ATR8000

OWNER'S MANUAL

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I. Introduction

Congratulations, you have purchased the most expandable, versatile disk interface available for your ATARI 800/400. The ATR8000 allows you to delve beyond the ATARI microcomputer world into another that offers nearly countless hardware and software options.

Serial or parallel printers can be connected to the ports of the ATR8000. You can choose from medium-speed, economical dot matrix printers to the faster, slightly higher priced, dot addressable dot matrix printers. OR you can get the quality and printing versatility of a more expensive daisy wheel printer.

For program storage, single, double or quad density, single or double-sided, 5 1/4" or 8" disk drives can be connected to the ATR8000. You're not limited to one type or size of drive because you can intermix them!

Single density ATARI DOS and double density OSA+, Version 4, can both be run on the standard ATR8000. OSA+, Version 4, is a double density DOS that runs twice as fast as ATARI DOS and stores twice as much data on a disk. The 64k upgrade includes CP/M configured for the ATR8000, complete with the standard CP/M manual. Software Publishers, Inc. furnishes additional double density software for CP/M purchasers.

CP/M purchasers receive DDINIT.COM: a double density disk initializing program with several double density format options; DDSYSGEN.COM: a sysgen program for reading and writing double density system tracks; CONFIGUR.COM: for selecting the proper printer driver to be incorporated into the double density systems tracks; DDCOPY.COM: a double density copy program; DISKDEF.COM: a utility program for defining CP/M parameters for compatibility purposes; MODEM7.COM: a reconfigured CP/M users' group program that runs the D.C. Hayes Smart Modem on the RS-232 serial port; and DISKMON.COM: a program for primitive disk access.

To connect the ATR8000, the ATARI 800/400, disk drives and any peripherals you have, choose the hardware connection subsection in Section II that best matches your equipment. Thoroughly read the configuring instructions for drives, printers and jumper options before testing the system.

Detailed information on the construction of the cables used with the ATR8000 system is in Section II.1. This subsection has been included so you know exactly how the cables are made and is for helping you if you perfer to make your own cables. Some peripherals, like those connected to the RS-232 Port, require configuring of jumper options on the ATR8000 circuit board. These options are clearly outlined in Section II.5.

Then, when all hardware components are connected and configured, test your system by following the guidelines in Section IV.

Section II also details how to connect a RS-232 terminal to the 64k ATR8000. Section V explains how to connect and test components added to the ATR8000 in the future.

The last section, Section VII, contains warranty information and the software license. Complete the enclosed warranty card and return it to us within 10 days to ensure that your ATR8000 is under warranty.

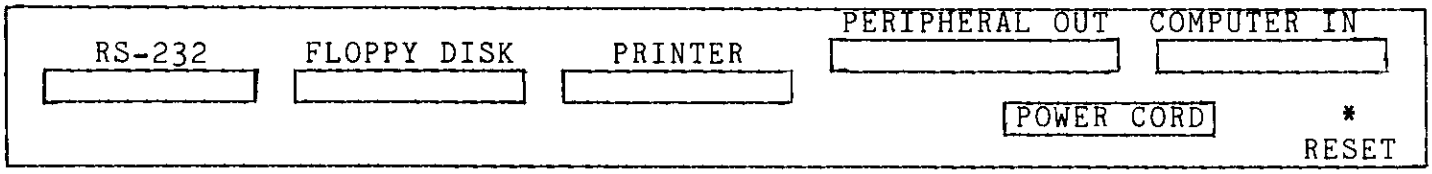
Thoroughly read this manual and carefully follow the instructions contained within to connect the ATR8000 and to start your journey into a broader-based microcomputer world. Because the ATR8000 is immensely versatile, the peripherals that can be connected are nearly countless. This means you need to thoroughly read this manual to obtain a complete knowledge for configuring and connecting your system.

We suggest reading the entire manual before attempting any connections. Then, when you understand all the stipulations involved, this familiarity will make connecting and configuring the system less confusing.

I.1 The ATR8000 System:

ATR8000 - the basic unit. It is a 4MHz Z80 double density processor that comes with 16k RAM. This RAM is upgradable to 64k. The ATR8000 has a COMPUTER IN port for connecting the ATARI 800/400, a PERIPHERAL OUT port for connecting the ATARI Daisy Chain Cable, a parallel PRINTER port, a FLOPPY DISK serial port for connecting disk drives, and a RS-232 port. A cable for connecting the ATR8000 to the ATARI 800/400 is included.

