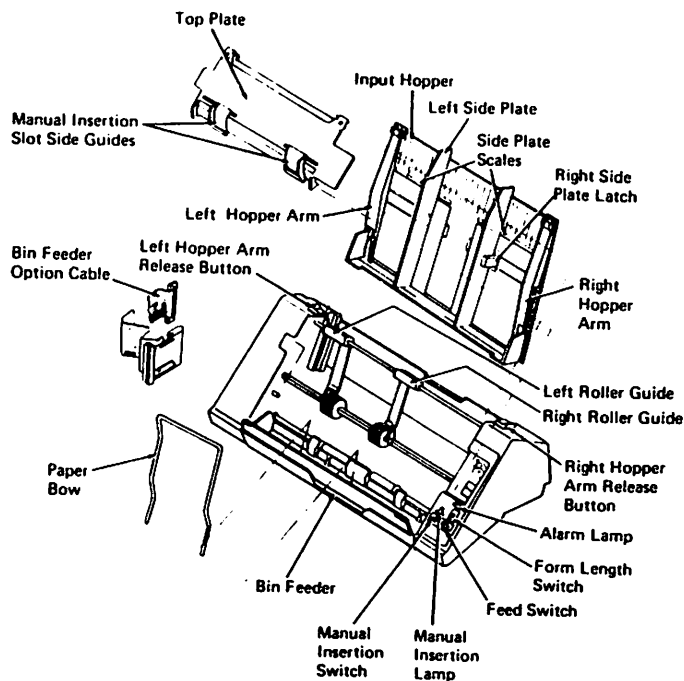
Figure 26   Single-bin feeder

Perform the following steps to load paper in your single-bin feeder:

1. Push down on the left and right hopper arms until they latch (Figure 27).

Hopper Arm   Side Plate

Input Hopper

Side Plate
Scale
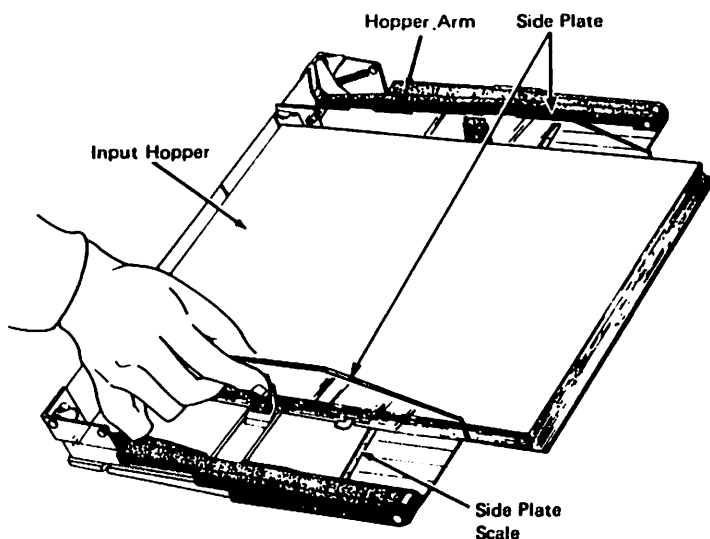
Figure 27   Loading paper

2. Remove the input hopper from the bin feeder by sliding it upward.
3. Select a supply of paper (180 sheets maximum) and riffle the edges. Place the paper, with all edges aligned and the print side down, in the input hopper. If necessary, adjust the left and right side plates to accommodate the paper width. The side plates can be adjusted when the side plate latch, located in the center of the outside edge, is pressed.
4. Center the paper by adjusting the side plates. The paper is centered when the readings on both side plate scales are the same and the side plates are adjusted to the proper width.
5. Make sure the sheets of the paper stack are inside the paper separators as shown in Figure 28 and the left and right hopper arms are latched down.

| Sheet Inside Of Paper Separator | Sheet Outside Of Paper Separator |
| Correct | Incorrect |
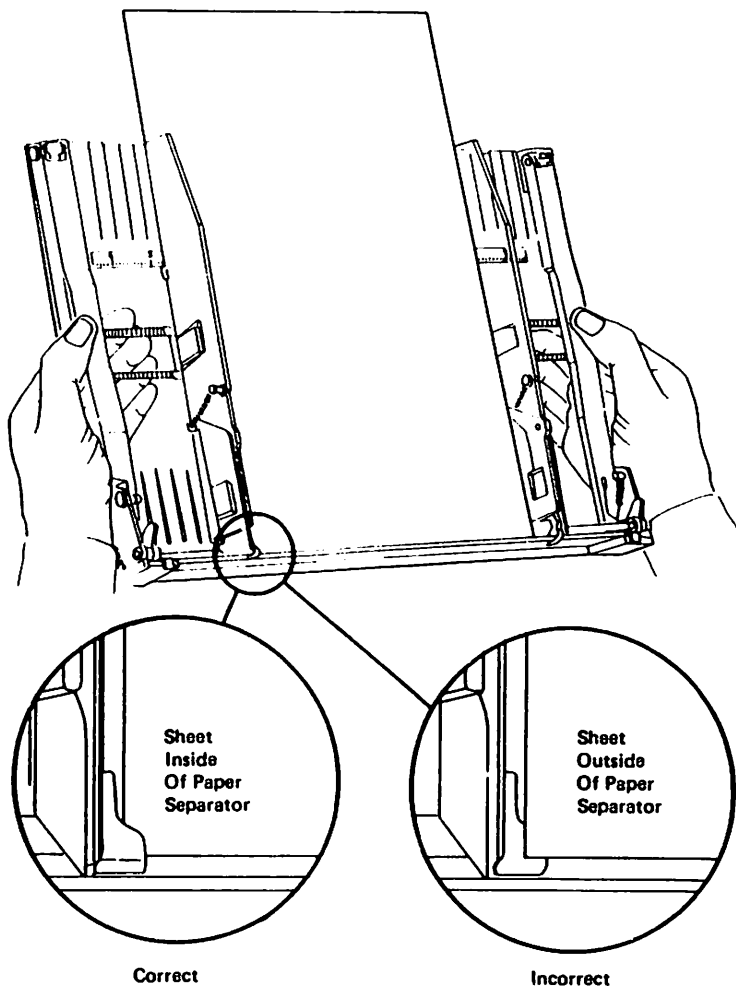
Figure 28   Paper separators

6. Adjust the left and right roller guides to align with the input hopper side plates. The top edge of the side plates must fit into the slots of the roller guides (Figure 29).

7. Insert the input hopper into the bin feeder.

8. Simultaneously push the hopper arm release buttons. The paper is now loaded and ready for printing.

Bin Feeder
Insertion Slots
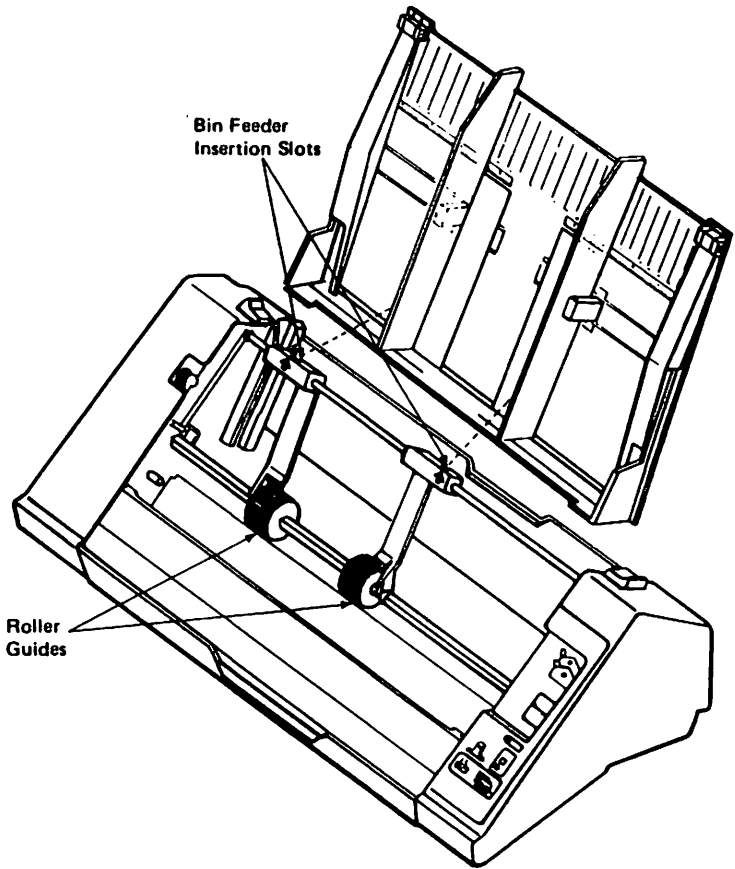
Roller
Guides

Figure 29   Roller guides

The single-bin feeder provides the following operator
controls (Figure 30):

• Form length switch - This switch should always be set
  to 15.

• Feed switch - When pressed, this switch causes the unit
  to move the print head to the center of the platen and
  to feed a single sheet.

• Manual insertion switch - When pressed, this switch
  selects the manual insertion slot.

• Manual insertion lamp - This lamp flashes to indicate
  that the manual insertion slot is selected. Press the feed
  switch to reset the lamp and return to hopper feed.

Alarm Indicator Lamp

ALARM

Form Length Switch

Manual Insertion Indicator Lamp

Manual Insertion Switch

Feed Switch

HOPPER

PUSH

13
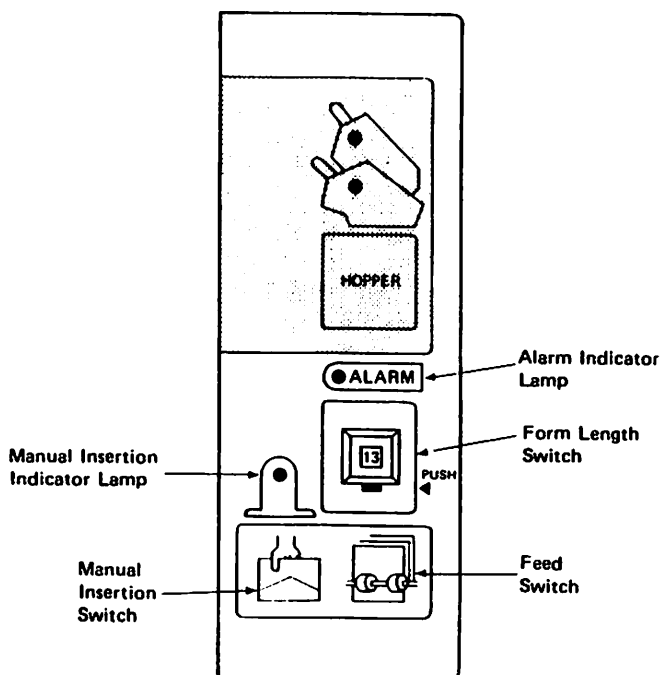
• Alarm lamp - This lamp is turned on when a paper out, a misfeed, or a paper jam condition is detected. Press the feed switch to reset the lamp when the condition has been corrected.

Paper can be fed manually with the single-bin feeder from either the input hopper or the manual insertion slot. To feed paper from the input hopper, perform the following steps.

1. Load paper in the input hopper.
2. With the printer POWER switch set to ON and the form length switch set to 15, press the feed switch. The print head moves to the center of the platen and the paper is then positioned to the first print line.

To feed paper from the manual insertion slot, perform the following steps.

1. Move the print head to a position that aligns with the left edge of the form specified in the document format. Align the left edge of the form with the red dot on the cardholder and the red line on the hammer cover (Figure 14).
2. Adjust the left side guide of the manual insertion slot to align with the left edge of the form.
3. Adjust the right side guide of the manual insertion slot to align with the right edge of the form.
4. Insert the form into the manual insertion slot and rotate the top of the platen knob to the rear of the printer to roll the form into the printer. Align the top of the form with the horizontal red line on the cardholder (Figure 14).
5. The paper is now loaded.
6. Repeat steps 4 and 5 for each form to be inserted manually.

Paper misfeeds can be cleared from the printer when a single-bin feeder is installed by using the following procedure:

1. Open the silencer hood of the printer.
2. Perform the steps necessary to halt the printing function.
3. Remove the top plate from the single-bin feeder.
4. Rotate the platen forward or backward as required to remove the misfeed or jammed paper. It may be helpful to pull the paper release lever to the FRONT position and gently pull on the paper.
5. Once the misfeed or jam is cleared, replace the top plate.
6. Close the silencer hood.

Dual-Bin Feeder

The following sections provide information on selecting paper, loading paper, removing paper, and clearing paper jams on the dual-bin feeder (Figure 31).
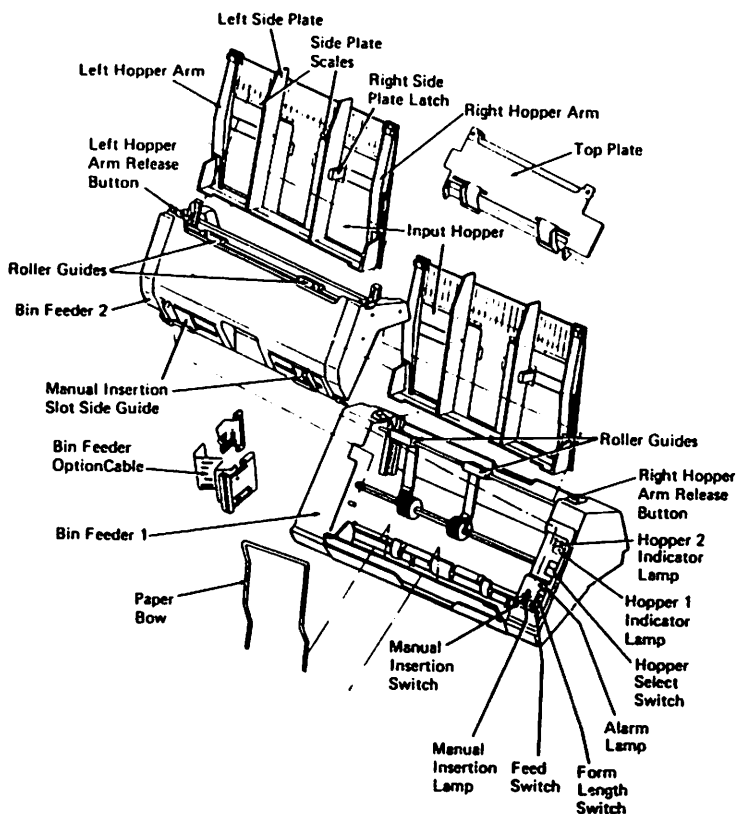
Figure 31   Dual-bin feeder

Use the following information to select paper for your dual-bin feeder:

- Width   Bin 1:   5.0 inches to 11.7 inches

  Bin 2:   5.0 inches to 11.7 inches

  Manual: 5.7 inches to 12.2 inches

- Length Bin 1:   4.3 inches to 14.0 inches

  Bin 2:   6.2 inches to 14.0 inches

  Manual: 4.0 inches to 14.0 inches

- Weight   18 pound stock to 24 pound stock

Perform the following steps to load paper in your dual-bin feeder:

1. For bin feeder 1, push down on the left and right hopper arms of input hopper until they latch (Figure 27).
2. Remove the input hopper from the bin feeder by sliding it upward.
3. Select a supply of paper (180 sheets maximum) and riffle the edges. Place the paper, with all edges aligned and the print side down, in the input hopper. If necessary, adjust the left and right side plates to accommodate the paper width. The side plates can be adjusted when the latch located in the center of the outside edge is pressed.
4. Center the paper by adjusting the side plates. The paper is centered when the readings on both side plate scales are the same and the side plates are adjusted to the proper width.
5. Make sure the sheets of the paper stack are inside the paper separators as shown in Figure 28 and the left and right hopper arms are latched down.
6. Adjust the left and right roller guides to align with the input hopper side plates (Figure 29). The top edge of the side plates must fit into the slots of the roller guides.
7. Insert the input hopper into bin feeder 1.
8. Simultaneously push the two hopper arm release buttons.
9. Repeat steps 1 through 8 for the input hopper of bin feeder 2.
10. The paper is now loaded and ready for printing.

The dual-bin feeder provides the following operator controls (Figure 32):

- Form length switch - This switch should always be set to 15.
- Feed switch - When pressed, this switch causes the selected bin feeder to move the print head to the center of the platen and to feed a single sheet.
- Manual insertion switch - When pressed, this switch selects the manual insertion slot.
- Manual insertion lamp - This lamp flashes to indicate that the manual insertion slot is selected. Press the feed switch to reset the lamp and return to hopper feed from the selected bin feeder.
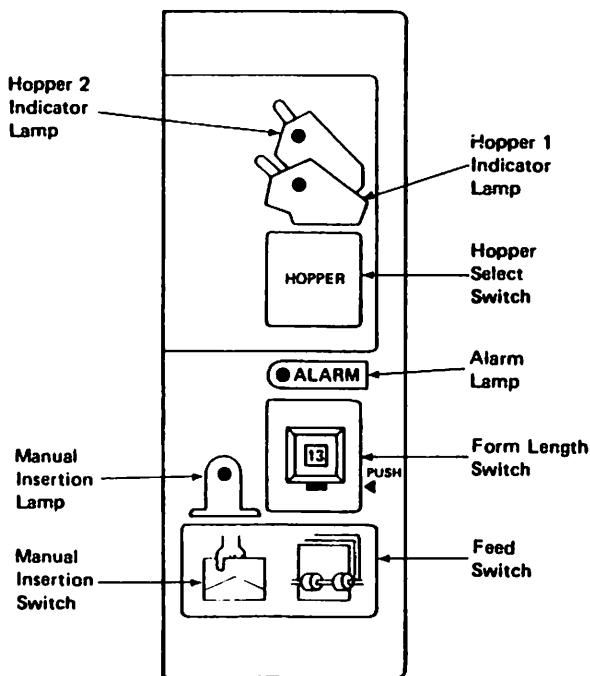
Figure 32 Dual-bin feeder operator controls

- Alarm lamp - This lamp is turned on when a paper out, a misfeed, or a paper jam condition is detected. Press the feed switch to reset the lamp when the condition has been corrected.
- Hopper select switch - This switch alternately selects bin feeder 1 or bin feeder 2 each time it is pressed.
- Hopper indicator lamps - One of the two lamps is turned on to indicate which of the two bin feeders is selected. Bin feeder 1 is selected during the power up sequence.

Paper can be fed manually with the dual-bin feeder from either of the two input hoppers or from the manual insertion slot. To feed paper from either of the two input hoppers perform the following steps.

1. Load paper in the input hopper.
2. With the printer POWER switch set to ON and the form length switch set to 15, press the hopper select switch if the desired bin is not selected, and press the

feed switch. The print head moves to the center of the platen and the paper is then positioned to the first print line.

To feed paper from the manual insertion slot, perform the following steps.

1. Move the print head to a position that aligns with the left edge of the form specified in the document format. Align the left edge of the form with the red dot on the cardholder and the red line on the hammer cover (Figure 14).
2. Adjust the left side guide of the manual insertion slot to align with the left edge of the form.
3. Adjust the right side guide of the manual insertion slot to align with the right edge of the form.
4. Insert the form into the manual insertion slot and rotate the top of the platen knob to the rear of the printer to roll the form into the printer. Align the top of the form with the horizontal red line on the cardholder (Figure 14).
5. The paper is now loaded.
6. Repeat steps 4 and 5 for each form to be inserted manually.

Paper misfeeds can be cleared from the printer when a dual-bin feeder is installed by using the following procedure:

1. Open the silencer hood of the printer.
2. Perform the steps necessary to halt the printing function.
3. Rotate the platen forward or backward as required to remove the misfed or jammed paper. It may be helpful to pull the paper release lever to the FRONT position and gently pull on the paper.
4. Close the silencer hood.

Ribbon Installation

Print ribbons for the printer are contained in easily replaceable ribbon cartridges. Single-color and two-color fabric ribbons are available as well as a multistrike film ribbon.

Replace the fabric ribbon cartridge as necessary to maintain clear printing. Replace or reverse the multistrike ribbon cartridge when the ribbon end is reached causing a ribbon fault to occur. A ribbon fault is indicated when the printer stops with the ribbon indicator light is on and the ribbon at the 'E' level of the ribbon cartridge indicator window (Figure 33).
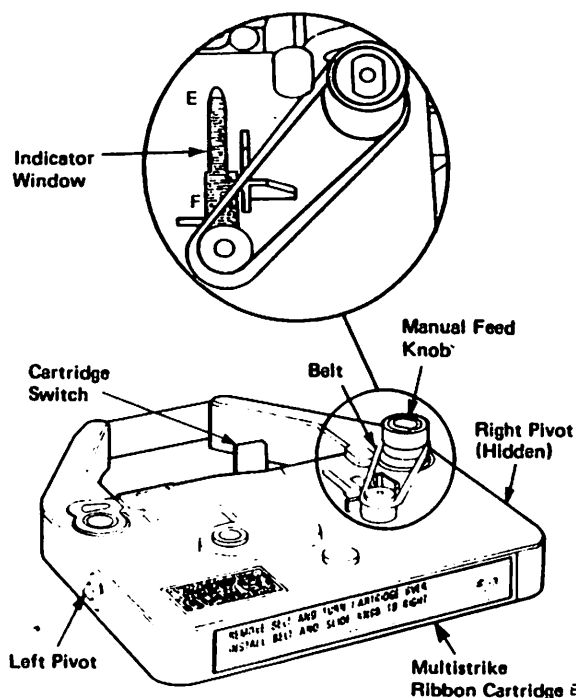
Figure 33   Multistrike ribbon cartridge

Reverse the multistrike ribbon cartridge when the first half is used and replace it when both halves are used. Figure 33 shows a multistrike ribbon cartridge with the first half used.

