Basic Four®
System 610/730
Operator's Guide

MAI Basic Four
Information Systems®

CONTENTS

Pin Belegung

1   ⊥ + Abschirmung

2   braun

3   gelb

7   weiss + grün

grau + rosa abisolieren und mit
Abschirmung verdrillen

FIGURES

Congratulations on your new Basic Four computer system. We hope, and expect, that it will serve you well. But to ensure maximum efficiency from a computer system, it is necessary to understand its workings, and more importantly, how it should be operated. This is the purpose of this operator's guide.

Since most Basic Four computer users are business men, rather than computer specialists, the descriptions of the system components are only as technical as required to understand the detailed operational instructions. Each operational instruction includes explanatory diagrams and photographs where appropriate to make the procedures as clear and easy to understand as possible.

As an adjunct to this guide, it may be beneficial for operating personnel to attend classes given on the operation of the Basic Four system. For information concerning curriculum or enrollment, contact your nearest sales office. Early enrollment will ensure attendance and may eliminate delays in attaining full operational status of your Basic Four system.

The operating system of any computer controls all of the individual elements of the computer system and thus is of prime inportance. The Basic Four operating system is known formally as BOSS (Basic Operating System Software). BOSS is completely resident in memory at all times, thus providing vast improvement in efficiency over disc-resident operating systems. A complete description of BOSS and the Business BASIC Interpreter that it includes, is available in the Reference Manual for Business BASIC Level 3 (BFC 5037).

The three major elements of BOSS are:
1. A disc-oriented, real-time executive program with multiterminal and multiprogramming features.

2. An interpreter for Business BASIC, a high-level programming language.

3. Specifications to support the exact hardware configuration of the Basic Four system.

Within the memory of your Basic Four computer system, whatever the specific configuration, is a version of BOSS tailored to fit your needs. Should this operating system become inoperable for any reason, it may be reloaded from disc and initialized using the following procedure:

• Insert the BOSS disc pack delivered with your computer and bring the disc drive to a READY status.

• Press the LOAD button on the CPU control panel to cause the entire BOSS system to be "loaded" from disc to memory. The BOSS system is automatically initialized and made ready for execution. The proprietary message is displayed at this time.

NOTE

If the HALT indicator is on at this time, remove the disc pack, verify that the proper disc pack is being used, carefully reinstall the disc pack, and repeat the procedure.

Once the proprietary message and system identification messages are displayed, the question "DO YOU WANT SPOOLING? (Y/CR)? is asked. A "Y" response will set up line printer spooling files. A "CR" response will bypass spooling. In either case, the system will respond with a "READY" message. The entire Basic Four system is now ready for use.
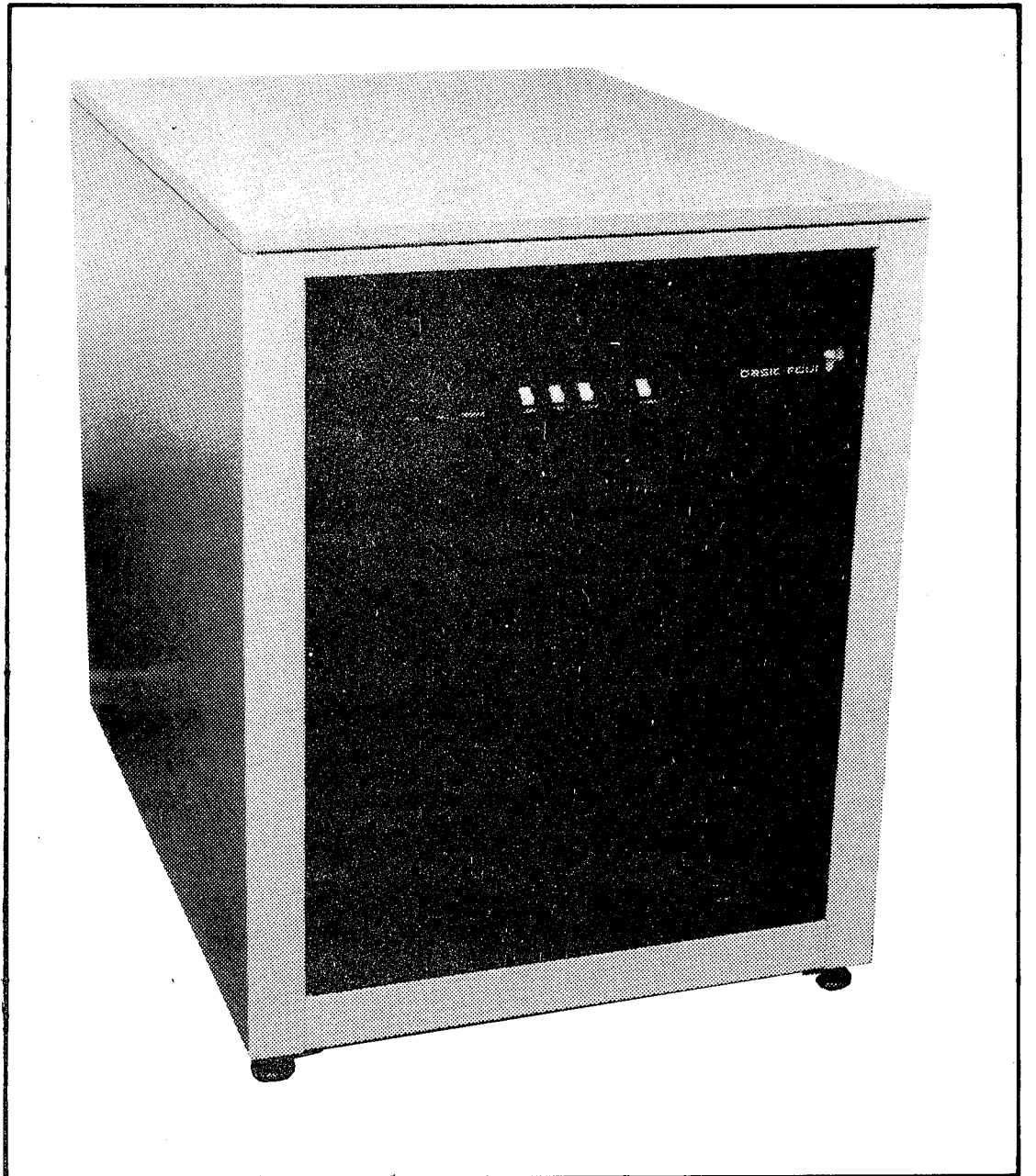
The central processing unit (CPU) is a compact, microprogrammed, general-purpose computer. The Basic Operating System Software, BOSS, is resident in 32K bytes of protected system memory. A minimum of 32K bytes (System 610) or 64K bytes (System 730) of user memory is also provided, which is expandable to a maximum of 160K bytes for the System 610 and 224K bytes for the System 730.

Two channels connect all peripheral devices to the CPU. The Direct Memory Access (DMA) channel provides high-speed access between the CPU and up to four disc drives. The Input/Output (I/O) channel is used to interface all other peripherals (terminals, printers, etc.) to the CPU.

CPU features include a continuously charged battery pack which preserves the information contained in semiconductor memory in case of a temporary power failure; full duplex asynchronous channels which can support, in a fully upgraded system, up to 32 directly connected or remotely located serial devices; and an optional intelligent binary synchronous communications channel for high-speed data transmissions such as CPU-to-CPU communications.

CENTRAL PROCESSING UNIT

SPECIFICATIONS
Memory

- 2048 words of 200 nanosecond semiconductor read-only microprogrammed control memory.

- 32K bytes of 600 nanosecond read-write protected operating system memory.

- 32K bytes (minimum) to 160K bytes (maximum) of user memory (System 610).

- 64K bytes (minimum) to 224K bytes (maximum) of user memory (System 730).

Peripheral Devices: (Maximum Allowable)	System 610	System 730
● Serial Devices	16*	32
● Disc Drives	4	4
● Printers (parallel)	2**	2**
● Magnetic Tape Drives	2	2
● Tape Cartridge Drive	1	1
● Synchronous Communications	1	1

*   Additional printers may be connected serially to terminal ports.

I/O Channel

- Concurrent (multiplexed) with 20K bps transfer rate.

DMA Channel

- High-speed direct memory access to disc drives at 1,210K bps.

Control Panel
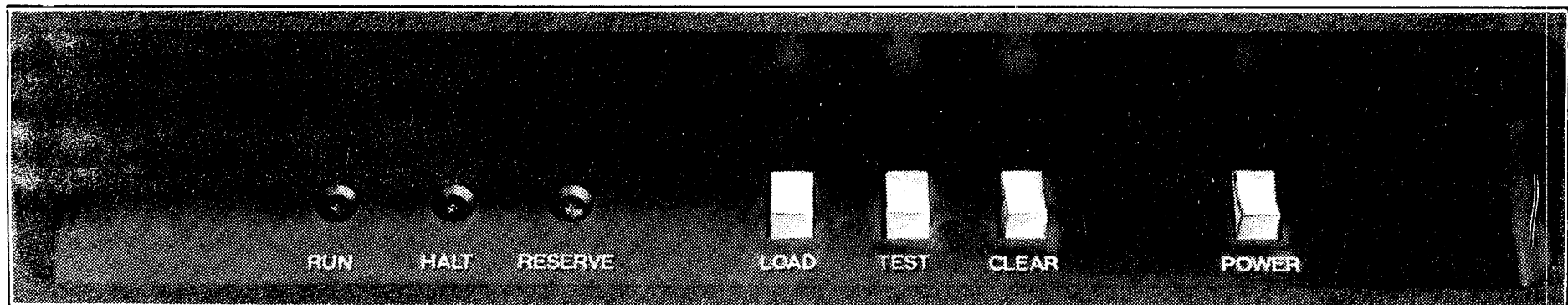
Figure 1. Control Panel

Power Switch - Provides electrical power to the CPU. Use only after turning off power to disc drives to prevent recording of invalid data on discs.

Run - Indicator lights when CPU is in operation.

Halt - Indicator lights when CPU is not in operation.

Reserve - Indicator lights when CPU is operating on reserve battery power.

Load - Momentary contact switch loads BOSS for Business BASIC Level 3 from disc.

Test - NOT TO BE USED

Clear - NOT TO BE USED

Backup Power

Semiconductor memory contents are protected against loss due to temporary power failure by built-in backup batteries. Power will be supplied to main memory for up to 6 hours.

If the batteries are discharged, the RESERVE indicator will go off and the contents of the CPU memory will be lost. However, there will be no effect on the disc storage memory.

CAUTION

Do not use the circuit breaker located at rear of CPU cabinet to turn power off, as memory contents will be lost.
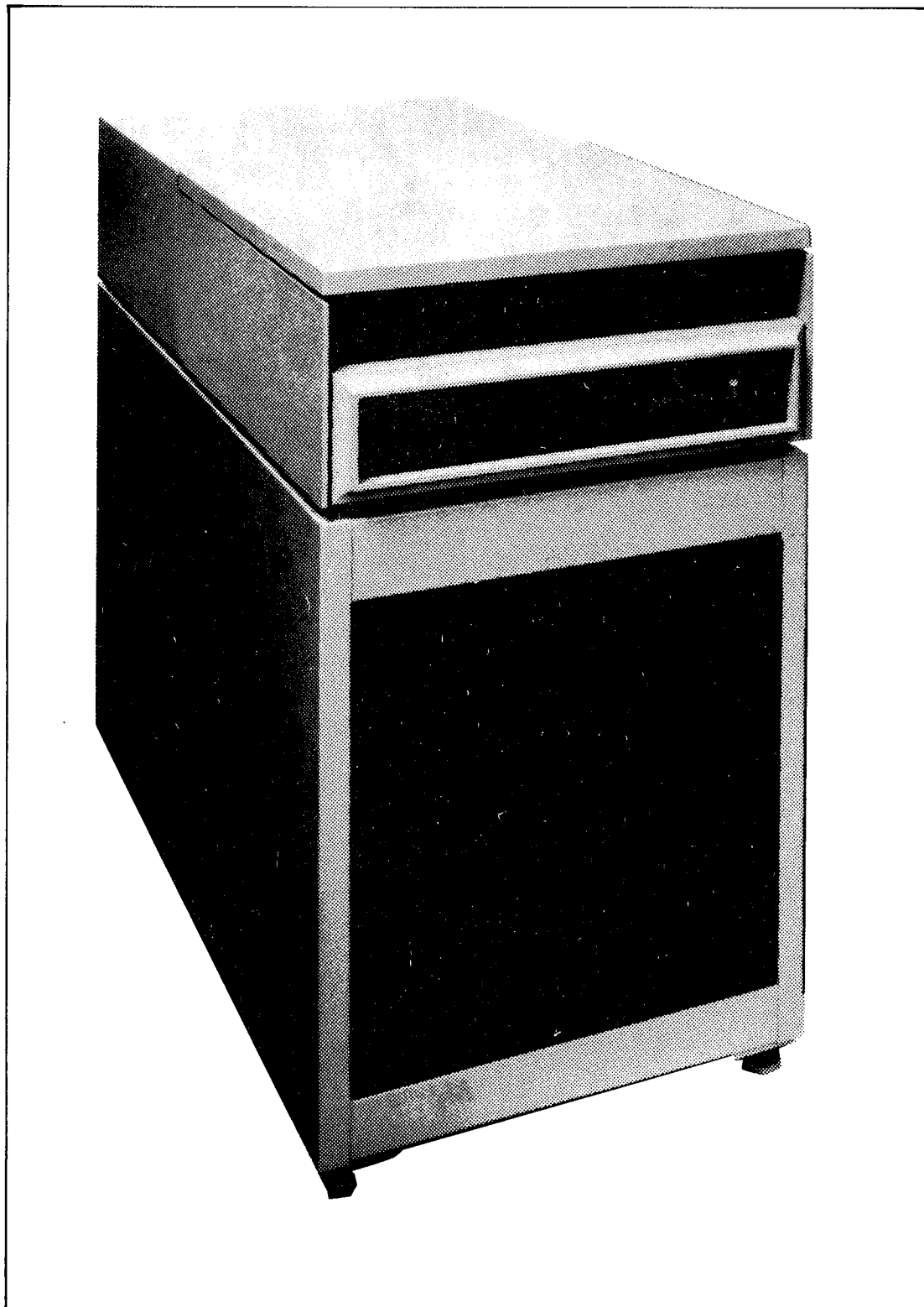
DISC DRIVE DESCRIPTION

The disc drives utilize a removable disc pack which contains five discs. The three center discs are used for data storage, while the top and bottom platters serve as protective surfaces. An associated microprocessor-based controller performs selected error checking and correcting routines. The microprocessor also controls data transfers between the CPU and the disc drive, thereby enhancing system throughput.

The systems can accommodate up to four 75-megabyte 2580 disc drives, which provide a total of 300 megabytes of on-line storage. The System 610 can also accommodate up to four 35-megabyte 2530 disc drives which provide a total of 140 megabytes of on-line storage. Drives installed on the same system must be of the same capacity.

DISC DRIVE

SPECIFICATIONS

Pack Configuration:	3 data discs, 2 guard surface discs
Disc Diameter:	14 inches, (without cover)
Pack Diameter:	16-inch removable pack
Transfer Rate:	1.2 megabytes per second
Pack Rotational Speed:	3,600 rpm
Minimum Access Time:	6 milliseconds
Average Access Time:	30 milliseconds
Average Rotational Delay: (latency)	8.3 milliseconds

	75MB Disc Drive	35MB Disc Drive
Sector Capacity (Net):		
Characters per sector	1,024	1,024
Sectors per disc pack	72,720	34,200
Track Capacity:		
Sectors per track	18	18
Tracks Per Disc Pack:	4,040	1,900
Cylinder Capacity:		
Tracks per cylinder	5	5
Cylinders per disc	808	380

DISC DRIVE CONTROLS

Power On/Off - Electrical power to the disc drive is controlled by switch located at the rear of the cabinet (Figure 1).
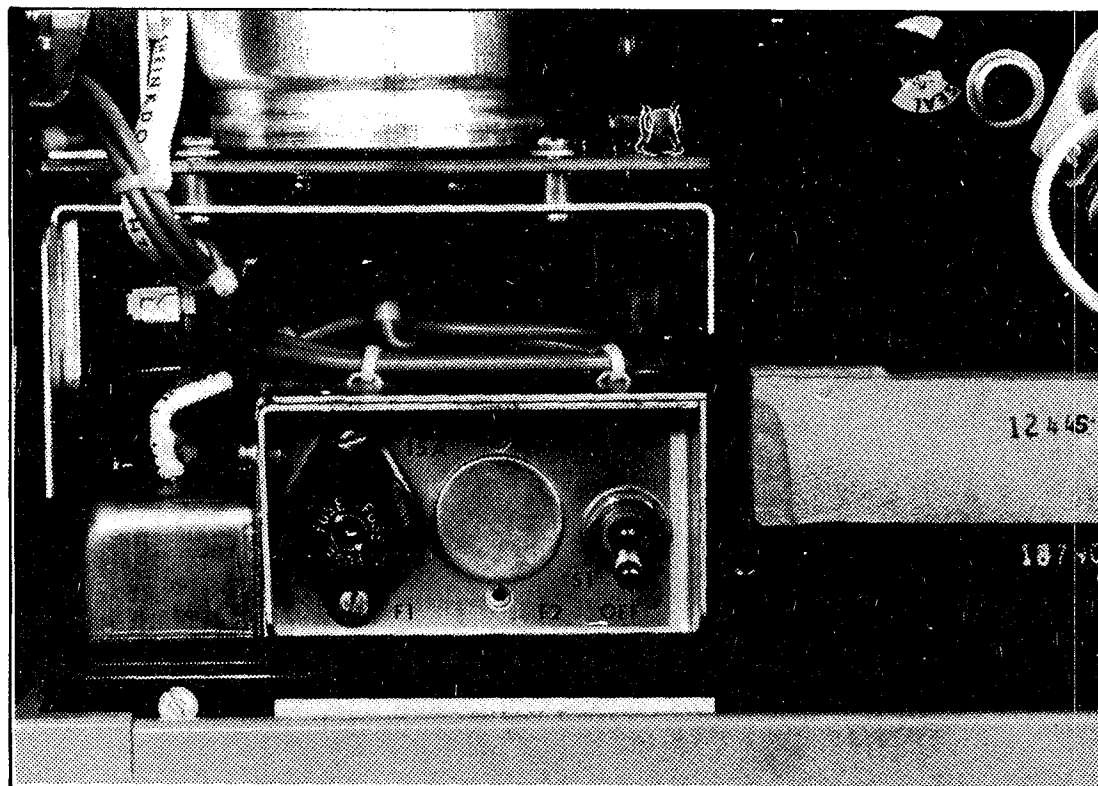

Figure 1. Power On/Off Switch

The control panel (Figure 2) is located at the right front of the cabinet. The following paragraphs describe the disc drive control switches and indicators.
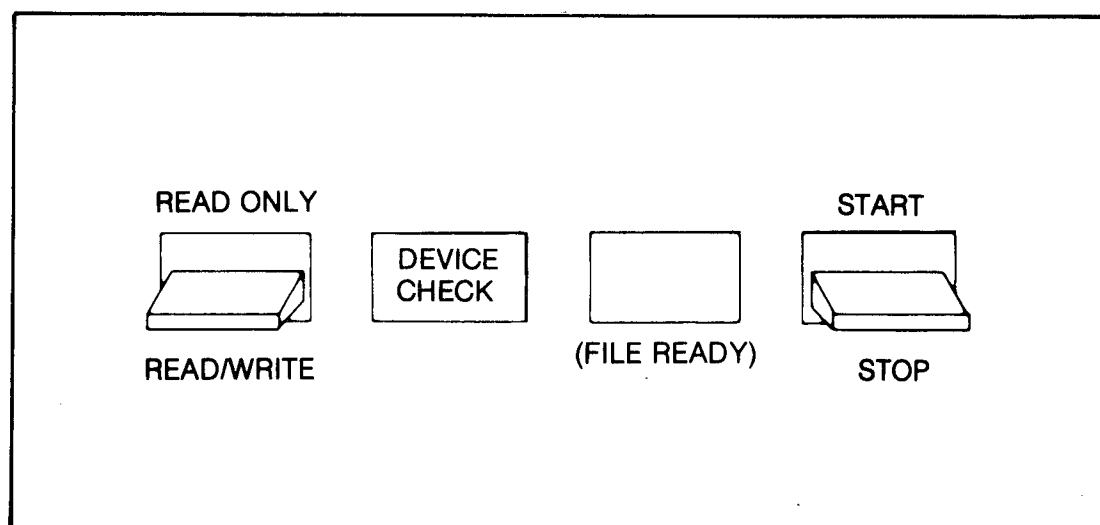
Figure 2. Control Panel

Switches and Indicators

Read Only—Read/Write - When placed in the READ ONLY position, this two-position toggle switch provides disc pack file protection by inhibiting write commands. The READ/WRITE position enables both data-read and data-write operations. The switch should be left in the READ/WRITE position.

Device Check - This indicator lights when a DEVICE CHECK error has been detected by the unit and remains on until it is reset or until the drive is powered down.

File Ready - This indicator flashes during power-up and power-down sequencing and stays on when the drive is in the Ready condition.

Start/Stop - This two-position toggle switch permits manual power-up and power-down sequencing. When placed in the START position, this switch applies power to the spindle drive motor and loads the heads. (The heads will not load and a seek incomplete will result if a disc pack is not installed or an unsafe condition exists.) Placing the switch in the STOP position retracts the heads, turns off the spindle drive motor, and activates the dynamic brake.

NOTE
Dynamic braking generates heat. Excessive braking (i.e., starting and stopping the drive repeatedly in a short span of time) can cause activation of the thermal overload protect feature. Once this feature is activated, the drive requires a cool-down period of from 10 to 40 m i n u t e s .

DISC DRIVE OPERATION

The disc drive can operate unattended and requires operator intervention only to start up the disc system and to change the disc packs.

DISC DRIVE

CAUTION
Only qualified service personnel should relocate the disc drive. Mishandling could result in serious damage to unit.

Start-Up

- Place the AC power switch in the ON position.

- Install disc pack and set the disc drive START/STOP switch to START. The spindle drive motor should start and the green FILE READY indicator should start flashing.

- After approximately 20 seconds, the green FILE READY indicator should stop flashing and remain on. The red DEVICE CHECK indicator should be off.

CAUTION
If the FILE READY indicator continues to flash, the start-up sequence has not been completed. Set the START/STOP switch to STOP, wait for the spindle to stop, and attempt to restart. If the disc drive will not come ready, contact your service representative.

Power Turn-Off

The disc drive may be powered down by placing the POWER ON/OFF switch in the OFF position. Prior to powering down, the disc pack should be removed according to the recommended procedure.

NOTE
Should the DEVICE CHECK indicator light during normal operation, it may be reset by setting the START/STOP switch to the STOP position, waiting for the FILE READY indicator to stop flashing and then placing the START/STOP switch in the START position. If the DEVICE CHECK indicator is still on after following this procedure, maintenance personnel should be contacted.

Power Failure

If power is lost while the disc is spinning, allow 5 to 10 minutes for motion to stop.

Disc Pack Loading Procedure

- Ensure that the disc drive START/STOP switch is in the STOP position and that the green FILE READY indicator is not on.

- Open disc drive cover.

- Check the disc pack area. It should be clean, and the heads and brushes should be completely retracted. (Figure 3.)

