Burroughs ⬡

B 80 SYSTEMS

OPERATOR'S MANUAL

THIS MANUAL REPLACES ALL PREVIOUS ISSUES OF FORM 2007241

Burroughs ⧖B

B 80
SYSTEMS

OPERATOR'S
MANUAL

THIS MANUAL REPLACES ALL PREVIOUS ISSUES OF FORM 2007241

LIST OF EFFECTIVE PAGES

Page	Issue
Title	Original
ii thru iii	Original
iv	Blank
v thru vii	Original
viii	Blank
1—1 thru 1—8	Original
2—1 thru 2—8	Original
3—1 thru 3—3	Original
3—4	Blank
4—1 thru 4—6	Original
5—1 thru 5—7	Original
5—8	Blank
6—1	Original
6—2	Blank
7—1 thru 7—2	Original
A—1	Original
A—2	Blank

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF ILLUSTRATIONS

Figure 1-1. B 80 Systems

SECTION 1
KEYBOARD OPERATION AND OPERATOR CONTROLS

INTRODUCTION

The Operator's Console contains all the controls that are required during program execution, and an easy to read Operator Communication System. The controls are: a standard Typewriter Keyboard which provides for individual national needs, a standard Numeric Keyboard which contains special function keys, 16 or 24 Program Keys, and a Ready Request Key. The Operator Communication System is provided by the Console Printer (described in Section 2) and as many as 50 Indicator lights. Printed statements and or light patterns can be used to display system status and operating condition information.

There are a minimum of 3 other operator controls which are located in the processor cabinet. They are: the Load Enable button, the System Test switch, and the Main Power Circuit Breaker which can also be used as an Emergency ON/OFF switch.

If the system has a 180 cps Printer with Paper Break/Paper Jam Detectors, the processor cabinet will also contain the Detector Inhibit switches (DET1/DET2).

The Typewriter Keyboard, the Numeric Keyboard, and individual Program Keys are enabled for use in accordance with system control modes and the user program. The status of the Keyboards, or individual Program Keys, is displayed by an associated Indicator light.

If a non enabled key is depressed, this will create a keyboard error condition in which an ERROR indicator is illuminated and an alarm bell sounds.

NUMERIC KEYBOARD

The Numeric Keyboard, shown in figure 1-2, is enabled for use when the user program requires a numeric data entry. This condition is indicated by the illumination of the NUMERIC Indicator (Amber) which is located on the right side of the keyboard.

If a key on the Numeric Keyboard, other than Reset or an Operation Control Key (OCK), is depressed when a Typewriter Keyboard entry is required, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key. The Numeric Keyboard can be programmed for operator entry of a maximum of 15 digits + sign. The most significant digit is entered first and the sign will always be positive when the Reverse Entry key is not depressed. If an attempt is made to exceed the programmed capacity, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the Reset key.

The Numeric Keyboard consists of 21 keys which are described in the following paragraphs.
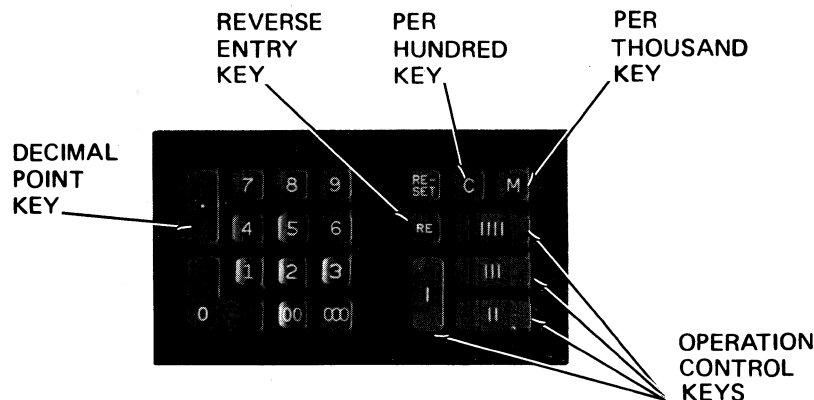
Figure 1-2. Numeric Keyboard

Numeral Indexing Keys (12)

The numeral keys consist of keys for "0 through 9", a Two-Cypher key and a Three-Cypher key. A raised dot on the "5" key assists the operator to determine the key positions by touch. The maximum number of digits that may be entered is determined by the program. If an attempt is made to exceed the programmed capacity, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key.

Decimal Point Key "."

A Decimal Point key is provided to facilitate the entry of numbers which include decimal-fractions. Numerals which are indexed prior to the depression of the Decimal Point key will be aligned to the left of the decimal point, and numerals indexed after depression of the Decimal Point key will be aligned to the right of the decimal point. The maximum number of digits that can be entered before and after the decimal point, is determined by the program. If an attempt is made to enter more than the programmed maximum number of digits, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key.

Reverse Entry Key "RE"

A Reverse Entry key is provided to allow proper arithmetic. Depression of this key, when it is enabled by the user program, will change the sign of the data entered from plus to minus. If the key is depressed when it is not enabled by the user program, this will create a Keyboard Error condition.

The erroneous entry and the error condition are cancelled by depressing the RESET key.

Per Hundred Key "C"

A Per Hundred key is provided to allow the operator to initiate special program routines. Depression of this key, when it is enabled by the user program, will condition the program to perform a routine function, possibly to divide the entered data by 100. If the key is depressed when it is not enabled by the user program, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key.

Per Thousand Key "M"

A Per Thousand key is provided to allow the operator to initiate special program routines. Depression of this key, when it is enabled by the user program, will condition the program to perform a routine function, possibly to divide the entered data by 1,000. If the key is depressed when it is not enabled by the user program, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key.

Reset Key "RESET"

A Reset key is provided to allow the operator to cancel an erroneous entry, made on either the Typewriter Keyboard or the Numeric Keyboard, and to simultaneously cancel the error condition resulting from that entry. When the Numeric Keyboard is enabled, depression of this key prior to the use of an OCK will cause the following operations to be performed.
1. The entered data will be cleared from the memory location which holds it.
2. The ERROR Indicator, if illuminated, will be extinguished.
3. The current program instruction will be reinitiated.

Operation Control Keys (4) "OCK"

The Operation Control Keys are provided to allow the operator to terminate Typewriter or Numeric Keyboard entries, thus allowing the program to advance to the subsequent instruction of the sequence. Four OCK's are provided, depression of any one of these keys will terminate keyboard entry. At each termination however, the program can be conditioned to perform one of 4 alternate routine functions as determined by the OCK which is used. OCK1 is raised above the plane of the other numeric key tops.

TYPEWRITER KEYBOARD

The Typewriter Keyboard, shown in figure 1-3, is enabled for use when the user program requires an alphanumeric data entry. This condition is indicated by the illumination of the ALPHA Indicator (Amber) which is located on the left side of the keyboard.

If a Typewriter key (except Line Advance, Shift, Shift Lock or any Numeral) is depressed when a Numeric Keyboard entry is required, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key which is located on the Numeric Keyboard.

The Typewriter Keyboard consists of 59 keys as described in the following paragraphs.

Typing Keys (48)

The Typing keys consist of 'alpha' keys for A through Z, 'numeric' keys for 0 through 9, and a

number of 'special symbol' keys. Data entered from the typing keys is passed to the keyboard buffer in binary coded form. Depending on the current program instruction, data from the buffer can be accepted for entry to memory, for printing, or for display on a peripheral.

The numeral keys on the Typewriter Keyboard have a dual alphanumeric – numeric function, that is, they can be used to enter numeric data when the Numeric Keyboard is enabled. If any other typing key is depressed when the Numeric Keyboard is enabled, this will create a Keyboard Error condition. the erroneous entry and the error condition are cancelled by depressing the RESET key.

Shift Keys (2) "SHIFT"

The Shift keys are provided to allow the operator to determine whether the upper or lower case character will be entered to the keyboard buffer when an upper/lower case typing key is used. When a Shift key is depressed in conjunction with an upper/lower case typing key, the upper case character pertaining to that key will be entered to the keyboard buffer.

Depression of a Shift key will also disable the Shift Lock feature.

Shift Lock Key "Shift Lock"

A Shift Lock key is provided to allow the operator to 'lock in' the function provided by the Shift key. When the Shift Lock key is depressed, all data subsequently entered to the keyboard buffer will be in the form of upper case characters, until a Shift key is depressed. An Indicator lamp adjacent to the Shift Lock key is illuminated when the Shift Lock feature is engaged.

Depression of a Shift key disables the Shift Lock feature.

Space Bar (Not Marked)

A Space Bar is provided to allow the operator to space the Print Head one character position to the right and to enter a space code to memory when memory entry is enabled.

Backspace Key "←"

A Backspace key is provided to allow the operator either to cause the Print Head to move 1/10 inch to the left, or to simultaneously cause the Print Head to move one character position to the left and cause the memory pointer to be decremented by one character. When the Backspace key is depressed, in conjunction with the Shift key or when the Shift Lock feature is engaged, the Print Head will move one character position to the left if printing is enabled. If the Backspace key is depressed when the Shift function is not engaged, the Print Head will move one character position to the left if printing is enabled, and the memory pointer will be decremented by one character if memory entry is enabled.

Line Advance Keys (2) "↑"

The Line Advance keys can be used to advance the paper that is held in the Paper Handler.

Repeat Keys (2) "REPEAT"

The Repeat keys are provided to allow the operator to repeat other Typewriter key functions. When the Repeat key is held depressed in conjunction with any other Typewriter key (except OCKs), the character or function code pertaining to that key will be entered to the keyboard buffer, once every 0.1 second, until that key or the Repeat key is released, or the programmed capacity of the instruction is exceeded.
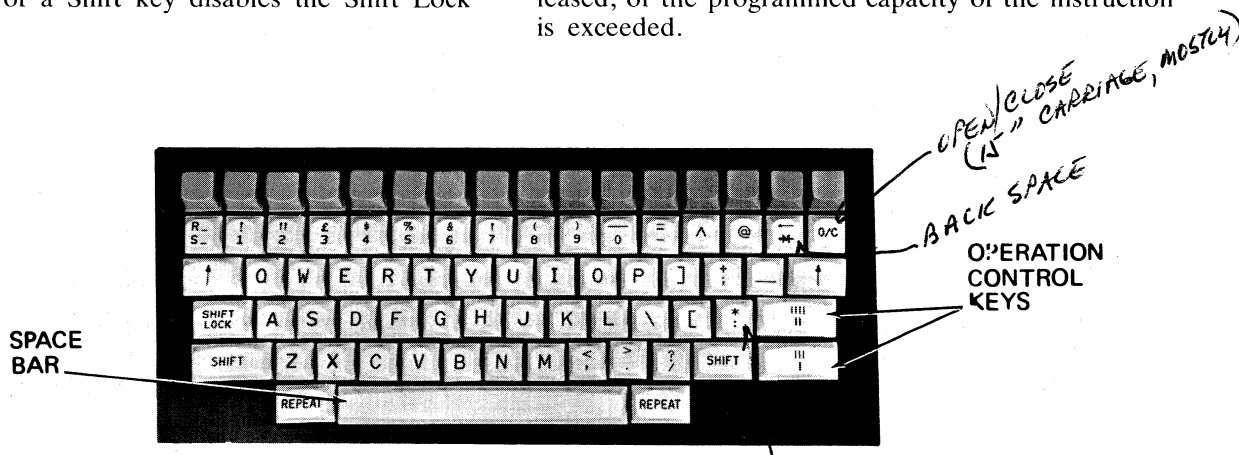
Figure 1-3. Typewriter Keyboard

Reset Key "RESET"

A Reset key, located on the Numeric Keyboard, is provided to allow the operator to cancel an erroneous entry, made on either the Typewriter Keyboard or the Numeric Keyboard, and to simultaneously cancel the error condition resulting from that entry. When the Typewriter Keyboard is enabled, depression of this key prior to the use of an OCK will cause one of the following operations to be performed:

1. With no error condition and the Reset key depressed once – the program instruction will be re-initiated and the Print Head/System Display cursor will move to the start position. Subsequent entry of data will destroy and replace the previously entered data.

2. In an error condition and the Reset key depressed once – the error condition will be cancelled but no other action will take place.

3. In an error condition and the Reset key depressed twice – the program instruction will be re-initiated and the Print Head/System Display cursor will move to the start position. Subsequent entry of data will destroy and replace the previously entered data.

Operation Control Keys (2) "OCK"

The Operation Control keys are provided to allow the operator to terminate Typewriter or Numeric Keyboard entries, thus allowing the program to advance to the next instruction. Two OCKs are provided but since each key has a discrete output on upper and lower case, there are 4 separate OCK signals available. Any OCK signal will terminate a keyboard entry and will also set 1 of 4 control flags which can be interrogated by the user program.

O/C Key "O/C"

The O/C key can be used to initiate the Clear Head function which is provided by the Console Printer and Paper Handler.

Set/Reset Underline Key "R—" "S—"

The Set/Reset Underline key is provided to allow the operator to set and reset the continuous underline function. If this key is depressed while the Shift function is not engaged, the continuous underline function will be enabled and all characters that are subsequently printed from the Typewriter Keyboard will be underlined. The continuous underline function is cancelled by depressing the Set/Reset Underline key while the Shift function is engaged.

PROGRAM KEYS

Twenty-four (24) Program Keys (PKs), shown in figure 1-4, are individually enabled for use by the user program, or by system software. The status of each PK is shown by a PK Indicator light immediately above the key. the Indicator lights are illuminated when the adjacent PK is enabled.

Enabled PKs can be used to terminate a keyboard entry and to set a control flag which can be interrogated by the user program, or by system software. If a non enabled PK is depressed during a keyboard read instruction, this will create a Keyboard Error condition. The erroneous entry and the error condition are cancelled by depressing the RESET key on the Numeric Keyboard.

PK function titles can be marked on the translucent PK Identification Strip which covers the PK Indicator lamps. By removing the plastic cover which holds the strip, the operator is able to replace the strip and change the function titles to suit different program applications. PK functions can alter within 1 program.

READY REQUEST KEY

The Ready Request key is located above and to the left of the PKs (see figure 1-4). This key can be used to create specific "system software conditions",

READY REQUEST KEY   PK IDENTIFICATION STRIP

PROGRAM KEYS

Figure 1-4. Program Keys

as and when required during system operation. For a description of those conditions, refer to the appropriate system software Manual.