REPLACING A RIBBON CARTRIDGE

Perform the following steps to replace a ribbon cartridge:

1. Raise the top cover (Figure 34).
2. While holding the ribbon cartridge, press the right locking spring to the right, and remove the cartridge by lifting upward on the right side (Figure 35).
3. Turn the manual feed knob on the new ribbon cartridge in the direction of the arrow (counterclockwise) to put tension on the new ribbon (Figure 36).
4. Insert the left pivot of the new ribbon cartridge into the left hole of the cartridge frame. Gently lower the right side of the ribbon cartridge while turning the manual feed knob in the direction of the arrow (counterclockwise) until the right pivot is latched by the right locking spring.

NOTE: The cartridge switch (Figure 33) of a multistrike ribbon cartridge must be positioned to the right to allow proper seating.

5. Make sure that the ribbon rests between the cardholder and the ribbon guide.
6. Close the top cover.
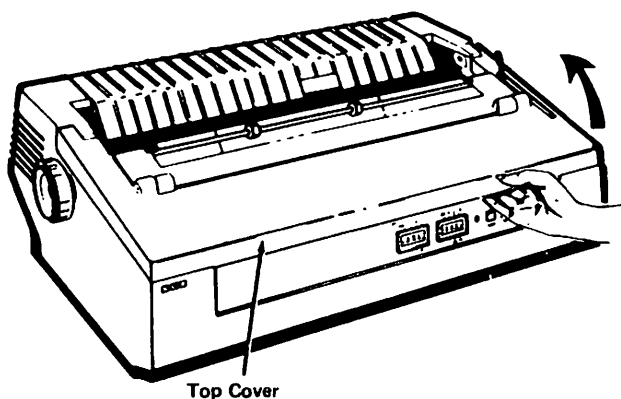
Top Cover

Figure 34   Raising the top cover

Ribbon

Ribbon Guide

Card
Holder

Right Locking
Spring

Ribbon
Cartridge

Cartridge Frame
(Left Hole)
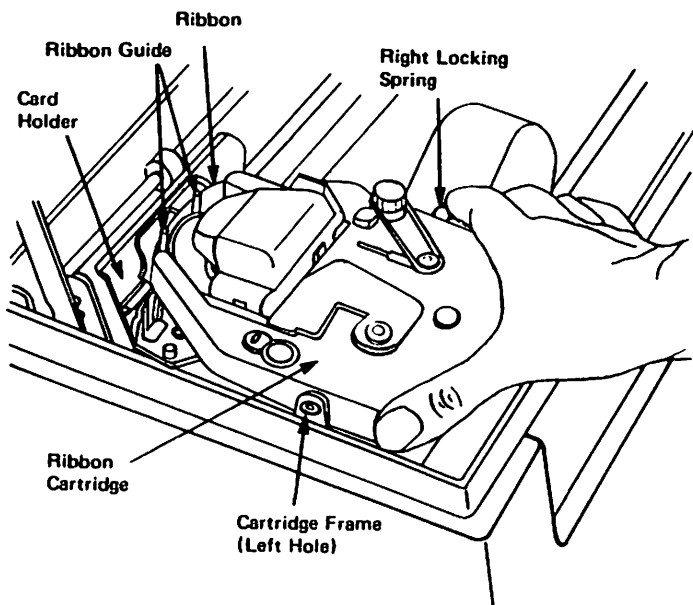
Figure 35   Removing the ribbon cartridge

Manual Feed
Knob

Right Pivot
(Hidden)

Left Pivot

Fabric Ribbon
Cartridge
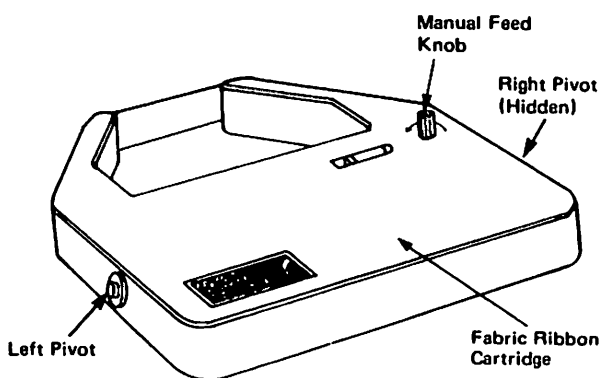
Figure 36   Fabric ribbon cartridge

REVERSING A MULTISTRIKE RIBBON CARTRIDGE

Perform the following steps to reverse a multistrike ribbon
cartridge:

1. Raise the top cover (Figure 34).

2. While holding the ribbon cartridge, press the right locking spring to the right, and remove the cartridge by lifting upward on the right side (Figure 35).

3. Remove the belt from the top of the multistrike ribbon cartridge (Figure 33). Turn the cartridge over and install the belt on the new top side.

4. Press the cartridge switch to the right (belt side). The arrow on the top of the cartridge should be aligned with the notch in the top of the cartridge switch.

5. Turn the manual feed knob on the ribbon cartridge in the direction of the arrow (counterclockwise) to put tension on the ribbon.

6. Insert the left pivot of the ribbon cartridge into the left hole of the cartridge frame. Gently lower the right side of the ribbon cartridge while turning the manual feed knob in the direction of the arrow (counterclockwise) until the right pivot is latched by the right locking spring.

7. Make sure that the ribbon rests between the cardholder and the ribbon guide.

8. Close the top cover.

Print Thimble Replacement

Perform the following steps to replace a print thimble on the printer:

1. Raise the top cover (Figure 34).
2. Lift the hammer cover from its right side (Figure 37).
3. Slide the lock piece (located in the center of the thimble holder) to the side and pivot it up so that it is vertical (Figure 38).
4. Remove the print thimble by gently holding the center hub and lifting it from the carriage (Figure 39).

NOTE: Hold the thimble by the center hub to avoid damaging the character type area.

5. Place the new print thimble in position by aligning the square hole in the bottom of the thimble with the square block on the carriage.
6. While gently holding the thimble seated, move the lock piece to the horizontal position and slide it toward the center to latch the print thimble (Figure 40).

Hammer Cover   Print Thimble
                                Cardholder

                                Ribbon Cartridge
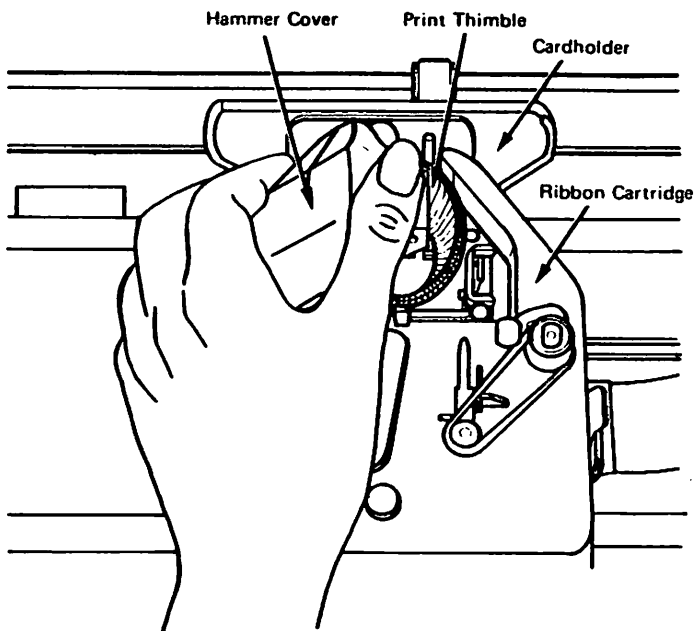
Figure 37   Lifting the hammer cover

Print Thimble

Lock Piece
Pin
Thimble
Mount
Square
Block
Insert
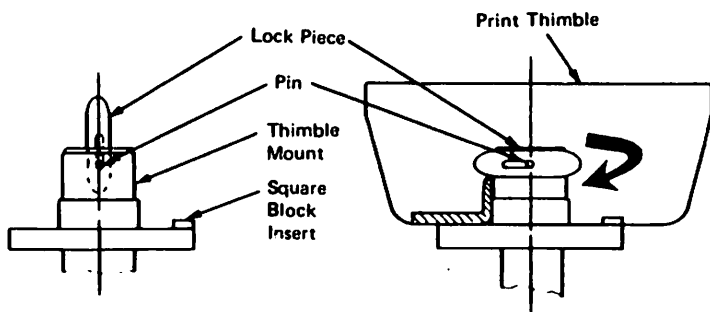
Figure 38   Releasing the thimble latch
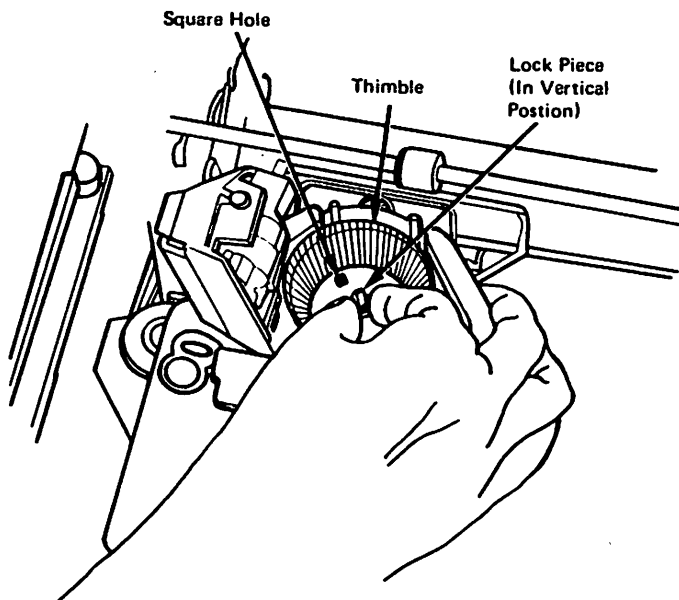
Figure 39   Removing the print thimble
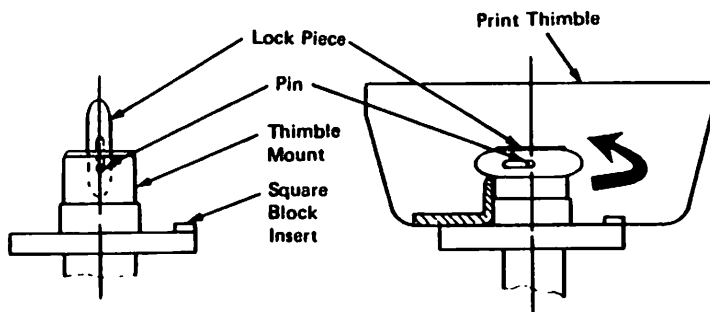
Figure 40   Locking the print thimble

7. Push the hammer cover back down until it locks into place.

8. Use the following guide and set the impression control switch (Figure 41) to match the print thimble being used.

   - Position 'L' for small typefaces (12 or 15 pitch) or graphics.
   - Position 'M' for normal density with average typefaces.
   - Position 'H' for multiple copies or large typefaces (Focus 10).

9. Close the top cover.

10. Set the switch SW2 on the operator control panel to correspond to the print thimble that was installed. Set switch SW3 on the operator control panel for the proper character per inch pitch setting.
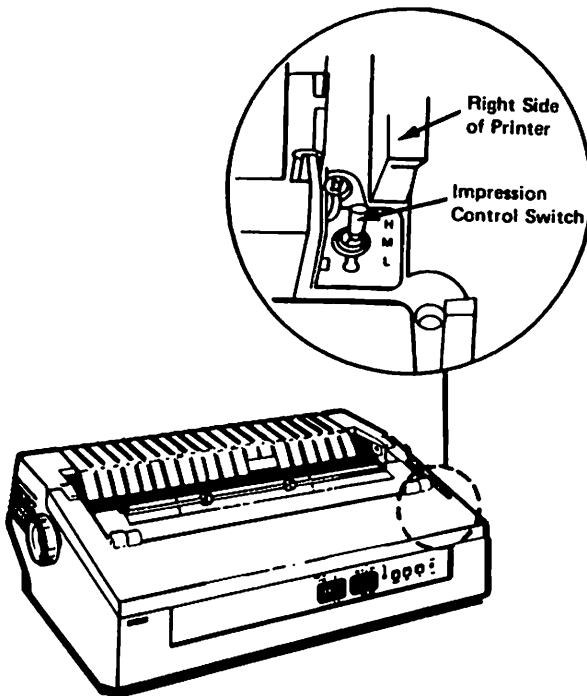
Figure 41   Impression control switch

Cleaning

Before cleaning the printer as explained here, remove power from the unit by turning off the printer and unplugging the power cord from the service outlet.

Common mild dishwashing detergents and water should be used to clean the cabinet. Moisten a soft cloth or paper towel with the cleaning solution and gently wipe all surfaces. Be careful not to saturate the cloth or towel where the cleaning solution might run into any area of the printer. Never spray or pour cleaning solutions directly on the printer cabinet.

To maintain good print quality, the cardholder and print mask must be cleaned at regular intervals. Perform the steps in the following procedure to clean the cardholder and print mask:

1. Turn OFF the printer POWER switch.
2. Open the top cover.
3. Remove the ribbon cartridge and print thimble.
4. Push the plastic tabs at the bottom of the cardholder toward the center and remove the cardholder by sliding it upward and off the ribbon guides (Figure 42).
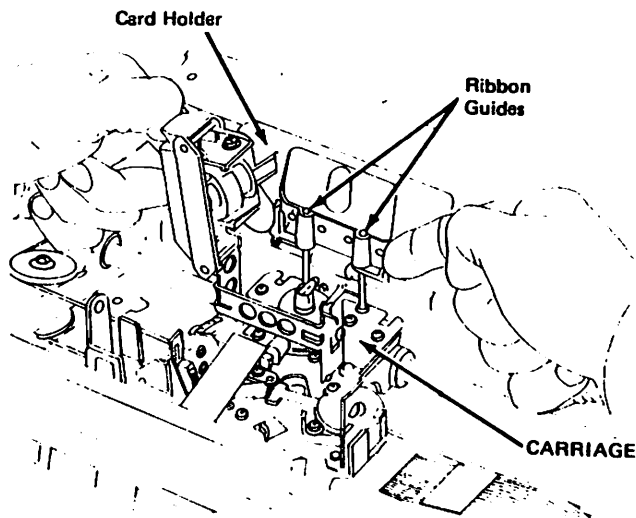
Figure 42   Removing the cardholder

5. Using a lint free cloth, clean the cardholder and print mask.
6. If necessary to replace the print mask, install the print mask on the cardholder as shown in Figure 43).
7. Install the cardholder on the two ribbon guides and push the cardholder down until it is latched in place.
8. Install the print thimble and ribbon cartridge.
9. Close the top cover and turn ON the printer POWER switch.

Step 1   Step 2
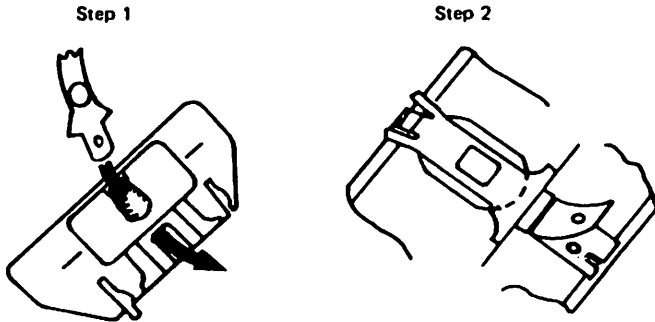
Figure 43   Installing the print mask

Problem Recovery

A number of printer problems can be corrected by the operator. Figure 44 shows a list of possible problems, their possible causes, and the recommended repair procedures. The troubleshooting guide should be used with the *Failure Analysis* section in this publication to separate problems that the operator can correct from problems that require an NCR Field Engineer to repair.

Printer Failure Analysis

One of the features of the NCR 6455 Letter Quality Printer allows the operator to select diagnostic functons to test the printer after a printer failure occurs. The diagnostic functions should be used with the Troubleshooting Guide to separate problems that require an NCR Field Engineer to repair.

Use the following steps when using the printer failure analysis feature.

1. When a printer failure occurs, do not turn the printer off. The error information that the printer generates when an error occurs will be lost if the printer is turned off.
2. Set the error monitor slide switch (SW1-8), located on the operator control panel switch 1, to the ON position.

SW 1

| 1 2 3 4 5 6 7 8 | Error Monitor |
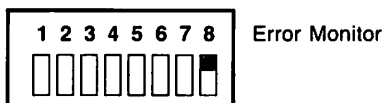
3. Move the right FORM LENGTH switch between positions 0 and 7. The DATA lamp and alarm will indicate the type of error that has occurred. Figure 45 shows a list of the possible errors that the failure analysis feature will detect and also lists the recommended recovery procedure for each error.
4. After correcting the problem, be sure to set SW1-8 to the OFF position; also, set the FORM LENGTH switch to the correct position.

NOTE: On all printer errors that require service from NCR Field Engineering, record the FORM LENGTH switch setting and type of error indication before turning the printer off.

Symptoms	Possible Causes	Operator Action
Does not print (fan not running)	Power source	1. Connect the printer to ac power 2. Turn on the power switch
Does not print No carriage movement CHECK indicator illuminates and alarm sounds	Cover open	Close the cover
RIBBON indicator illuminates and alarm sounds	Ribbon end	Check the ribbon cartridge. If using a multistrike cartridge, check to see if ribbon is at the end (window on the cartridge should be full). Replace or reverse the ribbon, and press the RESET switch.
PAPER indicator illuminates and alarm sounds	Paper out	Check paper supply and be sure paper is loaded correctly. Press the RESET switch.
Carriage moves but does not print	1. Ribbon broken or not installed properly 2. Thimble broken or not installed properly	Replace ribbon or install properly Replace thimble or install properly
Printing but no carriage movement Alarm may sound	1. Obstruction in carriage path 2. Broken carriage cable	Remove obstruction Call NCR Field Engineering

Figure 44   Troubleshooting guide (1 of 2)

Symptoms	Possible Causes	Operator Action
Paper tearing	1. Paper not loaded properly	Check paper loading
	2. Obstruction in paper path	Remove obstruction
	3. If using forms tractors, too much tension may exist	Adjust forms tractors
	4. Paper release lever may be engaged	Release paper release lever
Print is light or not clear	1. Ribbon worn, jammed, or broken	Replace ribbon or install properly
	2. Ribbon or thimble not installed properly	Install ribbon or thimble properly
	3. Print impression control not set correctly	Set impression control correctly
	4. Damaged platen or thimble	Inspect platen for scratches or other damage
REMOTE OPERATIONS		
CHECK and DATA indicators illuminate and alarm sounds	Parity or framing error	Check PARITY and SPEED switches for compatibility with host device. Press the RESET switch.
Carriage does not move and printer does not print	No data input	Check host device
CHECK indicator illuminates and alarm sounds	Buffer overflow	Check host device and press the RESET switch

Figure 44   Troubleshooting guide (2 of 2)

FORM LENGTH SWITCH SETTING	DATA LAMP ILLUMINATES ALARM SOUNDS INTERMITTENTLY	DATA LAMP ILLUMINATES ALARM SOUNDS FOR APPROXIMATELY 1/2 SECOND
0 (also 8)	Unused	Unused
1 (also 9)	Unused	Line error — This error indicates a communication link problem between the printer and the system. Set switch SW1-8 to the OFF position and contact the data processing manager for specified recovery procedures.
2	Rotate home alarm — This error indicates incorrect thimble positioning. Set switch SW1-8 to the OFF position and turn off the printer. Remove the ribbon cartridge and thimble. Check the ribbon for tears or breakage. Check the thimble for damaged or missing parts. If necessary, replace the cartridge and thimble. If the ribbons or thimbles break frequently, contact NCR field engineering.	Buffer overflow error — This error indicates an incorrect printer/system configuration. Check the switches on the operator control panel for being in the correct position for the particular system being used. Refer to the installation publication for a description of the switches.
3	Unused	Break code reception — This error indicates that the printer has received a break code. Set switch SW1-8 to the OFF position and contact the data processing manager for specific recovery procedures.
4	Unused	Parity/framing error — This error indicates one of the following conditions. • Transient communications error between the system and the printer Set SW1-8 to the OFF position, press the RESET switch, and continue use. • Frequent occurrances of this error can indicate a faulty communications connection Contact NCR field engineering to correct this problem.

Figure 45   Printer failure analysis (1 of 2)

FORM LENGTH SWITCH SETTING	DATA LAMP ILLUMINATES ALARM SOUNDS INTERMITTENTLY	DATA LAMP ILLUMINATES ALARM SOUNDS FOR APPROXIMATELY 1/2 SECOND
5	Spacing initialize alarm — This error indicates a carriage movement problem. Set SW1-8 to the OFF position and turn off the printer. Lift the cover and check to make sure that the rubber stopper that is shipped with the printer has been removed from the carriage rail. Also, check the carriage path for foreign objects or obstructions. Move the carriage from the extreme left positoln to the extreme right position, checking for freedom movement. If this problem occurs repeatedly, contact NCR field engineering.	Ribbon end — This error indicates a ribbon cartridge problem. Replace or reverse the multistrike cartridge. Be sure that the cartridge is installed properly. Press the RESET switch and set SW1-8 to the OFF position.
6	Spacing home switch alarm — This error indicates a carriage movement problem Set SW1-8 to the OFF position and turn off the printer. Lift the cover and check to make sure that the rubber stopped that is shipped with the printer has been removed from the carriage rail. Also, check the carriage path for foreign objects or obstructions Move the carriage from the extreme left position to the extreme right position, checking for freedom movement If this problem occurs repeatedly, contact NCR field engineering	Cover open — This error indicates that the printer cover is in the open position. Close the cover and set SW1-8 to the OFF position.
7	Memory error — This error indicates that a memory error has occurred in the printer memory. Set SW1-8 to the OFF position and turn off the printer. Turn on the printer and continue to use it. If this error occurs repeatedly, contact NCR field engineering.	Paper out — This error indicates either a torn from or a paper out condition. Correct the problem, press the RESET switch, and set SW1-8 to the OFF position.

