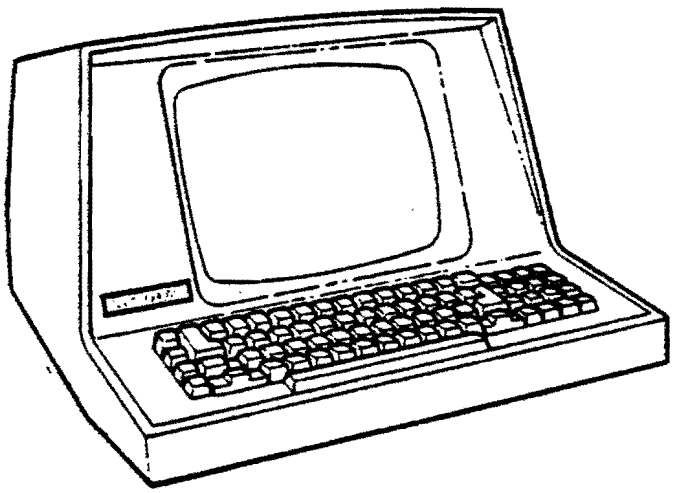
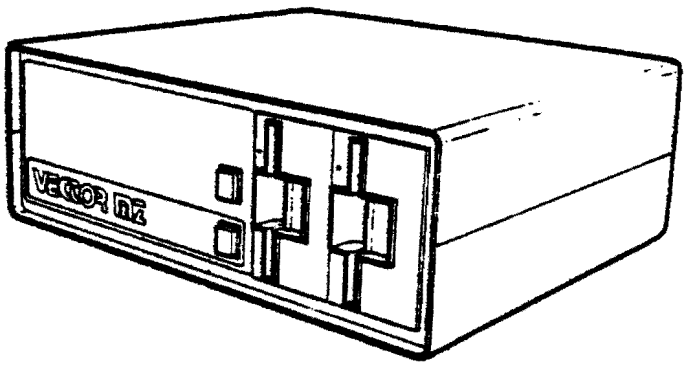
SYSTEM

OVERVIEW MANUAL





VECTOR
VECTOR GRAPHIC, INC

VECTOR SYSTEM B

AND

VECTOR SYSTEM B+S3

INSTALLATION, USE, AND MAINTENANCE

PRELIMINARY MANUAL

Revision A

January 17, 1980

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Since it is a preliminary release, there will be enhancements to this manual in the near future. In particular, the area of system maintenance, not covered herein, will be added.

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3. The System B or its variations is promptly returned to VECTOR GRAPHIC, INC., at customer's expense, for examination by VECTOR GRAPHIC, INC., to confirm the alleged defect, and for subsequent repair or replacement if found to be in order.

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FOREWORD

Audience This manual is intended for dealers, distributors, salespersons, consultants, and service personel. It requires a minimum of technical knowledge.

Scope It describes what the Vector Graphic System B and its variations do, what major components these systems consist of, how to install, how to use (generally), and how to maintain (generally) the systems.

Organization For many dealers and users, no other hardware manuals will be necessary, though technicians will make use of the more technical publications. Users will reference specific software manuals, depending on the particular application.

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I. PERSPECTIVE

1.1 Introduction

A System B is a general purpose microprocessor based computer. It is delivered by Vector Graphic completely assembled and fully tested, including both hardware and operating system software, and including two quad density mini-floppy disk drives.

1.2 Standard hardware and software

1) Video console with a keyboard featuring the feel of an excellent electronic typewriter and a 10-key number pad;

2) Two quad-density Micropolis 5 1/4-inch diskette drives, providing a total of 630,000 characters of on-line storage (1232 256-character sectors per diskette);

3) 56K of available random-access memory;

4) Capability of interfacing to one printer at a time, either one of Vector's system printers, or one of the many standard printers on the market;

5) Communications capability to interfacing to a standard asynchronous modem or acoustic coupler; standard software with the system enables 30 characters/second (i.e. 300-baud) emulation of a "dumb" serial terminal;

6) Industry-compatible CP/M 2 operating system, allowing use of most CP/M compatible software on the system; and the MDOS operating system, which can be used instead;

7) Microsoft BASIC-80, release 5, one of the fastest and most powerful general purpose languages available (used in conjuction with CP/M); and Micropolis BASIC, used in conjunction with MDOS;

8) Peachtree ready-to-use general business accounting software, including programs for Accounts Receivable, Accounts Payable, General Ledger, Payroll, and Inventory Management.