THE BACK OF THE ATR8000



64k UPGRADE - increases the ATR8000 RAM to 64k. CP/M configured for the ATR8000 is included, along with a separate CP/M manual. Software Publishers, Inc. supplies several double density systems programs for CP/M users. These include DDINIT.COM, DDSYSGEN.COM, DDCOPY.COM, CONFIGUR.COM, DISKDEF.COM, MODEM7.COM and DISKMON.COM (all are explained in the Introduction and in Section III). CP/M is available on both 5 1/4" and 8" disks.

OSA+, VERSION 4 - a double density ATARI DOS. This is approximately twice as fast as single density ATARI DOS and stores twice as much data on a disk. A separate manual detailing the use of this DOS is included. This DOS is available on both 5 1/4" and 8" disks.

5 1/4" DISK DRIVES - high-quality drives that have their own power supplies and enclosures.

PRINTER CABLES - we manufacture both serial and parallel printer cables to connect a printer to the ATR8000.

STANDARD DRIVE CABLES - daisy chain drive cables that plug into the FLOPPY DISK port in the back of the ATR8000. Available in both 2-connector and 4-connector styles.

8" ADAPTERS - used to connect an 8" drive to the Standard Drive Cable. These special adapters allow you to connect both 5 1/4" and 8" drives on the same cable, letting you run both drives sizes at the same time.

I.2 Power Requirements

The ATR8000 and all Software Publishers, Inc. peripherals requiring power plug into regular wall sockets (115-120 volts AC). The ATR8000 has a built-in MOV (Metal Oxide Varistor) to supress power surges and keep voltage at a safe level to protect sensitive circuit components.

I.3 Protection from Radio Frequency Interference

I.3.A. Radio Frequency Interference on Nonconnected Radio-TV

The ATR8000 uses and generates radio frequency energy. For this reason it has built-in RFI (Radio Frequency Interference) suppression to filter radio frequency noise. It is possible that the unit could cause interference to radio or television reception while it is operating. If you think the operating ATR8000 is causing interference, turn the unit off and check to see if the supposed interference still exists.

If interference is being caused by the unit, try one or more of the following:

- reorient the receiving antenna on the radio or television having reception difficulties.
- relocate the computer or radio-television.
- if the computer and the radio-television are plugged into the same power circuit, plug the computer into a different power outlet than the radio-television.

If you still have difficulties, you can write to the Federal Communications Commission for their pamphlet, "How to Identify and Resolve Radio-TV Interference Problems." This is available from the United States Government Printing Office, Washington, DC 20402, Stock No. 004-000-0035-4.