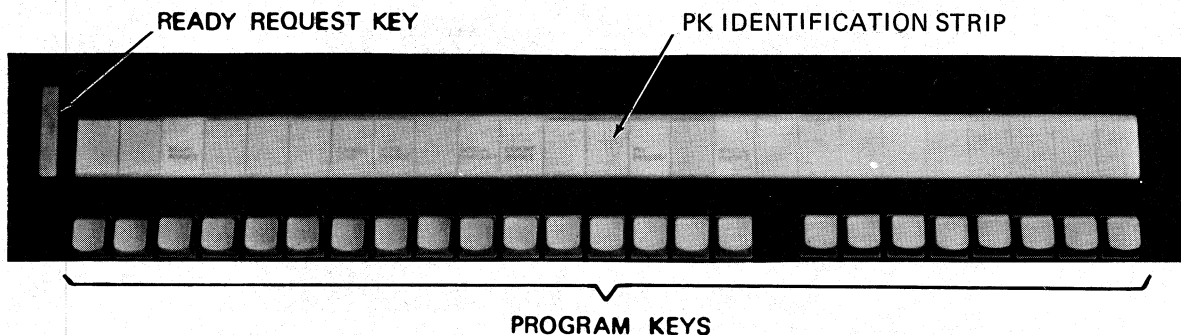# MAIN POWER CIRCUIT BREAKER

The Main Power Circuit Breaker, which is located in the processor cabinet as shown in figure 1-5, is a safety device. It is provided to protect the operator, and the system, in the event that the voltage or current supplied to the system exceeds a safe value. At pre-determined voltage or current values, the Circuit Breaker will operate to disconnect the power supply. In the situation where the overload condition is transient, the power can be re-connected after 10 seconds by moving the Circuit Breaker to the UP position. If the overload condition continues, the Circuit Breaker should not be repeatedly reset but the fault condition should be reported to the Burroughs Field Office. The Main Power Circuit Breaker can also be used as an Emergency On/OFF switch. When the Circuit Breaker is moved to its operated position (DOWN), the AC power is disconnected from the system.

Peripherals which have an independent AC power supply are not protected by the Main Power Circuit Breaker.

LOAD ENABLE BUTTON

The Load Enable button, which is located in the processor cabinet as shown in figure 1-5, can be used to enable the software load function. The software load function which is enabled by depressing this button, is automatically enabled when power is first connected to the system.

If the Load Enable button is depressed when the System Test switch is in its normal (down) position, the "system software" load procedure will be enabled. The software load procedure is initiated by depressing PK1 or PK2.

If the Load Enable button is depressed when the System Test Switch is in its TEST (up) position, the Customer Confidence Routine (CCR) load function will be enabled. The CCR load procedure is automatically initiated.

SYSTEM TEST SWITCH

The System Test switch, which is located in the processor cabinet as shown in figure 1-5, is used to determine which software load function will be enabled when the Load Enable button is depressed. If the System Test switch is in its normal (down) position when the Load Enable button is depressed, or when power is first connected to the system, a "system software" load function will be enabled.
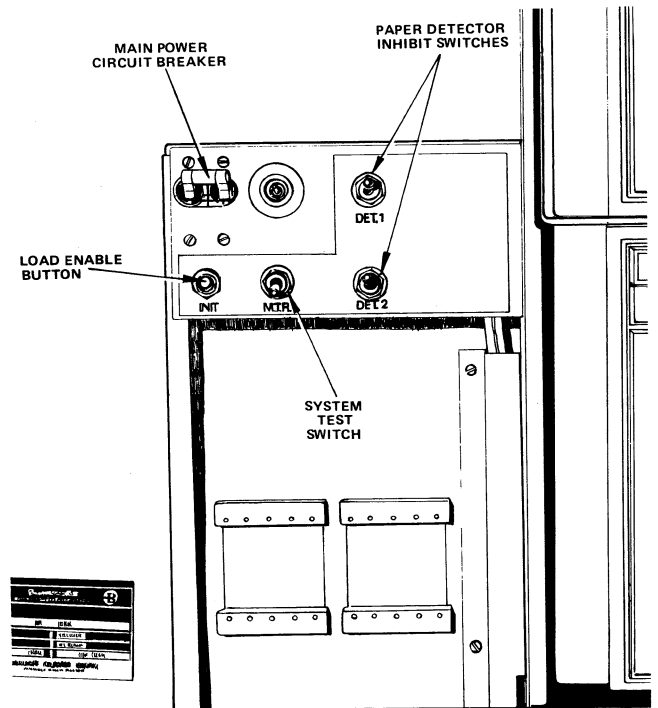
Figure 1-5. Operator Controls in Processor Cabinet

If the System Test switch is in the TEST (up) position when the Load Enable button is depressed, or when power is first connected to the system, a Customer Confidence Routine load function will be enabled.

DETECTOR INHIBIT SWITCHES

Detector Inhibit switches are provided on systems that have a 180 cps Printer with Paper Break/Paper Jam Detectors. When the switches are in the DOWN position the Detectors are enabled. When the switches are in the UP position the Detectors are disabled. Switch DET1 is used to control the detectors for the bottom, or bottom right Pin-feed Drive. Switch DET2 is used to control the Detectors for the upper (optional) Pin-feed Drive.

INDICATOR LIGHTS

Up to 50 Indicator lights are provided to communicate various operating conditions to the operator. The lights indicate which keyboard/Program Keys (PKs) are enabled, whether an operator error has occurred, and the status of input/output peripherals.

A light which illuminates when the Shift Lock feature is engaged, is located adjacent to the Shift Lock

key. A similar light, which is located in a corresponding position on the right side of the keyboard, is reserved for future use.

The remainder of the lights are arranged in 2 rows above the PKs, as shown in figure 1-6.

In the lower row of lights, the lights immediately above the PKs are associated with those keys. When a PK Light is illuminated, it normally indicates that the PK adjacent to that light is enabled. An exception to this occurs during system test procedures, when the PK lights can be used as a diagnostic aid.

The upper row of lights are associated with certain keys, functions, and operating conditions. The legends which are illuminated by these lights, and their significance, is described in the following paragraphs.

On Indicator (Green)

This indicator is illuminated when power is applied to the system.

Alpha Indicator (Amber)

This indicator is illuminated when the Typewriter Keyboard is enabled.

Numeric Indicator (Amber)

This indicator is illuminated when the Numeric Keyboard is enabled.

Ready Indicator (Green)

This indicator is associated with the functions provided by the Ready Request key.

Error Indicator (Red)

This indicator is illuminated when an incorrect keyboard entry is made. The error condition can be cancelled by depressing the Reset key.

Exception Condition Indicators D1-D8

The lights D1-D8 can be used to display system conditions and requirements. The light patterns that are used are system software dependent.

Data Communications Indicators

When the system is used in a data communications environment, the Data Communications Indicators can be used to display the operating status of 2 Data Communication Channels. When the system contains more than 2 channels, the 2 sets of Data Communication Indicators (with the exception of the CARR indicators) can be selected by system software to display the operating status of any 2 of those channels. When 2 or more Data Communications Channels are contained within a system, the Carrier (CARR) indicators are permanently connected to 2 of those channels.

When the Data Communication Indicators are used, the significance of the CARR indicators will not change but the significance of the other indicators can change in accordance with the line procedure that is in use. The legends that are illuminated by the Data Communications Indicator lights, and their possible significance is described in the following paragraphs.
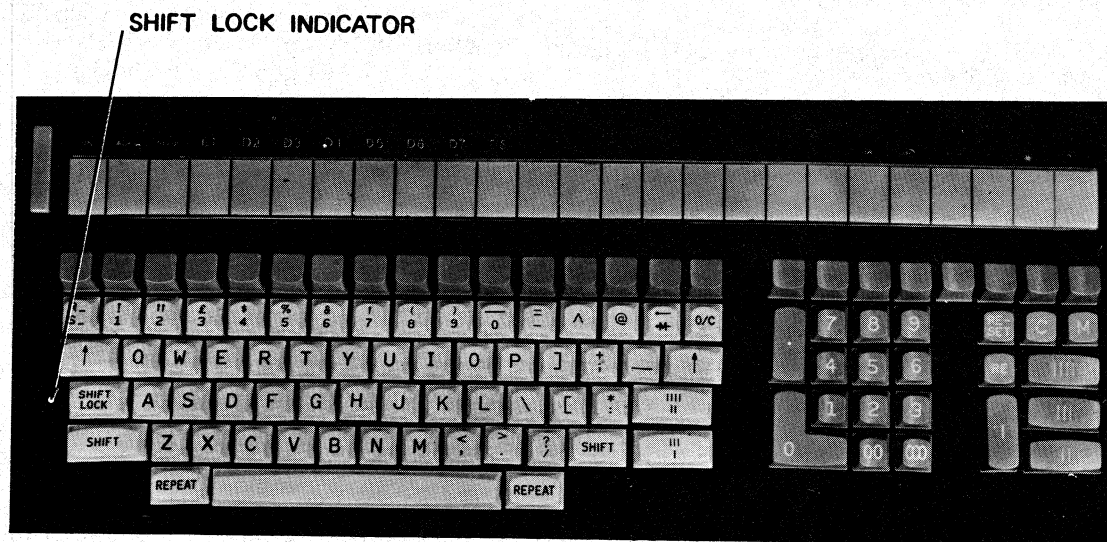

Figure 1-6. Indicator Lights

CARR Indicator

This indicator is illuminated when a Data Communication carrier is present.

DATA R Indicator

This indicator can be illuminated after the receipt of a Data Communication message, and extinguished when the message is unloaded from the receive buffer.

DATA S Indicator

This indicator can be illuminated when a Data Communication message is loaded to the output buffer, and extinguished when the message is transmitted.

CTL R Indicator

This indicator can be illuminated when specific Data Communication control codes are received, and extinguished when a response is transmitted.

CTL S Indicator

This indicator can be illuminated when the first character of a Data Communication control code is transmitted, and extinguished when the final character is transmitted.

KEYBOARD ERROR SUMMARY

During the execution of keyboard instructions an error condition can arise as a result of an invalid key depression. The causes of, and the methods of recovery from, such an error condition are described in the following paragraphs.

Numeric Keyboard Error

Causes

The entry exceeded the number of digits specified in the instruction.

The C (Per Hundred) or M (Per Thousand) key was depressed when it was not programmed.

The Reverse Entry key was depressed when it was not programmed.

A Typewriter key, other than Line Advance, Shift, Shift Lock, OCK, or a numeral, was depressed.

A non-enabled PK was depressed during a keyboard read instruction.

Recovery

The erroneous entry and the error condition are cancelled by depressing the RESET key. This will extinguish the ERROR Indicator and re-initiate the original program instruction.

Typewriter Keyboard Error

Causes

The entry exceeded the maximum number of characters specified in the instruction.

A key on the Numeric Keyboard, other than an OCK or RESET was depressed.

A non-enabled PK was depressed.

Recovery

The erroneous entry, and the error condition, are cancelled by depressing the RESET key which is located on the Numeric Keyboard. One depression of this key will cancel the error condition and a second depression will re-initiate the original program instruction and move the Print Head/System Display cursor to the start position.

Cleaning

Plastic surfaces on the machine Cabinet and Console can be cleaned using Anti Static Polish (Sales Supply No. 80-0001-596).

POWER ON/POWER OFF PROCEDURE

The power supplies for the Processor, Memory, and all peripherals with the exception of Line Printers and Cartridge or Fixed Disk Subsystems, are derived from the main AC power which is connected to the system through the Main Power Circuit Breaker in the processor cabinet. In an emergency, power can be disconnected from the entire B 80 system by operating the Main Power Circuit Breaker in the processor cabinet, and the Power ON/OFF switches on the Line Printer/s and the Disk Drive Cabinet/s. In normal circumstances, Disk Drive Units must be "logically powered off" before power is disconnected from them.

To connect power to a B 80 system, perform the following procedure:
1. Move the Main Power Circuit Breaker, in the processor cabinet, to the UP (ON) position.

2. Depress the Power ON switch on the Operator's Panel of the Cartridge or Fixed Disk Drive Cabinet/s (allow 20 seconds for the Disk to become "ready" before attempting to load system software).
3. Operate the Power ON/OFF switch at the rear of the Line Printer/s.

To disconnect power from a B 80 system, perform the following procedure:
1. Logically power off all Disk Drive Units – Depress and release the Ready Request key on the Operator's Console until the Ready Indicator is illuminated. When the Ready Indicator is illuminated, type in the message PO (Drive Unit specification). The Drive Units are specified as DKA to DKF for 6 Cartridge Disk Drive Units, DFA to DFF for 6 Fixed Disk Drive Units, and DMA to DMF for 6 Burroughs Super Mini Disk Drive Units.

When the message (Drive Unit as specified) OK is printed on the Console Printer, proceed to step 2.
2. Physically power off Cartridge Disk Drive Units (depress the Run/Stop switches), and Fixed Disk Drive Units (depress the Power ON switch).
3. Remove all Cartridge Disks, Mini Disks and Cassettes from their respective Drive Units, put them into their appropriate envelopes or containers and store them in the box or rack used for that purpose.
4. Depress the Power ON switch on the Operator's Panel of the Cartridge Disk Drive Cabinet/s.
5. Operate the Power ON/OFF switch at the rear of the Line Printer/s.
6. Move the Main Power Circuit Breaker, in the processor cabinet, to the DOWN (OFF) position.

SECTION 2
CONSOLE PRINTER AND PAPER HANDLER

INTRODUCTION

Each B 80 system contains a serial-impact matrix Printer, and a pin-feed drive Paper Handler. The Printer/Paper Handler configuration will be one of the following:

A 60 character per second (cps) Printer, with a 15 inch (38 cm) Paper Handler that has one Pin-feed Drive.

A 120 cps Printer, with a 15 inch (38 cm) Paper Handler that can have 1 or 2 Pin-feed Drives.

A 180 cps Printer, with a 15 inch (38 cm) Paper Handler that can have 1 or 2 Pin-feed Drives.

A 180 cps Printer, with a 26 inch (66 cm) Paper Handler that can have 2 or 3 Pin-feed Drives.

COMPARISONS

The Printers/Paper Handlers are categorized in terms of their print rate, and their nominal width. These are some of the most obvious differences between the various models. The only other significant difference is that while the 60 and 180 cps Printers always print in one direction (left to right) and at one character density (10 characters per inch/2.54 cm), the 120 cps Printer can print from left to right or right to left at either 10 or 15 characters per inch.

The selection of the required print direction/character density of the 120 cps Printer is a software function, and it does not require any additional actions to be taken by the operator. If and where there are different procedures required they will be fully described in the following paragraphs.

PRINT DENSITY

The density of the print is proportional to the force with which the Ribbon strikes the paper, and that is proportional to the distance between the paper and the Print Head.