9) Additional powerful software development tools including SCOPE - an advanced screen-oriented program editor; RAID - a full-screen simulator-debugger for assembly language programs; the ZSM assembler using the 8080-superset mnemonics; and the Extended Systems Monitor on PROM, allowing direct manipulation of memory and input/output.

10) Computer electronics consisting of:

a) Chassis with heavy duty power supply and 18-slot fully shielded and terminated S-100 motherboard;

b) High-speed (4 MHz) Z-80 CPU board;

c) Bitstreamer II input/output board, featuring 3 serial I/O channels, 2 parallel I/O channels;

d) 64K Dynamic RAM board;
e) 12K PROM/RAM board, which includes 12K of PROM sockets and 1K of scratch-pad RAM;

f) Flashwriter II Video board featuring a replacable character set;

g) Floppy disk drive controller board;

1.3 Optional hardware and software

1) The system can support two additional diskette drives, by adding the MicroStor module;

2) The system can support up to four additional consoles (5 total), each operating simultaneously and carrying on almost any task (for example, word processing concurrently with accounting, on different consoles);

3) Vector Graphic offers two system printers, the Sprint 3 letter-quality daisywheel printer, and the MP dot matrix printer which prints 150 characters per second. When integrated at the factory with a System B, the system is called respectively a System B+S3 or a System B+MP.

4) Memorite word processing software from Vector Graphic.

5) Sophisticated graphics capabilities, including Vector's High-resolution Graphics Display Board, Vector's Video Digitizer Board if desired, a graphics monitor, a TV camera (not available from Vector Graphic) to go with the Digitizer, and associated software.

1.4 Micropolis floppy diskette subsystem specifications

PERFORMANCE

Capacity per drive: 315K bytes, formated
Transfer rate: 250K bits/second
Average rotational latency time: 100 milliseconds
Access time - track-to-track : 30 milliseconds
Settling time: 10 milliseconds
Head load time: 75 milliseconds
Head positioner: stepper motor with lead-screw drive
Drive motor start time: 1 second
Rotational speed: 300 RPM
Recording density 5248 bits per inch (BPI)
Recording mode: MFM
Track density: 100 tracks per inch (TPI)
Surfaces used per diskette: 1

RELIABILITY

MTBF	8000 hrs.
MTTR	0.5 hrs.
Media life	3 X 10 EXP 6 passes on single track
Head life	10 EXP 4 hrs.
Soft error rate	1 in 10 EXP 9
Hard error rate	1 in 10 EXP 12
Seek error rate	1 in 10 EXP 6

1.5 Pre-installation check-list

The System B or System B+S3 can be ordered for either 110 or 220 volt power sources. Make sure that the system to be installed has the proper power supply for the power supply in your region.

It is recommended but not required that the power line to which the computer is connected be a "dedicated" power line; that is, the line comes directly from the building's power source, no other devices except another System B making use of it, and that it is well grounded. The intent in this recommendation is to eliminate electronic "noise" on the power line which can affect the reliability of the system, and to avoid the loss of data if a circuit breaker is tripped because another device short circuits or too many devices are connected. It is particularly critical that heavy machinery not be connected to the same power line.

Do not install more than two System B's per 20A circuit.

Extension cords are not recommended.

Special air-conditioning and raised floors are not required for a System B. It will function in any normal office environment.

Do not install a System B in an abnormally dusty or dirty environments, due to the effect on the disk drives and diskettes.

Make sure that there is adequate area for all equipment, and that there is adequate desk space next to the console. The printer MUST NOT be placed on top of the computer mainframe. The console should be low enough for comfortable typing. There must be some space on the left side and in back of the computer mainframe, for ventilation.

