TOPS–10/TOPS–20 Operator's Hardware Device and Maintenance Guide

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June 1988

This new guide describes the operation and maintenance of the major available peripheral devices that can be connected to the TOPS–10 and TOPS–20 series hardware systems.

The material in this guide was previously included in the *TOPS–10 Operator's Guide*, order number AA–H283B–TB, and the *TOPS–20 Operator's Guide*, order number AA–FP80A–TM.

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TOPS–20 Version 7.0

SOFTWARE: TOPS–10 GALAXY Version 5.1
TOPS–20 GALAXY Version 6.0

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PREFACE

The TOPS-10/TOPS-20 Operator's Hardware Device and Maintenance Guide describes the operation and maintenance of the major available peripheral devices that can be connected to the TOPS-10 and TOPS-20 series hardware systems. Each chapter describes a different peripheral line device.

This guide is written for experienced TOPS-10 and TOPS-20 operators.

SYNOPSIS

Chapter 1, "Printers," describes the operation and maintenance of the LP05, LP07, LP10, LP14, LP26, LP27 line printers and the LN01 and LN03 laser printers.

Chapter 2, "Card Readers," describes the operation and maintenance of the CR10-E and CR10-F model card readers.

Chapter 3, "DECtapes," describes the operation and maintenance of TU56 DECtape drives.

Chapter 4, "Magnetic Tapes," describes the operation and maintenance of the TU16, TU40, TU45, TU70, TU71, TU72, TU77, TU78, and TU79 magnetic tape drives.

Chapter 5, "Disk Drives," describes the operation and maintenance of the RP02, RP03, RP04, RP06, RM03, RP07, RP20, RA60, and RA81 disk drives.

Chapter 6, "Floppy Disks," describes the operation and maintenance of floppy disks.

CONVENTIONS USED IN THIS GUIDE

This guide uses the following conventions:

Convention	Meaning
TTY	Terminal.
<RET>	Press the RETURN key.
<CTRL/character>	Hold the CTRL key down while you type the character.
UNDERSCORED UPPERCASE PRINT	In command examples, anything that you type.

MANUALS REFERENCED

The following manuals are referred to in this manual:

- TOPS-10 Operator's Guide
- TOPS-20 Operator's Guide
- LN01 Programmer Reference Manual
- LN01 Electronic Printer Installation Guide
- LN01 Electronic Printer Operator Guide
- Installing and Using the LN03A
- LN03 Programmer Reference Manual
- TOPS-10 Software Installation Guide
- TOPS-20 KL Model B Installation Guide
- HSC50 User's Guide
- RA60 Disk Drive User's Guide
- RA80 Disk Drive User's Guide
- RA81 Disk Drive User's Guide

MAINTENANCE OVERVIEW

It is important to know how to operate the peripheral equipment on your system and how to keep it in the best possible condition. This guide discusses the necessary procedures.

Because most equipment operates more efficiently when kept clean, each chapter details a specific cleaning procedure for each device. There are, however, some general rules for cleaning. First of all, the computer room should be kept as neat and clean as possible. Second, you should have the following cleaning supplies available:

1. 91% isopropyl alcohol
2. Lint-free wipers
3. Spray cleaner
4. Vacuum cleaner with rubber or plastic attachments, which can blow air as well as take in air
5. Cotton-tipped applicators
6. Soft suede brush

You should clean the exterior of all equipment weekly. Vacuum all outside surfaces including cabinet tops. Use spray cleaner on all exposed surfaces except around switches.

In general, do not clean the interior of any equipment unless so directed in the following chapters; your DIGITAL Field Service Representative does that job. Specific instructions for cleaning line printers and magnetic tape drives are given in Sections 1.4, 3.2 and 4.3.

Always be careful not to bump or change the position of any switches, because this could cause the system or the device to crash. Likewise, when you are cleaning the exterior of any disk drives, be careful not to jar the equipment; that could cause a serious hardware head crash.

Last, if you ever have any problem or doubts concerning the operation or cleaning procedure for a device, consult your DIGITAL Field Service Representative.

CHAPTER 1

PRINTERS

This chapter describes procedures for operating and maintaining line printers and laser printers. Printers that have similar functions and controls are grouped together in the sections that follow. Be sure to follow the procedures for the appropriate printer.

1.1 LP05, LP14, LP26, AND LP27 PRINTERS

Sections 1.1.1 through 1.1.4 describe the physical characteristics and maintenance procedures for LP05, LP14, LP26, and LP27 line printers.

1.1.1 Control Panels

The LP05, LP14, LP26, and LP27 line printers are very similar in appearance and have the same hardware controls.

The operator control panel is located on the top right of the printer and is illustrated in the following figures:

Printer	Figure
LP05	1-1
LP14	1-2
LP26	1-3
LP27	1-4

The control panel contains error indicator lights, push-button switch/indicator lights, and toggle switches. Main power to the printer is supplied by a circuit breaker located at lower right beneath the main gate. When this is turned on, the POWER ON indicator will light (green). The following list describes all switches and indicator lights.

ALARM (indicator) - Lights red when a fault condition exists.

CLEAR (switch) - When a fault condition has been corrected, pressing CLEAR will clear master printer logic and cause the ALARM indicator to go out.

READY (indicator) - Printer is ready to be placed on-line when READY is lit.

ON/OFF LINE (switch/indicator) - Pressing this switch will place the line printer either on- or off-line. When on-line, the printer is under control of the user system.

PAPER STEP - Causes the paper to advance one line (enabled only when printer is off-line).

TOP OF FORM - Causes the paper to advance to top of form (enabled only when the printer is off-line).

FORMS RESET - Press down in order to use the COARSE VERTICAL FORM ADJUSTMENT control.

6-8 LPI - Selects either six or eight lines per inch vertical spacing. Six lines per inch is the more common setting.

One or more of the six red error indicator lights are lit when any of the following error conditions exist:

HAMMER - A print hammer is not operating properly.

FORMAT - The number of line feeds executed and number of line feed commands do not match.

RIBBON - The ribbon is not advancing properly due to failure to reverse, or due to a snag, or motor problem.

GATE - The drum gate is not latched.

PAPER - No paper, torn paper, or paper runaway problem.

TAPE - Parity error in the VFU memory.

Clear these lights by correcting the problem and then pressing the CLEAR switch.

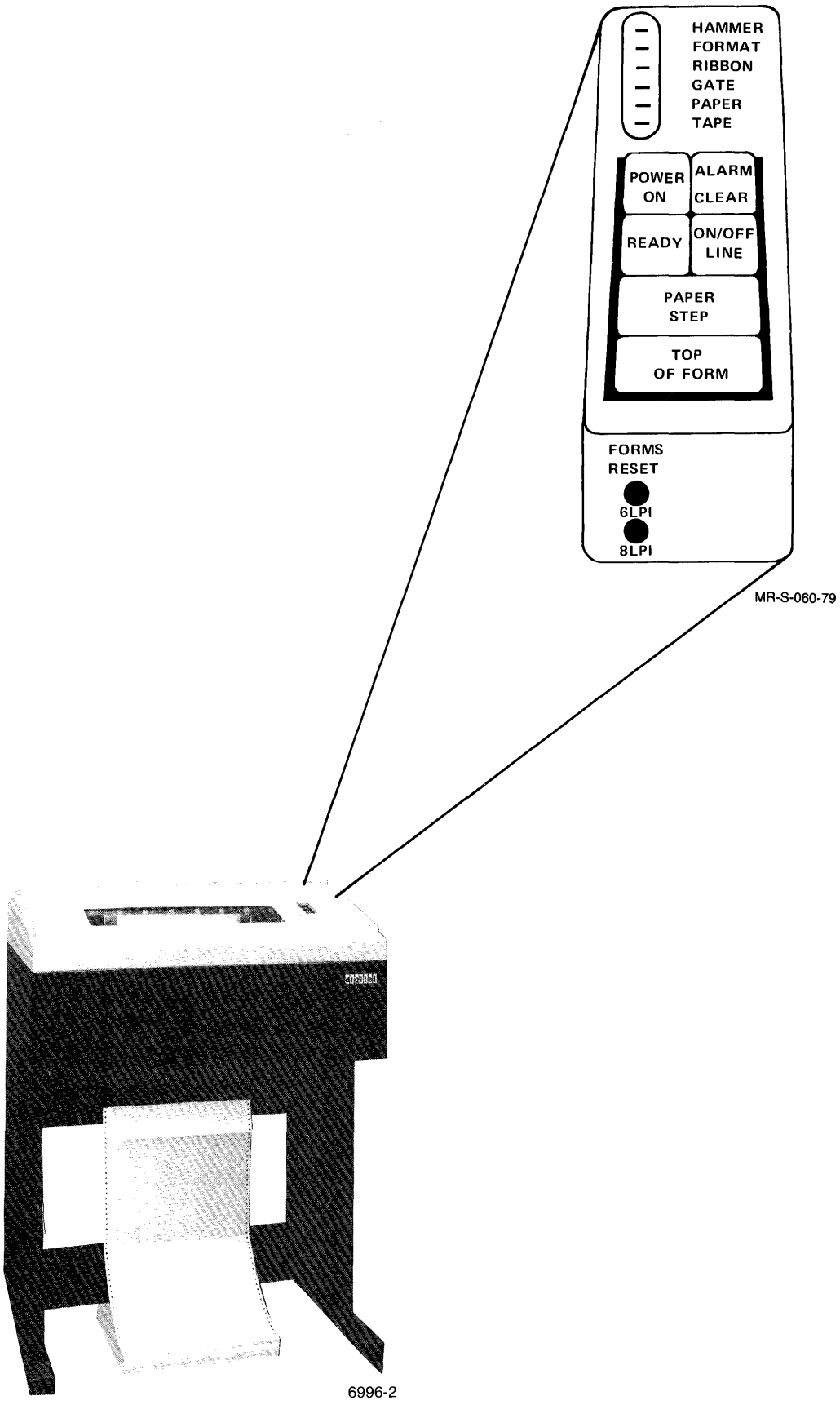


Figure 1-1: LP05 Line Printer

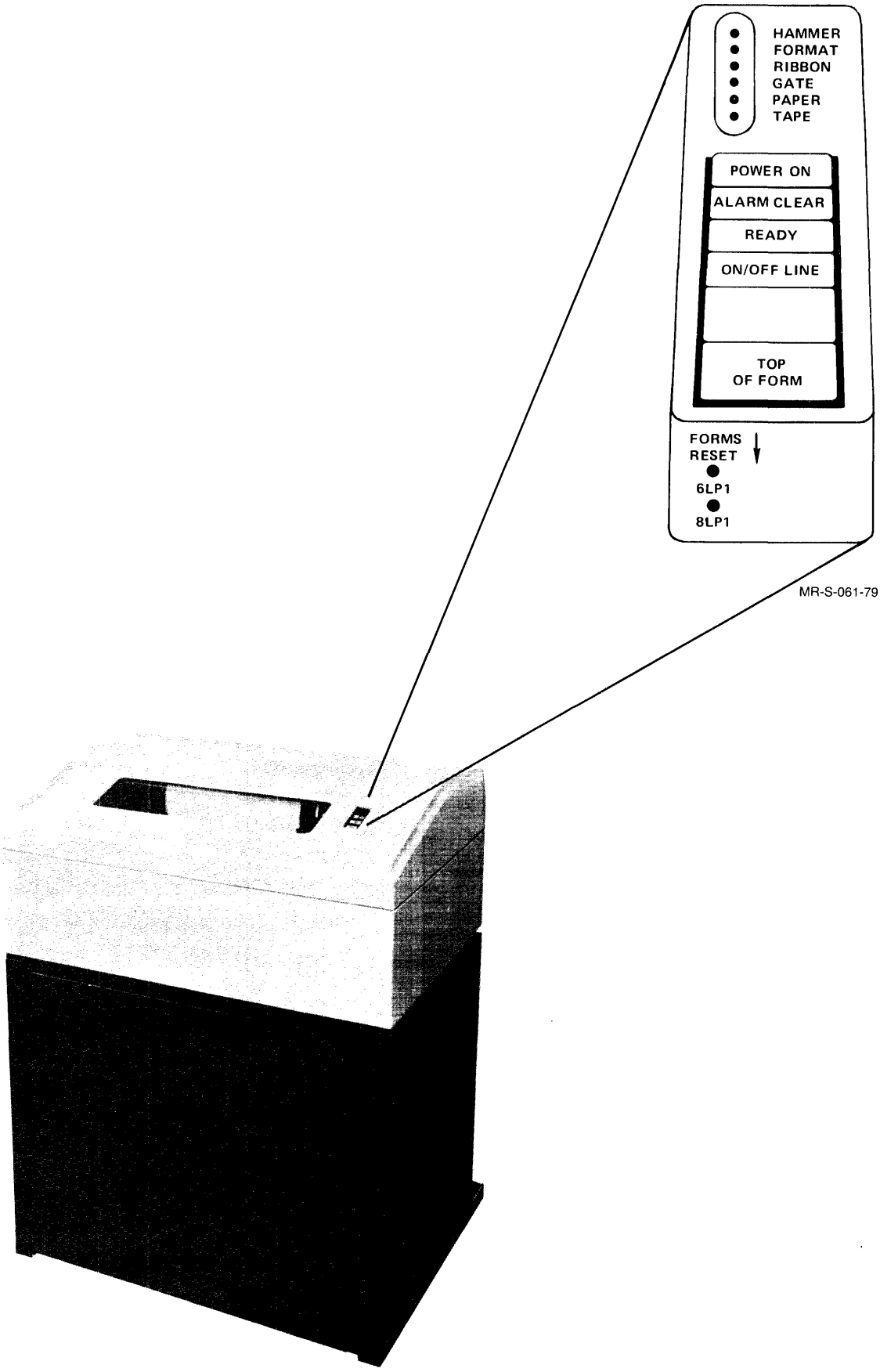


Figure 1-2: LP14 Line Printer

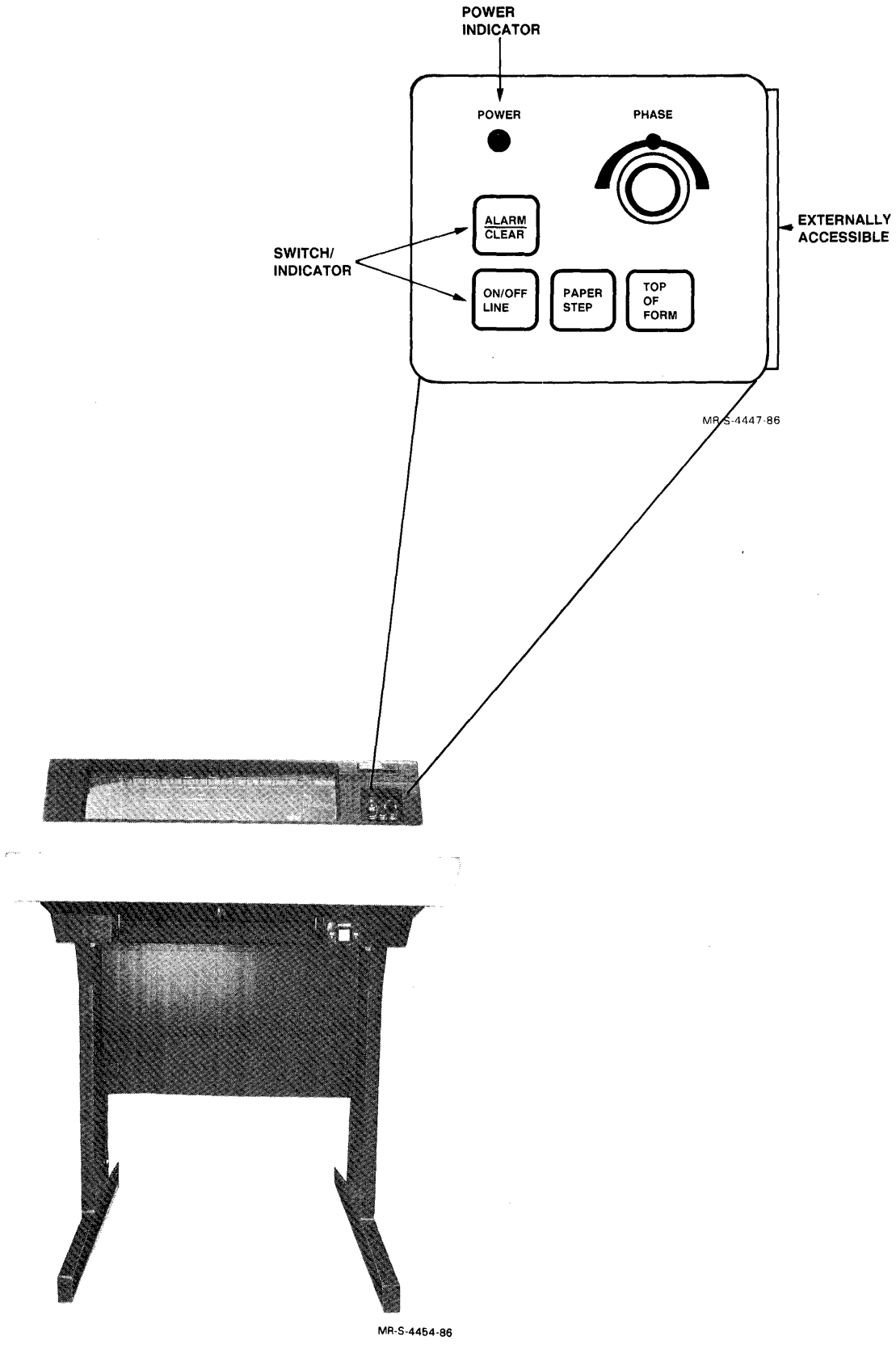


Figure 1-3: LP26 Line Printer

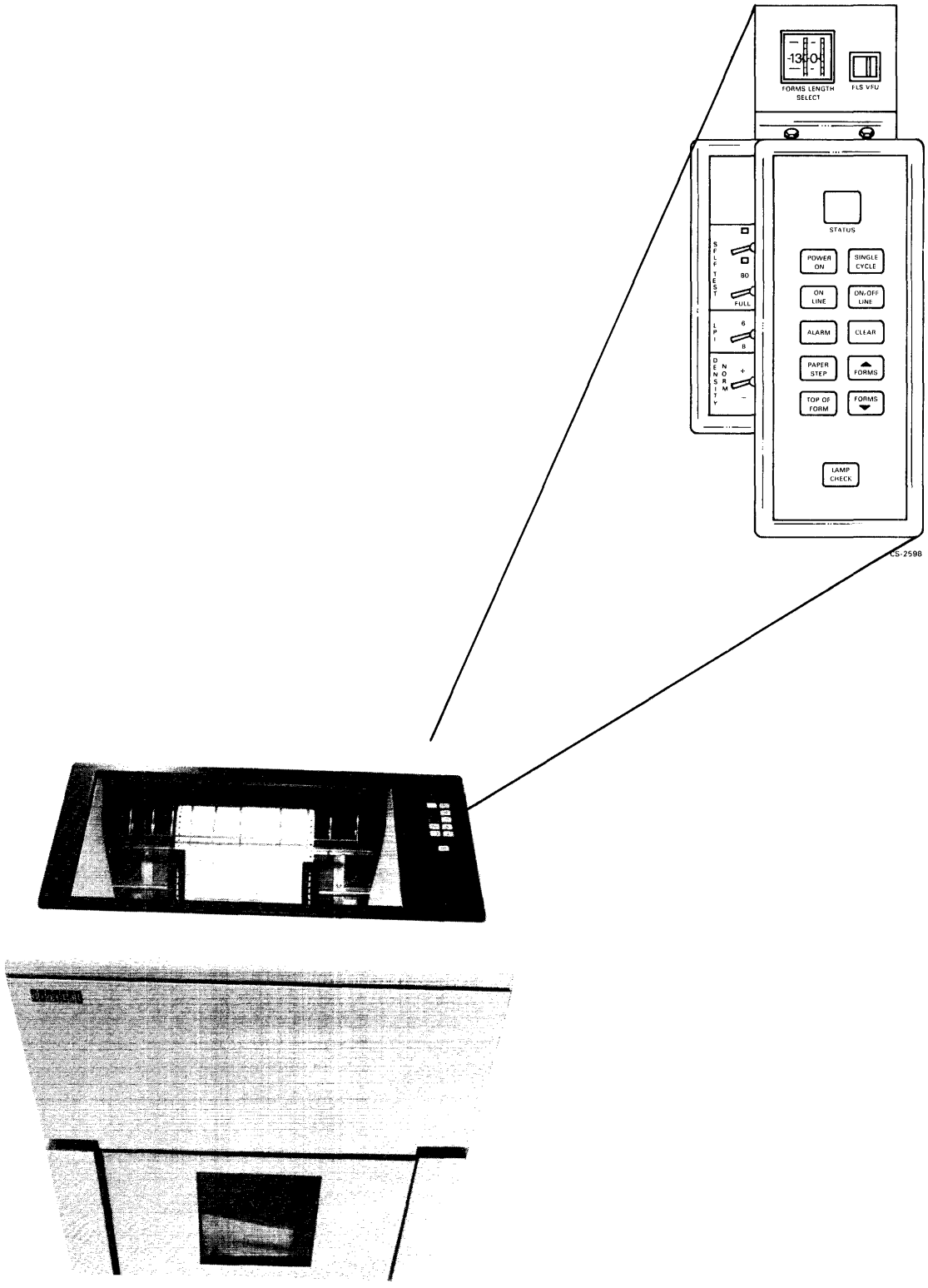


Figure 1-4: LP27 Line Printer

1.1.2 Changing Paper and Forms

The following procedure describes paper or forms installation, alignment, and adjustment on an LP05, LP14, LP26 or LP27 line printer (Figures 1-5, 1-6, 1-7 and 1-8).

1. Press the ON/OFF-LINE switch to set the printer off-line (indicator not lit).
2. Lift the printer cover.
3. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait for the character drum to stop rotating before you proceed.

4. Press and release the TOP OF FORM switch. The tractors will advance to the top-of-form position.
5. Open the spring-loaded pressure plates on the tractors.
6. Place paper in the tractors and close the pressure plates.
7. Loosen both paper-width adjustment guides and move both tractors laterally to adjust for correct paper-width. Tighten the paper-width adjustment guides.
8. If necessary, align the perforations in the paper above the print line index (Figure 1-6) by depressing the FORMS RESET switch and rotating the tractor shaft by using the COARSE VERTICAL FORM ADJUSTMENT control. Then release the FORMS RESET switch.
9. Adjust the horizontal position of the paper with the HORIZONTAL FORM ADJUSTMENT control. Use the horizontal indentation index marks as a guide.
10. Close and latch the drum gate.
11. Press ALARM/CLEAR switch.
12. Press and release the ON/OFF LINE switch to set the printer on-line (indicator lit).
13. Use the FINE VERTICAL FORM ADJUSTMENT control to correct any small misalignment in the printout during operation.
14. Close the printer cover.

Occasionally, the paper will jam in the line printer. When the paper jams, the printer goes off-line. If this happens, repeat Steps 2, 3, and 5 through 10. Then press the TOP OF FORM switch. Requeue the printer job and press the ON/OFF-LINE switch.

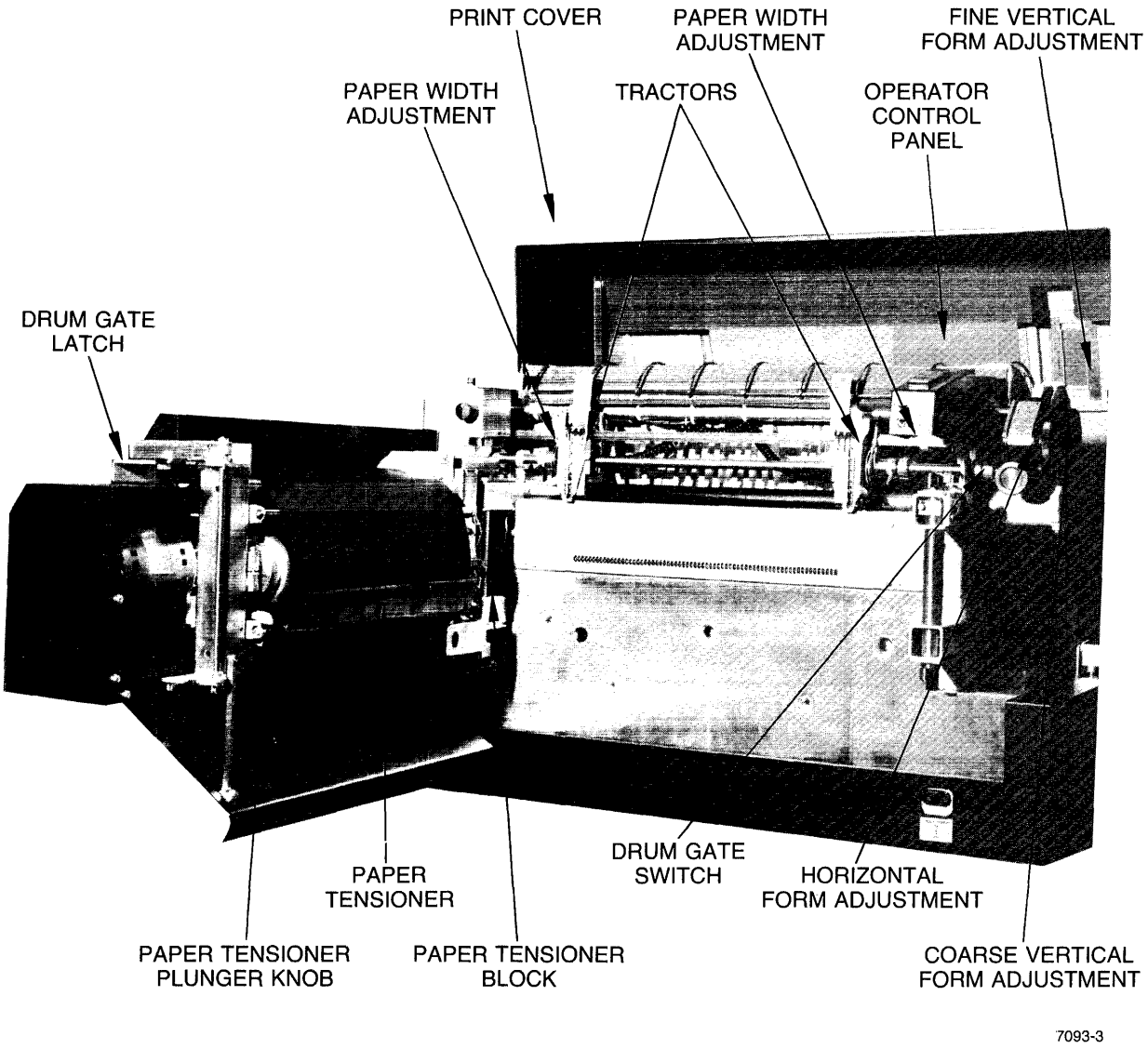
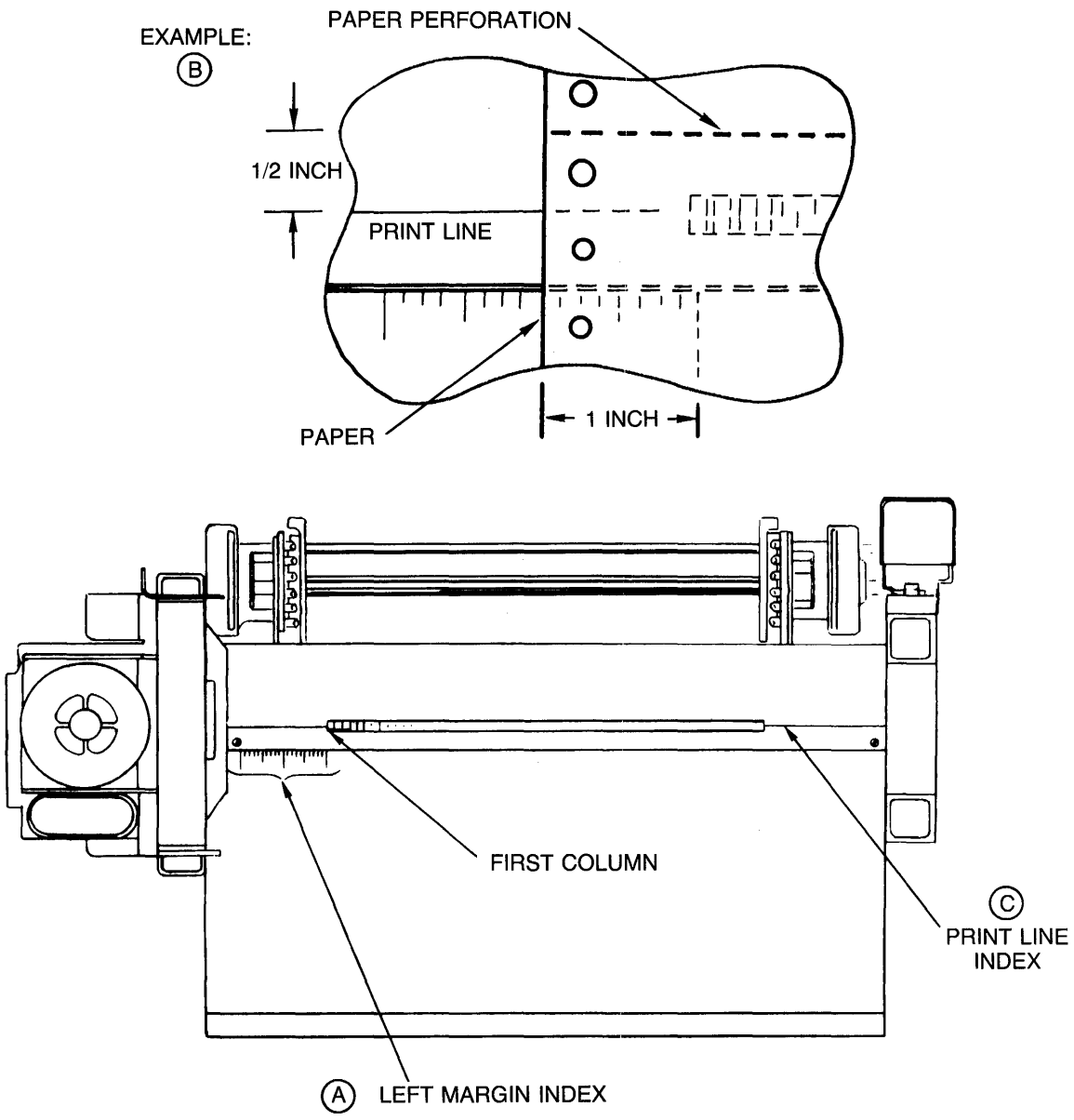


Figure 1-5: LP05 or LP14 Paper Installation



(A) The paper may be horizontally positioned to provide left margins up to two inches wide.

(B) The example shows paper properly installed for a 1/2-inch top margin (top-of-form spacing) and a one-inch left margin.

(C) The print line index shows the location of the center of the print line hammer bank.