In the 60 and 120 cps Printers the Print Density Control (shown in figure 2-1) can be used to adjust the position of the Print Head. This enables the required distance/print density to be retained irrespective of the thickness of paper that is in use. The adjustment is sufficient to permit the use of from 1 to 6 sheets of standard thickness pin-feed paper. A corresponding scale (1 to 6) which is marked on the Control can be used as a guide when the adjustment is being made. The optimum adjustment, which is dependent on both the quality and thickness of each sheet, can be made by setting the Control to the highest number that produces an acceptable printed
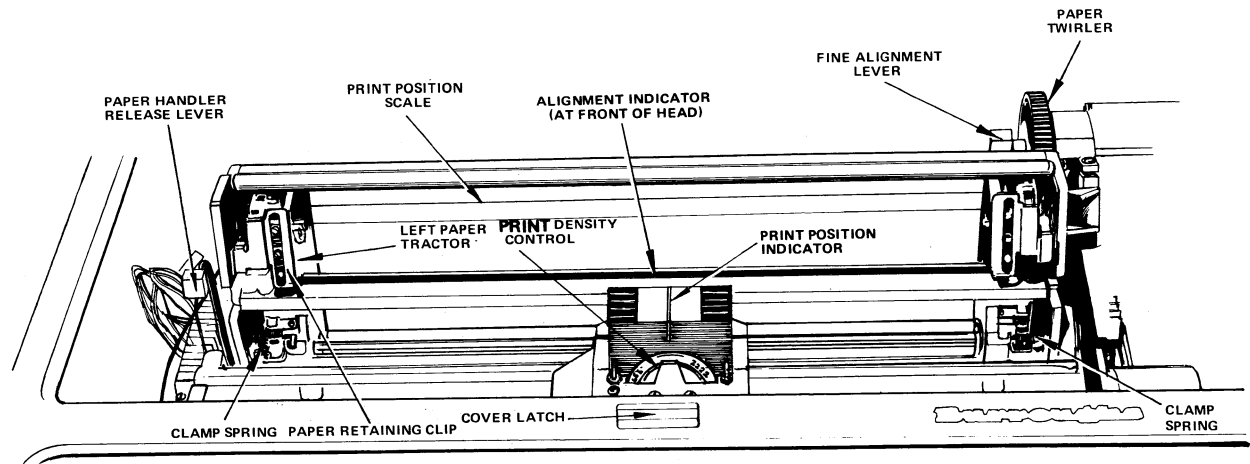

Figure 2-1. Print Density Control

copy. Correct adjustment of the print density will prevent premature wear of the ribbon and Print Head needles.

In the 180 cps Printer the distance between the paper and the Print Head is maintained by spring pressure. The Print Head is normally retracted from the paper, but while characters are being printed the spring pressure presses it onto a flexible Paper Shim, and presses the Paper Shim onto the surface of the paper. This causes the print density to be adjusted automatically when the thickness of the paper is changed.

HEAD POSITION INDICATORS

The location of the Head Position Indicators is shown in figure 2-1. The Print Position Indicator is used with reference to a scale marked on the Printer Cover, to indicate the print position in which the Head is located. The Alignment Indicator is used to indicate the position at which the next character will be printed. The 180 cps Printer has an additional Indicator which provides the same indication when the Print Head is in the Clear Head position. This additional Indicator is offset 2 inches (5 cm) to the left.

CLEAR HEAD FUNCTION

The Clear Head function is used to simplify the process of moving the Print Head or paper to obtain complete visibility of the print line. The use of this function enables the operator to move the Print Head or paper, view the print line, and then continue to enter data without having to re-position the Print Head or the paper.

The function is initiated by depressing the O/C Key. On a 180 cps Printer this will cause the Print Head to be moved 2 inches (5 cm) to the right (providing it is not within that distance of its maximum travel). On a 60 or 120 cps Printer it will cause the paper to be advanced by two line spaces. When the next Key is depressed the function will automatically return the Print Head or paper to its original position, and then perform any movement or operation required by that Key.

RIBBONS

Most of the Printers use a Cartridge Ribbon. One version of the 60 cps Printer uses a spool to spool Ribbon. Either type of Ribbon is a single color (black).

Changing the Ribbons

Cartridge Ribbons

Refer to figure 2-2 or 2-3.
1. Open the Printer Cover – On a 180 cps Printer (see figure 2-2) raise the Paper Handler Release Lever, and lift the Cover. On a 60/120 cps Printer (see figure 2-3) pull the Cover Latch forward, and lift the Cover. The Printer will not operate while the Cover is open.
2. Lift and remove the Ribbon Cartridge. The Cartridge is held in position by spring clips.
3. Install the new Cartridge – Locate the Cartridge over the Print Head, position the inside surface of the Ribbon over the front face of the Print Head, align the Ribbon Drive Spindle with the Drive Stud on the Head, push the Cartridge downwards until it is locked in position by the spring clips.
4. Rewind any slack Ribbon by rotating the Ribbon Advance Knob.
5. Close the Printer Cover – On a 180 cps Printer first close the Paper Handler by pushing down the Paper Handler Release Lever. Ensure that the Printer Cover locks into its closed position.

Spool to Spool Ribbon

Refer to figures 2-4 and 2-5.
1. Open the Printer Cover – Pull the Printer Cover Latch forward, and lift the Cover. The Printer will not operate while the Cover is open.
2. Open the Paper Handler – Push back the Paper Handler Release Lever (see figure 2-4), and lift the Paper Handler to its upper (open) position.
3. Remove the ribbon – Lift the spools, and remove the ribbon from the Guides and Posts.
4. Install the new ribbon – Install the empty spool on the left spool holder so that the counter clockwise rotation of the spool will rewind the ribbon. Ensure that the Reversal Actuating Eyelet is between the spool and the left Auto Reversal Guide. Position the ribbon in the ribbon path as shown in figure 2-5, and install the full spool on the right spool holder.
5. Rewind any slack ribbon.
6. Close the Paper Handler – Pull the Handler forward and ensure that it locks in its lower (closed) position.
7. Close the Printer Cover and ensure that it locks in its closed position.

PAPER BREAK/JAM DETECTORS

The Paper Handlers can be supplied with detectors which monitor the presence and movement of the paper supply. The detectors will inhibit the operation
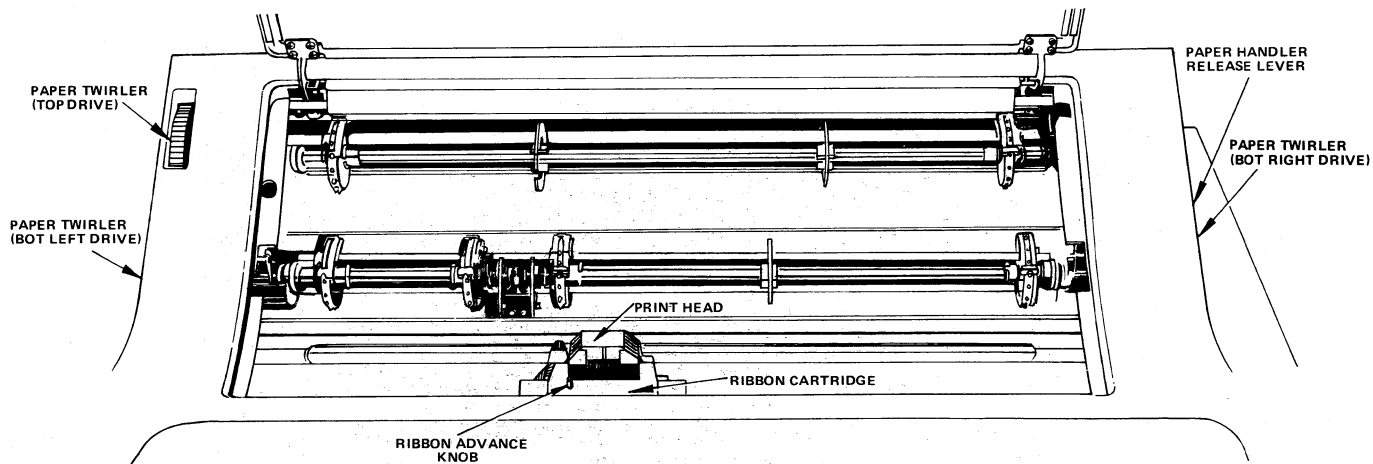
Figure 2-2. 180 cps Printer
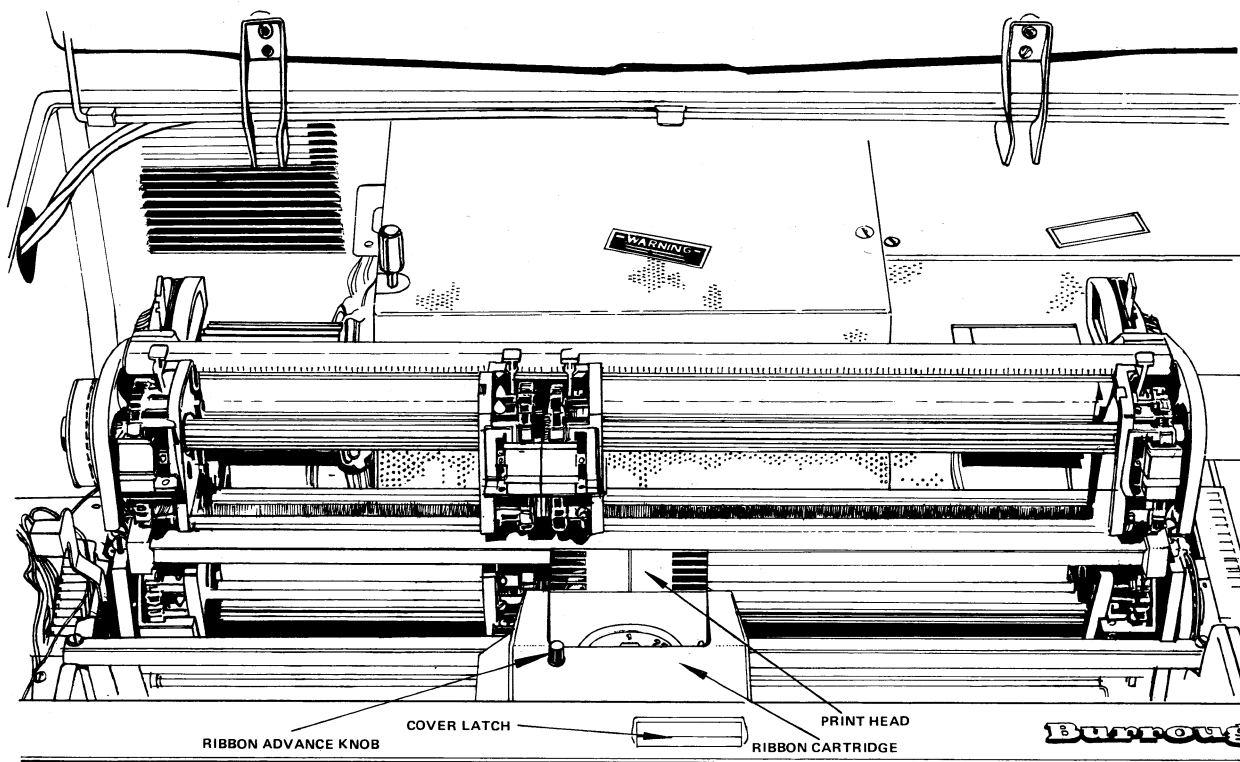
Figure 2-3. 120 cps Printer

PIN FEED MECHANISMS   FINE ALIGNMENT LEVER   PAPER HANDLER TWIRLER

PAPER HANDLER RELEASE LEVER

PRINT DENSITY CONTROL

ALIGNMENT GUIDES

PRINTER COVER LATCH

Figure 2-4. 60 cps Printer

RIBBON REPLACEMENT
REPLACE RIBBON WITH PAPER HANDLER
OPEN

SPOOL

EYELET BETWEEN SPOOL AND DETECTOR

POSTS

GUIDE

AUTO REVERSAL GUIDE

DETECTOR

Figure 2-5. Spool to Spool Ribbon Path

of the Printer if there is a break in the supply of paper, or if the paper fails to respond to a paper feed command. On the 60 and 120 cps Paper Handlers both conditions are monitored by detectors that are mounted on the bottom of the Paper Tractors. The 180 cps Paper Handlers use a photo-electric device to monitor paper movement, and they use a microswitch to detect out of paper conditions. If the Paper Handler has an upper drive it will have 2 microswitches, one for the bottom (right) drive and one for the top drive.

The microswitches are operated by bails that are located underneath the paper inlet. As shown in figure 2-6 the presence of paper will prevent the microswitches being operated, and the absence of paper will allow the bail rollers to fall between slots in the grid and thus cause the bails to operate the microswitches. If the rollers are moved to accommodate different widths of paper they must always be aligned with the slots in the grid. If only one paper supply is to be used the DET1 or DET2 switch in the processor cabinet can be used to inhibit one of the detectors.

PAPER SPACING

The paper can be driven by Software control, Keyboard control, or Manual control.

Software Control

The paper can be advanced in increments of 1 line space (1/6 inch or 4.2 mm). The advance rate varies in accordance with the number of lines that are to be advanced, and the type of Paper Handler that is being used. The slowest rate (for a single line advance on the 60 cps Paper Handler) is 170 milliseconds per line. The fastest rate (for multiple line advances on a 180 cps Paper Handler) is 33 milliseconds per line.

Keyboard Control

The Line Advance Key/s can be used to advance the paper in increments of 1 line space. With the 60 and 120 cps printers the O/C Key can be used to initiate the Clear Head function. This function advances the paper by 2 lines.

Manual Control

Each pin-feed drive can be driven by the use of a Thumbwheel, or Paper Twirler. The locations of the Paper Twirlers on the 180 cps Paper Handler are shown in figure 2-7. The locations of the Paper Twirlers and Fine Alignment Levers on the 120 and 60 cps Printers are shown in figures 2-8 and 2-9. The system should be switched ON while the position of the paper is being adjusted.

On the 180 cps Paper handler the Twirlers adjust the position of the paper in increments of 0.008 inches (0.2 mm). On the 120 cps Paper Handler, the Twirlers adjust the paper in increments of 1/12 inch (2.1 mm), and the Fine Alignment levers adjust it in increments of 0.025 inches (0.6 mm). On the 60 cps Paper Handler the Twirler normally adjusts the paper in increments of 1/12 inch (2.1 mm), but if the Fine Alignment Lever is moved to the rear it will adjust the paper in increments of 0.025 inches (0.6 mm).

NOTE
The 60 cps Paper Handler is inoperative while the Fine Alignment Lever is in the fine alignment position.