Make sure that the console is not directly opposite a bright open window, which will create glare on the surface of the screen.

If the carpet in the computer's area is a shag or thick carpet, especially if there is a lot of foot traffic near the computer or if the operator's chair has rolling casters, there may be a build up of static in the operator and passing people that can discharge into the system and cause the system to malfunction or crash. If you anticipate or experience this problem, spray the carpet in the machine's vicinity once a month, or more often as needed, with anti-static spray, available in many electronic supply and carpet distributors. If the system is still affected by static, we recommend purchase of a 3M anti-static mat to be placed on the floor in the computer's area.

II. INSTALLATION AND CHECKOUT

2.1 Installation of a System B

1. Inspect all cartons for external signs of damage. If any damage is observed, have the delivery agent note the damage on the shipping document. Some shippers may wish to be present when the container is opened if external damage is apparent.

2. Open all cartons, remove the packing material, and then withdraw the equipment and manuals. If present, remove plastic bags from the equipment.

3. Place the computer chassis in a horizontal position and the "Mindless Terminal" console as near as possible. Be very careful not to bump or jar the computer, because this can throw the disk drives out of alignment.

4. Remove the cover of the computer mainframe by unscrewing the four Phillips head screws, two on each side. Note that one of the four screws may be shorter than the others, and take note of which hole it came from. Carry out a quick internal inspection, checking for obvious shipping damage and loose boards due to shipping vibration. Press each board down firmly, making sure it is fully inserted in its slot. If you find any obviously broken boards or parts, do not use the equipment in order to avoid further damage, or unexplained malfunction at the user's site at a later date. Report the damage to the carrier, and contact qualified service personel, or Vector Graphic.

   Return the cover to the computer. Make sure that the slotted edge is on the same side as the slotted side of the bottom chassis. Do not replace the screws yet.

5. Using the black power cable which comes with the system, connect the computer to power. Connect the female end of the cable to the special 3-prong connector at the rear of the computer chassis.

6. Connect the console (the "Mindless Terminal") to the computer chassis using the 25-line flat ribbon cable found in the console's carton. The male end of the cable plugs into the socket at the rear of the computer chassis labeled "Mindless Terminal." The female end plugs into the back of the console. These plugs can only go in one way, so that there is no possibility of error.

7. Turn the power key in the front of the computer chassis. The RESET light should go on and the fan at the back of the computer should begin turning. If the RESET light comes on but the fan does not, DO NOT operate the computer, but contact service personel. Also contact service if the RESET light does not go on but the fan does. If neither one goes on, check the power connection and the fuse at the rear of the computer chassis. However, if both go on, then after warming up a short time, the console screen should light up showing a banner identifying the "Vector Graphic Monitor." The "Monitor", short for Extended Systems Monitor, is the piece of software built into the system and which waits for commands from the operator as soon as the system is turned on.

8. If the RESET light goes on, but the screen does not light up, check the connection to the console. If the "Vector Graphic Monitor" banner does not show up, and something else shows up instead, turn the system off then on. Try it several times if necessary, before contacting qualified service personel.

9. When the Monitor banner shows up, depress N on the keyboard, following the MON> prompt on the screen. N causes a memory test to occur. The acceptable response is "E000 FF C3", which should appear on the next line down within a few seconds. Following this, another MON> prompt should appear on the next line.

10. Following the MON> prompt, depress Y. This puts the system into an "echo" mode, in which each key causes its character to appear or causes the cursor to move, but has no other function. Depress every key on the keyboard except the ESC key, making sure that each one functions and that no keys stick. When you have completed this test, then depress the ESC key, which will take the system out of echo mode and put another MON> prompt on the screen.

11. Unwrap the CP/M system disk which comes with the system and insert it in the right-hand drive (drive A in the CP/M nomenclature). Insert it with the labeled side to the left and with the edge closest to the oval exposed region going in first. Push it in until it clicks in place. Mount the disk by pressing the door slowly to the right, pausing briefly at the mid-point, when the spring-pressure increases. Full instructions for use of the disk drives and handling floppy diskettes are found in the CP/M 2 System Diskette Introductory Manual enclosed with the system.