HEADS AND BRUSHES
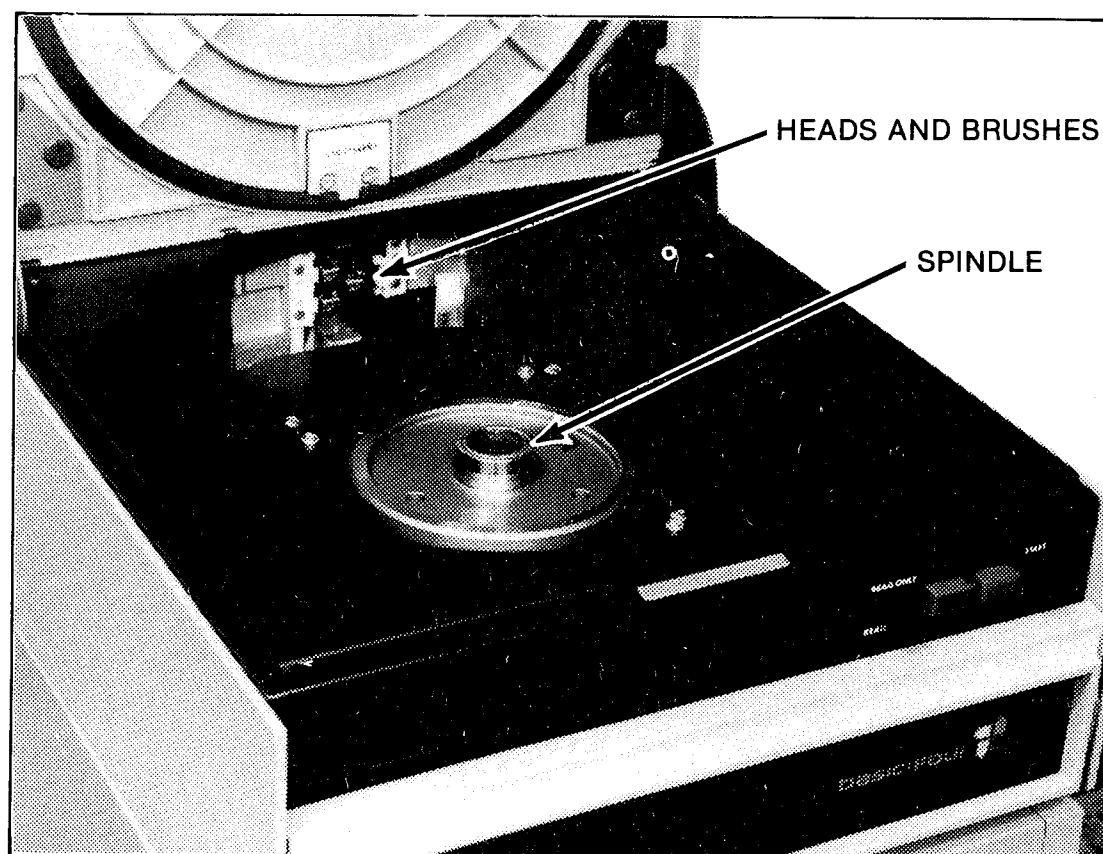
SPINDLE

Figure 3. Disc Pack Area

- Grasp the top cover handle and remove the lower cover from the disc pack by squeezing the locking mechanism located on the bottom side of the lower cover (Figure 4). Lower the disc pack carefully onto the spindle (Figure 5).
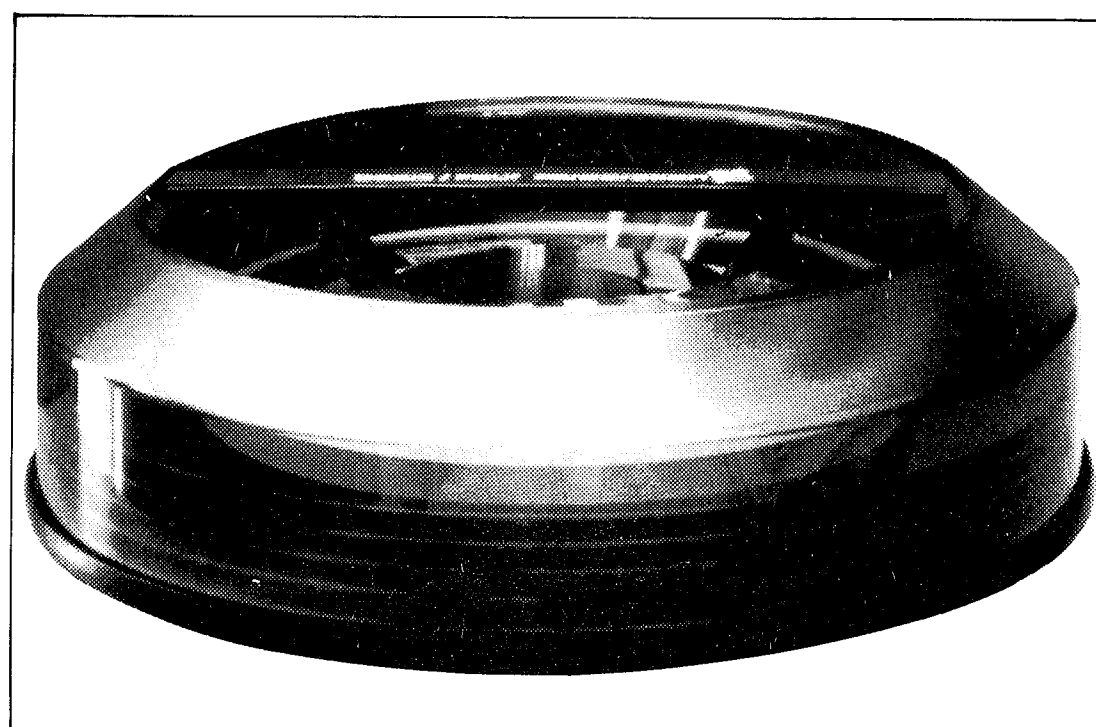
Figure 4. Disc Pack

Figure 5 Lowering Disc Pack Onto Spindle

- Rotate the top cover handle clockwise until disc pack is fully threaded onto the spindle (handle will stop). The top cover is now disengaged from the disc pack (Figure 6).

Figure 6 Engaging Disc Pack On Spindle

• Carefully lift and remove the top cover from the disc pack (Figure 7) and close the disc drive cover, making sure that the latch locks.

Figure 7 Removing Top Cover From Disc Pack

• Store the top and bottom covers of the disc pack inside the case to minimize dust accumulation.

Disc Pack Unloading

• Set the START/STOP switch to the STOP position. The green FILE READY indicator should start flashing.

• Wait until the FILE READY indicator stops flashing (approximately 20 seconds); open the disc drive cover.

• Carefully lower the top cover over the disc pack.

• Rotate top cover handle counterclockwise until a clicking sound is heard. The disc pack is now unlocked from the spindle and the top cover is re-engaged to disc pack.

• Lift the disc pack carefully from the disc drive and close the disc drive cover.

• Replace the bottom cover on the disc pack and return the pack to the storage area.

DISC PACK CARE AND HANDLING

Disc packs should be stored in their original shipping containers and stacked no more than eight high. Used packs should always be kept in their plastic cases, unless mounted in a disc drive. A disc pack case consists of a clear plastic top cover with a handle and a bottom cover. Where possible, the disc packs should be stored in the same room environment as the disc drive, or should be brought into the same room no less than two hours before use.
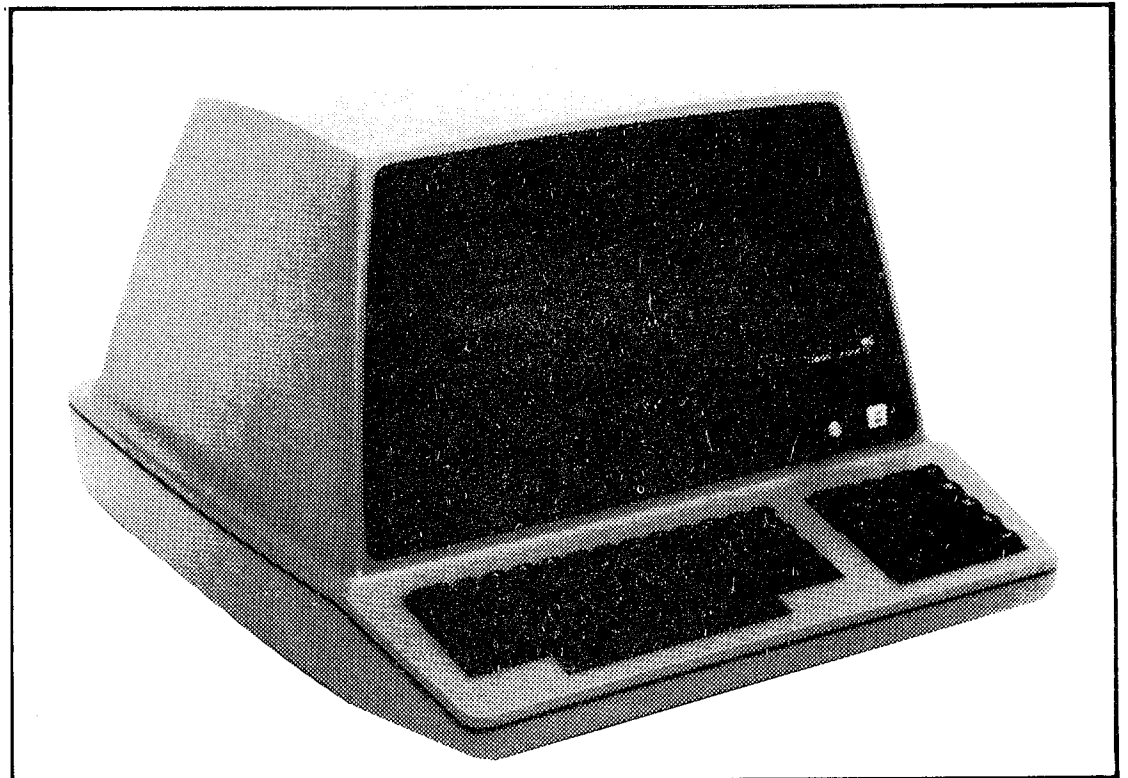
The video display terminal (VDT) provides fast, easy communication between the Basic Four computer system and its operators. The fully-buffered terminal provides a simplified means of correcting data prior to its entering the system. The speed of the VDT and its simple operation make it an ideal addition to those Basic Four systems involved in processing inquiries and high-volume data input. The VDT can also be operated remotely over ordinary telephone lines. Data transmission with a 1200 baud modem is at a rate of up to 120 characters per second.

SPECIFICATIONS

Keyboard Character Set: Full ASCII-character set, including a standard keyboard and 10-key numeric pad.

Character Display Capacity: 1920 characters, 80 characters per line, 24 lines.

Data Rate: 960 characters per second (maximum).

Screen Size: 12 inch diagonal.

Character Structure: 5 x 7 dot matrix on a standard 525-line TV raster.

Refresh Rate: 60 scans per second (TV standard).

Refresh Method: Integral semiconductor memory.

VIDEO DISPLAY TERMINAL

Display Character Set:	64-character upper case subset of ASCII with an integral cursor. Upper/lower case combination optionally available.
Data Formating:	Intensity-modulated field definition, two-level character intensity distinguishes between variable and fixed (predetermined format) data.
Mode:	Full duplex; character is transmitted only to the processor when typed. The display unit responds to outputs from the processor.

VDT CONTROLS

The following controls are located at the rear of the terminal:

Duplex - Selects the operating mode of the VDT. The switch must be in the "F" or full position for normal operation.

Rate - This 3-way switch selects the transmission rate of the VDT. It may be set at 2,400 baud, 9,600 baud, or an option position.

The following controls are located above the keyboard:

On/Off - Switch-Controls power to VDT.

Brightness - Knob controls brightness of display.

Cursor

The cursor (next character entry point indicator) is a solid white rectangular block. The keyboard cursor controls are as follows:

Space-Bar - Moves the cursor one position to the right while transmitting to the CPU the space code as a nonprint character.

CR/Enter - Causes the cursor to move to the first character position of the next line.

Keyboard Control Keys
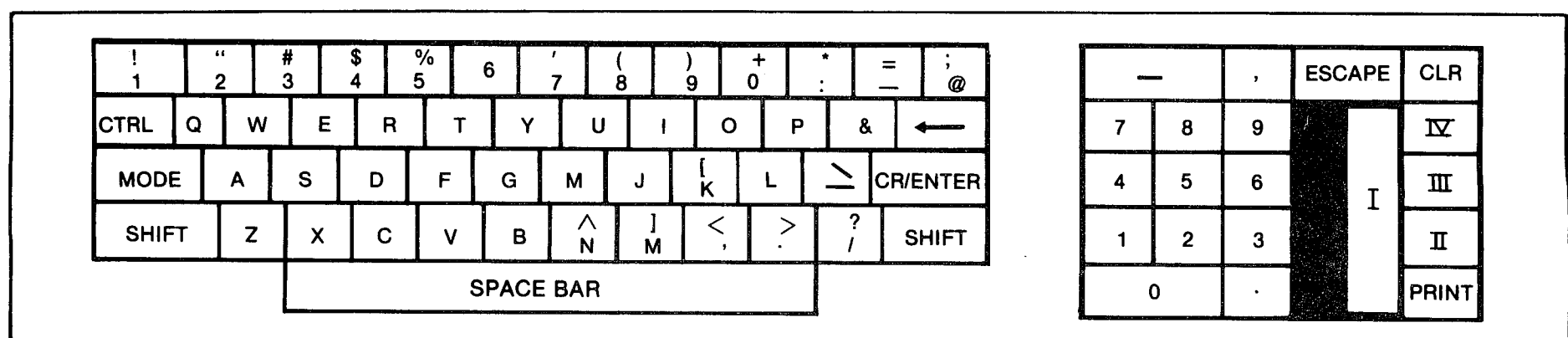
The keyboard is shown in Figure 1.

Figure 1. Keyboard

In addition to the standard typewriter keys and the numeric pad, the keyboard contains the following keys that control the information that is input and displayed on the screen.

Mode - Position of key determines if the letters print in upper or lower case. The standard VDT configuration prints only in upper case (MODE Key up).

Shift - Selects characters marked in the upper portion of certain typing keys.

Back Space (←) - Moves the cursor one character position to the left and also deletes the character replaced by the cursor.

CR/Enter - Must be pressed before computer will accept data. Also used to move cursor to the beginning of the next line.

CTRL - When held down while pressing any other character key, causes the code of the character typed to be modified.

I, II, III, IV - Four keys located on numeric pad whose specific functions are determined by your computer program. Depressing any of these keys results in an entry termination just as with a carriage return.

Escape - Generates an escape character which is recognized by the CPU as an interrupt to the process currently in progress when in the console mode.

CAUTION

When the terminal is in the run mode, the ESCAPE key must be depressed twice. This combination should NOT be used during normal operation of the program.

TURNING ON THE VDT

Set the switch to the ON position.

Allow 20 seconds for the CRT to warm up. At the end of this period, the cursor should appear in the display.

If the cursor does not appear, and if the entire display is blank, it is possible that the BRIGHTNESS control has been turned too far counterclockwise. Turn the control clockwise until the cursor appears. If the cursor does not appear, turn the POWER OFF and notify a service representative.

CLEANING

The VDT requires no more care than a conventional electric typewriter. Keep it clean; keep its connectors plugged in; and keep its immediate area clear of items that might interfere with free air circulation.

CLEANING (Continued)

Wipe off the dust, lint, smudges, etc., whenever they become noticeable, being careful not to allow dust to fall into the keyboard through the spaces between and around the keys. For wiping, use a soft clean dust cloth or dust-free, non-abrasive, commercial tissue. For stubborn accumulations, dampen the cloth or tissue slightly, but only with plain water or a cleaning liquid suitable (safe) for use on plastic and painted surfaces, such as one of the commercially available antistatic cleaning fluids. The cloth or tissue should not be wet, just damp, so that it will pick up dust or dirt readily.

This occasional light cleaning will not always prevent the gradual accumulation of a coating of varnishlike dirt, particularly on the keytops, and a more thorough cleaning will usually be necessary about once a month. Wipe all surfaces with the antistatic cleaning fluid and use a succession of soft cloths or tissues. Use enough fluid to moisten each cloth or tissue thoroughly so that very little wiping pressure will be needed, but not enough to allow dripping under the wiping pressure. After cleaning each surface, wipe off the fluid and dissolved dirt with a dry cloth or tissue.

Pay particular attention to the display area and to the keytops, which receive the largest deposits of dirt.

CAUTION
Do not use lighter fluid or other petroleum base cleaners as they will damage the finish. Do not use household paper towel/napkins to clean the plastic cover of the VDT since their abrasive content will scratch the plastic surface.
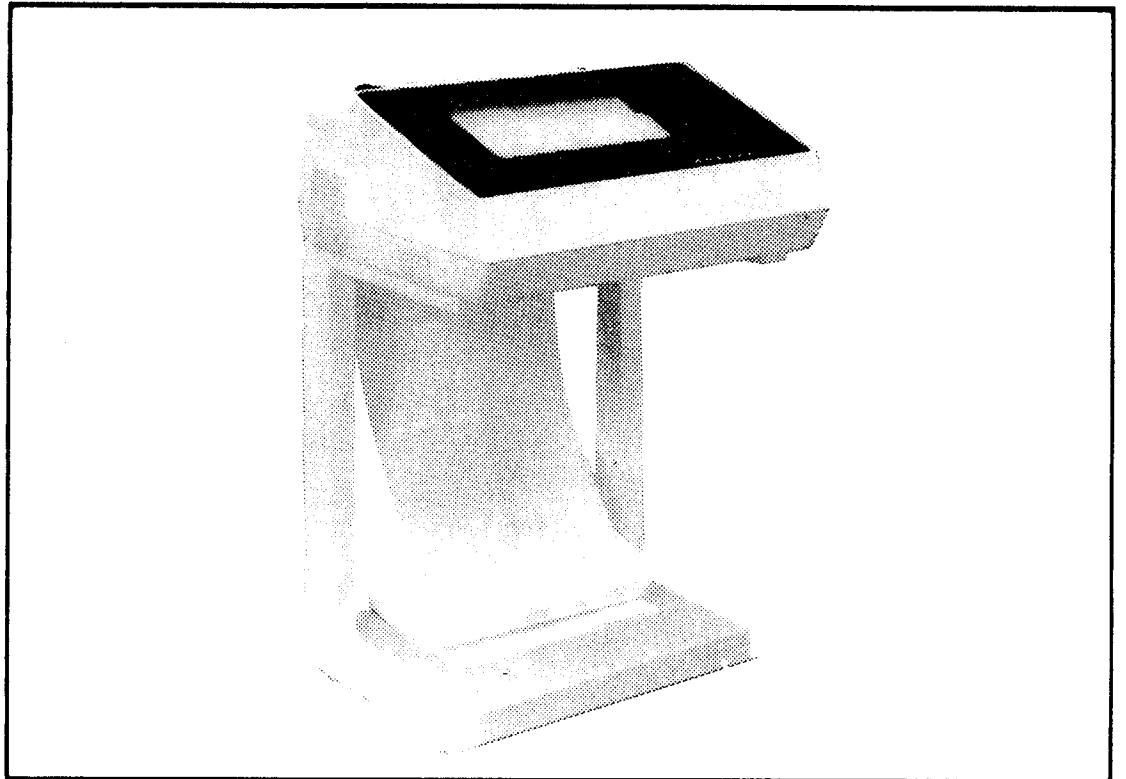
These character printers are economically-priced, medium speed bidirectional printers with printing rates of 120 and 160 characters-per-second. These print rates, combined with bi-directional capabilities, allow production of moderate volumes of multipart forms and reports. The printers can be operated remotely over ordinary telephone lines and come with a sturdy stand as standard equipment.

SPECIFICATIONS

Printing Rate/Line Rate:	120 characters-per-second, bidirectional, 45 lines-per-minute (132 character lines) to 115 lines-per-minute (short lines). 160 characters-per-second, bidirectional, 60 lines-per-minute (132 character lines) to 150 lines-per-minute (short lines).
Character Set:	96-character subset of ASCII, upper and lower case.
Printed Line Length:	132 characters.
Character Format:	9 x 7 dot matrix (10-point type equivalent)
Vertical Line Spacing:	6 lines per inch
Paper Feed:	Pin-feed (half-inch center-to-center holes) forms up to 14-7/8 inches (maximum) with up to 5 carbons.
Data Buffer:	Two full-print lines.

PRINTER ADJUSTMENT

The adjustment controls (Figure 1) permit the operator to make certain preliminary adjustments that may be required before printer start-up.
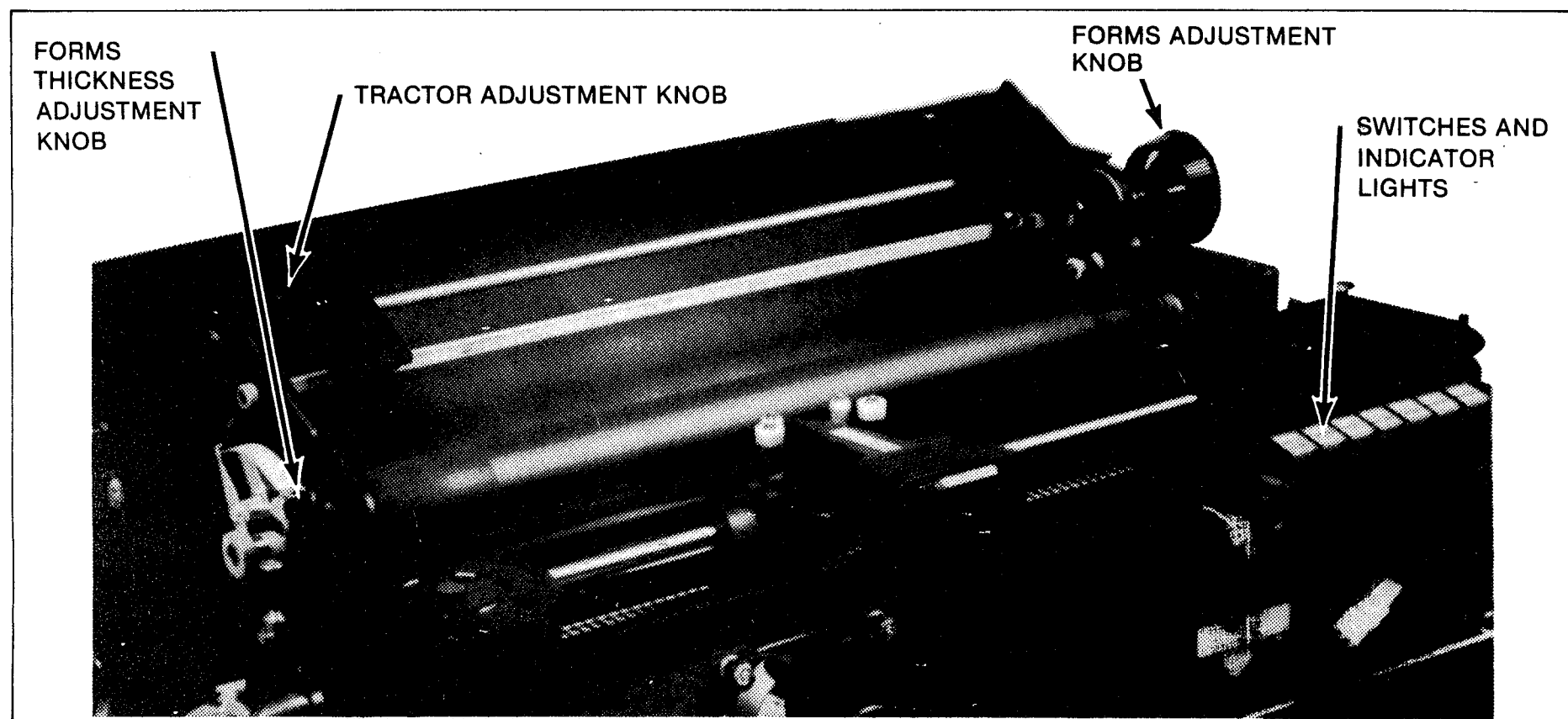
Figure 1. Adjustment Controls

ADJUSTMENT CONTROLS

Tractor Adjustment - Permits lateral adjustment of tractor assembly to match paper width (14-7/8 in. maximum).

Forms Thickness Adjustment - Positions the platen to accommodate a range of form thicknesses (one to five). Darkens printing to compensate for ribbon wear.

Forms Adjustment - Sets top of form to correct position with print head.

OPERATOR CONTROLS

The control panel (Figure 2), located at the right front of printer, contains the functional switches and light indicators utilized in the printing procedure.
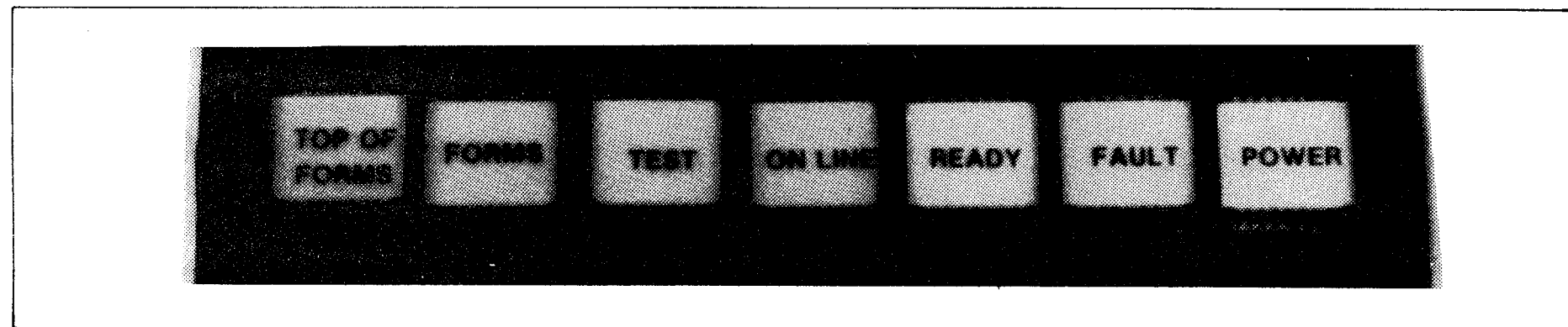
Figure 2. Control Panel

Switches and Indicators

Top of Forms - Depressing switch causes paper to advance to the top of next form. When light comes on, indicates paper is at the top of form position.

Forms - When light is on, indicates printer is out of paper or paper is torn. To finish printing current page, depress ON-LINE switch and hold FORMS switch down until page is completed.