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Figure 1-6: LP05 or LP14 Forms Alignment

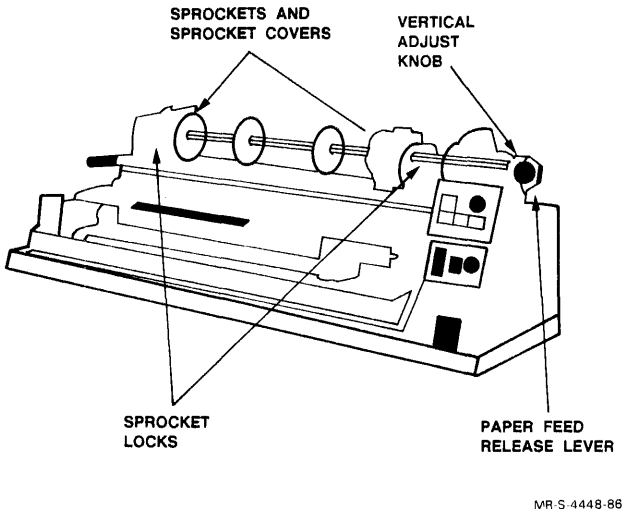

Figure 1-7: LP26 Paper Installation

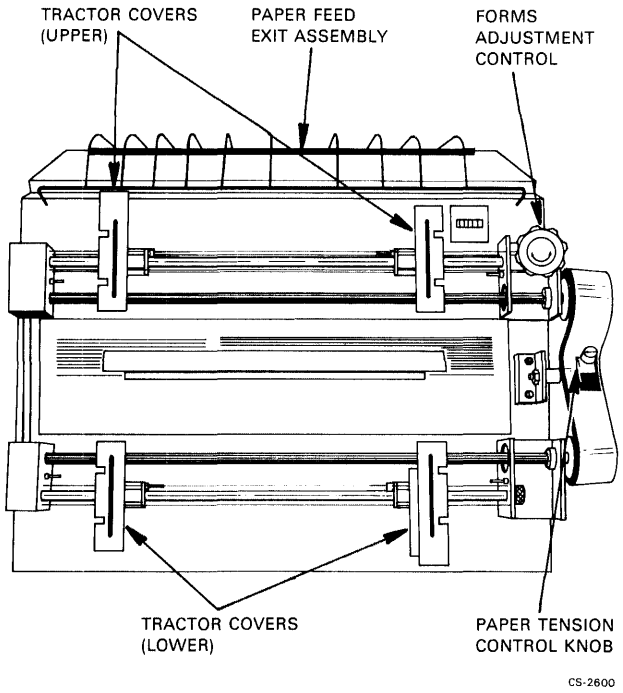

Figure 1-8: LP27 Paper Installation

Replenishing Forms

If you are merely replenishing forms and not changing to a different form, proceed as follows:

1. Lift the printer window.
2. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait for the character drum to stop rotating before you proceed.

3. Open all tractor pressure plates.
4. Insert the new form, overlapping the old one by at least one page and aligning the two at the page perforations. Close all tractor pressure plates.
5. Close and latch the drum gate.
6. Close the printer window.
7. Press the ON/OFF-LINE switch to set the printer on-line (ON LINE indicator lit).

1.1.3 Controlling the Vertical Format Unit

A vertical format unit (VFU) controls the paper advance through the printer. The LP05, LP14, LP26 and LP27 line printers have a direct access vertical format unit (DAVFU), which is controlled by software. The operating system loads this software.

1.1.4 Changing and Reversing the Ribbon

The following procedures describe how to change the ribbon on LP05, LP14, LP26, and LP27 line printers (Figure 1-9).

1. Use the plastic gloves supplied with the ribbon.
2. Press the ON/OFF LINE switch to place the printer off-line (indicator not lit).
3. Lift the printer cover.
4. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait until the next character drum stops rotating before proceeding to next step.

5. While holding the paper tensioner with one hand, pull the paper tensioner plunger knob to your left and remove the paper tensioner from the drum gate.

6. Grasp the right end (fixed ribbon holders) of the top and bottom ribbon cores and push left against the floating holder springs; pull the right end of the ribbon cores away from the drum gate first.

7. Remove the new ribbon from its packing box and remove the plastic wrapping.

8. Place the fully wound ribbon core over the top floating ribbon holder. The ribbon must be installed so that it unwinds from the top of the ribbon core.

9. Push the ribbon core end toward your left against the floating ribbon-holder spring, and place the opposite ribbon core end over the top fixed ribbon holder. Be sure that the holder guide-pin slips into the core end slot.

10. Unwind the second ribbon core and bring it down over the character drum and ribbon guide bars.

11. Place the ribbon core on the bottom ribbon holders as in Step 9, for the top ribbon core.

12. Install the paper tensioner by placing the paper tensioner block in position and pushing the tensioner against the tensioner knob, while pulling the knob to allow engagement.

13. Close the drum gate and press the ALARM/CLEAR switch.

14. Press the ON/OFF-LINE switch to place the printer on-line (indicator lit).

Most listings have more print on the left half of the paper. Therefore, to prevent the ribbon from wearing unevenly, you should reverse the ribbon using the following procedure:

1. Follow Steps 1 through 6 above to remove the ribbon.

2. Holding the two ribbon cores as you took them off the printer, rotate them clockwise until the top core is at the bottom.

3. Now that you have reversed the top and bottom ribbon cores, put the ribbon back on the printer by following Steps 9 through 14 above.

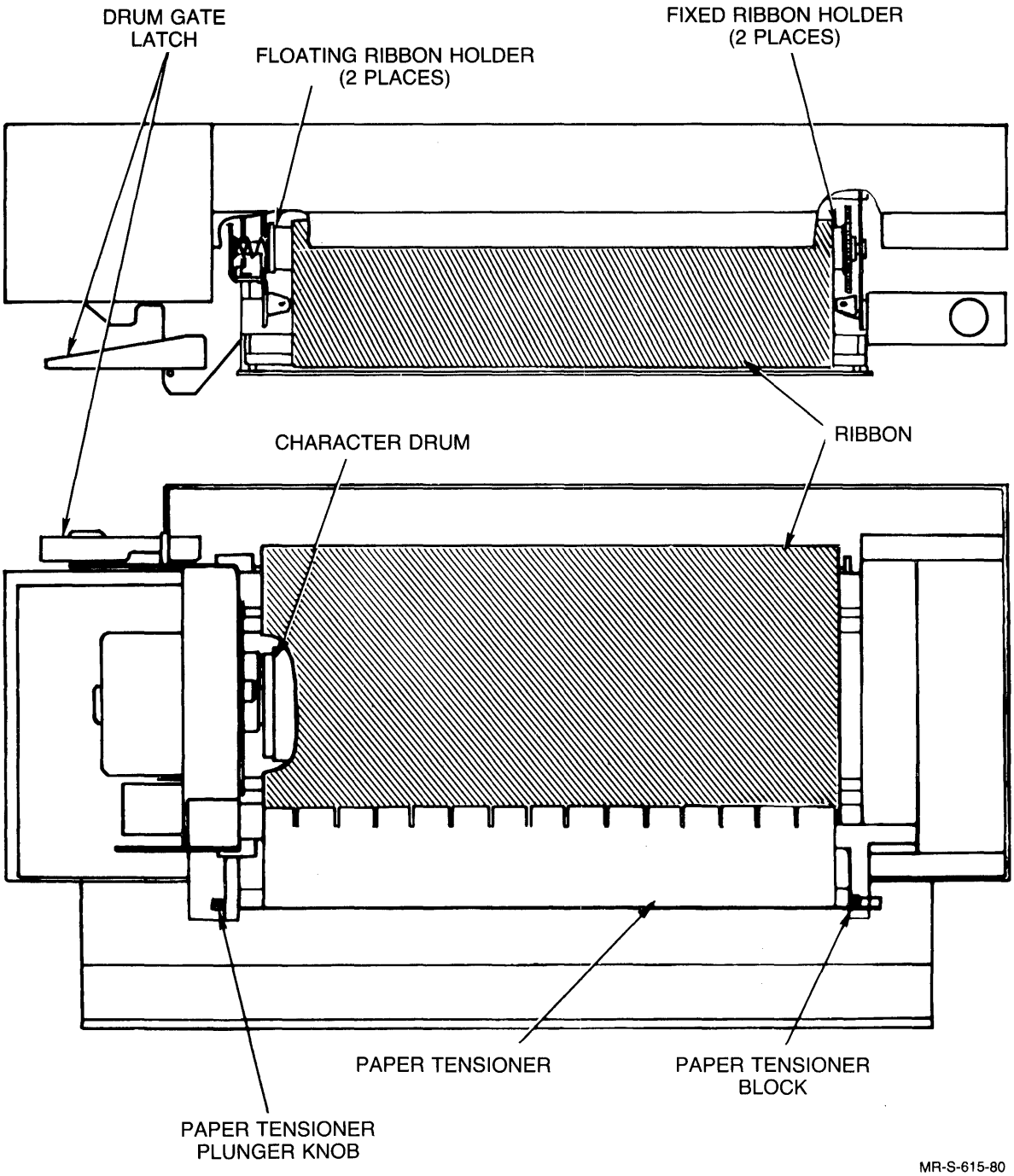

Figure 1-9: LP05, LP14, LP26 or LP27 Ribbon Installation

1.2 LP07 PRINTER

Sections 1.2.1 through 1.2.4 describe the physical characteristics and maintenance procedures for the LP07 line printer.

1.2.1 Control Panel

The LP07 control panel is on top of the printer at the left. Controls for normal operation are visible; other controls are covered by a metal plate which can be lifted. The control panel is illustrated in Figure 1-10. The panel contains switches (two-position), white indicator lights, red error lights and two dial knobs. From the bottom up, these controls are as follows:

START/STOP Switch - Places the printer on-line (the RUN light comes ON) or takes it off-line.

SINGLE CYCLE Switch - Permits printing of one line at a time each time the START/STOP switch is pressed.

TOP OF FORM Switch - With the printer off-line, depressing the TOP OF FORM switch causes the paper and/or the carriage control loop to position themselves at the top of a page ready for printing.

CHECK CLEAR Switch - After an error condition has been corrected, pressing this switch clears the error lights.

RUN Indicator - This is lit when the printer is READY and STARTed.

READY Indicator - When lit, there are no error conditions, the printer can be placed on-line. If this light fails to come on, there is a paper fault or Charaband problem.

POWER ON Indicator - When lit, the power switch is in the ON position.

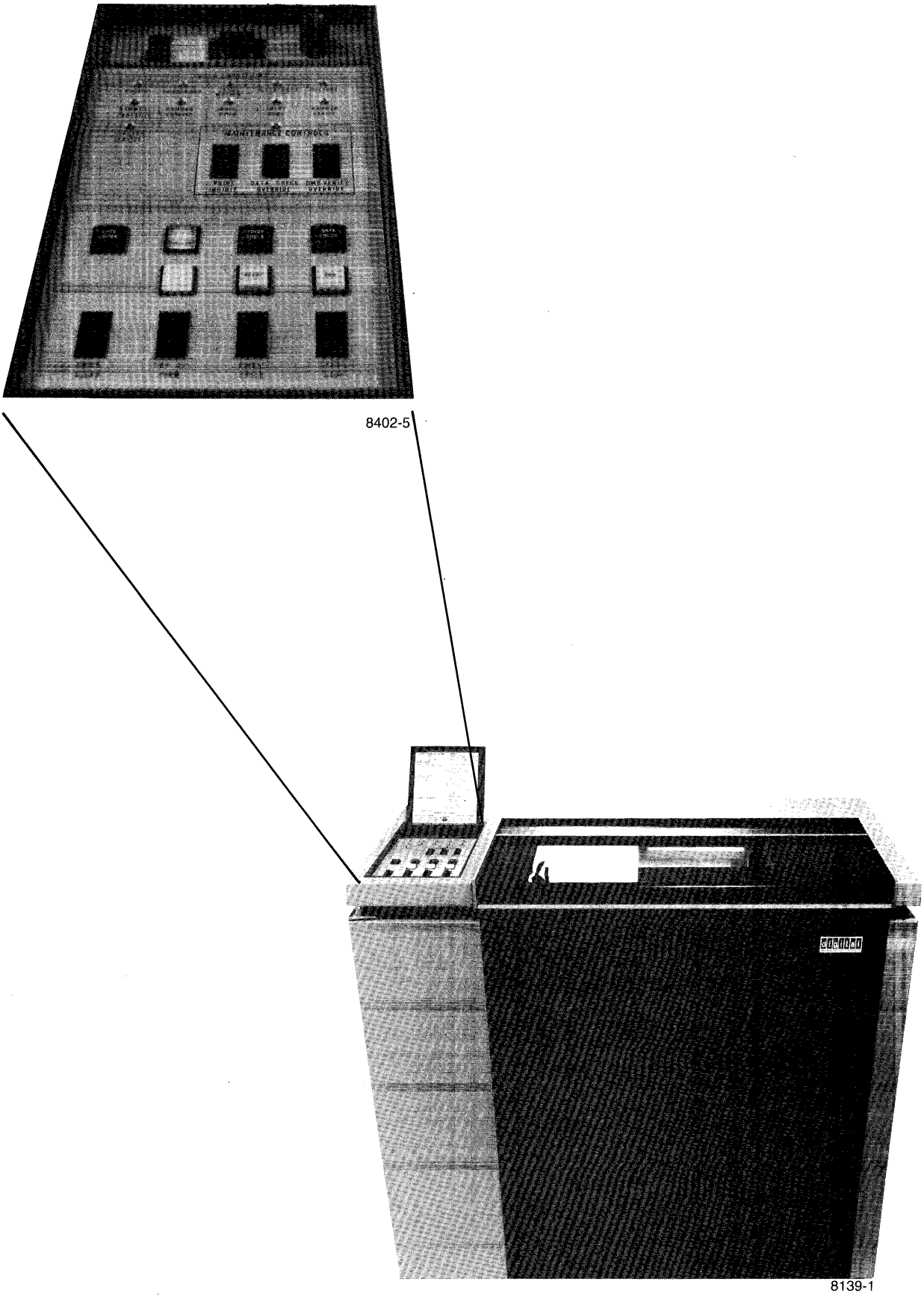

Figure 1-10: LP07 Line Printer

ERROR LIGHTS

Whenever an error condition occurs, such as running out of paper, VFU error, or a problem with the Charaband, the RUN and READY lights go out. At this time one of the red error lights below may come on.

GATE CHECK Indicator - The gate is open and must be closed before printing can commence. This may also indicate a Charaband problem.

FORMS CHECK Indicator - The printer is out of paper, or runaway paper motion has occurred.

PRINT CHECK Indicator - There is an electrical malfunction, hammer problem, or one of the OVERRIDE switches is set.

DATA CHECK Indicator - There is a PARITY or HAMMER cooling error, or the SINGLE CYCLE or DATA CHECK OVERRIDE is set.

To turn these lights off, correct the problem and hit the CHECK CLEAR Switch.

MAINTENANCE CONTROLS

These consist of three switches and an indicator light. Setting any of these switches allows certain error conditions to be overridden. For example, PRINT INHIBIT deactivates the hammer firing mechanism, so that printer functions can occur without paper being loaded. DATA CHECK OVERRIDE allows the printer to disregard the IDENTIFIER code on the Charaband. These switches are essentially for Field Service use.

CHECK CONDITIONS

These eleven small, red error indicator lights are sub-conditions of the four large error indicator lights discussed above. Their meaning is in many cases self-explanatory. INTERLOCKS lights if the RUN/ADJUST CLUTCH is open, or the VFU cover is open.

OTHER CONTROLS and SWITCHES

POWER Switch - Powers the printer ON and OFF.

PRINT RATE Switch - The printer can operate at both high and low speeds. Make certain the POWER switch is OFF before changing the speed.

PENETRATION CONTROL Knob - Increasing the penetration causes the printer hammers to fire with more force. The penetration should be increased when printing forms with multiple or carbon copies. Check the quality of the bottom copy before proceeding with the entire print job.

PHASING CONTROL Knob - This equalizes the right-to-left density of the characters; the adjustment is necessary when you have changed the penetration or Charaband speed.

1.2.2 Changing Paper and Forms

The following procedure describes how to install forms, align them, and adjust the paper on an LP07 line printer. (See Figures 1-11 and 1-12.)

1. If the printer is running, press the START/STOP switch to place the printer in STOP mode (RUN indicator is not lit).

2. Lift the printer window.

3. Unlatch and fully open the band gate and ribbon mask.

CAUTION

Wait until the Charaband stops rotating before proceeding to the next step.

4. If necessary, reposition the upper and lower left forms tractors. Make sure that they are still vertically aligned.

5. Unlock the upper and lower tractor locks on the right tractors.

6. Open all tractor pressure plates.

7. Insert the left edge of the form in the upper left tractor and close the pressure plate.

8. Slide the upper right tractor to a position beneath the right hand form feed holes and close the pressure plate. Lock the upper right tractor.

9. Loosen the PAPER TENSION control lock and set the PAPER TENSION control to its extreme counterclockwise position (least tension).

10. Insert form in the lower left tractor and close the pressure plate.

11. Slide the lower right tractor to a position beneath the right hand form-feed holes and close the pressure plate. Lock the lower right tractor.

12. Adjust the PAPER TENSION control clockwise to achieve proper vertical form tension. Proper tension occurs when there is a slight crease on the top edge of the form-feed holes. Tighten the PAPER TENSION lock.

13. Press the TOP OF FORM switch on the operator control panel.

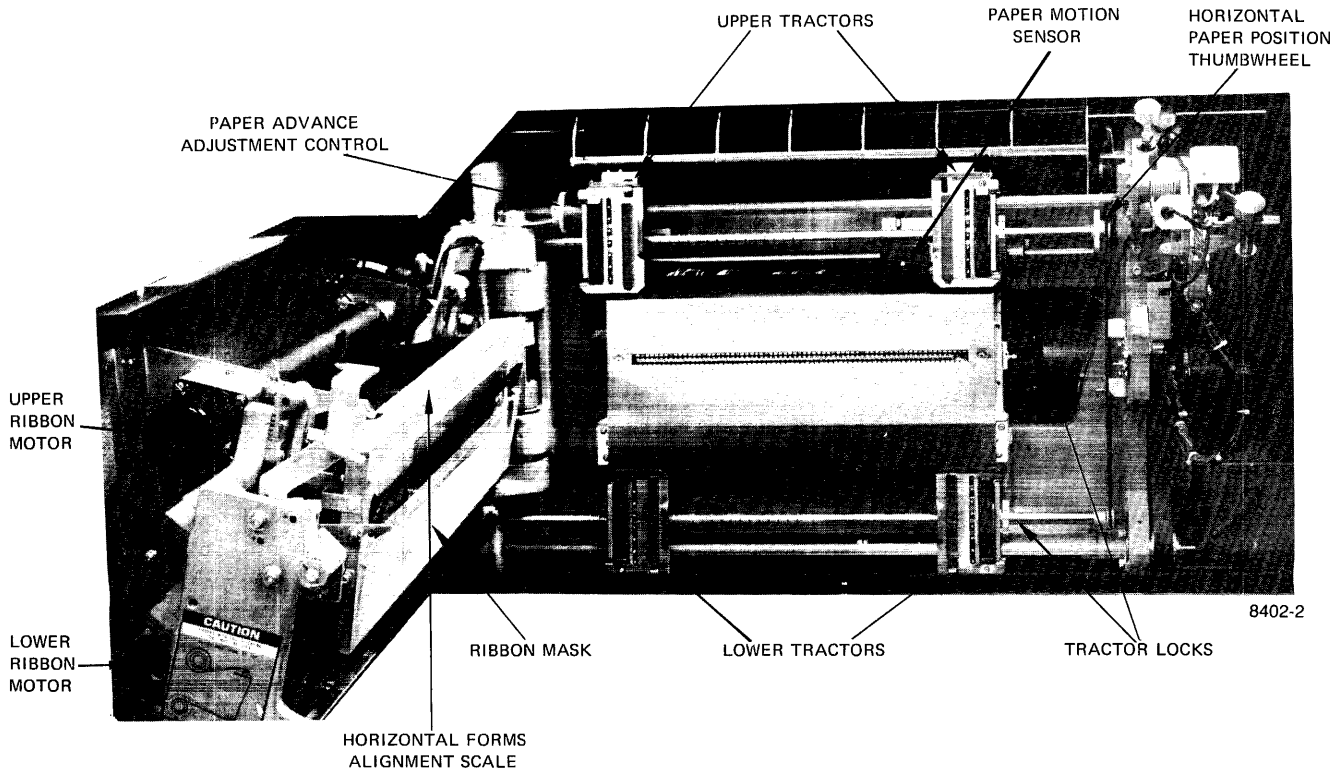

Figure 1-11: LP07 Paper Installation

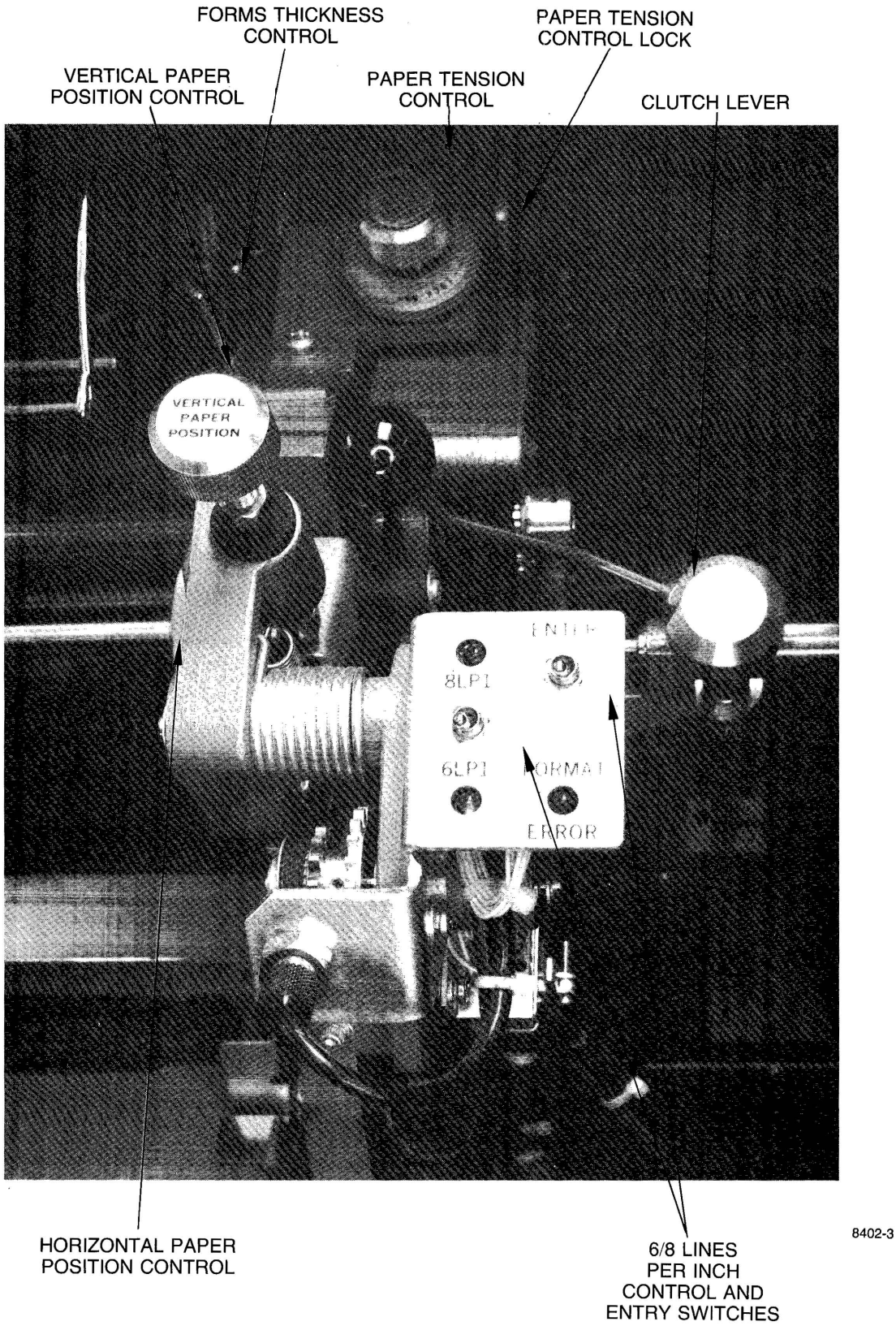

Figure 1-12: LP07 Forms Alignment

14. Rotate the PAPER FEED clutch clockwise to the ADJ position and use the PAPER ADVANCE ADJUSTMENT control to position the form at the first line of print. Use the hammer faces as a print-line guide. Return the clutch to the RUN position.

    You can use the VERTICAL PAPER POSITION control to obtain a finer adjustment of vertical position. This may be necessary when using pre-printed forms.

15. Close and latch the ribbon mask.

16. Rotate the HORIZONAL PAPER POSITION control to align the form horizontally; use the horizontal forms alignment scale on the ribbon mask assembly for reference.

17. Set the thickness control to match the form being loaded.

18. Close the band gate and printer window.

19. Press the TOP OF FORM switch several times to ensure that the form is advancing correctly through the tractors.

20. Press the START/STOP switch to place the printer in RUN mode (RUN indicator will light).

Occasionally, the paper will become jammed in the line printer and the printer goes off-line. If this happens, repeat Steps 2 through 13. Then press the TOP OF FORMS switch. Restart the printer job and press the ON/OFF-LINE switch.

Replenishing Forms

If you are merely replenishing the forms supply and not changing to a different form, proceed as follows:

1. Lift the printer window.

2. Unlatch and fully open the band gate and ribbon mask.

   CAUTION

   Wait until the Charaband stops rotating before proceeding to the next step.

3. Open all tractor pressure plates.

4. Insert the new form, overlapping the old one by at least one page and aligning the two at the page perforations. Close all tractor pressure plates.

5. Close and latch the ribbon mask.

6. Close the band gate and printer window.

7. Press the START/STOP switch to place the printer in RUN mode (RUN indicator is lit).

1.2.3 Controlling the Vertical Format Unit

The LP07 line printer has a direct access VFU (DAVFU) that is the software counterpart of a carriage control tape. The direct access VFU is loaded with a file containing an 8-channel by 143-line bit matrix. The ON bits in this matrix represent the punched holes in the corresponding carriage control paper tape.

NOTE

In most conventional line printers the vertical format unit is a punched paper tape. Instead of a punched paper tape, the LP07 has a direct access vertical format unit (DAVFU). A DAVFU is a programmable binary matrix that replaces the punched paper tape.

The LP07 printer provides for the software control of the print density (six or eight lines per inch) as well as for operator control by means of a switch.

Information on how to generate, store, and load DAVFU matrices is contained in the files MAKVFU.DOC and MAKVFU.HLP.

TOPS-10 Only

On a TOPS-10 system, to generate a default matrix that corresponds to Channels 1-8 of the standard line printer carriage tape for the LP10, proceed as follows:

.R MAKVFU	Run the MAKVFU program.
*OUTPUT	If this is the only command, the default matrix is generated and is stored as DSK:NORMAL.VFU on your disk area.
*EXIT	Return to the monitor.

.

To generate a custom matrix, load MAKVFU and give the appropriate MAKVFU commands as described below.

Command	Function
CHANNEL n ALL	Set all lines in logical page for channel n. (n = 1,2,...8)
CHANNEL n BOTTOM	Set last line in logical page for channel n. (n = 1,2,...8)
CHANNEL n EVERY m	Set every m-th line in physical page for channel n. (n = 1,2,...8) (m = 1,2,...length)
CHANNEL n LINES m1 m2 ...	Set lines m1, m2, ... in physical page for channel n. (n = 1,2,...8) (m1 m2... = 1,2,...length)
CHANNEL n TOP	Set line 1 in physical page for channel n. (n = 1,2,...8)
EXIT	Exit from MAKVFU.
FORMS	Clear all forms break channels.

FORMS n	Define forms break for channel n.
HELP	Display the MAKVFU.HLP file on the terminal.
INFORMATION	Display a brief description of the VFU file, including length, page size, forms break, and LPI (lines per inch) settings.
INFORMATION n	Display a description of the lines defined for channel n.
LENGTH x	Define the physical page size to be x. (x = 1 - 143). Length must be greater than or equal to page size.
LPI y	Define the print density in lines per inch, where y = 0, 6, or 8. 0 indicates density has been set manually.
OUTPUT dev:file.ext[p,pn]	Generate a binary VFU file with the specified name. If the argument is omitted, the default is DSK:NORMAL.VFU in the user's disk area.
PAGE z	Define the logical page size to be z where z = 1 - 143. Page size must be less than or equal to length.

The automatic loading of an appropriate DAVFU file is discussed under LPTSPL in the TOPS-20 Operator's Guide.

1.2.4 Changing and Reversing the Ribbon

The following procedure describes how to change the ribbon on an LP07 line printer. (See Figure 1-13.)

1. Lift the operator panel access cover and set the POWER circuit breaker to the OFF position.
2. Lift the printer window; unlatch and fully open the band gate leaving the ribbon mask against the forms.

CAUTION

Wait until the Charaband stops rotating before proceeding to the next step.

3. Using plastic gloves, grasp the ribbon rolls and force them to the right until the ribbon cores are free of the ribbon motors.
4. Pull the ribbon completely free of the band gate. Discard the ribbon unless you are reversing it.
5. Remove the new ribbon from its box and remove the plastic wrapping and any protective cardboard collars.

6. Hold the ribbon cores with the fully wound core above the other so the ribbon will unwind from the underside of the ribbon core when installed. Force the right end of the upper ribbon core against the top floating ribbon holder, align the left end with fixed ribbon holder, and allow the spring tension to lock the core into position.

7. Unwind the other ribbon core over the ribbon guide bars and Charaband. Position the lower ribbon core between the bottom ribbon holders in the same manner.

8. Ensure that the slots in the ends of the ribbon cores are engaged by the ribbon holder guide pins.

9. Ensure that the ribbon position sensor is not covered by the ribbon.

10. Close the band gate and printer window.

11. Set the POWER circuit breaker to the ON position and close the operator panel access cover.

12. When the READY indicator comes on, press the START/STOP switch to place the printer in RUN mode. (RUN indicator is lit.)

Some listings have more print on the left half of the forms. To prevent the ribbon from wearing unevenly, you can reverse the ribbon as follows:

1. Follow Steps 1-4 above to remove the ribbon.

2. Holding the two ribbon cores as you took them off the printer, rotate them so that the top and bottom cores are reversed.

3. Put the ribbon back on the printer by following Steps 6 through 12.

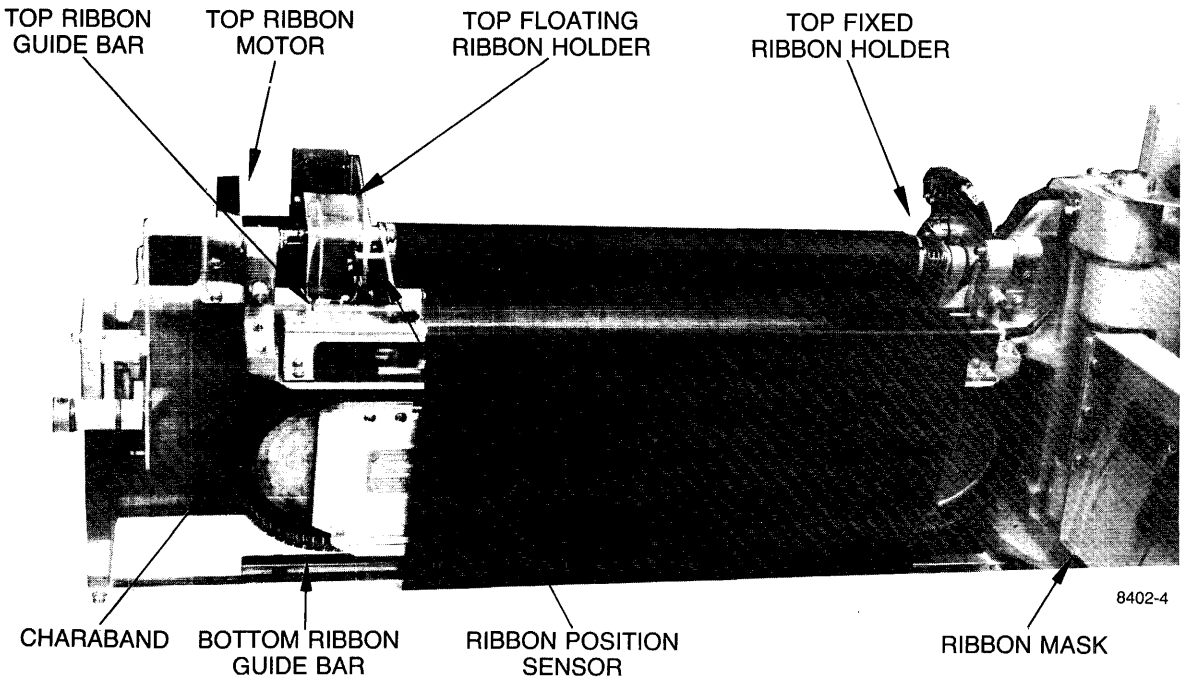

Figure 1-13: LP07 Ribbon Installation

1.3 LP10 PRINTER

1.3.1 Control Panel

The operator control panel is located on top of the printer at the left. Controls for normal operation are visible, other controls are covered by a metal plate which can be lifted from the front. The control panel is illustrated in Figure 1-14. The panel contains switches (two-position), white indicator lights (POWER indicator can be green), red error lights and two dial knobs. From the bottom up, these controls are as follows:

TOP OF FORM Switch - With the printer off-line, depressing the TOP OF FORM switch causes the paper and/or the carriage control loop to position themselves at the top of a page ready for printing.