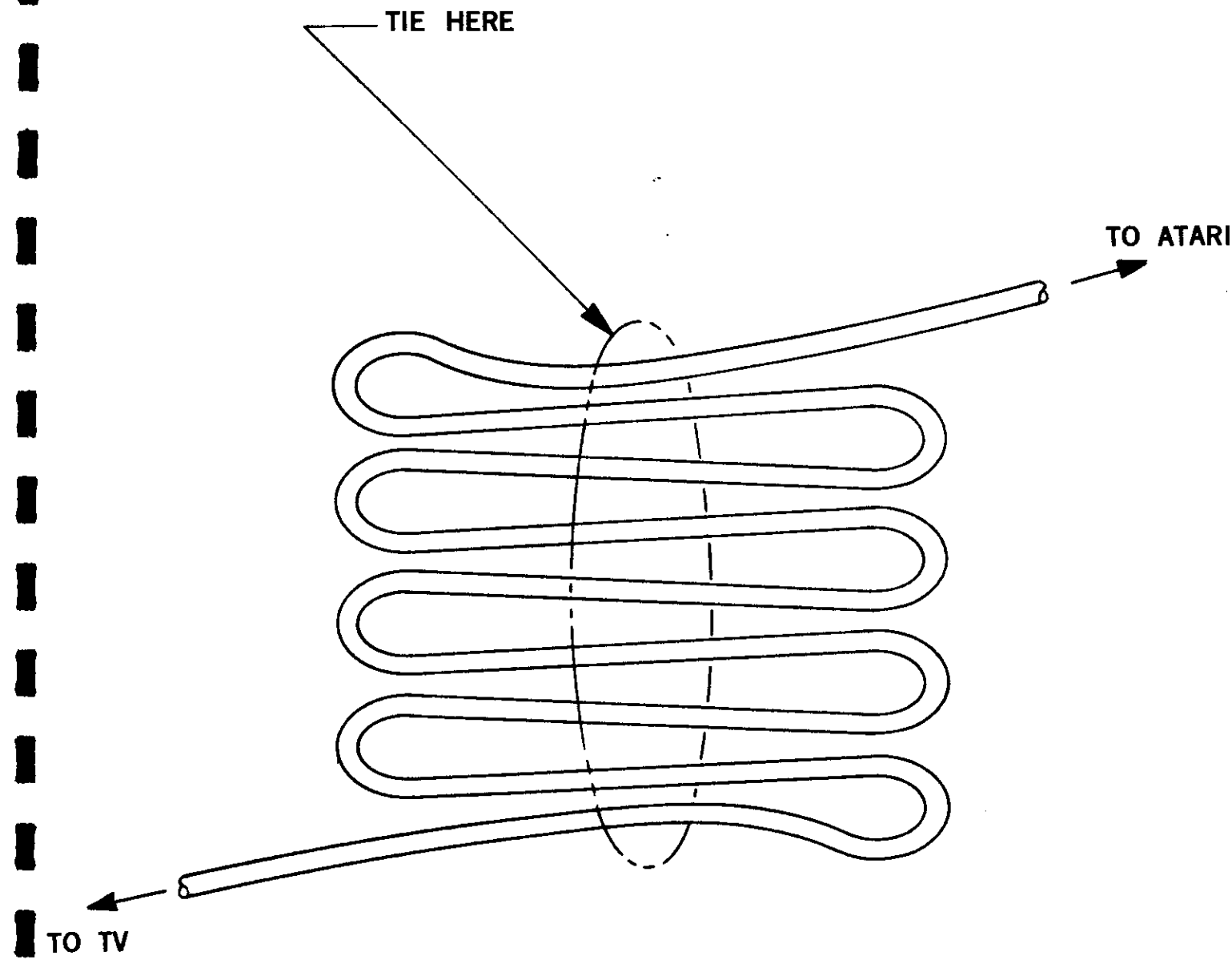
I.3.B. Radio Frequency Interference Within the ATR8000 System

Proper lacing of the connection cables will eliminate radio frequency problems within the ATR8000 system. If, during system operation interference occurs on the television used for a monitor, reposition the system's components (i.e., ATARI, ATR8000, drives, etc.). To properly lace cables:

1) Keep all I/O cables away from ATR8000 power cable.
2) Excess wire between the ATARI and the television adapter must be looped properly. Do not circularily coil the cable as this will cause it to act as an antenna! Bind

the excess cable as close to the top of the television set as possible. For the proper method of zigzagging the cable, see the diagram below. Then, tie the middle of the bundle together as shown.

DIAGRAM 1: Cable Binding for Monitor



II. Connecting the Hardware

To successfully and properly connect the components of the ATR8000 system, carefully read the following subsections. Each subsection details vital connection information. If at first you do not thoroughly understand any of the hardware information, go over the information until you have a working knowledge of the connection stipulations. (For unresolvable difficulties, consult your dealer).

It is important to unplug and turn off the power on all of the components before connecting and configuring the ATR8000. If a component is turned off but is still plugged into an electrical socket, you can be electrically shocked.

For any connection it is important that the cables are correctly interfaced to the ATR8000. Subsection 1 contains diagrams showing the construction of each type of cable that connects to the ATR8000. Pin 1 on each cable is marked. (On some types of cables, Pin 1 is denoted by a colored wire on an outside edge of the cable.)

Subsection 2 contains ATR8000 port information. The order of each port's pins is shown along with a listing of the pin signals. Pin 1 of the port must be connected to Pin 1 of the interfacing cable.

Specific information about disk drives, modems and printers is discussed in Subsection 3. This information MUST be considered before making any connections. Once the first three subsections have been carefully read, the actual connections of the cables are done in Subsection 4. Subsection 4 is divided into several subdivisions that describe interconnecting different amounts and types of peripherals.