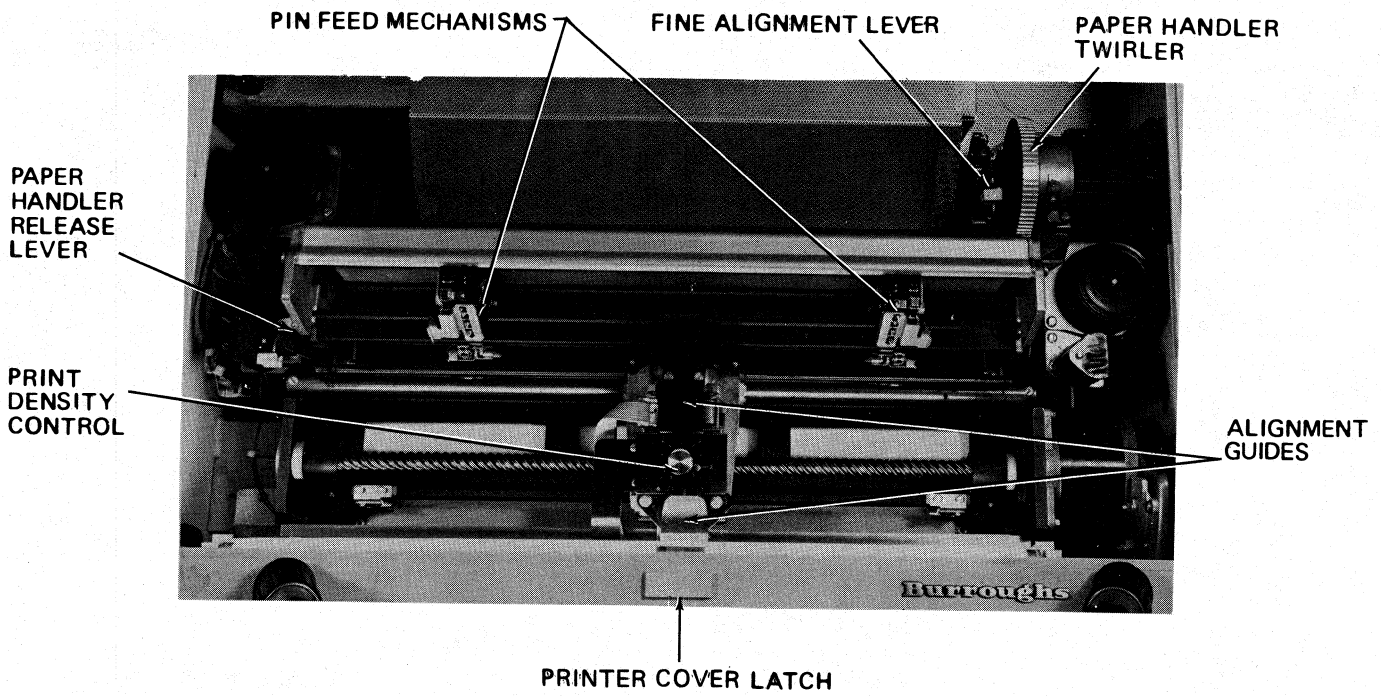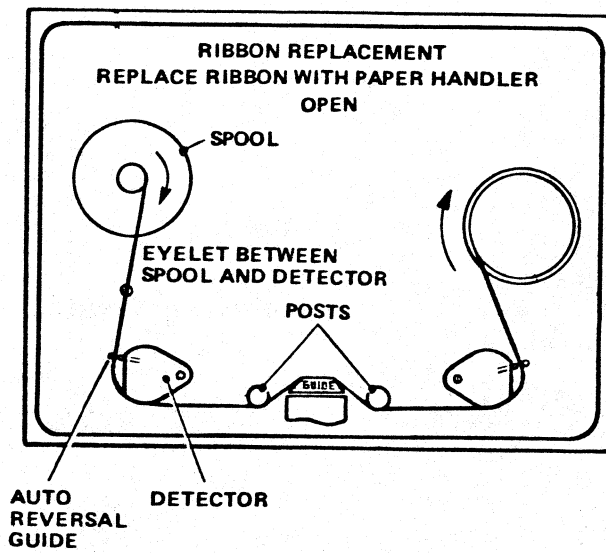**Figure 2-6. 180 cps Out of paper Detectors**

2007241
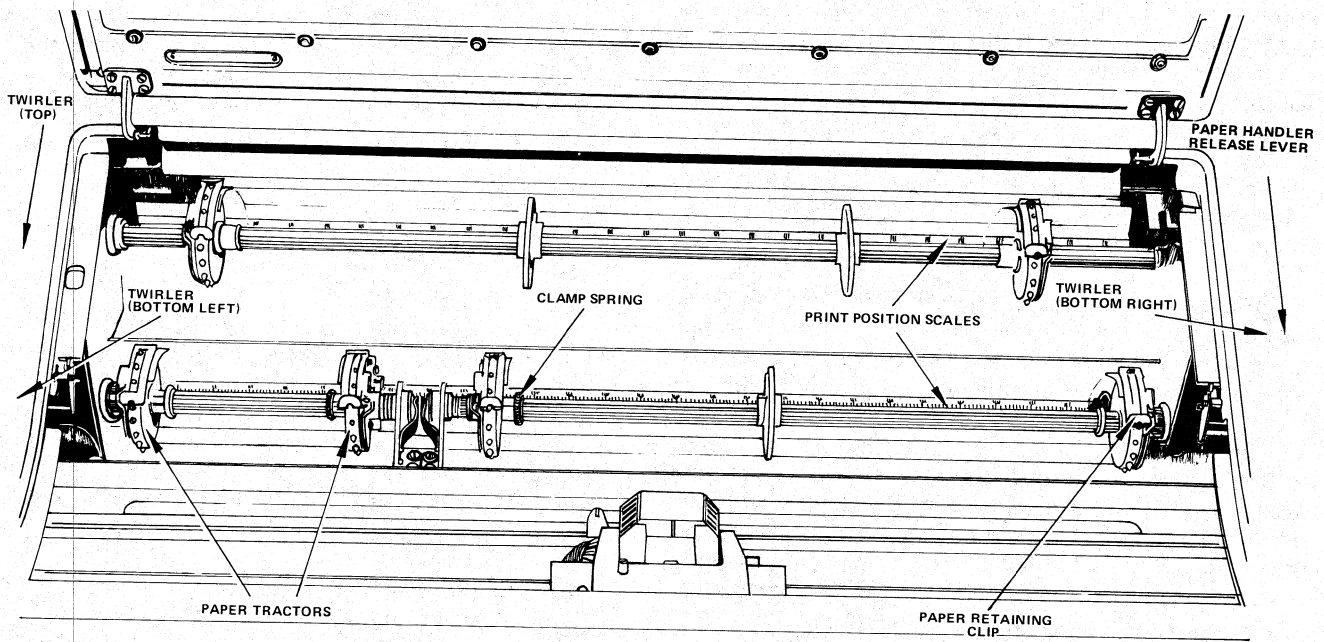
Figure 2-7. 180 cps Paper Handler
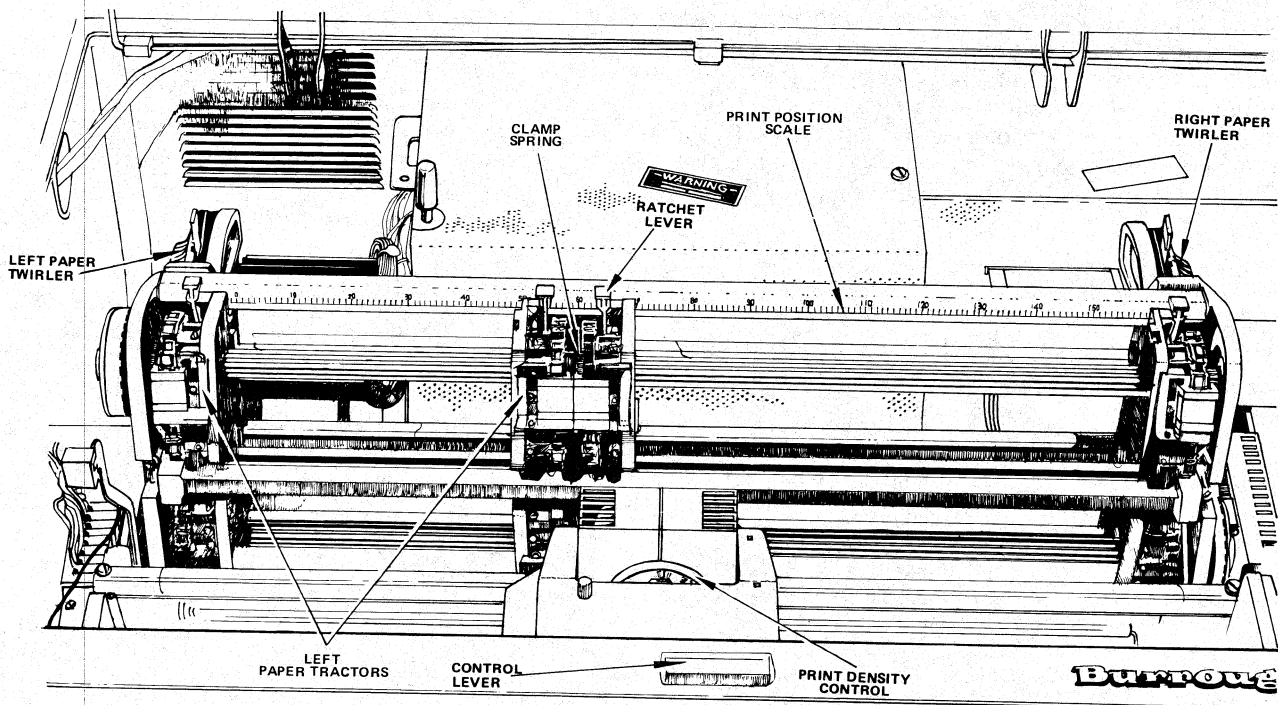
Figure 2-8. 120 cps Paper Handler
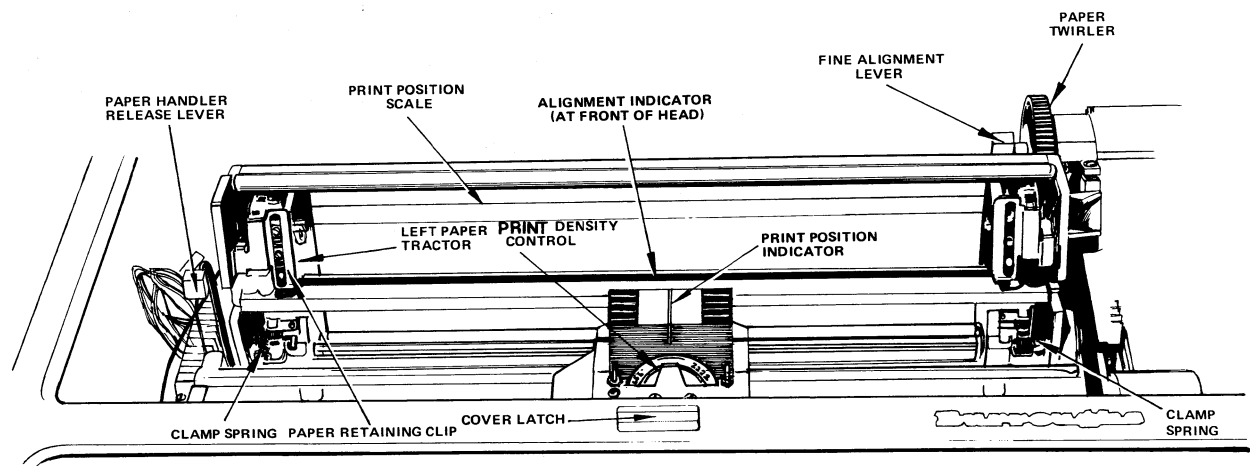
Figure 2-9. 60 cps Paper Handler

PAPER LOADING

The 60 and 120 cps Printers have a Paper Inlet at the bottom of the Printer Cabinet. This enables the operator to insert the paper into the cabinet from the front of the system. The Paper Inlet to the 180 cps Printer is at the rear of the cabinet, and the paper must be inserted from the side or the rear of the system.

The following procedure should be used to load paper to the Paper Handlers:
1. Open the Printer Cover and Paper Handler:
   a. On the 180 cps Printer raise the Paper Handler Release Lever (shown in figure 2-7), and lift the Printer Cover.
   b. On the 120/60 cps Printers (see figures 2-8 and 2-9) pull the Cover Latch forward, lift the Printer Cover, push back the Paper Handler Release Lever and lift the Paper Handler to its upper (open) position.
2. Adjust the positions of the Paper Tractors to suit the required position of the paper: free the Tractors from the drive spindle by moving the Clamp Springs towards the body of the tractors (on the 120 cps Handler also depress the Ratchet Lever), align the Tractors with reference to the Print Position Scale on the rear of the Paper Handler, and then reset the Clamp Springs (and release the Ratchet Lever) to hold the Tractors in position. The location of the Clamp Springs and Ratchet Levers is illustrated in figure 2-10.
3. On the 120/60 cps Printers, adjust the Print Density Control to suit the thickness of the paper being loaded. For a dual drive Paper Handler the print density should be adjusted to suit the thickest paper, and to maintain a good quality of print the number of parts in each paper supply should not vary by more than 3 (or 2 for 6-part paper).
4. Insert the paper into the Printer Cabinet. When loading paper to a 180 cps Printer fold over the first page of the paper. The fold will hold the paper in the Printer Cabinet until it is installed in the Tractors. On a 180 cps Printer with Paper Break Detectors (see figure 2-6), ensure that the paper is located between the grid and the Detector Bails, and that the rollers are located over slots in the grid. If the upper or bottom (right) Drive is not being used its detector must be inhibited by setting the appropriate switch (DET1 or DET2 in the processor cabinet) to its UP position (refer to the description of the Paper Break/Paper Jam Detectors).

5. Lift the paper Retaining Clips, and install the first page of the paper on the Tractors.

6. Close the Paper Handler.

7. Adjust the vertical position of the paper (refer to the description of Paper Spacing).

8. Feed the paper through the appropriate paper outlet in the Printer Cover, and close the Cover.

EXCEPTION CONDITIONS

The operating status of the Printer and Paper Handler is continually monitored by system software. If an exception condition occurs the operator will be notified via the Operator Communication System. For details of exception conditions, and the manner in which they are notified, refer to the appropriate system software Manual.
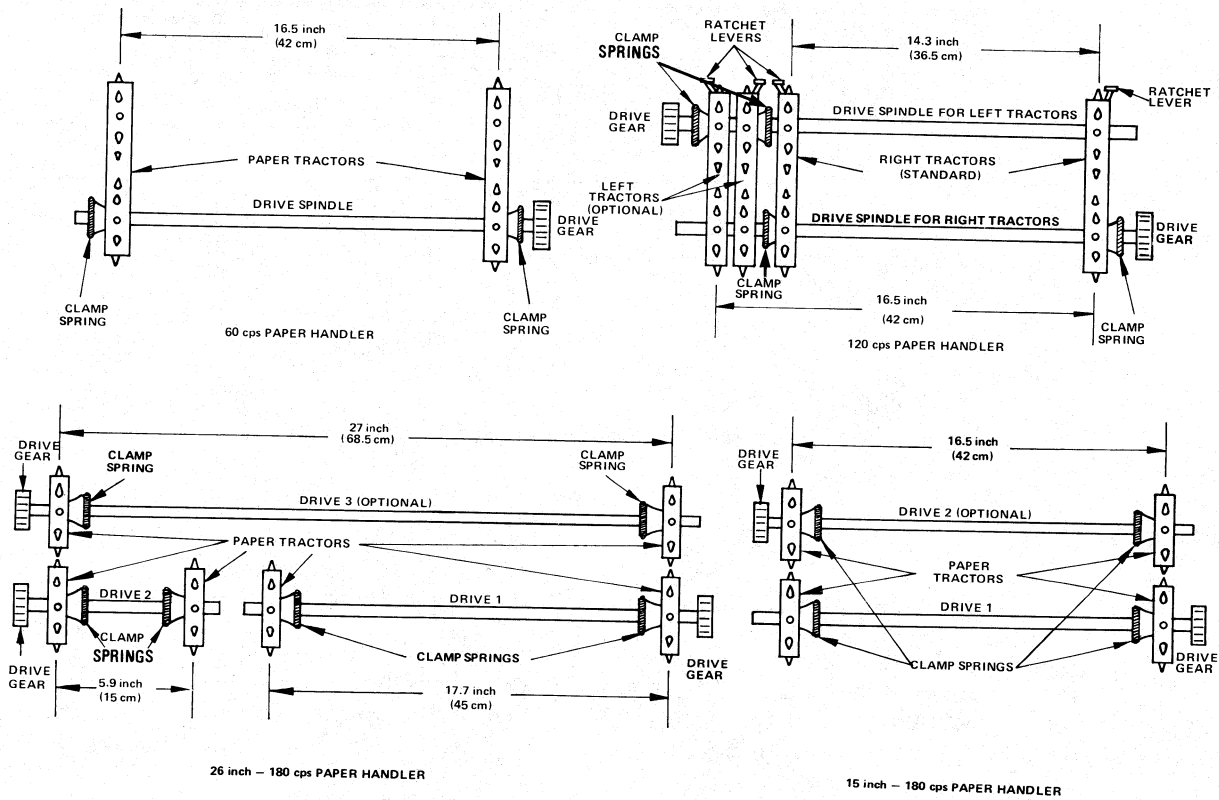
Figure 2-10. Pin-feed Drive Locations

SECTION 3
MAGNETIC TAPE CASSETTE SUBSYSTEM

INTRODUCTION

The Magnetic Tape Cassette (MTC) Subsystem, which can contain 1-4 Cassette Drive Units, is used as an Input/Output storage device. System software, user programs, and data files can be read from, or written to, the MTC Subsystem. The recording technique used can be either Non Return to Zero (NRZ) or Phrase Encoded (PE).