TEST MODE Switch - With the printer off-line, causes a 132 character line to print continuously until the switch is depressed again. Used to test forms setup and also to check if all 132 hammers are firing.

ON/OFF/LINE Switch - Places the printer on-line or takes it off-line.

POWER Indicator Light - When lit, the power switch is in the ON position.

READY Indicator Light - When lit, there are no error conditions such as paper faults, no ribbon change needed, the printer can be placed on-line or the test mode switch depressed.

TEST Indicator Light - The TEST MODE switch is depressed.

ON-LINE Indicator Light - When lit, the printer can respond to the program.

ERROR LIGHTS

Whenever an error condition occurs, such as running out of paper, improper installation of format loop, or ribbon reversal needed, the ON LINE and READY lights go out. At this time one of the red error lights below may come on.

DRUM GATE Light - The drum gate is open and must be closed before printing can commence.

PAPER FAULT Light - Any of these conditions will cause this to be lit: The printer is out of paper, runaway paper motion has occurred, incorrect format loop, ribbon-reversal needed.

PRINT INHIBIT Light - When lit there is an electrical malfunction.

To turn these lights off, correct the problem and press the MASTER CLEAR Switch.

OTHER CONTROLS AND SWITCHES

POWER Switch - Powers the printer ON and OFF.

DRUM SPEED Switch - The printer can operate at both high and low speeds. Make certain the POWER Switch is OFF and the drum has ceased to rotate before changing the speed.

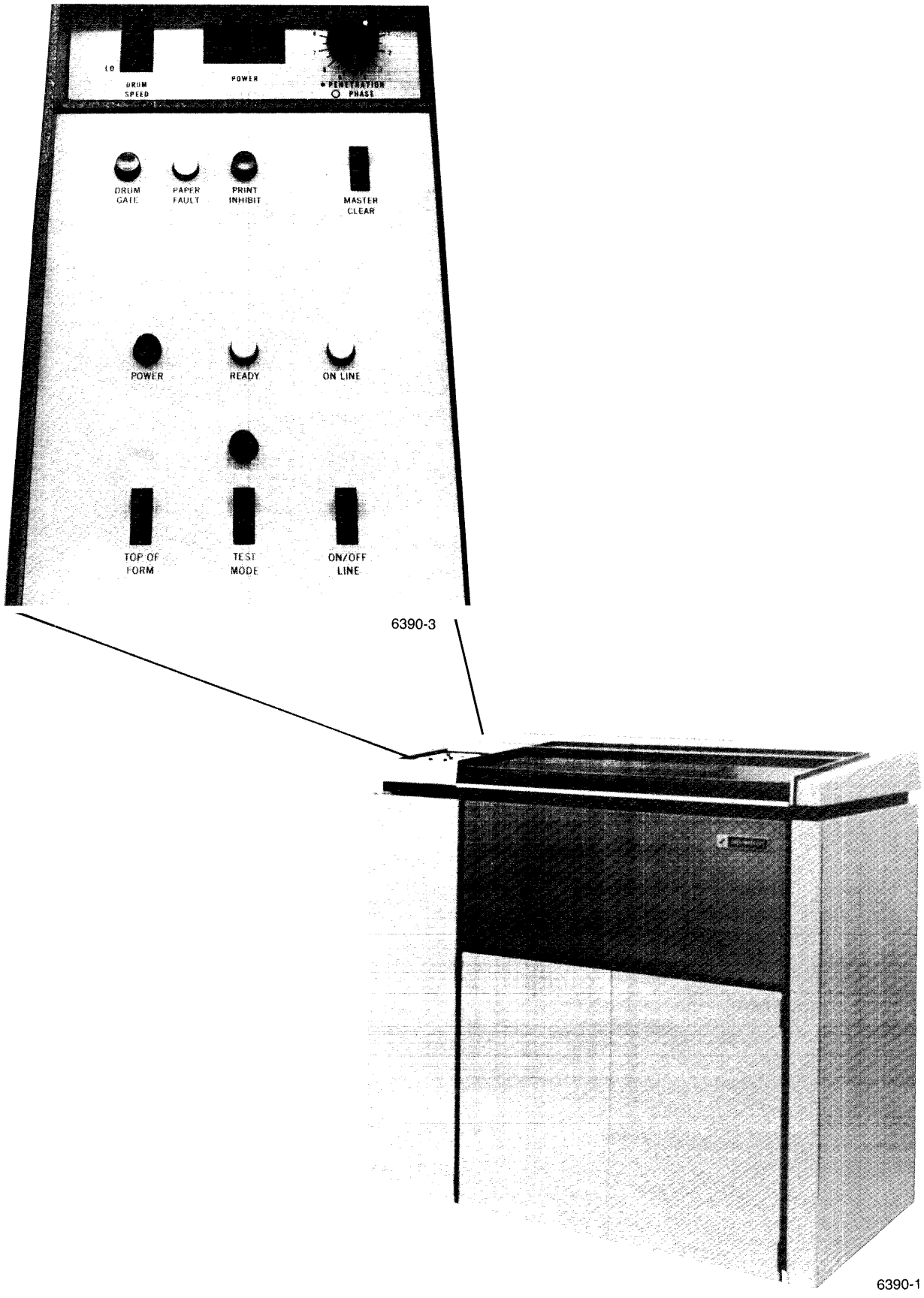

Figure 1-14: LP10 Line Printer

PENETRATION CONTROL Knob - Increasing the penetration causes the printer hammers to fire with more force. The penetration should be increased when printing forms with multiple or carbon copies. Check the quality of the bottom copy before proceeding with the entire print job.

PHASING CONTROL Knob - This is used to equalize the top-to-bottom density of the characters; the adjustment is necessary when you have changed the penetration or drum speed.

1.3.2 Changing Paper and Forms

The following procedure describes forms installation, alignment, and adjustment on an LP10 line printer. (See Figure 1-15.)

1. Press the ON/OFF-LINE switch to set the printer off-line (ON LINE indicator is not lit).
2. Lift the printer window.
3. Using the drum gate latch, unlatch and fully open the drum gate.

CAUTION

Wait for the character drum to stop rotating before you proceed.

4. Be sure that the proper vertical format tape has been mounted on the vertical format unit.
5. Press and release the TOP-OF-FORM switch.
6. Set the COPIES CONTROL LEVER to match the form being used.
7. Be sure the upper and lower left tractors are vertically aligned.
8. Rotate the FINE ADJUSTMENT thumbwheels completely clockwise on both the upper and lower right tractors.
9. Unlock the upper and lower tractor locks on the right tractors and move them to the extreme right.
10. Open all tractor pressure plates.
11. Place the left edge of the form in the upper left tractor and close the pressure plate.
12. Position the upper right tractor to allow precise alignment of the tractor feed pins to the form-feed holes in the form. Lock the upper right tractor and close the tractor pressure plate over the form.

NOTE

Do not pull the paper taut.

13. Loosen the PAPER TENSION locking knob and turn the PAPER TENSION control knob completely counterclockwise.

14. Place the form in the lower left tractor and close the pressure plate.

15. Position the lower right tractor to allow precise alignment of the tractor feed pins to the form-feed holes in the form. Lock the lower right tractor, and close the tractor pressure plate.

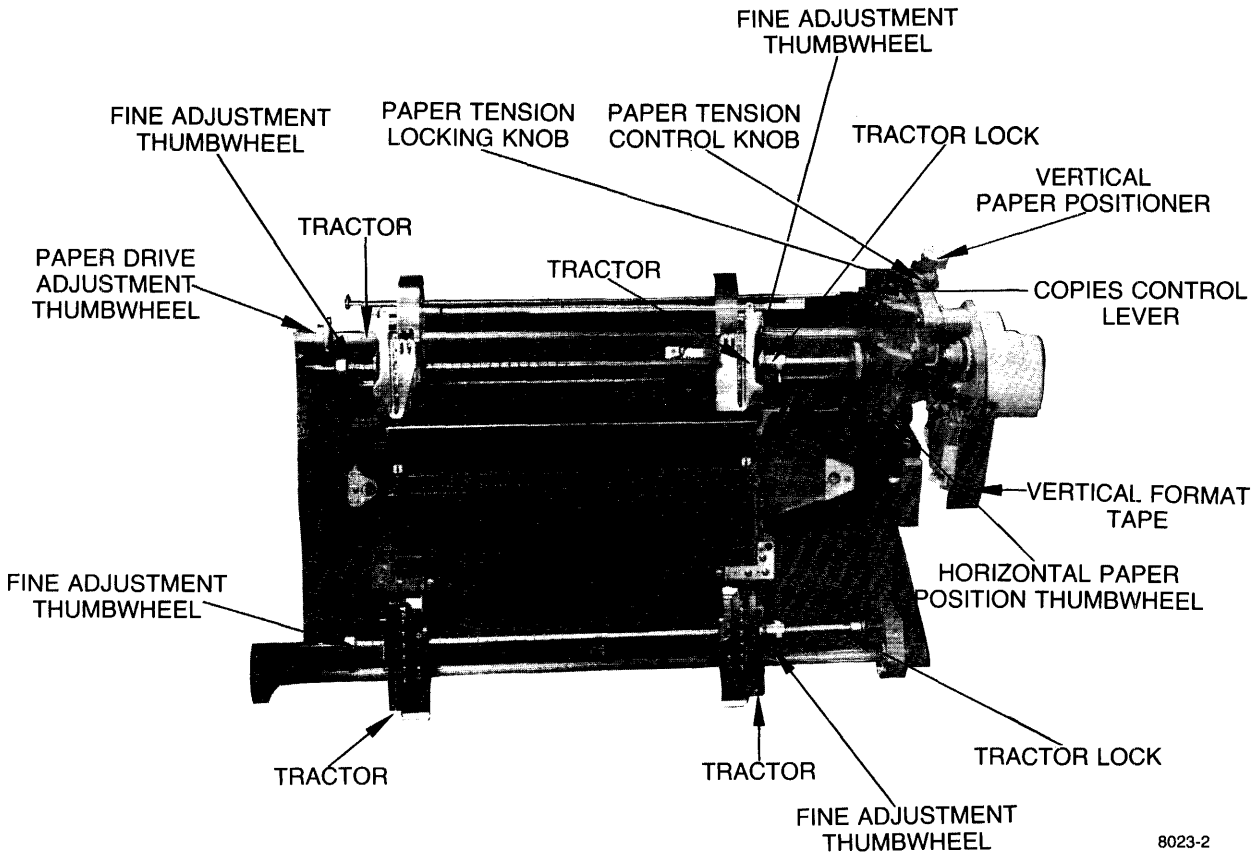

Figure 1-15: LP10 Paper Installation

16. Turn the PAPER TENSION control knob clockwise until the proper paper tension exists; this occurs when a slight crease on the top edge of the form-feed holes in the form appears. Tighten the PAPER TENSION locking knob.

17. Rotate the FINE ADJUSTMENT thumbwheel on both the upper and lower right tractors until proper horizontal paper tension exists. The tension is correct when there is a slight crease on the right edge of the form-feed holes in the form.

18. Mount the forms alignment scale (located in the paper storage area, right side) across the hammer bank area using the dowel pins located on special castings at both sides of the hammer bank.

19. Using the HORIZONTAL PAPER POSITION thumbwheel, move the form horizontally until the first print column on the form corresponds to the first column on the forms alignment scale.

20. Move the paper feed clutch lever (located to the right of the vertical format unit) to the ADJUST position. Using the PAPER DRIVE ADJUSTMENT thumbwheel, adjust the form vertically until the first print line of the form is aligned with the FORMS ALIGNMENT SCALE print line.

21. Remove the FORMS ALIGNMENT SCALE, and replace it in the scabbard (paper storage area, right side).

22. Move the paper feed clutch lever to the RUN position.

23. Close and latch the drum gate.

24. Close the printer window.

25. Check the paper tension by pressing the TOP-OF-FORM switch several times and ensuring that the paper does not pull loose from the tractor feed pins.

26. Press the ON/OFF LINE switch to set the printer on-line (ON LINE indicator lit).

Occasionally, the paper will become jammed in the line printer and the printer will go off-line. If this happens, repeat Steps 2, 3, and 7 through 17. Then press the TOP OF FORM switch, restart the printer job and press the ON/OFF LINE switch.

1.3.3 Controlling the Vertical Format Unit

To make a standard carriage control tape for vertical format control of 11-inch paper with six lines of printing per inch, do the following:

1. Obtain a manual- or machine-operated punch made to punch 12-channel carriage control tapes.

2. Obtain a carriage control tape with feed holes, channels numbered 1 through 12, and lines numbered 0 to at least 135. In this case, the tape loop accommodates two forms.

3. Align the tape in the punch to begin punching in line 0.

4. Using Table 1-1 as a guide, proceed line by line on the tape, and punch a hole for each of the channels indicated on a line.

Table 1-1: Standard LP10 Line Printer Carriage Tape

Form 1 Line	Form 2 Line	Channels Punched
00	66	1-2-3-4-5-6-7-8-9-10-11-12
01	67	5-8
02	68	3-5-8
03	69	4-5-8
04	70	3-5-8
05	71	5-8-9
06	72	3-4-5-8
07	73	5-8
08	74	3-5-8
09	75	4-5-8
10	76	3-5-6-8-9
11	77	5-8
12	78	3-4-5-8
13	79	5-8
14	80	3-5-8
15	81	4-5-8-9-10
16	82	3-5-8
17	83	5-8
18	84	3-4-5-8
19	85	5-8
20	86	3-5-6-7-8-9
21	87	4-5-8
22	88	3-5-8
23	89	5-8
24	90	3-4-5-8
25	91	5-8-9-11
26	92	3-5-8
27	93	4-5-8
28	94	3-5-8
29	95	5-8
30	96	2-3-4-5-6-8-9-10
31	97	5-8
32	98	3-5-8
33	99	4-5-8
34	100	3-5-8
35	101	5-8-9
36	102	3-4-5-8
37	103	5-8
38	104	3-5-8
39	105	4-5-8
40	106	3-5-6-7-8-9-12
41	107	5-8
42	108	3-4-5-8
43	109	5-8
44	110	3-5-8

45	111	4-5-8-9-10
46	112	3-5-8
47	113	5-8
48	114	3-4-5-8
49	115	5-8
50	116	3-5-6-8-9-11
51	117	4-5-8
52	118	3-5-8
53	119	5-8
54	120	3-4-5-8
55	121	5-8-9
56	122	3-5-8
57	123	4-5-8
58	124	3-5-8
59	125	5-8
60	126	5
61	127	5
62	128	5
63	129	5
64	130	5
65	131	5

5. After you have punched all the lines through 131, cut the tape at line 135. Spread some rubber cement between lines 129 and 135. Place line 0 over line 132. Keeping the feed holes aligned, press the ends of the tape together.

6. Repunch the holes covered by the overlapped tape.

7. Set the printer off-line, and open the printer cover.

8. Lift the tape loop reader handle so that the sprocket shoe clears the sprocket teeth.

9. Place the tape over the tape loop reader capstan so that the feed holes are over the sprocket teeth. Be sure that channel 12 of the tape is toward your left as you are facing the front of the line printer.

10. Close the tape loop reader. Be sure the tape stays attached to the drive sprocket while you clamp the drive sprocket shoe in place.

11. Press TOP-OF-FORM. The tape should halt with the channel 1 star wheel just beyond the TOP-OF-FORM hole.

12. Align forms vertically.

13. Close the printer cover.

The standard LP10 carriage tape causes the vertical actions shown in Table 1-2. Channels 1 through 8 are used by system software, and channels 9 through 12 are used by diagnostic programs.

Table 1-2: Standard LP10 Line Printer Vertical Action

Channel	Vertical Action
1	Top of form.
2	Space half a page (30 lines).
3	Double space with automatic top of form after 30 impressions.
4	Triple space with automatic top of form after 20 impressions.
5	Single space (Channel 5 is the only channel that can be specified for the last six lines of the page).
6	Space one-sixth of a page (10 lines).
7	Space one-third of a page (20 lines).
8	Single space with automatic top of form after 60 impressions.
9	Space one-twelfth of a page (5 lines).
10	Space one-fourth of a page (15 lines).
11	Space 25 lines.
12	Space 40 lines.

A programmer wanting a nonstandard carriage control tape must tell you what channels need to be punched on each line. Be sure that you punch a tape to accommodate the number of forms that are needed to make the tape loop at least ten inches in circumference.

1.3.4 Changing and Reversing the Ribbon

The following procedure describes how to change the ribbon on an LP10 line printer. (See Figure 1-16.)

1. Use the plastic gloves supplied with the ribbon.
2. Press the ON/OFF-LINE switch to set the printer off-line (ON LINE indicator not lit.)
3. Lift the printer window.
4. Move the drum gate latch left and pull forward to fully open the drum gate.

CAUTION

Wait for character drum to stop rotating before you proceed.

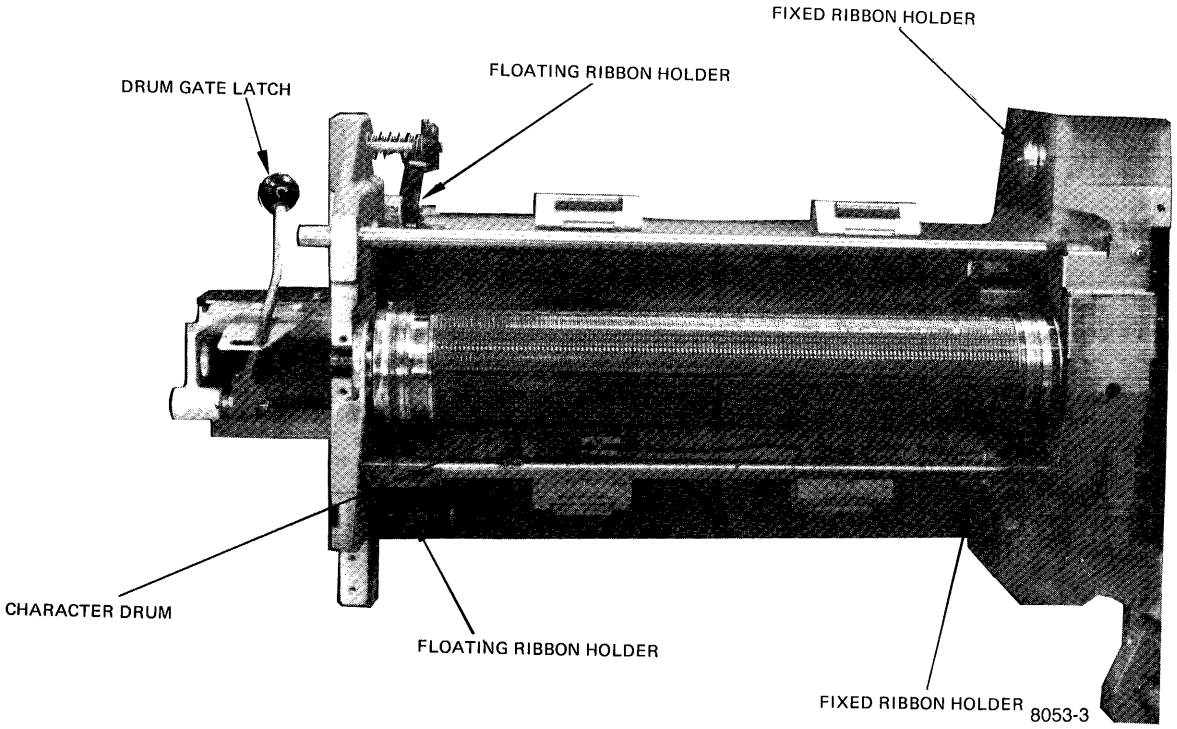

Figure 1-16: LP10 Ribbon Installation

5. Grasp the ribbon cores and force them to the left toward the drum gate latch until the floating ribbon-holder springs are completely compressed.

6. Remove the ribbon by pulling the right end of the ribbon cores away from the drum gate. Discard the ribbon unless you are reversing it. (See below.)

7. Remove the new ribbon from the box and hold the ribbon cores together. Remove any protective cardboard collars.

8. Place the fully wound ribbon core over the bottom floating ribbon holder.

9. Push the core to the left and place the right end over the bottom fixed ribbon holder. Be sure that the holder guide-pin slips into the slot on the core end.

10. Unwind enough of the fully wound ribbon core to bring the ribbon up and over the character drum.

11. Slip the ribbon between the ribbon guide clips and the box sensor.

12. Place the ribbon core against the top floating ribbon holder.

13. Push the core to the left and place the right core end over the top fixed ribbon holder. Be sure that the holder guide-pin slips into the slot on the core end.

14. Close and latch the drum gate.

15. Close the printer window.

16. Press the ON/OFF-LINE switch to set the printer on-line (ON LINE indicator is lit).

Most listings have more print on the left half of the paper. Therefore, to prevent the ribbon from wearing unevenly, you should reverse the ribbon. Do the following:

1. Follow Steps 1 through 6 above to remove the ribbon.

2. Holding the two ribbon cores as you took them off the printer, rotate them clockwise until the top core is at the bottom. Now the top and bottom cores are reversed.

3. Put the ribbon back on the printer by following Steps 9 through 16 above.

1.4 CLEANING A LINE PRINTER

In addition to the general cleaning procedures for impact printers given at the beginning of the chapter, you should pay particular attention to the printing elements.

You should inspect the Charaband assembly on the LP07 daily for excessive ink and paper residue collection. Use isopropyl alcohol to clean away ink accumulation from the Charaband slugs. Whenever the Charaband is removed or reversed, the roadbed and top ribbon guide should be vacuumed.

You should clean the character drum on the LP10, LP05, LP14, LP26 and LP27 every 100 hours or sooner, using a soft suede brush and a vacuum cleaner. Every 500 hours or sooner, clean the character drum with isopropyl alcohol.

1.5 CONTROLLING THE TOPS-20 CHARACTER TRANSLATION RAM

There are two files on the TOPS-20 system to control the character translation RAM (random-access memory). The file SYS:LP64.RAM is used for 64-character-set printers and the file SYS:LP96.RAM is used for 96-character-set printers. This RAM controls the way characters are treated by the line-printer controller (LP20). After TOPS-20 is started, this RAM is loaded according to a PRINTER command in <SYSTEM>n-CONFIG.CMD, where n is the TOPS-20 release number. (See the TOPS-20 KL Model B Installation Guide for more information on n-CONFIG.CMD.)

If a RAM file gets destroyed, you can re-create it with MAKRAM. The instructions for running MAKRAM are in the files MAKRAM.HLP and MKR3-20.DOC.

1.6 LN01 LASER PRINTER

The LN01 laser printer is a microcomputer-based laser output device which forms electrostatic images for xerographic reproduction.

The LN01 produces xerographic originals on single 8 1/2-by-11 inch sheets, a page at a time, at a maximum rate of 12 pages per minute (approximately 600 lines per minute). Pages can be printed with either a vertical (80 characters wide) or a horizontal (132 characters wide) orientation. Note that the LN01 prints a page at a time, not a line at a time. No output occurs until a page terminator character (a form feed, for instance) is received.

The LN01 uses a 142-character line buffer for the horizontal orientation and a 150-character line buffer for the vertical orientation.

Overstriking characters on the LN01 is possible within the limits of the line buffer size (in other words, everything to be overprinted must fit in the buffer at once). However, bold characters cannot be made this way since the image is not built up by impact.

NOTE

In the case of the LN01 laser printer, it is especially important to have on hand the following three manuals for reference:

- LN01 Programmer Reference Manual
- LN01 Electronic Printer Installation Guide
- LN01 Electronic Printer Operator Guide

Certain operation and maintenance procedures can **only** be performed by **licensed** Field Service personnel.

Commands for loading fonts in the LN01 are described in the TOPS-10 Operator's Guide.

1.6.1 Control Panel

The control panel for the LN01 laser printer is located on the top of the printer as shown in Figure 1-17. There are five displays on the panel (as numbered in the illustration), indicating the following:

On-Line - Ready to make prints. Normal mode.

Off-Line - Stops printing. Used for testing and service.

Test - Makes a test print (off-line only). DEC Field Service use.

Display - Displays status code.

Keyboard - Keyboard is for service actions.

A small instructions booklet is attached to the LN01 printer.

NOTE

Maintenance of the LN01 laser printer should be provided only by Digital Field Service personnel.

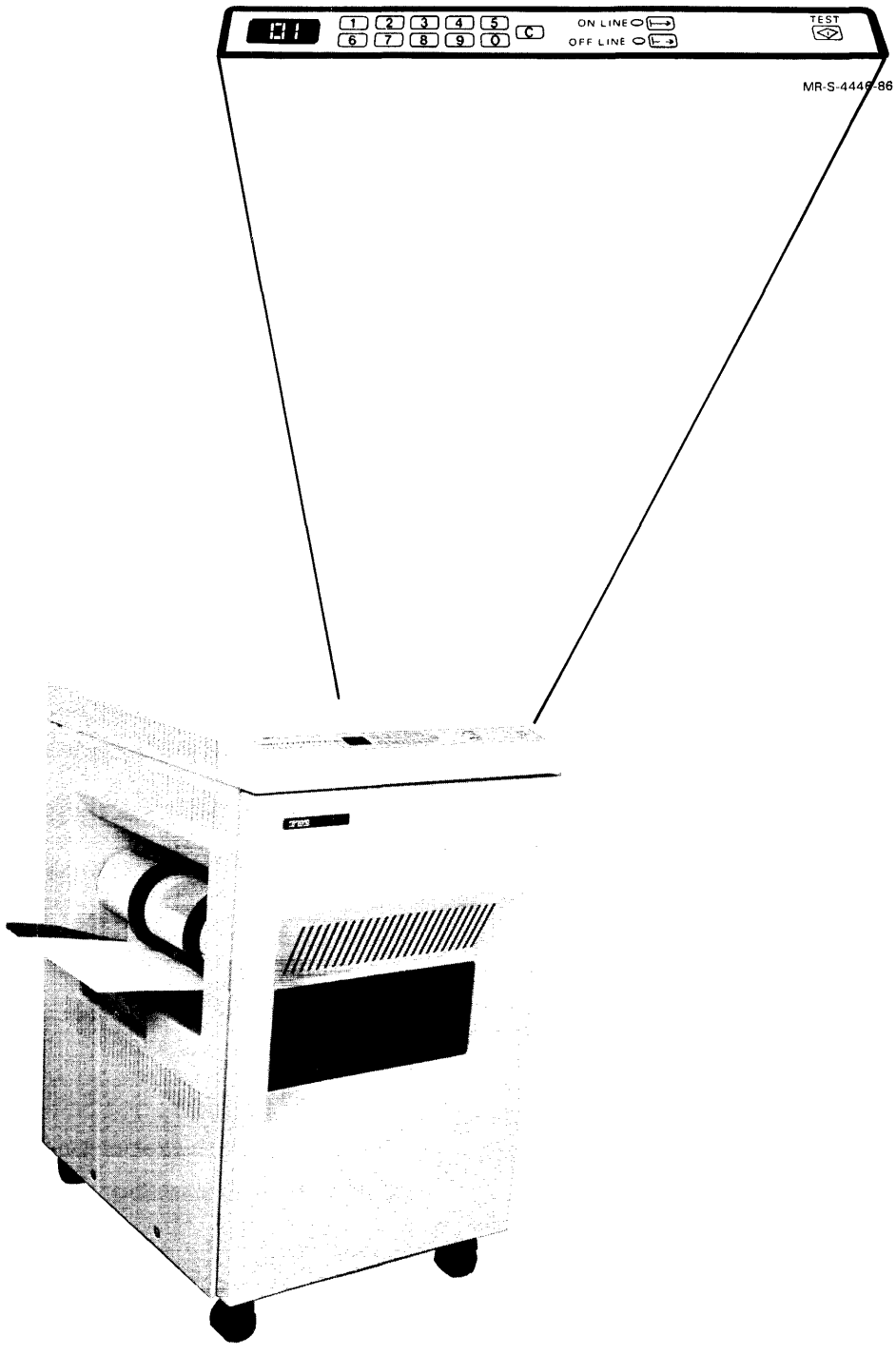

Figure 1-17: LN01 Laser Printer

1.6.2 Loading Paper

This section shows you how to remove the paper cassettes and load paper.

To remove the paper cassettes:

1. Turn the cassette selector handle to the left (counterclockwise).
2. Pull the paper cassettes all the way out of the LN01.

To load paper:

1. Load paper from the package with the label right side up. This step ensures the paper curl matches the drum curl.

NOTE

For the best results, use only DIGITAL LN01X-AB paper or the equivalent. Call your local DIGITAL representative for information on equivalent papers.

2. Load paper into the paper cassettes (Figure 1-18). Do not load above the maximum fill line. Make sure to stack all paper under the tray positioning bars. If the paper is predrilled, make certain the holes are to the right. Load letterhead paper with the letterhead face down and to the rear.

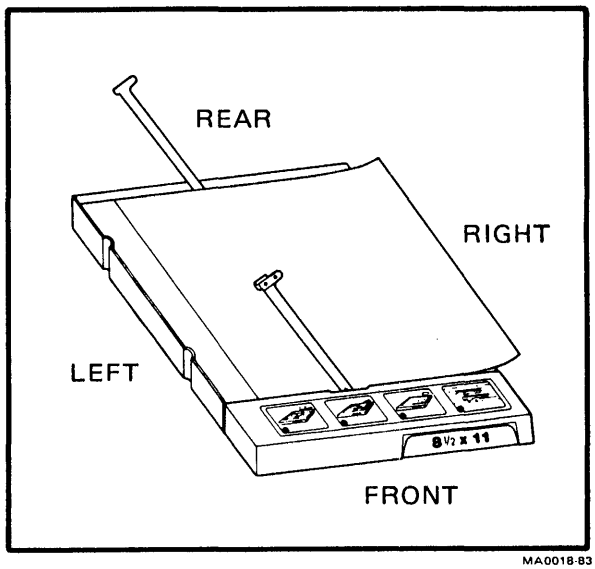

Figure 1-18: LN01 Paper Cassette

3. Insert the cassettes into the LN01 and slide the cassettes all the way in.
4. Turn the selector handle upright (clockwise). If a print job was halted by the "out of paper" status code (C4), the LN01 automatically starts printing again.

1.6.3 Controlling the Vertical Format Unit

This feature is controlled by the software on the LN01. See the LN01 Programmer's Reference Manual for information about the VFU.