After the cables have been connected, the ATR8000's jumper options need to be considered. These options and their settings are described in Subsection 5.

The next step is internally configuring all of the system's drives to have unique and valid drive numbers. Subsection 6 details this process for various types of drives.

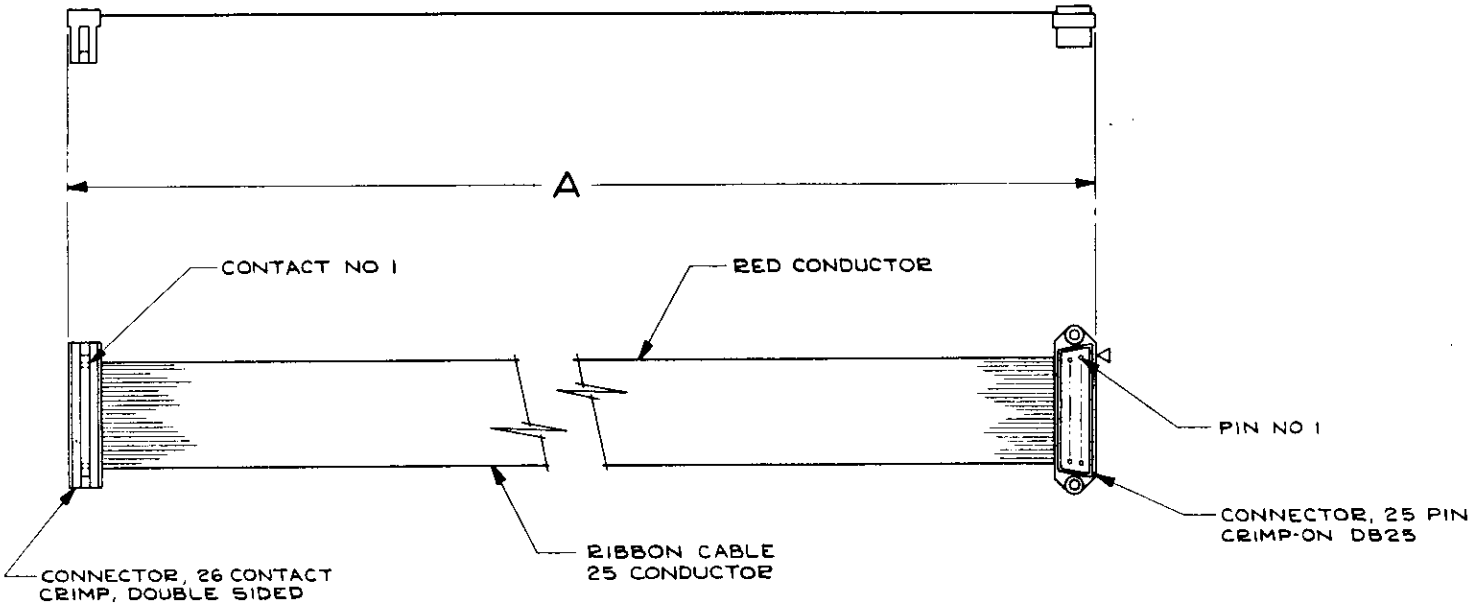
Subsection 7 explains the optional connection of an RS-232 serial terminal to the 64k ATR8000 (in place of the ATARI). The 64k ATR8000 and an RS-232 terminal can be used for CP/M operation.

After completing this Section, go on to Section III. Software. Then Section 4 will tell how to test the installed ATR8000 system.