Data, which is recorded in "blocks" of no more than 256 characters, is recorded on "computer grade" Cassette Tapes. A Cassette contains a minimum of 282 feet (86 M) of 2 track magnetic recording tape, on which data is recorded at a maximum density of 800 bits per inch (2.54 cm). When the NRZ recording technique is used both tracks of the tape are recorded simultaneously, data is recorded on 1 track and a synchronizing clock pulse is recorded on the other. When the PE technique is used, one track is recorded when the tape is driven in one direction and the other track is recorded when the tape is driven in the other direction. The Cassette can be inserted with the A side outermost or the B side outermost, and so the tape can be driven in both directions and 2 PE data tracks can be recorded over the full length of the tape.

CASSETTE USE

To preserve the reliability of a Cassette and its contents, the following rules should be observed:

1. Never open a Drive Unit door while the magnetic recording tape contained in that Drive Unit is in motion.
2. Except when required to do so by a fault condition, do not remove a Cassette from a Drive Unit or open the Drive Unit door until the tape has been rewound to clear leader (Ready (R) Indicator extinguished).
3. If, due to a fault condition, a Cassette has to be removed when the tape is not at clear leader, ensure that there is no loose tape on either spool when the Cassette is re-inserted.
4. Never touch the magnetic recording tape.
5. Never use force to insert the Cassette in a Drive Unit.
6. Never put the Cassette on a hot surface or on a device which produces an electrical or magnetic field.
7. Ensure that the Cassette is kept absolutely clean.
8. Replace the Cassette in its container after use.

Figure 3-1. Magnetic Tape Cassette Subsystem

Write Inhibit/Enable Tabs

To preclude inadvertant erasure of recorded information, the two Write Inhibit/Enable Tabs shown in figure 3-2 should only be set to the write enable position when it is intended to "Write" information to the Cassette. When the Write Inhibit/Enable Tabs are folded outwards to cover the "write inhibit holes", information can be written to or erased from, the Cassette. When the Write Inhibit/Enable Tabs are folded inwards to uncover the "Write inhibit holes", information can only be read from the Cassette.

Figure 3-2. Magnetic Tape Cassette

Cassette Insertion

The forward drive direction of a Cassette is from left to right. When a correctly rewound Cassette is inserted in a Drive Unit, it should be inserted with the full spool to the left and the Write Inhibit/Enable Tabs to the top. If a Cassette is inserted when the tape is not at clear leader, it will automatically rewind when the Drive Unit door is closed. If a Cassette is inserted with the full spool to the right, and a Cassette drive instruction is given, the drive instruction will be inhibited and the Ready (R) indicator will "flash". To rewind a Cassette which is in this condition – remove the Cassette; manually rewind the clear leader on to the empty spool; insert the Cassette with that spool to the left; close the Drive Unit door.

To insert a Cassette in a Drive Unit, perform the following procedure:
1. Position the Write Inhibit/Enable Tabs according to the operation that is to be performed.
2. Open the Drive Unit door – ensure that the Ready (R) indicator is OFF or FLASHING and depress the Release Bar which is at the top of the Drive Unit.

3. Insert the Cassette with the full spool to the left and Write Inhibit/Enable Tabs to the top.
4. Close the Drive Unit door.

Cassette Removal

To remove a Cassette from a Drive Unit, perform the following procedure:
1. Open the Drive Unit door – ensure that the Ready (R) indicator is extinguished or flashing and depress the Door Release Bar which is at the top of the Unit.
2. If the Ready (R) indicator was extinguished, the Cassette can be removed and put into its container.
3. If the Ready (R) indicator was flashing, remove the Cassette and identify the cause of the fault condition. If the tape is at the end of tape clear leader – manually rewind that clear leader onto the empty spool, insert the Cassette with that spool to the left and close the Drive Unit door to initiate an Auto Rewind.

If the tape is broken or jammed, discard the Cassette. If there is no obvious cause for the fault condition, report the fault to the Burroughs Field Office.

Cassette Updates

The MTC Subsystem is a sequential access device. Data blocks must be recorded sequentially. When data is to be corrected or updated, a new Cassette must be created from the Cassette which contains that data.

Cassette Control

There are no operator controls for the MTC Subsystem. Control functions are implemented by the user program, system software and the MTC Subsystem hardware.

INDICATOR LIGHTS

The indicators used to display the operating status of the MTC Subsystem are the Ready (R) and Write Enable (WS) indicators on each Cassette Drive Unit.

Ready (R) Indicator

This indicator can be used to indicate 3 separate conditions which are as follows:
1. Ready light extinguished – this indicates that there is no magnetic recording tape over the Read/Write Head, either because there is no Cassette in the Drive Unit, or because the tape that is in the Drive Unit is at clear leader. In this condition the Drive Unit door can be opened to insert or remove a Cassette.

2. Ready light illuminated – this indicates that there is a magnetic recording tape over the Read/Write Head. In this condition the Drive Unit door must not be opened. If it is, the present position of the tape will be lost during the Auto Rewind which will be initiated when the door is closed.
3. Ready light flashing – The Ready light will flash to inform the operator that the Drive Unit has failed to perform a function within a specified time. Possible causes of such a failure are: the tape contained in the Drive Unit is broken, or jammed, or at the end of tape clear leader (full spool to the right), or the Drive Unit is attempting to read a blank tape. When the Ready light flashes the operator must remove the Cassette and take action to correct the fault.

Write Enable (WS) Indicator

This light is illuminated when the Write Inhibit/Enable Tabs on the Cassettes contained in the Drive Unit are in the write enable position. When this light is illuminated, data can be read from, written to, or erased from the magnetic recording tape. When the light is extinguished, data can only be read from the tape.

MTC EXCEPTION CONDITIONS

The operating status of the Magnetic Tape Cassette Subsystem is continually monitored by the system software. If an exception condition occurs, system software will notify the operator by means of a display on the Operator Communication System. For details of the exception conditions that can be displayed, and the manner in which they are displayed, refer to the appropriate system software Manual.

MAINTENANCE

It is recommended that after every 8 hours of operation, the tape path and the Read/Write Heads in each Cassette Drive Unit are cleaned using Burroughs TP 35 Tape Path Cleaner. This cleaner is available in kit form (Sales Supply No. 25-1110-511), which includes lint free cloths, wipers, and cotton swabs. Ensure that no cotton remains in the tape path or on the Read/Write Heads when cleaning is completed.

SECTION 4
DISK SUBSYSTEMS

INTRODUCTION

The B 80 system can support a maximum of 6 magnetic Disks. The Disks can be Burroughs Super Mini (BSM) Disks, Industry Compatible Mini Disks (ICMDs), Cartridge Disks, or Fixed Disks. A selection of Disk Drive Cabinets are shown in figure 4-1.

The BSM and ICMD Drive Units can be an integral part of the main processor cabinet, or as shown in figure 6-1 they can be located in a free standing unit. The Cartridge Disk Drive Cabinets have 2 Drive Units, and can accommodate 2 Cartridge Disks. The Fixed Disk Drive Cabinets can have 1 or 2 Drive Units, and can accommodate 2 or 4 Fixed Disks. Each BSM or ICMD Drive Unit accommodates one Disk.

DISK USE

Great care must be taken to ensure that Disks are not damaged or contaminated. Very little contamination or distortion on the recording surface of a Disk which is in use, can cause serious damage to the Disk, the Read/Write Heads in the Drive Unit, or both.

In the ICMD and BSM Subsystems, if the protective plastic casing of the Disk is contaminated, the contamination should be removed using a soft cloth or tissue. If the recording surface of the Disk has been contaminated, the Disk should be discarded.

In the Cartridge and Fixed Disk Subsystems, when the Read/Write Heads are transferring information to or from the Disk, they are less than 100 microinches above its surface. If it is ever suspected that contamination or distortion have caused the Read/Write Heads to come into contact with the surface of the Disk, stop the Drive Unit and do not use the Disk or the Drive Unit until they have been inspected and declared serviceable by a Burroughs Field Engineer.

To preserve the reliability of a Disk and its contents, the following rules should be observed:

1. Never touch the recording surface of the Disk.
2. Ensure that the Disk/plastic casing/Cartridge are kept absolutely clean.
3. When a Disk is removed from a Drive Unit, put it into the plastic envelope provided and store it in a clean environment. ICMD and BSM Disks should be stored in the Ten Pack Box. Cartridge Disks should be stored in a rack that is designed
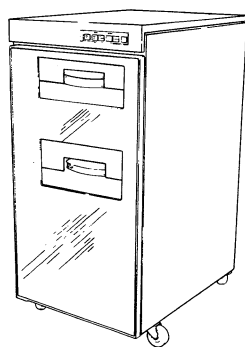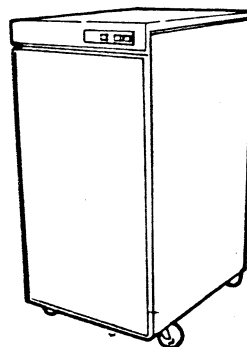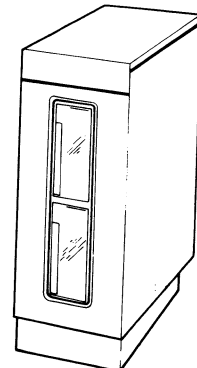
CARTRIDGE   FIXED   SUPER MINI

Figure 4-1. Disk Subsystems

for vertical storage. For a detailed description of storage procedures, and the environment in which Disks should be stored, refer to the B 80 Installation and Planning Manual.

4. Close the Head Access Door when a Cartridge Disk is removed from a Drive Unit.
5. Open the Head Access Door immediately before a Cartridge Disk is inserted in a Drive Unit.
6. Never use force to insert a Disk in a Drive Unit.
7. Ensure that power is connected to the Drive Unit before attempting to insert a Disk.
8. Never put a Disk on a hot surface, on a device which produces an electrical or magnetic field, or leave it in direct sunlight.
9. Before a Cartridge Disk is used it must be conditioned to the "machine room" temperature for a minimum period of 2 hours.
10. Use a felt tip pen to write on the Disk Label of an ICMD or BSM Disk. Always use the labels that are supplied with the Disks.
11. When sending a BSM Disk, always use the MAILER that is supplied with the Disk.

BURROUGHS SUPER MINI (BSM)
SUBSYSTEM OPERATING PROCEDURES

Disk control is semi-automatic in the BSM Subsystem. When a Disk is inserted in a Drive Unit and the Drive Unit door is closed, the Disk is automatically driven to its operating speed. When a Disk has to be removed from a Drive Unit, the operator must initiate the logical power off (PO) function for the Drive Unit. When the PO function has been executed the Door Release Bar can be depressed to open the Drive Unit door. When the Door Release Bar is depressed, the drive to the Disk is automatically stopped.

The BSM Subsystem provides a "Write inhibit facility". To write inhibit a BSM Disk, remove the tape that is covering the Write Lockout Hole (see figure 4-2). To subsequently write enable a BSM Disk that has been inhibited in this manner, cover the Write Lockout Hole with a label or tape that does not allow light to pass through the hole.

The Indicator lights that are used to display the operating status of the BSM Subsystem, are the Ready and Write Enable lights on each Drive Unit. The Ready light (Blue) is illuminated when the Disk is correctly inserted and at operating speed. The Write Enable light (Red) is illuminated when data can be written to, and erased from, the Disk.

BSM Disk Insertion

To insert a BSM Disk in a Drive Unit, perform the following procedure:

1. Ensure that power is connected to the Drive Unit.
2. Open the Drive Unit door – depress the Door Release Bar.
3. Insert the Disk as shown in figure 4-2.
4. Close the Drive Unit door. The Ready light (blue) should illuminate almost immediately. It will not illuminate if the Disk has been incorrectly inserted.
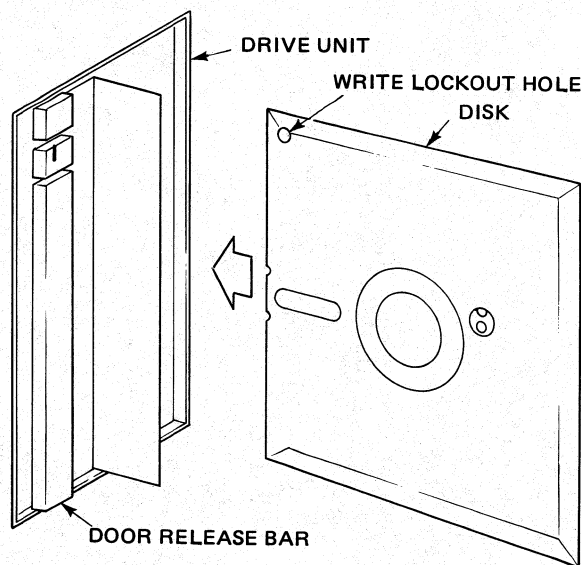

Figure 4-2. BSM Disk Insertion

BSM Disk Removal

A Disk must not be removed from a Drive Unit while the files on that Disk are being used by a program, and a Drive Unit door must not be opened while it contains a Disk that is in use. Before a Disk is removed from a Drive Unit, or a Drive Unit door is opened, the logical power off (PO) function must be executed for that Drive Unit. When this function is initiated, no further tasks will be permitted to use the Disk in the specified Drive Unit, and when all files that are in use on the Disk have been closed, the message (Drive Unit as specified) OK will be printed on the Console Printer.

This message informs the operator that the specified Drive Unit has been logically powered off and that the Disk can now be removed from the Drive Unit, and or the Drive Unit door can now be opened. If the Disk contained in a Drive Unit is not in use when the PO function is initiated for that Drive Unit, the OK message will be printed immediately. If the Disk is in use when the PO function is initiated, a message will be printed to inform the operator of the status of the specified Drive Unit, and when all the files on the Disk have been closed the OK message will be printed.

BSM Disk Drive Units are specified by the letters DM, and a particular Drive Unit on a system is specified by the addition of one further letter. The first Drive Unit on a system is specified as DMA, the second as DMB, and so on through to DMF for a system which contains 6 BSM Disk Drive Units.