1.6.4 Checking and Adding Dry Imager

Dry imager is the black powder that forms the image on LN01 prints. To keep the image quality high, you should perform the following steps as needed:

- Check the dry imager and paper cassettes (DIGITAL recommends checking the dry imager and cassettes at the start of your shift).
- Add dry imager.
- Stir dry imager.
- Load paper.
- Check the print quality.
- Unload the output tray.

Never store dry imager in an area where the temperature exceeds 110 degrees Farenheit (26 degrees Centigrade).

Always keep the dry imager supply at a level above the agitator blades, but below the top of the hopper. Otherwise, prints become lighter when the dry imager runs low. Sometimes the dry imager may require stirring with the stirring paddle. Check the dry imager as follows:

1. Open the access door (Figure 1-19).

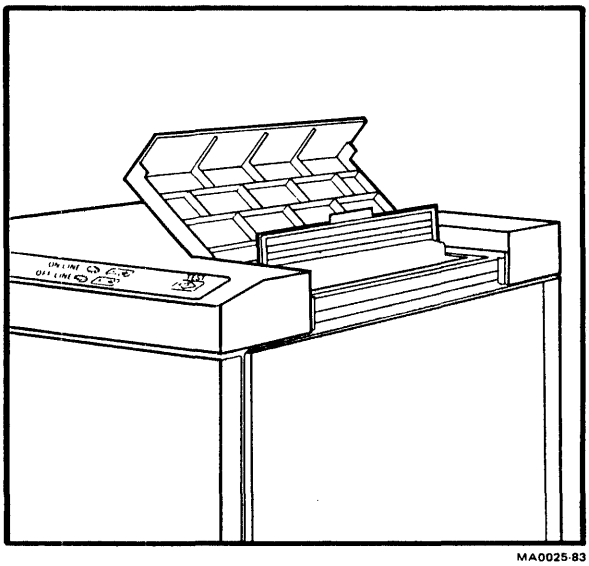

Figure 1-19: LN01 Access Door

2. Lift the cover of the dry imager hopper.

3. If you can see the agitator blades (Figure 1-20), add LN01X-AA dry imager or the equivalent, as follows:

   a. Carefully read and follow the instructions on the label of the dry imager bottle.

   b. Shake the dry imager well before adding.

   c. Place the funnel top on the dry imager bottle.

   d. Carefully fill the dry imager hopper above the level of the agitator blades, but leave at least 1/2 inch below the top of the hopper (Figure 1-20). Stir.

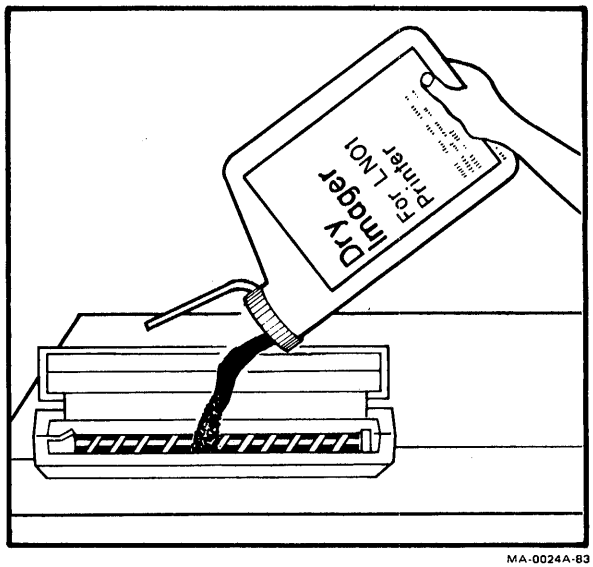

Figure 1-20: Adding Dry Imager to the Hopper

4. Avoid spilling dry imager outside the hopper area. If you do, wipe it up with a dry cloth.

CAUTION

To prevent damage to the LN01, use only LN01X-AA dry imager or its equivalent. Call your local DIGITAL representative for information on LN01X-AA equivalents.

5. Close the dry imager hopper cover.

NOTE

If you get any dry imager on your hands or clothes, you can brush, vacuum, or wash it off. Use cold water only.

NOTE

Do not attempt to clean the LN01 Laser Printer yourself. Call your Digital Field Service Representative for maintenance on the LN01.

1.7 LN03 LASER PRINTER

The LN03 laser printer is a nonimpact page printer that uses laser recording technology to produce high-quality printed output. When performing continuous text printing, the LN03 prints eight pages per minute.

1.7.1 Indicator Panel

The indicator panel is located on the front of the LN03 in the upper right-hand corner. (See Figure 1-21.) The panel can display the following symbols, shown in Figure 1-21 inset:

1. CHARACTER DISPLAY - Displays informational or error code.

   NOTE

   A flashing "6" on the CHARACTER DISPLAY is not an error condition. It indicates the printer is busy loading fonts, which can take several minutes.

   A steady "6" on the CHARACTER DISPLAY indicates there is still data in the buffer. Press ON/OFF LINE twice to eject the last page of print.

2. PAPER JAM - Flashes with "E" on CHARACTER DISPLAY when paper exit area needs clearing. Flashes with "F" on CHARACTER DISPLAY when paper feed area needs clearing.

3. CONTROLLER ERROR - Flashes to indicate an error caused by the controller.

4. ON/OFF LINE Indicator Button - Press to set printer ON-LINE or OFF-LINE. Lit when the printer is ON-LINE.

5. READY Indicator - Flashes when the printer is warming up. Lit steadily when the printer is ready to print. The READY indicator remains OFF when the printer is printing.

6. POWER Indicator - Lit when printer power is ON.

7. CALL FIELD SERVICE - Flashes with CHARACTER DISPLAY when printer needs repair.

8. ADD PAPER - Flashes when paper tray is empty (see Loading Paper, Section 1.7.2).

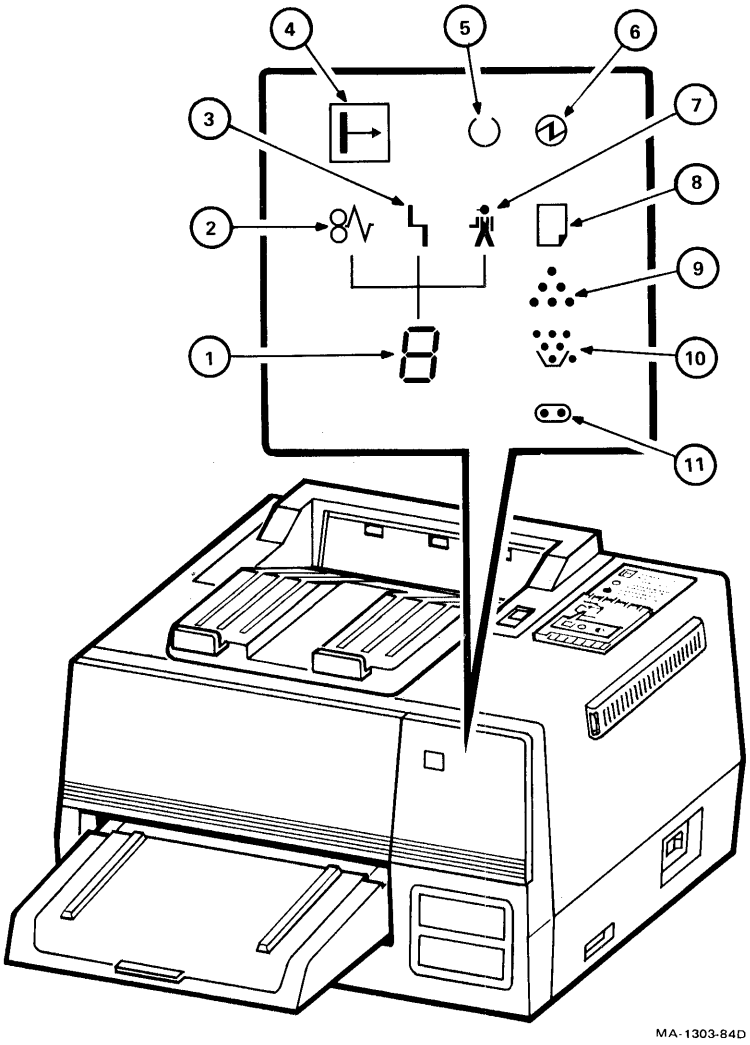

Figure 1-21: LN03 Indicator Panel

9. REPLACE TONER CARTRIDGE & CLEANING PAD - Flashes when toner cartridge and cleaning pad need to be replaced (see Replacing the Toner and Cleaning Pad, Section 1.7.3).

10. REPLACE TONER COLLECTION BOTTLE - Flashes when toner collection bottle is full or not present (see Replacing the Toner Collection Bottle, Section 1.7.4).

11. MAINTENANCE - Lit when printer needs maintenance. See Installing and Using the LN03A or the LN03 User Maintenance Kit (PN LN03X-AD) for maintenance procedures.

An operator reference booklet is attached to the top of the printer.

1.7.2 Loading Paper

To load paper, lift the paper tray cover and place paper in the paper tray (Figure 1-22). (The side that is up in the paper tray is the side that will be printed.) Then close the paper tray cover.

To avoid paper jams, do not add paper above the paper tray limit line, shown in Figure 1-22 inset.

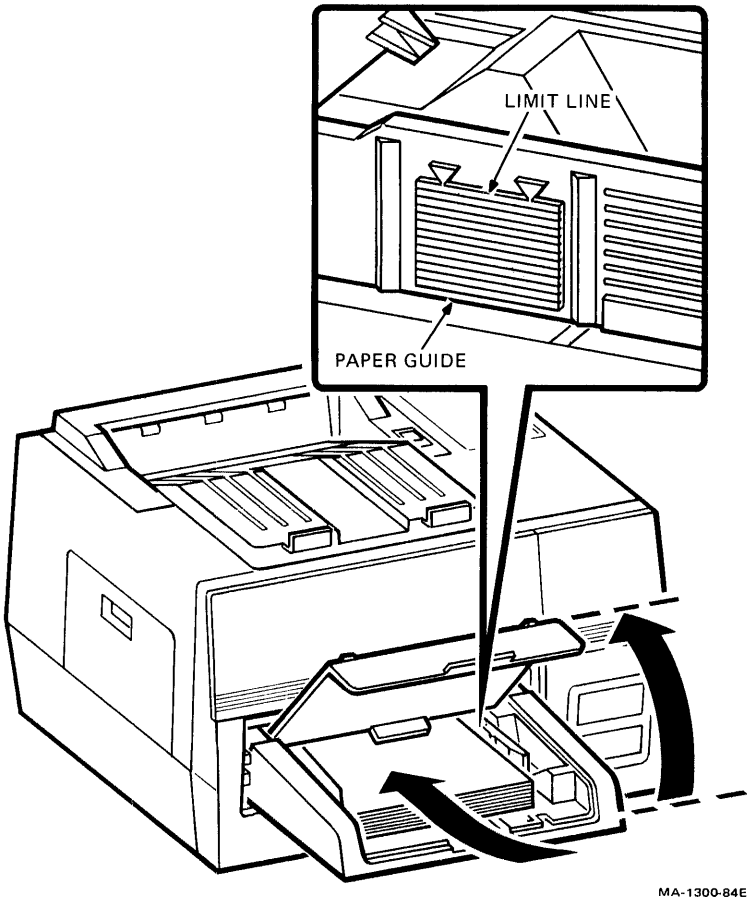

Figure 1-22: LN03 Paper Tray

NOTE

Use only high quality paper such as DIGITAL's LN03X-AF and/or LN03X-AH to ensure smooth operation of your LN03.

1.7.3 Replacing the Toner Cartridge and Cleaning Pad

The LN03 indicates when it needs paper, toner, or maintenance by flashing the appropriate indicator panel symbol.

Instructions for replacing the toner cartridge and cleaning pad are included in the LN03 Toner Kit (PN LN03X-AC) and in the manual Installing and Using the LN03A. Use the following procedure if you do not have those instructions.

CAUTION

Too much toner can damage the printer. Add one toner cartridge and cleaning pad to the printer only when the REPLACE TONER CARTRIDGE & CLEANING PAD indicator lights.

1. Power off the printer.
2. Check that the printer's paper tray is installed.
3. Pull the development drawer out firmly, letting it slide in the guide tracks on the paper tray cover until it stops (see Figure 1-23).

CAUTION

Do not open the development drawer without the paper tray installed. The paper tray supports the development drawer.

4. Open the toner cartridge cover (see Figure 1-24).
5. Remove the old toner cartridge by sliding it to the left and then up (see Figure 1-24 inset).
6. Shake the new toner cartridge vigorously for about 15 seconds.

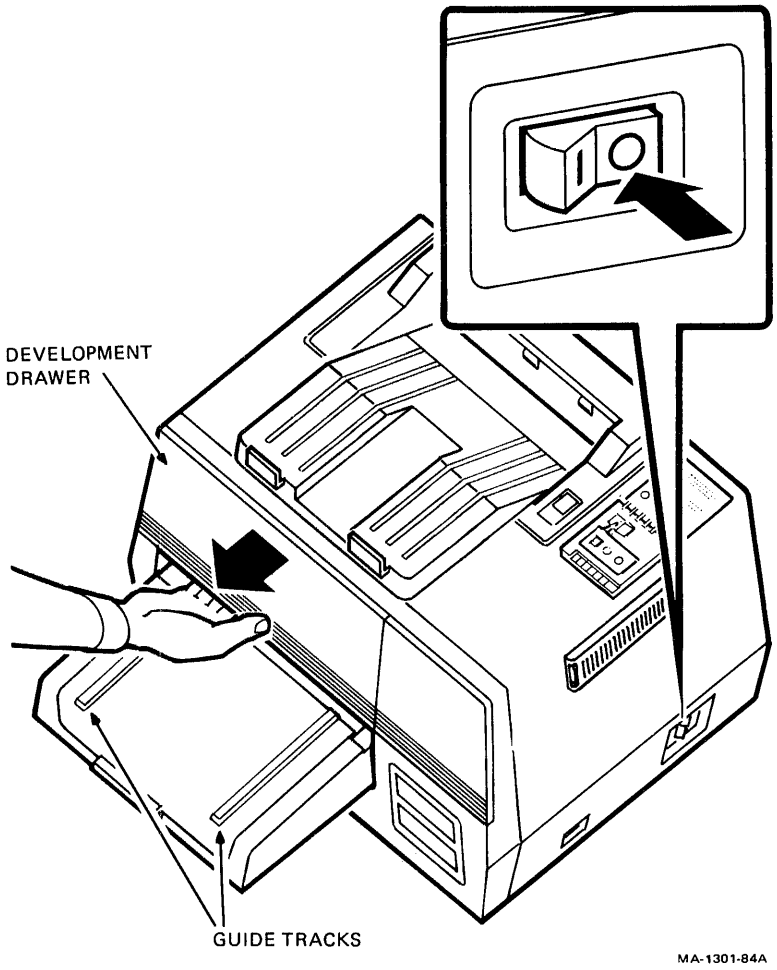

Figure 1-23: LN03 Development Drawer

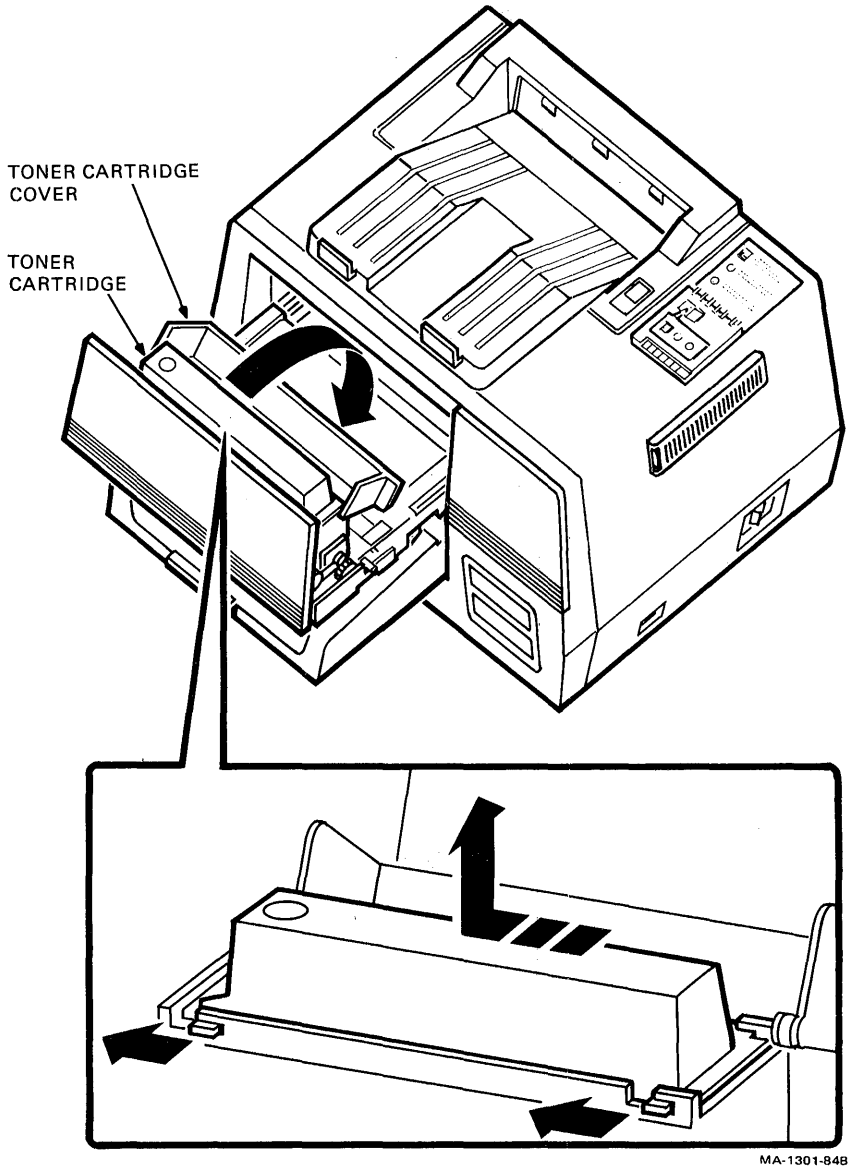

Figure 1-24: LN03 Toner Cartridge

7. Install the toner cartridge, foil side down, so the release tab is on the right side and the cartridge guides are in the hopper notches.

8. Slide the toner cartridge to the right until the guides stop against the hopper notches (see Figure 1-25).

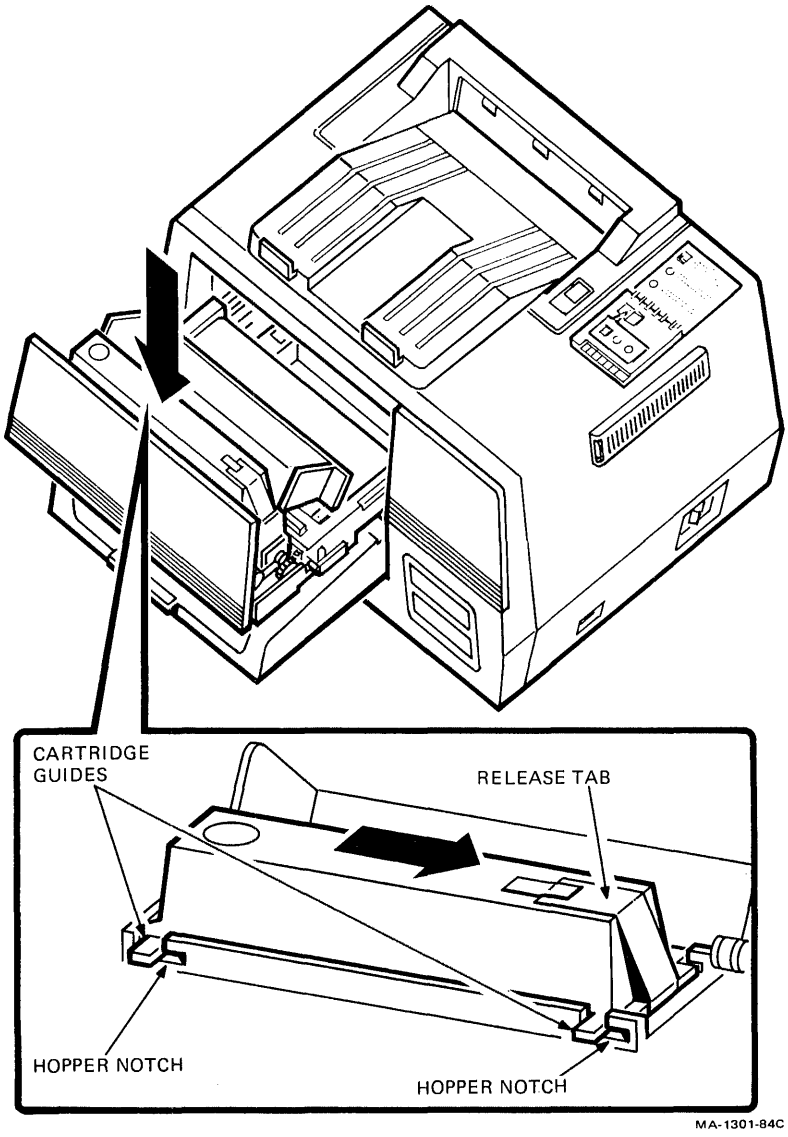

Figure 1-25: LN03 Toner Cartridge Hopper Notches

9. Move the release tab from the top of the toner cartridge; let the tab hang from the right side of the cartridge.

10. Close the toner cartridge cover.

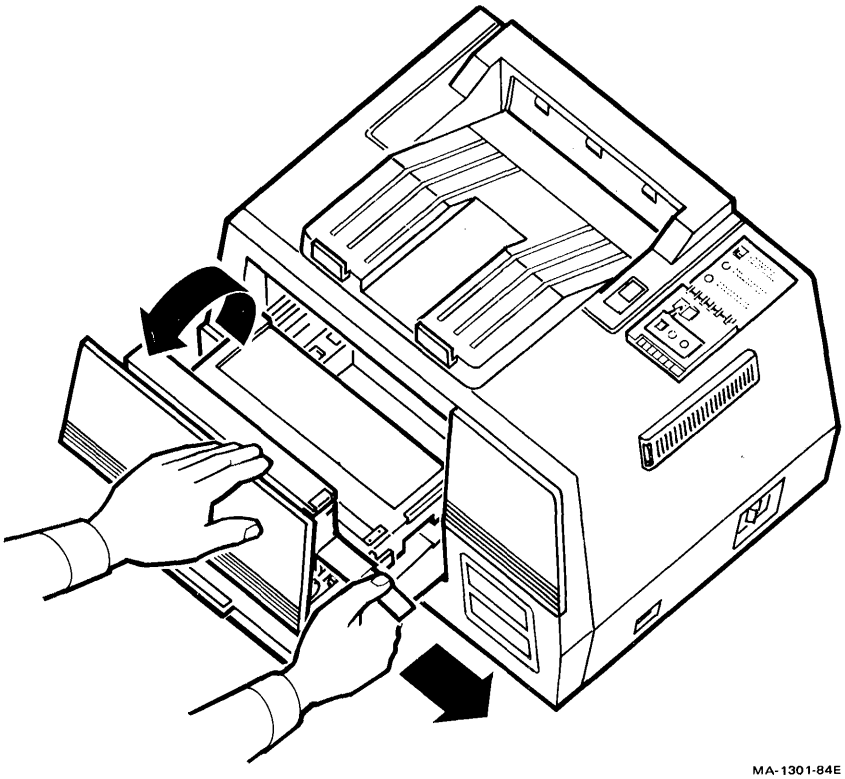

Figure 1-26: LN03 Toner Cartridge Release Tab

11. Holding the toner cartridge cover down securely, pull the release tab out firmly until the second release tab appears (see Figure 1-26).

12. Pull the second tab out firmly to release the toner and remove the tabs.

CAUTION

Do not remove the toner cartridge after adding the toner. The cartridge acts as a cover to keep stray toner from damaging the printer.

13. Close the development drawer.

You are now finished replacing the toner cartridge. Steps 14 through 21 describe how to replace the cleaning pad.

WARNING

To prevent personal injury, the printer should remain off for 40 minutes until completely cool before you open the fusing unit cover to replace the cleaning pad.

14. Open the paper exit cover by lifting its release lever (see Figure 1-27).

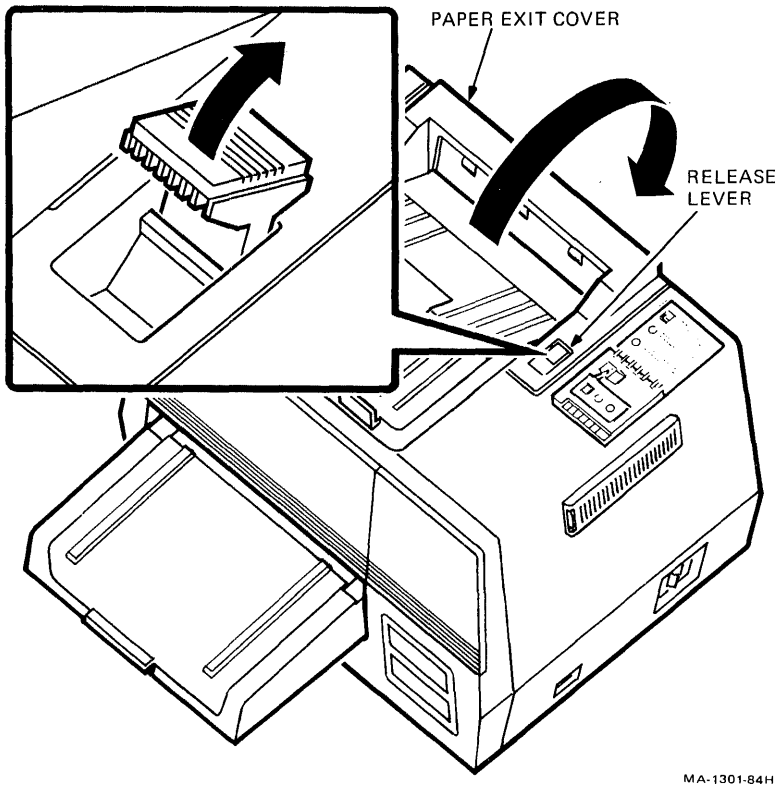

Figure 1-27: LN03 Paper Exit Cover Release Lever

15. Push the lock lever firmly toward the rear of the printer until the fusing unit rests on the paper exit cover (see Figure 1-28).

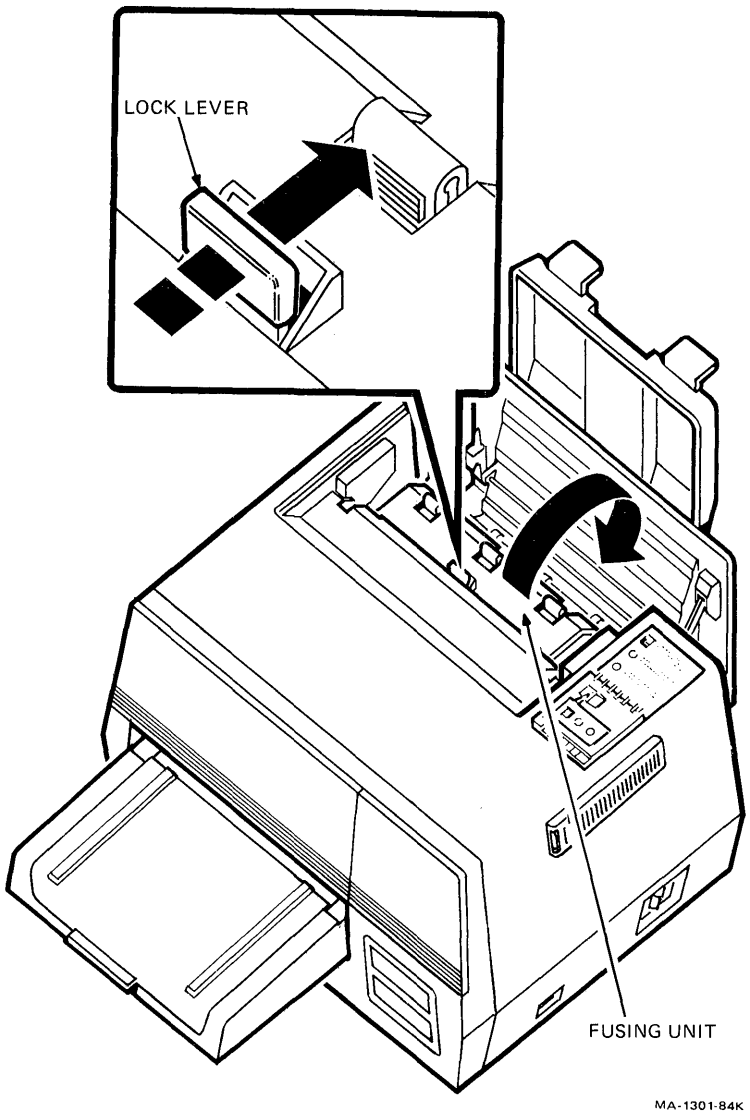

Figure 1-28: LN03 Paper Exit Cover Lock Lever

16. Open the fusing unit cover by pushing the two locking tabs back (see Figure 1-29).

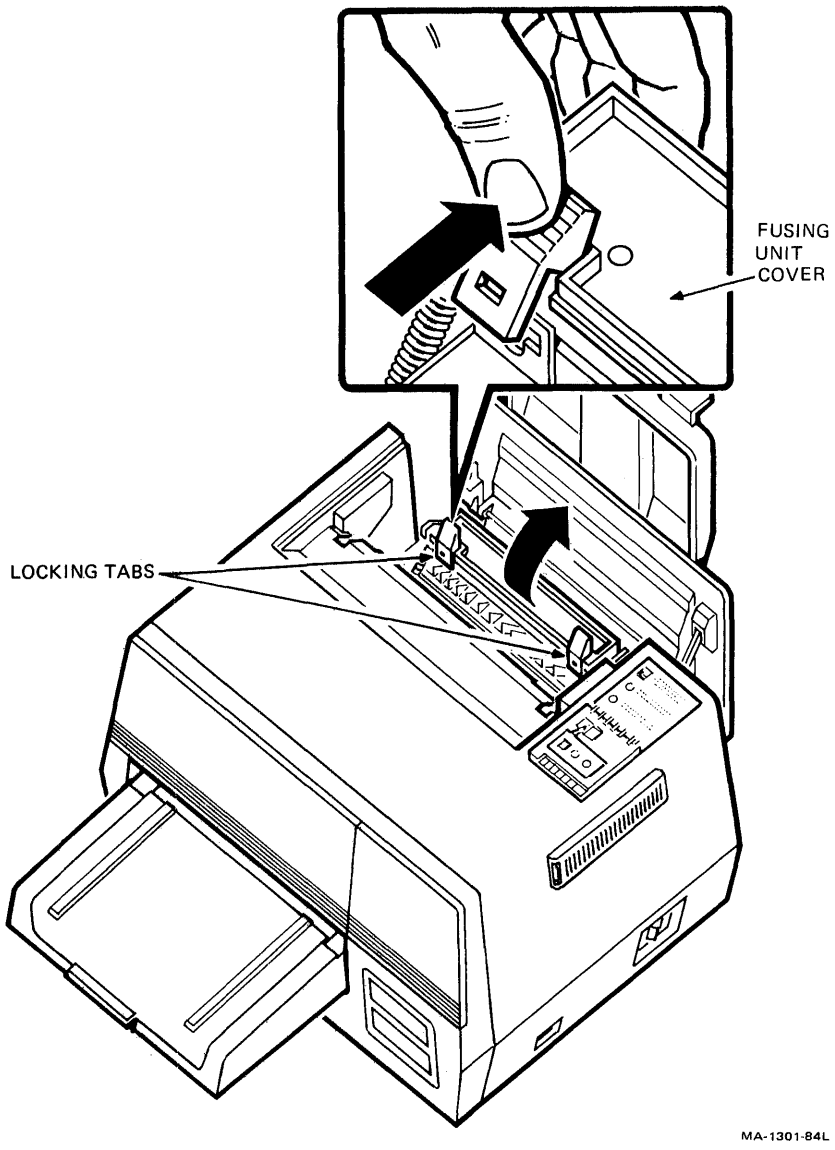

Figure 1-29: LN03 Fusing Unit Cover Locking Tabs

17. Remove the old cleaning pad (see Figure 1-30).

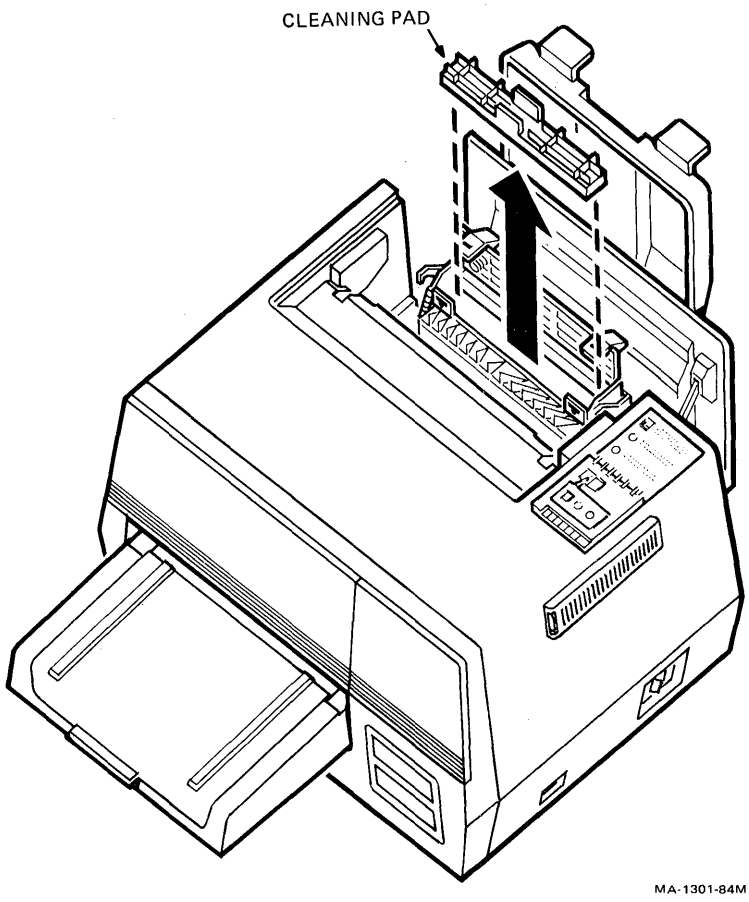

Figure 1-30: LN03 Cleaning Pad

18. Insert a new cleaning pad.

19. Close the fusing unit cover.

20. Pull the fusing unit forward until it locks into its operating position.

21. Close the paper exit cover.

22. Power on the printer.

23. Print ten summary sheets by pressing the test button at the rear of the printer for each sheet.

NOTE

The summary sheets are printed to properly seat the cleaning pad to the heat roller. After ten sheets the print quality should be clean and legible.