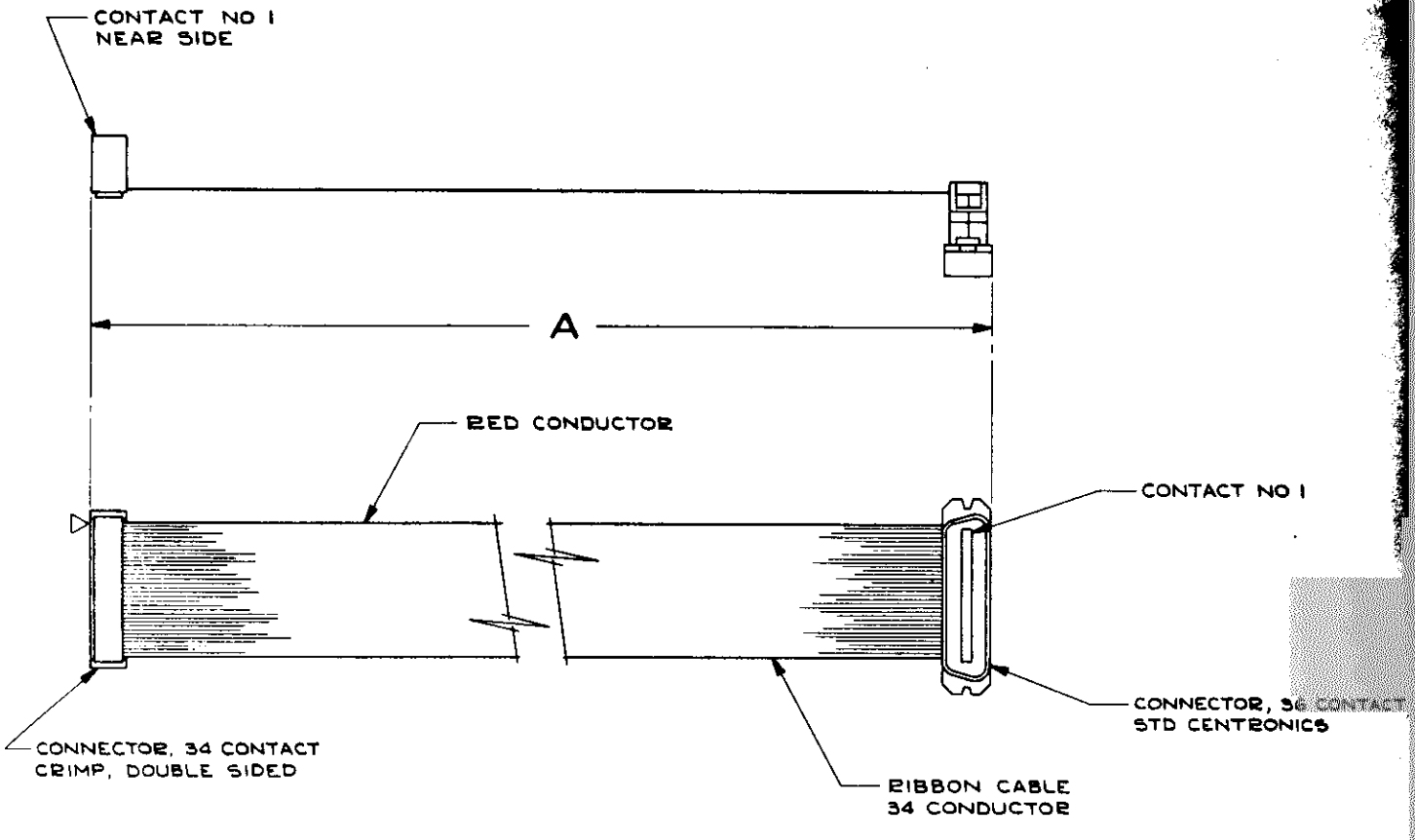
II.1. Cable Specifications

This section contains diagrams that detail the construction of the cables used with the ATR8000 system. If you make your own cables, or purchase cables from a source other than Software Publishers, make sure they are constructed this way.