To remove a BSM Disk from a Drive Unit, perform the following procedure.
1. Logically power off the Drive Unit – Initiate the logical power off (PO) function by typing in the message PO (Drive Unit specification).

2. When the message (Drive Unit as specified) OK is printed on the Console Printer, remove the Disk from the specified Drive Unit – depress the Door Release Bar on that Drive Unit (to open the Drive Unit door), remove the Disk, put it into the plastic envelope provided and store it in the Ten Pack Box.

INDUSTRY-COMPATIBLE MINI-DISK (ICMD) SUBSYSTEM OPERATING PROCEDURES

Disk control is completely automatic in the ICMD Subsystem. When a Disk is inserted in a Drive Unit and the Drive Unit door is closed, the Disk is automatically driven to its operating speed. When the Door Release Lever is operated to open the Drive Unit door, the drive to the Disk is automatically stopped.

The ICMD Subsystem provides a "write inhibit facility". To "write inhibit" an ICMD Disk, remove the tape that is covering the Write Lockout Hole located in a corner of the Disk casing. To subsequently write enable an ICMD Disk that has been inhibited in this manner, cover the Write Lockout Hole with a label or tape that will not allow light to pass through the hole.

ICMD Disk Insertion

To insert an ICMD Disk in a Drive Unit, perform the following procedure:
1. Ensure that power is connected to the Drive Unit.
2. Open the Drive Unit door – slide the Door Release Lever in the direction away from the door.
3. Insert the Disk as shown in figure 4-3.
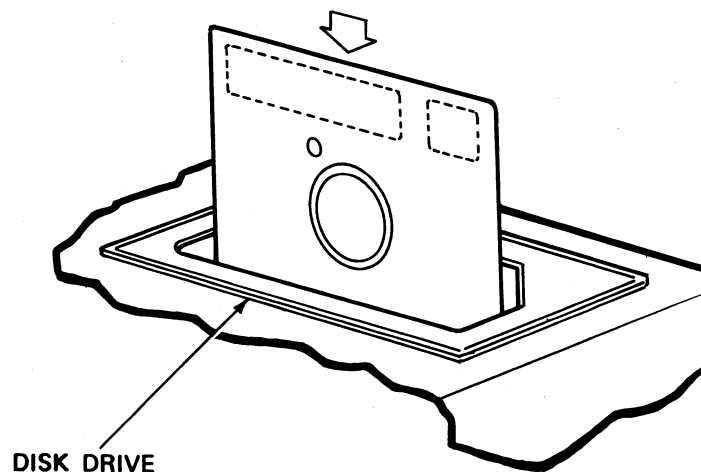4. Close the Drive Unit door.

DISK DRIVE

Figure 4-3. ICMD Disk Insertion

ICMD Disk Removal

To remove an ICMD Disk from a Drive Unit; slide the Door Release Lever in the direction away from the door; remove the Disk; put it in the envelope provided and store it in the Ten Pack Box.

CARTRIDGE DISK SUBSYSTEM OPERATING PROCEDURES

Operator controls for the Cartridge Disk Subsystem are contained in the Operator's Panel of the Cartridge Disk Drive Cabinet. The indicators that are used to display the operating status of the Subsystem are the indicators that are contained in the Operator's Panel of the Disk Drive Cabinet, and 2 Drive indicators (Blue) which are located under the Disk Drive Units. The Drive indicators, DRIVE 1 and DRIVE 2, are illuminated when the associated Disk Drive Unit is in operation.

The Cartridge Disk Subsystem provides a "write inhibit" facility. A Write Lockout Plug, on the Disk Cartridge, can be depressed to prevent data being written to, or erased from the Cartridge Disk. To write inhibit a Cartridge Disk, depress and turn the Write Lockout Plug. The slotted head of the plug should remain locked in a position below the surface of the Cartridge. To subsequently write enable the Cartridge Disk, turn and release the Write Lockout Plug. The slotted head of the plug should be flush with the surface of the Cartridge. The Cartridge Disk and Write Lockout Plug are shown in figure 4-4.
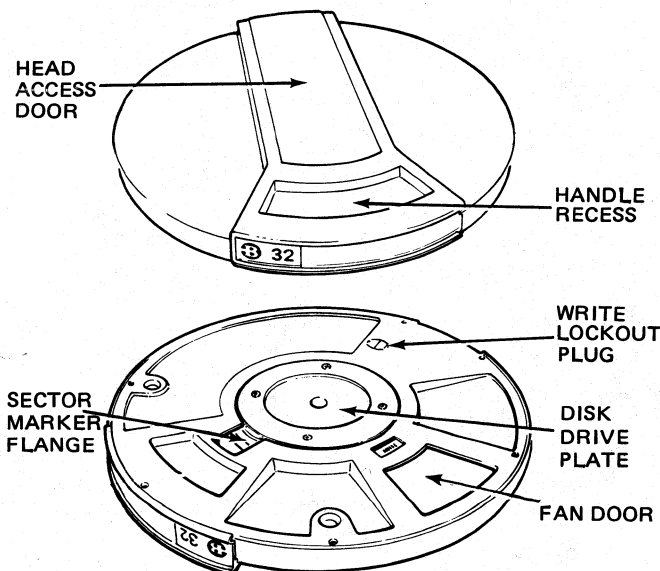

Figure 4-4. Cartridge Disk

Operator's Panel

The Operator's panel (figure 4-5), contains 2 Indicators, and 4 "control switches" which also function as Indicators. The indicators and control switches are as follows:

1. Power ON switch/indicator – This switch can be depressed to apply the AC supply voltage to the power supply circuits of the Disk Drive Cabinet. When the AC supply is connected to the power supply circuits, an indicator in the switch is illuminated. If the switch is depressed while the indicator is illuminated, the AC supply will be disconnected from the power supply circuits and the indicator will be extinguished. The AC supply must not be disconnected until all Disks have been removed from the Drive Units.

2. Write Enable Indicators (2) – 1 Write Enable indicator is provided for each Disk Drive Unit. The indicator is illuminated when the Write Lockout Plug on the Cartridge Disk contained in the Drive Unit, is not depressed. When this indicator is illuminated data can be read from, written to, or erased from the Disk contained in that Drive Unit.

3. Run/Stop indicators/switches (2) – While power is connected to the power supply circuits, 1 of the 2 indicators in these switches will be illuminated. If the Stop indicator (Red) is illuminated, the Receiver Handle can be moved to its open position and a Disk can be removed from, or inserted in, the Disk Drive Unit. If the Run indicator (White) is illuminated, the Receiver Handle is locked in its closed position.

   When the Stop indicator is illuminated and a Disk is installed in the Drive Unit, the Run/Stop switch can be depressed to cause that Disk to revolve and the Read/Write Heads to be moved into the Cartridge. When the Disk begins to revolve, the Stop indicator will extinguish and the Run indicator will illuminate. When the Run indicator is illuminated the Run/Stop switch can be depressed to cause the Disk to stop revolving and the Read/Write Heads to be retracted from the Cartridge. When the Disk has stopped, the Run indicator will extinguish and the Stop indicator will illuminate. The period required for the Disk to stop can be 30 seconds.
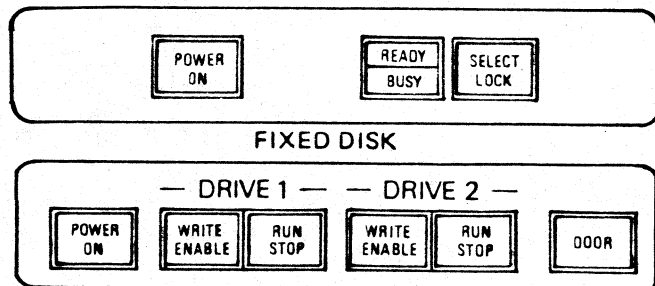

CARTRIDGE DISK
Figure 4-5. Operator's Panels

4. Door switch/indicator – The indicator in this switch will remain illuminated while the AC supply voltage is connected to the power supply circuits of the Disk Drive Cabinet. When the indicator is illuminated, the switch can be depressed to operate a solenoid which will open the door of the Disk Drive Cabinet.

To Insert/Start a Cartridge Disk

To insert/start a Cartridge Disk, perform the following procedure:
1. Ensure that power is connected to the Drive Unit, and that the Stop indicator is illuminated in the Run/Stop switch of the Drive Unit that is to be used.
2. Pull the Receiver Handle (out and down) into its open position.
3. Open the Head Access Door of the Cartridge.
4. Insert the Cartridge in the Drive Unit – Slide the Cartridge into the Drive Unit, with the Head Access Door in the upper position and the opening provided by that door pointing towards the center of the Drive Unit.
5. Lift the Receiver Handle into its closed position.
6. Depress the Run/Stop switch. The Run Indicator will illuminate when the Disk begins to rotate.

To Stop/Remove a Cartridge Disk

A Cartridge Disk must not be stopped while the files on the Disk are being used by a program. Before a Disk is stopped the logical power off (PO) function must be executed for the Drive Unit that contains the Disk. When the PO function is initiated it prevents any further files being opened in the specified Drive Unit, and it prints the message (Drive Unit as specified) OK when all presently opened files have been closed.

Cartridge Disk Drive Units are specified by the letters DK, and a particular Drive Unit is specified by the addition of one further letter. The first Drive Unit on a system is specified as DKA, the second as DKB, and so on through to DKF for a system containing 6 Cartridge Disk Drive Units.

To remove a Cartridge Disk from a Drive Unit perform the following procedure:
1. Logically power off the Drive Unit – Initiate the logical power off (PO) utility by typing in the message PO (Drive Unit specification).
2. When the message (Drive Unit as specified) OK is printed on the Console Printer, depress the appropriate Run/Stop switch.

3. When the appropriate Stop indicator is illuminated, remove the Disk from the Drive Unit – pull the Receiver Handle (out and down) into its open position, remove the Disk from the Drive Unit, close the Head Access Door on the Cartridge, put the Cartridge into the plastic envelope provided and store it in the rack used for that purpose.

FIXED DISK SUBSYSTEM OPERATING PROCEDURES

Operator controls and indicators for the Fixed Disk Subsystem are contained in the Operator's Panel of the Fixed Disk Drive Cabinet.

Operator's Panel

The Operator's Panel (figure 4-5) contains 2 Indicator lights, and a switch which also functions as an Indicator. The switch and indicators are as follows:
1. Power ON switch/indicator – This switch can be depressed to connect the AC power supply to the power supply circuits of the Disk Drive Cabinet. An Indicator in the switch is illuminated while the supply is connected to the circuits. The AC supply will be disconnected if the switch is depressed while the Indicator is illuminated. The AC supply must not be disconnected if the Ready and Select Lock Indicators are both flashing.
2. Ready Indicator – The Ready Indicator is extinguished while the Read/Write Heads are in their retracted position. It is illuminated while the Heads are in their read/write position and the Drive Unit is ready to be used. It will normally become illuminated at approximately 20 seconds after the AC supply is connected to the Disk Drive Cabinet.
   If it does not illuminate within this period it indicates that an error has been detected. At this point the AC supply can be switched OFF (for a minimum period of 2 seconds) and a second attempt can be made to start the Disks. If the second attempt fails the error condition should be reported to the Burroughs Field Engineering Office.
   If the Indicator is flashing it indicates that the Heads are in their read/write position, but the Drive Unit is not ready to be used. If the Select Lock Indicator is also flashing it indicates that the Heads can not be retracted. In this condition the AC supply must not be switched OFF.
3. Busy Indicator – The Busy Indicator will flash for a period of 1 second after a seek operation has been performed.
4. Select Lock Indicator – The Select Lock Indicator will flash if a failure occurs in either of the Drive Units. The AC supply must not be switched OFF until the Ready Indicator is extinguished.

To Start a Fixed Disk

Fixed Disks are permanently located in their Drive Units, and they are automatically started when the AC supply is connected to the Disk Drive Cabinet. The Ready Indicator on the Cabinet will illuminate when the Disks are ready to be used.

To Stop a Fixed Disk

A Fixed Disk must not be stopped while the files on the Disk are being used by a program. Before a Disk is stopped the logical power off (PO) function must be executed for the Drive Unit that contains the Disk. When the PO function is initiated it prevents any further files being opened on the specified Drive Unit, and it prints the message (Drive Unit as specified) OK when all presently opened files have been closed.

Fixed Disk Drive Units are specified by the letters DF, and a particular Drive Unit is specified by the addition of one further letter. The first Drive Unit on a system is specified as DFA, the second as DFB, and so on through to DFF for a system containing 6 Fixed Disk Drive Units.

To stop a Fixed Disk, perform the following procedure:
1. Logically power OFF the Disk – Enter the message PO (Drive Unit specification).
2. When the message (Drive Unit as specified) OK is printed – Depress the Power ON switch).

EXCEPTION CONDITIONS

The operating status of each Disk Subsystem is continually monitored by the system software. If an exception condition occurs, the system software will notify the operator by means of a display on the Operator Communication System. For details of the exception conditions that can be displayed, and the manner in which they are displayed, refer to the appropriate system software Manual.

SECTION 5
LINE PRINTERS

INTRODUCTION

The B 80 system can contain 1 or 2 free standing Line Printers. There are 4 Line Printers available which operate at different "print rates" but are otherwise identical. Each Printer prints 10 characters per inch and 132 characters per line. With the standard 48 alpha-numeric character set, the print rate of the Printers ranges from 86 lines per minute to 350 lines per minute. The Printers contain a "1 line" input buffer. Characters that are to be printed are loaded to this buffer and then printed when the buffer is full (132 characters), or the user program provides a paper advance command. Any invalid character codes that are loaded to the buffer will be printed as blanks when a 48 character set is used, and as question marks when a 64 or 96 character set is used.

The Line Printers are controlled by the user program, system software, and a Vertical Format Unit which is part of the Line Printer. The Vertical Format Unit is used to control vertical paper motion when the user program provides a Form Feed or Vertical Tab command, or when the Form Feed switch on the Printer cover is depressed. The Vertical Format Unit, which can be a 2 channel or 12 channel device, drives and reads a 12 channel Format Tape which can be punched to produce the vertical page format that is required by the user.