Figure 45   Printer failure analysis (2 of 2)

Floppy Disk Drive
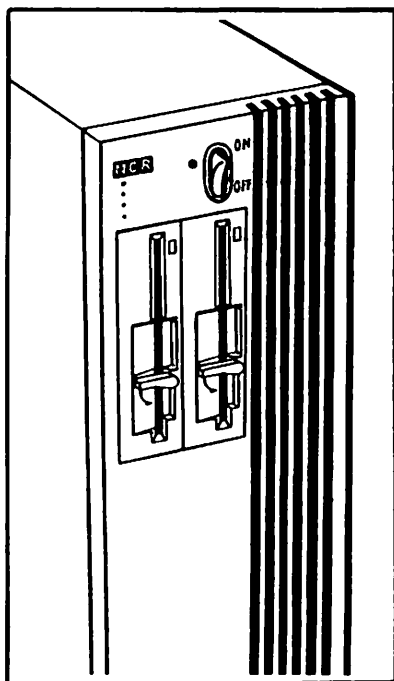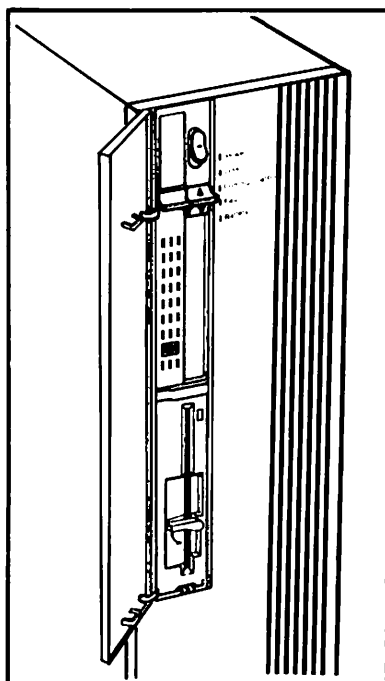
TOWER XP and MiniTOWER   TOWER 32

The integrated 5.25 inch floppy disk drives reads and writes data from and to floppy disks.

When the power switch on the main unit is in the ON position, the disk drives are ready to be used. Power should never be applied to or removed from the unit with a disk installed in either disk drive. The red indicator on the floppy disk drive indicates that the unit is either reading or writing.

Floppy Disk

The floppy disk has a coat of magnetic material which is the recording surface. The floppy disk is inside a sealed jacket. The jacket is approximately 5.25 inches square. The drive accesses the recording surface of the floppy disk through the recording slot and the index hole (Figure 1) in the jacket. Do not touch the magnetic material which is visible through these holes and do not drop the floppy disk. If dirt is on the recording surface, the floppy disk cannot be used.

Disk
Label

Floppy
Disk

Recording
Slot

Write
Inhibit
Slot

Index
Hole

Jacket

Storage
Envelope

NCR
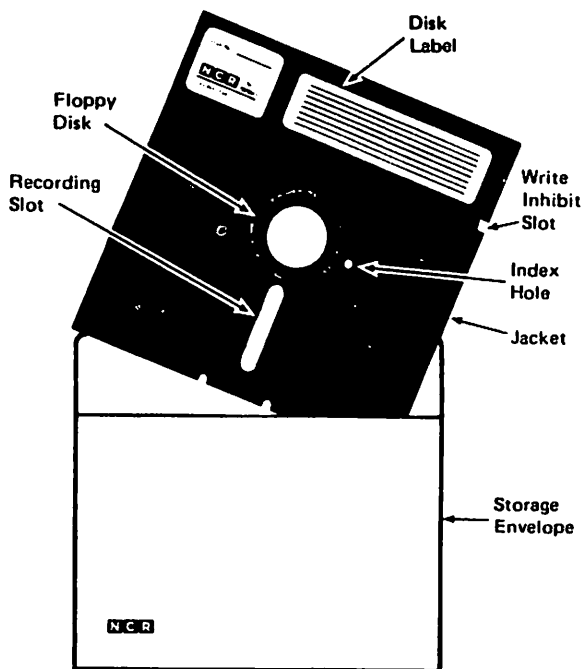
In addition to the jacket, a storage envelope (Figure 1) is provided with each floppy disk to protect it from dirt. When the floppy disk is not installed in the drive, it must be in this envelope. When putting a floppy disk in its envelope, insert it with the disk label visible, as shown in Figure 1. This makes sure that the recording surface, which is visible through the jacket holes, is protected from dirt.

The floppy disk is a double-sided, double density disk having 96 tracks per inch when formatted. Floppy disks are available from the NCR Systemedia representative under stock number 280833 for double sided recording.

Floppy Disk Storage

At all times, except when the floppy disk is installed in the drive, it must be in its envelope. Keep these envelopes in the container box.

Do not put floppy disks near any magnetic fields from motors, transformers, magnets, or magnetized tools. Protect it from dirt and liquid.

Floppy disks must be permitted to reach the same temperature and humidity as that of the drive before they are used. If floppy disks are not kept in the same area as the drive, move them near the drive at least one hour before they are used.

Floppy Disk Labeling

Each carton of NCR floppy disks include 10 floppy disks, a sheet of self-adhering disk labels, and a sheet of self-adhering metallic strips.

When a floppy disk is used, a disk label should be installed on the floppy as shown in Figure 2. The label provides sufficient space for the date and the contents of the floppy disk to be written. The contents should define the file system name or the file names of the files on the floppy. Do not put more than 2 layers of disk labels on a floppy disk. A floppy disk with a number of labels on it may not fit properly into the drive.

Use a felt tip pen to write on the floppy disk label. Deposits from lead pencils, erasers, grease pencils, or ball point pens can damage the recording surface. Write on the label before putting it on the floppy disk; or, if the label is already on the disk, write on the label only when the floppy disk is in the envelope.

Floppy Disk Handling

If the floppy disk is handled correctly, it can be used for a long period of time. In particular, pay attention to the following points:

1. Do not put the floppy disk in direct sunlight.
2. Do not put a label on the seamed-side of the jacket.
3. Do not put paper clips or rubber bands on the jacket.
4. Do not touch the recording surface.
5. Do not, by any method, clean the floppy disk. The inner surface of the jacket cleans the floppy disk during processing.

To prevent inadvertent writing to any files on the disk, a metallic strip can be installed over the write inhibit slot. The metallic strip should be installed (Figure 2) on the floppy disk so that it adheres to both sides of the floppy disk while covering the write inhibit slot.

Metallic
Strip
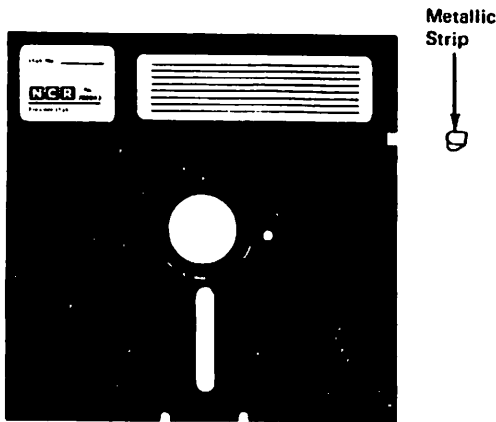
Figure 2   Write inhibit

Installing the Floppy Disk

Figure 3 shows the floppy disk drive. The drive is less than 2 inches wide and has a lever that makes a quarter turn to either block or unblock the drive unit slot; its red indicator is on the right side of the drive unit slot.
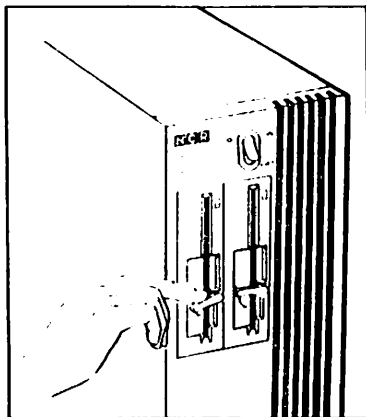
Figure 3   Disk access door

Use the following procedures to install a floppy disk in the drive. If the floppy disk drive is installed in a TOWER 32, open the door on the front of the unit to gain access to the drive.

1. Make sure the main unit is turned on. Do not install a floppy disk in the drive when the main unit is turned off.
2. Open the disk access door with the tip of a finger by turning the lever counterclockwise 1 quarter turn to unblock the drive unit slot (Figure 3).
3. Remove the floppy disk from its envelope; do not touch the recording surface.
4. With the label facing the right and the write inhibit slot upward (Figure 4), carefully push the floppy disk into the drive until it clicks into position.
5. Turn the lever clockwise 1 quarter turn to block the drive access slot.
6. Do not turn the lever until the floppy disk is removed.
7. Protect the storage envelope from dirt, liquid, and metal.
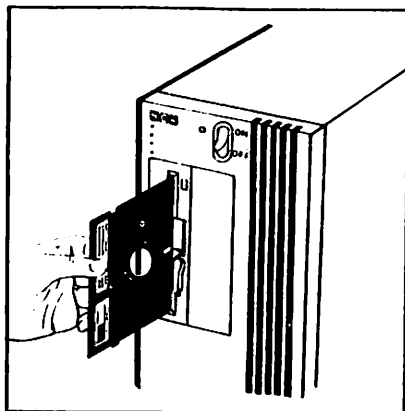
Figure 4   Inserting the floppy disk

Removing The Floppy Disk

Use the following procedures to remove a floppy disk from the drive.

1. Open the disk access door with the tip of a finger by turning the lever counterclockwise 1 quarter turn to unblock the drive unit slot. Floppy disk rotation stops and the drive disengages.
2. Remove the floppy disk from the drive unit slot and put it in the envelope. Be sure to touch only the jacket and not the recording surface.
3. Put the floppy disk in the container box.

Streaming Tape Drive

Streaming
Tape
Drive

TOWER XP and
MiniTOWER

TOWER 32
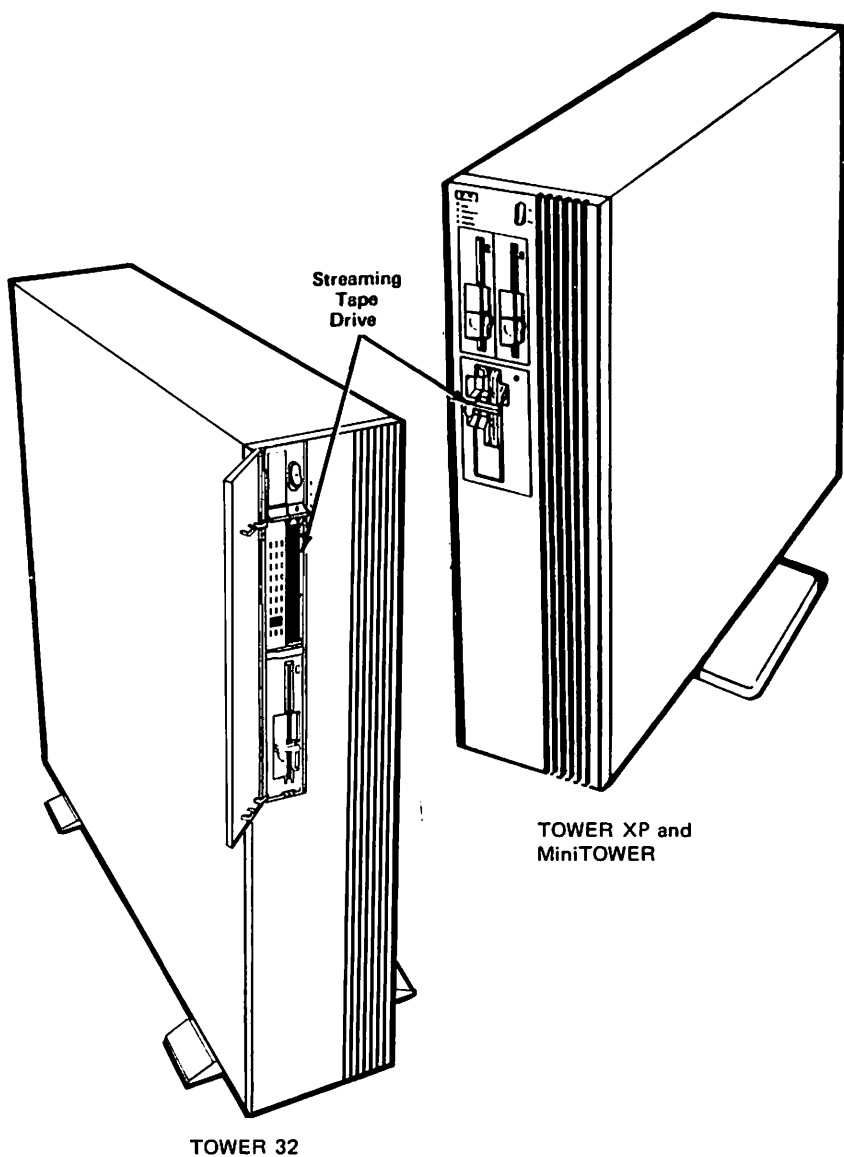
The streaming tape drive reads and writes data to and from magentic streaming tape cartridges. This chapter gives an explanation of the streaming tape drive operation and the streaming tape cartridge management.

Streaming Tape Drive

The streaming tape cartridge is installed in, and accessed through a vertical opening in the Main Unit. When the Main Unit is turned on, the drive is ready for operation.

The drive read/write head must be clean to provide smooth operation (Figure 1). Clean it after every 40 hours of operation using the following procedure.
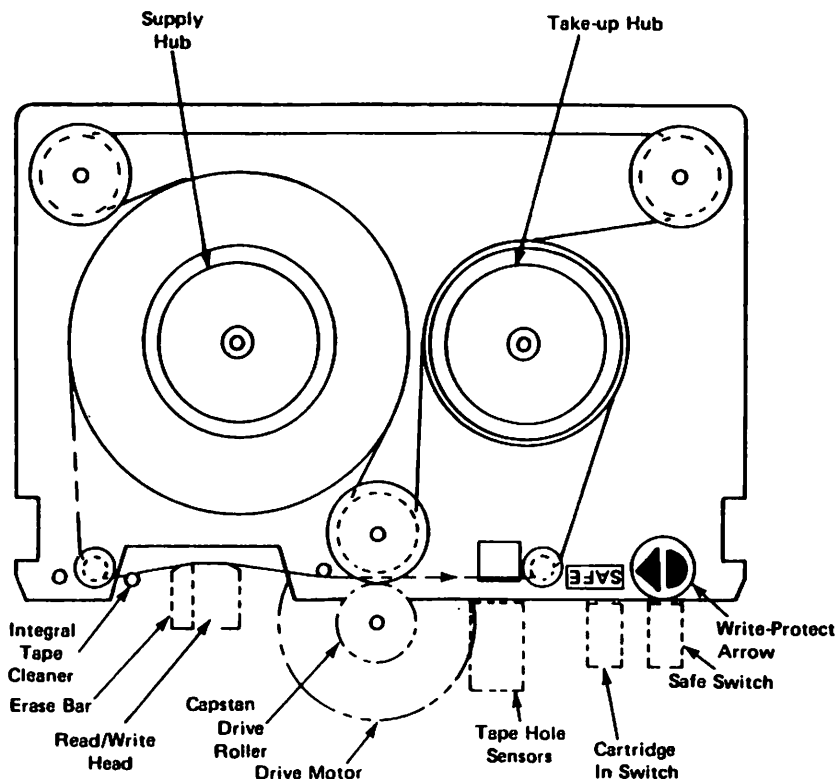
Figure 1

1. Be sure the power is turned off on the Main Unit.
2. Apply isopropyl alcohol to a clean cotton swab. Use the swab to clean the read/write head and the capstan.
3. Use a new swab to remove any remainder of alcohol.
4. Remove any lint from the read/write head with a lint-free cloth.

Streaming Tape Cartridge

The magnetic data cartridge must have recording tape which is certified for 8000 bits per inch. The streaming tape cartridge is available from NCR under stock number ST#279857.

Streaming Tape Cartridge Description

The streaming tape cartridge contains a 4-track magnetic recording tape installed on 2 reels. Each of the 4 tracks is approximately 450 feet long (Figure 2). Each track is filled with data before the next track is started; all 4 tracks are not recorded at one time. In the first part of the tape, there are beginning-of-tape holes (BOT), followed by a load point hole. In the last part of the tape, there is an early warning hole, followed by end-of-tape holes (EOT). When the BOT/EOT sensor detects BOT or EOT, tape movement stops, making sure that the physical end of the tape is not reached; the tape is not attached to either reel. The drive reads and writes only after the load point hole is detected. When the early warning hole is detected, the drive selects the next track in sequence after completing the current block. When this occurs on the last available track, the end-of-tape procedure is automatically performed.

The streaming tape cartridge has a write-protect hole in the right side of the back edge (Figure 1). When the hole is open, the drive can read the tape, but it can not write on it. When the hole is closed, the drive can read and write on the tape. To open the hole, turn the arrow on the streaming tape cartridge in the direction of the embossed SAFE indicator. To close the hole, turn the arrow in the opposite direction. Use a paper clip to open and close the hole.

The drive capstan is in the center of the back edge. The drive uses this capstan to move the tape. The BOT and EOT holes must be in their proper position for the drive to correctly

control the tape. Because of this, the tape should not be moved while handling the cartridge. This is easily done by moving the capstan, while the cartridge is out of the drive.

The drive accesses the tape through a door in the left, back edge of the streaming tape cartridge. Do not open this door. The drive opens the door while the cartridge is being installed.
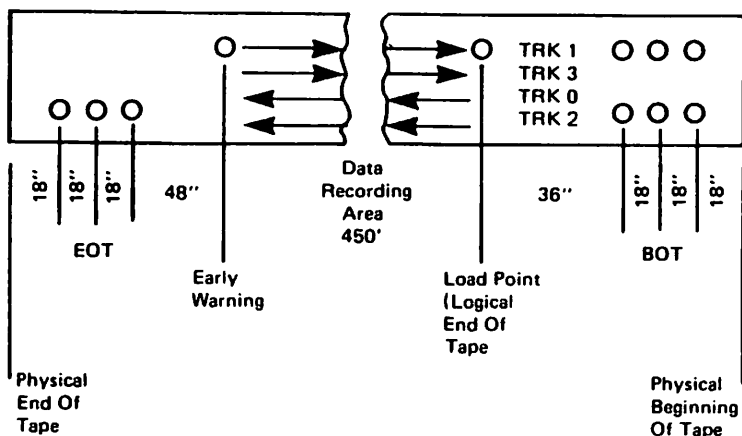
Figure 2

Streaming Tape Cartridge Labeling

Each carton of streaming tape cartridges includes cartridges with labels for each cartridge. The labels are self-adhering. One label should be put on the cartridge container and one label should be put on the streaming tape cartridge (Figure 3). The label should define the file system name or the file names of the files on the tape.

Use a felt tip pen to write on the streaming tape label. Deposits from lead pencils, erasers, grease pencils, or ball point pens can damage the recording tape surface. Write on the label before putting it on the container or cartridge.

Streaming Tape Cartridge Storage

A streaming tape cartridge must be stored with the back edge down. Storing the cartridge with the aluminum bottom in a horizontal position can cause the tape to become unevenly wound on the reels. Put the streaming tape cartridge in its container so that when the bottom edge of the cartridge is down (Figure 3), the label on the container is visible. This makes it easy to select the correct cartridge.

At all times, except when installed in the drive, the streaming tape cartridge must be in its container and the container must be closed. When the cartridge is in the drive, the container must be closed.

Streaming tape cartridges must be permitted to reach the same temperature and humidity as that of the drive before they are used. If cartridges are not kept in the same area as the drive, move them near the drive 1 hour before they are used.

Do not put streaming tape cartridges near any magnetic fields from motors, transformers, magnets, or magnetized tools.
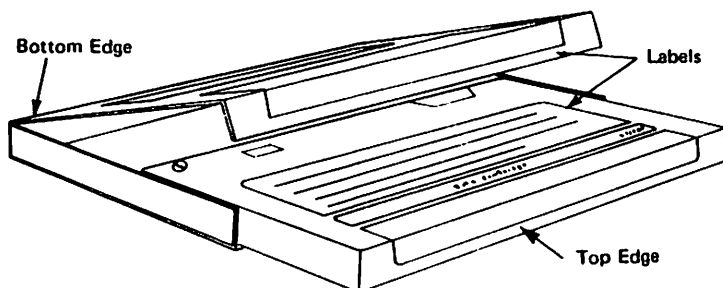
Figure 3

Installing the Streaming Tape Cartridge

When handling a streaming tape cartridge, do not touch the magnetic recording tape and do not drop the cartridge. Operation is smoother when the cartridge is clean.

When the cartridge locks in the drive, the tape is automatically positioned to the beginning of the first track. Therefore, after the program starts, do not remove the cartridge until the program has stopped using it. If the program has moved the tape, and the cartridge is removed and then installed again, the tape is automatically positioned to the beginning of the first track and is not in the correct position. The program must be started again. The drive opens the cartridge read/write head access door while the cartridge is being inserted.

A data cartridge should not be in the drive, unless it is being used by the program. If the cartridge is in the drive for a long period of time without the tape moving, heat may cause the tape to lose its correct tension.

Figure 4 shows one model of tape drive. The drive has a
lever that makes a quarter turn to lock or unlock the cartridge.
Use the following procedure to install a data cartridge in the
model of drive with the quarter-turn handle.
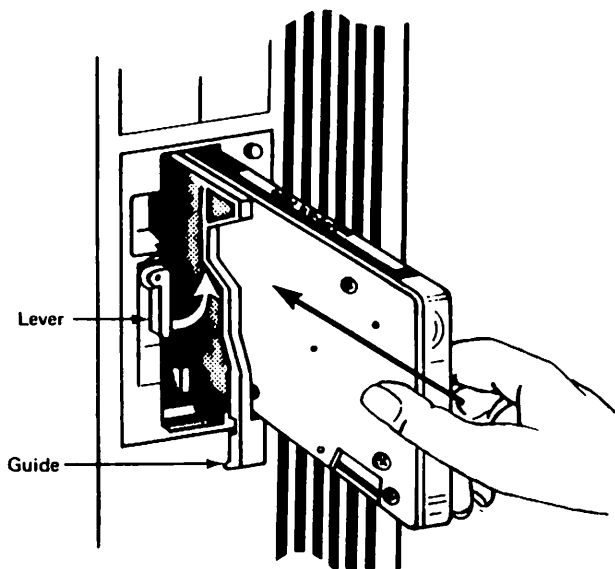
Figure 4

1. Turn the lever clockwise 1 quarter turn to unblock the drive
   unit slot (Figure 4).
2. Pull the cartridge guide to the front.
3. Remove the data cartridge from its container and close the
   container.
4. With the top edge (label edge) up and the aluminum plate
   to your left, slide the cartridge into the drive until it stops;
   the cartridge guide moves into the drive.
5. Turn the lever counterclockwise 1 quarter turn until it clicks
   into position; make sure the lever clicks into position.