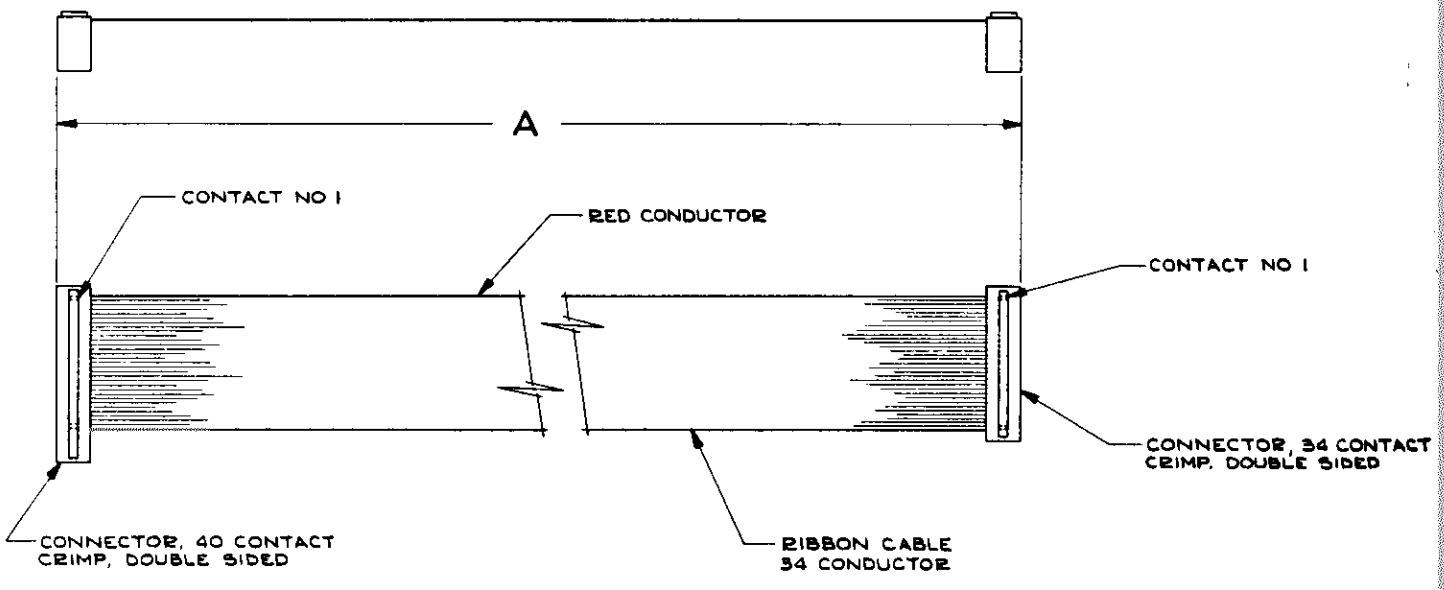
II.1.A. & DIAGRAM 2: RS-232 Serial Printer Cable



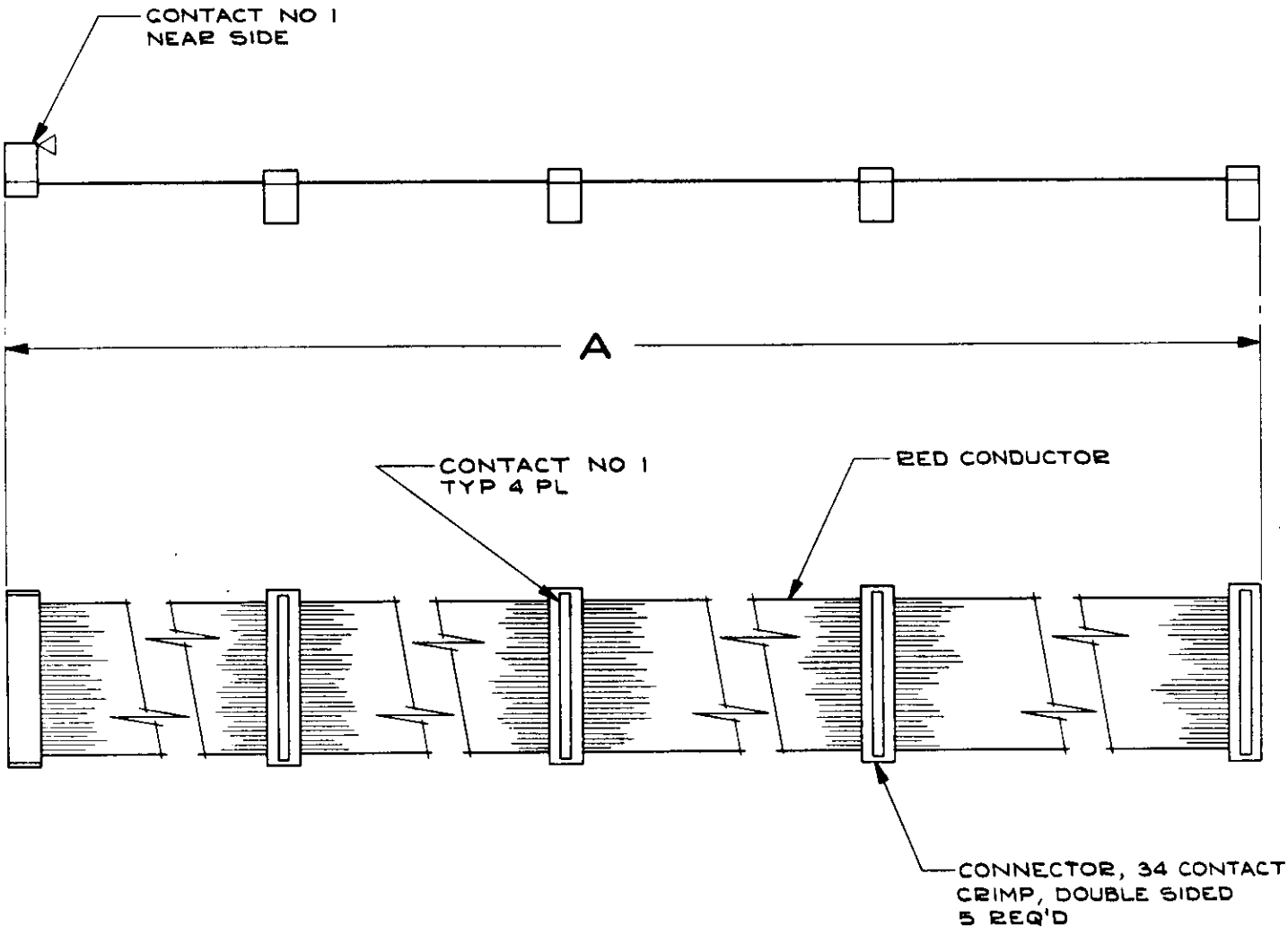
II.1.B. & DIAGRAM 3: Standard Centronics Parallel Printer Cable