Test - Depressing switch causes test pattern to be printed.

On-Line - Depressing switch places printer on-line to the computer and actuates light.

Ready - When light is on, indicates printer is ready to operate.

Fault - When light is on, indicates printer is not ready to operate.

Power - Depressing switch, applies power to printer. Light indicates power is on.

PAPER LOADING

To properly load paper into the printer, the following steps must be performed:

• Place paper supply on shelf directly below the printer.

• If the ON-LINE indicator is on, depress ON-LINE switch to return it to an off condition.

• Lift printer cover and let it rest in the upright position.

• Open four tractor covers that hold paper in position—two on each side, top and bottom (Figure 3).

TRACTOR COVERS (OPEN)

TOP

BOTTOM
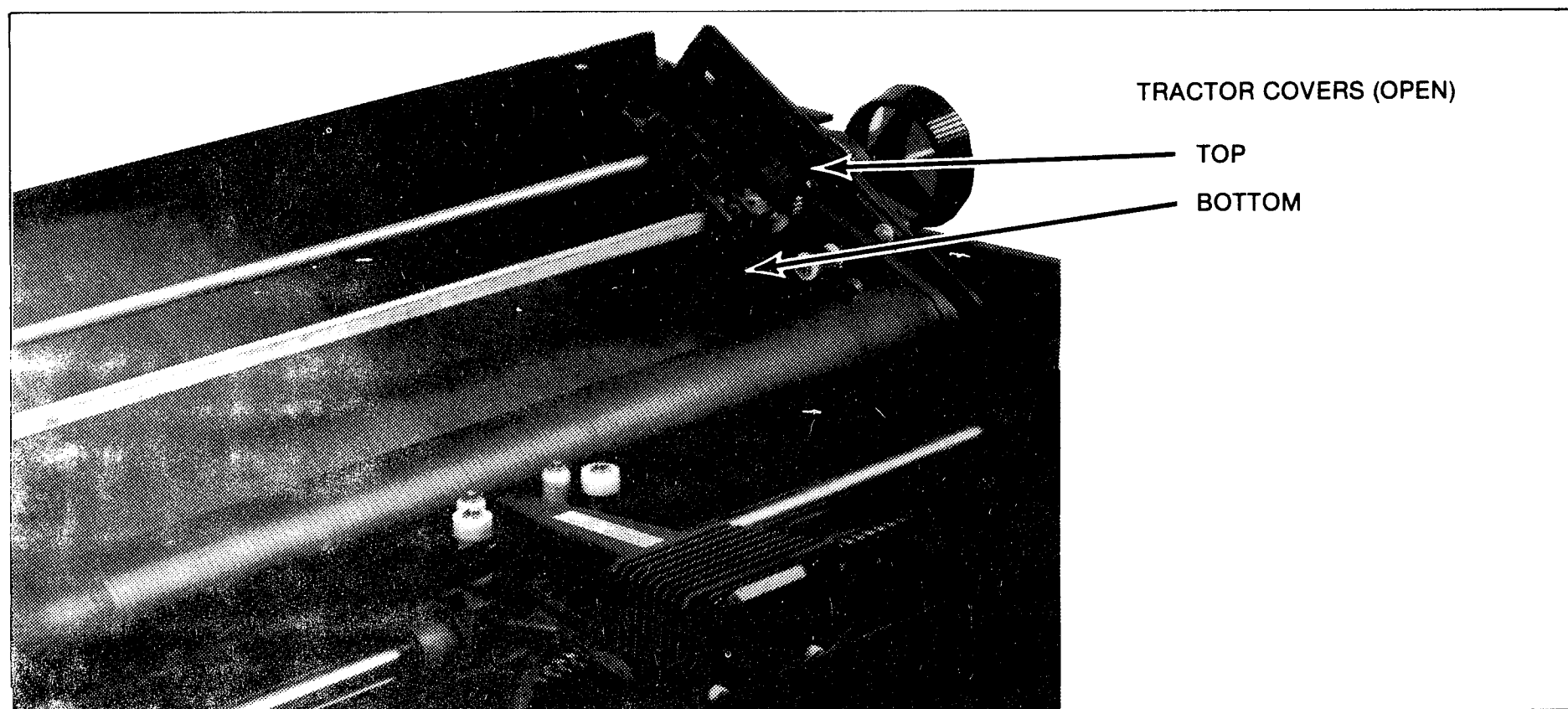
Figure 3. Tractor Covers

• With printer cover open, insert paper from the rear through opening in cover (Figure 4).
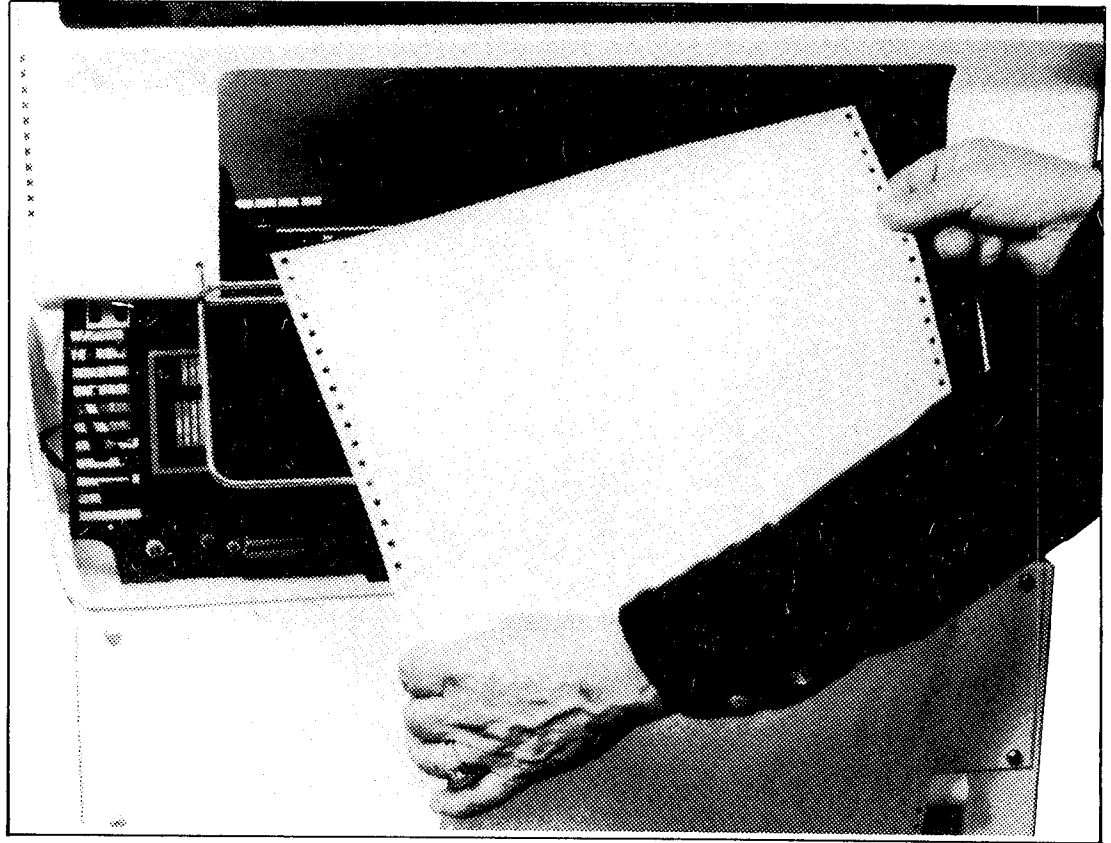
Figure 4. Paper Loading

• Thread the paper under two stainless steel bars, lower tractor assembly, and under the platen, allowing at least 18 inches of paper to extend past platen (Figure 5).
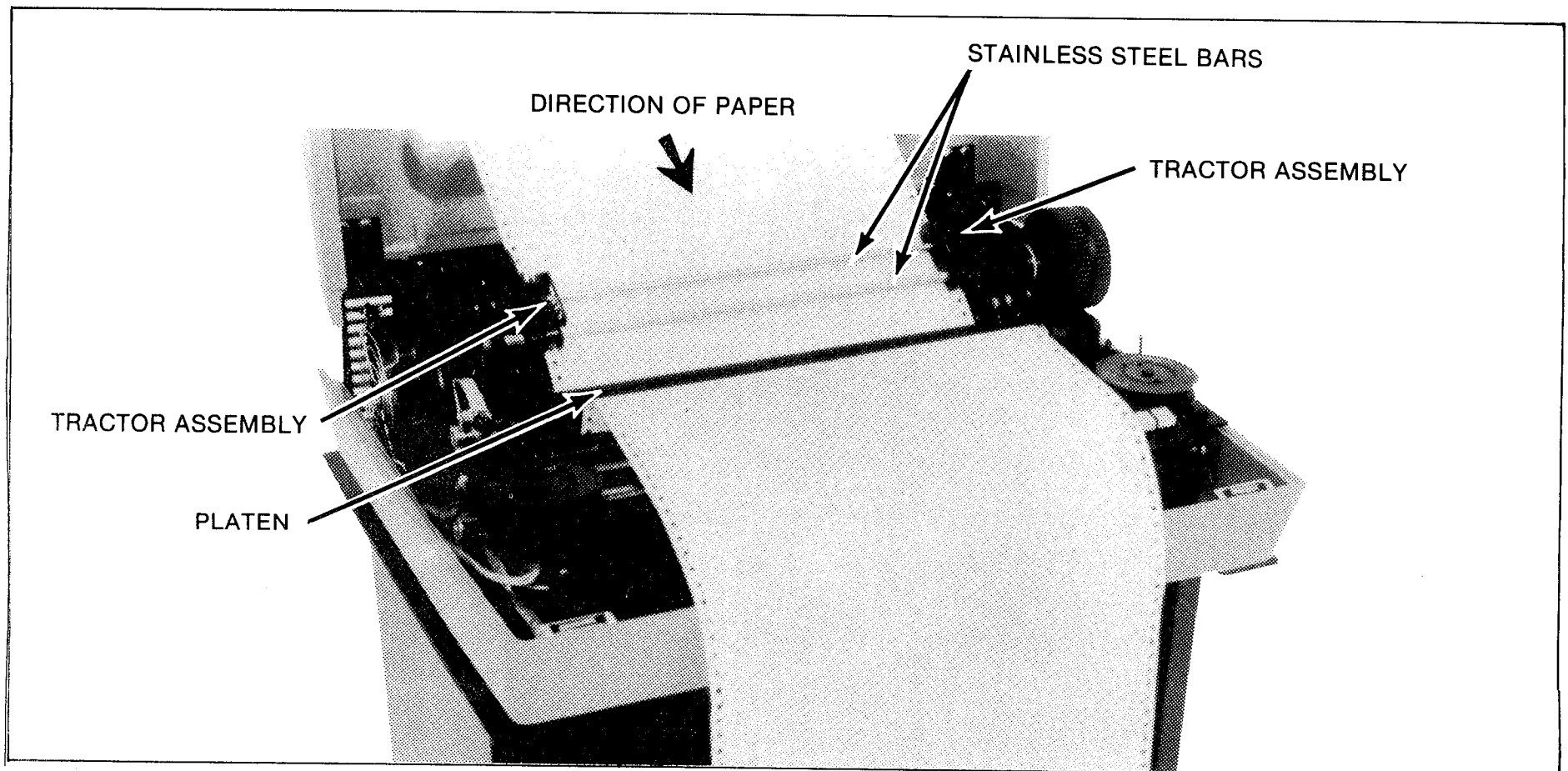
Figure 5. Threading Paper

NOTE
Make sure that printed side (front) of paper or forms is facing down.

* Wrap paper around platen and back over upper tractor assemblies (Figure 6).
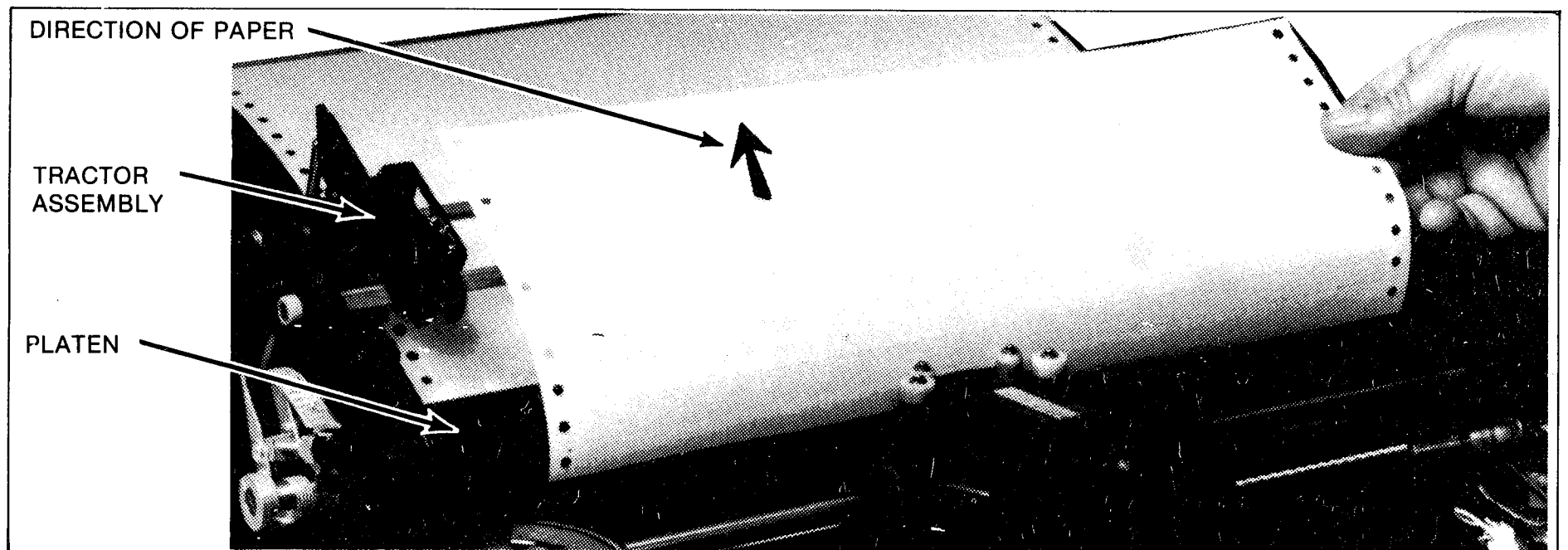
Figure 6. Positioning Paper

* If necessary, adjust right tractor assembly to paper width by loosening tractor adjustment thumb screw and moving tractor assembly to proper position. Tighten thumb screw.

* Align holes in paper over lower left sprocket teeth with right hand and gently pull paper backwards until snug. Close lower left tractor cover (Figure 7). Repeat this procedure on lower right sprocket teeth. (This step may seem a little awkward the first time; however, if the fingers are used as a feeling guide, aligning the paper holes with the sprocket teeth will be easier to accomplish.)
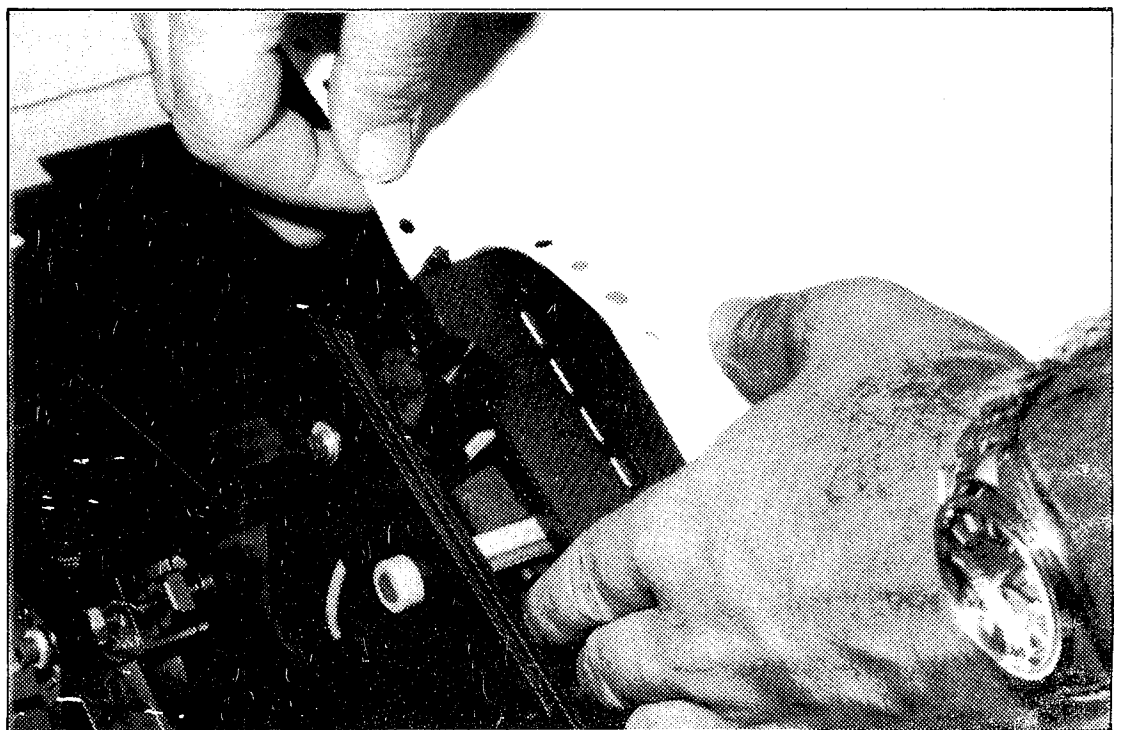
Figure 7. Aligning Paper (Lower Sprocket Teeth)

- Align holes in paper over left and right upper sprocket teeth and close tractor covers. (Figure 8).
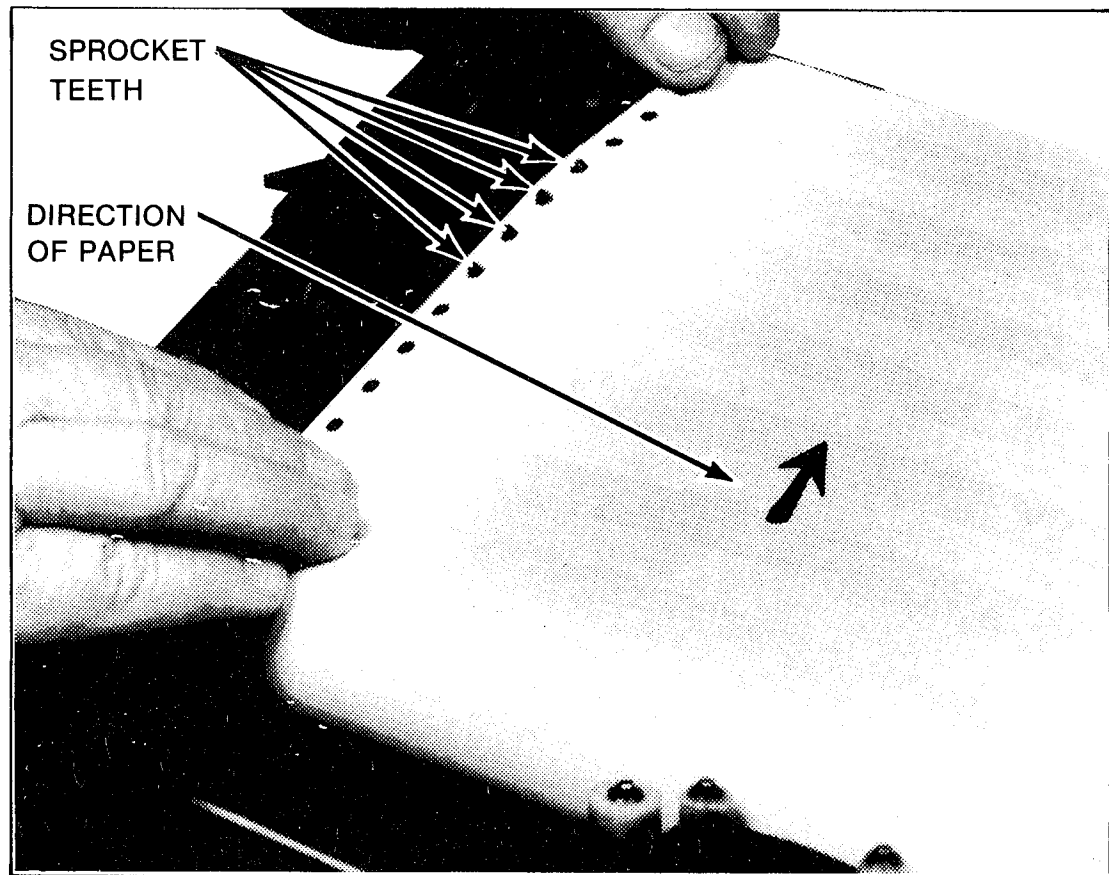
Figure 8. Aligning Paper (Upper Sprocket Teeth)

NOTE

Make sure that holes in paper are aligned horizontally on both left and right sprocket teeth.

- Close printer cover.

TOP OF FORM ADJUSTMENT

After paper has been loaded, the top of a form must be set to correct position. All spacing then takes place under program control.

- Turn forms adjustment knob located at right of printer (Figure 9) forward or backward until print head is positioned on line desired at top of page.
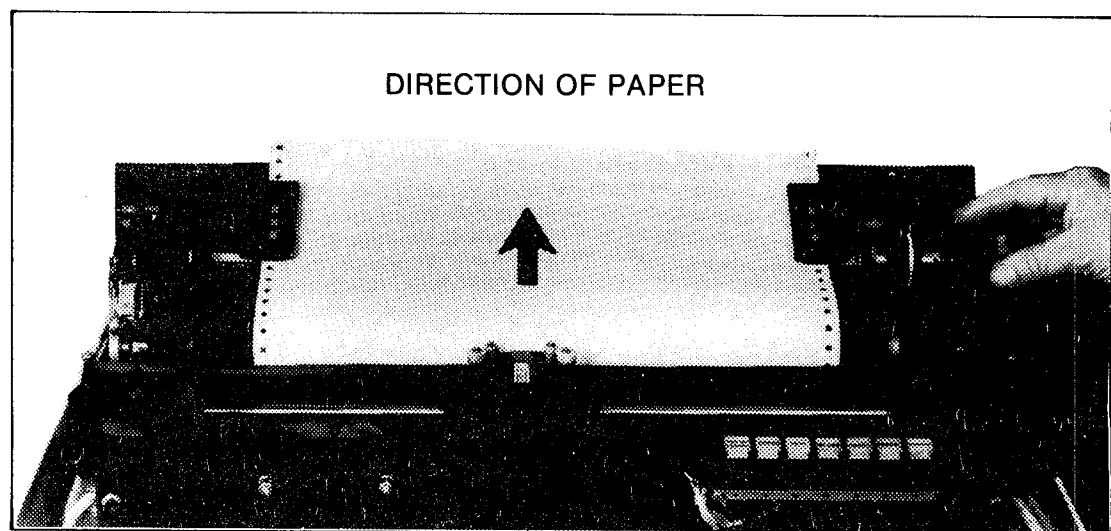
Figure 9. Forms Adjustment Knob

- Depress TOP OF FORM switch to verify that paper moves to top of next form.

- If correct, depress ON-LINE switch. Printer is ready to operate.

NOTE

TOP OF FORM switch is activated only when printer is off-line.

START-UP PROCEDURE

Before start-up, make sure that printer has an adequate supply of paper and a ribbon is installed. Proceed as follows:

- Turn power on by depressing POWER switch. Light will come on indicating power is on. Print head will move to right margin and then return to left margin. READY light will now come on together with TOP OF FORMS light.

- Depress ON-LINE switch to begin operation. Light will come on indicating that printer is on-line.

FORMS THICKNESS ADJUSTMENT

The printer can print up to five copies plus the original. When multiple forms are used, the platen must be adjusted to assure optimum print quality. The adjustment may also be necessary when using a different thickness of paper, or to compensate for ribbon wear.