12. Boot up the CP/M operating system by depressing B on the keyboard, following the MON> prompt. The red light on the right-hand drive should light up, an audible click should be heard from the disk drive, and then a message announcing the CP/M operating system should appear on the screen.

    If this does not occur within 5 seconds of pressing B, depress RESET on the computer chassis, then dismount the disk. (To dismount a disk, press the door latch further to the right until it springs open.) Remove it from the drive and make sure that (a) it is the serialized CP/M 2 disk that came with the system, (not from a different system), and (b) that it is oriented correctly as described above. Then remount it carefully. Depress the RESET key on the computer chassis and try the B command again.

    If still no CP/M message appears, repeat the process of RESETING, dismounting, checking the disk, remounting and rebooting once again. Then, if there is no CP/M message, try the same process but use a CP/M 2 disk from a different system, or if you have none, then try using the MDOS diskette that came with the new system. If none of these diskettes will boot up, the chances are that there is something wrong with the disk subsystem that requires the help of service personel. If MDOS boots up but CP/M 2 does not, then obtain a replacement CP/M 2 diskette having the same release number (not necessarily the same serial number).

13. When CP/M boots up, you should see an A> prompt on the screen following the sign on message. Type DIR (return) following the prompt. (return) means press the RETURN key. You do NOT have to use capital letters when typing a CP/M command. You should immediately see a directory of the files on the diskette, consisting of at least 5 lines of names. Make sure there is a file named BACKUP. This will be used next.

14. You are now going to copy the CP/M serialized diskette. This has the double function that it tests the disk drives for compatibility and it gives you a working copy of CP/M - the copy which will become the Personalized CP/M 2 System Diskette. Insert and mount a completely unused diskette (or one whose contents are not needed) in the left-hand drive (drive B in the CP/M nomenclature). Make sure it is a Dysan, Scotch, or Maxell brand 16-sector diskette. These are the only types of diskettes you should use with the Vector Graphic system at this time, due to the high density of storage employed; other brands have been found unreliable in this system. At this time, Scotch seems to be the most reliable of the brands.

    Then type BACKUP (return) following the A> prompt. In response to the question "Source drive", press A. In response to the question "Destination drive", press B. In response to the command "Press RETURN to begin", press the RETURN key. The backup process will take approximately 3 minutes at this point.

15. At the end of the process, or earlier if an error occurs, you will see a message on the screen following the last line. This message tells you whether or not the copying process succeeded. Always look for it. If successful, you will see "Copy complete".

    If unsuccessful, you will see either "Bad source diskette" or "Bad destination diskette". If unsuccessful, you should unload completely, and remount the diskettes, then go to step 15 and try the process again with the same diskettes. If it does not succeed a second time and you get "Bad destination diskette", try again using a different diskette in drive B, because it is probably a defective diskette. If possible, try a different brand of diskettes, from one of the three brands mentioned above. Each time you try it, unload and remount both diskettes. After you get a successful backup, repeat the process again with the same diskettes. If you cannot consistently get a successful backup, then contact service personnel to adjust the drives.

16. In response to the statement "(R) to return to system (B) execute backup again", type an R to return to the CP/M executive (called "CCP"), or type B if you want to repeat the backup process.

17. Once you have backed up your serialized CP/M diskette, the System B (without its printer) is probably functioning satisfactorily. At this time, you may follow the procedure in Section 3.6 of the CP/M 2 Introductory Manual, which configures the Personalized CP/M 2 System Diskette so that it makes full use of the 56K of memory in the system (rather than using only 48K). You can skip this procedure if CP/M will not be used by this particular user.

18. After configuring the Personalized diskette for use in a 56K system, remove the serialized diskette, return it to its envelope and store it in a safe place. Unless the Personalized diskette and all its copies are damaged, you should never use the serialized diskette again. Unload the Personalized CP/M 2 System Diskette, and label it as such, including the release number and the serial number of the serialized diskette.

19. At this time, if you are using a printer, you should connect the printer to the computer. If your system is a System B+S3 from Vector Graphic, go NOW to Section 2.2 and continue there.