To remove the data cartridge, turn the lever 1 quarter turn
clockwise. Pull the cartridge out and put it in the container.

Figure 5 shows another model of tape drive. The drive is shown mounted in a TOWER 32. The drive is located behind the door on the front of the TOWER 32 unit. Use the following procedure to install a data cartridge in the drive.
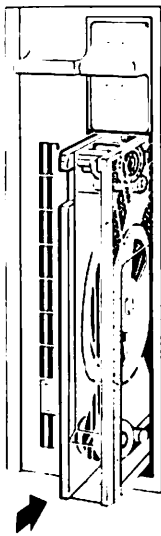
Figure 5

1. Open the door on the front of the unit (if this is a TOWER 32).
2. Remove the data cartridge from its container and close the container.
3. With the aluminum plate to your left side and with the notches in the aluminum plate toward the top, slide the cartridge into the drive until it stops.
4. Without releasing the pressure on the data cartridge, move the cartridge to the left with your finger as shown in Figure 6.
5. Remove your finger from the data cartridge. If the cartridge does not stay completely in the drive, it was not positioned far enough to the left. Repeat step 4 until the data cartridge stays in the drive.
6. Push the lock lever at the top of the tape drive opening down until it clicks into position. The data cartridge is now locked into the drive and is ready to use.
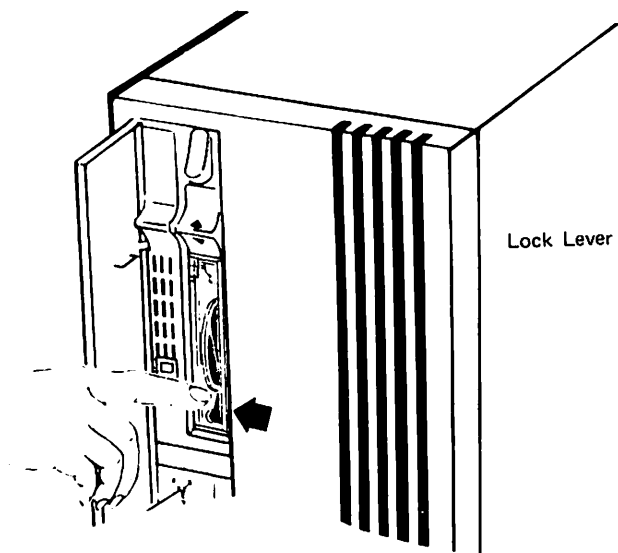
Lock Lever

Figure 6

To remove the data cartridge, pull the lock lever up until it stops. The data cartridge will then partially slide out of the tape drive. Remove the data cartridge and return it to its container.

File System

Definition

Your NCR computer is called an electronic filing cabinet because many of the papers you formally filed in cabinets are filed in the computer: reports, records, letters, spreadsheets, etc. The files in the computer are recorded electronically on disks.

File Room

The computer file system is analogous to a business file room. Typically a business file room contains a variety of different filing cabinets. Some filing cabinets contain hanging folders, some contain manila folders, some contain both, and some contain neither. A tray labeled "To Be Filed" is usually overflowing. The computer filing system has the same characteristics, except everything in the computer is always filed. There is no "To Be Filed" tray.

Consider a file room which has a number of filing cabinets. Labels on the filing cabinet drawers specify the contents of the drawers.
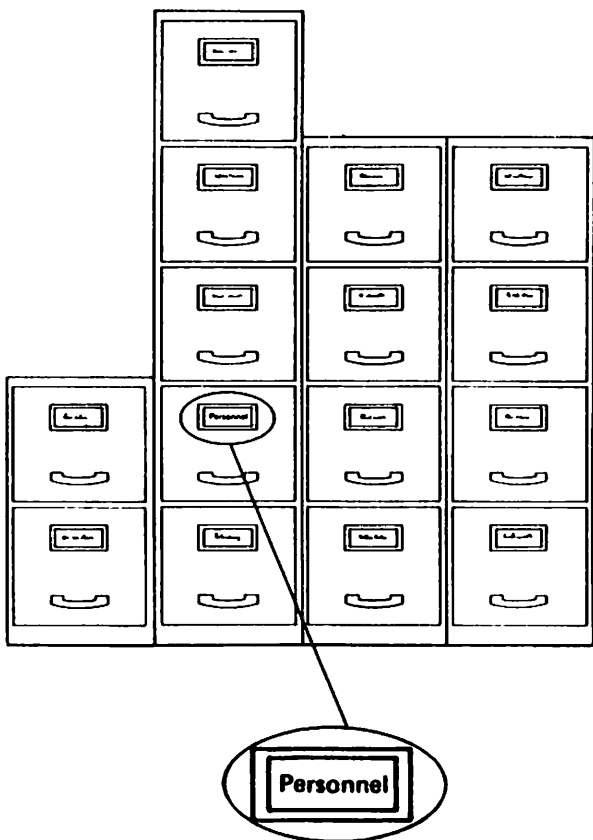
A number of hanging folders may be in a drawer, and each hanging folder may contain several manila file folders. In each manila folder are several records.
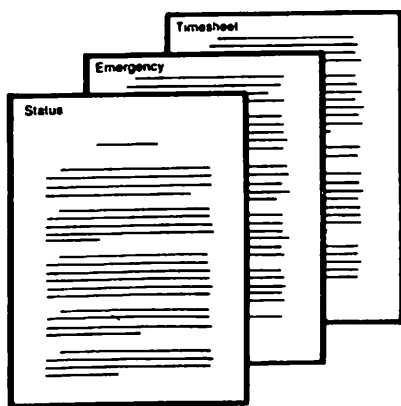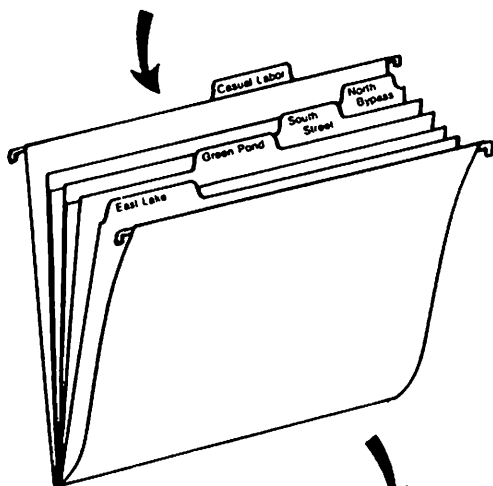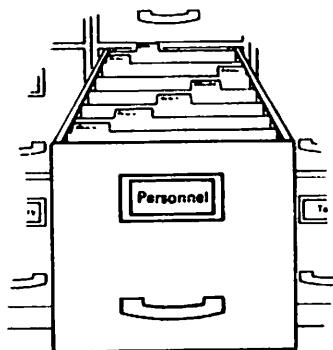
To describe the location of a particular report, you might say, "In the file room, look in the second file cabinet in the drawer labeled 'Personnel', in the hanging folder labeled 'Casual Labor', in the manila folder labeled 'East Lake' to find the 'Status' report." A diagram of the location of the Status report might look like this where the path to the Status report is shown by a dark line.

file room

| first file cabinet | second file cabinet | | third file cabinet | fourth file cabinet | . . . |

| first drawer | second drawer | third drawer | fourth drawer (Personnel) | fifth drawer |

| folder | Casual Labor folder | folder | folder | . . . |

| East Lake folder | South Street folder | North Bypass folder | Green Pond folder | . . . |

| Time Sheet | Emergency | Status | . . . |
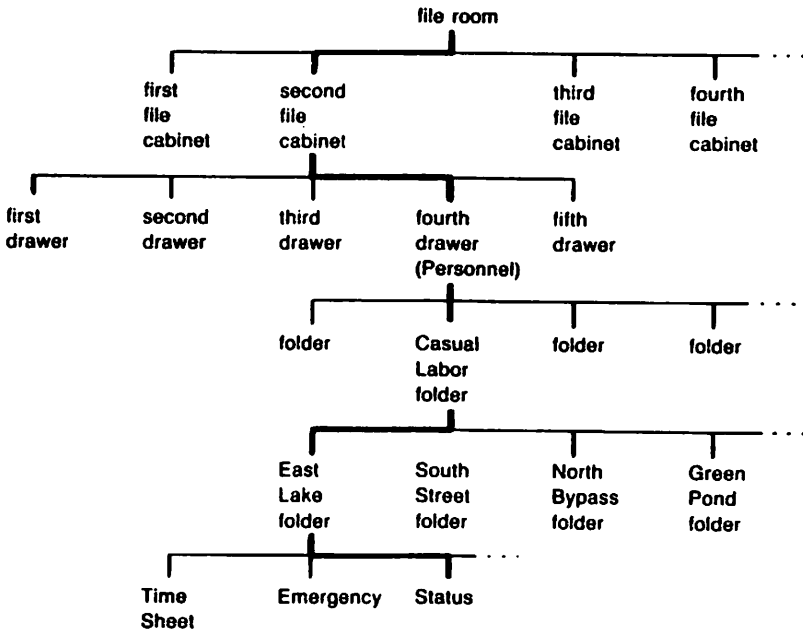
In the computer, the path to the Status report is similar. However, expressions like "the second filing cabinet" are long. To make it easier, each component of the computer file system is given a meaningful name. The file room itself, which is the complete computer file system, is called root because the path diagram resembles an inverted tree with root as the beginning. You can assign any names to the other components of your file system. Assume that the assigned names are:

root — the name of the file room
employee — the name of the second filing cabinet
personnel — the name of the fourth drawer
casual — the name of the hanging folder

eastlake — the name of the manila folder
status — the name of the report

In specifying the path to the Status report, a slash symbol (/) specifies root. A slash symbol is also used to separate the file system component names. The Status report location is specified as:

/employee/personnel/casual/eastlake/status

This specification is called the full pathname of the Status report. Sometimes full pathnames are required; often they are not. More information about the pathname requirements is given later in this chapter.

The file room, cabinet drawers, and folders function as separators and holders of information. In themselves, they do not provide information. They may even be empty. The papers in these holders, however, do provide information. The Status report, for example, contains status information about the casual labor employed at East Lake.

In the computer, because the Status report contains information, the Status report is a file. The file contains all the characters, numbers, and spaces which make up the report. This file is assigned the file name of status. (A file may also be empty which is like filing a blank sheet of paper.) The holders of information are directories, and each directory has a directory name. For example, root, employee, personnel, casual, and eastlake are directory names. Sometimes directories are referred to as subdirectories. For example, the eastlake directory is a subdirectory of the casual directory. Because all directories are subdirectories of the root directory, generally holders of information are referred to simply as directories.

A diagram of the computer file system may look like this.

```
                              root
        ┌──────────┬──────────┴──────────┬──────────┬── · · ·
     inventory  employee              bids      estimates
  ┌──────────┬──────────┬──────────┬──────────┐
:nding  applications  resumes  personnel  payroll
                        ┌──────────┬──────────┬──────────┐
                     fulltime   casual    parttime   contract
                  ┌──────────┬──────────┬────── · · ·
               eastlake  southstreet northbypass greenpond
        ┌──────────┬──────────┬── · · ·
    timesheet  emergency   status
```
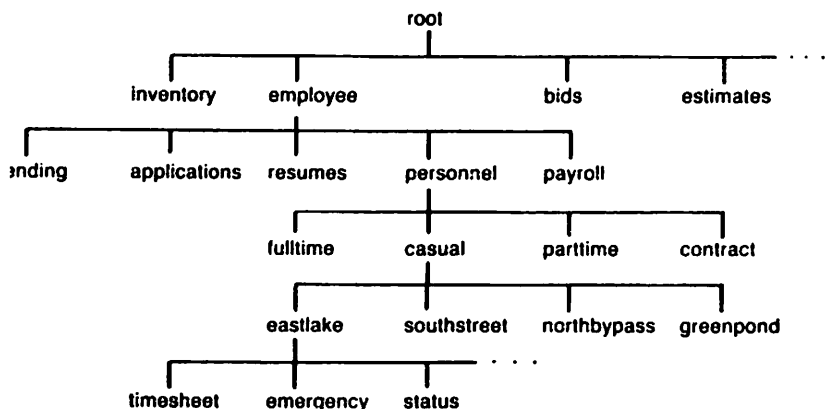
The full pathname of the emergency file for East Lake is:

/employee/personnel/casual/eastlake/emergency

The full pathname of the contract directory is:

/employee/personnel/contract

In a filing cabinet, all reports do not need to be in folders,
and manila folders do not need to be in hanging folders. This
is also true for your computer file system. Consider a Status
report which is a summary of the Status reports for East Lake,
South Street, North Bypass, Green Pond, etc. This summary
report, named casualsum, may be filed in the casual directory.
The diagram is:


```
                              root
        ┌──────────┬──────────┴──────────┬──────────┬── · · ·
     Inventory  employee              bids      estimates
  ┌──────────┬──────────┬──────────┬──────────┐
nding  applications  resumes  personnel  payroll
                        ┌──────────┬──────────┬────── · · ·
                     fulltime   casual    parttime   contract
                  ┌──────────┬──────────┬──────────┬────── · · ·
              casualsum  eastlake  southstreet northbypass greenpond
        ┌──────────┬──────────┬── · · ·
    timesheet  emergency   status
```
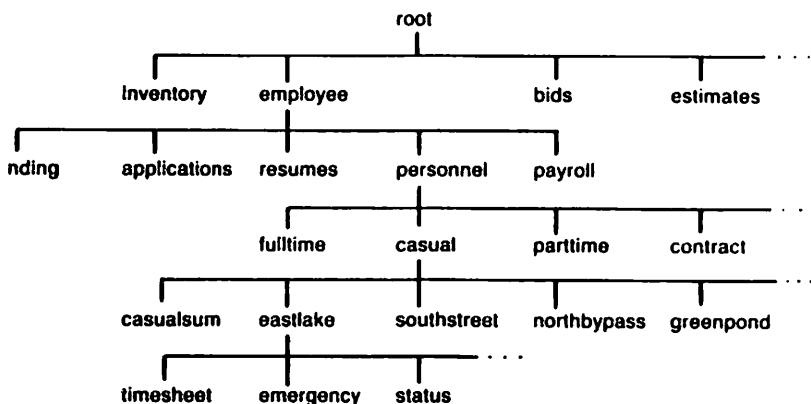
The full pathname of the summary report is:

/employee/personnel/casual/casualsum

The casual directory contains one file (casualsum) and several directories (eastlake, southstreet, northbypass, greenpond, etc.). Any directory in your computer file system may contain:

- files
- directories
- files and directories
- nothing (the directory is empty)

In a filing cabinet, you can:

- put reports in a drawer
- put reports in a manila folder in a drawer
- put reports in a hanging folder in a drawer
- put reports in a manila folder in a hanging folder in a drawer

Further divisions of the holders of information require techniques such as tabs or color coded labels. In your computer file system, you can have as many levels of directories as you need. The number of directory levels and the number of files which can be in your computer file system are limited only by the amount of disk space. Consider, for example, the need to divide the East Lake reports into work shifts. You might put three directories in the eastlake directory — firstshift, secondshift, and thirdshift — and file reports in these directories. The East Lake part of your file system then looks like this:

```
                          .
                          .
                          .
          · · · ─────────┼───────── · · ·
                      eastlake
                          │
                      secondshift
                    ┌─────┼─────┐
               timesheet emergency status
        firstshift                  thirdshift
     ┌──────┼──────┐            ┌──────┼──────┐
timesheet emergency status  timesheet emergency status
```
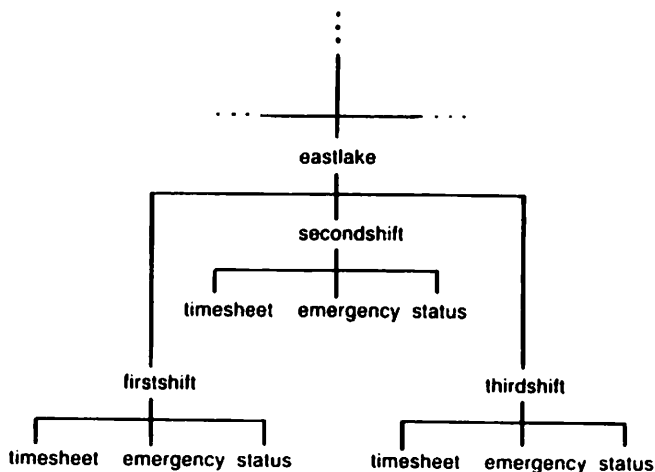
The full pathnames to the Status reports are:

/employee/personnel/casual/eastlake/firstshift/status
/employee/personnel/casual/eastlake/secondshift/status
/employee/personnel/casual/eastlake/thirdshift/status

Remember, you do not usually need to specify full pathnames to find a report (file) in your NCR computer electronic filing cabinet. You do need to know exactly how your file room (root) is organized to effectively use all of your computer electronic filing cabinet features. Two of these features are transfer files and locked files.

Transfer Files

When a business file room or a particular filing cabinet drawer is full, or the information is not current enough for frequent reference, files are discarded or moved to transfer files in a storage area.

Files can be discarded from your computer file system by removing them. Removing a file deletes the file from the file system. A removed file cannot be recovered.

Files can be transferred from your computer file system by first copying the files to a floppy disk or streaming tape, and then removing the files. The floppy disks or streaming tapes which contain the transferred files should be stored in a safe place. If any transferred file is needed again, the file can be copied back to your file system.

Checked Files

In a business file room, some filing cabinets have locks. When the filing cabinet is locked, all drawers are locked. Files within the locked cabinet are accessible only to persons who have keys or combinations.

In your computer file system, you may lock any drawer, folder, or report. You can then issue keys to only authorized persons. The keys in your computer file system not only restrict access, they restrict the types of access.

The access persmission to any directory or file may be set to permit access by the owner, a group, or everyone.

- owner — The owner of a directory or file is the user who created the directory or file. After a directory or file is created, the ownership may be changed only by the current owner or the system administrator.
- group — The group of a directory or file is a group name of a number of users who can access the directory or file. Any directory or file can have one group name associated with it. Any number of users may be assigned to the group. Any user may be assigned to a number of groups.
- everyone — Everyone is all users on the system.

The owner, group, or everyone may be restricted to certain types of directory or file access: read, write, and execute access.

- read — Read access permits the owner, group, or everyone to read the directory or files. Read access permits a user to display, print, and copy a directory or file. The user may also run programs which read the directory or file.
- write — Write access permits the owner, group, or everyone to write the directory or file. Write access for a file is different from write access for a directory. Write access for a file permits a user to copy to the file and to run programs which write to the file. Write access to a directory permits a user to copy files into the directory, create files in the directory, and remove (delete) files from the directory.
- execute — Execute access for a file which is a program is different than execute access for a text file (report, letter, etc.) or directory. Execute access for a program file permits a user to run the program. Execute access for a text file or directory permits a user to search for a specific item in the file or directory. The search permission is limited to specific items. No metacharacters are allowed in the search.

Metacharacters, commonly called wildcards, are defined later in this chapter.

Root File System

Your computer root file system is a structure of directories and files which allows you to access the files and devices in the system. When your system is installed, the root file system is created. The root file system looks like this, where thompson, clark, stone, and adams are example user names:
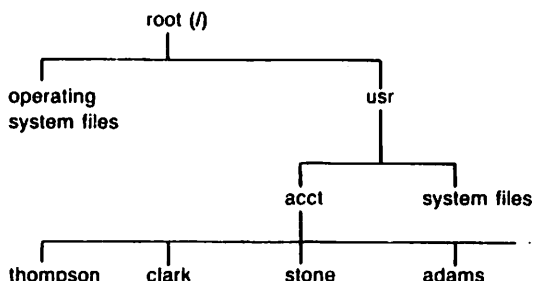
Pathnames

The pathnames in your system specify the locations of directories and files. The name of a directory or file is a string of 14 or less characters. The string can contain any characters except a space character. For example, payreport, Payreport, PayReport, and PAYREPORT are valid names. Pay Report is not a valid name because a space character is contained in the name between Pay and Report. Typically, names are in lowercase letters, digits, and symbols. Uppercase letters are valid, but using uppercase letters requires more keystrokes.