1.7.4 Replacing the Toner Collection Bottle

Replace the toner collection bottle when the REPLACE TONER COLLECTION BOTTLE indicator lights (see Figure 1-31).

Instructions for replacing the toner collection bottle are included in the LN03 Toner Kit (PN LN03X-AC) and in the manual Installing and Using the LN03A. Use the following procedure if you do not have those instructions.

1. Open the left side cover (see Figure 1-31).

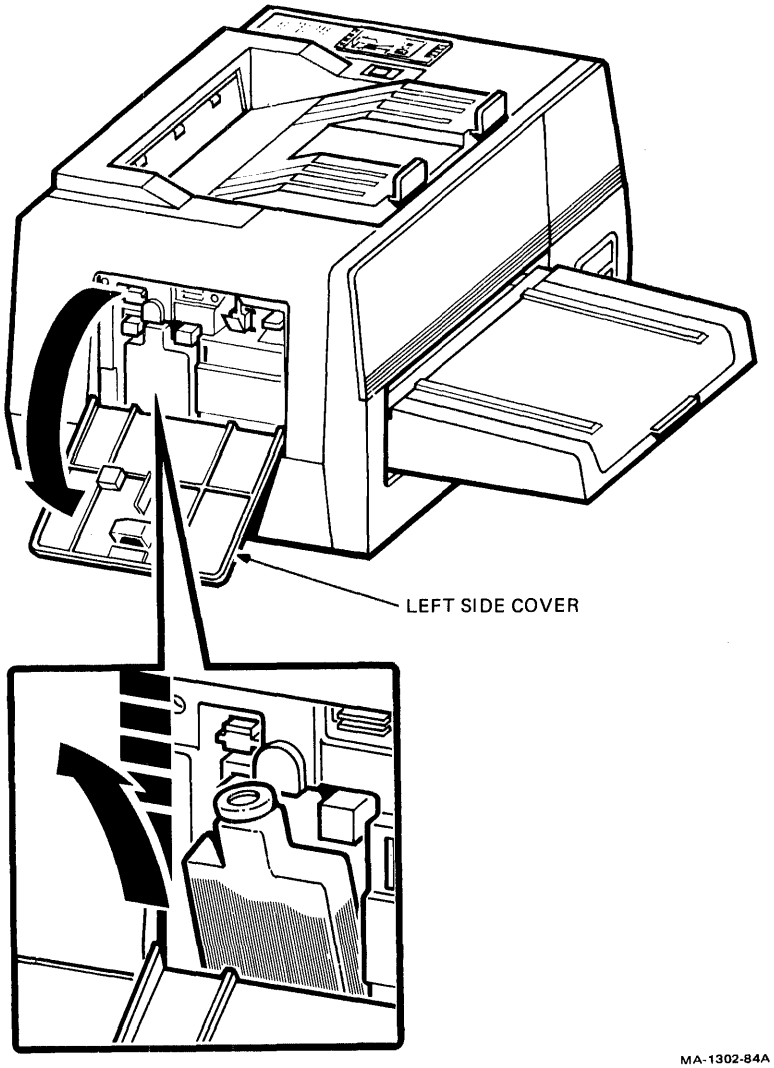

Figure 1-31: LN03 Toner Collection Bottle

2. Remove the old, full toner collection bottle by gently pushing it down and then lifting it out at a slight angle (see Figure 1-31 inset).

3. Remove the cap from the new toner collection bottle and place the new cap on the bottle of used toner. Discard the old bottle.

CAUTION

Do not reuse toner from the toner collection bottle. Used toner will damage the development unit.

4. Insert a new toner collection bottle.

5. Close the left side cover.

After adding toner, clean the external surfaces with a soft, damp cloth. Vacuum the feed, exit, and fusing areas.

CHAPTER 2

CARD READERS

The operator control panels for the high-speed reader CR10-E and the low-speed reader CR10-F are shown in Figures 2-1 and 2-2, respectively.

2.1 LIGHTS AND SWITCHES

At the back of each card reader are a power switch and two toggle switches. For normal operation the toggle switches should be set in the REMOTE and AUTO positions. Setting the mode switch to MANUAL takes the reader off-line.

The following alarm indicator lights are used as follows:

HOPPER CHECK - When lit, the hopper is empty or the stacker is full. Add cards to the hopper and/or remove them from the stacker. Press RESET to proceed.

STACK CHECK - The last card is not seated properly in the stacker. Check for a mutilated card.

PICK CHECK - The reader attempted to read a card but the card failed to reach the read station. Check the hopper for mutilated or worn edges, rubber bands or staples, warpage of the cards. If the cards are all right, check the picker face for ink build-up and clean with alcohol if necessary. Press RESET to proceed.

READ CHECK - Card has torn edges or is mispunched. This can also indicate a failure in the read electronics.

When one of the above lights comes on, the RESET light goes out. After the trouble has been corrected, press RESET to allow the program to continue.

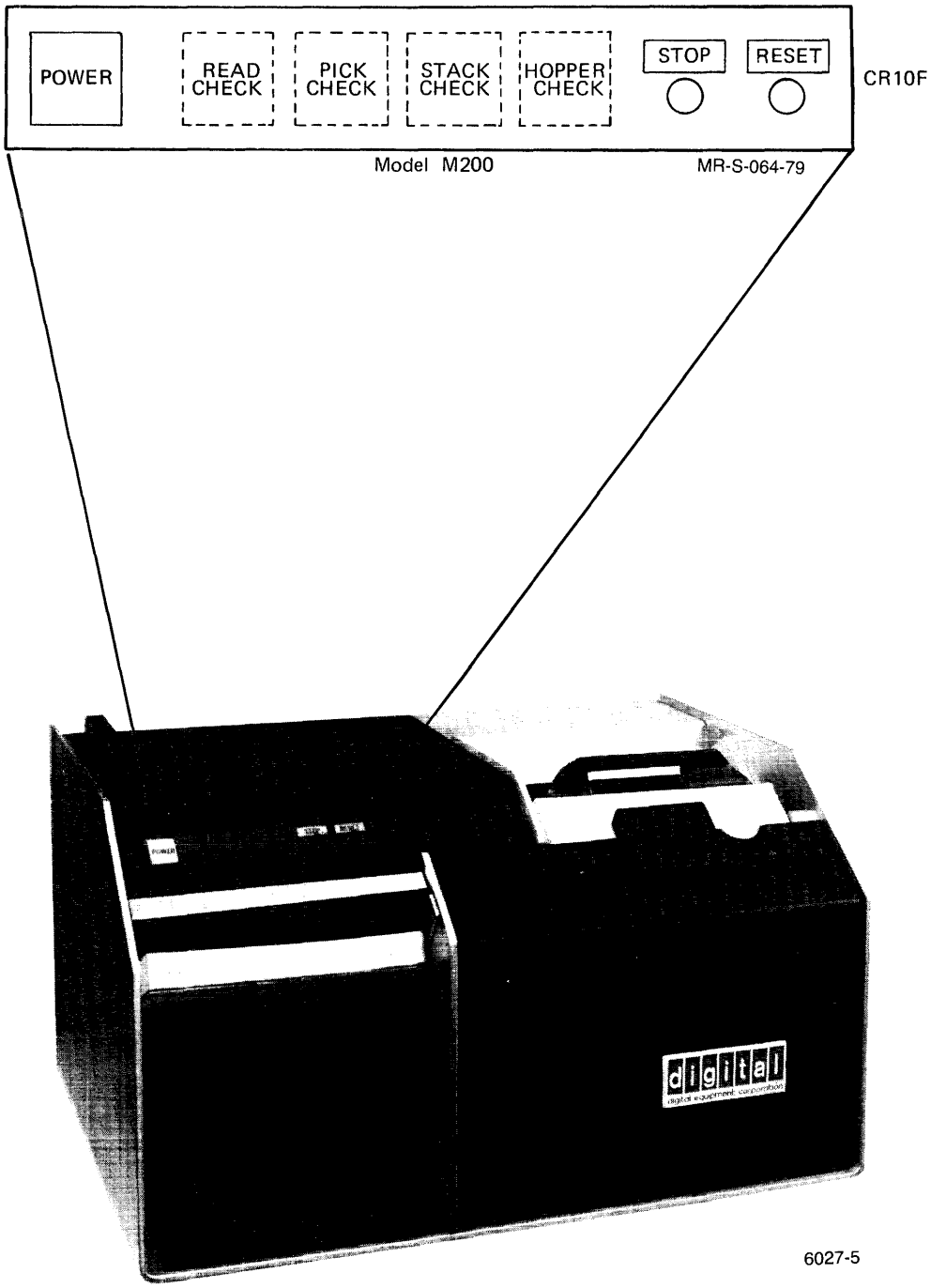

Figure 2-1: CR10-E Card Reader

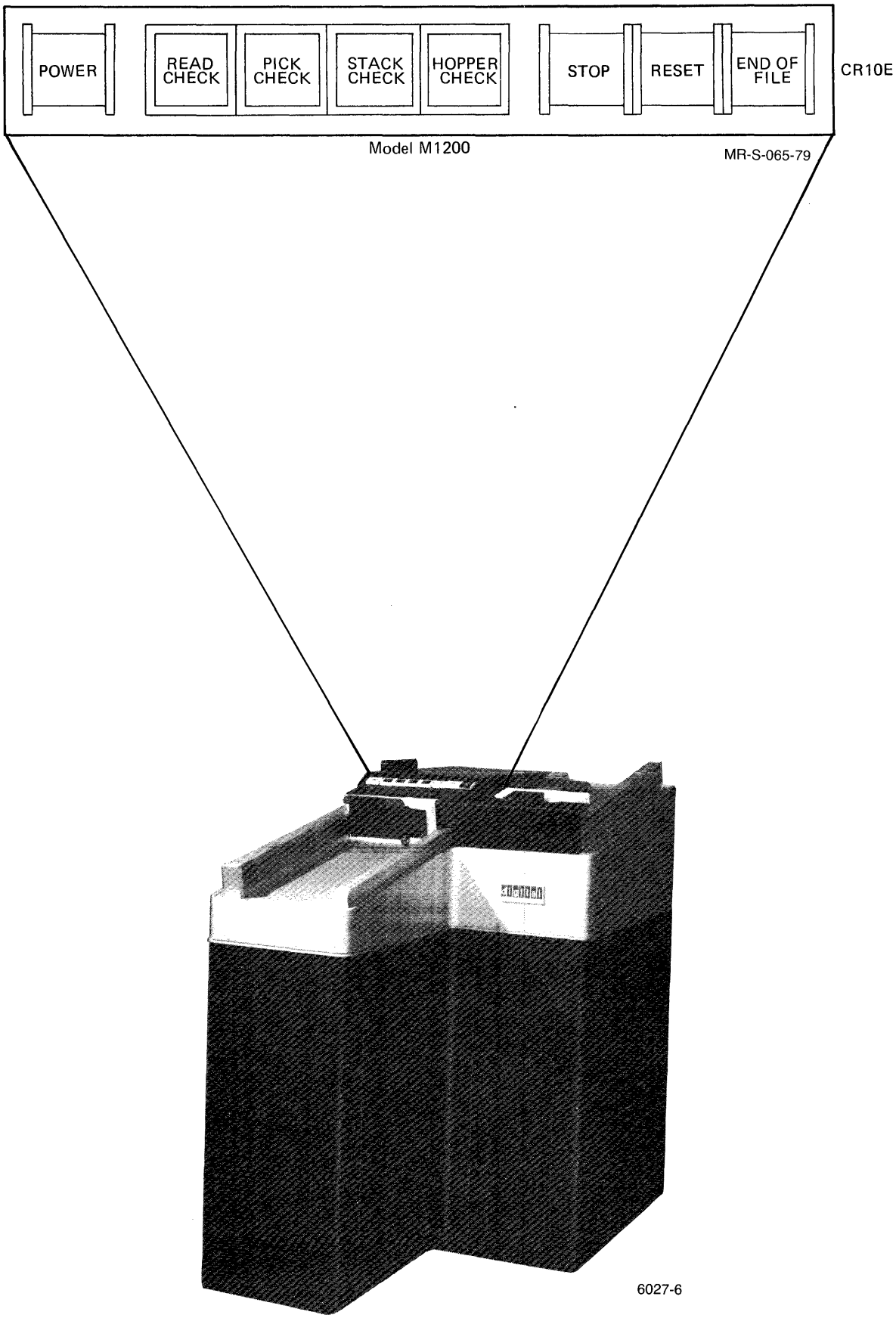

Figure 2-2: CR10-F Card Reader

2.2 LOADING AND UNLOADING CARDS

Use the following procedure to load the input hopper with punched cards to be read:

1. Be sure the reader is powered ON (POWER indicator lit), and check that the MODE switch on the rear control panel of the reader is set to REMOTE.

2. Pull the hopper follower back with one hand and begin loading card decks into the hopper. Be sure to place the first card to be read at the front with the 9 edge down, column 1 to the left.

3. Continue placing cards into the input hopper until it is loosely filled.

WARNING

> Do not pack the input hopper so full that the air from the blower cannot riffle the cards properly. If the cards are packed too tightly, the vacuum picker cannot work properly.

4. Press RESET to allow cards to be read.

5. You may continue loading cards while the reader is operating, provided you maintain tension in the front portion of the deck as you add cards to the rear. Do not add more cards until the hopper is at least half empty.

WARNING

> When you are trying to maintain pressure on the card deck, use just enough pressure to maintain the riffle action to prevent damaging cards or jamming the reader.

6. Usually, all cards are moved through the reader into the stacker. However, if you need to remove cards from the input hopper, simply pull back the follower and remove the card deck.

7. To unload cards from the output stacker, pull the stacker follower back with one hand and remove the card deck from the stacker. Be careful to maintain the order of the deck. The stacker can be unloaded while cards are being read.

2.3 CLEANING THE CARD READER

The important cleaning area for a card reader is the card path, which accumulates card dust. If this builds up, it causes data errors, card motion errors, and possibly even card jams. The card path should be cleaned at least weekly. With the power OFF, the path from the hopper to the stacker should first be blown out and then vacuumed thoroughly.

CHAPTER 3

DECTAPES (TOPS-10 ONLY)

The following procedures describe the actions necessary to mount and dismount a DECtape on the TU56 transport on a DECsystem-10. To assign a drive to your job, enter:

.ASSIGN DTAn Where n = 0-7, the number on the drive selector indicator of some unused drive. If the number on the drive indicator is 8, enter DTA0.

3.1 MOUNTING AND DISMOUNTING DECtapes

See Figure 3-1 for a view of the TU56 transport.

To mount DECtapes:

1. Place the REMOTE/LOCAL switch to OFF (middle position). This switch is located immediately to the right of the drive selector indicator.

2. Mount the DECtape onto the left-hand hub so the tape feeds upward at the left perimeter of the reel.

3. Thread the tape to the right, over the top of the tape guides and tape head, and clockwise onto the take-up reel.

4. Wind several turns of tape clockwise onto the take-up reel.

5. Press the REMOTE/LOCAL switch into the LOCAL (bottom-pressed) position.

6. Advance the tape about ten turns onto the take-up reel by pressing the top end of the rightmost rocker switch.

7. Press the REMOTE/LOCAL switch into the REMOTE (top-pressed) position.

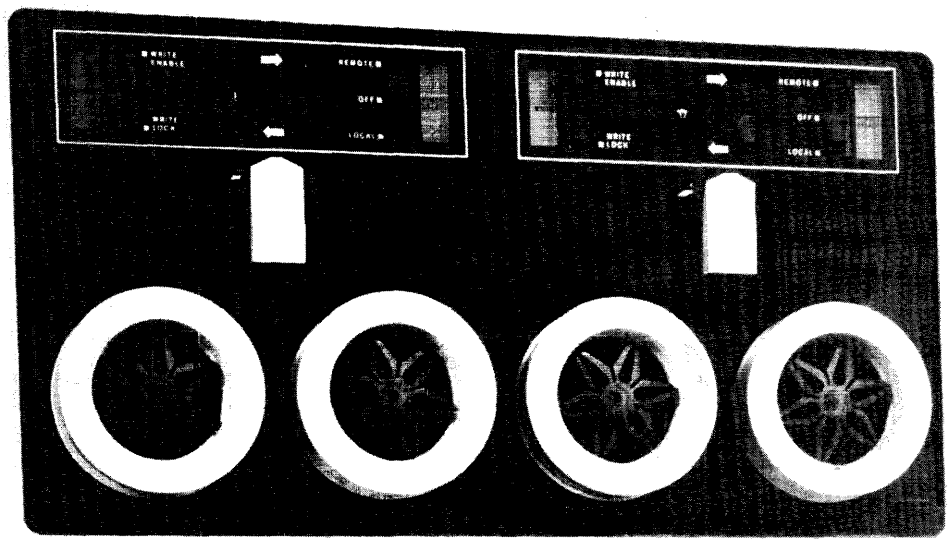

Figure 3-1: TU56 DECtape Transport

8. To write on the tape, set the WRITE ENABLE/WRITE LOCK switch to the WRITE ENABLE (top pressed) position.

To dismount DECtapes:

If the software has rewound and unloaded the tape, skip Steps 1 and 2.

1. Set the REMOTE/LOCAL switch to the LOCAL position.

2. Wind the tape completely onto the left reel by pressing the rewind switch (top end of the leftmost rocker switch) and holding it pressed until all the tape has wound onto the left reel.

3. Place the REMOTE/LOCAL switch to OFF (middle) position and remove the tape.

3.2 CLEANING DECtape DRIVES

DECtapes do not have a complicated tape path; however, the brown oxide powder that flakes off when a tape is in motion will accumulate on the tape guides and tape head. Once each shift, or at least once daily, you should clean these areas with a cotton-tipped applicator and 91% isopropyl alcohol.

CHAPTER 4

MAGNETIC TAPES

The TOPS-10 and TOPS-20 series hardware systems support a variety of magnetic tape drives. They cover both 7-track and 9-track operation, tape speeds of 45 to 200 inches per second (1143mm/s to 5080mm/s), and recording densities of 200 to 6250 bits per inch (8 rows/mm to 246 rows/mm). Various size reels can be accommodated and some drives will accept industry-standard cartridges.

The system software identifies the drives by physical device names in the form MTxn. x is an alphabetic character representing the controller; n is a drive unit number for that controller. MTA0, MTB3, and MTC2 are all examples of valid names. A user can access a particular physical tape drive for input or output by indicating the physical device name.

In TOPS-20, the <SYSTEM>n-CONFIG.CMD file (see the TOPS-20 KL Model B Installation Guide) defines these device names by matching a magnetic tape device name to the serial number of a drive.

4.1 MAGNETIC TAPE CONTROLS AND INDICATORS

The following sections describe each type of magtape drive:

Model	Section
TU16	4.1.1
TU40	4.1.2
TU45	4.1.3
TU70/71/72	4.1.4
TU77	4.1.5
TU78/79	4.1.6

4.1.1 TU16 (TOPS-10 Only)

Table 4-1 explains the switches on a TU16 drive, and Table 4-2 describes the indicator lights. (See Figure 4-1.) Apply power to the drive by placing LOAD/BR REL switch to the center position.

Table 4-1: TU16 Switches

Switch	Function
LOAD/BR REL	
LOAD position	Enables vacuum motor, which draws tape into the buffer columns.
Center position	Disables vacuum motor; brakes are full on.
BR REL position	Releases brakes.
ON-LINE/OFF-LINE	
ON-LINE position	Selects remote operation.
OFF-LINE position	Selects local operation.
FWD/REW/REV	
FWD position	Selects, but does not initiate forward tape motion when transport is off-line.
REW position	Selects, but does not initiate tape rewind when transport is off-line.
REV position	Selects, but does not initiate reverse tape motion when transport is off-line.
START/STOP	
START position	Initiates tape motion selected by FWD/REW/REV switch when transport is off-line.
STOP position	Clears any motion commands when transport is off-line.
UNIT SELECT (plug activated)	Selects the tape transport unit by number (0-15); this number is used in the program to address the tape transport (slave address).

Table 4-2: TU16 Indicators

Switch	Function
PWR	Indicates power has been applied to the transport.
LOAD	Indicates the vacuum is on and the tape is loaded into the buffer columns.
RDY	Indicates that the tape transport is ready (vacuum on and settle-down delay complete); no tape motion.
LD PT	Indicates that the tape is at load point (beginning of tape - BOT).
END PT	Indicates that the tape is at end point (end of tape - EOT).
FILE PROT	Indicates that write operations are inhibited because the write enable ring is not mounted on the file reel.
OFF-LINE	Indicates local operation by the control box.
SEL	Indicates the tape transport is selected by the controller (program).
WRT	Indicates that a write operation has been initiated.
FWD	Indicates that a forward command has been issued.
REV	Indicates that a reverse command has been issued.
REW	Indicates that a rewind command has been issued.

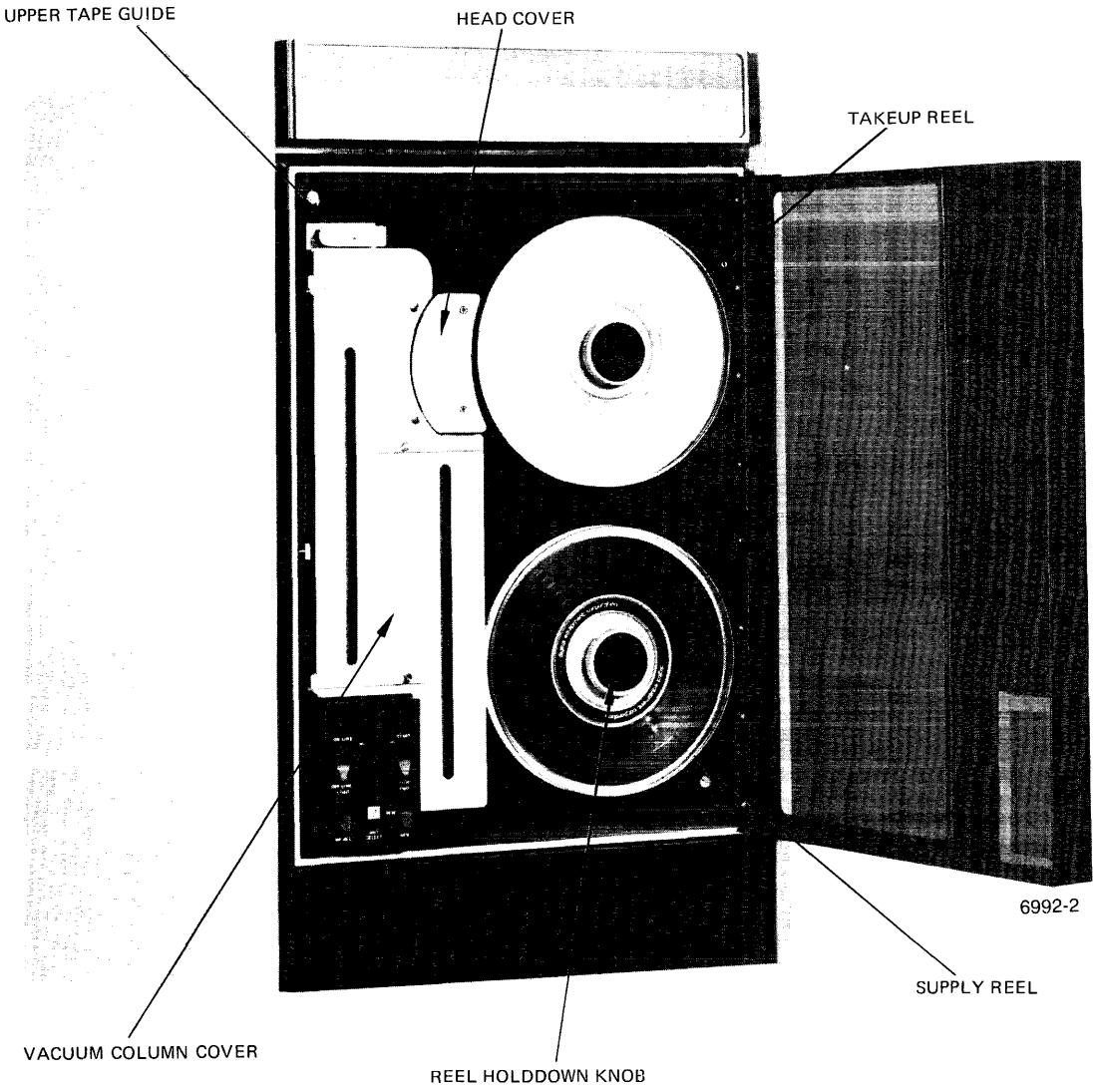

Figure 4-1: TU16 Magnetic Tape Drive

4.1.2 TU40 (TOPS-10 Only)

At the left on the control panel at the top of the TU40 transport is a rotary switch for selecting the transport number; the selected number appears in the window above the switch. (See Figure 4-2.)

The lights above the switches indicate the state of the transport, whether produced by the switches or the program.

READY - The READY light indicates the transport is on-line.

SELECT - SELECT lights whenever the transport is selected by the control.

FILE PROTECT - FILE PROTECT indicates the write enable ring is absent from the supply reel.

The lower part of the panel contains a row of pushbuttons, all of which are momentary-contact except the one at the right end, which controls power to the transport.

START - Pressing START puts the unit on-line, provided it is ready for use by the program (the tape is properly closed).

RESET - Pressing RESET stops the tape and takes the unit off-line, enabling the remaining switches for local control. Note however that if the tape is rewinding, you must press the RESET button twice to stop the tape. The first time you press RESET will change the rewind operation to normal reverse speed.

LOAD REWIND - Pressing LOAD REWIND raises the transport window and loads tape from supply reel to takeup reel, unless the tape is already loaded, in which case it rewinds the tape to loadpoint. Detection of a failure of any sort during loading operations lights LOAD CHECK and the unit shuts down.

UNLOAD REWIND - Pressing UNLOAD REWIND rewinds the tape to loadpoint, and then unloads it entirely onto the supply reel and lowers the transport window. A tape positioned at loadpoint or endpoint is indicated by the BOT (beginning of tape) and EOT (end of tape) lights.

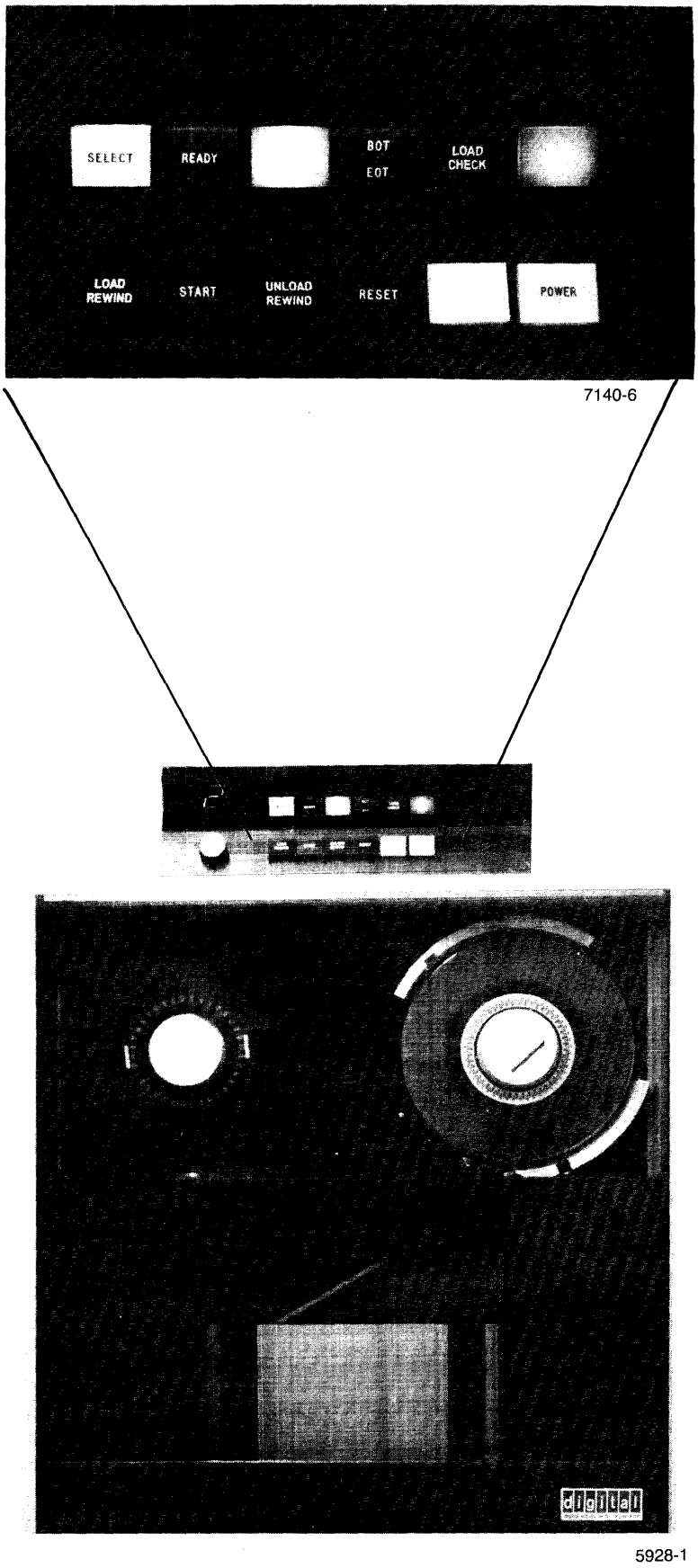

Figure 4-2: TU40 Series Magnetic Tape Drive

4.1.3 TU45

The TU45 control panel is located at the top left on the drive, as shown in Figure 4-3.