    If it is a serial printer emulating the Diablo protocol (such as Diablo 1610 or 1620, NEC Spinwriter, DataProduct serial daisywheel printer, or Qume Sprint 5) or emulating the standard serial (sometime called Teletype) protocol (such as a Decwriter or TI 810), and it runs at 1200 baud or less, simply connect it using a 25-line flat ribbon cable to the female socket labeled RS-232C on the rear of the computer chassis. Some printers may require a cable with male connectors at both ends. The allowable length of cable has not yet been determined, but it is several hundred feet at least.

If it is a Sprint 3 printer from Vector Graphic, but not part of a System B+S3 from the factory, connect the printer as described in the instructions that come with the printer.

If it is one of the above kinds of printers, remove the cover of the computer and check that the baud rate setting of Serial Channel C of the Bitstreamer II board matches the speed of the printer. Find the Serial Channel C switch near the upper left hand corner of the board, press the desired rocker down and away from the OPEN designation, and press all other rockers in the opposite direction. A Sprint 3 always operates at 1200 baud. The system does NOT have to be turned off during this procedure.

If it is a Centronic's parallel printer, contact Vector Graphic for instructions on interfacing.

If it is a TI 810 printer and you want to operate it at 1200 baud, determine if it will be used to print word-processing text, long program listings, or any kind of output which is dumped directly and continuously from memory, with no breaks for disk access or calculation. If so, an additional hardware modification to the system is required. This modification is not necessary if the printer is used for normal data-processing output. The modification is as follows: Remove the Bitstreamer II board from the computer. Find pin 11 of the RS-232C connector on the backplane of the computer chassis. Solder one end of a wire to this pin (on the inside of the computer) and the other end to pin 1 of chip U26 on the Bitstreamer II board. Then solder one end of a short jumper wire to pin 3 of U26 and the other end to pad 1 of jumper area N. Jumper area N is near the bottom right side of the board. Finally, look at the back side of the board and find the trace which leads downward from pad 1 of jumper area N. This trace narrows down just below the pad. Using a sharp knife, cut this trace through the narrow part, scraping the trace on each side of the cut so that the connection is thoroughly cut. Then, return the board to the system. Having made this modification, you can communicate to the printer at 9600 baud, which will speed up throughput by about 25%. Set both Serial Channel C and the printer to 9600 baud.

If you are using a kind of printer not mentioned above, refer to both the printer's manual and the Bitstreamer II manual for the information you will need to connect it, but Vector Graphic does not take responsibility for supporting this interface or its consequences.

You may now return the cover of the computer, again making sure the slotted edge is on the same side as the slotted side of the chassis. Unless you plan further hardware modifications (such as required by the Memorite word processing software), you may screw the cover down.

Refer to the printer's manual for how to load ribbon, paper, printwheel, how to connect it to power, and how to turn it on. (Instructions for connecting and turning on the Sprint 3 in a System B+S3 are found in Section 2.2 below.)

20. After connecting and turning on the printer, you have to configure the Personalized CP/M 2 System Diskette to work with this system. First, mount the Personalized CP/M 2 System Diskette in drive A (right-hand drive). If you just turned the system on after connecting the printer, boot up CP/M from this diskette by depressing B. If, however, the system has been on all along, then just depress control-C after the A> prompt. This is the so-called "warm boot", which tells the system a new CP/M diskette is in drive A.

    Then, following the A> prompt, type CONFIG (return). Answer the first question by choosing the appropriate printer option. (IMPORTANT: If you are using the Sprint 3, select the System Printer option.)

    After selecting a printer option, go through the rest of the configuration without selecting any of the special options. The fastest way to do this is to depress the RETURN key after the next two questions, and then to depress Y when you are asked whether to save the configuration on disk. Note: if you wish to understand more of what can be done with CONFIG, read section 3.7 of the CP/M 2 Introductory Manual.

    If you get an error message regarding the disk system, remount the diskette in drive A, and while you are at it, make sure there is no write-protect tab on the diskette. (This tab is a piece of metallized tape over the cutout on the right edge of the diskette, described in Section 2.6 of the CP/2 Introductory Manual.) Then try the CONFIG procedure again.