The names should describe the contents of the directory or file. Names like file1, file2, etc. are not very helpful. Names like payreport1, payreport2, etc. might be used for the payreport files for January, February, etc. Sometimes using symbols helps readability. For example, the January and June payreport file names might be any of the following:

payreport.1	payreport.6
payreport__1	payreport__6
payreport-1	payreport-6
payreport.ja	payreport.jn

Directories and Files

The full pathname given to a directory or file depends on how the directory or file is created. Each user given access to the system has a directory which has the same name as the user name. When a user logs in to the system, this directory is the user's current working directory. For example, thompson is the current working directory when the user name thompson is used to log in.

```
                    root (/)
        . . . ────────┼──────── . . .
                     usr
        . . . ────────┼──────── . . .
                     acct
        . . . ────────┼──────── . . .
                   thompson
```
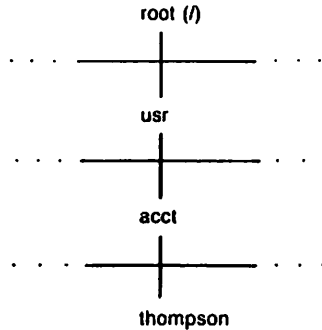
Assume that the thompson directory contains the following directories and files. A name beginning with the letter d is a directory. A name beginning with the letter f is a file.

```
                    root (/)
        . . . ────────┼──────── . . .
                     usr
        . . . ────────┼──────── . . .
                     acct
        . . . ────────┼──────── . . .
                   thompson
          ┌────────────┴───────────────────┐
       dstatus                          ftestprog
     ┌────┴────┐
  fstatus.1  fstatus.2
```
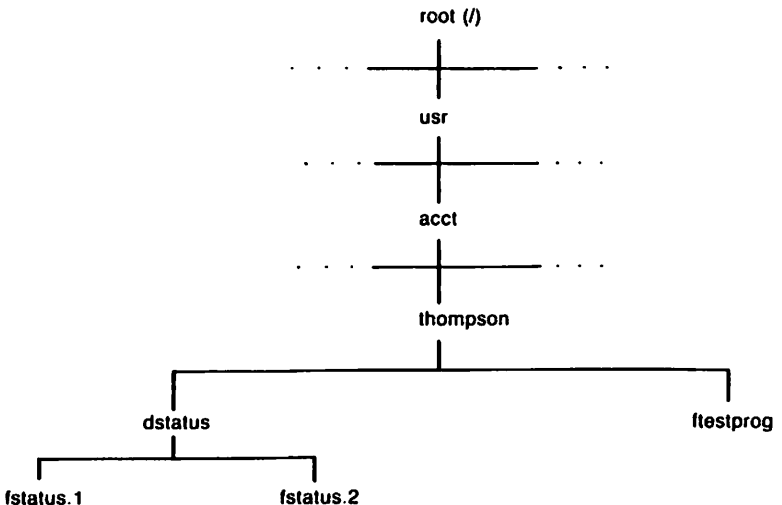
When thompson is the current working directory, any subdirectory or file can be accessed without the full pathname. For example, the full pathname of the ftestprog file is:

/usr/acct/thompson/ftestprog

The file can be accessed by:

ftestprog

The fstatus.1 file can be accessed by:

dstatus/fstatus.1

If a new directory or file is created by specifying only a name, the directory or file is automatically put in the thompson directory. Creating a new file specified as

ftestdata

puts ftestdata in the thompson directory.

```
                          thompson
        ┌────────────────────┼────────────────────┐
     dstatus             ftestprog             ftestdata
   ┌────┴────┐
fstatus.1    fstatus.2
```
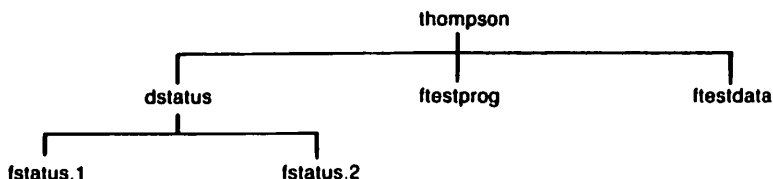
Creating a new directory specified as

dprogrpts

puts dprogrpts in the thompson directory.

```
                          │
                      thompson
        ┌────────────┬────┴────┬────────────┐
     dstatus     ftestprog  ftestdata    dprogrpts
   ┌────┴────┐
fstatus.1    fstatus.2
```
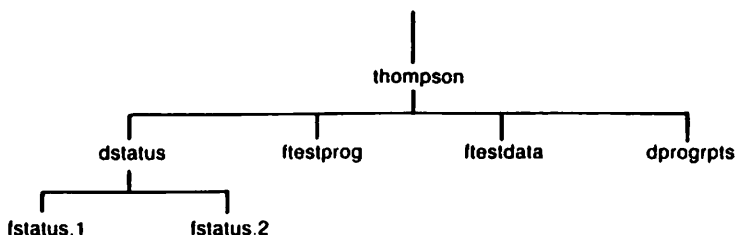
Creating a new file named ffile in a new directory named ddirectory by:

ddirectory/ffiles

cannot be done in one step. First, ddirectory must be created; then, ffile can be put in ddirectory.

The current working directory can be changed. Assume a number of files need to be created in the dprogrpts directory: fprogrpt.1, fprogrpt.2, etc. These files can be created by specifying:

dprogrpts/fprogrpt.1
dprogrpts/fprogrpt.2

If the current working directory is changed to dprogrpts, then these files can be created by specifying:

fprogrpt.1
fprogrpt.2

While dprogrpts is the current working directory, other directories and files in the thompson directory may be accessed by full pathnames. For example, the fstatus.1 file is accessed by:

/usr/acct/thompson/dstatus/fstatus.1

If the current working directory is changed back to thompson, fstatus.1 is accessed by:

dstatus/fstatus.1

A number of directories or files can be accessed by one entry by using metacharacters which are commonly called wildcards. The metacharacters are asterisks (*), question marks (?) and brackets ([ ]).

* — An * specifies any number of characters.
? — A ? specifies a single character.
[ ] — Brackets enclose a list of characters.

The entry of

ftest*

specifies ftestprog and ftestdata. The * specifies any characters which follow the ftest characters.
     The entry of

dstatus/fstatus.?

specifies dstatus/fstatus.1 and dstatus/fstatus.2. The ? specifies a single character which follows the dstatus/fstatus. characters.
     The entry of

[d-f]*

specifies all files whose names begin with the letter d, e, or f.
     The entry of

f[a-b]*

specifies all files whose names begin with fa and fb.
     The entry of

[df]*

specifies all files whose names being with d or f. Files whose names begin with e are not included.
     The entry of

f[ac]*

specifies all files whose names begin with fa or fc.

Devices

The pathnames of the system devices allow access to the devices just as pathnames allow access to files. The devices are accessed through the /dev directory. The following chart lists the operating system device names.
     The pathname for any device is /dev/devicename. For example, the pathname of the left or only floppy disk device is one of the following.

/dev/fdsk/0s1 — block mode name
/dev/rfdsk/0s1 — character mode name

Main Unit			
Device Description	**Operating System Names**		**Diagnostic**
	Block Mode Access	**Character Mode Access**	**Name**
Fast Floating Point	NA	NA	fp00
Terminals			
Processor Memory Controller ports	NA	ttya-ttyb	pt0a-pt0b
First 8-Channel I/O Controller ports	NA	tty00-tty07	tt00-tt07
Second 8-Channel I/O Controller ports	NA	tty08-tty15	tt08-tt15
Serial Printers			
Any 8-Channel I/O Controller ports (Numbered 0 through 15)	NA	lp00-lp15	tt00-tt15
Parallel Printer			
Any High Performance 8-Channel I/O Controller Parallel Printer port (Numbered 0 through 1)	NA	lp00-lp15	lp00-lp01
Floppy Disks			
Left, top, or only drive			
Physical disk	fdsk/0s0	rfdsk/0s0	f501
File system	fdsk/0s1	rfdsk/0s1	NA
Right or bottom drive			
Physical disk	fdsk/1s0	rfdsk/1s0	f502
File system	fdsk/1s1	rfdsk/1s1	NA
Hard Disks			
First through second 5.25 inch			
Physical disk	dsk/0s0-1s0	rdsk/0s0-1s0	h501,h502
File system	dsk/0s1-1s1	rdsk/0s1-1s1	NA
Streaming Tapes			
First through second tape drive			
See Note 1	NA	rstp/0yy-1yy	st01,st02
See Note 2	NA	rstp/0yn-1yn	NA
See Note 3	NA	rstp/0ny-1ny	NA
See Note 4	NA	rstp/0nn-1nn	NA
Note 1 Rewind on open; rewind on close			
Note 2 Rewind on open; no rewind on close			
Note 3 No Rewind on open; rewind on close			
Note 4 No rewind on open; no rewind on close			
Communication Lines			
Binary synchronous ports	NA	bt00-bt03	bt00-bt03
HDLC Common Carrier port	NA	hd00-hd03	hd00-hd03
BSC 3270	NA	bm10-bm1w	bm10-bm1w
	NA	bm20-bm2w	bm20-bm2w
	NA	bm30-bm3w	bm30-bm3w
ETHERNET Controller			
First Controller	NA	et00	et00
Second Controller	NA	et10	et10
OMNINET Controller			
First Controller	NA	om00	om00
Second Controller	NA	om10	om10

Expansion Unit			
Device Description	**Operating System Names**		**Diagnostic**
	Block Mode Access	**Character Mode Access**	**Name**
First through Fourth 8 inch			
Physical disk	dsk/2s0-5s0	rdsk/2s0-5s0	h801-h805
File system	dsk/2s1-5s1	rdsk/2s1-5s1	NA

SCSI Unit			
Device Description	**Operating System Names**		**Diagnostic**
	Block Mode Access	**Character Mode Access**	**Name**
Hard Disks			
First through sixteenth drive			
Physical disk	dsk/6s0-21s6	rdsk/6s0-21s6	sd01-sd34*
File system	dsk/6s0-21s6	rdsk/6s0-21s6	NA
* First number identifies SCSI unit (0-3), second number identifies drive (1-4)			
Magnetic Tapes			
First through third drive		See Note 5	
See Note 1	NA	rmt/0xyy-2xyy	ss61,ss51,ss41
See Note 2	NA	rmt/0xyn-2xyn	NA
See Note 3	NA	rmt/0xny-2xny	NA
See Note 4	NA	rmt/0xnn-2xnn	NA
Note 1 Rewind on open; rewind on close			
Note 2 Rewind on open; no rewind on close			
Note 3 No Rewind on open; rewind on close			
Note 4 No rewind on open; no rewind on close			
Note 5 The x in the character mode field represents either m, which specifies low density, or h, which specifies high density.			

Mounted File Systems

Generally, directories and files created by a user or a program are put on the Winchester disks automatically mounted by the operating system at system startup and unmounted at system shutdown. Files may be put on other partitions of Winchester disks and on a floppy disk by making a file system on a disk and mounting the disk. In making the file system and mounting it, the device name of the disk is specified as the block mode name, for example:

/dev/fdsk/0s1

The floppy disk file system may be mounted at any directory node. For example, assume the thompson directory looks like this.

```
                        |
                    thompson
                        |
        ┌───────────────┴───────────────┐
     dstatus                         dprogrpts
        |
   ┌────┴────┐
fstatus.1   fstatus.2
```
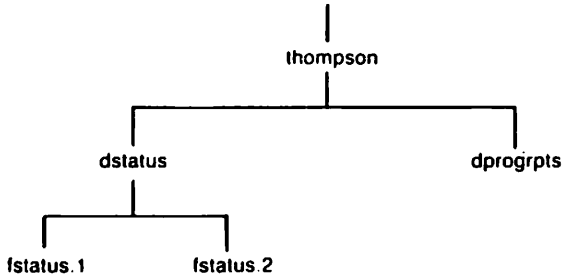
A floppy disk file system may be mounted at the dprogrpts directory node. Any directories and files created in the dprogrpts directory while the file system is mounted are put in the floppy disk file system. Assume the following directories and files are created in dprogrpts.

thompson

dstatus   dprogrpts

fstatus.1   fstatus.2   ftestdata   dtestprog   floppy disk file system
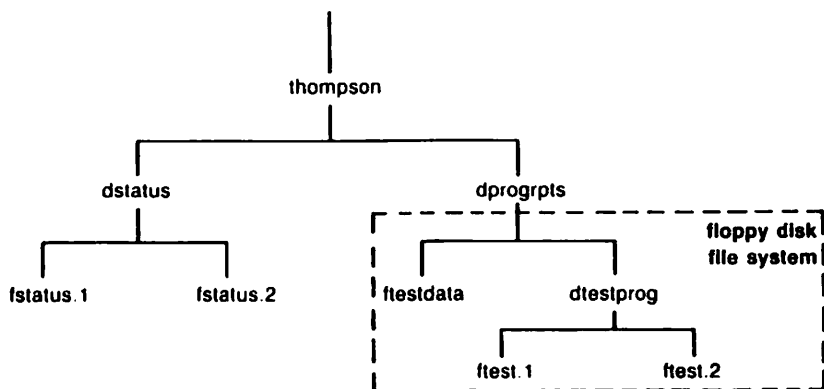
ftest.1   ftest.2

These directories and files have pathnames just like any other pathnames. For example, the pathname of ftest.1 from the current working directory thompson is:

dprogrpts/dtestprog/ftest.1

When the floppy disk file system is unmounted, the directories and files in the file system cannot be accessed.

The file system on the floppy disk can be mounted again, and it may be mounted at any directory node. If a directory contains files and directories, and a file system is mounted at that directory node, the files and directories cannot be accessed until the file system is unmounted. For example, usually fstatus.1 can be accessed from the thompson current working directory by entering:

dstatus/fstatus.1

If a file system is mounted at the dstatus directory node, fstatus.1 (and fstatus.2) cannot be accessed. Directories and files in the mounted file system can be accessed.

thompson

dstatus   dprogrpls

mount
path

fstatus.1   fstatus.2

floppy disk
file system

ftestdata   dtestprog

ftest.1   ftest 2
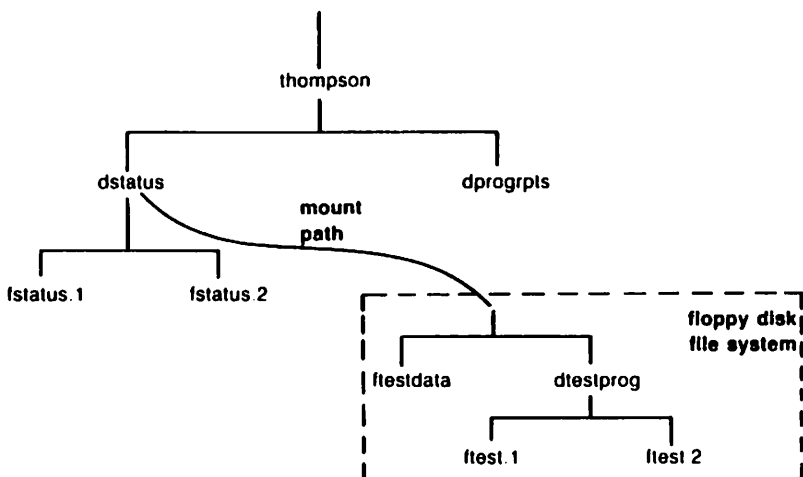
For example, ftest.1 is accessed from the thompson current working directory by entering:

dstatus/dtestprog/ftest.1

When the floppy disk file system is unmounted, fstatus.1 and fstatus.2 may be accessed again.

Your file system has two standard directories provided to mount file systems. Using these standard mount directories eliminates the possibility of inadvertantly making directories and files inaccessible. The full pathnames of the standard mount directories are:

/mnt/fd70 — left, or only, floppy disk device
/mnt/fd71 — right floppy disk device

System Start Up

Overview

This chapter provides a reference for the computer daily start up procedures and an introduction to the control panels. The daily start up procedures reference includes the interaction associated only with the TOWER, TOWER 32, or MiniTOWER Main Unit control panel and the start up messages associated with the system console terminal. Detailed peripheral operation and set up information is found within the Peripheral Operation tab.

A typical daily start up includes the following sequential steps.

1. Prepare the system peripherals for operation by turning them on, enabling the proper modes, installing and setting forms, and so on. For the system console terminal, make sure that it is on and in the on line, roll screen, and no auto line feed modes. If your system includes NCR 7900 Model 1 terminals, press any key on the keyboard, after enabling the proper modes, to enable its communication logic.
2. Move the Main Unit power switch from Off to On. The system enters single user mode.

Control Panels

Your operator interface for the TOWER, TOWER 32, or MiniTOWER Main Unit and the optional TOWER Mass Storage Expansion Unit (Figures 1, 2, and 3) consists of a single On/Off switch and status indicators. All of the operator interface elements are conveniently located on the front of each unit. The On/Off switch is typically used for daily start up procedures and to remove operating voltages from the units when they are not in use. The status indicators provide hardware integrity information and hardware activity information. Keep in mind that the primary interaction with the system is through a terminal.

Optional
Mass Storage
Expansion Unit

Main Unit

On/Off (Not labeled)

Disk
Communications
Fault
Battery

On

Floppy
Disk Activity
(Not labeled)

Streaming
Tape
Activity
(Not labeled)
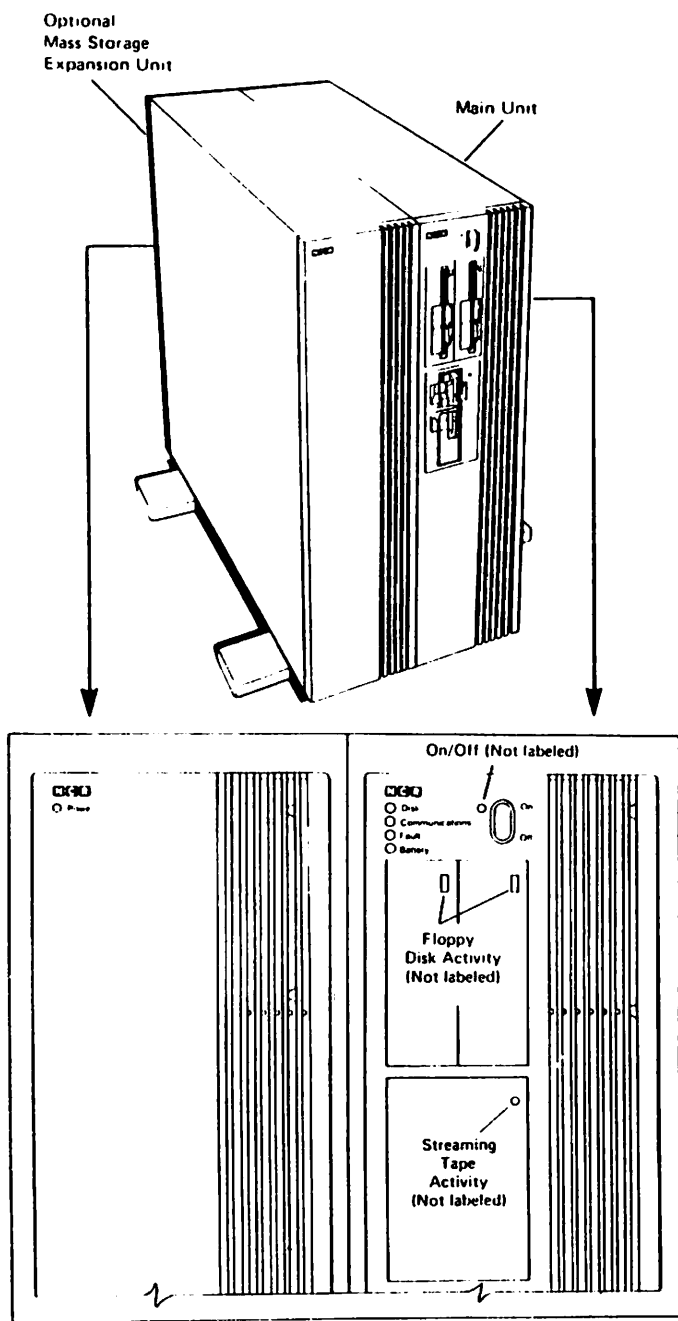
Figure 1   TOWER control panels

On/Off
(Labeled
'Power')

Disk
Activity
(Not
Labeled)

Floppy Disk
Activity
(Not Labeled)
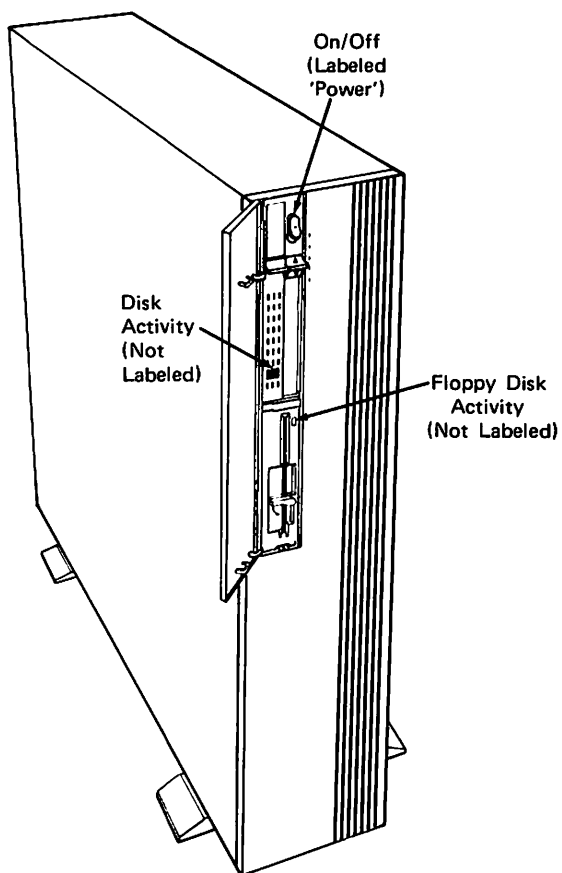
Figure 2   TOWER 32 control panel

On/Off
(Not labeled)

Streaming Tape
or Floppy Disk
Activity
(Not labeled)
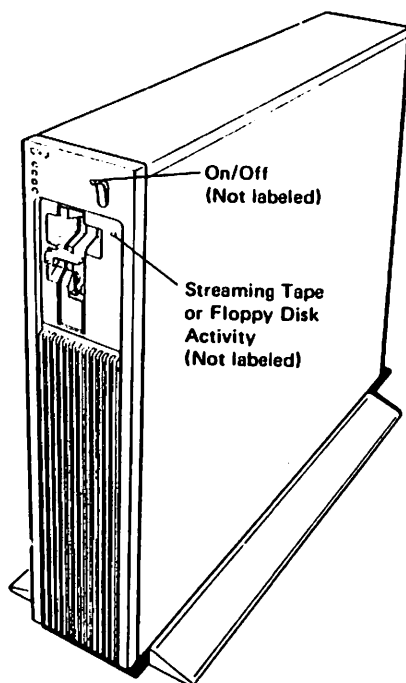
Figure 3   MiniTOWER control panel

TOWER, TOWER 32, or MiniTOWER Main Unit

The following information identifies the functions of the Main Unit control panel elements.