The POWER switch is part of the control panel. **The drives must be powered ON before the system is started, otherwise they will not be recognized by the software as available for use.** Power may also be removed from a drive by opening the large lower door and setting the small toggle switch to the off position. Normally, power should only be removed by means of the switch on the control panel.

The control panel also includes a UNIT SELECT DIAL, which normally allows the device name, such as MTA0 or MTA1 to be selected. This capability, however, is not implemented on the TU45 at present. Each drive retains its physical device name irrespective of the setting of the dial. To avoid confusion, DO NOT CHANGE the setting of the dial.

The FILE PROTECT light (FPT), when ON, indicates that the loaded tape has no write ring, so that writing on the tape is not allowed.

The LOAD control is a momentary switch/indicator. Pressing and releasing the control initiates a load sequence.

The ON-LINE control is a momentary switch/indicator that is enabled after an initial load or rewind sequence has been completed. Pressing and releasing the switch changes the transport to an ON-LINE mode. Pressing the ON-LINE control a second time sets the drive OFF-LINE.

The REWIND control is a momentary switch/indicator that is enabled only in the off-line mode. Pressing and releasing the control causes tape to rewind.

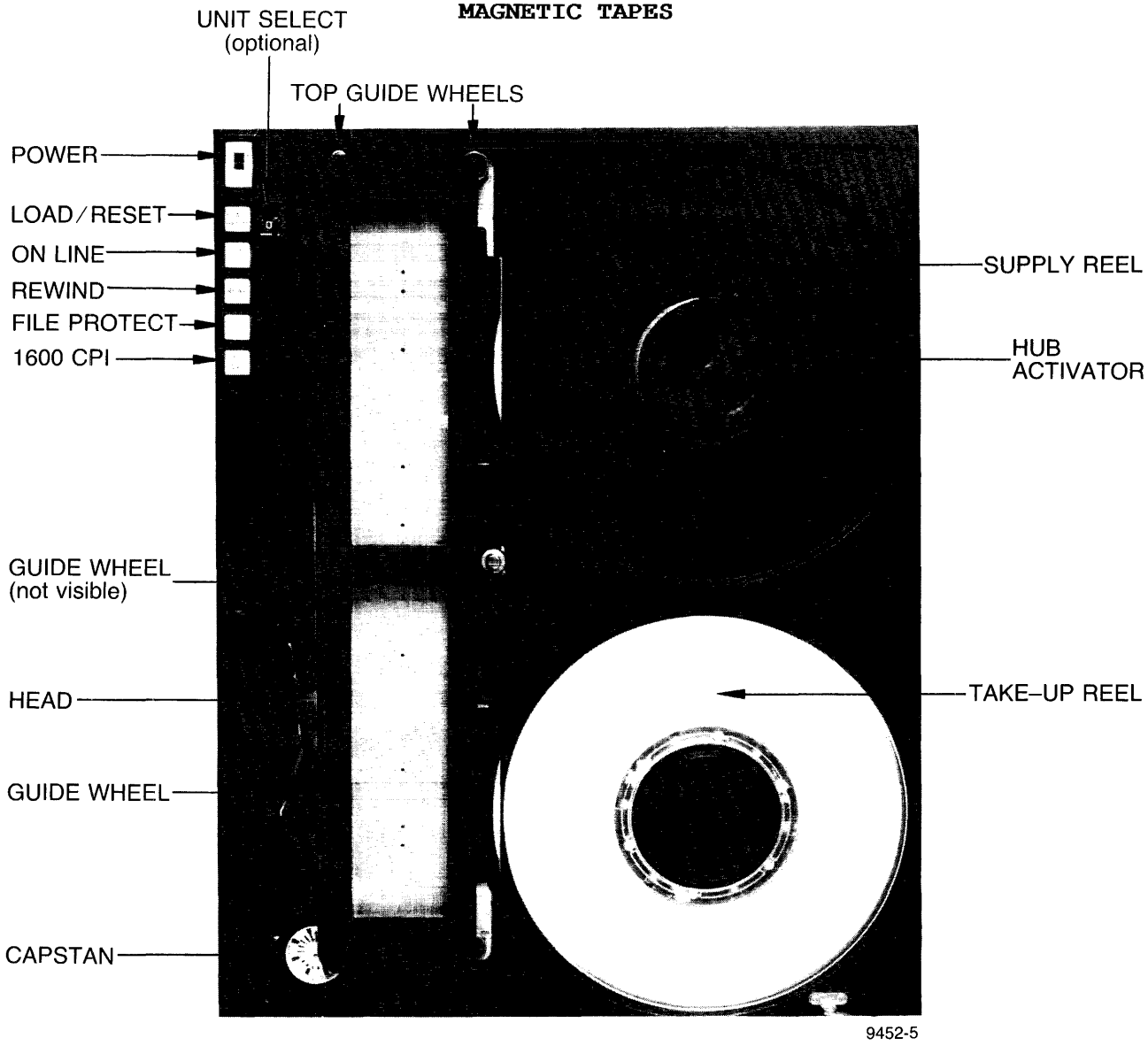

Figure 4-3: TU45 Magnetic Tape Drive

4.1.4 TU70

The control panels for TU70, TU71, and TU72 drives are identical except for the END OF TAPE and TAPE INDICATE switch. (See Figure 4-4.) Power is supplied from the tape controller, which sequences the power to groups of four drives.

The tape drives can be controlled locally by the control panel pushbuttons and indicators. Table 4-3 describes the controls and indicators.

Table 4-3: TU70 Series Controls and Indicators

Switch	Function
LOAD/REWIND	Initiates a load sequence; or, if the tape is loaded, rewinds the tape.
START	Puts the drive on-line after it is loaded.
UNLOAD/REWIND	Rewinds and unloads the tape after the drive is off-line.
RESET	Takes the drive off-line.
HUB/WINDOW UP	Lifts the hub window; the drive must be off-line.
SELECT	Indicates the drive is connected to the specified controller.
READY	Indicates the drive is on-line.
WRITE/DISABLED	Indicates the loaded tape has no write ring when lit; writing on the tape is not allowed.
TAPE INDICATE	Indicates the end of the tape (EOT).
MACHINE CHECK	Indicates some type of hardware error exists.

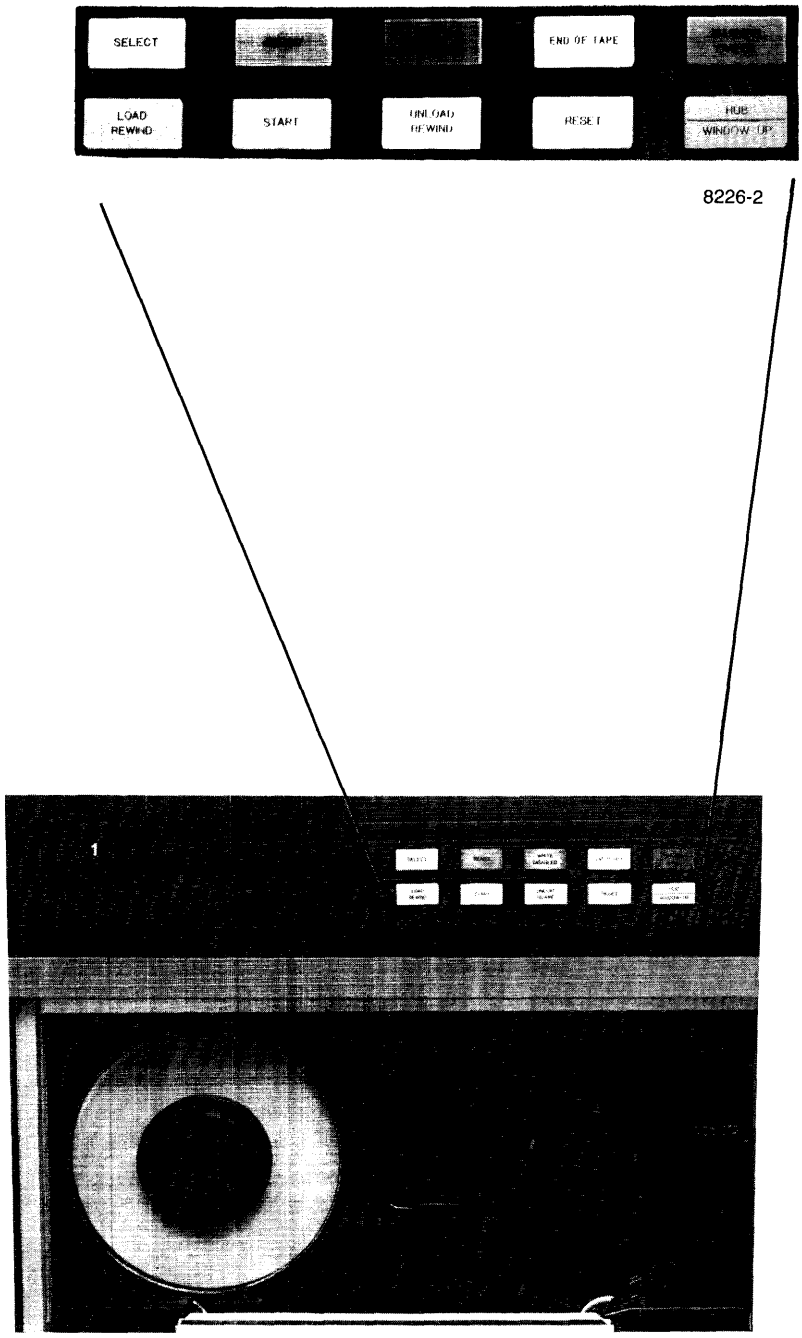

Figure 4-4: TU70 Series Magnetic Tape Drive

4.1.5 TU77

The TU77 is shown in Figure 4-5. Power is applied to the TU77 when the system CPU is turned on. Table 4-4 explains TU77 controls, and Table 4-5 describes TU77 indicators.

Table 4-4: TU77 Controls

Control	Function
Slave Select Switch (unlabeled)	Selects the address (slave number 0 to 3) of the tape transport.
LOAD/REW	Pressing and releasing the LOAD/REW button will initiate one of the following sequences: o With no tape in path, a load sequence is initiated. o With tape in path but not tensioned, a mid-reel load sequence will be initiated. In a mid-reel load sequence the tape will load and run in the reverse direction to BOT. o With tape in path and tensioned, and the transport off-line, the tape rewinds to BOT. If the tape is already at BOT or if the transport is on-line, no action occurs.
ON LINE	Pressing and releasing the ON-LINE button will change the transport from off-line to on-line. Pressing and releasing the button again will change the transport from on-line to off-line.
UNLOAD	If the TU77 is off-line, pressing and releasing the UNLOAD button causes the tape to rewind and unload. If the tape is already at BOT, it will unload. If the TU77 is on-line, the UNLOAD button has no effect.
RESET	Pressing and releasing the RESET button terminates all functions and clears a load fault.

Table 4-5: TU77 Indicators

Indicator	Function
POWER	Indicates presence of DC and secondary AC power.
BOT	Indicates the beginning of the tape (BOT).
ON LINE	Indicates the TU77 is on-line. The transport will revert to the off-line mode if any of the following occur. o ON LINE button is pressed. o An external rewind unload command is received. o Vacuum column interlock is broken. o AC power is lost. o RESET button is pressed.
FILE PROTECT	Indicates that a reel of tape without a write-enable ring has been loaded onto the transport.
LOAD FAULT	Lamp flashes when a load fault has occurred; such as when the autoload sequence has failed to load a tape from a 267 mm (10-1/2 in) reel after two trys.
800	Indicates the tape transport is set to read or write at 800 BPI (NRZI mode).
1600	Indicates the tape transport is set to read or write at 1600 BPI (PE mode).

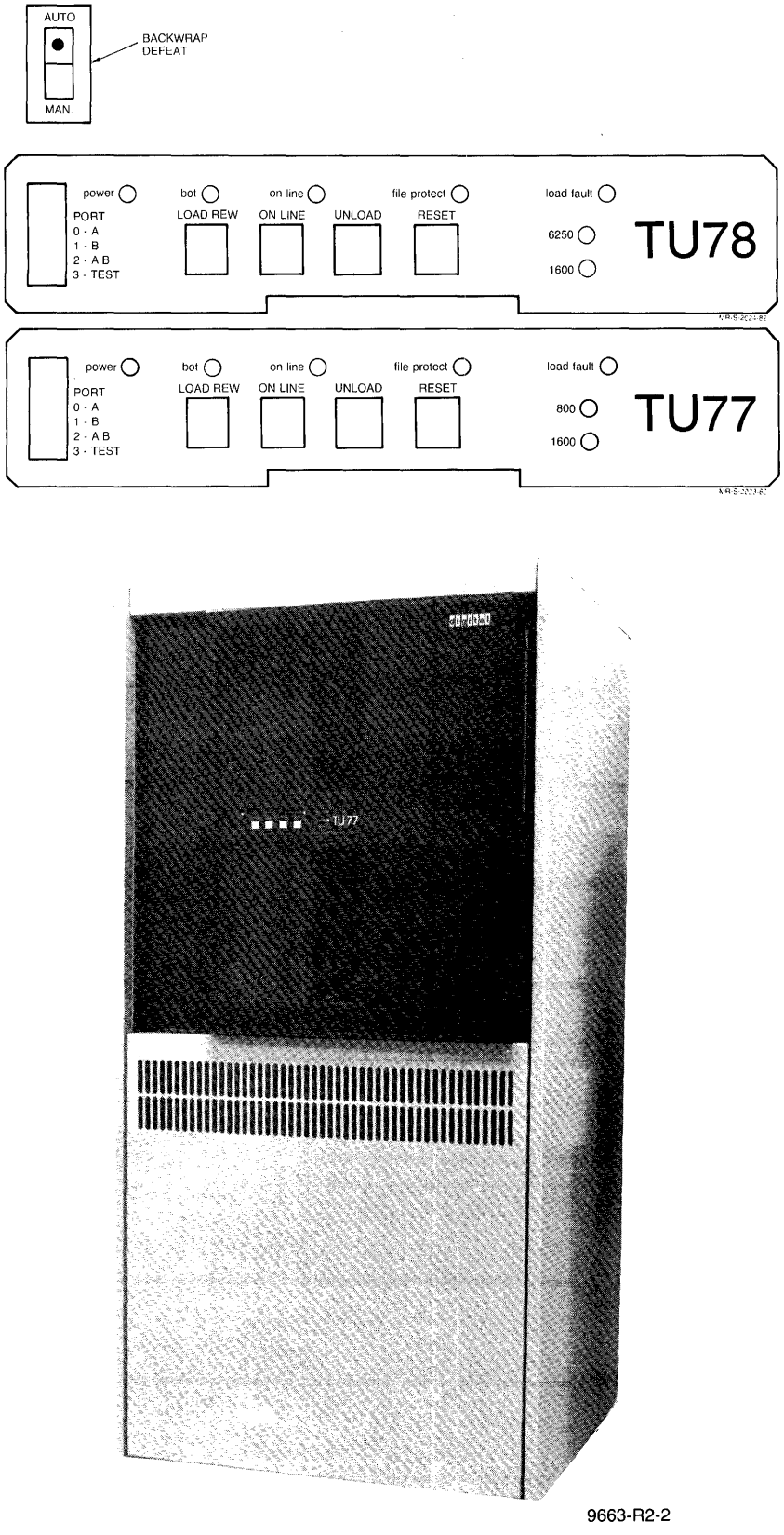

Figure 4-5: TU77 Magnetic Tape Drive

4.1.6 TU78/79

Power is applied to the TU78/79 when the CPU is turned on. Table 4-6 explains TU78/79 controls, and Table 4-7 describes TU78/79 indicators.

Table 4-6: TU78/79 Controls

Control	Function
Port Select Switch	Selects the Massbus I/O port(s) allowed to send commands to this tape transport. Switch Position — Function 0 — Transport connected to Massbus port A 1 — Transport connected to Massbus port B 2 — Transport connected to both Massbus ports A and B 3 — Transport disconnected from both Massbus ports and placed in maintenance mode (available to TM78/79 formatter maintenance panel)

Table 4-7: TU78/79 Indicators

Control	Function
LOAD/REW	Pressing and releasing the LOAD/REW button will initiate one of the following sequences: o With no tape in path, a load sequence is initiated. o With tape in path but not tensioned, a mid-reel load sequence will be initiated. In a mid-reel load sequence the tape will load and run in the reverse direction to BOT. o With tape in path and tensioned, and the transport off-line, the tape rewinds to BOT. If the tape is already at BOT or if the transport is on-line, no action occurs.

ON LINE	Pressing and releasing the ON-LINE button will change the transport from off-line to on-line. Pressing and releasing the button again will change the transport from on-line to off-line.
UNLOAD	If the TU78/79 is off-line, pressing and releasing the UNLOAD button causes the tape to rewind and unload. If the tape is already at BOT, it will unload. If the TU78/79 is on-line, the UNLOAD button has no effect.
RESET	Pressing and releasing the RESET button terminates all functions and clears a load fault.
BACKWRAP DEFEAT	AUTO (automatic) position: Allows a backwrap and retry for 10-1/2 inch reel, with or without a cartridge. MAN (manual) position: Inhibits a backwrap and retry for 10-1/2 inch reel without a cartridge.
POWER	Indicates presence of DC power and secondary AC power.
BOT	Indicates tape is at BOT.
ON LINE	Indicates the TU78/79 is on-line. The transport will revert to the off-line mode if any of the following occur: o ON LINE button is pressed. o An external rewind unload command is received. o Vacuum column interlock is broken. o AC power is lost. o RESET button is pressed.
FILE PROTECT	Indicates that a reel of tape without a write-enable ring has been loaded onto the transport.
LOAD FAULT	Lamp flashes when a load fault has occurred; such as when the autoload sequence has failed to load a tape from a 267 mm (10-1/2 inch) reel after two trys.
1600	Tape transport set to read or write at 1600 bits/inch density (PE mode).
6250	Tape transport set to read or write at 6250 bits/inch density (GCR mode).

4.2 MOUNTING AND DISMOUNTING MAGTAPES

The following procedures describe the steps needed for mounting and dismounting magnetic tape reels on the various drives supported by the TOPS-10 and TOPS-20 series hardware systems. Some drives provide for the automatic threading of the tape onto the take-up reel while others require you to thread the tape manually. For all drives, you must insert a write enable ring in the groove on the back of the tape reel in order to allow writing. If this ring is not present, an indicator light (FILE PROTECT on some drives, WRITE DISABLE on others) will warn you that writing is inhibited.

TOPS-20 NOTE

If tape drives are allocated to users under control of the MOUNTR program, you should use the OPR command DISMOUNT TAPE drive-name to rewind and unload the tape(s). Use the following procedures only with tape drives directly assigned by users, or if the system has crashed or the drive has malfunctioned.

4.2.1 TU16 Procedures (TOPS-10 Only)

To mount a tape on the TU16, perform the following steps:

1. Rotate the reel holddown knob of the lower hub counterclockwise as far as it will go, and place the supply reel over the holddown knob with the groove toward the back. Hold the reel firmly against the hub flange and turn the holddown knob clockwise until it is right.

2. Press BR REL and pull the tape from the supply reel. The tape should unwind from the left with the oxide (dull) side toward the hub. If the tape unwinds from the top, check that the reel is mounted with the groove toward the back.

3. Grasp the tape in both hands with the left hand at the end and the right hand back about a foot. Place the tape against the bottom and left side of the head cover over the threading slot. Pull the tape taut and slide it upwards and into the slot. Lead the tape around the upper right corner of the vacuum column cover, slide it into the slot between the cover and the upper tape guide, and lead it around the guide. Place the end of the tape over the top of the take-up reel hub, and wind about six turns of the tape clockwise on the reel.

4. Press LOAD to draw tape into the vacuum columns. Press FWD and push START to advance the tape to loadpoint. When the loadpoint marker is sensed, the tape stops, the FWD light goes out, and LD PT comes on. Note that if tape motion continues for more than ten seconds, the tape is beyond loadpoint. Press STOP, REV and then START. The tape should move back and stop at loadpoint.

5. Press ONLINE.

To dismount tapes on the TU16, perform the following actions:

1. Rewind to loadpoint by pressing OFF LINE, setting the rocker switch to REWIND, and pressing START.

2. Press BR REL and wind the remaining tape onto the supply reel.

3. Turn the holddown knob counterclockwise and remove the reel.

4.2.2 TU40 and TU41 Procedures (TOPS-10 Only)

To mount tapes on the TU40 or TU41, perform the following steps:

1. If the transport is closed, press UNLOAD REWIND to lower the window. Pull one end of the reel lock release on the right hub and place the supply reel over the hub. If the reel does not have a cartridge, slip the end of the tape into the shoe at the lower right of the reel. If the reel has a cartridge, place it on the hub so that the projections from the cartridge fit into the two reel-positioning guides. The pin on the motor face plate should go into the opening on the tape cartridge toggle.

2. Press LOAD REWIND to load the tape automatically. Press START to place the unit on-line.

To dismount tapes on the TU40 or TU41, perform the following actions:

1. Press RESET and then UNLOAD REWIND.

2. When the window has opened, remove the tape by opening the reel lock release and pulling the reel from the hub.

4.2.3 TU70, TU71, and TU72 Procedures

To mount tapes on the TU70, TU71, or TU72, perform the following steps:

1. Press the HUB/WINDOW up button to open the transport window.

2. Push the tape onto right-hand hub so that the tape unwinds clockwise. (The tape snaps onto the hub and is automatically secured.)

3. Ensure that the end of tape is not twisted and lies flush on the reel.

4. Press the RESET button, causing the window to close.

5. Press LOAD REWIND button, putting the tape at load point.

6. Press START. READY light goes on.

   If the tape did not load correctly, the MACHINE CHECK button will flash, and the window will open. You should then reposition the tape and repeat Steps 4, 5, and 6 described above.

To dismount tapes on the TU70, TU71, or TU72, perform the following steps:

1. Press RESET.
2. Press the UNLOAD REWIND button, causing the tape to rewind completely and the transport window to open.
3. Pull the tape off the hub.

NOTE

The TU70 series magnetic tape drives are able to accommodate tape reels that are enclosed in cartridges. When mounting, the cartridge must be positioned on the hub so that the two tabs on either side of the cartridge toggle fit into the two slots on the left side of the right-hand hub. (The cartridge toggle will automatically be opened in the loading process and closed in the unloading process.)

4.2.4 TU45 Procedures

The supply reel (reel to be read or written) is the top reel on the drive (Figure 4-3). The reel should be positioned in such a way that the tape will unwind if the reel is turned in a clockwise direction.

To mount tapes on the TU45, perform the following steps:

1. Position the reel on the quick-release hub and press the hub actuator.
2. Thread the tape as follows:
   a. Toward the arrow to the upper left of the supply reel
   b. Over the two top guide wheels from right to left
   c. Down and to the left of the upper white guide wheel
   d. Slightly right and down, to go under the head
   e. Down and to the left of the lower white guide wheel
   f. Down under the capstan
   g. Up and right, toward the arrow to the left of the takeup reel
3. Wrap the tape leader onto the take-up reel so that the tape will be wound onto the reel when it is rotated clockwise. Wind at least three turns onto the take-up reel. Remove all slack in the tape path.

4. After the tape has been loaded and checked for correct seating in the guides, position the tape at the Load Point by pressing the LOAD switch. Recheck tape tracking in the guides and close the dust cover door.

NOTE

The transport door should remain closed during normal operation to achieve maximum data reliability.

5. When the load cycle is complete, the tape will stop at the Load Point. Then, if the ONLINE indicator is not lit, press ONLINE. The transport is now ready to receive additional commands.

To dismount a tape, do the following:

1. Press the OFFLINE switch.

2. Press the REWIND switch; the tape will rewind to the BOT (beginning of tape) marker.

3. Press the REWIND switch a second time; this will start an unload sequence.

NOTE

It is not necessary to wait for the tape to rewind to the BOT marker if an unload is desired; press the REWIND switch twice in succession and the tape will rewind and unload.

4. Open the transport door and remove the reel. Close the transport door.

4.2.5 TU77 and TU78/79 Procedures

The TU77 drive can be loaded manually or automatically depending on the size of the reel that is being loaded. When a 216 or 178mm (8-1/2 or 7 inch) reel is being loaded, the manual procedure must be used. If a 267mm (10-1/2 inch) reel is used and the reel is in a cartridge, the cartridge will engage the cartridge interlock and causes the autoload procedure to be used. Note that the drive door must be closed for autoload to occur. See Figure 4-6 for a chart of loading methods.

For safety requirements, you cannot load these drives with the doors open. The interlock switch cannot be pulled out. There is an AUTO/MAN rocker switch for manual load of 10-1/2 inch reels.

The autoload procedure requires a full reel of tape be used. A full reel of tape is such that the tape on the reel comes to within 1.59 and 0.64mm (5/8 and 1/4 inch) of the other edge of the reel. Make sure the tape reel is a large 267mm (10-1/2 inch) reel. The supply reel (containing the tape to be read or written) is the top reel on the drive (Figure 4-7). The reel should be positioned in such a way that the tape will unwind if the reel is turned clockwise. You must insert a write-enable ring on the back of the supply reel to allow writing on the tape.

To autoload a tape reel on a TU77, do the following:

1. Place the supply reel in position on the upper hub, rotate until it slips easily into place, and press the reel-retaining actuator.

NOTE

The supply reel may be contained in a wraparound cartridge. It is not necessary to remove or open the cartridge. The cartridge will be opened automatically during the autoload sequence.

2. Close the drive front door.

3. Check that power is applied to the tape drive (power light on).

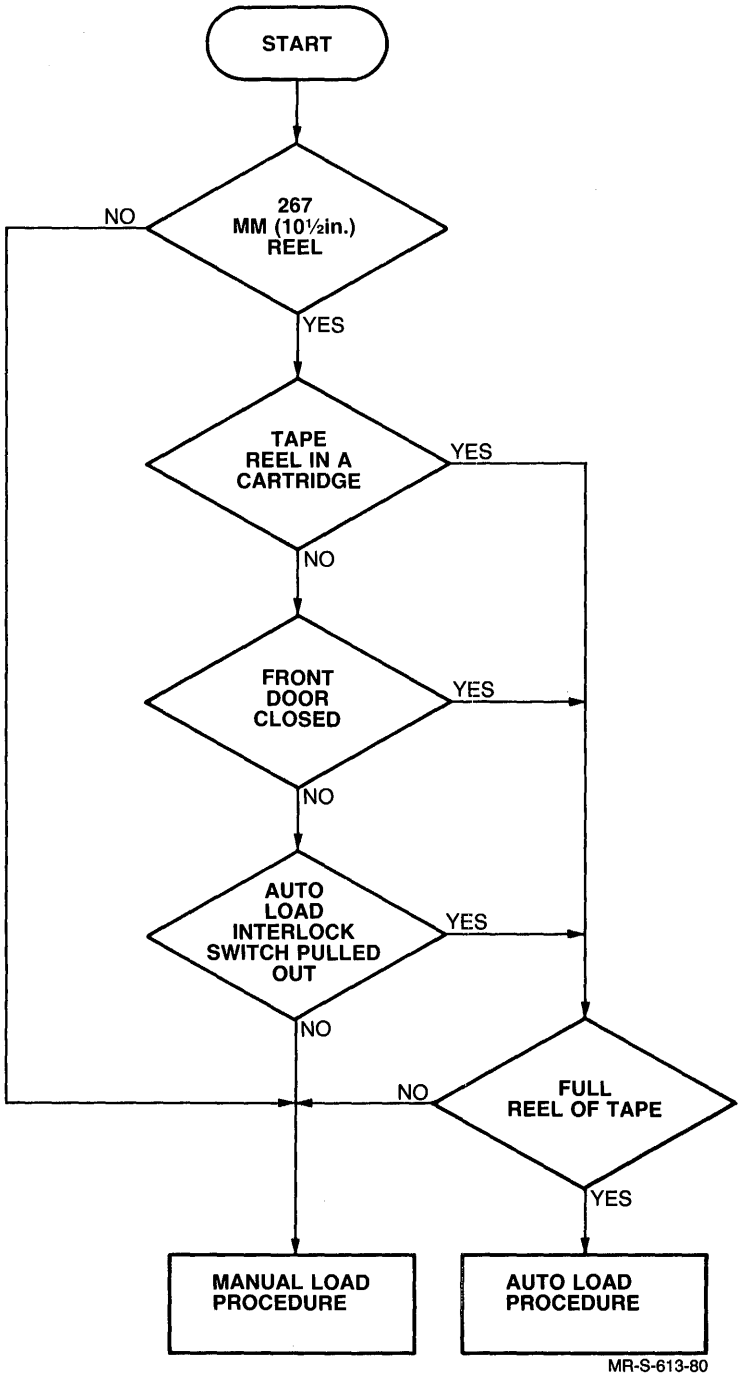

Figure 4-6: TU77, TU78, or TU79 Loading Methods

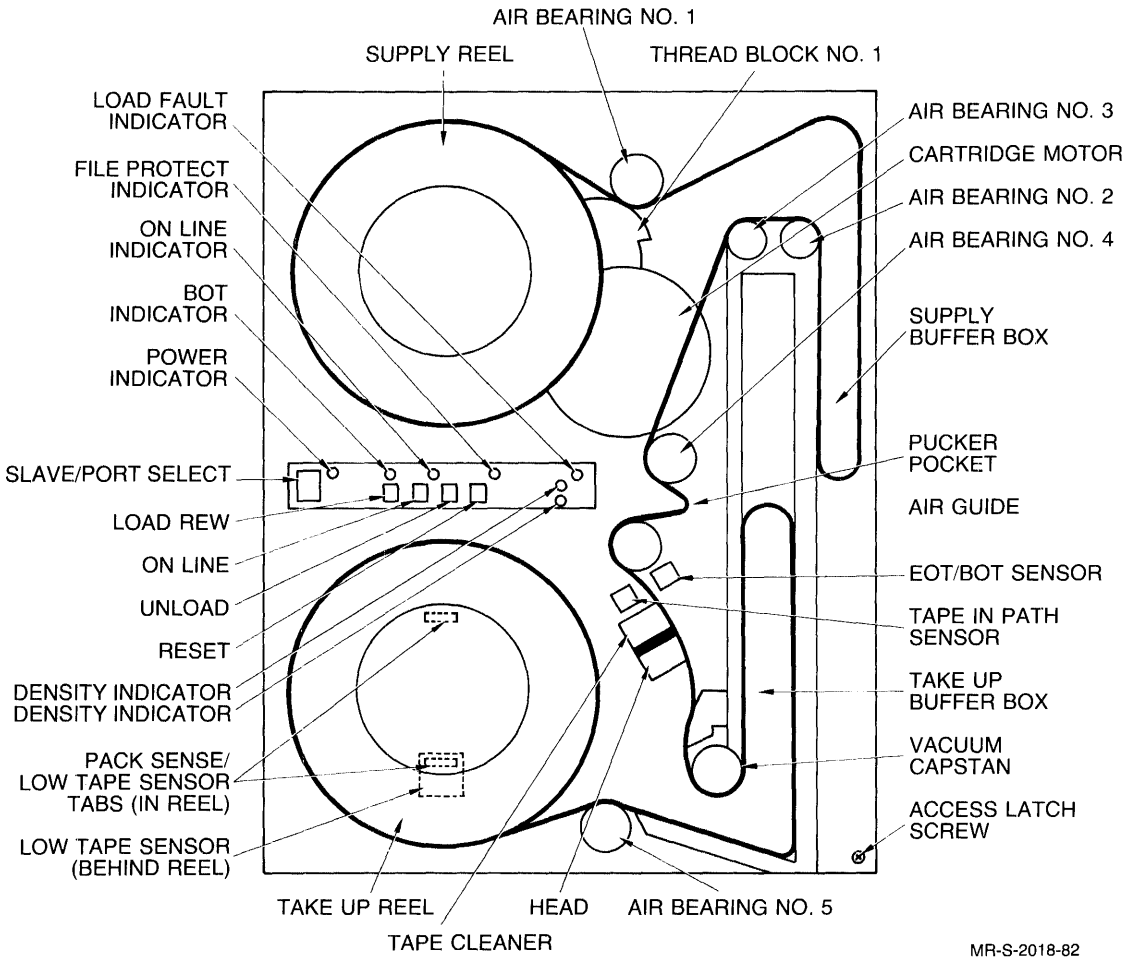

Figure 4-7: TU77, TU78, or TU79 Tape Path and Controls

4. Press the RESET switch.

5. Press the LOAD/REW switch.

The take-up reel will start to turn clockwise. The supply reel will turn counterclockwise a few turns and then rotate forward and eject the tape into the tape path. The tape is threaded and wrapped onto the take-up reel.