- Turn forms thickness adjustment knob (Figure 10) clockwise to move platen closer to print head.
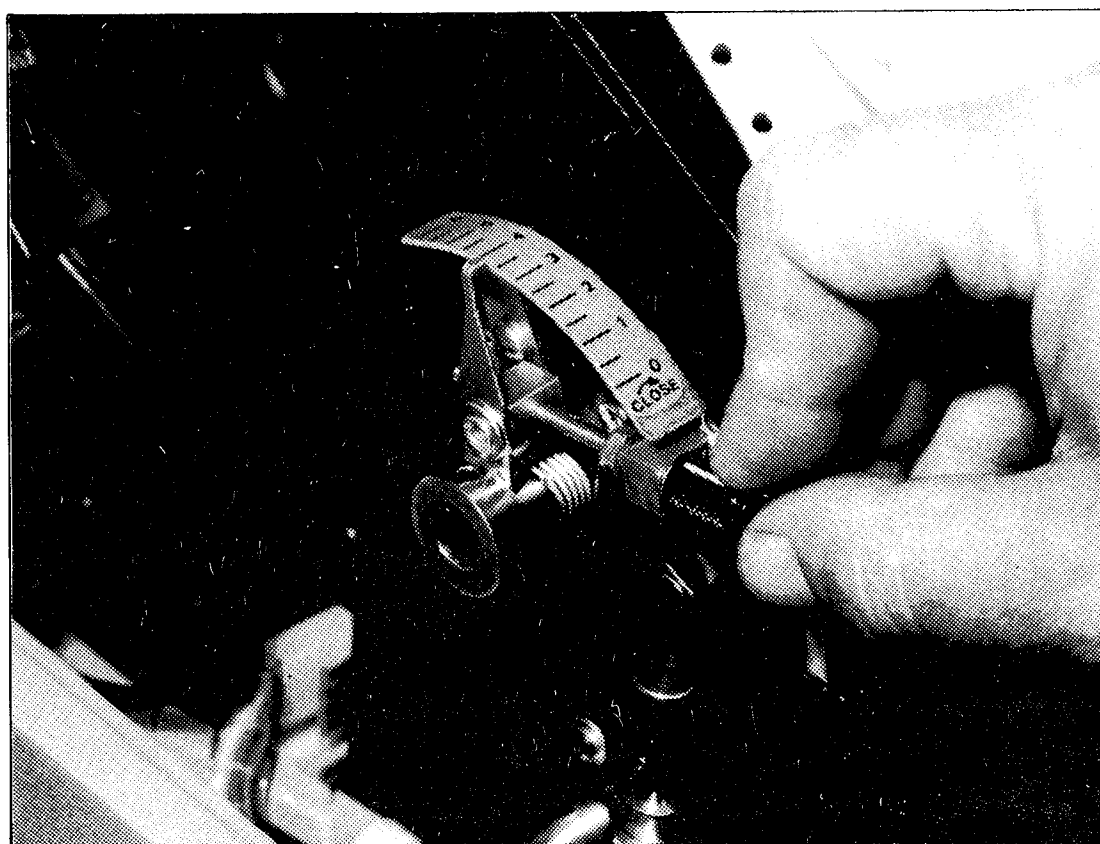
Figure 10. Forms Thickness Adjustment Knob

- Turn adjusting knob counterclockwise to move pl‥ ‥ away from print head.

- Turn adjusting knob in small increments and briefly run printer. Repeat procedure until desired printing quality is obtained.

REPLACING RIBBON

To ensure good printing quality, the ribbon should be replaced periodically. To avoid excessive wear of the printhead, Model 3908 ribbons or equivalent should be used. Figure 11 shows the ribbon guide path.
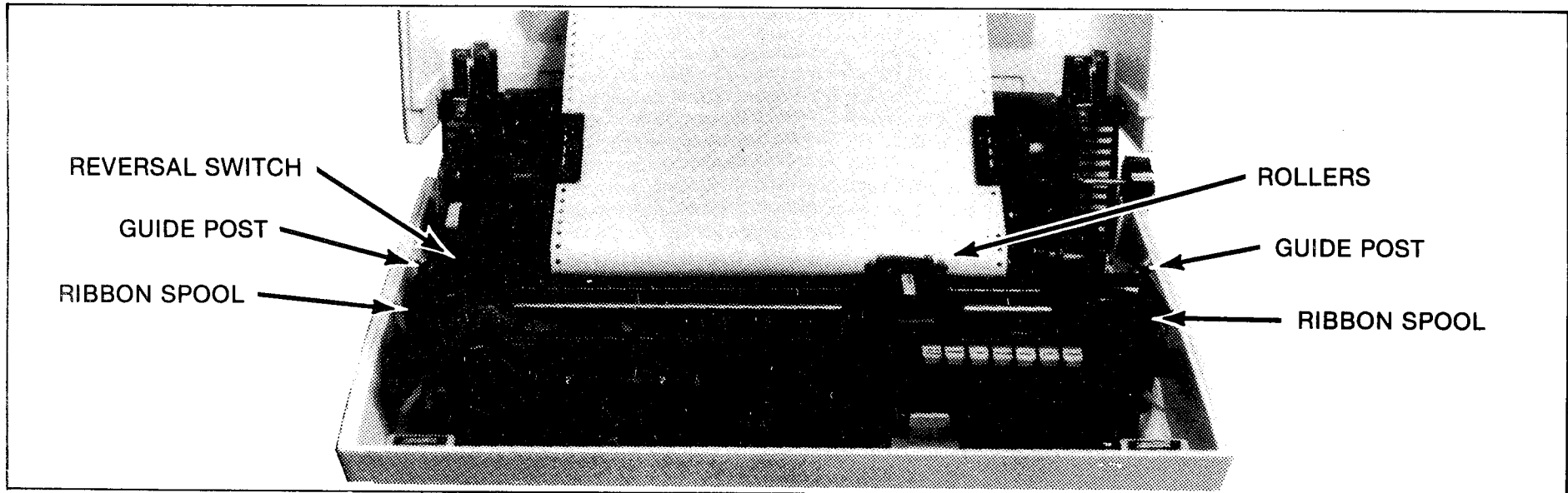
Figure 11. Threading Ribbon

CAUTION
Wear disposable plastic gloves to protect hands from ink. Handle ribbon carefully to avoid soiling clothing and printer cabinet.

- Depress ON-LINE switch to stop printer.

- Remove old ribbon from guide posts, rollers, and reversal switches and lift spools from hubs.

- Place new ribbon spools on hubs. The full spool is installed on left hub.

- Thread ribbon from left to right around guide posts, rollers, and through reversal switches.

CAUTION
Make sure that ribbon is threaded around outside of ribbon arms. Otherwise, takeup spool will not wind correctly.

- Adjust platen, if required, as described in FORMS THICKNESS ADJUSTMENT section.

SPECIAL PRINTING FEATURES

Vertical Forms Unit (VFU)

The printer is equipped with an electronic VFU which operates under program control. The following example demonstrates how to set the slew positions for this printer (refer to VFU code, Figure 12).

```
0010 REM "VFULOAD - LOADING VFU FOR 3230"
0020 BEGIN
0030 OPEN (7)"LP"
0040 DIM A$(68, "O")
0050 LET A$(1, 1)="1"
0060 LET A$(10, 1)="2"
0070 LET A$(20, 1)="3"
0080 LET A$(25, 1)="4"
0090 LET A$(30, 1)="5"
0100 LET A$(35, 1)="6"
0110 LET A$(40, 1)="7"
0120 LET A$(55, 1)="8"
0130 PRINT (7)'SL', A$, 'EL'
0140 PRINT (7)'FF', "THIS IS TOP-OF-FORM"
0150 PRINT (7)'S2', "THIS IS THE SECOND SLEW POSITION TO LINE 10"
0160 PRINT (7)'S3', "THIS IS THE THIRD SLEW POSITION TO LINE 20"
0170 PRINT (7)'S4', "THIS IS THE FOURTH SLEW POSITION TO LINE 25"
0180 PRINT (7)'S5', "THIS IS THE FIFTH SLEW POSITION TO LINE 30"
0190 PRINT (7)'VT', "THIS IS THE SIXTH SLEW POSITION TO LINE 35"
0200 PRINT (7)'S7', "THIS IS THE SEVENTH SLEW POSITION TO LINE 40"
0210 PRINT (7)'S8', "THIS IS THE EIGHTH SLEW POSITION TO LINE 55"
9999 END
```

Figure 12. VFU Code

Line 40 shows the length of A$ as 68. This was determined by multiplying the length of the form (in this case, 8.5 inches) by the number of lines per inch (in this case, 8). The string variable A $ may be interpreted as the "carriage tape."

Lines 50 to 120 set the eight slew positions. The "1" represents position 1 (Top of Form). Positions "2" through "8" represent 10, 20, 25, 30, 35, 40, and 55 of the string.

In line 130, the string is loaded into the VFU (the "carriage tape" is mounted) by using 'SL' (Start Load) and 'EL' (End Load) mnemonic constants.

In lines 140 through 210, the slew positions are printed. Mnemonic "FF" (Form Feed) is used to arrive at Top of Form. The mnemonic 'Sn' is used to slew to the respective n position in the string A $ which may be 2, 3, 4, 5, 6, 7 or 8. (Note that 'S6' is not valid, but that 'VT' (Vertical Tab) is used to slew to channel 6. This allows seven different slew positions per page, excluding Top of Form; however, the same slew position may be used more than once provided the program control handles it properly. This allows as many slew positions as there are lines per page.

Upper and Lower Case

The printer is capable of printing characters in both upper and lower case. This is accomplished by entering data at the terminal with the MODE key depressed to transmit in lower case or by program control.

MAINTENANCE

Maintenance on the printer is limited to checkout and corrective procedures that can be performed on-site. Only qualified electronic technicians should perform any maintenance other than replacing ribbon or adjusting print head.

Routine Maintenance

Aside from regular monitoring of printout, routine inspection of moving parts and internal cabling must be performed to detect wear or faulty parts. Keep area around printer free of items that might obstruct free air circulation.

Cleaning

Use a soft clean cloth to wipe off dust, lint, or smudges, being careful to protect any exposed internal areas of printer. For stubborn accummulations, use only water or a suitable cleaning fluid safe to use on plastic or painted surfaces. A more thorough cleaning may be necessary if surfaces are allowed to accummulate excessive dirt.

PAPER SPECIFICATIONS

The printer uses continuous pin-fed paper from 4 to 14-7/8 inches wide and can print an original and up to five copies (carbon or carbonless). All non-standard forms should be tested prior to purchase.

Stock Forms and
Standard Construction
Custom Forms:

Single Copy	— 18-or 20-lb. bond
Two Copies	— 15-lb. bond, 7-lb. carbon
Three Copies	— 15-lb., 12-lb., 15-lb. bond, 7-lb. carbon

Carbonless Papers:

Four Copies	— 15-lb. paper in white or colors, 15- or 16-lb. for last copy.
Five copies	— 14-lb. paper in white or colors.
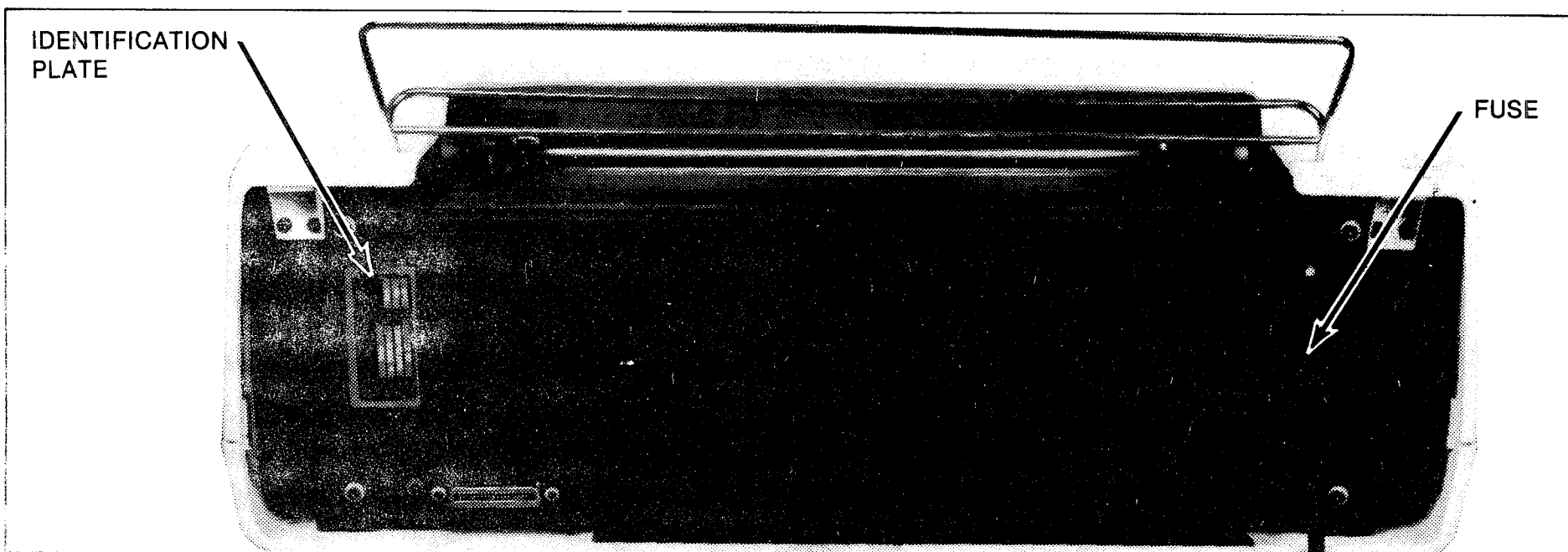
Figure 13. Location of Fuse

TROUBLESHOOTING CHART

Trouble	*Probable Cause*	*Remedy*
Printing is too light.	Platen too far from printhead.	Adjust platen as described under FORMS THICKNESS ADJUSTMENT.
	Ribbon is worn.	Replace ribbon as described under REPLACING RIBBON.
	Printhead is faulty.	Replace print head. Check that: All characters are printed; character spacing is uniform; forms control operates correctly.
Printer stops, FORMS light comes on, and alarm sounds.	Printer is out of paper. Paper is torn.	Reload printer as described under PAPER LOADING.
Paper jams during operation.		Depress ON LINE switch to stop printer and **turn power off.** Lift cover. Move print carriage manually, if necessary, to clear paper jam.
Printer stops operating suddenly.	Electrical overload has blown fuse.	Replace fuse located at rear of printer (Figure 13). To remove fuse, press down on fuse cap, turn left and lift out. Insert new fuse (313 AG, or 3A25 CV) in cap, place in receptacle, press in—turning to right until engaged.
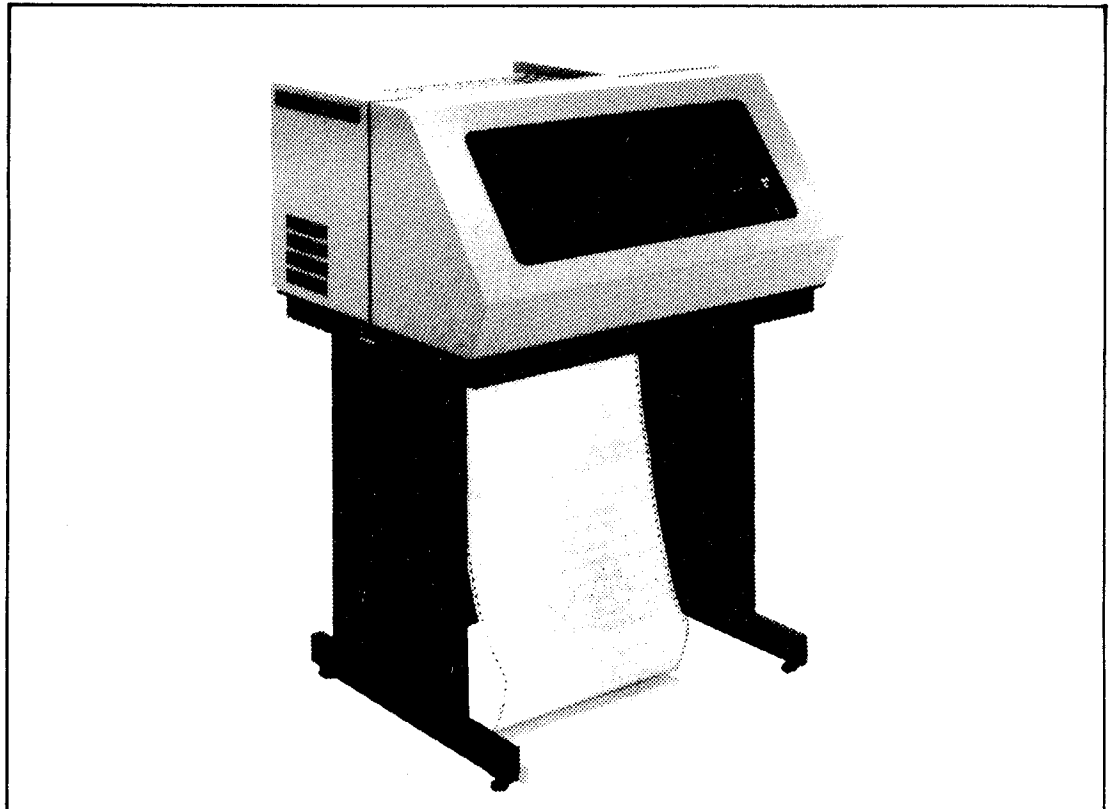
These line printers produce large volumes of forms and reports at a rate of 150 or 300 lines-per-minute, in addition to having the capability of plotting graphs. They are free-standing and have an enclosure to reduce printer noise.

The printers use forms up to 16 inches wide. Features include heat sensitive switches including a switch for selecting either six or eight lines-per-inch. The printers are available with a standard 96-character (upper and lower case) type font, produced by a 9 x 7 dot matrix. A paper stacker is included for ease of gathering processed documentation. A forms length selector switch is optional.

SPECIFICATIONS

Printing Rate: 150 and 300 lines-per-minute

Character Set: 96-character (upper and lower) Gothic style equivalent to 10 point type size.

Printer Line Length: 132 characters

Character Spacing: 6 or 8 lines-per-inch, switch selectable

Slewing: 8 inches-per-second

Data Buffer: Full line, 132 characters

Paper: 4-1/2 to 16 inch wide, sprocket fed, single or multiple part forms

Copies: Original plus five

Paper Feed: Pin feed (half-inch, center-to-center holes) continuous fan fold forms

PRINTER ADJUSTMENT

The adjustment controls (Figure 1) permit the operator to make certain preliminary adjustments that may be required before printer start-up.
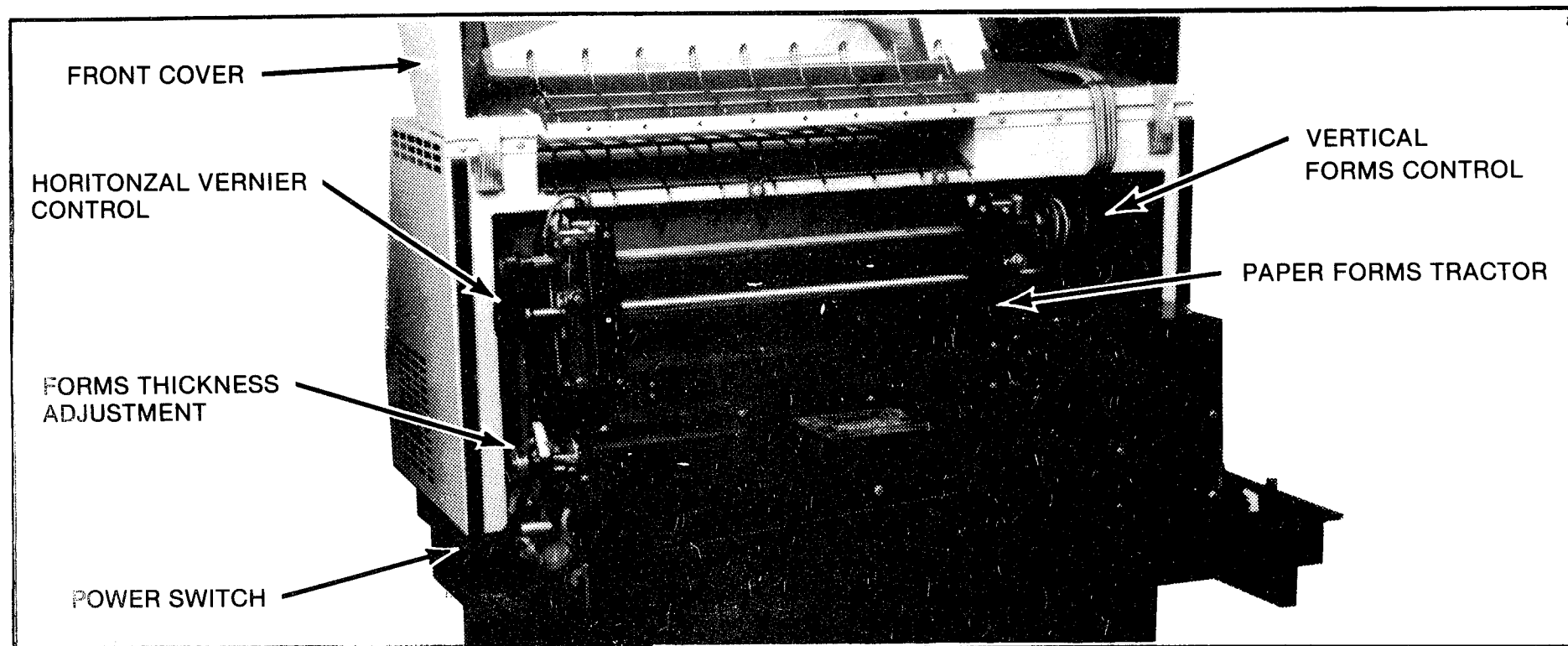
Figure 1. Adjustment Controls

ADJUSTMENT CONTROLS

Power Switch - The ON/OFF toggle switch, located on the lower left side (toward rear) applies AC power to the printer.

Horizontal Vernier Control - Permits lateral adjustment of the tractors over a range of approximately two character widths providing accurate horizontal registration of printing on preprinted forms.

Forms Thickness Adjustment - Positions the platen to accommodate a range of form thicknesses (one to six). When raised to the uppermost position, this adjustment opens the platen, allowing the insertion or removal of printer forms.

Paper Forms Tractors - The tractors may be moved to accommodate forms ranging from 4-1/2 to 16 inches in width.

Vertical Forms Control - Permits accurate vertical form positioning.

OPERATOR CONTROLS

Switches and Indicators

The control panel (Figure 2) contains the functional switches and light indicators that are used in the printing procedure.
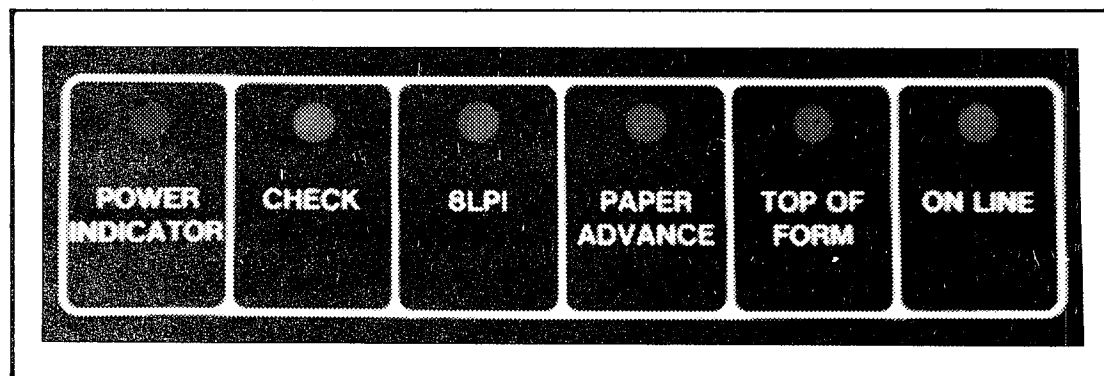
Figure 2. Control Panel

Power Indicator - This indicator will light when AC power switch is in the ON position.

Check - This combination switch/light indicator will light when printer is not loaded, when the printer has run out of paper, or when paper is torn below the print station or is jammed. It will also light if voltage levels within the printer reach abnormal levels. This indicator will turn off automatically when a condition is cleared. However, if the paper motion detector generated the (paper jam or out of paper) condition, the CHECK switch must be activated in order to reset the indicator.

NOTE

The CHECK switch does not function while plotting. Do not leave printer unattended while plotting.

8 LPI - This combination switch/light indicator selects line spacing of either six lines or eight lines per inch. It will light only when eight line per inch spacing is selected.

Paper Advance - This switch will cause paper to advance at a rate of eight inches per second.

Top of Form - This combination switch/light indicator causes a paperfeed cycle, which advances paper to the top of the next form. It is operational only when the printer is off-line (ON-LINE indicator is not on).

On-Line - This combination switch/light indicator places the printer in an on-line and ready condition. The printer cannot go on-line if the CHECK indicator is on.

PAPER LOADING

To properly load paper into the printer, the following steps must be performed:

- Open front cover.

- Raise Form Thickness Adjustment to LOAD position.