21. The best way to test the printer is to print several pages of material on it. To do this, first turn the printer on and load continuous fan-fold paper having 11-inch page length. If the printer is wide enough, use standard 14-inch wide fan-fold paper. If you are using a printer having an add-on form-feed tractor (such as the Vector Sprint 3), and if you are not familiar with it, do not try to use the form-feed tractor mechanism (which usually comes in a separate carton) at this time. Simply roll the paper up, as you would with an ordinary typewriter. Make sure that the paper is loaded so that the print-head, when at the left edge of the printer, lines up just to the right of the sprocket holes on the left edge of the paper. Make sure the ribbon and printwheel (if any) are in place, and that the cover is on. If the printer has a character spacing switch on its front, set it for 12 characters per inch. (Sprint 3 has no such switch.) Then, following the A> prompt type PIP LST:=DUMP.PRN (return). The computer will read this sample file from the diskette and then print it out.

    It will use up 5 sheets of paper. Make sure that the printer spaces down to the top of each new sheet. (Note that it should do this, even though you did not specify the Automatic Paging option in the CONFIG routine. This is because the form-feed commands are within the DUMP.PRN text.) Make sure that each line is even along the left margin and that the characters in the line are level and evenly spaced. No lines should print past the right margin, even if the printer is set for 10-characters per inch. Make sure that the characters are printed completely and evenly. (If they are not, it is probably because the printwheel or the ribbon is not loaded properly).

22. If the printer came with an add-on form-feed tractor, you may put it on the printer now.

With the Sprint 3, or Qume Sprint 5 printers, you must remove the top cover of the printer and snap the tractor mechanism over the platen axel, so that its gear meshes with the platen gear. To open the metal fingers which snap over the platen axel, press on the metallic levers on each side of the form feed tractor. In order to use a form-feed tractor, the platen pressure lever on the right side of the Sprint 3 or Sprint 5 printer must be in the forward position so that the paper slides through freely.

23. Once the System B and its printer is tested and working, you have completed the basic installation and check out of a System B or a System B+S3. You may proceed to (1) make the necessary modifications for the Memorite word processing software (also called the Word Management System), (2) install additional terminals, (3) install graphics hardware and software, (4) connect and test a modem or acoustic coupler, or (5) make use of the other software which comes with the system.

To do (1), refer to the instructions that come with the Memorite software. To do (2), refer to the instructions which come with the Time-Share Multi-User System B conversion package. To do (3), refer to the appropriate technical manuals for graphics-related boards and software. To do (4) (connect a modem or acoustic coupler), contact Vector Graphic. For (5), refer to the manuals for that software.

After all interior modifications are complete, you may screw down the computer cover.

2.2 Installing and using the Sprint 3 printer in a System B+S3

This section is only applicable if the internal interface components of the Sprint 3 Subsystem have already been installed within the computer chassis - in other words, it is a "System B+S3".

UNPACKING

1. If not already done, remove the printer from its carton and any plastic bag. The following items should be found in the carton: Sprint 3 printer, special power cable (a thick round cable with a 12-pin molex connector at one end), 4 round metal plugs, a printwheel, and a ribbon.

2. Inspect the printer for scratches, dents, loose or damaged parts, or other signs of damage. Note any evidence of such damage on the invoice, and file a claim with the carrier immediately, if the condition of the units warrants.

3. Using a 7/16-inch (or 11 mm) socket wrench, remove the four screws securing the printer to its shipping pallet.

4. Insert the 4 round metal plugs in the holes vacated by the pallet screws on the bottom of the printer.

5. Remove any paper wrapped around the platten.

6. Remove the top front cover by lifting up under the edge at the front of the printer.

7. IMPORTANT: Using cutting pliers, cut and remove the two plastic ties securing the paper bail during shipping.

8. IMPORTANT: Cut and remove the plastic tie securing the carriage assembly to the printer chassis.

9. Now, load the printwheel and then the ribbon in the printer. Instructions will be found in Chapter 3 of the Sprint 3 Maintenance/Training manual, if you are not familiar with the procedure. Make sure the printwheel is completely flat against the metal plate on the carriage. Make sure the carriage mechanism is returned to the horizontal position and the "C" button is clicked-down. Make sure the ribbon cartridge is fully clicked-in and the ribbon is threaded through both guides.