The Format Tape is a continuous paper tape which has a loop length that is equal to, or an even multiple of, the required format length. The holes that are punched in the Format Tape to produce the required format, are detected by the Vertical Format Unit. When a Form Feed command is provided by the user

POWER ON/OFF SWITCH
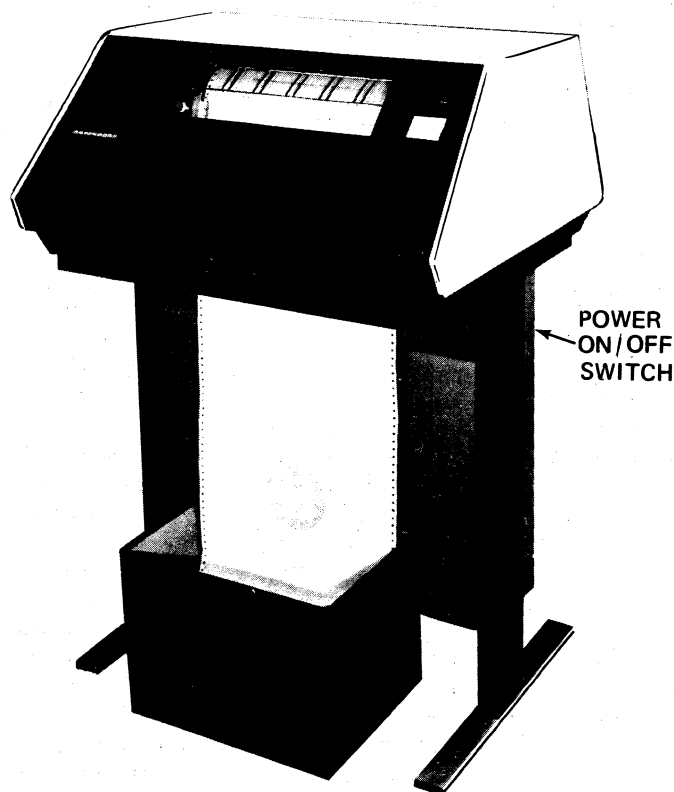
Paper container not included

Figure 5-1. Free Standing Line Printer

program, or the Form Feed switch is depressed, the paper and the Format Tape will be driven until the "top of form hole" is detected in channel 1 of the Format Tape. When this hole is detected, the paper and Format Tape movement will be stopped. When a Vertical Tab command is provided by the user program, the paper and the Format Tape will be driven until a hole is detected in the tape channel that was specified in the command. Format Tapes can be interchanged when a new page format is required.

OPERATOR CONTROLS

The following control is located at the right rear side of the Printer base:

Power ON/OFF Switch – This is a rocker switch which must be set to the ON position to connect the AC supply voltage to the Line Printer. An indicator in the switch, and a fluorescent lamp in the Printer cabinet, are illuminated when the AC supply is connected to the Printer.

The following controls are located on the front face of the Printer cover:

1. Line Feed Switch – This is a momentary contact switch which can be depressed to cause the paper held in the Printer to be advanced by 1 line space. The line Feed is enabled when the Ready indicator is OFF, the Printer yoke is closed, and a Format Tape is installed in the Vertical Format Unit.

2. Form Feed Switch – This is a momentary contact switch that can be depressed to cause the paper held in the Printer to be advanced by 1 Form length. The paper will stop when the next "top of form hole" is detected in channel 1 of the Format Tape. The Form Feed switch is enabled when the Ready indicator is OFF, the Printer yoke is closed and a Format Tape is installed in the Vertical Format Unit.

3. Stop Switch – This is a momentary contact switch that can be depressed to cause the Printer to enter a not Ready condition. In this condition, printing is inhibited and the Ready indicator is extinguished. If the Stop switch is depressed after the start of a print cycle, paper motion and printing will be completed before the Printer enters the not Ready condition.

4. Print Switch – This is a momentary contact switch that can be depressed to cause the Printer to enter the Ready condition. When the Print switch is depressed the Printer will enter the Ready condition and printing will be enabled, providing the Printer yoke is closed and a Format Tape is installed in the Vertical Format Unit. If the Printer has entered the not Ready condition because the end of the paper supply has been detected, each depression of the Print switch will enable 1 line to be printed. The Out Of Paper Detector is approximately 2 inches below the Print Station.

The following controls are located inside the Printer cabinet, on top of the electronics unit.

1. Test Switch – This is a toggle switch that can be moved to the right to cause continuous printing of the currency character.

2. Alarm Enable Switch – This is a toggle switch that can be used to enable or disable the detection of open circuit hammer fuses. The Printing mechanism uses electrically actuated hammers. When the Alarm Enable switch is in the left position (Alarm Enabled) and a fuse in the firing circuit of a hammer becomes open circuit, no character will be printed in that column, the ALARM indicator on the front face of the Printer cover will be illuminated, and printing will be inhibited when that line of print is completed. When the Alarm Enable switch is in the right position (Alarm Disabled) and a fuse in the firing circuit of a hammer becomes open circuit, no character will be printed in that column and the ALARM indicator on the front face of the Printer cover will be illuminated. With the switch in this position printing can continue but no characters will be printed in the column where the hammer fuse is open circuit.

3. Motor Switch – This is a 3 position switch that can be used to determine when the Print Chain

Drive Motor will operate, and to reset the Printer logic. The left position of the switch is a momentary contact position that is selected by pressing the switch to the left against spring pressure. When the switch is released it will return to the center position. When the Motor switch is pressed to the left position (Reset) all control and buffer logic is reset. When the Motor switch is in the center position (Motor Always On) and the Printer yoke is closed, the Print Chain Drive Motor will run continuously. When the Motor switch is in the right position (Auto) and the Printer yoke is closed, the Print Chain Drive Motor will be controlled by the main processor commands from the B 80 system.

The following controls are located inside the Printer cabinet, on the Hammer Bar Pivot Plate and on the left end of the Pin Feed Drive Spindle:

1. Print Density Controls (2) – These controls, which are located on the left and right Hammer Bar Pivot Plates, can be rotated to move the Hammer Bar Assembly away from, or toward the Character Belt. This adjustment permits a constant print density to be maintained irrespective of the thickness of paper that is in use. The controls should normally be set in accordance with the number of parts in the paper being used. The optimum adjustment can vary however in accordance with the quality and thickness of individual sheets – clockwise rotation of the controls will increase the print density. To prevent excessive wear of the Printer ribbon and the possibility of ghosting or smearing of the printed characters, it is recommended that the Print Density Controls are adjusted to the highest number that produces an acceptable printed copy.

2. Paper Advance Control – This control, which is located on the left end of the Pin Feed Drive Spindle, can be rotated to advance the paper held in the Pin Feed Drives and/or the Format Tape held in the Vertical Format Unit. If the control is rotated while it is engaged with the Paper Advance Drive Pulley, the paper and the Format Tape will be advanced simultaneously. If the control is rotated while it is disengaged from the Paper Advance Drive Pulley (pulled outward), the paper will be advanced but the Format Tape position will not change. The control is used in this manner to align the paper with the "top of form hole" in the Format Tape.

INDICATOR LIGHTS

The following Indicator lights are located on the front face of the Printer cover:

1. No Paper Indicator – This indicator is illuminated when the end of the paper supply to the Printer is detected. When the indicator illuminates there are approximately 2 inches of paper below the Print Station. The Printer will enter a not Ready condition and normal printing will be inhibited until a new paper supply is installed.

2. Ready Indicator – This indicator is illuminated when the Printer is ready to print, or drive paper, as required by the B 80 system. The following conditions must be satisfied before the Printer can enter the Ready condition:
   a. More than 2 inches of paper must be available below the Print Station.
   b. A Format Tape must be installed in the Vertical Format Unit.
   c. The Printer yoke must be closed.
   d. The Print switch must have been depressed.

3. Alarm Indicator – This indicator is illuminated when the Printer yoke is open, the yoke handle is raised, a hammer fuse is open circuit, or when the end of the paper supply is detected.

4. Motor OFF Indicator – This indicator is illuminated when the Print Chain Drive Motor is OFF.

PAPER AND PAPER LOADING

The Line Printer can print on pin-feed paper that has between 1 and 6 parts. The specifications, in pounds (lb) and grams per square meter (gsm), of the paper that can be used are as follows:

Single Part Paper: 15, 18, or 20 lb Bond (56, 70, or 75 gsm).

Multiple Part Paper with Carbon Tissues:
2 and 3 part – 15 lb Bond (56 gsm). Number 8 Tissues.
4 and 5 part – 12 lb bond (45 gsm) for first 3 or 4 parts, 15 lb Bond (56 gsm) for last part. Number 8 tissues.
6 part – 12 lb Bond (45 gsm) for first part, 10 lb Bond (38 gsm) for intermediate parts, 15 lb Bond (56 gsm) for last part. Number 8 Tissues.

Multiple Part Carbonless Transfer Paper
15 lb Bond (56 gsm) for first part.
14 lb Bond (53 gsm) for intermediate parts.
15 lb Bond (57 gsm) for last part.

Paper Loading

To load paper to the Line Printer, perform the following procedure (refer to figure 5-2):

1. With power ON press the Form Feed switch to drive the Format Tape to the "top of form" position. Open the cabinet; open the yoke; open the paper tractors and draw the paper into the Printer cabinet.

2. Install the paper in the tractors and close the tractors (a minimum of 2 inches (5.08 cm) of paper must be below the zero print position to cover the No Paper Detector). Adjust the position of the tractors as required to ensure that the paper is not under tension. Pull the Paper Advance Control out of engagement with the Paper Advance Drive Pulley, and advance the paper until the position at which the first line has to be printed is opposite the zero mark on the Vertical Position Scale.

3. Close the yoke and close the cabinet. Check paper tracking by pressing the FORM FEED button.

4. The paper should exit the printer as shown. Several sheets of the form should be folded and placed into the stacker tray.
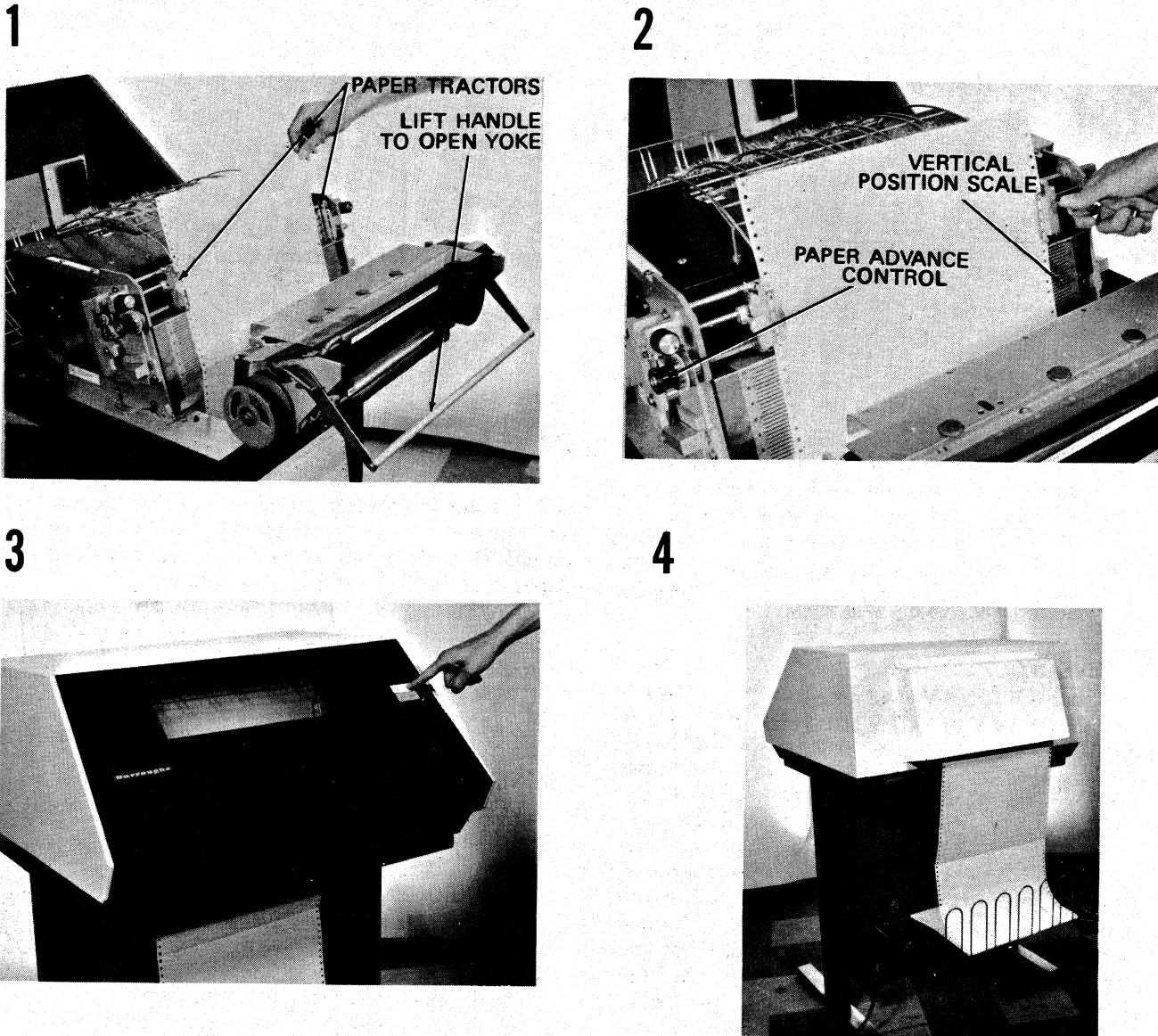

Figure 5-2. Paper Loading
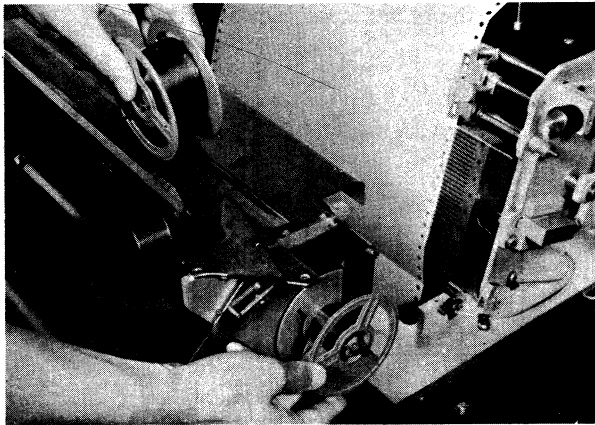
RIBBON AND RIBBON LOADING

The Line Printer uses a 1 color (Black) ribbon. The mylar ribbon is self reversing and moves diagonally across the Print Station to provide optimum usage and print quality.
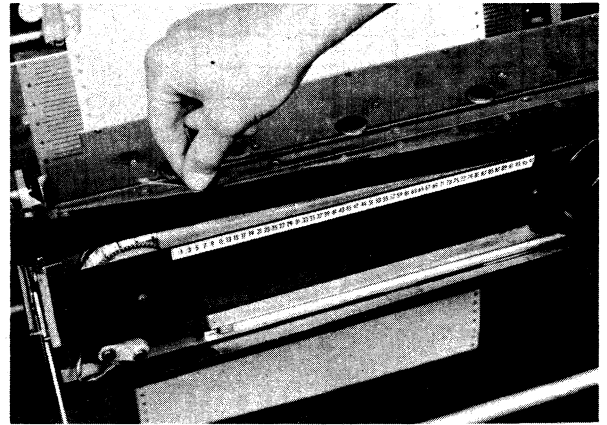
Ribbon Loading

To load the ribbon, perform the following procedure (refer to figure 5-3):

1. Turn off power, open the cabinet, and open the yoke. Remove the old ribbon and place the full new spool on the right side as shown. Thread the ribbon around the idler roller and over the guide as shown.
2. The ribbon should be placed under the ribbon shield as it crosses the yoke.
3. On the left side, thread the ribbon over the guide and around the idler roll.
4. Place the take-up spool on the left side, take up the slack, and close the yoke.
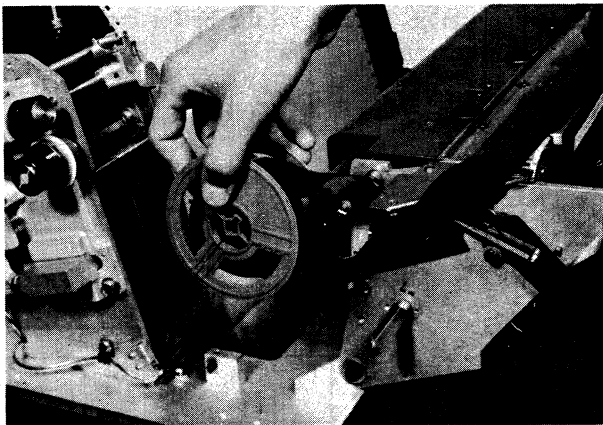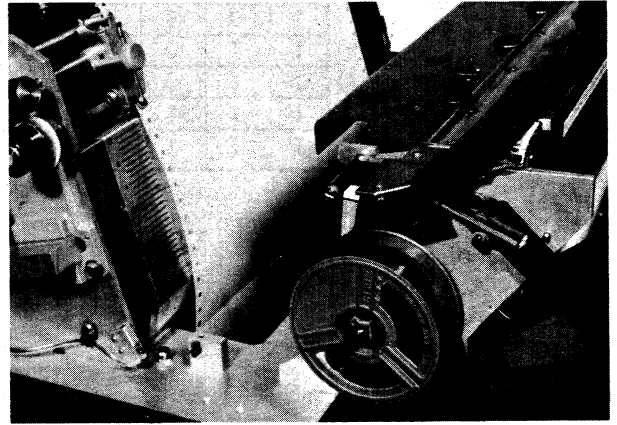
1

2

3

4

Figure 5-3. Ribbon Loading

FORMAT TAPE AND FORMAT TAPE LOADING

The Line Printer uses a Format Tape, and the Vertical Format Unit, to provide a page formatting facility (vertical). The Format Tape must be prepared from Line Printer Format Tape (Sales Supply No. 70-027-178). The holes that are punched in the tape to produce the required page format, must be punched using the 6 line to the inch guide, by a Tape Punch (Part No. 1622 6995).