- Open left and right tractor gates (Figure 3), and remove any remaining paper.
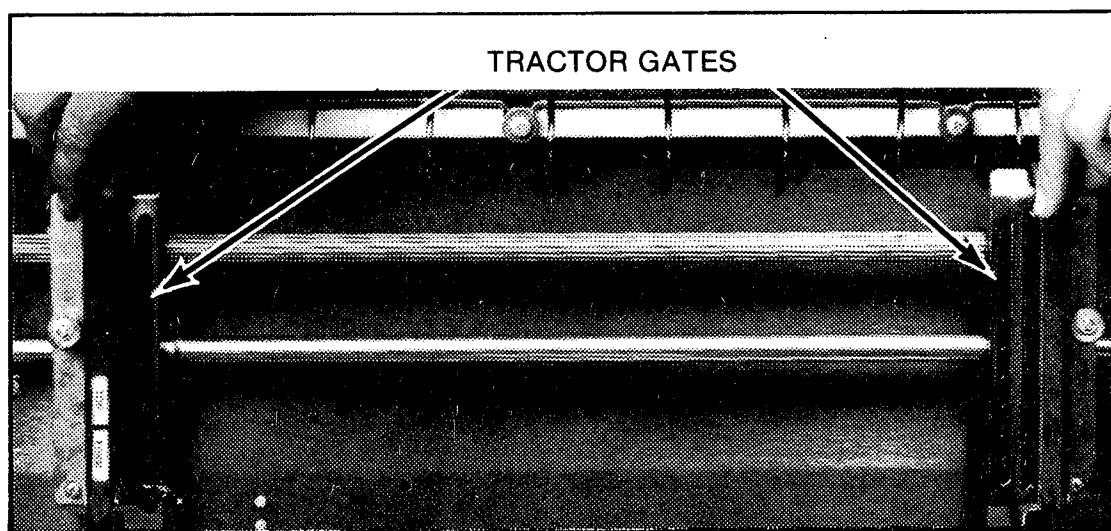
Figure 3. Tractor Gates

- Insert top edge of paper through slot in bottom of printer and move it upward until top paper edge can be grasped above print station (Figure 4).

Insert paper into slot.

NOTE: If you have trouble inserting multipart forms, fold at perforation and insert folded edge. After you've raised paper to tractor level, unfold and position normally.
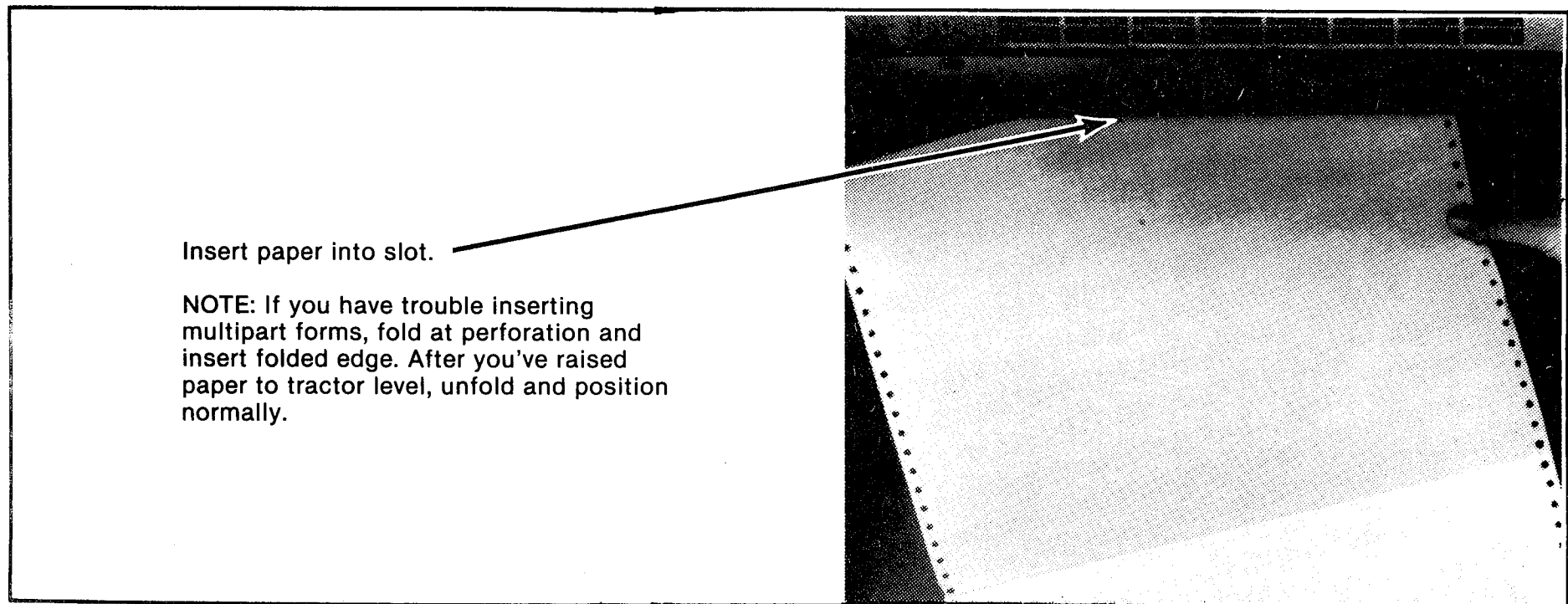
Figure 4. Inserting Paper

- Keeping paper parallel with tractors, raise and position it on tractor feed pins (Figure 5). If paper is too wide or too narrow to fit on both tractors, loosen knurled nut on right-hand tractor and move tractor until feed pins and sprocket holes line up. Position paper on feed pins and close tractor gates.
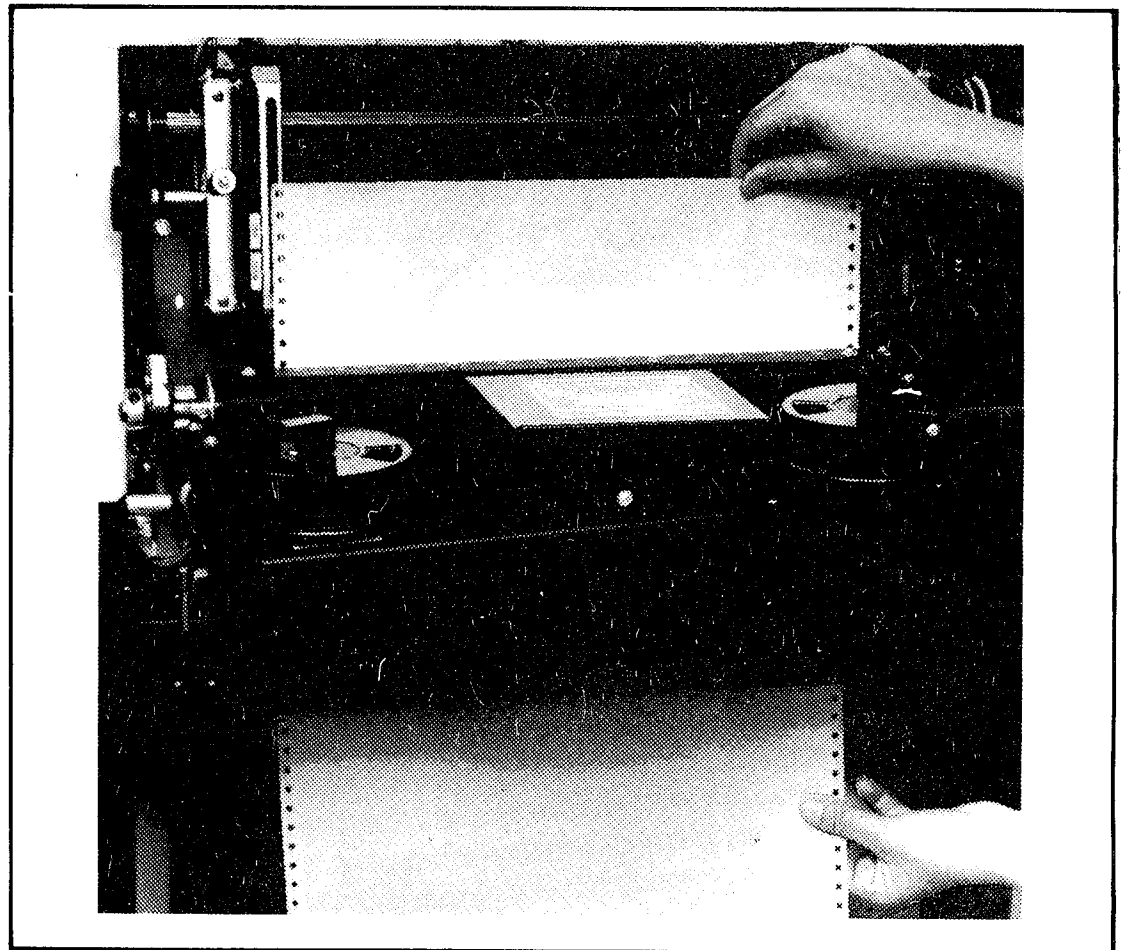
Figure 5. Positioning Forms

- The paper should be positioned so that the first character position falls in the desired first column position on the paper. This may be accomplished by adjusting the Horizontal Vernier Control or loosening the knurled nut on each tractor and moving the tractors to the desired position.

- The tractors should be adjusted to create slight tension across paper. Too little tension may result in wavy print lines; excessive tension may distort or tear sprocket holes.

NOTE

Be sure that paper is positioned so that the left side covers all of the paper-out detector surface. The printer will not go ready if the paper-out detector is not covered.

- With Forms Thickness Adjustment still in LOAD position, turn Vertical Forms Control knob so that first print line position is aligned with top-of-form indicator on tractors (Figure 6).

TOP OF FORM INDICATOR

PAPER INDICATOR MARK AND POINTER
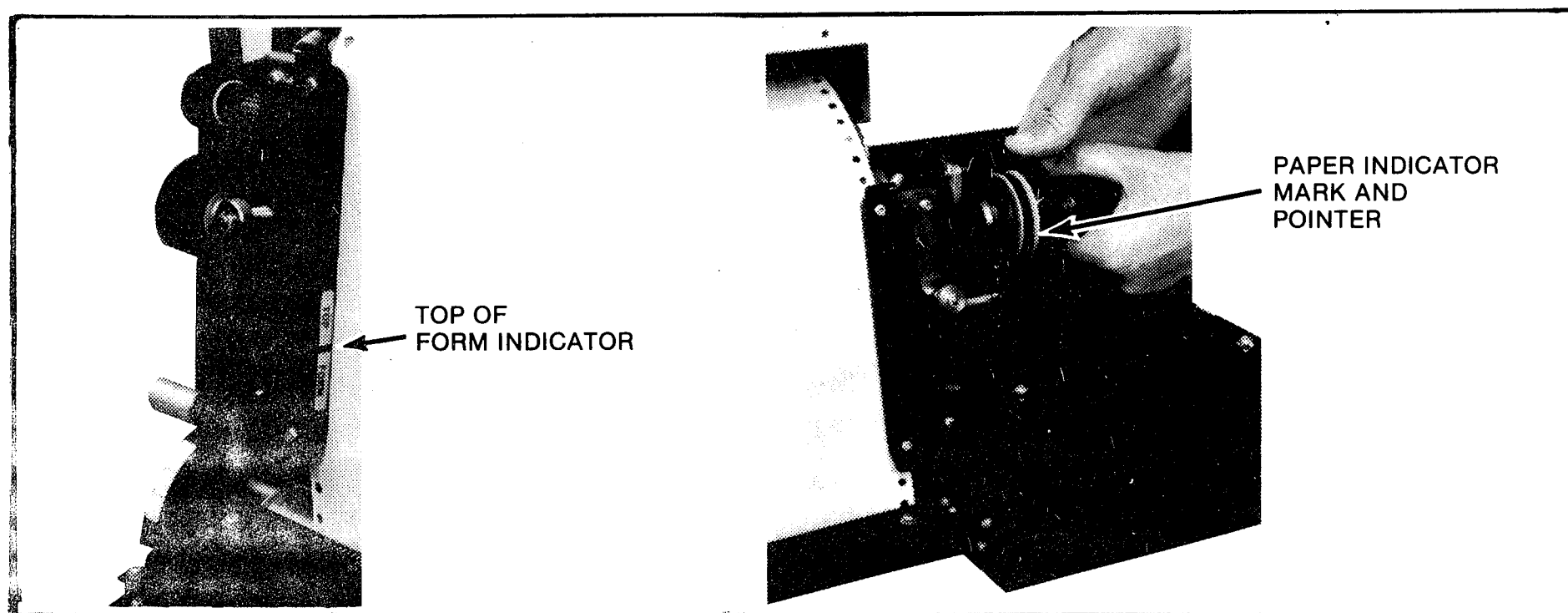
Figure 6. Aligning First Print Line Position

- Align paper indicator mark on Vertical Forms Control wheel with pointer, then rotate knob exactly one revolution to lower paper to

proper position. Indicator mark should once again be aligned with pointer (Figure7).
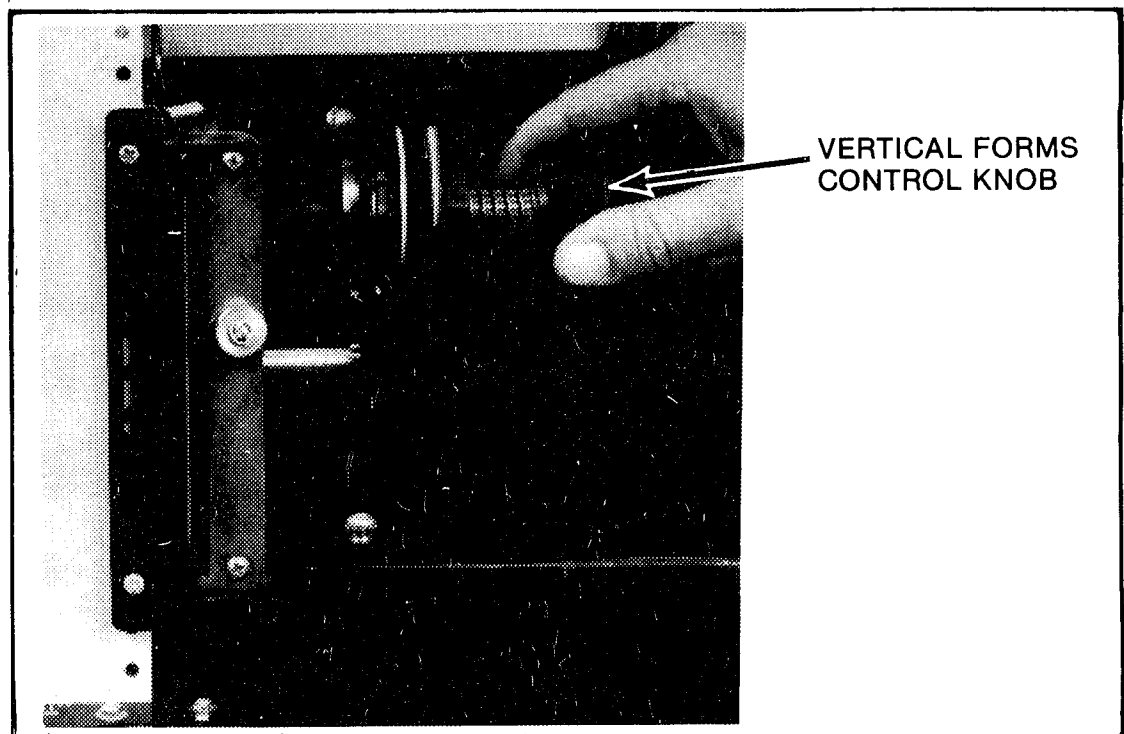
Figure 7. Aligning Top of Form

- Grasp paper on both sides below entrance slot, and gently pull downwards so that paper is taut within printer (Figure 8).
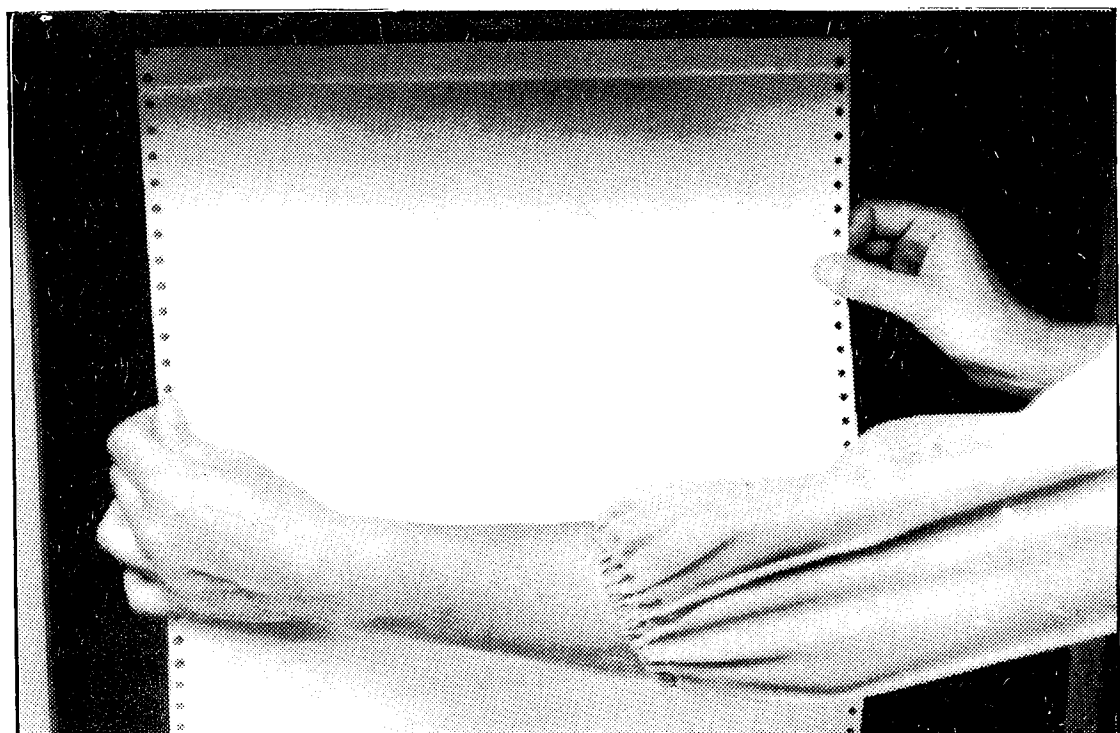
Figure 8. Tensioning Form

- Move Form Thickness Adjustment downwards to the desired position: single, 3-part, 6-part, or an appropriate intermediate position.

CAUTION

If the Form Thickness Adjustment is inadvertently left open or positioned incorrectly for the thickness of the form, printing may not occur and the ribbon may be destroyed.

• Close front cover and activate TOP OF FORM switch. If CHECK indicator comes on, paper is positioned incorrectly.

VERTICAL FORMS UNIT (VFU)

The printers utilize an electronic VFU which operates under program control. If top of form or slewing operations do not function properly, contact your systems programmer for assistance.

RIBBON REPLACEMENT

Ribbon life drops off sharply if ribbon guides and the overall ribbon guide path are not kept clean. This includes rollers and guides. Cleaning should be done prior to putting on a new ribbon, or sooner if it is determined that dirt or ink buildup on these parts has contributed to printing degradation. It is recommended that a soft lint-free cloth and isopropyl alcohol be used for this purpose.

The inked ribbon is one inch wide and should be replaced after approximately 120,000 lines of print:

• Turn AC power OFF, open front cover, set Form Thickness Adjustment to LOAD position.

• Rotate either reel to obtain slack in ribbon.

• Raise lock lever on each hub, lift off ribbon spools and clear ribbon from left and right guides (Figure 9).
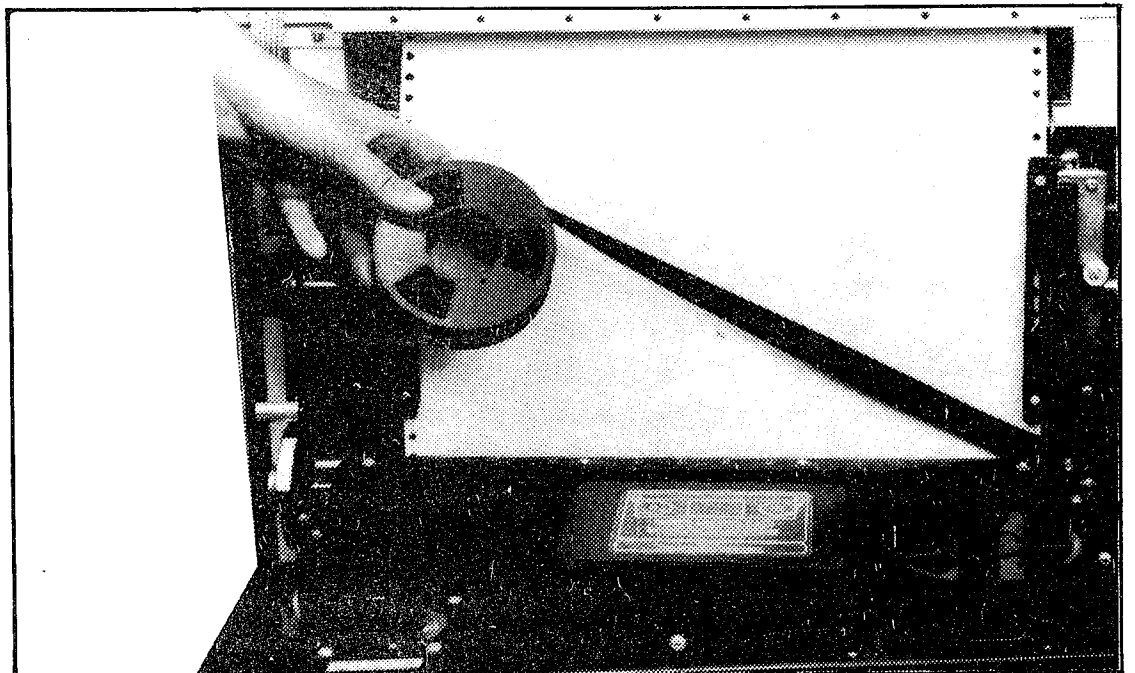
Figure 9. Replacing Ribbon

• Place supply reel on left-hand hub and lower lock lever, locking reel on hub. Holding take-up reel, run ribbon over ribbon guides following path shown in diagram on ribbon deck. Place take-up reel on right-hand hub and lower lock lever.

• Rotate either reel to take up slack and verify that ribbon runs smoothly and is not twisted.

- Place AC power switch in ON position.

- Set Form Thickness Adjustment to desired setting.

- Close front cover.

CAUTION

Be sure that end-of-reel sensor wires are NOT on the hammer bank side of the guides with ribbon installed. This would cause ribbon to wear out very quickly.

ROUTINE MAINTENANCE

The following maintenance should be performed by the operator to ensure proper operation of the printer.

The printer should be kept clean, both inside and outside, to ensure proper operation. The platen should be opened, paper removed, and the area around the platen dusted with a soft brush and/or vacuumed as often as required.

The printer case can be cleaned as required using household liquid cleaner. Do not use steel wool, abrasive cleaners, or any type of solvent cleaners. These cleaners may damage the painted surface.

PAPER SPECIFICATIONS

The following are recommendations regarding the correct types of forms to be used with the Basic Four printers. The carbon weights as well as the various paper weights are given as a guideline for selecting the proper paper.

Stock Forms and Standard Construction Custom Forms

Single Copy	— 15, 18-, or 20-lb. bond
2 and 3 Copies	— 15-lb., 7-lb. carbon
4 and 5 Copies	— 12-lb. bond, on first sheet and intermediate copies, 15-lb. bond on last copy, 7-lb. carbon
6 copies	— 12-lb. bond on first sheet, 10-lb. bond on intermediate copies, 15-lb. bond on last copy, 7-lb. carbon

Carbonless Papers

6 copies	— 14 or 15-lb. carbonless paper in white or colors, 15 or 16-lb. white or colors in last position
10 copies	— 10-lb. white carbonizing bond (carbon-backed), 15-lb. bond recommended for last copy

The printers will also accept other types of continuous forms. For any special purpose forms see your forms salesman. All forms other than stock forms should be tested prior to purchase.

These printers produce large volumes of forms and reports at a rate of 600 lines-per-minute. They are free-standing and have an enclosure to reduce printer noise.

The printers use forms up to 16-3/4 inches wide. Features include simplified operator controls, an 8-channel vertical forms unit for slewing to preselected positions, and a switch for selecting either 6 or 8 lines-per-inch. The printers are available with a standard 64-character or an optional 96 character (upper and lower case) type font. A paper stacker for ease of gathering processed documentation is included.

SPECIFICATIONS

Printing Rate:	600 lines-per-minute
Character Set:	64 character subset of ASCII or 96-character (upper and lower case). Gothic style equivalent to 10-point type size. There is a reduction in printer speeds when the 96-character drum is used.
Printer Line Length:	132 characters.
Character Spacing:	10 characters-per-inch
Line Spacing:	6 or 8 lines-per-inch, switch selectable.

SPECIFICATIONS (continued)	Slewing:	600 lpm: 8-channel; 25 inches-per-second
	Data Buffer:	Full line, 132 characters.
	Paper:	4 to 16-3/4 inches wide, sprocket fed, single or multiple part forms.
	Copies:	Original plus five.
	Paper Feed:	Pin feed (half-inch, center-to-center holes) continuous fan fold forms.