On/Off Switch

- On - Enables the operation of the Main Unit and the optional Mass Storage Expansion Unit by putting the power system in each unit in an on state. In addition, moving the switch from Off to On causes the Main Unit logic elements to perform a predefined start up sequence consisting of basic integrity testing, loading system software into memory if it is installed and has not previously been loaded, and enabling system software.

- Off - Disables the operation of the Main Unit and the optional Mass Storage Expansion Unit by putting the power system in each unit in an off state. With the switch in the off position, the memory support system

remains enabled which preserves the contents of system memory and keeps the system time-of-day clock current.

On/Off Indicator (Two color indicator - red and green)

- Green - Identifies that the power system logic operating voltages, including the memory support system voltages, are enabled and operating within their specified range. This is the normal operating mode.
- Red - Identifies that a power system logic operating voltage, including the memory support system voltage, is not within its specified operating range. The system is not operational if this condition exists.
- Off - Identifies the off condition for the unit power system excluding the memory support system.

Disk Indicator

- On - A Main Unit Winchester disk is selected and performing an operation. Depending on the duration of the disk activity, the indication may appear as only a flicker.
- Off - Identifies the absence of Main Unit Winchester disk activity.

Communications Indicator

- On - One or more of the unit's remote communication channels is requesting a line connection.
- Off - A remote communication channel in the unit removed its request for a line connection.

Fault Indicator

- On - A critical system failure exists. The system is not operational when this indicator is turned on.
- Off - The system is operational.

Battery Indicator

- On - A fault exists in the memory support system. When this condition occurs, the system also turns on the Fault indicator to identify a critical system failure. The system is not operational.
- Flashing - The battery is being charged. The battery may or may not preserve the contents of memory if AC power is lost.
- Off - The battery is fully charged and capable of preserving the contents of memory during an AC power failure.

Floppy Disk Indicator

If your system has two floppy disk drives, each drive has an indicator.

- On - The floppy disk drive is selected and ready for disk activity; or the drive is selected and a disk operation is in progress.
- Off - Identifies the absence of floppy disk activity.

Streaming Tape Indicator

If your system has a streaming tape drive, the drive has an indicator.

- On - The streaming tape drive is selected and ready for tape activity; or the drive is selected and a tape operation is in progress.
- Off - Identifies the absence of tape activity.

TOWER Mass Storage Expansion Unit

The single indicator on the Mass Storage Expansion Unit provides the following information.

Power Indicator (Two color indicator - red and green)

- Green - The power system logic operating voltages are enabled and operating within their specified range. This is the normal operating mode.
- Red - A logic operating voltage is not within its specified range. The unit is not operational.
- Off - The unit power system is in an off condition.

Starting the System

After preparing the system peripherals for operation, move the Main Unit power switch from Off to On. This action causes the system to perform its predefined process. The start up process outputs progress messages to the system terminal. When the start up process is complete, the login prompt is displayed and the system is in single user mode.

To put the system in multi-user mode login as "startup".

login: **startup**

A file system check is performed. If the check passes, the system goes multi-user. If the check fails, call your system administrator.

If start up fails, check the Memory Power Switch on the rear of the Main Unit (Figures 4, 5, and 6). The Memory Power Switch should always be in the on position. If this switch is On, the content of memory is maintained when the control panel On/Off switch is turned off. If the Memory Power Switch is Off, the content of memory is lost when the control panel On/Off switch is turned off. NOTE: The content of memory is maintained by the battery during a power failure regardless of the setting of the Memory Power Switch.

Memory
Power Switch
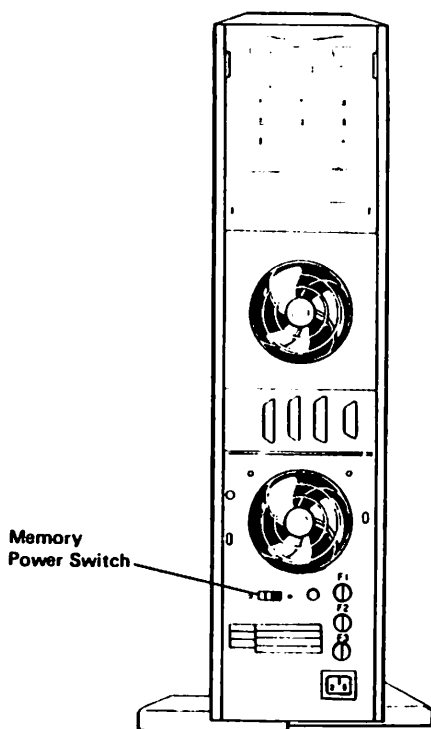
Figure 4   Rear view of TOWER
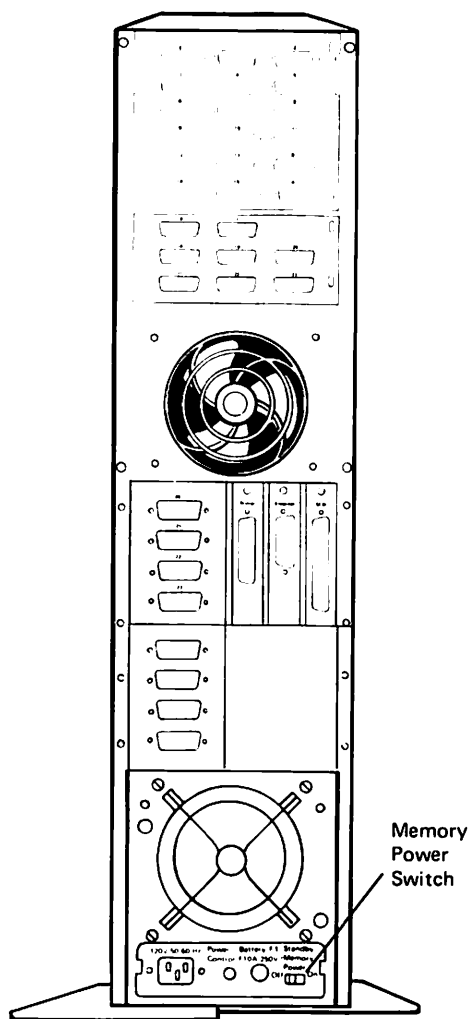
Figure 5   Rear view of TOWER 32
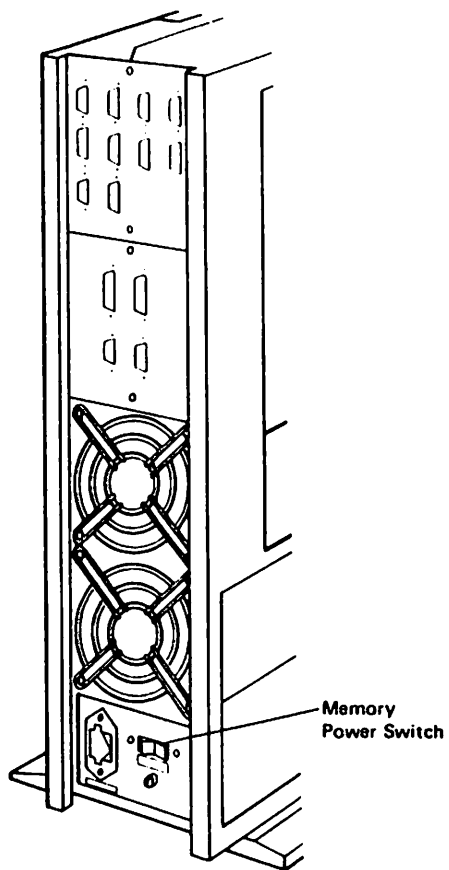
Figure 6   Rear view of MiniTOWER

Menu Operations

Overview

The operating system offers friendly menu lead-through interfaces for both the application end user, the application developer, and the system support personnel. The features of the System Operation menu includes:

- help information screens
- minimum number of key entries to perform a selected process
- automatic cursor positioning
- easy-to-read item selections
- data entry correction
- choice of two menu levels of return
    - main menu level
    - previous menu level
- automatic return to current menu level after selected process performance

How to Run the System Operation Menu

The System Operation menu has three types of displays:
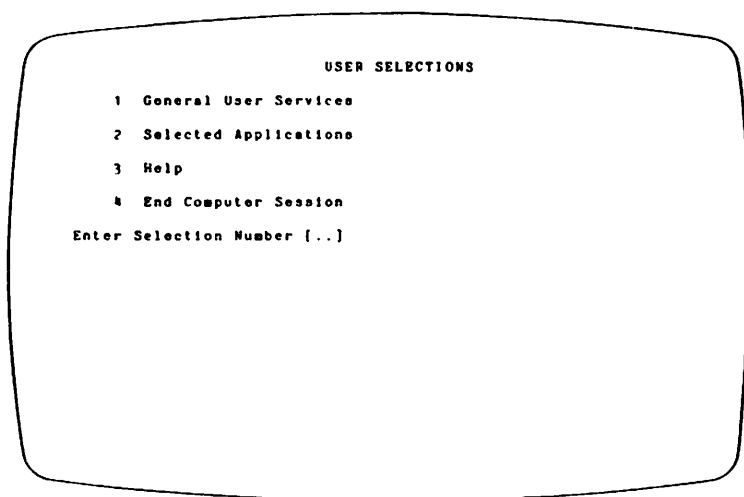
- item selection menu
- toggle selection menu
- data entry menu

Each type of menu display is identical in the way the selection of a process is entered. When any of the menus are first displayed, the cursor is automatically put at the first required entry position in the entry field. The entry field is identified by one or more dots enclosed by an open bracket (|) and a closed bracket (|). The dots represent the maximum number of entry positions. If the maximum number of entry positions is used on any line, the operating system automatically terminates the line and either puts the cursor at the next menu entry position or the specific process is performed. If the maximum number of entry positions is not used, press the newline key (NEW LINE) or the return key (RETURN) to terminate the entry in the entry field. After the

entry is terminated, the cursor is put at the next menu entry position or the specific process is performed. Any dots remaining in the entry field after the entry is terminated are ignored by the operating system.

Item Selection Menu

An item selection menu performs two types of functions when an item is selected. It either continues with the display of another menu or the selected process is performed. An example of an item selection menu is as follows.

```
                        USER SELECTIONS

        1   General User Services

        2   Selected Applications

        3   Help

        4   End Computer Session

    Enter Selection Number [..]
```

For an example, to select item 1 General User Services, enter 1 in the entry field. After 1 is entered, the General User Services menu is displayed.

Toggle Selection Menu

A toggle selection menu sets the values to be used for a selected process. To change any of the initial values of an item, enter the corresponding item number. After an item number is entered, the new set value is displayed. After a value is set it may be changed back to the previous setting by entering the same item number.

If a value other than Yes or No can be set, then both of the values are identified in the description of the item. Only after the values are set, enter item 1 Selection Complete to continue the performance of the selection process. An example of a toggle selection menu is as follows.

```
         ALLOW OR DENY MESSAGE RECEPTION

   1   Selection Complete

   2   Message Reception                   Allow

   3   Help

   4   Return to Previous Menu

Enter Selection Number [..]
```

For an example, to change the initial value of item 2 Message Reception, enter 2 in the entry field. After the item is changed, the menu displays the new set value as follows. If the value is set correctly, enter item 1 Selection Complete to continue with the selection process.

```
         ALLOW OR DENY MESSAGE RECEPTION

   1   Selection Complete

   2   Message Reception                   Deny

   3   Help

   4   Return to Previous Menu

Enter Selection Number [..]
```

Data Entry Menu

The data entry menu enables specific data entry fields of a process to be identified. The data entry fields, for example, may be file names, directory names, and messages. After the data

entry fields are entered, the operating system gives you a choice to indicate if the entries are correct or if any entry needs to be corrected. If the entries in the data entry field are correct, entering y (for yes) continues the performance of the selected process. If any entry in any data entry field is to be corrected, entering n (for no) returns the cursor to the selection number in the data entry menu. With the cursor positioned at the selection number entry field, either the newline key (NEW LINE) or the return key (RETURN) may be pressed one or more times to position the cursor at the entry field that is to be corrected or the entries in the entry fields may be re-entered. When the newline key is pressed, the entry in that entry field is not changed. An example of a data entry menu is as follows.

```
                 SEND IMMEDIATE MESSAGE TO USERS

       1.   Help
       2.   Cancel command and return
       3.   Enter data
 Enter Selection Number [.]

 Enter either:
       the word "all" indicating that you wish to send
       the message to all users or the user name to
       whom you wish to send the message
         [.........]

 Enter the message to be sent

 [................................................]
 [................................................]
 [................................................]
 [................................................]
 [................................................]
 [................................................]
 [................................................]

 Is the above information correct? Enter "y" for yes or "n" for no [.]
```

For an example, the following data entry menu shows an entry in each of the entry fields.

```
                    SEND IMMEDIATE MESSAGE TO USERS

        1  Help
        2  Cancel command and return
        3  Enter data
    Enter Selection Number [3]

    Enter either:
         the word "all" indicating that you wish to send
         the message to all users or the user name to
         whom you wish to send the message
            [Jones...]

    Enter the message to be sent

    [All time cards must be in payroll by 12.00   Wed. ]
    [.................................................]
    [.................................................]
    [.................................................]
    [.................................................]
    [.................................................]
    [.................................................]

    Is the above information correct? Enter "y" for yes or "n" for no [y]
```

Help Information Screens

A help information screen is available in each of the System Administrator menus. All help information screens are selected by entering the item number with the item description of help.

The help information screen displays a brief explanation of each process that may be selected from the current menu of each entry that may be entered in the current menu. After the help information screen displays, press the newline key (NEW LINE) or the return key (RETURN) to return to the current menu. If the help information screen contains more than one page the capability to move from one page to another page, backwards or forwards, is provided. Entering a control-b displays the previous page while entering a control-f displays the next page. To terminate the listing enter the letter x. When the current menu is displayed again, the cursor is re-positioned at the first required entry position in the entry field. If the help information screen is selected after entries have been made in the entry field of the current menu, the entries are erased when the system returns to the current menu.

Application End User Procedures

Overview

The *Application End User Procedures* chapter describes the following jobs that may be performed by both the application user and the office procedures analyst.

- General User Services — permits a user to set a unique password for their system login name, the current login terminal name to be displayed, the current system date and time to be displayed, a message to be sent to any user, all messages sent to the logged in user to be displayed, an immediate message to be sent to one or users currently logged in the system, and a user to specify whether or not messages can be sent to your logged on terminal.

- Selected Applications — permits a user to select the application that is to be performed. Only the applications that may be selected by the logged in user are displayed.

For convenient reference, the quick reference for this book lists the descriptive name of each job and its item entry selection numbers. The item entry selection numbers are the numbers entered to select a job. For an example, to select the job Display Date and Time, enter one number in sequence each time the system displays Enter selection number.

Getting Started

The first time you login on the system, the terminal displays the User Selections menu. Before you continue with any other process or job, set your own private password to prohibit unauthorized access to the system. Refer to the "Set Password" section in this chapter.

After a password is set, access to the system is only permitted by the entry of a correct login name and its associated password. A password is any sequence of eight characters, except a control-d character. The set password of a user can not be read, but it can be either changed by the login user or removed by the system administrator of your system.

Allow or Deny Message Reception

Allowing or denying message reception permits a user to specify whether or not other system users have the write permission to send messages to your logged on terminal.

Display Current Terminal Name

Displaying the current terminal name displays the name of the termianl you are currently using.

Display Data and Time

Displaying the data and the time permits the current system data and time to be displayed to the terminal.

End Computer Session

Ending the computer session terminates the current logged on computer session of the application user. After the terminal is successfully logged off, it helps to prevent unauthorized users from gaining access to the system.

Receive Mail

Receiving mail permits each message sent to the user to be displayed to the terminal. Each message is displayed in a last in first out format and shows the user who sent the message and the date and the time when the message was sent. Once the message is displayed, the message may be saved or deleted. If the Receive Mail job is performed and there is no mail, the system displays the message "No mail".

Selected Applications

Selecting an application allows the application user to select which application is to be run. The available application selections may vary depending on the applications installed for each application user. Only the application selections installed under the application user's login name are displayed and may be selected during the application selection process.

All application selections for each application user are controlled by the system administor.

Send Immediate Message to Users

Sending an immediate message permits a message to be displayed on the terminal of one or all users currently logged in on the system.

Send Mail

Sending mail permits a message to be sent to any user in the system. When the message is sent, the message is stored in the system. Once the specified user logs in the system, the system notifies the user "You have mail".

Set Password

Setting the password permits a new password to be specified or the current password to be changed.

Application Developer Procedures

Overview

The *Application Developer Procedures* chapter describes the system interfaces that are available to the application developer. The application developer is a member of the programming staff who uses application generation tools and high level languages. The application developer has the capability to:

- display help information for the developer tools through a menu-driven interface
- perform all jobs and processes through direct control of the operating system

The application developer is expected to have a thorough knowledge of the operating system and is expected to be familiar with the *User Reference Manual*

Operations

1. With the system displaying the login prompt, login by entering the assigned application developer login name.
2. The terminal displays a HELP entry description and the system prompt ($).
3. With the operating system shell prompt ($) displaying, the application developer has an option to:
   - Enter the uppercase letters "HELP", to display the help information for the application developer.
   - Enter the operating system command needed to perform a specific process or job. If this is your first login, set your password; refer to passwd(1) in the *User Reference Manual.*
   - Logoff the system by holding down the control key (CONTROL) and pressing the d key.

The HELP process allows you to list the installed development applications, programming languages, and the standard development utilities. The standard development utilities are the command and applications described in the *User Reference Manual*. The manual is available online through the *man* command if the optional system files are installed on your system.

Menu Interface Utilities

Overview

The menu interface utilities provide a menu-driven interface between the system and its users. In the system, these utilities provide the system interface for the application user, the procedures analyst and the system administrator. After one of these users logs on the system, system operations are chosen and initiated through menu selections.

This chapter describes the usage of the menu interface utilities for the developer who wishes to have application input/output performed through a menu interface. The interface permits the user to choose an operation from a list of operations, to define options, if necessary, by accepting either default or alternate option values, or to enter parameters as fill-in-the-blank type entries.

The interface provides a structure of menus by permitting the access of a submenu as a menu selection. This permits operations to be categorized similar to the menu interface of the system administrator. Once the intended operation is performed by the user, predefined menu programs provide the return from a submenu to a higher level menu, or the return from a submenu to the first menu displayed.

The menu interface consists of five programs and the text files generated by the developer that define the menus and their formats; these text files are called description files.

Menu Structure

Figure 1 shows a typical structure of menus. The top menu is the main menu initially displayed to the user. This screen might categorize user task into three groups. From this main menu, one of the three submenus could be accessed with a menu interface program. Each task group might be divided further into functions, each function having its own menu from which to operate. Selecting a function would move the user to a menu one level lower in the menu structure. The application developer

can have the menu user define options and execute an application from any level in the menu structure. Once the application is performed, control is returned to the menu level from which it was called.

Movement within the menu structure is under the control of the menu user. For this reason, menus must also offer a selection that returns the user to the previous menu. Predefined menu interface commands permit returns to the previous menu and the initial menu. The menu user exits the menu structure from the point of entry, the initial menu.
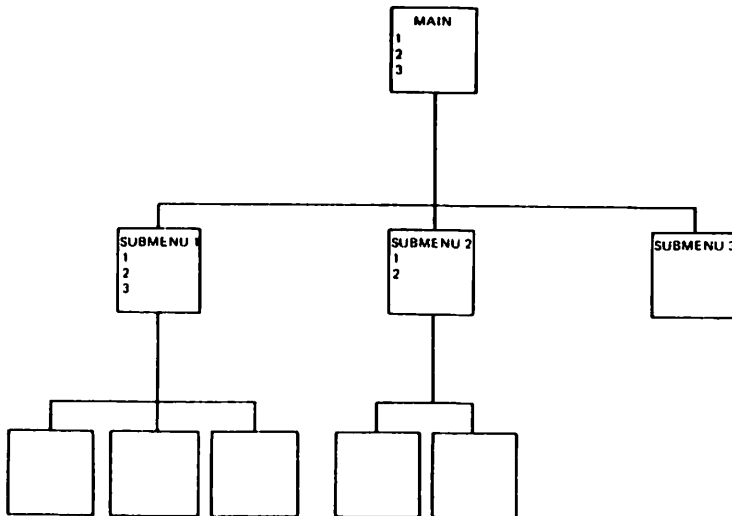
Figure 1

Interface Programs and Commands

There are five programs and four menu control commands at the disposal of the developer which provide the menu interface. The programs require one or more text files as arguments on a command line. The text files can be created with one of the operating system editors such as ed or vi.

- menu program — performs an operation selected by the menu user. The menu user selects from a list of text entries; the menu program executes a command line associated with the text line chosen.

- paint program — displays a screen that requests parameters from the user, and executes a user-defined program after all parameters are specified. The parameters defined by the user become the program parameters of the executed program. Parameters are entered using a fill-in-the-blank format.
- paintfile program — displays a screen that requests parameters from the user, and stores the answers in a file. Parameters are entered using a fill-in-the-blank format.
- options program — displays a screen of parameters and their default values. For each parameter the user either accepts the default value or selects an alternate value with a single keystroke. When the parameters are accepted, a user-defined program is executed using these parameters as command line arguments.
- more program — displays a text file to the menu user one screen at a time until the end of the file or until the menu user cancels the operation. The more program is used to display information to the menu user during the execution of a shell script.
- help command — displays a text file one screen at a time; after each screen display, the menu user can either continue to the next screen, or cancel the display. This command is intended to be within the menu program and the option program to display on request more information about user functions.
- return command — returns the menu user to the menu previous to the one currently displayed.
- return main command — returns the menu user to the initial menu.
- exec command — used in the options program to execute the user-defined program.

Menu Program

Command line:

/menu/obj/menu.o description-file

Argument(s):

- description-file — the description file contains the list of text entries that are seen by the menu user as enumerated selections, and a command line for each text entry that executes when its associated text line is chosen.