When the tape is spliced, it must be spliced so that its loop length is equal to, or is an even multiple of the format length, and is no less than 3 inches and no greater than 17 inches. To splice a Format Tape, perform the following procedure:
1. Apply a thin coat of adhesive to the area indicated on the Format Tape, and also to the corresponding area on the underside of the other end of tape. Allow the adhesive to dry until it becomes tacky.
2. Press the adhesive coated surfaces together.
3. Clean off excess adhesive using a solvent.

When the Format Tape is used with a 2 channel Vertical Format Unit, holes must not be punched in tape channel 10. A hole in this channel will be detected as a broken, or absent Format Tape. When the Format Tape is used with a 12 channel Vertical Format Unit, holes must not be punched in tape channels 1 and 12 of the same line. This combination of holes would be detected as a broken or absent Format Tape. If a broken or absent Format Tape is detected, paper motion will be inhibited immediately.

When a blank Format Tape is loaded to the Vertical Format Unit and a Form Feed command is given, the paper will be driven continuously for a period of 5 seconds.

Format Tape Loading

To load a Format Tape to the Vertical Format Unit, perform the following procedure (refer to figure 5-4):
1. Ensure that power is connected to the Printer.
2. Depress and release the Stop switch on the front face of the Printer cover.
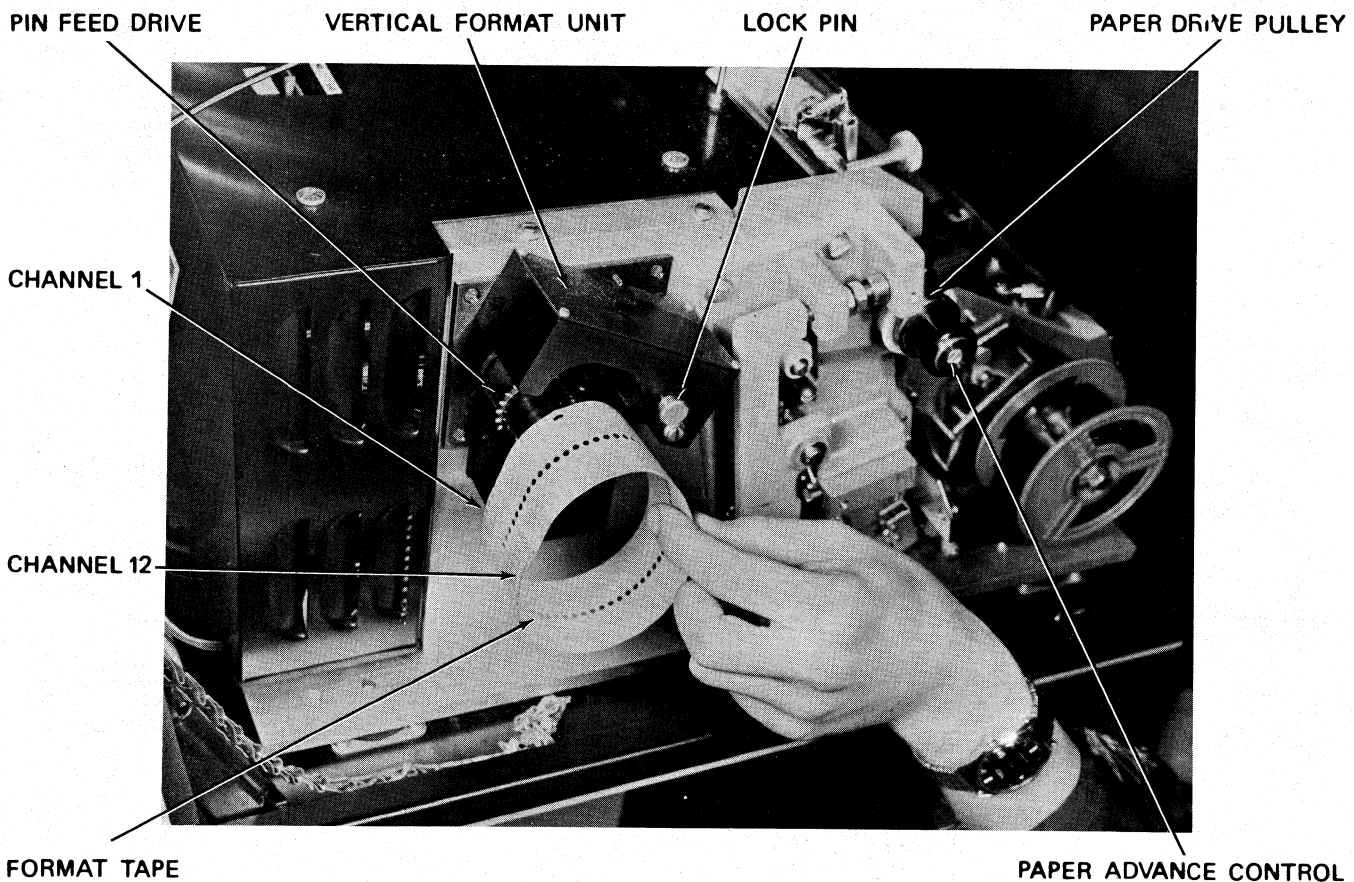3. Open the Printer cover.

Figure 5-4. Format Tape Loading

4. Load the Format Tape – pull the "lock pin" outward from the left side of the Vertical Format Unit and raise the top of the Vertical Format Unit. Locate the Format Tape on the pin feed drive and close the Vertical Format Unit.
5. Align the Format Tape with the paper held in the Printer – depress and release the Form Feed switch on the front face of the Printer cover and allow the Format Tape and the paper to drive until the "top of form hole" is detected in channel 1 of the Format Tape. The drive will automatically stop when this hole is detected. Pull the Paper Advance Control, on the left end of the Pin Feed Drive Spindle, out of engagement with the Paper Advance Drive Pulley. Rotate the Paper Advance Control until the position on the paper at which the first line has to be printed is opposite the Zero (0) mark on the Vertical Position Scale. The Vertical Position Scale is located on the Hammer Bar cover. Release the Paper Advance Control and ensure that it is properly engaged with the Paper Advance Drive Pulley.
6. Close the Printer cover.

SECTION 6
SYSTEM DISPLAY

INTRODUCTION

The System Display can be used to display information from the keyboard, or memory, or both, as directed by the user program. Information, in the form of illuminated characters, is displayed on a SELF SCAN®Display Panel. The maximum number of characters that can be displayed is 256 (8 rows of 32 characters).

An illuminated cursor can be continually positioned to indicate the point at which the next character display will appear. The cursor position is controlled by the user program.

Some Display Panels have 2 slide levers mounted on the right edge of the Panel. The lower of the two levers can be used to adjust the brilliance of the display. The upper lever is not used on the B 80 system.
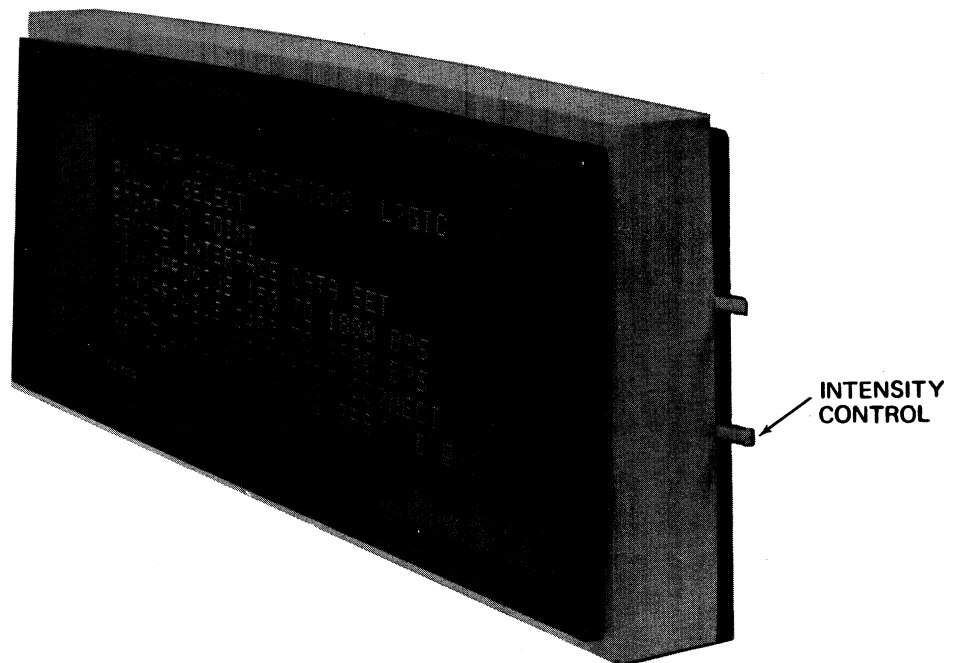

INTENSITY
CONTROL

Figure 6-1. SELF SCAN®Display Panel

SECTION 7
CUSTOMER CONFIDENCE ROUTINE

INTRODUCTION

The Customer Confidence Routine is a programmed system test procedure, which can be performed by the operator when the integrity of the system is suspect, or at prescribed intervals as determined by the customer. An initial section of the test program is stored in the "Read Only" segment of the system memory (ROM), and the remainder is stored in the Customer Confidence Routine Cassette/Mini-Disk.

CONFIDENCE ROUTINE OPERATION

The Confidence Routine is mainly automatic but, in addition to loading and initiating the test program, the operator is required to monitor the system Indicator lights, and operate the system controls as and when directed by the program printout. To execute the Customer Confidence Routine, perform the following procedure:

1. Load the Paper Handler – set the left Pin Feed mechanism to the zero print position and load a paper which is not less than 14 inches (355 mm) wide.

2. Insert the PK Identification Strip pertaining to the Customer Confidence Routine, into the plastic cover which is located over the PK Indicators.

3. Insert the Customer Confidence Routine Cassette/Mini-Disk, and remove all other Cassettes/Mini-Disks.

4. Set the System Test switch to the TEST (up) position.

5. Depress the Load Enable button – this initiates the first section of the test program. If no faults occur during those tests, the second section of the test program will be initiated automatically.

6. Ensure that the second section of the test program is initiated within 60 seconds – at the beginning of the second section of the program the Printer is initialized (carrier moves to the right bumper and then to the zero print position), and the program "header" is printed.

NOTE
If the second section of the test program is not initiated within 60 seconds, repeat steps 3 through 7 (use another

Cassette/Mini-Disk Drive Unit if the system contains more than one). If repeated attempts to enter the second section of the test program are not successful it must be assumed that a fault has been detected during the initial ROM tests. This fault condition should be reported to the Burroughs Field Engineering Office.

7. Perform the first block of printed instructions which appear on the program printout.

8. Select "Automatic Test" and complete the Confidence routine as directed by the program printout.

9. Remove and retain the program printout and report any fault conditions, that is Field Codes, which have been printed on the right side of the form.

10. Return the System Test switch to the NORMAL (down) position.

11. Remove the Customer Confidence Routine Cassette/Mini-Disk.

CONFIDENCE ROUTINE PRINTOUT

All program printouts should be retained and presented to the Burroughs Field Engineer on his next visit. The printouts contain information which can assist the Field Engineer to evaluate the system performance and to identify degraded components before they fail.

Printed Instructions

The procedural instructions which are printed during the second section of the test program are printed in the English language and, with the exception of the following key titles, require no interpretation:

1. "KEY R/" refers to the Set/Reset Underline key "R—"
   S—
2. "UND KEY" refers to the Underline key "_"
3. "LINE FEED" refers to the Line Advance keys "↑"
4. "B/S HEAD" refers to the Backspace key "←"
5. "ON/OFF Key" refers to the Ready Request Key.
6. "O" Key refers to the key marked "~"
7. "/KEY" refers to the key (upper case 7) marked "↑"

B 80 SYSTEM – SITE RECORD

OPERATOR'S NAME _____

LOCATION OF SYSTEM _____

STYLE NO. OF SYSTEM _____

DATE OF INSTALLATION _____

PERIPHERALS INSTALLED _____

_____

_____

_____

_____

_____

_____

BURROUGHS FIELD OFFICE

Address _____

_____

_____

_____

Telephone No. _____

APPENDIX A
ASSOCIATED PUBLICATIONS

The following Manuals provide information concerning the installation of the B 80 system, and the operation of the system and its related software.

MANUAL	FORM NUMBER
B 80 Systems Customer Site Planning Manual	2011151
B 80 Systems Reference Manual	2007233
CMS ARCS Reference Manual	2012713
CMS COBOL Reference Manual	2007266
CMS MCP Reference Manual	2007555
CMS RPG Reference Manual	2007274
CMS MPLII Reference Manual	2007563
CMS System Software Operation Guide	2007258
B 80 Accounting Computer System (ACSYS) System Software Operational Guide	2007639
B 80 Accounting Computer System (ACSYS) Reference Manual	2007621
B 80 ACSYS Disk Programming Reference Manual	1105319