PRINTER ADJUSTMENT

The adjustment controls (Figure 1) permit the operator to make certain adjustments that may be required before printer start-up.
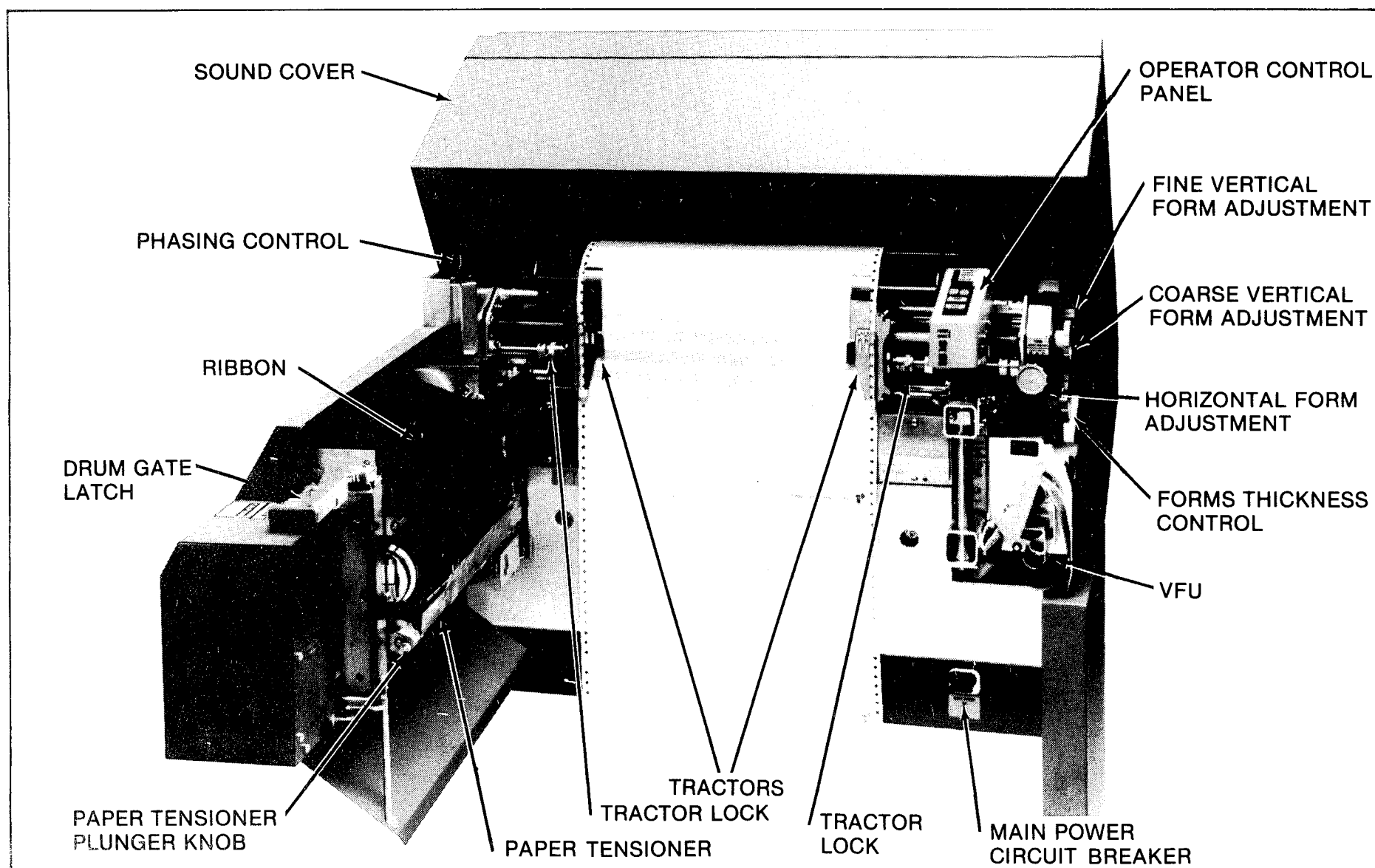
Figure 1. Adjustment Controls

ADJUSTMENT CONTROLS

Fine Vertical Form Adjustment - Provides fine vertical positioning of paper between the predetermined increment range of the coarse vertical form adjustmentcontrol.

Coarse Vertical Form Adjustment - Vertically positions the paper at predetermined increments. The forms reset switch must be in the "down" position when using this adjustment.

Forms Thickness Control - Compensates for different paper thickness. Adjust when installing paper.

Horizontal Form Adjustment - Provides fine horizontal paper adjustment by moving both tractors in unison.

Tractor Locks - These two adjustments allow movement and positioning of the tractors with the edge of the paper.

Phasing Control - Varies ink density of characters top-to-bottom.

The main power circuit breaker (Figure 1) controls the application of primary power to the printer, motors, and power supplies. It must be turned on to operate the printer.

The control panel (Figure 2) contains the functional switches and light indicators that are used in the printing procedure.

OPERATOR CONTROLS
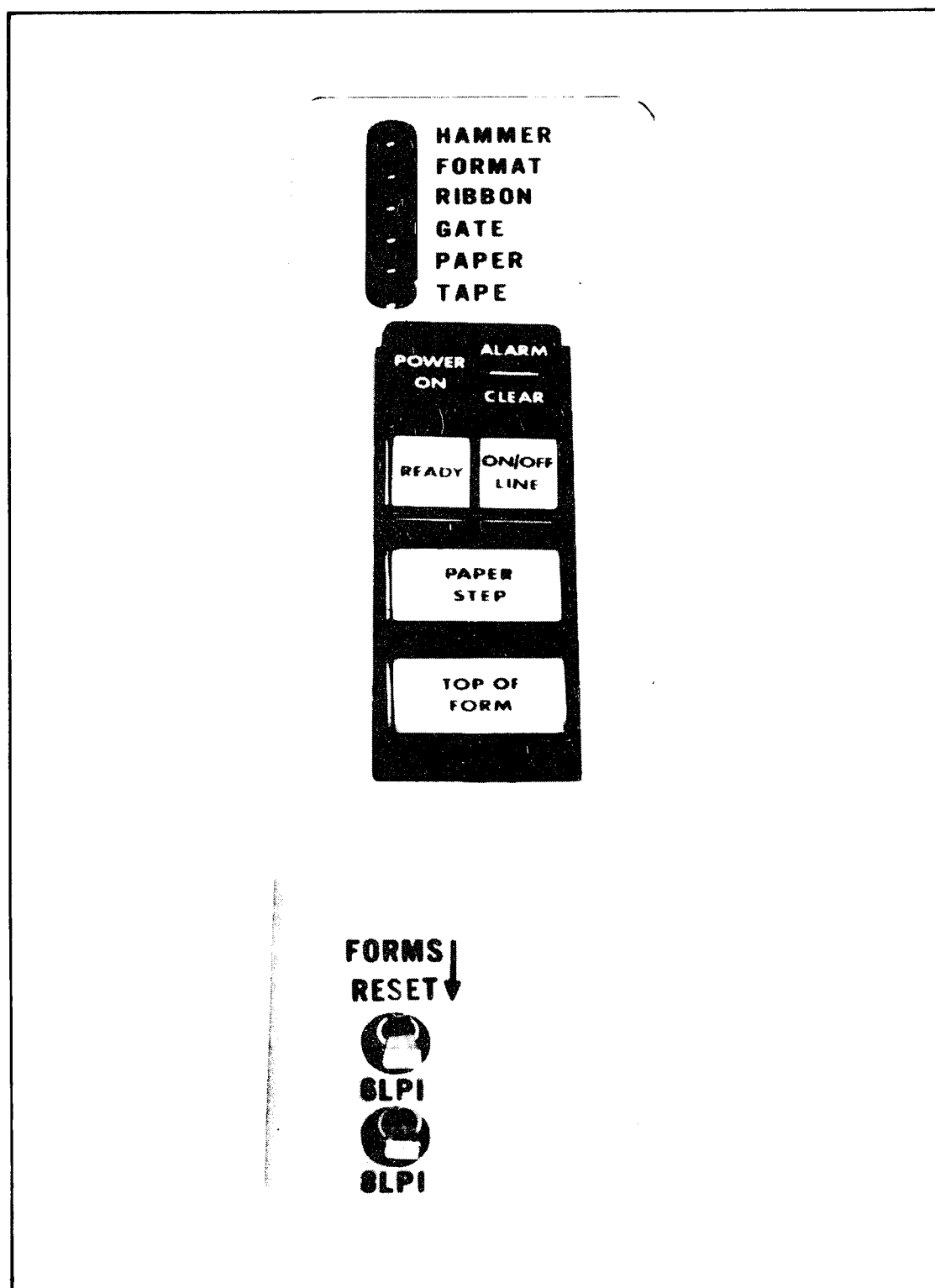
Figure 2. Control Panel

Switches and Indicators

Power On - This indicator lights when power is applied and all power supply voltages are within tolerance.

Alarm/Clear - ALARM indicator when on shows the existence of a fault condition or the Print Inhibit switch is on. If the specific fault has an associated indicator, that indicator will also be on. A fault condition will take the printer off-line. Pressing the CLEAR switch will master clear (initialize) the printer logic.

Ready-On/Off Line - The READY indicator when on indicates that the printer is ready to be placed on-line. Depression of the ON/OFF LINE switch will place the printer either in the on-line or off-line mode. When ON/OFF LINE indicator is on, the printer is on-line.

Paper Step - Depressing this switch advances the paper to the next line. The switch is disabled when the printer is on-line and during VFU tape loading.

**Top of Form** - Depressing this switch advances the paper to the top of the next form. The switch is disabled when the printer is on-line and during VFU tape loading.

Forms Reset - This switch allows manual override of the paper feed system for form positioning. See FINE and COARSE VERTICAL FORM ADJUSTMENT for direct application of this switch.

6LPI/8LPI - This switch allows selection of either 6 or 8 lines-per-inch vertical spacing.

FAULT INDICATORS

In all cases, when a fault indicator is on, the ALARM indicator will also be on. To clear a fault condition, take appropriate corrective action (if any) and press the ALARM switch to master clear the printer logic. If the fault remains, check the corrective action and again press the ALARM switch. If the fault condition persists, the SORBUS representative should be contacted.

Hammer - Indicates a print hammer is not operating properly. The occurrence of a hammer fault clears the printer without completing the printer operation in progress.

Format - Indicates that the number of line feeds executed does not correspond to the number of line feed commands. The occurrence of this fault causes the printer to go off-line upon completion of the printing operation in progress. Reposition paper and press FORM RESET switch to correct before pressing ALARM.

Ribbon - Indicates ribbon is not advancing properly due to a failure to reverse; a snag; or a motor problem. The occurrence of a ribbon fault will cause the printer to go off-line upon completion of the printing operation in progress.

Gate - Indicates that the drum gate is not latched. The printer is master cleared when the drum gate is opened with the power on.

FAULT INDICATORS (continued)

Whenever the drum gate is opened the PAPER fault indicator is on. The ALARM/CLEAR switch must be pressed before the printer will go to ready after the gate has been opened.

Paper - Indicates torn paper, out-of-paper, or paper runaway condition. The occurrence of a paper fault will cause the printer to go off-line upon completion of the printing operation in progress.

Tape - Indicates a parity error in the VFU memory, or a tape channel command received for which no hole has been punched. The occurrence of a tape fault will cause the printer to go off-line upon completion of the printing operation. Reload the VFU tape to correct the fault before pressing ALARM switch.

PAPER LOADING

To properly load paper into the printer, the following steps must be performed:

CAUTION
If a previous printing operation has just been completed, make sure that the print drum has stopped rotating after opening the drum gate.

• Lift the sound cover. Pull drum gate latch forward and swing drum gate fully open (Figure 3).
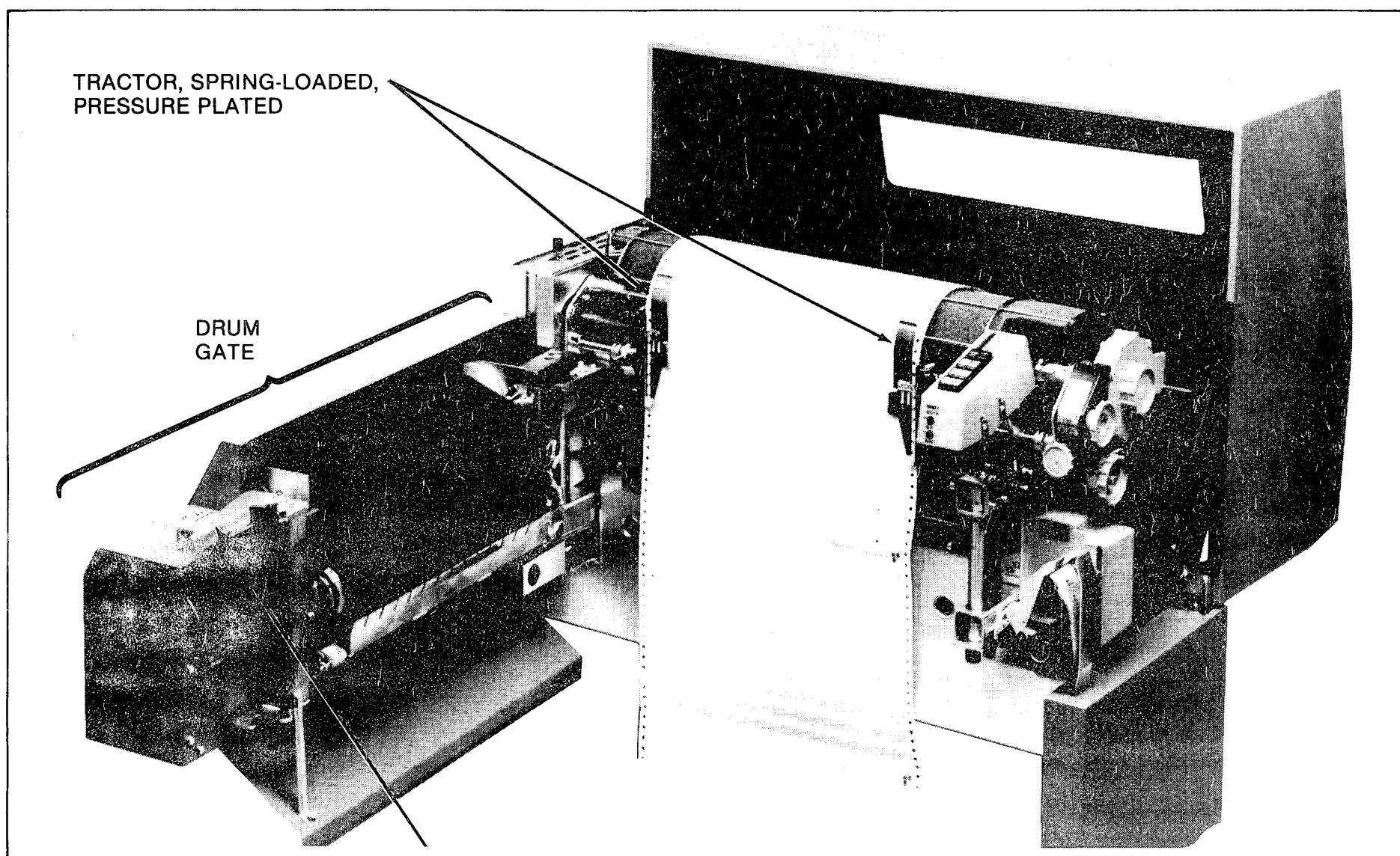
Figure 3. Paper Loading

- Ensure that the MAIN POWER CIRCUIT BREAKER is in the ON position. Press and release the TOP OF FORM switch. The tractors will automatically advance to top-of-form position.

- Open the tractor spring-loaded pressure plates.

- Place paper in the tractors and close pressure plates. Loosen both tractor locks, and move both tractors laterally, if necessary, to adjust for correct paper width. Tighten tractor locks.

- Align paper perforation to top-of-form by pressing the FORMS RESET switch while rotating the tractor shaft via the COARSE VERTICAL FORM ADJUSTMENT knob.
  a. Paper is normally installed so that the first line of print is either 1/4 or 1/2 inch from perforation (top-of-form). (Figure 4 shows the paper installed with the first line 1/2 inch from top-of-form.)
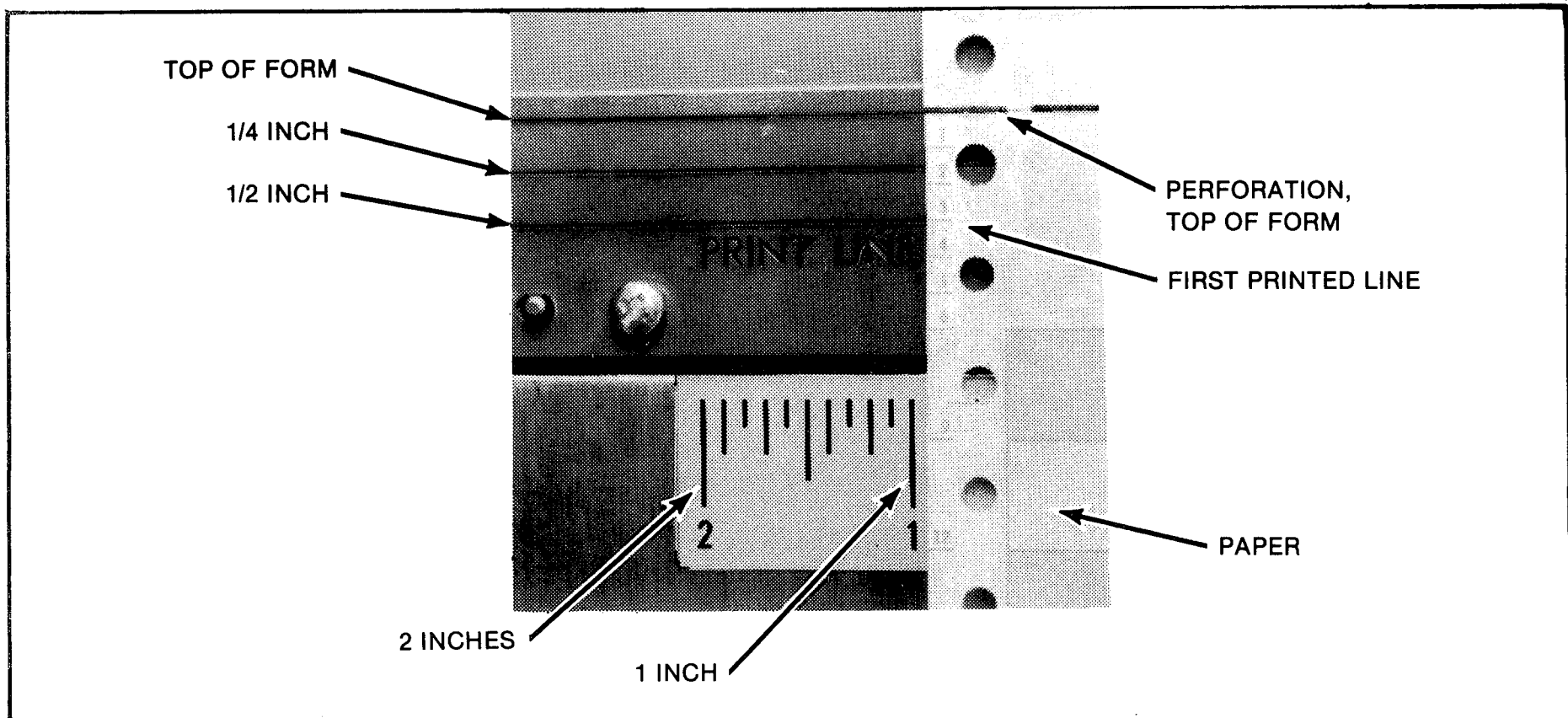
Figure 4. Paper Positioning

  b. Paper may be installed so that the first print column may be indented up to two inches from the paper's edge. (Figure 4 shows the paper installed with the first print column indented approximately one inch.)

- Use the FINE VERTICAL FORM ADJUSTMENT knob to correct for any small remaining misalignment in print-out during operation. (Fine adjustment is made with FORMS RESET switch in the up position, drum gate closed, and sound cover raised.)

- Use the HORIZONTAL FORM ADJUSTMENT knob to correct for any small remaining horizontal misalignment in print-out.

RIBBON LOADING AND REMOVAL

A ribbon life of 500,000 lines is anticipated under normal printer use. To load or remove the ribbon, proceed as follows:

- Lift the sound cover, pull drum gate latch forward, and swing drum gate fully open.

• Holding the paper tensioner with one hand, pull the paper tensioner plunger knob and remove the paper tensioner with one hand, pull the paper tensioner from the drum gate. (See Figure 5.)

PAPER TENSIONER PLUNGER KNOB

TENSIONER INDEXING SLOT
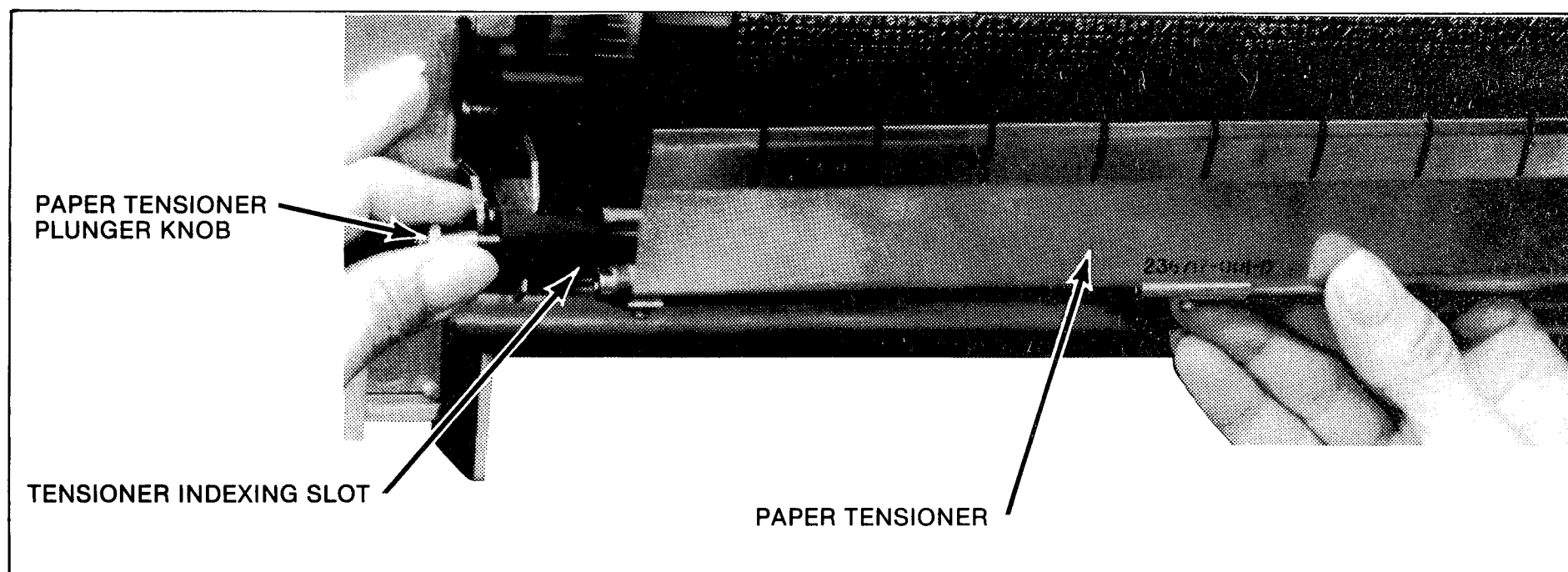
PAPER TENSIONER

Figure 5. Paper Tensioner Removal

• Using the gloves provided, hold ribbon cores together and remove ribbon from box.

NOTE
Ribbon should be installed so that it unwinds from the top of the ribbon core.

• Place the fully wound ribbon core over top floating ribbon holder. (Figure 6.)