II.1.C. & DIAGRAM 4: Nonstandard Centronics Parallel Printer Cable



II.1.D & DIAGRAM 5: Standard Drive Cable (4-connector cable shown)



II.2 ATR8000 Port Specifications

This subsection lists the pin information for each of the ATR8000's ports. Supplementary diagrams show the order of the pin numbers on each port's edge connector.

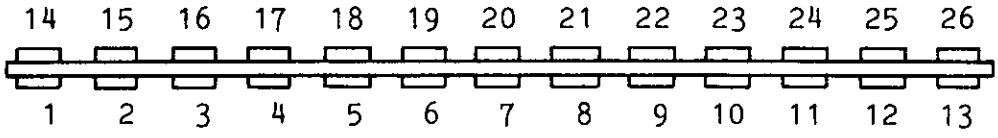
II.2.A. RS-232 Port

RS-232 Port Pin Information

1. N.C. (not connected)	14. N.C.
2. Transmit Data	15. N.C.
3. Receive Data	16. N.C.
4. Request to Send	17. N.C.
5. Clear to Send	18. N.C.
6. Data Set Ready	19. N.C.
7. Signal Ground	20. DTR
8. Carrier Detect	21. N.C.
9. N.C.	22. Ring Indicator
10. N.C.	23. N.C.
11. Reverse Channel	24. N.C.
12. N.C.	25. N.C.
13. N.C.	26. N.C.

When looking at the back of the ATR8000 the RS-232 Port pins are in the order shown below. When interfacing to this port, make sure that Pin 1 on the RS-232 cable is connected to Pin 1 of the port.

DIAGRAM 6: RS-232 Port Pin Order



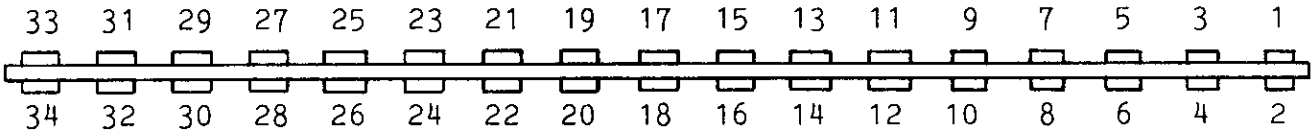
II.2.B. FLOPPY DISK Port

FLOPPY DISK Port Pin Information

1. ⏚ (Ground)
2. N.C. (not connected)
3. ⏚
4. N.C.
5. ⏚
6. Drive Sel 4
7. ⏚
8. Index
9. ⏚
10. Drive Sel 1
11. ⏚
12. Drive Sel 2
13. ⏚
14. Drive Sel 3
15. ⏚
16. Motor On
17. ⏚
18. Direction Select
19. ⏚
20. Step
21. ⏚
22. Write Data
23. ⏚
24. Write Gate
25. ⏚
26. Track 00
27. ⏚
28. Write Protect
29. ⏚
30. Read Data
31. ⏚
32. Side Sel
33. ⏚
34. N.C.