Argument format:

- description-file — the three types of entries in the description file are the comment line, the text line, and the

command line. A comment line describes the contents of the file and is not displayed. A text line is displayed to the menu user as an enumerated selection. A command line is a shell script command with or without parameters, an object program command with or without parameters, or a menu control command.

The first character of a comment line must begin with a number sign (#).

The first character of a text line must be a colon (:). Six spaces must separate the colon from the first character of the displayed text. Displayed text lines (including spaces) are limited to the line width display capability of the terminal. While the menu program can accommodate a programmed line of 120 characters, the developer must know the characteristics of the terminals using the menus.

The first character of a command line must be an exclamation point (!). Command lines are limited to 120 characters. Spaces must be used as separators, and tabs are treated as spaces on command lines. None of the special shell script conventions apply to filenames; that is, full pathnames must be used without including any metacharacters. A command line must follow a text line.

The only restriction on the menu length is the maximum number of lines able to be displayed on one terminal screen. This number, like the line width, is a terminal characteristic and must be considered when creating the menus.

Figure 2 is an example of a menu description file; it is one of the files used in the system administrator shell. When this menu is displayed with the menu program, the menu user sees the screen display shown in Figure 3.

The developer should make note of the command lines in Figure 2 for menu selections 1 and 2; these command lines pertain to the current directory which is a parameter of the environment. Because the menu interface creates processes, changes made to the environment cannot be guaranteed as the user moves through a menu/submenu structure. The cd and pwd system utilities cannot be used for changing and displaying the current directory; the developer should use the menu/script/pwd.sh script file as a menu selection to display the current directory and the menu/script/cd.sh script file as a menu selection to change the current directory.

```
# This file is from the shell
# of the system administrator.
#
:                         DIRECTORIES
:
:
:       Display the Current Directory
!/menu/script/pwd.sh
:
;       Change the Current Directory
!/menu/script/chdir.sh
:
:       Create a Directory
!/menu/obj/paint.o /menu/data/mkdir.d /menu/help/mkdir.h
:
:       Remove a Directory
!/menu/obj/paint.o /menu/data/rmdir.d /menu/help/rmdir.h
:
:       Change Directory Access Permissions
!/menu/obj/paint.o /menu/data/daccess.d /menu/help/dacess.h
:
:       List Directory Files
!/menu/obj/option.o /menu/data/lsdir.m /menu/script/lsdir.sh
:
:       Help
!/menu/obj/help.o /menu/help/dirman.h
:
:       Return to Previous Menu
!return
:       Return to Initial Menu
!returnmain
```

Figure 2

```
                    DIRECTORIES

    1.    Display the Current Directory

    2.    Change the Current Directory

    3.    Create a Directory

    4.    Remove a Directory

    5.    Change Directory Access Permissions

    6.    List Directory Files

    7.    Help

    8.    Return to Previous Menu

    9.    Return to Initial Menu

  Enter selection number [..]
```

Figure 3

Paint Program

Command line:

/menu/obj/paint.o description-file help-file

Arguments:

- description-file — the description file defines the screen that prompts the user for parameter input. The file defines the displayed text describing each parameter and a fill-in-the-blank field for that parameter. The fill-in-the-blank field appears as a series of periods enclosed in brackets. The file also determines how a user entry is to be validated. After all entries are made, a call is made to a script or object program using the data entries as parameters.
- help-file — the user can display the help file to get more information on the parameters needed. It is a text file.

Argument formats:

- description-file — the description file contains text lines displayed to the menu user, data entry field definitions that define the fill-in-the-blank format, and a call to a script or object program. How the parameters are used by the script or object program is discussed in the "Menu Programming" section which contains some typical programming techniques.

Each line of text to be displayed has the format

:row:column:text line

The row and column entries are numerical values that define row and column positions at which the text line should begin. The text line cannot exceed 80 characters.

The screen should have a title on row 0. (Row numbering starts at 0.) The next text line (usually a request for data entry) should be on row 7, or beyond. Rows 1 through 6 are reserved for a selection menu which is standard for every fill-in-the-blank screen. The last 3 rows are reserved for a data entry request for parameter verification by the user.

The fill-in-the-blank data entry field may be placed anywhere in the screen except rows 1 through 6 and the last 3 rows. The data entry field has the following format.

!row-column-field length!validation code

The row and column entries are numerical values defining row and column positions at which the data entry field should begin. The field should begin. The field length is a numerical entry defining the number of character positions to reserve for the answer. The field should not be defined to extend beyond the last displayed column. Each data field must be defined on a separate line in the description file.

The validation code determines how the user entries are to be validated. The eight validation codes are the following:

0 - the field cannot be left blank; the entry may not contain operating system metacharacters (*, ?, or [ ]).

1 - the field cannot be left blank; metacharacters are permitted.

2 - the field may be left blank; the entry may not contain operating system metacharacters.

3 - the field may be left blank; operating system metacharacters are permitted.

4 - the field cannot be left blank; no operating system metacharacters are permitted; screen characters are displayed as number signs (#) to not echo displayed values.

5 - the field cannot be left blank; metacharacters are permitted; number signs replace typed text.

6 - the field may be left blank; metacharacters are not permitted; number signs replace typed text.

7 - the field may be left blank; operating system metacharacters are permitted; number signs replace typed text.

The validation code is optional and has a default value of 0.

After all entries are made, the script of object program is called. The invocation script that calls this program can be any line within the description file. The first character of this line must be a question mark (?). The data field entries are treated as command line arguments for this program. If the command line contains explicit arguments, the data field entries as arguments are subsequent.

- help file — the help file is a text file. It should contain adequate information for the user to define the data entry fields. The help file can extend over more than one screen.

Figure 4 shows an example of a description file for the paint program.

```
:0:1:                 COPY A FILE
:7:1:Enter name of file to be copied
I8I2I50I0
:10:1:Enter name of target file
I11I2I50I0
?/menu/script/cpfile.sh
```

Figure 4

Figure 5 shows the screen display resulting from this file.

```
                        COPY A FILE

    1 Help
    2 Cancel command and return
    3 Enter data
Enter selection number [.]

Enter name of file to be copied
[....................................................]

Enter name of target file
[....................................................]

Is the above information correct? Enter "y" for yes or "n" for no [.]
```

Figure 5

Note that rows 1 through 6 contain a selection menu; this is a standard menu displayed with all paint program screens. When the screen is first displayed, the cursor is at the data field for the selection number. An entry of 1 displays the help file; after the help file is displayed, control returns to this screen. An entry of 2 returns the user to the menu that called the paint program. An entry of 3 permits the user to define the remaining data fields; the cursor is positioned at the first data field.

Data fields with a validation code of 1, 3, 5, or 7 accept any character. Data fields with validation codes of 0, 2, 4, or 6 screen the operating system metacharacters. If metacharacters are

screened, for example, typing an asterisk (*) for character substitution causes the terminal to beep, and no character is entered.

A data field is complete when all character positions are filled, or the data entry is terminated by pressing the newline or return key. If the validation code is 0, 2, 4, or 6, pressing the newline or return key is not accepted as the first character in the field.

The last line of the displayed screen prompts the user to verify that the data entries are correct. Entering y (yes) erases the screen and executes the command line in the description file. Entering n (no) displays the message

Enter NEW LINE to position marker to appropriate field

and positions the cursor at the data field of the selections menu. From this point, the user can cancel the operation, display the help file, or change a data field. Correct data fields can be stepped through by pressing the newline or return key. Changing a data field consists of entering new data for that field and pressing the newline or return key.

Paintfile Program

Command line:
/menu/obj/paintfile.o description-file help-file answer-file
Arguments:

- description-file — the description file for the paintfile program is functionally the same as the paint program with one exception. Like the paint program, it defines the screen that prompts the menu user for parameter input. It defines the screen fill-in-the-blank format, and it defines how the user input is to be validated. However, when the screen is completed by the menu user, all the answers entered by the user are in an answer file.
- help file — the help file, like the help file for the paint program, is a text file the user can display to gain information on the parameters needed.
- answer file — the answer file is the output file of the paintfile program. The paintfile program puts all data entry values in the answer file.

  The answer file can initially contain data entry field values. In this case, the screen displayed to the user has predefined data entry fields. The user now has a choice of accepting a data entry field value as is, or editing it.

Argument format:

- description file — the description file contains text lines displayed to the menu user and data entry field definitions that specify the fill-in-the-blank format. The format for the text lines and the data entry field definitions is exactly the same as the paint program. Since this file calls no script or object program, it contains no command line.

  This program is typically called from within a shell script. The data entered may be used for processing within the shell script. How the data in the answer file can be accessed and used is discussed in the "Menu Programming" section.

- help file — like the help file for the paint program, the help file is a text file containing adequate information for the user to define the data entr fields.

- answer file — the answer file is the output file of the paintfile program. It can either be empty, or it can contain text to predefine data entry fields. Text lines in the answer file correspond one-to-one to the data entry fields defined in the description file.

Figure 6 shows an example of a description file for the paintfile program.

In this file, only the title is directly displayed from the file. If the answer file contains

TOWER 1632 System

Backups are performed Monday through Friday
    from 12 noon - 1 PM.

then the screen displayed to the user would be that shown in Figure 7.

When this screen is displayed, the cursor is located in the data field which asks if the above information is correct. An entry of y (yes) accepts the screen; the answer file is unchanged. An entry of n (no) transfers the cursor to the field for the selection number. From this point, the user could either display the help screen, cancel the generation, or edit the message to be displayed. Editing the message edits the answer file.

If the answer file initially has data, the cursor is first located in the last data field for the yes or no entry. If the answer file is empty, the cursor is first located in the data field for the selection number.

I71I17813
I81I17813
I91I17813
I10I117813
I11I117813
I12I117813
I13!I17813
I14I117813
I15I117813
I16I117813
I17I117813
I18I117813

Figure 6

Figure 7

Options Program

Command line:

/menu/obj/option.o description-file

Argument:

- description file — the description file defines a format of option selections displayed to the user. The screen is primarily a list of option definitions with an option value for each definition. Each option definition also has a

predefined alternate value which is not displayed. An option value can be changed to and from its alternate value by selecting the number which enumerates it in the list. A script or object program is invoked by selecting a number after all options are defined correctly.

Argument format:

• description file — the three types of entries in the description file are the comment line, the text line, the option value definition field, and a command line to call to a script or object program. How the defined options are used by the script or object program is disucssed in the "Menu Programming" section; this section contains some typical programming techniques.

For the option value, the description file defines the column number where the display is to start, the default option value to be displayed, and the alternate option value. This specification begins in column 1 of the description file and has the format

?column number?default value?alternate value

where the column number is the numerical value specifying the screen column for the first character of the default value shown. The default value entry is the default value of the option. The alternate value entry is the one other value the option can have.

One of the selections on the screen must be a command line to execute a script of object program. The command line must have the format

!exec program-name

where program-name is the name of the script or object program. The defined options are treated as command line arguments to the program. The command line may have explicit arguments declared after the program-name, in which case the defined options as arguments are subsequent.
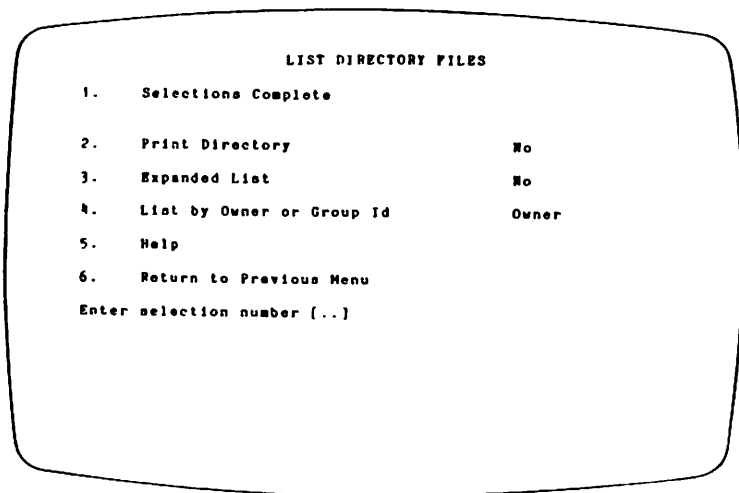
Another selection on the screen must permit the user to cancel the operation. To return to the menu or script which called the options screen, the command line has the format

!return

If the options menu was called from a submenu several
levels below some main menu, a return to that main menu
is done with the command line

!returnmain

Figure 8 is an example of a description file for the option
program. Note that the first selection is for the program
execution line; this is simply a convention of the system
administrator menus. This command line may appear anywhere
among the options.

```
:                                              LIST DIRECTORY FILES
:
:
:        Selections Complete
!exec program-name
:
:
:
:        Print Directory
?35?No?Yes
:
:        Expanded List
?35?No?Yes
:
:        List by Owner or Group Id
?35?Owner?Group
:
:        Help
!/menu/obj/help.o /menu/help/lsdir.m.n
:
:        Return to Previous Menu
!return
```

Figure 8

Figure 9 shows the option screen as displayed to the user. Selecting item 2 would change the Print Directory option from No to Yes; selecting item 2 again would change it back to its original No value.

```
                    LIST DIRECTORY FILES
     1.     Selections Complete

     2.     Print Directory                    No

     3.     Expanded List                      No

     4.     List by Owner or Group Id          Owner

     5.     Help

     6.     Return to Previous Menu

     Enter selection number [..]
```

Figure 9

More Program

Command line:

/menu/obj/more.o display-file cancel

Arguments:
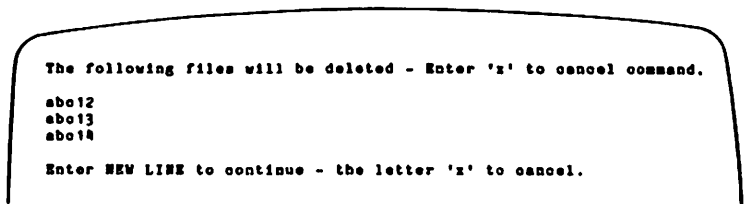
- display file — The display file is a text file displayed by the more program. The file is displayed one screen at a time; the user advances to the next screen by pressing the newline or return key. With the display of each screen, the user has the option of advancing to the next screen or cancelling the display operation.
- cancel — This argument is a keyword on the command line that determines the status output of the more program when the operation is cancelled. If the keyword is used, the more program returns a status of 1 when the operation is cancelled. The user cancels the operation by entering x after a screen is displayed.

    Using the cancel keyword permits the more program to be used within a script program in which the user is to decide whether to continue or cancel the script.

Figure 10 is an example script which deletes files whose file names begin with "abc". Figure 11 shows the screen as it is displayed to the user. If the user enters an x, the script commands to delete the files are not performed.

```
echo "The following files will be deleted — Enter "x" to cancel > tmpfile
ls abc * > tmpfile
/menu/obj/menu.o tmpfile cancel
case $?
0);; #continue
*)exit1;;
esac
rm abc*
rm tmpfile
```

Figure 10

```
The following files will be deleted - Enter 'x' to cancel command.

abc12
abc13
abc14

Enter NEW LINE to continue - the letter 'x' to cancel.
```

Figure 11

Help Command

Command line:
    help help-file
Argument:
  • help file — the help file provides additional information to the user for parameter or option definition.
Argument format:
  • help file — the help file is a text file; it needs no special characters at the beginning of each text line. Multiple screens for the help file are permitted, so the file may have more lines than can be displayed at one time by the terminal.

Comments can be put in the help file to identify it for the developer. These lines are proceeded by a number sign (#).

If the help file is longer than 24 lines, the file is displayed a screen at a time. At the bottom of each displayed screen is a message telling the user to press the newline or return key to continue to the next screen, or enter x to cancel. If x is entered, the user is immediately returned to the screen from which the help screen was called; the help file is not displayed further.

Return Command
Command line:
     return

The return command is used in the menu and options programs to return control to the menu previous to the one currently displayed. An example of the return command format in a menu is in Figures 2 and 8.
     A return command performed from the initial menu exits the user from the menu interface.

Returnmain Command
Command line:
     returnmain

The returnmain command is used in the menu and options programs to return control to the initial menu from any level of the menu structure. An example of the returnmain command is in Figure 2.

Menu Programming
This section describes how to access data obtained through a menu interface. It also shows some typical shell script command lines that can be used for this data access.

Positional Parameters
The three interface programs which use user-defined parameters are the paint program, the paintfile program, and the options program. Parameters for all three programs are accessed using the system positional parameters $1, $2, ..., $n.

Paint Program
Options Program
     If the paint or options program executes a script program with no explicit arguments on the command line, the system

positional parameters $1 to $9 take on the values of the parameters defined by the user on a one-for-one basis. There are as many positional parameters as there are user-defined parameters. However, if there are more than 9 user-defined parameters, an assign-and-shift method must be used to access the positional parameters beyond $9. This method uses the shift system command an example of which is the following:

```
param1 = $1
shift # $1<--$2, $2<--$3, $3<--$4,...,$(n-1)<--$n
param2 = $1
shift
param3 = $1
shift # the shift and assign are done until $9 references $n
    .
    .
    .
```

The above example would be suitable for 12 user-defined parameters. The first three user-defined parameters are param1, param2, param3. The remaining nine parameters are referenced by $1 through $9.

If the paint or options program executes a script program with explicit command line arguments, positional parameters first take on the explicit argument values, and then take on the user-defined values. Therefore, if there are two explicit arguments on the command line, then positional parameters $1 and $2 define these values; user-defined parameters from the menu would start with $3.

If the paint or options program executes an object program without explicit arguments on the command line, user-defined parameters are passed to the called program in the order they are defined. If the command line has explicit arguments, these arguments are passed first with user-defined parameters being subsequent.

Paintfile Program

The paintfile program is typically called from within a shell script program to return the menu-defined parameters data to the script. Two methods are available for obtaining the data from the answer file that is created by the paintfile program.

If there are nine parameters or less, the set system command can be used in conjunction with the cat system command in the following format:

```
set 'cat answer-file'
```

After this command, positional parameter $1 has the value of the first user-defined parameter, $2 the second parameter value, and so on up to $9.

If there are ten parameters or more, the split system command can be used to split the answer file into one line files; each file contains one data entry that was defined by the user from the menu. Variables can then be assigned using the cat system command. The segment of script to do this might be the following:

```
split-1 answer-file /dir/tmp$$
parm1 = 'cat /dir/tmp$$aa'
parm2 = 'cat /dir/tmp$$ab'
parm3 = 'cat /dir/tmp$$ac'
        .
        .
        .
rm /dir/tmp*
```

On the split command line, the /dir/tmp$$ argument specifies a prefix to be used in the file names of the split files. The $$ specifies the process id number to be used in each file name; this assures unique file names should more than one user be performing the application. Keyword parameters (parm1, parm2,...) are then assigned using the cat system command. Once these parameters are defined, the temporary files can be deleted. The split command is described in more detail in the *User Reference Manual.*

Exporting Parameters

When a shell script is invoked, both positional and keyword parametersd may be supplied with the call. If a call from within a shell script to another shell script is the following:

```
scriptname parm1 parm3 $4
```

then keyword parameters parm1 and parm3 and positional parameter $4 are passed to positional parameters $1, $2, and $3 in the called shell script, respectively.

Keyword parameters are also made available implicitly to a called shell script and any process it initiates by specifying that parameters are to be exported with the export system command. If an export command has the following:

export parm2 parm3

then keyword parameters parm2 and parm3 are marked for export. When a shell script is invoked, copies of these variables are made for use within the invoked procedure.

Program Exit Status

All four of the interface programs (menu, paint, paintfile and options) return a status of 0 if they perform without errors and a status of 1 if an error occurs. For the more program, the exit status could be changed by the menu user to either perform or skip over script commands. For the remaining three programs, the developer should check the exit status of a program before proceeding to subsequent script command. Using the paintfile program as an example, a segment of script might be the following:

```
error = 1 #set error exit number
paintfile data-file help-file answers-file #generate screen
case $? in # test exit status of paintfile program
        0);; #continue
        *)exit $error
    esac
    # get answers from the answer file
split-1 answer-file /dir/tmp$$        set 'cat answer-file'
parm1 = 'cat /dir/tmp$$        or    parm1 = $1
parm2 = 'cat /dir/tmp11'              parm2 = $2
        .                            .
        .                            .
        .                            .
```

Interrupt Signals

Once the user is in the menu interface, the quit signal (SIGQUIT) and the interrupt signal (SIGINT) are disabled. This disabling prevents an unintentional exit from the menu structure. When the application program is invoked by one of

the menu programs, it is the responsibility of the developer to enable these signals in the application program or to leave them disabled. These signals are enabled when the user exits the menu structure.

Error Messages

A menu program error occurs if there is an error in the format of a description file. The error is detected when the file is accessed by one of the interface programs. The system returns to the state previous to the start of the menu interface.

Can't open description file
> The description file to be displayed by the options program cannot be opened. Check the access mode of the file to insure that it has a read mode.

Errors encountered in description file load
> The description file could not be loaded. This message is usually the second message when there is an error condition. The first message describes the error more specifically.

First line not a text file
> The first line of the description file is neither a text line nor a comment line. The first character of a text line must be a colon (:). The first character of a comment line must be a number sign (#). Edit the description file causing the error.

Help is not available
> There is no help screen available for more information.

Line nn - bad character x
> In the description file for the paint or paintfile program, a character other than a question mark is used as a field separator. The nn value is the number of the line causing the error. The x value is the invalid character. Edit the file replacing the character with a question mark.

Line nn - bad option column
> The description file for the options program has an invalid option definition line. The nn value is the number of the line that contains the error. The column number entry, which defines the placement of the option value, is not valid. Edit the file using a valid column number.

Line nn - bad option #1
> The description file for the options program has an invalid option definition line. The nn value identifies the line having the error. The first (default) option value is not delimited

properly. Edit the file using correct placement of delimiters (question marks).

Line nn - bad column numeric entry

Line nn - bad row numeric entry

Line nn - bad length numeric entry

Line nn - bad valid numeric entry

> In a description file for the paint or paintfile program, the numerical entry for the named field is not valid. The nn value is the number of the line causing the error. Edit the description file using valid numerical values.