RIBBON CORE

RIBBON

SPRING-LOADED FLOATING RIBBON HOLDER (UPPER LEFT WHEN FACING OPEN DRUM GATE).
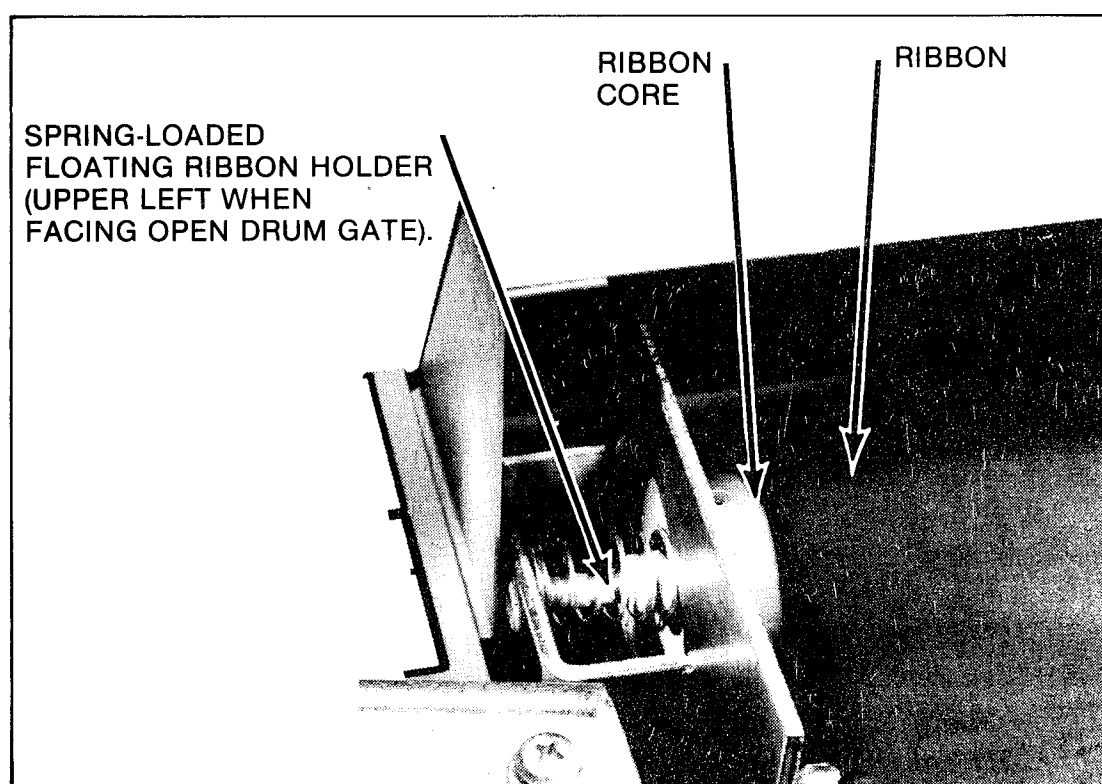
Figure 6. Floating Ribbon Holder

- Push ribbon core against floating ribbon holder spring and place opposite ribbon holder. Ensure that holder guide pin slips into slot on core end. (Figure 7.)

RIBBON

RIBBON CORE

TOP FIXED RIBBON
HOLDER PIN GUIDE
(OPPOSITE END OF
RIBBON CORE SHOWN
IN FIGURE 6)
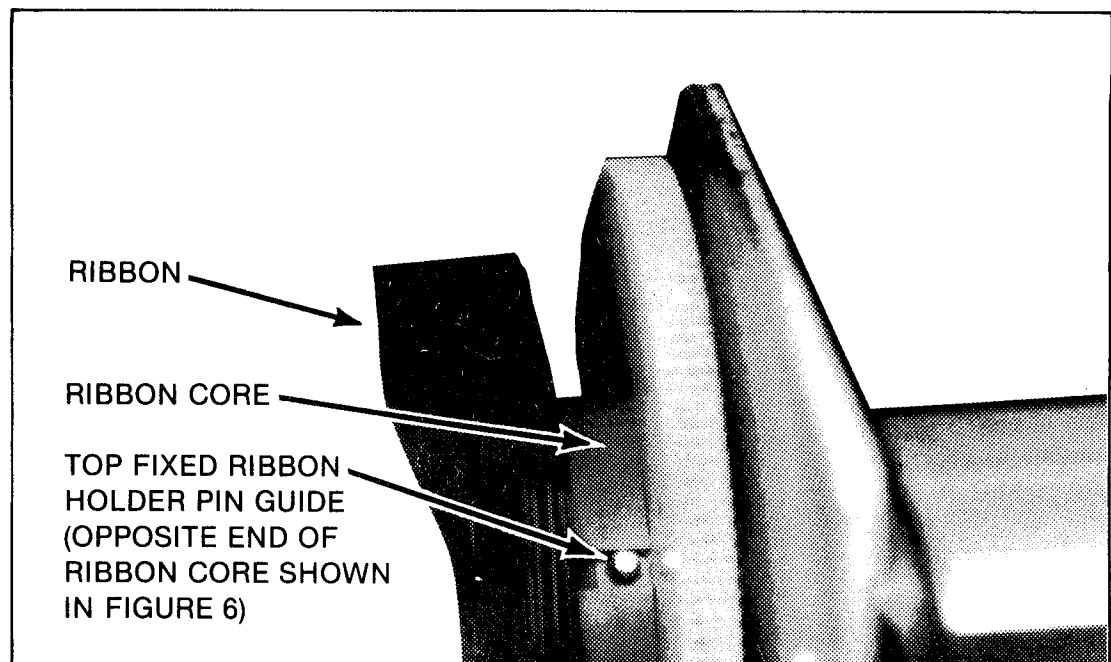
Figure 7. Guide Pin Location

- Unwind second ribbon core and bring down over character drum and ribbon guide bars. Once in position, install ribbon cores as described above.

- Install paper tensioner by inserting the paper tensioner block into position and pushing the tensioner against tensioner knob indexing slot while pulling knob to allow slot engagement. Once engaged, release knob. Figure 8 shows ribbon and tensioner completely installed.

RIBBON

TOP FLOATING
RIBBON HOLDER

PAPER TENSIONER

TENSION
PLUNGER KNOB

TENSIONER
INDEXING SLOT

BOTTOM FLOATING
RIBBON HOLDER

BOTTOM FIXED RIBBON HOLDER

TOP FIXED
RIBBON HOLDER

PAPER
TENSIONER BLOCK

BOTTOM FIXED
RIBBON HOLDER
(BEHIND BRACKET)

Figure 8. Ribbon and Tensioner Installed

- If the printer paper is installed, close and latch the drum gate. Lower the sound cover.

ON-LINE START-UP PROCEDURE

To place the printer on-line after paper and ribbon are installed, proceed as follows:

- Set the MAIN POWER CIRCUIT BREAKER to the ON position. After five seconds, make sure that the POWER ON and READY indicators are on.

- Press and release the ON/OFF LINE switch to place the printer in operation (indicator will light).

- Check printer operation and adjust VERTICAL FORM ADJUSTMENT if necessary to obtain desired print line positioning.

- Adjust the PHASING CONTROL if necessary to obtain uniform ink density of characters. Slowly rotate control clockwise or counterclockwise to obtain proper density.

SHUTDOWN PROCEDURE

To place the printer off-line, proceed as follows:

- Press and release the ON/OFF LINE switch. Make sure that the indicator goes out after printing of current line has been completed.

- Set the MAIN POWER CIRCUIT BREAKER to the OFF position. The READY indicator should go off.

VERTICAL FORMAT TAPE

The vertical format unit (VFU) permits high-speed forms movement to nine predetermined printing lines. Forms movement is controlled by a pre-punched paper tape loop that moves in synchronization with the paper feed system. Channel 1 is used for Top of Form control. Channels 2 to 8 are used for high-speed skipping. Channels 9 to 11 are not used. Channel 12 is used for Bottom of Form control.
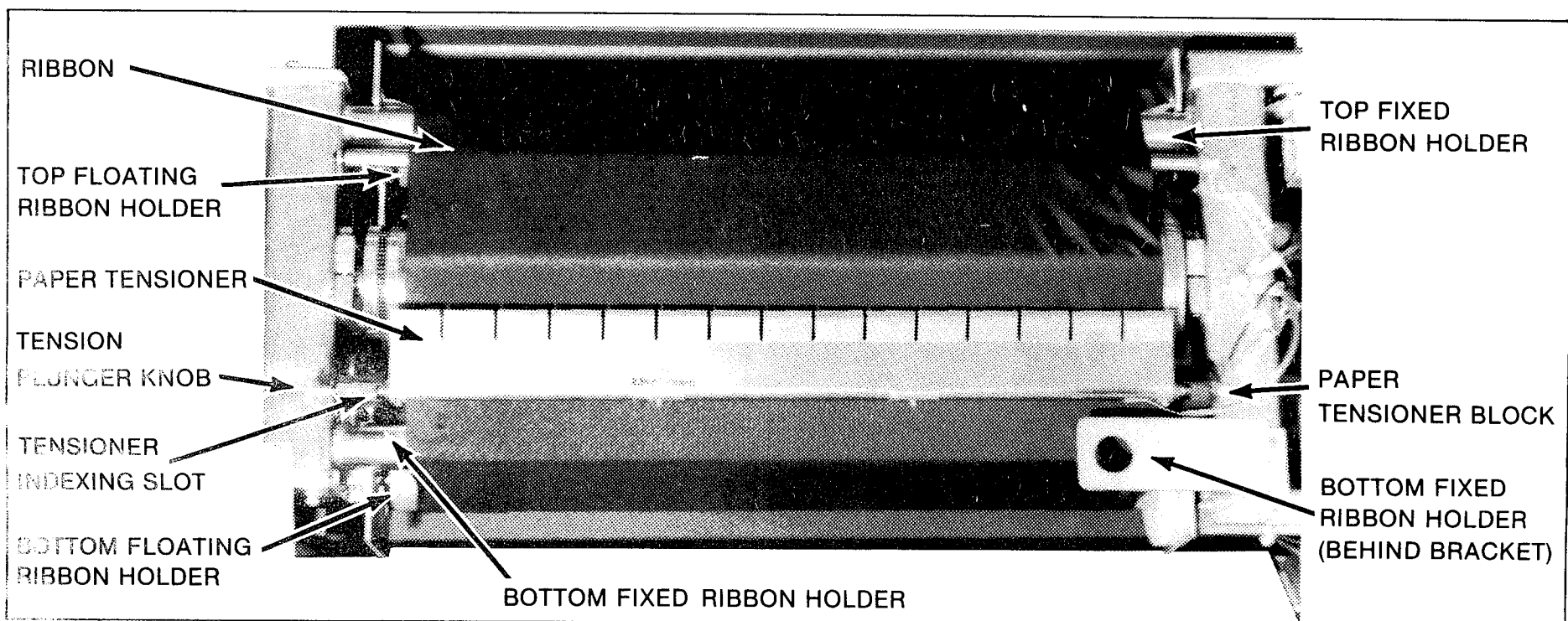
NOTE
The VFU tape must be punched to include BOF at channel 12 to allow printing to continue to bottom of form.

The procedure stated herein is recommended for the preparation of format tape loops. Since applications differ, this procedure is intended to serve as a guide. The following tools and materials, or their equivalents, may be utilized for the preparation of the tape loops:

ITEM	IBM PART NUMBER
Tape Punch	120910
Format Tape	429754
Glue	419012

TAPE PUNCHING

The VFU is designed for the standard IBM (or equivalent) twelve channel tape only. Each sprocket hole corresponds to one line of print. Tape Channel 1 is used for Top of Form sensing, therefore the tape should have only one hole in Channel 1.

Since the VFU counts lines (not lines-per-inch), the tape length should be as long, or have as many sprocket holes, as the length of the forms times the number of lines-per-inch.

- On an 11-inch form used at 8 lines-per-inch, the tape will be 88 lines long or have a total of 88 sprocket holes.

- At six lines-per-inch, using the same form, the tape will be 66 lines long.

The following is an example of VFU tape loop preparation. In this example a tape length of 66 lines (or sprocket holes) is assumed (Figure 9).

OPPOSITE END TO OVERLAP AND CONNECT HERE FOR TAPE LOOP

CHANNEL ONE TO BE USED FOR TOP-OF-FORM

PRINT FORM LINES

SPROCKET HOLES

Figure 9. VFU Tape Punching
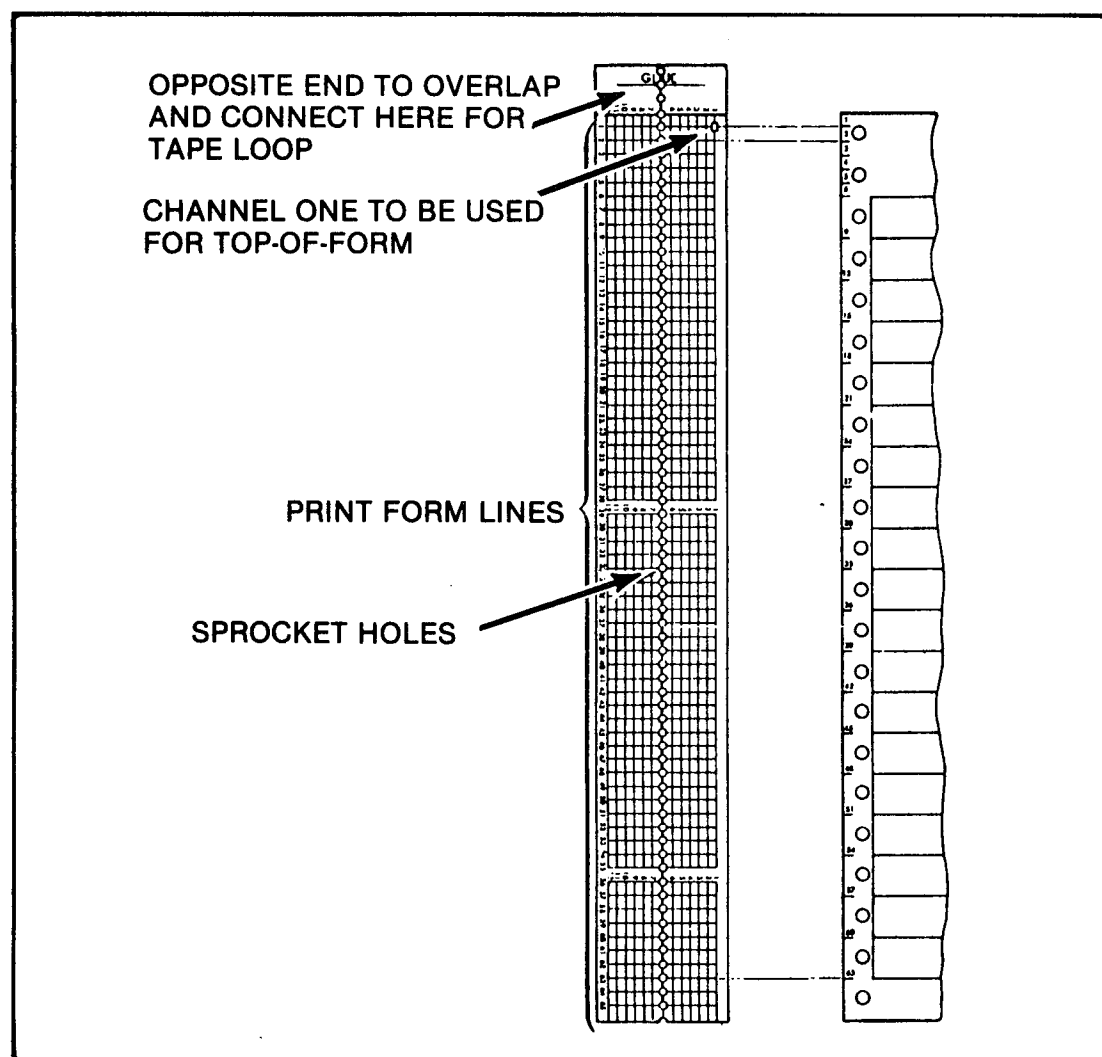
- Cut off the format tape at the numbered line corresponding to the total number of lines on the form. In our sample case, this would be line 66.

- Cut through the center of the sprocket hole corresponding to this line. The leader on the tape provides automatic 3-line extension so that the tape is actually 69 lines in length. This provides sufficient space for overlap and glueing of the tape.

TAPE PUNCHING (continued)

- Lay out a sample form and mark out each line to which a high-speed paper slew is desired. Place the tape beside the sample form and mark the points on the tape with a pencil.

- Insert tape into the tape punch fixture and align first hole to be punched with punch guide line.

- Select channels by moving the carriage knob of the tape punch.

- Punch the format hole into the tape by pressing the punch at the desired sprocket hole.

- Carefully lift the tape off the sprocket pins and advance it through the punch until the next punching position is reached. (If format holes have been punched adjacent to the first sprocket hole, they should be duplicated adjacent to the 66th sprocket hole since these areas overlap.)

- Punching in the last four holes, or position zero, should be avoided if possible because of the overlap.

- Apply a thin coat of glue across the width of the tape from line zero position up to the top of the tape.

- Place tape into the punch with a sprocket pin engaging the hole adjacent to line zero.

- Hold the tape in the punch and place the other end of the tape over the first edge of the 66th sprocket hole aligned with the hole adjacent to column zero.

- Align any holes which may have been punched adjacent to the first and 66th sprocket holes so that they coincide.

- Apply pressure to the splice until it is held firm.

- Clean off excess glue.

VFU TAPE LOADING

To initially load tape on the VFU Reader proceed as follows:

- With the MAIN POWER CIRCUIT BREAKER in the OFF position, raise the sound cover, pull drum gate latch forward, and swing drum gate fully open.

- Open VFU cover and place the punched tape on the sprocket drive with channel 1 oriented toward the front of the printer (Figure 10.)
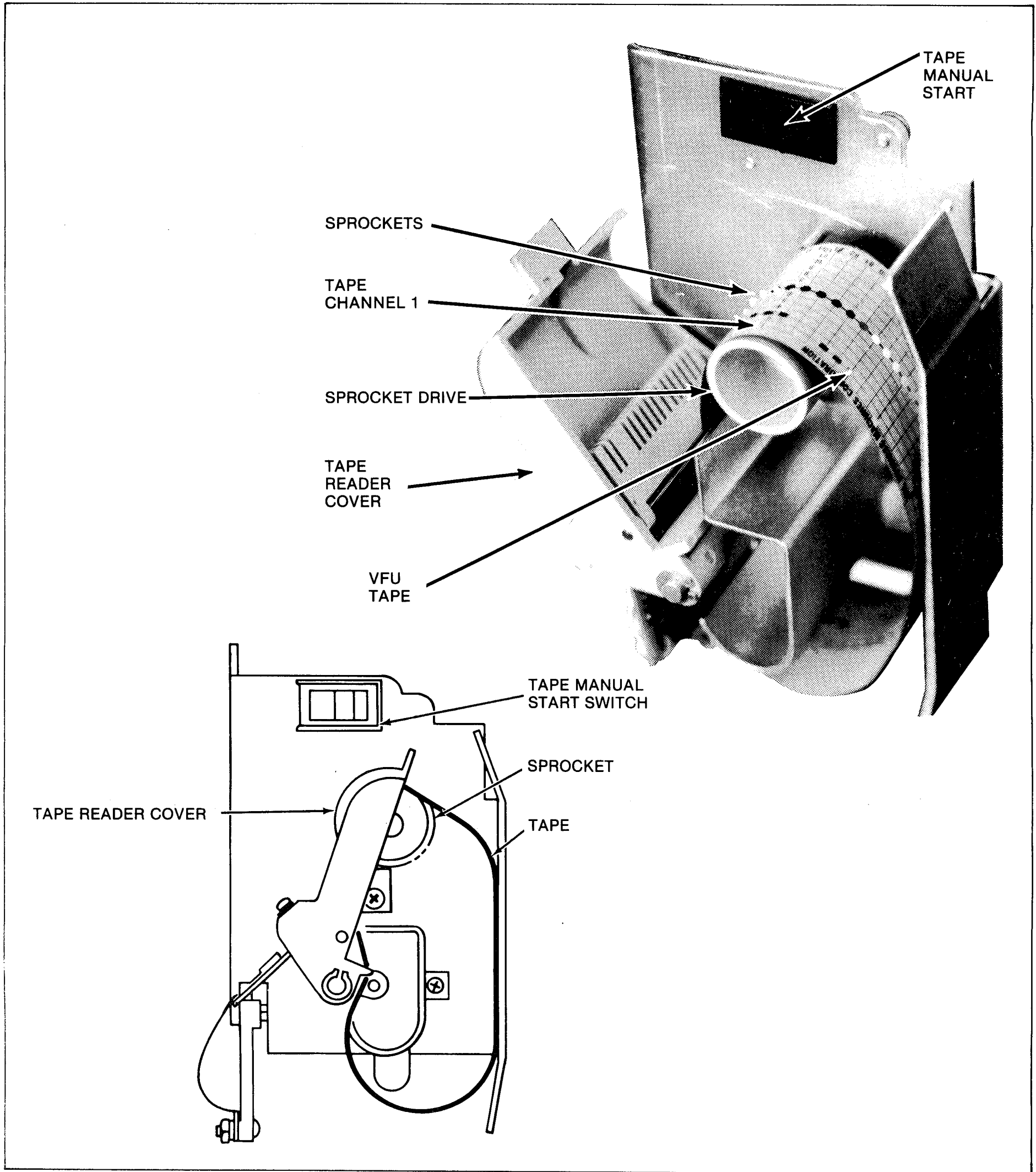
Figure 10. VFU Tape Loading

TAPE MANUAL START

SPROCKETS

TAPE CHANNEL 1

SPROCKET DRIVE

TAPE READER COVER

VFU TAPE

TAPE MANUAL START SWITCH

SPROCKET

TAPE

TAPE READER COVER

- Close the VFU cover, close and latch the drum gate, lower the sound cover, and turn the MAIN POWER CIRCUIT BREAKER to ON. The tape will load automatically after the power stabilizes.

- When the tape is loaded, the READY indicator will light.

CONCURRENT VFU TAPE LOAD

To load the punched tape on the VFU Reader during printer operation proceed as follows:

- Raise the cover and open the drum gate.

CAUTION
Make sure that print drum has stopped rotating prior to proceeding to the next step.

- Open the VFU cover and place the punched tape on the sprocket drive with channel 1 oriented toward the front of the printer.

- Close the VFU cover, close and latch the drum gate, press the ALARM/CLEAR switch, press the TAPE MANUAL START switch, and lower the sound cover. The tape will load automatically.

- When the tape is loaded, the READY indicator will light.

ROUTINE MAINTENANCE

The printer should be kept as clean as possible, both inside and outside the unit, to ensure proper operation. The drum gate should be opened and the areas around the paper path and ribbon path should be dusted and/or vacuumed.

The sound cover and other external parts may be cleaned as required using any brand of mild liquid household cleaner. Do not use steel wool, abrasive cleaners, or any solvents. These may damage the painted surface.

Ribbon guides, rollers, and the overall ribbon guide path should be kept clean so as not to decrease expected ribbon life. Ink buildup should be prevented from accumulating on the character drum as this will degrade print quality. Lint may be vacuumed. Areas where ribbon ink tends to accumulate may be cleaned with isopropyl alcohol or an equivalent solvent. Do not let this solvent drip on other parts, on electrical circuits, or on the ribbon. The character drum can be rotated by hand to get at its full print area.

When ink accumulation has been removed, dry the cleaned areas with a clean, lint-free cloth.

PAPER SPECIFICATIONS

The following are recommendations regarding the correct types of forms to be used with the Basic Four printer. The carbon weights, as well as the various paper weights, are given as a guideline for selecting the proper paper.

Stock Forms and
Standard Construction
Custom Forms

Single Copy	— 15-, 18- or 20-lb. bond
2 & 3 Copies	— 15-lb. bond, 7-lb. carbon
4 & 5 Copies	— 12-lb. bond on 1st sheet, 10-lb. bond on intermediate copies, 15-lb. bond on last copy, 7-lb. carbon.
6 Copies	— 12-lb. bond on 1st sheet, 10-lb. bond on intermediate copies, 15-lb. bond on last copy, 7-lb. carbon

Carbonless Papers

6 ply	— 14- or 15-lb. carbonless paper in white or colors, 15-lb. or 16-lb. white colors in last position.
10 ply	— 10-lb. white carbonizing bond (carbon-backed), 15-lb. bond recommended for last copy.

The printer will also accept other types of continuous forms. For any special purpose forms see your forms salesman.

NOTE

When utilizing forms that are not full width of the printer, the ribbon should be reversed (top to bottom) to prevent ribbon skew caused by repeated hammer strikes on one side. Repeated use of only one portion of the ribbon will cause that portion of the ribbon to stretch. Reverse the top and bottom ribbon cores as detailed in RIBBON LOADING AND REMOVING.
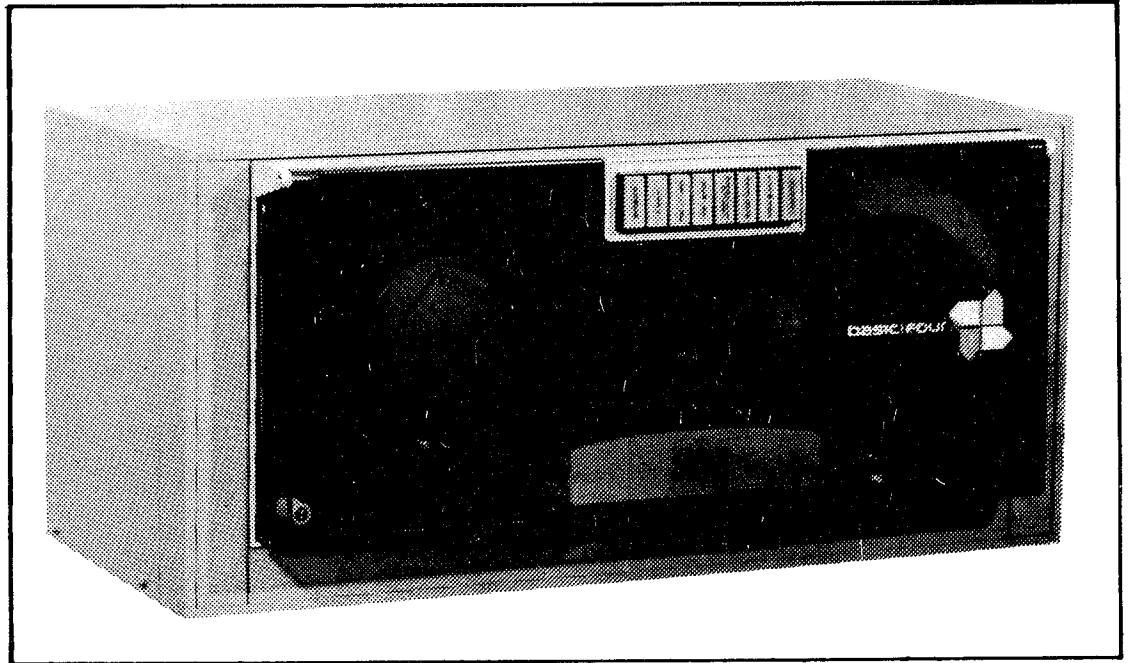
The magnetic tape drive provides a means of storing large volumes of data. This unit can be used in applications where the faster data access time of the disc drive is not needed.