For manual loading, keep in mind that the supply reel (containing the tape to be read or written) is the top reel on the drive (Figure 4-7). The reel should be positioned in such a way that the tape will unwind if the reel is turned clockwise. You must insert a write-enable ring on the back of the supply reel to allow writing on the tape.

To manually load a tape reel on a TU77, do the following:

1. Place the supply reel in position on the upper hub, rotate until it slips easily into place, and then press the reel-retaining actuator.

2. Manually place the tape leader between thread block number 1 and air bearing number 1 (Figure 4-7). Manually thread three to five inches of tape.

3. Carefully close the buffer door, making sure the door is closed securely.

NOTE

Ensure that there is no tape slack or sag between the supply reel and thread block number 1.

4. If a 216 or 178mm (8-1/2 or 7 inch) reel is being loaded, close the drive front door. If a 267mm (10-1/2 inch) reel is being loaded, place the AUTO/MAN switch in the MAN position. This disables the autoload sequence that would normally occur with a 267mm reel.

5. Check that power is applied to the tape (power light is on).

6. Press RESET switch.

7. Press LOAD/REW switch.

To unload a tape on the TU77 or TU78/79, do the following:

1. Press RESET switch.

2. Press UNLOAD switch.

4.3 CLEANING MAGNETIC TAPE DRIVES

Cleanliness is essential for proper operation. Minute particles of dirt trapped between the head and the tape can cause data errors.

Each day you should do the following:

- Clean the head. Use a lint-free cloth or cotton swab moistened in isopropyl alcohol. Wipe the head carefully to remove all accumulated oxide and dirt.

NOTE

Do not use rough or abrasive cloths to clean the head.

- Clean the fixed guides and vacuum chamber with a cotton swab moistened with isopropyl alcohol to remove accumulated oxide and dirt. The vacuum column door may be opened to gain access to the chamber surfaces.

- Clean the rotating tape guides and rubber punch rollers with a lint-free cloth or cotton swab moistened in isopropyl alcohol. Wipe the surfaces carefully to remove all accumulated oxide and dirt.

NOTE

Do not soak the guides with excessive solvent; it can seep into the guide bearings, causing contamination or a breakdown of the bearing lubricant.

- Clean the capstan with a cotton swab moistened with water. Wipe dry lightly with a lint-free cloth or cotton swab.

CHAPTER 5

DISK DRIVES

This chapter describes operating procedures for the disk drives supported by the TOPS-10 and TOPS-20 series hardware. Drives with similar functions and like controls are grouped together in the chapter.

The drive number indicates the logical position of the drive on the controller and ranges from 0 to 7. Because a controller is associated with a channel, the term "channel number" is often used when referencing a controller. A specific disk drive is identified by its channel number and unit number. For example (0,1) indicates channel 0, drive 1.

5.1 DISK DRIVE CONTROLS AND INDICATORS

Six types of disk drives with removable disk packs, along with their operator control panels, are shown in Figures 5-1 through 5-6. The figures accompany the description of controls and indicators for each particular drive.

5.1.1 RP02 and RP03 (TOPS-10 Only)

The disk pack is illustrated in Figure 5-1. If the main power is on, a pack loaded and the cover closed, press START to turn on the drive. After a stabilization delay of about a minute, the drive loads the heads and positions them to cylinder 0.

Press STOP to unload the heads and turn off the drive.

The numbered lights indicate the last cylinder to which the drive was commanded to position its heads.

FILE UNSAFE indicates an electrical malfunction in the drive or the control (pressing STOP resets this indicator if the condition has been cleared).

The remaining switches affect the drive only when it is not selected by the control. If the switches are manipulated while the drive is selected, the conditions they represent are applied to the drive when it is deselected at the beginning of the next function (deselection occurs even if the new function reselects the same drive).

With the drive in proper operating order, pressing ENABLE places it on-line, lighting the large indicator at the left center of the panel.

Pressing READ-WRITE allows unrestricted use of the pack by the program.

Pressing READ-ONLY lights the associated indicator at the right and prevents the program from writing on the pack.

Pressing DISABLE takes the unit off-line.

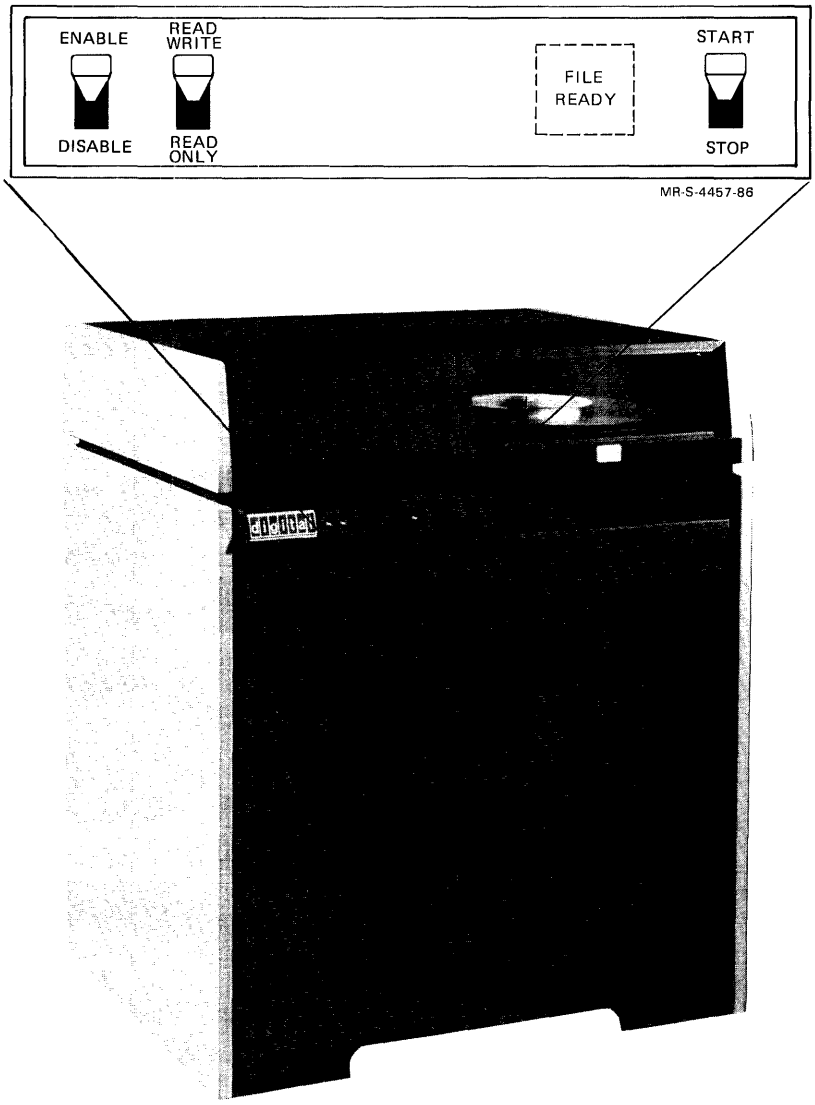

Figure 5-1: RP03 Disk Drive

5.1.2 RP04 and RP06

Each panel contains a number of switches, indicator lights and a CONTROLLER SELECT switch. (See Figures 5-2 and 5-3.)

SWITCHES

WRITE-PROTECT - For normal operation, the WRITE-PROTECT switch is OFF, allowing unrestricted use of the pack by the user. Setting this switch ON lights the associated indicator light, and prevents the user from writing on the pack.

START/STOP - The START/STOP switch is used to power the drive UP (ONLINE) and DOWN (OFFLINE).

DISABLE - On the RP04 drive, the DISABLE switch takes the drive off-line (ready light goes out).

STANDBY - The STANDBY switch is used in special circumstances. Software can place the drive in STANDBY mode. Pressing the STANDBY switch will then ready the drive for use again.

CONTROLLER SELECT - The CONTROLLER SELECT switch on a dual-ported drive must be set to the A/B position. The CONTROLLER SELECT switches on single-ported drives should be set to either A or B depending upon how the hardware has been configured.

INDICATOR LIGHTS

READY - The READY light comes on when the drive is loaded and ready for use. This occurs after the pack is properly loaded and the START switch is pushed. The pack then powers up to the correct rotational speed, and the read/write heads position themselves between the platters. At this point the READY light comes on.

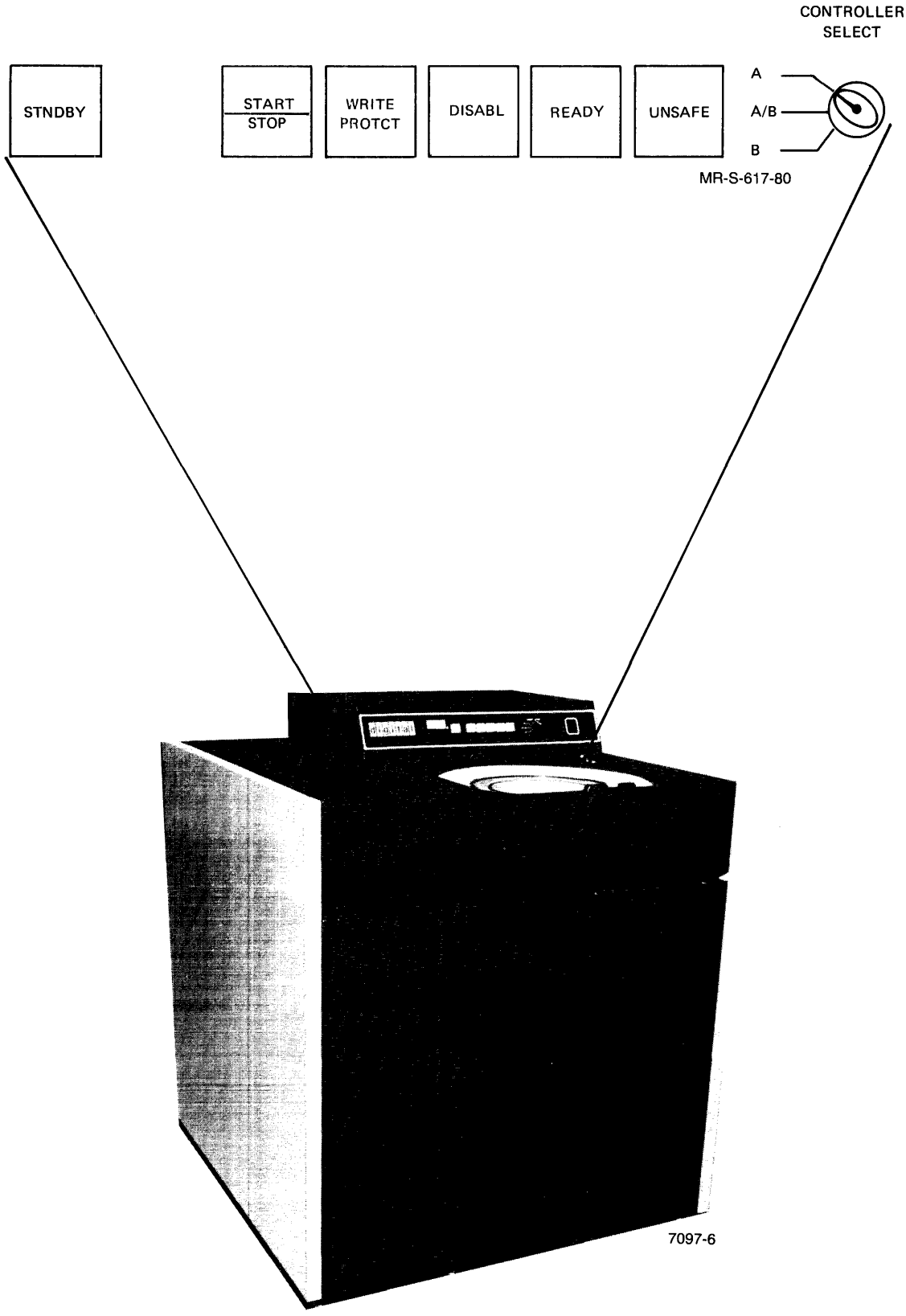

Figure 5-2: RP04 Disk Drive

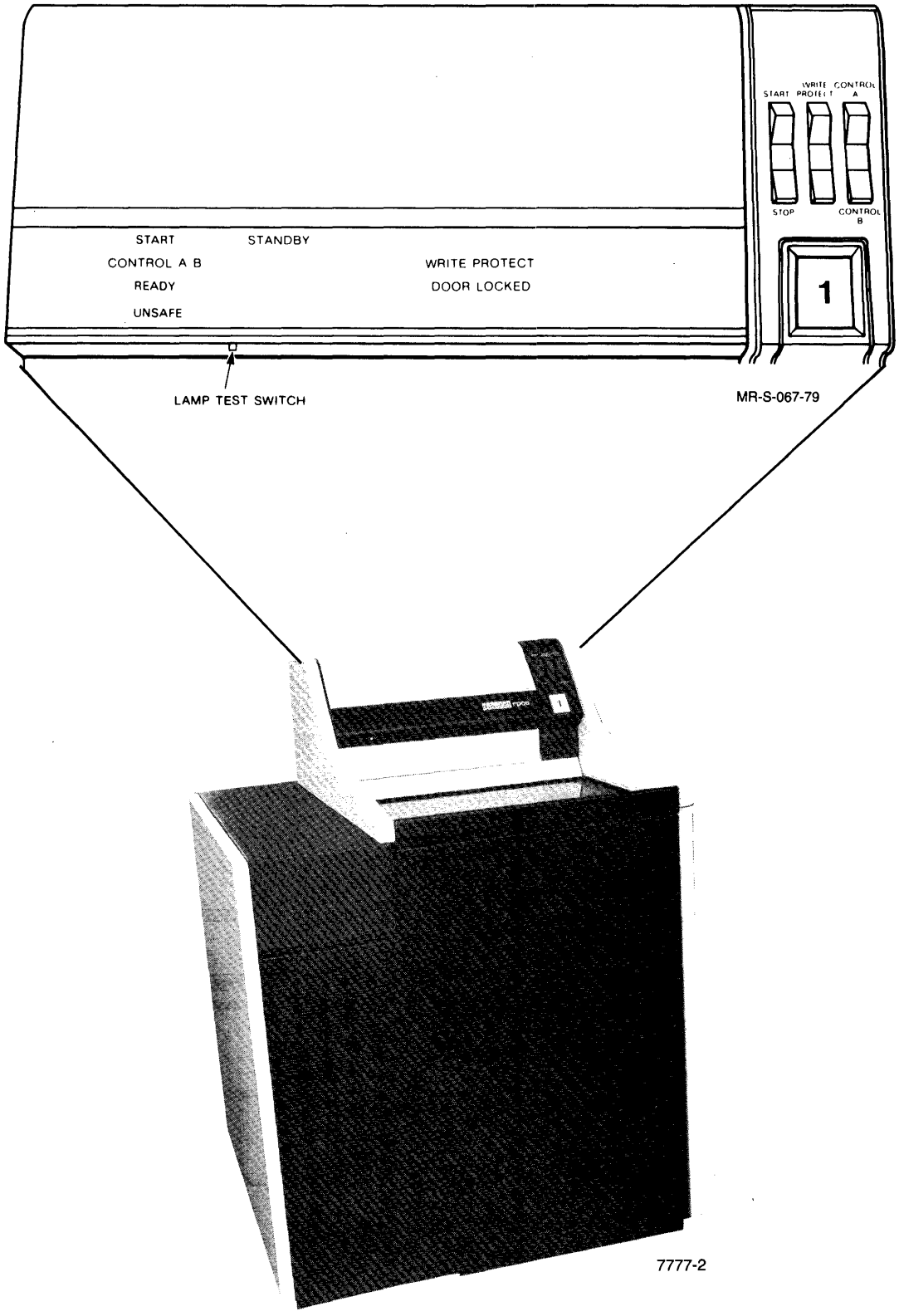

Figure 5-3: RP06 Disk Drive

5.1.3 RM03

The front control panel contains eight controls and indicators. (See Figure 5-4.)

START switch - The START switch is a 2-position pushbutton. Pressing the START switch when the drive is in the power-off condition (disk pack not spinning), lights the START indicator and initiates the power-up sequence provided the following conditions are met:

- o Disk pack is installed.
- o Pack access cover is closed.
- o All power supply circuits are on.

START indicator - This indicator will light when the START switch is depressed from the off position provided the three preconditions just mentioned are met. The light indicates that power is on.

READY indicator - Once the start sequence has been initiated by pressing the START switch, the READY indicator will blink once a second until the disk pack is up to speed.

When the READY indicator stays on, it indicates the following conditions have been met:

- o Disk pack is up to speed.
- o Heads are loaded.
- o No fault conditions exists.

DRIVE SELECT plug - This plug determines the logical address of the drive. The address can be changed to any number from 0 to 7 by installing the proper plug. If no plug is installed, the Plug Valid line to the controller is false.

FAULT Indicator - The FAULT indicator lights up when one or more of the following fault conditions exist in the drive:

- o Write fault
- o Head select fault
- o Read/write fault
- o Read/write while off cylinder fault
- o Voltage fault

FAULT CLEAR Switch - This switch is a momentary contact pushbutton used to clear the FAULT indicator. Pressing the FAULT CLEAR switch will extinguish the FAULT indicator only if the fault condition no longer exists.

WRITE PROTECT Indicator - When this indicator is on, it signifies that the drive is in the write protect mode. While in this mode, data cannot be written on the disk pack.

WRITE PROTECT Switch - This switch is a 2-position pushbutton. When pressed to the IN position, it lights the WRITE PROTECT indicator and disables the drive's write circuits. While in this position, data cannot be written on to the pack.

Releasing this switch back to its OUT position removes the Disable signal from the write circuits and extinguishes the WRITE PROTECT indicator.

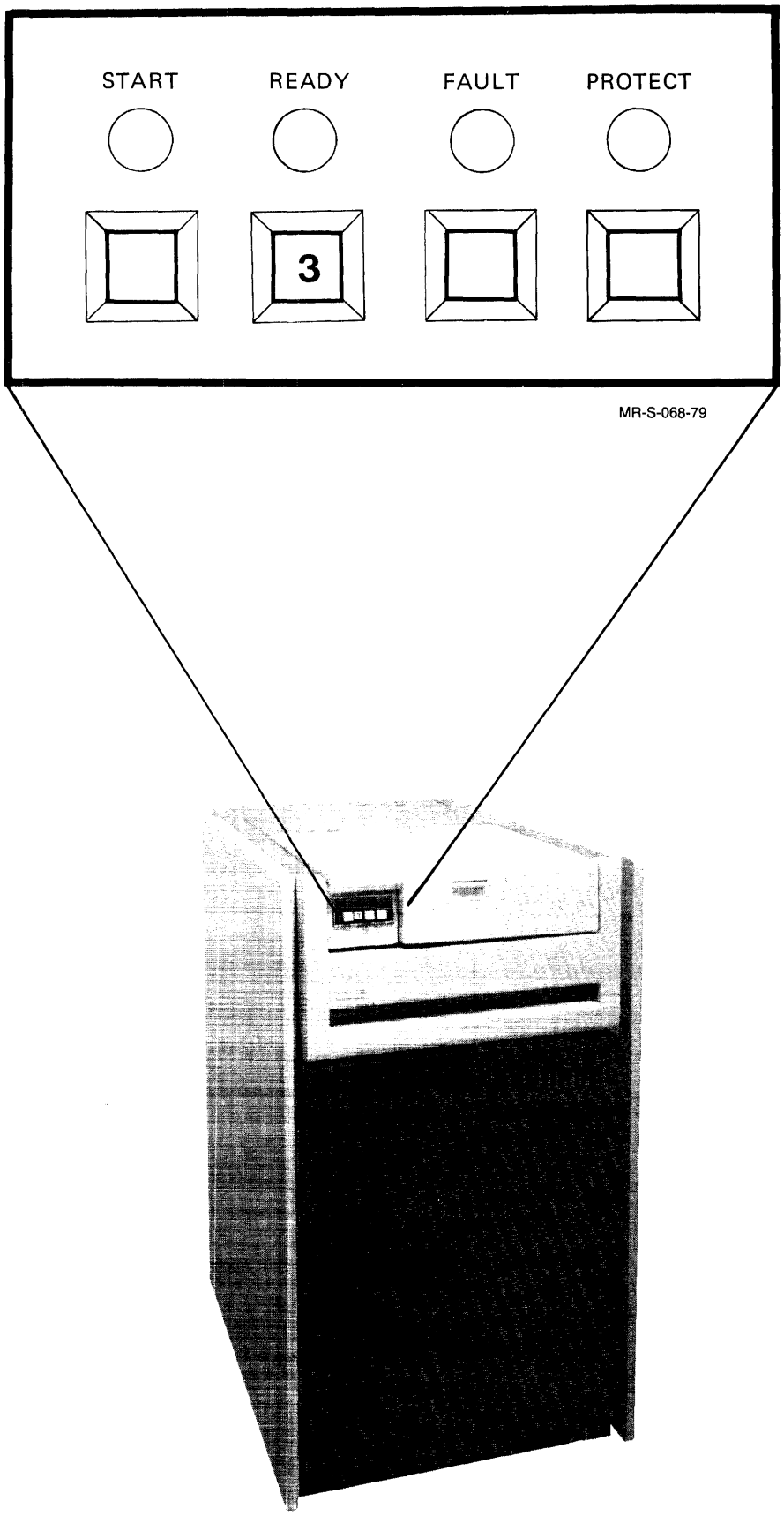

Figure 5-4: RM03 Disk Drive

5.1.4 RP20

Each RP20 master disk drive (see Figure 5-5) contains these switches and control indicators:

START/STOP Switch - The drive START/STOP toggle switch starts and stops a drive. When set to START, the brake is released, the disks rotate up to speed, and the heads move to cyclinder 0. When set to STOP, the heads retract, the brake engages, and the disks stop. An electrical interlock in the STOP position prevents a stop if the drive is busy.

READY Indicator - The READY indicator turns on when the drive is on, the disk drive speed is up to normal, and the head is on a track.

ATTN. Switch - When pressed, the ATTN. pushbutton switch starts a rezero operation. Rezero moves the heads to cyclinder 0, resets the address registers, and signals attention to the controller. Device and interrupts are generated for both logical devices.

WARNING

The ATTN. button should never be pressed under any circumstances.

R/W READ Switch - When in the READ position, no write or erase operation can be performed. If set in R/W, all reading and writing operations are possible. If the position of this pushbutton switch is changed during an operation, the condition does not change until the operation is completed.

Interface X and Interface Y Enable/Disable Switches (Dual Port) - The device interface switches have been added to the RP20-A Disk Drive control panel. The left switch controls the X interface; the right switch controls the Y interface. These enable/disable switches select the active interfaces by either dedicating the master and associated drives to a single interface or if both switches are on, to a Dual Port Device Interface.

NOTE

These X/Y Interface switches should be set according to the system configuration prior to restoring the operating system. The state of these switches should not be changed while the operating system is up.

POWER ON Switch/Indicator - Pressing the POWER ON switch supplies AC power to the master and slave drives if the ENABLE POWER OFF switch is in the ENABLE position. The POWER ON indicator is on when DC power is applied to the master drive.

ENABLE POWER OFF Switch - With this switch in the ENABLE position, the master and slave drives may be powered up by pressing the POWER ON switch or by a system controlled power up sequence.

With this switch in the OFF position, the master and slave drives are powered down. Power cannot be restored until switch is placed in ENABLE position and POWER ON is pressed again.

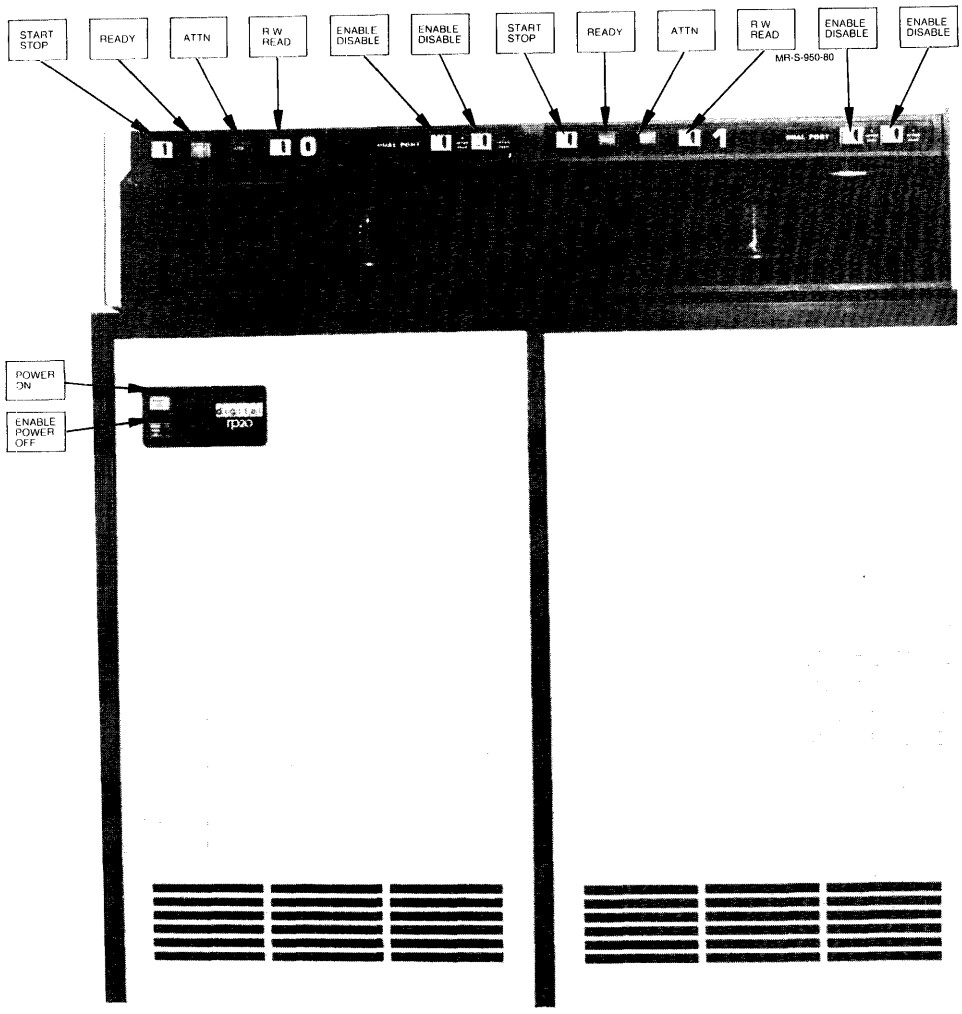

Figure 5-5: RP20 Disk Drive

5.1.5 RP07

The RP07 (see Figure 5-6) contains these switches and indicators:

START/STOP switch - The START/STOP toggle switch starts or stops the drive.

ON-LINE switch and indicator - The ON-LINE switch sets the disk on or off line. When the drive is on-line, the ON-LINE indicator is lit.

WRITE-PROTECT Switch and Indicator - The WRITE-PROTECT toggle switch enables or disables the drive's write circuit. When WRITE-PROTECT is on, the WRITE-PROTECT indicator is lit and data cannot be written to the disk. When the WRITE-PROTECT is off, the light is unlit and disk writes are permitted.

ACCESS Switch and Indicator - The ACCESS switch allows you to select either port, or both ports, for use. The indicator notes your selection. If A/B is selected, the indicator light is off. While the disk is in operation, this switch is disabled.

UNIT-NUMBER Indicator - This indicator shows the disk unit number in your hardware configuration.