10. Manually slide the print-head carriage from the left side of the printer all the way to the right, and back again. Make sure it slides smoothly over the complete range. Make sure that there are no obstructions or foreign objects inside the printer. Slide the carriage fully to the left. Now, return the top cover of the printer. Make sure that the line down the center of the print-hammer lines up, or is further to the left of, the Ø mark on the printer cover.

CONNECTING

11. IMPORTANT: If the computer is on, unmount any diskettes in the drives (you do not have to remove them from the drives), and turn the computer off.

12. Find the 50-line flat ribbon cable coming out from inside the back of the computer chassis. Plug the far end of this cable into the socket on the right side of the rear of the printer (when you are facing the rear of the printer). Make sure that the colored edge of the cable is on the left side of the cable when you are facing the rear of the printer. (Normally, this is the only way the connector will go in because of a restraining insert in the connector.) If the connector has screws for fastening to the corresponding screw holes in the printer, tighten them down snuggly.

13. Find the printer power cable which came in the printer carton. Plug the 12-pin molex connector into the middle molex socket on the back panel of the computer. It can only go in one way. Press it firmly as far in as it can go.

14. Insert the other end of this cable into the connector on the left side of the rear of the printer (when you are facing the rear of the printer). It will not go in very far until you start tightening down the screws in the cable connector. However, it cannot be screwed down at all if you try to attach it upside down, so that there is no way to make a mistake. Tighten the two screws on the ends of the connector alternately, until the connector is in as far as it will go.

15. Now, turn the computer power on again. Note that the lights on the front panel of the printer go on. The Sprint 3 printer in a System B+S3 does not have a separate on/off switch. It is on whenever the computer is on. If the printer does not go on, check that the power cable is properly installed. If it does go on, but one or more of the front panel lights does not light up, refer to the troubleshooting tips below.

16. Otherwise, return to step 19 in Section 2.1, and follow the instructions there for testing the printer subsystem. If the printer does not work during testing, you may refer to the troubleshooting points below.

TROUBLESHOOTING

If the Sprint 3 printer does not work:

(1) Make sure that you are commanding it correctly.

(2) Check the POWER light on the printer. If it is off, make sure the power connection to the computer is completed. If necessary, check the System B manual for a description of the cabling.

(3) Check the READY light on the printer. If it is off but power is on, this means either: the cover of the printer is not on tight, there is some kind of jam in the mechanism preventing the printwheel from rotating properly, there is something preventing the carriage from moving back and forth freely, or there is something more seriously wrong with the printer. Check the first three possibilities. If after correcting the problem the printer does not start up by itself, you may have to reinitialize it by rebooting the operating system, or in the case of Memorite software, issuing an RS command. If you cannot get the READY light to go back on, then refer to the accompanying Sprint 3 Printer Maintenance/Training manual or qualified service personnel.

(4) If the other lights are on, Check the RIBBON light on the printer. If it is off, this means that the ribbon is out. Load a fresh ribbon.

(5) If the POWER, READY, and RIBBON lights are on and it still does not print, make sure the connection to the computer is complete. Refer to the System B manual if necessary for a description of the cabling.

(6) If the above checks do not get the printer going, then refer to the accompanying Sprint 3 Printer Maintenance/Training manual or qualified service personnel.

MAINTENANCE OF THE SPRINT 3 PRINTER

The Sprint 3 is a highly reliable device that will work well for long periods without attention. In a normal office environment, the Sprint 3 requires periodic lubrication and simple preventive maintenance every six months for optimal performance and to prevent more serious breakdowns. In very heavy use, this period should be shortened accordingly. Full instructions for this maintenance procedure are given in the Sprint 3 Printer Maintenance/Training manual, included in the system's hardware documenation. General maintenance procedures for the Sprint 3, for use by service personnel, are found in the same manual.