SPECIFICATIONS

Tape Velocity: 12.5 inches per second.

Data Transfer Rate: 2,300 to 10,000 characters per second.

Rewind Velocity: 50 inches per second (nominal).

Compatibility: 9-track

Tape: Computer grade, 0.5 inch wide, 1.5 mil. thick.

Reel Size: 7-inch maximum diameter, IBM hub compatible.

Data Density and Recording Mode: 800 bpi with NRZI recording mode.

OPERATOR CONTROLS

During normal operation of the tape unit with the computer system, tape motion and the reading or writing of data are controlled by the CPU. When the tape system is not under computer control (i.e., when it is off-line), tape motion can be controlled by the operator through pushbuttons on the control panel (Figure 1). Indicator lights are also provided to show the conditions under which the equipment is operating.
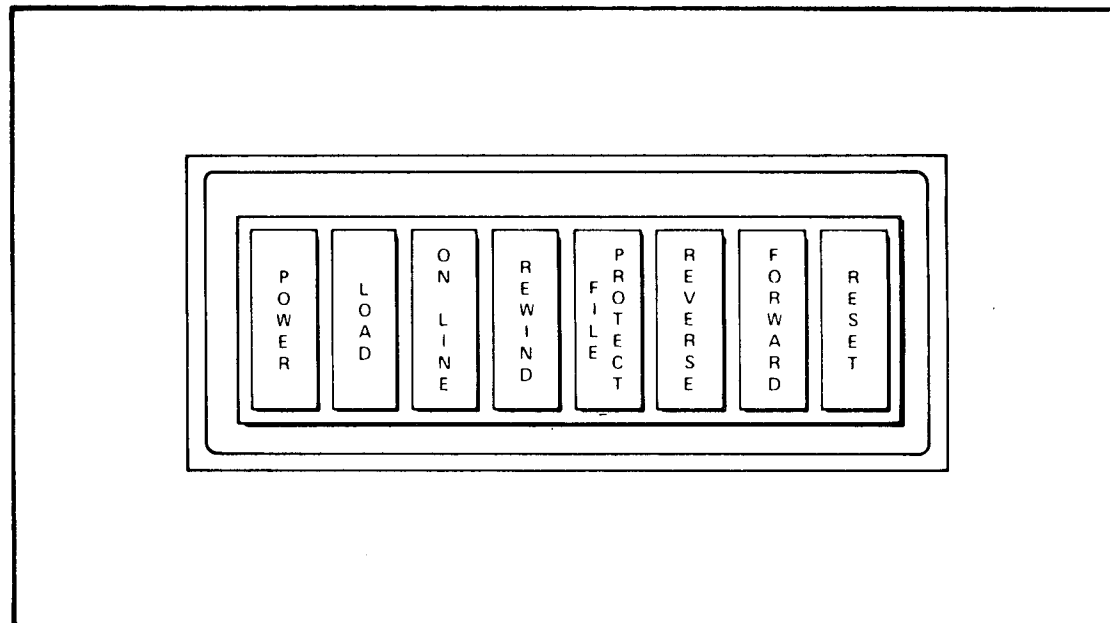
MAGNETIC TAPE DRIVE (Reel-To-Reel)

Figure 1. Control Panel

Switches and Indicators

Power - This is a combination alternate action switch/indicator which controls power to the unit. The indicator lights when power is on.

Load - After threading the tape, press this combination pushbutton switch/indicator to complete the tape loading operation. Tape is automatically advanced to the load point, or beginning-of-tape marker, and then the tape system goes on-line. LOAD and ON-LINE indicators will light when the action is completed. The LOAD light will go out when the tape is either advanced from the load point or rewound; however, it will light any time that the tape is positioned at the load point.

On-Line - This is a combination pushbutton switch/indicator. It lights when the system is under control of the computer. If the system is off-line and if control is to be turned over to the computer, press the ON-LINE pushbutton.

Rewind - Pressing this pushbutton switch will result in rewind of the tape with high-speed reverse operation. The operator can stop this reverse motion by pressing the RESET pushbutton. If RESET is not pressed, the tape will go beyond the beginning-of-tape marker, stop, and then automatically return to the load point. If the REWIND pushbutton is again pressed, the tape will be drawn out of the tape path and the unload sequence will be completed. If the tape system is under computer control, the REWIND pushbutton will not function. This safety feature prevents accidental tape damage.

File Protect - This indicator lights when a write enable ring is not installed on the supply reel. When a supply reel is loaded with the write enable ring in place in the slot at the back of the reel, the FILE PRO-

Switches and Indicators (continued)

TECT light will be off. This indicates that data can be written on the tape. Without the ring, protective circuits in the tape system prevent data from being written, which would in turn erase data previously written on the tape.

Reverse - If the ON-LINE indicator is on, pressing the REVERSE pushbutton will not affect the operation of the unit. If the tape unit is off-line, pressing this switch will cause the indicator to light and move the tape in reverse at the normal tape speed. To stop the tape unit when it is running in this mode, press the RESET pushbutton.

Forward - This combination pushbutton switch/indicator will function only when the unit is off-line. If the ON-LINE indicator is on, pressing the FORWARD pushbutton will have no effect. If the ON-LINE indicator is off and the FORWARD pushbutton is pressed, the indicator will light and the tape unit will move tape in the forward direction at the normal tape speed. To stop the tape unit when it is running in this mode, press the RESET pushbutton.

Reset - All tape motion, regardless of the command that established it, will stop when the RESET pushbutton is pressed. Pressing RESET also removes the tape unit from on-line operation with the computer and turns off the ON-LINE indicator.

TAPE MOVEMENT CONTROL

When the system is operating, the speed and direction of the tape are determined by the capstan. The capstan pulls the tape past the head assembly so that it may be either written or read. For the tape system to operate efficiently, the tape must be started and brought up to speed as quickly as possible. The weight of the tape on the reels prevents the reels from starting as rapidly as the capstan, so a small length of tape is held by buffer arms near the supply and takeup reels. When the capstan starts quickly, the buffer arms are either pulled in or released by the tape motion. Changes in the position of these arms result in the supply and takeup reels either feeding tape to the capstan or taking up the slack created by the capstan motion.

END OF TAPE DETECTION

Reflective markers at either end of the tape prevent it from being pulled completely from either the supply or takeup reels, except when the operator wants to change the reel. A sensing post near the read/write head assembly illuminates the tape and issues a stop signal when the marker is detected. Markers for the beginning and end of the tape are on opposite sides, providing to the computer or data system an indication of which end of the tape has been reached.

TAPE LOADING

Operation of the tape system requires only a few simple procedures. These include tape loading and unloading, manual rewind, and power failure recovery.

Tape loading is made particularly easy by the toggle action hold-down knob for the supply reel. Positive indication is provided by the knob for installation of the reel and for the locked condition.

Reel Installation

To prepare the knob for installation of the reel, depress the toggle at the end marked PRESS. It will remain in that position. Place the tape reel on the knob with the write enable ring or the slot provided for it, toward the tape unit. This will automatically position the end of the tape on the reel for proper threading. After pressing the reel firmly against the knob, using the fingertips against the reel hub only, press the extended end of the toggle until it is flush with the face of the hold-down knob. The snap action of the knob will be distinctly felt, indicating that the knob is firmly locked.

CAUTION

Care should be taken to avoid pressing the reel flanges against the tape pack when loading the tape or locking the knob. Pressure of the flange against the tape edges causes two types of damage: (1) oxide is dislodged from the film, causing potential read errors; and (2) deformity of the edge of the tape results in misalignment of the tape as it passes the head, with an increased possibility of errors.

Tape Threading

The following procedure is used to thread the tape (Figure 2):
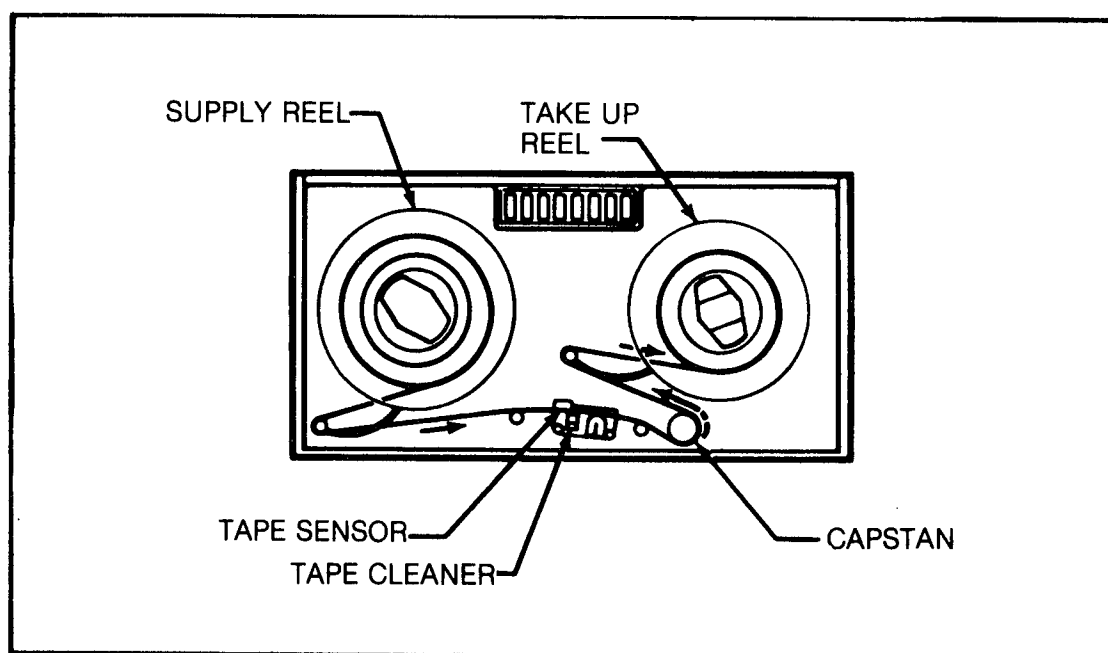

Figure 2. Tape Threading

- Lead the end of the tape over and around the left side of the buffer arm guide.

- Continue across the head assembly from left to right by passing over the fixed guide, tape cleaner, head, and second fixed guide to the capstan.

- At the capstan end of the head assembly, lead the tape below and around the right side of the capstan.

- Pass the tape around the left side and over the top of the other buffer guide.

- Lead the tape below and around the right side of the fixed takeup reel.

- Press the tape end against the top of the hub.

- Holding the tape against the hub, turn the reel until the end of the tape is overlapped and secured by the next tape layer.

- To complete the loading operation, firmly press the LOAD pushbutton. Both buffer arms will move to their normal operating positions and the capstan will pull the tape forward until the beginning-of-tape marker reaches the photosensitive assembly. Control of the tape system will then be turned over to the data system automatically, and the ON-LINE and LOAD indicators will light. No operator action is needed to put the tape system on-line.

- If the on-line mode is not desired, the tape unit may be taken off-line for control from the operator's control panel by pressing the RESET pushbutton.

TAPE CLEANER

To provide the greatest assurance that data on the tape will be read correctly, the tape is cleaned just before it gets to the head assembly. The tape cleaner has small holes into which loose dirt or oxide is deposited as the tape is drawn across the cleaner. For optimum system operation, the dirt must be removed from the cleaner periodically.

REWINDING

At the conclusion of a tape system operation with the computer, or at other times when it is necessary, the tape will be rewound onto the supply reel. Normally, the computer will issue a rewind command without operator participation. Other conditions will sometimes require the operator to rewind the tape by pressing the REWIND pushbutton on the operator control panel. This will result in high-speed reverse operation. When the beginning-of-tape marker reaches the photosensitive unit, the rewind will be ended, and the tape unit will advance until the reflective marker is at the photosensitive head.

TAPE UNLOADING

To unload the tape, press the REWIND pushbutton. The tape will be pulled through the tape path and returned to the supply reel. The tape reel may then be removed from the tape unit by pressing the toggle to the unlock position. Again, care should be taken to avoid damage from pressing the reel flanges against the sides of the tape.

In the event of power failure while the system is on-line, the buffer arms will be relaxed, preventing any possible tape damage. When power has been restored, tape system operations may be resumed by pressing the LOAD pushbutton. When the buffer arms have returned to their operating position, press the RESET pushbutton.

MAGNETIC TAPE DRIVE (Reel-To-Reel)

ROUTINE MAINTENANCE

Proper and regular maintenance of the tape unit will assure operation at the high levels of data and mechanical reliability that have been designed into the system. Particularly important are the operator maintenance functions that are intended to keep the system free of dirt and contaminants. At the high densities of data on tapes written or read, extremely small particles of dust or oxide from the tape are capable of causing data errors. Careful attention to the cleaning procedures described below will assure the greatest possibility of trouble-free operation.

Transport and head cleaning should be performed *after every eight hours* of system use in the following manner:

- Remove tape from the tape unit.

- If the installation makes head cleaning more convenient with the head cover off, it may be removed by pulling it gently away from the unit.

- Moisten a soft, lint-free cloth or cotton swab with head cleaning solution. *Do not get the cleaner on your skin.* Many solvents are irritating to the skin, or they may have a toxic effect. After the head surfaces, including the surface of the tape cleaner, have been carefully swabbed, they should be dried with a dry, clean, lint-free cloth.

- Clean the head guides and head guide blocks with head cleaner. The guide blocks are immediately in back of the guides. Dry all parts with a clean, lint-free cloth.

- Replace head cover by aligning the holes in the cover with the mounting pins on the transport and press firmly into place.

Capstan cleaning should be performed *after every eight hours* of use:

- Moisten a cloth with head cleaning solution, again being careful not to get it on the skin.

- Rotate the capstan slowly with one hand, without touching the rubber surface. At the same time, clean the surface of the capstan with the moistened cloth.

- Make a visual inspection of the capstan surface for abrasion or polish. If defects are observed, contact your service representative.

Additional cleaning should be performed at longer intervals: *Every four months* the entire surface of the tape should be cleaned with solvent, making sure that accumulations of dust around the hold-down knobs and in the head area are removed. Head covers should be removed and cleaned on the inside and outside, making sure that all deposits of dust and other possible tape contaminants are removed.

Any periodic maintenance functions beyond those described here should be performed by a service representative.

GENERAL CLEANING

Keep the immediate area clear of stacked papers, books, and other items that might interfere with free air circulation.

Wipe up or brush off dust, lint, smudges, etc., whenever they become noticeable, being careful not to wipe or brush them into exposed internal areas of the unit. Use a soft, clean dust cloth, being careful not to scratch plexiglas surfaces by hard rubbing.

For stubborn accumulations, dampen the cloth slightly, but only with plain water or a cleaning liquid suitable (safe) for use on plastic and painted surfaces, such as one of the commercially available antistatic cleaning fluids. The cloth should not be wet, just damp, so that it will pick up dust or dirt readily.

The occasional light cleaning described above will not always prevent the gradual accumulation of a varnishlike dirt and a more thorough cleaning will usually be necessary about once a month. Wipe all surfaces with the antistatic cleaning fluid and use a succession of soft cloths. As each cloth becomes dirty, discard it and continue with a clean one. Use enough fluid to moisten each cloth thoroughly so that very little wiping pressure will be needed, but not enough to allow dripping under the wiping pressure. After cleaning each surface, wipe off the fluid and dissolved dirt with a dry cloth.

Pay particular attention to plexiglas surfaces, where any residual dirt film will easily be visible.
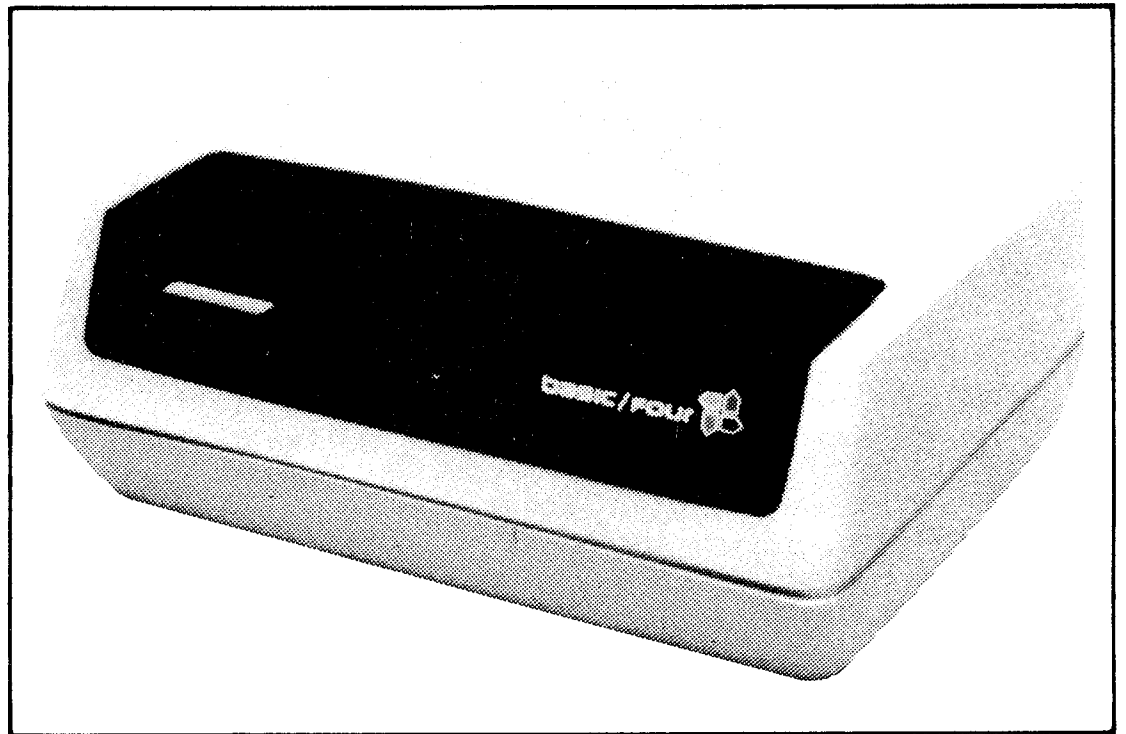
GENERAL DESCRIPTION

The magnetic tape cartridge drive provides an economical means of storing medium volumes of data. This unit can be used for back-up of applications programs and data.

Data is written so that it may also be read by other Basic Four computer systems with compatible tape cartridge drives. One track of data is written on the tape at a density of 6,400 bits-per-inch. During normal operation of the tape cartridge unit with the system, tape motion and reading or writing of the data are controlled by the CPU. When the tape system is OFF-LINE, tape motion cannot be controlled by the operator.

SPECIFICATIONS

Data Density and Recording Mode:	9.2 megabyte capacity, 4-track— 6,400 bpi
Length:	300 ft.
Tape Velocity:	30 inches per second
Data Transfer Rate:	24K bytes per second
Rewind Velocity:	90 inches per second (nominal)
Compatibility:	ASCII
Tape:	Computer grade, 0.25 inch wide
Cartridge Size:	4 in. x 6 in. x 5/8 in.

MAGNETIC TAPE CARTRIDGE

The magnetic tape cartridge comes with computer grade magnetic tape that provides performance characteristics normally associated with half-inch reel-to-reel tape. It is compatible with ANSI, ECMA, and ISO standards.

The cartridge assembly consists of a high-impact plastic cover mated to a precision machined metal baseplate that provides effective protection for the cartridge drive elements. The precision drive system employs a seamless, elastomeric drive belt to assure constant tape tension throughout start, stop, and run modes.

Protection against contaminants is provided by a plastic door that closes over the tape head opening when the tape cartridge is removed from the transport. To further protect the magnetic tape cartridge against dust, a plastic dust-proof container is provided. This can be inserted into the special cardboard container that comes with the cartridge.

The cartridge is equipped with a special read-only key to prevent accidental writing to tape cartridges. When the arrow points to safe, it is in a protected or read-only mode. A screwdriver may be used to turn the lock to the appropriate position.

END-OF-TAPE DETECTION

Two positioned holes at either end of the tape prevent it from being pulled completely from either the supply or take-up hubs. A sensing post near the read/write assembly illuminates the tape and issues a stop signal when the holes are detected.

Properly positioned holes are provided in the tape for optical sensing of Beginning of Tape (BOT), Load Point, Early Warning, and End of Tape (EOT).

TAPE LOADING

To properly load the tape drive, proceed as follows:

• Turn tape cartridge drive on by tripping power switch located at rear of unit. The indicator lights and fan will come on simultaneously.

• Position tape cartridge at entry opening and slide forward until firm stopping point is felt.

• Press firmly into position.

REWINDING

At the conclusion of a tape system operation, the computer will issue a rewind command without operator participation, resulting in high-speed reverse operation. When the Beginning of Tape marker reaches the optical sensor, the rewind will end and the tape will advance until the marker holes are sensed by the photosensitive head.

TAPE UNLOADING

Before unloading the tape, wait until the rewind procedure is complete. To remove the tape cartridge, the release lever is actuated and the cartridge is automatically ejected.

MAINTENANCE

Proper and regular maintenance of the tape cartridge unit will assure optimum performance and mechanical reliability that have been designed into the system. The system must be kept free of dirt and contaminants; extremely small particles of dust or oxide from the tape are capable of causing data errors. Careful attention to the cleaning procedures described in the following paragraphs will assure trouble-free operation.

Magnetic Head - Head cleaning should be performed after every 8 hours of operation. Dirty heads may cause data dropout.

• Remove tape cartridge from tape unit.

• Remove head cover by pulling it steadily and gently directly away from unit.

• Moisten a soft, lint-free cloth or cotton swab with a non-residue, non-corrosive head cleaning solution, being careful not to get liquid on your skin. (Many solvents are irritating to the skin and may have a toxic effect.) Clean all head surfaces, tape cleaner face, headguides, headguide blocks, and roller guides. Dry all parts with a clean, lint-free cloth.

CAUTION

Spray-type head cleaners are not recommended because of the possibility of contaminating the drive motor lubricant.

Tape Cleaner - Foreign material that accumulates in and around the tape cleaner must be removed after every 40 hours of operation to ensure continuous effective tape cleaning.

• Insert folded sheet of paper in bottom of cleaning slot of cleaner. Slide paper upward to dislodge foreign substance.

CAUTION

Do not use metal objects to clean tape cleaner. Scratching of surface may occur which, in turn, could damage the oxide coating of tape.

• Use a soft bristle brush and vacuum cleaner to remove foreign material from around tape cleaner and head assembly.

Motor Capstan - The drive capstan is made of hard polyurethane and must be cleaned when foreign substances build up.

• Rotate capstan slowly and clean with a cotton swab moistened with 91% isopropyl alcohol. Dry with clean, lint-free cloth.

- Visually inspect capstan surface for abrasions or polish. If defects are observed, contact Service Representative.

- Replace head cover by aligning holes in cover with mounting pins on transport and press firmly into place.

The entire surface of the tape unit should be cleaned with solvent every four months, making sure that accumulations of dust around the hold-down knobs and in the head areas are removed. Head cover should be removed and cleaned on the inside and outside, making sure that all deposits of dust and other possible tape contaminants are removed.

Any periodic maintenance functions beyond those described here should be performed by a Service Representative.

GENERAL CLEANING

Keep the immediate area clear of stacked papers, books, and other items that might interfere with free air circulation.

Remove dust, lint, smudges, etc., whenever observed being careful not to wipe or brush them into exposed internal areas of the device. For wiping use a soft, clean dust cloth, being careful not to scratch plexiglas surfaces by hard rubbing.

For stubborn accumulations, dampen the cloth slightly with plain water or a cleaning fluid safe for use on plastic and painted surfaces, such as one of the commercially available antistatic cleaning fluids.

The occasional light cleaning described will not always prevent the gradual accumulation of varnish-like dirt and a more thorough cleaning will usually be necessary about once a month. Wipe all surfaces with the antistatic cleaning fluid. As each cloth becomes dirty, discard it and continue with a clean one. After cleaning each surface, wipe off the fluid and dissolved dirt with a dry cloth.