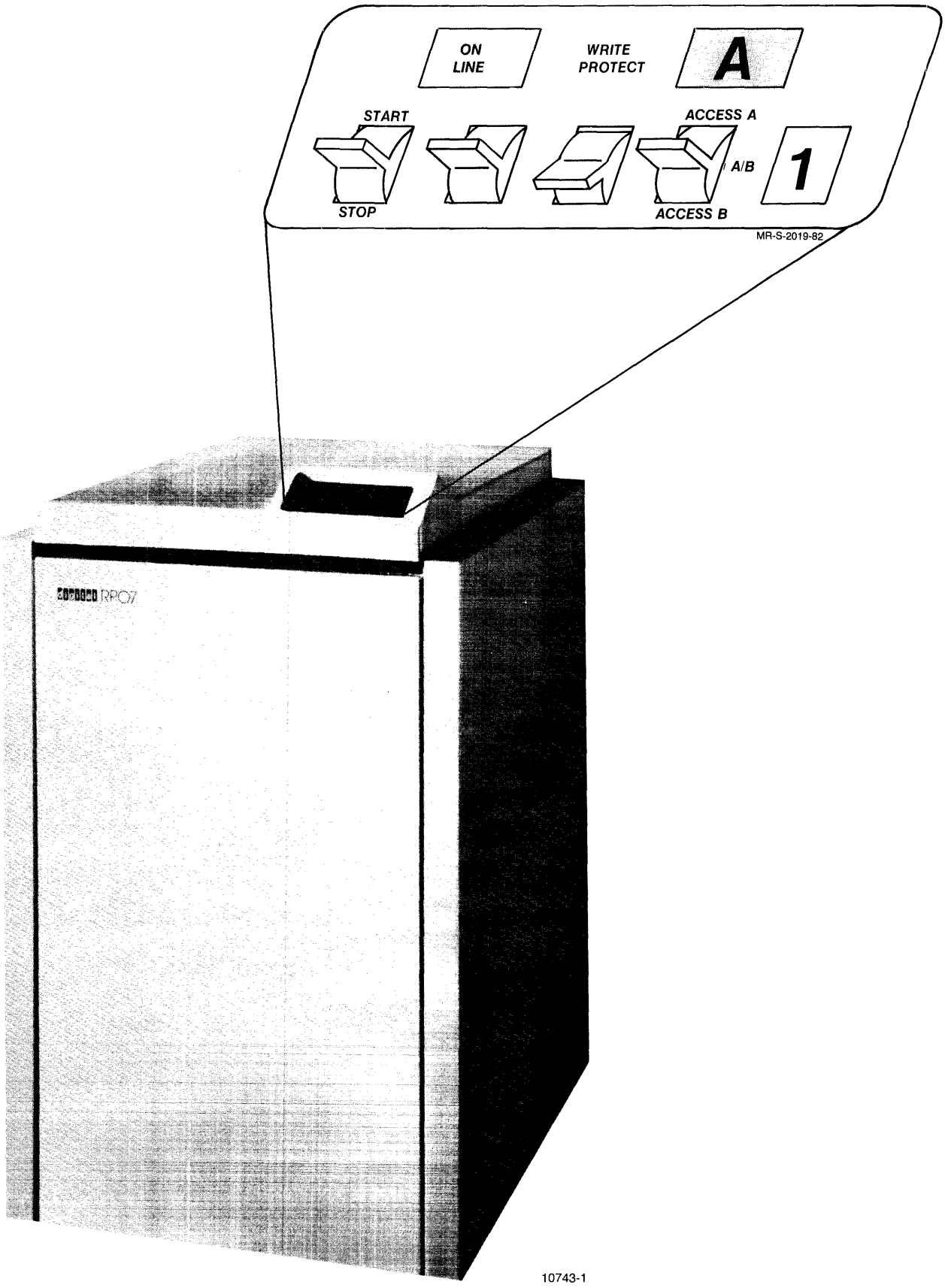

Figure 5-6: RP07 Disk Drive

5.1.6 CI (HSC50, RA60, and RA81)

The RA60 and RA81 disk drives are connected to the KL CI20 bus, and controlled by the HSC50 disk controller. The HSC50 allows the drives to be accessible to multiple KL (SMP) systems. Refer to the following hardware manuals for operating information:

- HSC50 User's Guide
- RA60 Disk Drive User's Guide
- RA80 Disk Drive User's Guide
- RA81 Disk Drive User's Guide

5.2 MOUNTING AND DISMOUNTING DISK PACKS

The following steps describe how to mount and dismount disk packs. Extreme care must be taken to avoid physical damage to the pack and drive. Do not put anything on top of a drive except empty disk pack covers.

5.2.1 RP02, RP03, RP04, or RP06 Procedures

To mount an RP02, RP03, RP04, or RP06 disk pack, perform the following steps:

1. Slide back or lift the drive cover.
2. Remove the bottom plate from the disk pack container by compressing the locking handle on the underside of the pack bottom.
3. Be sure that you have the pack with the correct label on it; slide the pack straight down onto the disk drive hub.
4. Turn the pack cover clockwise until the pack is locked into position. DO NOT FORCE THE COVER ONCE IT STOPS TURNING.
5. Pull the pack cover straight up and off the pack.
6. Close the drive cover and put the empty disk pack cover on its base and store it on top of the drive.
7. Push or toggle the START/STOP switch to the START position.
8. When the READY light is on, the drive is ready.

To dismount an RP02, RP03, RP04, or RP06 disk pack, perform the following steps:

1. Push or toggle the START/STOP switch to the STOP position and wait until the pack comes to a complete stop.
2. Slide back or lift the drive cover.
3. Slip the pack cover straight down over the pack.
4. Turn the cover counterclockwise until the pack is free.
5. Lift the pack straight up until it clears the drive.

6. Secure the bottom plate to the pack cover by compressing the locking handle on the underside of the pack bottom.

7. Close the drive cover.

5.2.2 RM03 Disk Pack Procedures

To mount an RM03 disk pack, perform the following steps:

1. Push the latch and pull up the drive cover.

2. Compress the locking handle on the underside of the bottom plate to remove the bottom from the disk pack cover.

3. Make sure that you have the pack with the correct label on it, and then slide the pack straight down onto the disk drive hub.

4. Turn the pack cover clockwise until the pack is locked into position. DO NOT FORCE THE COVER ONCE IT STOPS TURNING.

5. Pull the pack cover straight up and off the pack.

6. Close the drive cover and put the empty disk pack cover on its base and store it on top of the drive.

7. Push the START switch. This causes the START light to blink.

8. When the READ light stops blinking, the drive is ready.

To dismount an RM03 disk pack, perform the following steps:

1. Push the START switch, which causes the START light to blink, and wait until the START light goes off.

2. Pull up the drive cover.

3. Slip the pack cover straight down over the pack.

4. Turn the cover counterclockwise until the pack is free.

5. Lift the pack straight up until it clears the drive.

6. Compress the locking handle on the underside of the bottom plate to secure the bottom plate to the disk pack cover.

7. Close the drive cover.

5.2.3 RA60 Disk Pack Procedures

To mount an RA60 disk pack, perform the following steps:

1. Pull the drawer out, unless this is the topmost drive in the cabinet.
2. Push the latch on the front panel and lift the drive cover.
3. Make sure that you have the pack with the correct label on it. Slide the pack straight down onto the disk drive hub.
4. Turn the pack cover handle clockwise until the pack is locked into position. DO NOT FORCE THE COVER ONCE IT STOPS TURNING.
5. Pull the pack cover straight up and off the pack.
6. Put the empty disk pack cover aside, close the drive cover, and push the drawer in.
7. Verify that port switch A or B is in the ON position, depending on which port is to be accessed by the controller. When both port switches are in the ON position at the same time, either Port A or Port B can be accessed by the controller.
8. Push the RUN/STOP switch.
9. When the READY light is on, the drive is ready.

To dismount an RA60 disk pack, perform the following steps:

1. Push the RUN/STOP switch and wait until the READY light goes off.
2. Pull the drawer out.
3. Push the latch on the front panel and lift the drive cover.
4. Slip the pack cover straight down over the pack.
5. Turn the cover counterclockwise until the pack is free.
6. Lift the pack straight up until it clears the drive.
7. Close the drive cover and push the drawer in.

5.3 POWERING UP AND POWERING DOWN DISK SYSTEMS

This section describes the steps for powering up and powering down disk drives.

5.3.1 RP20 Procedures

To power up an RP20 disk system, perform the following steps:

1. Place the POWER switch, located on the front of the master disk drive, to the ENABLE position.

2. Press the POWER ON button located on the front of the master disk drive.

NOTE

If the disk drive does not power up, check the POWER ON switch in the back of the disk control unit. If the switch is in the ON position and the disk drive is still not powered up, call your DIGITAL Field Service Engineer.

To power down an RP20 disk system, perform the following steps:

1. Stop all RP20 disk drives.

2. Place the POWER switch, located on the front of the master disk drive, to the OFF position.

5.3.2 RP07 Procedures

To power up an RP07 disk drive, perform the following steps:

1. Place the ON LINE switch located on the front of the disk drive to OFF LINE.

2. Place the START/STOP switch, located on the front of the disk drive, to the START position.

3. Wait until lights stop flashing and ON LINE indicator is off. Place the ON LINE switch located on the front of the master disk drive to ON LINE.

To power down an RP07 disk system, perform the following steps:

1. Place the ON LINE switch located on the front of the disk drive to OFF LINE.

2. Place the START/STOP switch, located on the front of the master disk drive, to the STOP position.

5.3.3 HSC50 Disk Controller Procedures

Before using the CI disk sub system you must configure all HSC50 disk controllers to use the correct sector size. To do this, use the HSC50 utility program SETSHO. In order to verify the sector size parameter, type the following commands on the HSC50 console terminal:

1. Type a <CTRL/Y> to get the HSC50> prompt.

2. Type the command RUN SETSHO<RET>.

3. When you receive the SETSHO> prompt, type the command SHOW SYSTEM<RET>. The SETSHO program types the system configuration information on the HSC50 console terminal. A typical print-out is shown in Figure 5-7.

4. If the "sector size" parameter on the third line of the print-out is set to 576, no further action is necessary. Type the command EXIT<RET> to exit from the SETSHO program. If the "sector size" parameter is not set to 576, you must type the command SET SECTORSIZE 576<RET>. Now type the command EXIT<RET>.

5. The SETSHO program prints the following question on the HSC50 console terminal:

   SETSHO-Q Rebooting HSC; type Y to continue, <CTRL/Y> to abort:?

   Type a Y in response to this question.

6. The HSC50 now reboots. When the HSC50 software is reloaded the new "sector size" parameter is in effect.

```
.RUN SETSHO
SETSHO>SHOW SYSTEM
28-Oct-1985 09:30:21.27 Boot: 17-Oct-1985 15:01:18.67  Up:258:29
Version: Y25G           System ID: %X00000000E708      Name: HSC008
Front Panel Enabled     Sector size-576
Console Dump Enabled    TU58 Dump Disabled
Restart - Warm
Automatic Diagnostics Enabled
Periodic Diagnostic Interval- 1     Enabled
DISK allocation class = 0       Tape allocation class = 0
Start command file Enabled
SETSHO>
```

Figure 5-7: TOPS-10 SHOW SYSTEM Output

For information on powering up and powering down the HSC50 disk controller, consult the latest version of the HSC50 User Guide.

5.4 STARTING AND STOPPING DISK DRIVES

This section describes the steps for starting and stopping various kinds of disk drives.

5.4.1 RP20 Disk Drive Procedures

To start an RP20 disk drive, perform the following steps:

1. Place the START/STOP toggle switch to the START position.
2. Wait for the READY light to illuminate.

Follow these procedures for each RP20 disk drive you plan on using.

To stop an RP20 disk drive, place the START/STOP toggle switch to the STOP position.

5.4.1.1 Switching an RP20 Disk Drive between Systems - If the RP20 drive is equipped with the dual-port feature, you can disable both ports and then enable the port for the system on which the drive is to be used. Then press the ATTN button once to get the attention of the system to which the drive has been connected.

5.4.2 Starting an RP07 Disk Drive

To start an RP07 disk drive, perform the following steps.

1. Place the START/STOP toggle switch to the START position.
2. Wait for the on-line light to illuminate.

Follow these procedures for each RP07 disk drive you plan on using.

NOTE

When the RP07 is brought on-line the access control light (A or B) is illuminated.

5.4.3 Stopping an RP07 Disk Drive

To stop an RP07 disk drive, perform the following step.

1. Place the START/STOP toggle switch in the STOP position.

5.4.4 RA60 and RA81 Procedures

To start an RA60 or RA81 disk drive, perform the following steps:

1. Verify that the port switch A, B, or A and B is set, depending on which port you are using.
2. Press the RUN/STOP switch.
3. Wait for the READY light to come on.

Follow these procedures for each RA60 or RA81 disk drive you plan to use.

To stop an RA60 or RA81 disk drive, press the RUN/STOP switch and wait for the READY light to go off.

5.5 FORMATTING DISK PACKS

NOTE

The RP07, RP20, RA60, and RA81 disk packs are already formatted. If you need to have an RA60 or RA81 disk pack reformatted, contact your Digital Field Service Representative.

Formatting and mapping disk packs is required prior to their first use. This procedure is also recommended if a disk pack develops search errors or other problems such as bad spots on the pack. Formatting writes (or rewrites) a header record at the beginning of each sector so that the hardware can position itself when reading or writing on the disk. Mapping is the process of writing and reading each disk block, or sector, a number of times to search for bad blocks. A log of any bad blocks is kept and is output in two duplicate BAT blocks.

Because the formatting process destroys all data on the disk pack, you should first run the BACKUP program and save any important files. (Refer to the TOPS-10 Operator's Guide for information on BACKUP.)

5.5.1 RP02s and RP03s with TOPS-10 DCRPE

RP02s and RP03s can all be formatted in a timesharing environment using the DCRPE program. The requirements for running DCRPE are:

- You must be logged in under [1,2], preferably on a hard copy terminal.
- The disk pack must be mounted on a private drive; the pack must not have been ASSIGNed or MOUNTed.
- The "write header" switch inside the appropriate RP10 disk controller must be set to enable write headers (LK OUT position).

Proceed as follows:

Step	Function
.R DCRPE[6,6] <RET>	Run DCRPE, which is usually stored in the hardware and diagnostic area [6,6]. DCRPE will then enter into a dialogue with you.
TYPE THE PHYSICAL NAME OF THE DISK PACK DRIVE:	Reply with the physical designation of the drive; for example, DPA0 or DPB2.
DO YOU WISH TO FORMAT THE PACK? Y or N	Y will continue with the formatting; N will skip the formatting and go to the mapping questions that follow the NOTE below.
NAME THE DEVICE FOR ERROR REPORTING:	Enter the logical or physical name of the device for error reports; for example, TTY. A carriage return defaults to disk.

***ARE YOU SURE YOU WANT TO PROCEED? ALL INFORMATION ON DEVICE dev WILL BE LOST BEYOND THIS POINT. Y or N <CR>-	This is your last chance to exit before losing data or disk. Type Y if all necessary data has been saved.
FORMATTING IN PROGRESS hh:mm:ss	DCRPE notifies you that it has started to format the disk and gives you a timestamp.
HEADERS HAVE BEEN WRITTEN- VERIFICATION NOW IN PROGRESS	DCRPE has completed writing the headers and is now reading them to verify their validity.
FORMATTING COMPLETE- RECOMMEND MAPPING THE PACK TOTAL ERRORS:n TOTAL FORMATTING TIME= hh:mm:ss	DCRPE has completed the verification: you are notified of the number of errors (n) and of the time it took for the formatting process.
DO YOU WISH TO MAP THE PACK? Y or N <CR>-	Y will continue with mapping; N will exit to the monitor.

At this time you can switch the "write headers" switch on the disk controller back to the WH position.

NOTE

If you are formatting a new pack, one that has not been used since it came from the factory, it will not have the valid HOM and BAT blocks required by the mapping portion of DCRPE. Run the ONCE program in user mode, and select the DEFINE startup option to structure the pack, give it a scratch name, and initialize both the HOM and BAT blocks. You can find a detailed description of the ONCE program in Appendix A of the TOPS-10 Software Installation Guide.

Next, reload the DCRPE program. Answer N to the question DO YOU WISH TO FORMAT THE PACK?. You will then be prompted as follows:

Step	Function
USE OLD BAT BLOCK AS BASE? Y or N <CR>-	You must reply Y (for Yes).
DO YOU WISH TO RETAIN THE HOME BLOCKS IF YES, THE PACK WILL HAVE TO BE REFRESHED IF NO, THE HOME BLOCK PARAMETERS WILL HAVE TO BE REDEFINED IN ONCE Y or N <CR>-	Again, answer Y.
NAME THE DEVICE FOR CRASH RECOVERY DATA:	The usual reply is DSK.

NAME THE DEVICE FOR ERROR REPORTING:	This question is asked only if you skipped formatting. Answer with TTY.
***ARE YOU SURE YOU WANT TO PROCEED? ALL INFORMATION ON DEVICE dev WILL BE LOST BEYOND THIS POINT Y or N <CR>-	Type Y if all necessary data files have been saved.
MAPPING IN PROGRESS hh:mm:ss	DCRPE notifies you that it is mapping and gives you a timestamp.
END OF PASS 1; ELAPSED TIME =hh:mm:ss	DCRPE has read all the blocks once in the time shown and has found n errors.
n ERRORS THIS PASS CONTINUE? A or Y or N <CR>-	Type A to continue reading all the blocks a total of ten times without stopping. Type Y to read the blocks one more time and ask the question again. Type N to end mapping at this pass.
TOTAL MAPPING TIME FOR dev=hh:mm:ss HISTORY OF BAD BLOCKS: START OF BAD BLOCK: bbbbbb=ccc,hh,ss SIZE OF BAD REGION IN BLOCKS=n . . . p=BAD BLOCKS TOTAL q=BAD REGIONS TOTAL EXIT	After the final pass, DCRPE prints out the total mapping time and the location, size, and number of any bad regions on the disk. Each bad area is located by block number bbbbbb, as well as cylinder (ccc), head (hh) and sector (ss). The size of each bad region is given by n. After all bad areas have been logged, the total number of bad regions (q) and bad blocks (p) are printed. This same information is also stored in the two duplicate BAT blocks. The program then exits.

Now, run the ONCE program in user mode with the REFRESH startup option to re-initialize the two duplicate HOM blocks and clear the Storage Allocation Table (SAT). This procedure frees up any lost blocks and eliminates fragmentation of files since the subsequent BACKUP operation, RESTORE, will reload the files systematically.

5.5.2 Formatting RP02s and RP03s with TOPS-10 DDRPC

RP02 and RP03 disks can also be formatted in exec mode using the DDRPC program. This program gives you the additional capability of formatting single cylinders of a disk pack and single surfaces of a cylinder.

The requirements for running DDRPC are:

- The "write header" switch inside the appropriate RP10 disk controller must be set to enable write headers (LK OUT position).
- Drives that are not to be formatted must be placed off line with the STOP switch.

Load and start the DDRPC program; it will initialize and print a description of the disk system.

```
PDP-10 RP10 Disk Pack Reliability Test (DDRPC) Version 000,002

Memory Map =
From    To     SIZE/K
000000 077777 32K

POWER FREQUENCY = 60 HZ

Write Enable Entire Disk Y or N <CR> Y <RET>
DF10 in KA Addressing Mode
Number of Drives= 4
DPA0 = RP03, STATUS-ON LINE
DPA1 = RP02, STATUS-OFF LINE
DPA2 = RP03, STATUS-OFF LINE
EDDT
```

You are now ready to format an entire disk or selected portions of it.

----- Examples -----

1. Formatting an Entire Disk Pack

You type everything that is underscored:

Step	Function
EX FORMAT$X <RET>	You want to use the formatting capability of the DDRPC diagnostic program. (Note that $ indicates pressing the ESCape or ALTmode key.)
WANT TO FORMAT THE DISK? Y or N <CR> - Y <RET>	Type Y to format pack.
WHAT DRIVE?-<CR>0 <RET>	Format drive 0.
WANT TO FORMAT ENTIRE DISK? Y or N <CR>-Y <RET>	The complete disk pack on drive 0 is to be formatted.

```
VERIFY ERROR, DISK ADDR, DPA=0 CYL=013 SURF=02 SECT=03
VERIFY ERROR, DISK ADDR, DPA=0 CYL=056 SURF=01 SECT=01
VERIFY ERROR, DISK ADDR, DPA=0 CYL=103 SURF=04 SECT=03
VERIFY ERROR, DISK ADDR, DPA=0 CYL=277 SURF=06 SECT=00

          **********
          EXIT TEST-FORMAT RUN TIME 0:15:20
          **********
```

The error messages above indicate that the disk failed to format the indicated disk addresses successfully. The disk may be completely formatted again or the individual addresses (surfaces) may be reformatted as indicated in the example below.

2. Formatting a Portion of the Disk Pack

You type everything that is underscored:

Step	Function
EX FORMAT$X <RET>	Format a portion of a disk pack. (Note that $ indicates where you press the ESCape or ALTmode key.)
WANT TO FORMAT THE DISK? Y or N <CR>-Y <RET>	Type Y to format pack.
WHAT DRIVE?-<CR>0 <RET>	Format drive 0.
FORMAT ENTIRE DISK? Y or N <CR>-N <RET>	To format only a portion of the disk.
CYL(8)=100 <RET>	Cylinder 100 (octal).
SURF (8)=0 <RET>	All sectors of surface 0.
CYL(8)=102 <RET>	Cylinder 102.
SURF(8)=A <RET>	All surfaces.
CYL(8)=B <RET>	B is an illegal character.
?HUH?	
CYL(8)=217 <RET>	Cylinder 217.
SURF(8)=40 <RET>	40 is an illegal surface address.
?HUH?	
CYL(8)=217 <RET>	Cylinder 217 again.
SURF(8)=4 <RET>	Surface 4.
CYL(8)=E <RET>	Either E or X at this point causes the program to ask if there is another drive to be formatted (or tested).
TEST WHAT DRIVE?-<CR>E <RET>	The formatting for the above cylinders and surfaces will be done, error messages may appear as in the above example, and EXIT TEST will be output.

At this time you can switch the "write headers" switch on the disk controller back to the WH position.

5.5.3 Formatting RP04s and RP06s with TOPS-10 DDRPI

RP04s and RP06s can be formatted and mapped in either a timesharing environment or stand-alone using the DDRPI program.

DDRPI (Timesharing)

Running DDRPI during timesharing requires the following:

- You must be logged in under [1,2].
- Packs to be formatted must not be in the system structure list.
- The following files must be in your area:

```
DIAMON.SAV
 DDRPI.SAV
 KLDDT.SAV
SUBRTN.SAV
```

Proceed as follows, type everything that is underscored:

.ASSIGN DSK LPT <RET>	Direct printer output file to disk.
.RUN DIAMON <RET>	Load and start the diagnostic monitor. DIAMON will then request a command.
DIAMON CMD-	Enter "DDRPI" to start the disk formatting dialogue.

The DDRPI dialogue for formatting RP04 and RP06 type disk drives is rather lengthy. Print out the DDRPI.HLP file and use it as reference. The dialogue questions and their suggested responses are fully detailed.

5.5.4 Formatting RP04s and RP06s on TOPS-20

To format an RP04 or RP06 disk pack while TOPS-20 is timesharing, you must use a single ported disk drive or one channel only (A or B) on a dual ported drive. Follow this procedure:

1. Start OPR.
2. Type PUSH.
3. Type ENABLE.
4. Type FORMAT.

CAUTION

Format only one disk pack at a time. If you run more than one FORMAT program simultaneously, you can destroy information on the packs. Also, use the FORMAT program only when there is just one disk pack on a channel on-line; otherwise you could crash the system. However, the VERIFY mode allows more than one disk pack per channel to be on-line.

5. Type RP04 or RP06 to indicate the kind of pack to format, or type HELP to print the help text.

6. If FORMAT prints THE FOLLOWING UNIT IS AVAIL., type Y to use that unit; otherwise, type N. If you type N and other units of the correct kind are available, FORMAT prints the above message again.

   When no units of the correct kind are available, FORMAT prints a message starting with SORRY - THERE ARE NO DRIVES and then exits. You should then type CTRL/X to return to PTYCON. Later, when a drive is available, try this entire procedure again. A drive is available when it is the correct type for the pack you specify (RP04 or RP06), when it is off-line, and when it is not in use by a diagnostic.

7. After you type Y for an available unit, place the pack to be formatted on the drive. Put the drive on-line, and then write-enable the drive. Then press RETURN to the FORMAT program.

8. Type F, V, or B.

   - F formats the pack and destroys all data on the pack.
   - V verifies (maps the bad regions on) a formatted pack. It creates new BAT blocks first and then puts entries in the BAT blocks for any bad regions found on the disk. Data, other than the BAT blocks, is not destroyed.
   - B formats and then verifies.

9. When formatting a pack having data indicating a structure, FORMAT asks if you are sure you want to reformat. Type Y to reformat; otherwise, type N.

   Formatting a disk pack is a lengthy procedure. Typing CTRL/T during the formatting operation will tell you how much of the pack is formatted.

10. When formatting and/or verification end(s), FORMAT asks if you want to format another pack. Type Y for yes, N for no. If you type Y, go back to Step 4.

11. After you type N in Step 9, type CTRL/X to return to PTYCON.

----- HINT -----

For more detail on FORMAT, type HELP to FORMAT, or give the command PRINT HLP:FORMAT.HLP for a listing of the FORMAT help text.

----- Example -----

```
OPR>PUSH
TOPS-20 Command Processor 7.0
@ENABLE
$FORMAT

TOPS-20 ON-LINE FORMATTER FOR DISK PACKS ON RH20'S, VERSION IS 5(1)

ENTER TYPE OF PACK TO BE USED. (OR HELP)
PICK ONE: (  HELP  RP04  RP05  RP06  ) - RP06
```

```
THE FOLLOWING UNIT IS AVAIL.  DRIVE-5 RH-540
DO YOU WISH TO USE THIS ONE ?("Y" OR "N" <CR>) - Y


OPR ACT'N REQ'D:  DRIVE-5 RH-540
CYCLE UP PACK TO BE FORMATTED AND WRITE ENABLE THE DRIVE
HIT <CR> WHEN READY


- BEWARE - FORMATTING DESTROYS ALL EXISTING PACK DATA
OPTIONS ARE: FORMAT ONLY (F), VERIFY ONLY (V), DO BOTH (B)
PICK ONE (F,V,B) - F

THE SERIAL # OF THE DRIVE IS - 73.

PACK NAME IS: PS
ARE YOU SURE YOU WANT IT RE-FORMATTED  ? ("Y" OR "N" <CR>) - Y

22-JUN-78 10:35:08 STARTING FORMAT OPERATION
22-JUN-78 10:43:02  OPERATION 20.% COMPLETED. CURRENT BLOCK #61941.
22-JUN-78 10:57:19  OPERATION 40.% COMPLETED. CURRENT BLOCK #123882.
22-JUN-78 11:04:02  OPERATION 60.% COMPLETED. CURRENT BLOCK #185823.
22-JUN-78 11:10:56  OPERATION 80.% COMPLETED. CURRENT BLOCK #247761.
22-JUN-78 11:17:43 FORMAT COMPLETED

OPR ACT'N REQ'D:  DRIVE-5 RH-540
REMOVE PACK FROM THE DRIVE
HIT <CR> WHEN READY


FORMAT ANOTHER PACK ? ("Y" OR "N" <CR>) - N

[EXIT]
@
PTYCON>
```

----- Requirements -----

OPERATOR, WHEEL, or MAINTENANCE capability required.

The program must be run under a timesharing job, not a batch job.

----- Error Message -----

```
USER DOES NOT HAVE PROPER PRIV. TO RUN THIS PROGRAM !!
WHEEL, OPERATOR, OR MAINTENANCE CAPABILITY REQUIRED
```

Although you do not need to enable capabilities to run FORMAT, the logged-in directory under which you run FORMAT must have at least one of the required capabilities. You can run FORMAT under an <OPERATOR> which has OPERATOR capability.

5.6 CLEANING DISK DRIVES

Other than keeping the outside of the drive and the cover of the packs clean, you should leave this task to your Digital Field Service representative.

CHAPTER 6

FLOPPY DISKS

A floppy disk is a single, record-like platter which is housed in a protective cover. A narrow slot in this cover allows the surface to be accessed by the drive heads. During system installation, the front-end software is loaded from floppy disks and transferred to the regular disk system. During normal operation of the computer thereafter, the floppy disks are used only occasionally. Such use may involve booting the system if normal methods fail, or mounting a floppy with diagnostic programs for trouble-shooting by Digital Field Service.

As you face the two floppy disk units, unit 0 is the left one, and unit 1 is the right one.

6.1 INSERTING AND REMOVING FLOPPY DISKS

To insert a floppy disk (Figure 6-1), first choose the correct unit and press the pushbutton in the middle of the unit to allow the spring-loaded front cover to open. Insert the floppy disk with the narrow slot toward the back of the drive and the label up. Then push the bar on the cover to lock it.

To remove a floppy disk, press the pushbutton again to open the front cover and slide the floppy disk out.

NOTE

Do not open the covers while the floppy disks are being accessed.

6.2 HANDLING FLOPPY DISKS

To prolong the life of a floppy disk and to prevent errors, you should handle floppy disks with reasonable care. You should follow the handling recommendations given below to prevent unnecessary loss of data or interruptions of system operation.

- To attach visual information to a floppy disk, first write the information on a label, then attach the label to the floppy disk. Do not write on the floppy disk.
- Do not use paper clips on a floppy disk.
- When you write on the outer jacket in which you store a floppy disk, do not use anything that leaves flakes, such as lead or grease pencils.

- Do not touch the surface exposed in the slot or small index hole.
- Do not clean the floppy disk in any manner.
- Keep the floppy disk away from magnets or tools that may have become magnetized. Exposure to a magnetic field may cause a loss of data.
- Do not expose the floppy disk to a heat source or sunlight.
- Always return floppy disks to the envelopes supplied with them to protect them from dust and dirt, and store them horizontally.
- Protect empty envelopes from liquids, dust, and metallic materials.
- Do not place heavy items on floppy disks.
- Do not store floppy disks on computer cabinets or in places where dirt can be blown by fans.
- If a floppy disk has been exposed to less than 59 degrees Fahrenheit (15 degrees Centigrade) or more than 90 degrees Fahrenheit (32 degrees Centigrade), let it stay in the computer room about five minutes before you use it.

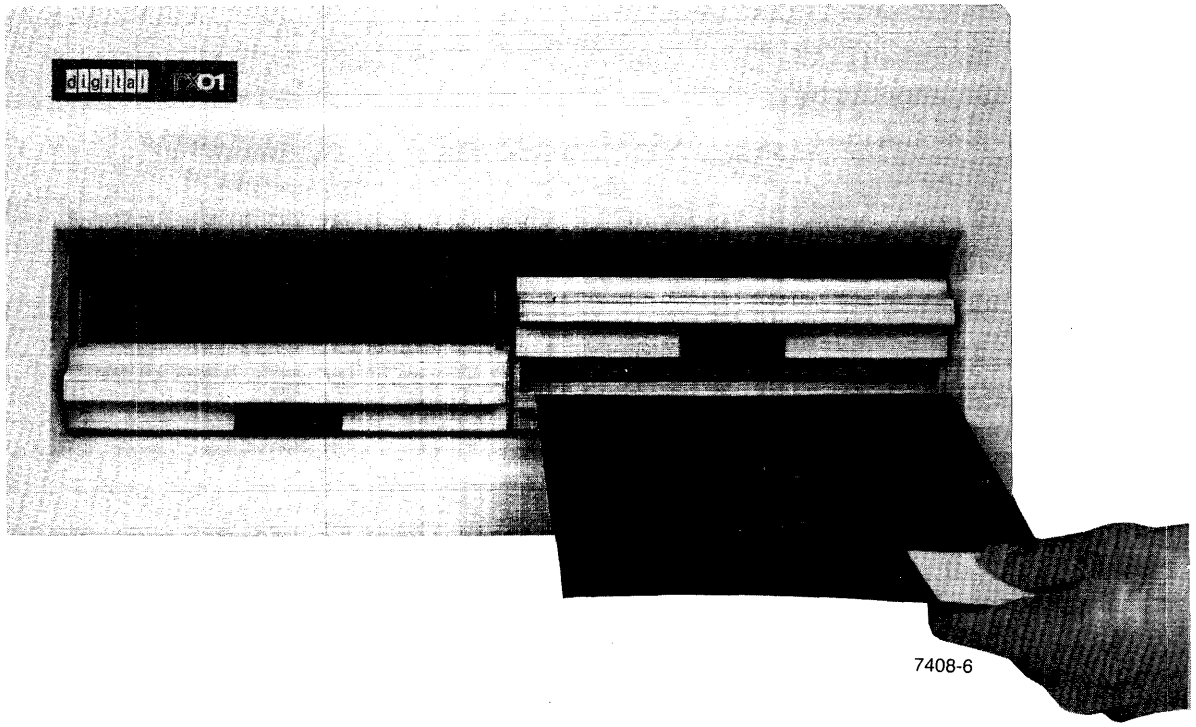

Figure 6-1: Floppy Disk

TOPS-10/TOPS-20
Operator's Hardware Device
and Maintenance Guide
AA-KZ39A-TK

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For which tasks did you use this manual? (Circle your responses.)

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Did the manual meet your needs? Yes ☐ No ☐ Why? _____

Please rate the manual in the following categories. (Circle your responses.)

	Excellent	Good	Fair	Poor	Unacceptable
Accuracy (product works as described)	5	4	3	2	1
Clarity (easy to understand)	5	4	3	2	1
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Illustrations, examples (useful)	5	4	3	2	1
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