Line nn - column out of range

Line nn - row out of range

Line nn - length out of range

Line nn - valid value out of range

> In a description file for the paint or paintfile program, the numerical entry for the named field is out of range. The nn value is the number of the line causing the error. The dimensions of the terminal screen are the only limitations when displaying text or data entry fields. All lines are usable except the last three lines on the screen which are reserved for system messages. The maximum number of characters per line is 2 less than the line width of the terminal screen. Edit the file using valid numerical values.

Line nn - command line limit

> The description file for the menu program contains too many command lines. The nn value identifies the command line causing the excess. The number of command lines is limited to 20 per screen.

Line nn - invalid description line type

> The description file has an invalid line. The nn value is the number of the line containing the error. The menu program cannot specifically identify the error type. Inspect the line causing the error and verify its format.

Line nn - max options exceeded

> The description file for the options program contains too many options. The nn value identifies the option line causing the excess. The number of options is limited to 19 options per screen.

Line nn - missing column entry

Line nn - missing row entry

Line nn - missing length entry

Line nn - missing valid entry

> In a description file for the paint or paintfile program, a line describing a data entry field is missing the entry named in

the message. The nn value is the line number of the line causing the error. Edit the file and correct the line in error; it should have a row, column, length, and validation code entry. Entries are separated by exclamation points (!).

Line nn - missing option

The description file for the options program has an invalid option definition line. The nn value is the number of the line causing the error. The alternate option value is not delimited properly. Edit the file using correct placement of delimiters (question marks).

Line nn - no text line

The description file for the options or menu program is missing a text line before a command line or option definition line, respectively. The nn value identifies the command or option definition line that is missing a text line. Edit the file and insert a text line.

Line nn - option line limit

The description file for the options program is using too many arguments for the script or object program it executes. The nn value identifies the number of the option line causing the excess.

Parameters defined through the options program are subsequent arguments to the formal program arguments that follow the program name on the command line. The total number of command line arguments and option program parameters (as arguments) cannot exceed 17.

Line nn - row is beyond screen limit

In a description file for the paint or paintfile program, the number of rows to be displayed is more than the capability of the terminal screen. The nn value is the number of the line causing the error. Edit the file and condense the number of lines to be displayed.

Line nn - text line limit

The description file for the menu or options program contains too many text lines. The nn value identifies the number of the line causing the excess. The number of text lines in the description file cannot exceed 23.

Line nn - text line limit exceeded

The description file for the menu or options program contains more lines than the terminal screen can display at one time. The nn value is the number of the line that caused the excess. The maximum number of lines is dependent on how the terminal is defined in the system. Edit the file to reduce the number of lines in the file. The

maximum number of lines is one less than than the nn value in the error message.

Maximum number of parameters exceeded

A command line in a description file for the menu or options program has too many parameters following the program name. The number of parameters on the command line is limited to 19.

Missing description file name argument

In a description file used by the menu program, a command line is missing its description file name argument. The command line in error corresponds to the selection made when the error occurred. Edit the file and insert a description file name.

Missing execute file parameter

In a description file used by the options program, the exec command line does not have a program name following it. Edit the file and insert a program file name.

Selection is not available

This error does not cancel the menu program operation. The user simply cannot perform the chosen operation. The syntax of the command line causing the error is correct, but the operation could not be performed. Some of the more common causes of this error are if a file on the command line was not found or if an access mode made a file unavailable. Check the status of each file on the command line that caused the error.

Application Interface

Overview

This chapter describes the application interface files that are necessary for an application to interface to a system. The application is assumed to be completed and ready for use before the application developer generates the interface files. The interface files and the application files are made available to a system administrator for installation. After installation, the application is selectively available for use by system users: application end users, procedures analysts, application developers, or system support personnel.

After the procedures described in this chapter are complete, a system administrator may install the application directly, from streaming tape, or from floppy disk. Installing an application directly permits users on your system to run an application created by you on your system. Installing an application from streaming tape or from floppy disk allows an application created on your system to be installed on another system.

The procedures for interfacing an application include:

- Classifying the application according to its intended users
- Developing interfaces for application installation and invocation
- Packaging the application for system administrator installation

Application Classification

The system has four user categories. Classifying the application by user category determines the application invocation method and required interfaces. Classify the application according to the following user categories.

Application End User

The application end user category includes persons who use, rather than program, the system. The application end user

does not need to have knowledge of either the system or the operating system. The interface to the system provided for the application end user is a menu-driven, highly interactive process. The end user selects programs to run from a set of applications permitted to the user by the system administrator.

Procedures Analyst

The procedures analyst category includes persons who use application generation tools to tailor applications to the specific needs of the business. The interface to the system, provided for a procedures analyst is the same menu-driven interactive process as provided for an application end user. The procedures analyst selects programs to run from a set of applications permitted to the user by the system adminstrator.

Application Developer

The application developer category includes persons who develop application programs. The interface to the system provided for the application developer is through the operating system commands. Help information screens are provided to define the programming languages and operating system development utilities.

System Support Analyst

The system support analyst category includes persons charged with running diagnostic programs and solving any system problems. The interface to the system provided for the system support analyst is through the operating system commands and a menu-driven diagnostic and maintenance program selection. Help information screens are provided to define operating system support utilities.

Classifying the application determines if interfaces are required for menu invocation or operating system command level invocation of the application.

Menu Selection Invocation

The application interface for an application to be invoked from a menu selection by an application end user or procedures analyst is an executable shellscript file. This file is explained in the "Invocation Script File" section.

Operating System Command Invocation

If the application is to be invoked as a command entered in response to the shell prompt ($) by an application developer or

system support analyst, no special interface is required. The application is invoked by entering the pathname of the object file and any necessary program arguments. This may be acceptable if the application is infrequently used, or if the command line entry is concise.

To make invocation easier, the application developer can generate a shellscript file equivalent to the command line entry. Entering the pathname of this script file now invokes the program. Alternatively, if the file has a pathname of /usr/bin/filename, then entering filename on the command line is sufficient to invoke the application.

The content of this script file and the script file discussed in the "Menu Selection Invocation" section are the same. The script file used for the menu selection invocation is required. The script file used for the operating system command invocation is at the discretion of the application developer.

If the application developer generates a script file for the operating system command invocation, the file is to be considered an application component file that accompanies all other component files.

Application Interface Files

There are a maximum of eight files to be generated by the application developer. The files contain text or executable script and are created with one of the operating system editors such as ed or vi.

- Installation script file (required only for installation from streaming tape or from floppy disk)
- Application category file
- Application name file
- Application path file
- Removal script file
- Title line file
- Help information file
- Invocation script file (required only for menu invocation)

For a direct installation, file names for the files created must be supplied to the system administrator. For a streaming tape or floppy disk installation, the files must have specific names. The required file name for each file is contained in the description of the file.

Installation Script File

Requirement: Only for installation from streaming tape or from floppy disk

Filename: INSTALL

Size: No restriction

Format: Must contain executable shellscript.

The developer must create a standalone script which performs the installation of application component files, copying them to the correct directory. This script must:

- check whether installation is from streaming tape or from floppy disk. The shell variable mntdev is /dev/fdsk70 (left drive) or /dev/fdsk71 (right drive) if the installation is from floppy disk. The shell variable mntdev is /dev/rtp if the installation is from streaming tape.
- mount any installation floppy disks
- if the installation is from floppy disk, execute cpio to unpack component files and copy them to appropriate destinations; the pass-option is recommended for this copy process; if the installation is from streaming tape, the component files are already copied to their appropriate destinations
- change mode of component files, if needed
- change owner of component files, if needed
- update ${log}log
- handle errors, returning to calling script with a value of 1 after the error has been processed and a message issued
- handle instructions and query/response with the operator
- clean up any temporary files
- unmount any installation floppy disks
- return to calling script after normal termination, returning a value of 0 for successful installation, and a value of 1 for error termination (This INSTALL script is responsible for returning to the calling script for both successful and error cases; INSTALL may not terminate on its own.)

The INSTALL script may make only the following assumptions about the environment in which it will be invoked:

Streaming Tape

- The installation streaming tape is in the drive.
- Shell variable log is set to temporary filename and application log ${log}log will receive log.

Floppy Disk

- Installation floppy disk number 1 is in the floppy disk drive, and is not mounted.
- Shell variable mntname is set to appropriate name of floppy disk drive specified by the user; for example, top, left, bottom, or right.
- Shell variable mntdev is set to appropriate floppy device pathname, and is exported; for example, /dev/fdsk70
- Shell variable mntdir is set to appropriate directory pathname, and is exported; for example, /mnt/fdsk70
- Shell variable log is set to temporary filename and application log ${log}log will receive log.

The INSTALL installation script file is invoked from the system administration menus to install the application from streaming tape or one or more floppy disks.

The following example of a completed application installation floppy disk shows four files and the INSTALL script which copies the files to the system. The pathname for each file facilitates copying and is discussed in the "Floppy Disk Installation" section.

- /mnt/fdsk70/base/usr/bin/appname — An invocation script file. This file is the optional script file discussed in the "Operating System Command Invocation" section. This script file invokes the application for application developers and system support analysts. This file is treated as a component file of the application.
- /mnt/fdsk70/base/appl/appname/aprun — An application component program.
- /mnt/fdsk70/base/appl/appname/ap.file1 — An application component program
- /mnt/fdsk70/base/appl/appname/ap.file2 — An application component program

The shell script to transfer these files for streaming tape and floppy disk is the following. Comment lines begin with a colon (:).

```
:             APPLICATION INSTALLATION SCRIPT
:     This script assumes following:
:       1.  Shell variable mntdev is set to appropriate device pathname and
:       is exported    ex. /dev/fdsk70
:       2.  If installation is from flex disk, disk #1 is in the drive
:       unmounted. If installation is from streaming tape all the application
:       files are on hard disk in the correct final position.
:       3.  Shell variable mntdir is set to appropriate directory pathname,
:       and is exported  ex. /mnt/fdsk70
:       4.  Shell variable log is set to temporary filename and application
:       log   {log}log  will receive log.
:       5.  Shell variable mntname is set to top/bottom/left/right as
:       appropriate and is exported.
date | tee -a ${log}log
echo "Installation of <application name> Starting...'' | tee -a ${log}log
k1=/dev/fdsk70
k2=/dev/fdsk71
if test $mntdev = $k1 -o $mntdev = $k2
    then
    /etc/mount $mntdev $mntdir > /dev/null
    case $? in
    1) echo "Flex Disk will not mount, Installation Aborted !" | tee -a ${log}log
      exit 1;;
      esac
    return='pwd'
    cd $mntdir/base
    echo ''<application name> Files Installed'' | tee -a ${log}log
    find . -print | cpio -pdmuv / 2>/tmp/temp | tee -a ${log}log
    case $? in
    1) echo "Error in cpio unpacking, Installation Aborted !" | tee -a ${log}log
      cd $return
      /etc/umount $mntdev
      exit 1;;
      esac
    echo "Total Disk Space Used:" | tee -a ${log}log
    cat /tmp/temp
    cp ${log}log /tmp/tempp
    cat /tmp/temp /tmp/tempp > ${log}log
    rm /tmp/temp /tmp/tempp
    cd $return
    /etc/umount $mntdev
    case $? in
```

```
1) echo ''Flex Disk will not unmount, Installation Aborted !'' | tee -a ${log}log
   exit 1;;
esac
echo ''Remove <application name> Flex Disk from '' $mntname ''
drive''
fi
chown root /usr/bin/appname
chown root /appl/appname/*
chmod 755  /usr/bin/appname
chmod 755  /appl/appname/aprun
chmod 644  /appl/appname/ap file*
echo ''Installation Complete ...:'' | tee -a ${log}log
echo ''Enter NEWLINE or RETURN to continue''
read reply
exit 0
```

The application component files are in the /appl directory. This is the designated directory for installed applications. The application developer should insure that file names are unique.

The /usr/bin/appname script file invokes the application from the shell prompt when appname is entered on a command line. This file is not needed if the application is exclusively intended for menu users (application end users or procedures analysts). In this case, the invocation script file is used to start the application when the menu selection is made.

Application Category File

Requirement: Optional and only for installation from floppy disk and direct installation

Filename: INSTALL.u

Size: One line of one character

Format: Must contain displayable text

The application category file contains the letter specifying the user category:

A — application end user or procedures analyst

B — application developer

C — system support analyst

If this file is not created, the system administrator must be advised of the correct category to enter during installation from floppy disk or direct installation. See the "Streaming Tape

Installation" section for specifying the user category for streaming tape installation.

Application Name File

Requirement: Optional and only for installation from floppy disk   and direct installation
Filename: INSTALL.n
Size: One line of 14 or less characters
Format: Directory name

The application name file contains the base name of the application. If this file is not created, the system administrator must be advised of the base name to enter during installation from floppy disk or direct installation. See the "Streaming Tape Installation" section for specifying the base name for streaming tape installation.

Application Path File

Requirement: Optional and only for installation from floppy disk and direct installation
Filename: INSTALL.p
Size: One line
Format: Pathname

The application path file contains the pathname of the application. The parent pathname is:

/appl — application end user or procedures analyst applications
/appl/appdev/languages.dir — development languages
/appl/appdev/instapp.dir — development non-language applications
/appl/suppanl/instsup.dir — support applications

If this file is not created the system administrator must be advised of the pathname to enter during installation from floppy disk or direct installation. See the "Streaming Tape Installation" section for specifying the pathname for streaming tape installation.

Removal Script File

Requirement: All applications
Filename: INSTALL.r
Size: No restriction

Format: Must contain executable shellscript

The developer must create a standalone script which removes all component files of the application, using the full pathnames of the files. The script should handle all combinations of errors and missing files. The use of "rm -f" for files and "rm -rf" for directories is recommended. The removal script must return to the calling script with a value of 0 for successful removal or a value of 1 for error removal.

The INSTALL.r removal script file is invoked from the system administration menus to remove the application. After the application is removed, the system removes the administrative files for the application: installation script, removal script, title line, help information, and invocation script.

The following is an example of a removal script file. The files removed are those previously installed in the "Install Script File" section.

```
rm -f /usr/bin/appname
rm -rf /appl/appname
exit 0
```

Title Line File

Requirement: All applications
Filename: INSTALL.t
Size: One line of 50 or less characters
Format: Must contain displayable text

The developer must create a title line file of one line of 50 or less characters.

The title line contains the title of the application. The title line is displayed when the system administrator lists all installed applications or adds a user to the system. It is the application selection line displayed for an application end user or a procedures analyst and the help information selection line displayed for an application developer or system support analyst.

The following is an example of a title line file.

```
apname - the example application APNAME
```

Help Information File

Requirement: All applications
Filename: INSTALL.h

Size: Restricted to from 1 through 4 lines for application end
user and procedures analyst applications; restricted to from
1 through 20 lines for application developer and system
support analyst applications.
Format: Must contain displayable text
The developer must create a help information file which
identifies the application, its purpose, and its
capabilities.

The help information file is displayed when an application
end user or procedures analyst selects the help process from
a menu, or when an application developer or system support
analyst enters the HELP command and selects help for the
application.
The following is an example of a help information file.

```
apname – the APNAME application is used to provide an example
     in the description of the application interface files
```

Invocation Script File

Requirement: required for application end user and procedure
analyst applications
Filename: INSTALL.sh
Size: No restrictions
Format: Must contain executable shellscript.

The invocation script file accesses the application
component files and starts the application. The script file cannot
require user parameters on the invocation entry line. The file
named in the one line shell script may be an executable object
program or an executable shellscript.
Because the application is to be invoked by selecting an
item from a menu, the application invocation line must be static.
No run-time parameter entries are permitted. If parameters are
required, they could be requested, for example, by menus or
scripts added to the application by the application developer.
An executable shellscript may also offer selections of
programs when the application is a multiple program
application.
The executable shellscript must permit the user access to
all components of the application and be invoked from a single,
static command line.

An example of the invocation script file is the following:

```
/appl/appname/aprun param1 param2
```

In this shellscript, all the example component files installed in the "Installation Script File" section are initiated.

Application Packaging

Streaming Tape Installation

One or more applications may be packaged on a streaming tape. Each streaming tape has the following format:

index file
application 1 files
application 2 files
.
.
.
application n files
trailer file

The index file is a text file which contains exactly four lines for each application; these lines are:

title line — application title in 30 or less characters
product identification and version number — application product identification (1-14 characters), a slash (/), and product version number (1-6 characters; for example, D102/020200)
appl — the exact word "appl"
category name path — space separated list of the user category, base name, and pathname of the application

The application files should be packaged exactly as they are to be on the Winchester disk. The INSTALL and xsum files should be copyable directly to /.

The trailer file is the streaming tape boot block /sys/boot/boot.stp.

Use cpio to copy these files to a streaming tape as follows:

```
< /dev/rtp                          rewind the tape
dd if=index of=/dev/nnrtp           copy the index file with no
                                    rewind
cpio -ovc <app-list-1¦              copy application 1 files
 dd of=/dev/nnrtp obs=300k
 .
 .
 .
cpio -ovc <app-list-n¦              copy application n files
 dd of=/dev/nnrtp obs=300k
dd if=/sys/boot/boot.stp            Copy trailer file
  of=/dev/nnrtp
< /dev/rtp                          rewind the tape
```

Floppy Disk Installation

To package an application on floppy disk, the floppy disk(s) must be formatted and contain a file system. After the interface files are created, they must be copied to the mounted file system on the first floppy disk. These files must be at the top or mount level of the file system hierarchy. For example, the interface files have pathnames of:

```
/mnt/fdsk70/INSTALL
/mnt/fdsk70/INSTALL.u
/mnt/fdsk70/INSTALL.n
/mnt/fdsk70/INSTALL.p
/mnt/fdsk70/INSTALL.r
/mnt/fdsk70/INSTALL.t
/mnt/fdsk70/INSTALL.h
/mnt/fdsk70/INSTALL.sh
```

The application component programs must be copied to the floppy disk file system. These conventions are established for ease of packaging.

- Use all of the first floppy disk. The interface files are small, leaving most of the first floppy disk for the application. Unless application structure requires a full or separate floppy disk, locate the entire application within the remainder of the first floppy disk.
- Beneath a mount level directory named "base", create a skeleton file system on the floppy disk and distribute the application's component files within that skeleton, setting ownerships and modes as desired on system disks.

By creating a skeleton file system which is empty except for the application, the cpio utility with the pass option can efficiently unpack this "base" directory and move all component files from floppy disk into the correct locations on system disks. The cpio utility also preserves file ownership, modes, and modification dates.

The use of a "base" directory also simplifies the process of creating and maintaining the installation floppy disk itself. A developer may create his own permanent skeleton "base" directory under his development account and move completed application component files into that skeleton. Then, cpio can conveniently be used to create the "base" directory on the floppy disk being created for later installation.

The example application files used throughout this chapter would have pathnames of:

```
/mnt/fdsk70/base/usr/bin/appname
/mnt/fdsk70/base/appl/appname/aprun
/mnt/fdsk70/base/appl/appname/ap.file1
/mnt/fdsk70/base/appl/appname/ap.file2
```

After the interface files and application component programs are in the floppy disk file system, a checksum must be created on the floppy disk. The following example is a procedure which creates the checksum file xsum on the left or top floppy disk drive.

```
/etc/mount /dev/fdsk70 /mnt/fdsk70
rm /mnt/fdsk70/xsum
cd /mnt/fdsk70
find . -print | /menu/obj/gensumlist.o > /tmp/xsum
cp /tmp/xsum /mnt/fdsk70
cd
/etc/umount /dev/fdsk70
```

The checksum should always be generated off of the floppy disks, then copied to the disk. If any of the interface files or application files are modified, a new checksum file must be generated. The current checksum file must be deleted from the disk before generating another checksum file.

Direct Installation

To package an application for direct installation requires only that the system administrator be notified of the pathnames of the interface files.

For direct installations, the developer is responsible for the placement of application components on the system. The application developer should consider the following during file placement.

- No application component files can be put in the /bin directory
- Application component files can be placed in the /usr or /usr/bin directories, however all the system utilities are already in these directories. This could "bury" the application and make future file maintainance more difficult.
- Application files must be placed under a subdirectory in the /appl directory; /appl is the intended directory for installed applications.

The developer is cautioned to exercise care in designing the INSTALL.r removal script file to ensure that the removal script removes only the application's component files used in daily execution and does not remove development-type files. Especially in the case of directly installed applications, the developer should keep separate all development files from released files.

System Support Personnel Procedures

Overview

The *System Support Personnel Procedures* chapter describes the system interfaces that are available to system support personnel. The system support personnel includes customer data processing management personnel, system analysts, and NCR system support personnel. A system support person uses data capture, program trace, and support tools to analyze and isolate problems. The support person has the capability to:

- display help information of the support analyst tools through a menu-driven interface
- perform maintenance and diagnostics processes through a menu-driven interface
- perform all jobs and processes through direct control of the operating system

The system support person is expected to have a thorough knowledge of the operating system and is expected to be familiar with the *User Reference Manual* and the *Superuser Reference Manual.*

Operations

1. With the system displaying the login prompt, login by entering the assigned system support analyst login name.
2. The terminal displays a HELP entry description, a TEST entry description, and the system prompt ($).

3. With the operating system shell prompt ($) displaying, the support analyst has an option to:

- Enter the uppercase letters "HELP", to display the help information for the support analyst.

  The HELP process allows you to list the installed support applications and the standard support utilities. The standard support utilities are the commands and applications described in the *Superuser Reference Manual*. The manual is available online through the *man* command if the optional system files are installed on the system.

- Enter the uppercase letters "TEST", to display the Maintenance and Diagnostics menu. Refer to the *Maintenance and Diagnostics* chapter in the *System Administration* book.

- Enter the operating system command needed to perform a specific process or job. If this is your first login, set your password; refer to passwd (1) in the *User Reference Manual*.

- Logoff the system by holding down the control key (CONTROL) and pressing the d key.

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