When looking at the back of the ATR8000, the FLOPPY DISK Port pin numbers are as shown below. When connecting a disk drive cable to the port, make sure that Pin 1 on the cable matches Pin 1 on the port.

DIAGRAM 7: FLOPPY DISK Port Pin Order



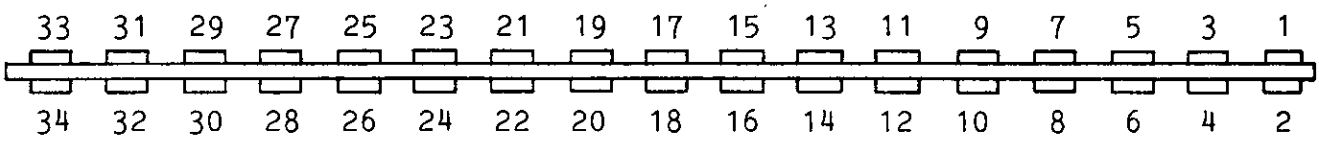
II.2.C. PRINTER Port

PRINTER Port Pin Information

1. Strobe
2. ∓ (Ground)
3. D0 Out (Data 0)
4. ∓
5. D1 Out
6. ∓
7. D2 Out
8. ∓
9. D3 Out
10. ∓
11. D4 Out
12. ∓
13. D5 Out
14. ∓
15. D6 Out
16. ∓
17. D7 Out
18. ∓
19. D3 In
20. ∓
21. D7 In
22. ∓
23. D6 In
24. ∓
25. D5 In
26. N.C. (not connected)
27. ∓
28. D4 In
29. D2 In
30. D1 In
31. N.C.
32. D0 In
33. N.C.
34. N.C.

When looking at the back of the ATR8000 at the PRINTER Port, the pins are numbered as below. Make sure that you match Pin 1 on the Port with Pin 1 on the cable used to interface into the PRINTER Port. (This is a parallel port.)

DIAGRAM 8: PRINTER PORT Pin Order



II.3. Peripherals

The ATR8000 system is extremely versatile; it interfaces with nearly any peripheral on the microcomputer market. This means you can connect various types of disk drives, printers and modems to the system. Due to this versatility, connecting peripherals can be complex (depending on what you have acquired).

This subsection explains necessary information for connecting some types of peripherals, including the affect of certain peripherals on other components in the system. Carefully read this data. If your equipment requires that several considerations be met to connect the hardware, we suggest making notes to refer to while actually doing the connection (following Section II.4.).

II.3.A. Disk Drives

The ATR8000 accepts all standard 5 1/4" and 8" disk drives. ATARI 810 and Percom drives can also be used with certain limitations. Disk drive sizes (5 1/4" or 8"), densities (single, double or quad) and type (single or double-sided) can be intermixed. All drives must have their own power supplies.

Before connecting drives to the system, familiarize yourself with the following disk drive information.

II.3.A1. ATARI 810 Drives

ATARI 810 disk drives are nonstandard drives that are only capable of single density operation. These drives can be used with the ATR8000 to run single density ATARI DOS. They can also be used for additional storage (single density) while the system is operating under OSA+, Version 4. (To run OSA+ the system must have at least one standard drive.) **They cannot be used when running CP/M.**

ATARI 810 drives are connected to the ATR8000 on the ATARI Daisy Chain Cable that is connected to the PERIPHERAL OUT Port of the ATR8000. The ATR8000 will run up to four drives of mixed definition. So if one ATARI 810 is connected, three standard drives can also be connected.

The drive designated to be Drive 1 is the drive that boots the operating system. A standard 5 1/4" drive can boot all three DOSes (ATARI, OSA+, and CP/M), whereas an ATARI 810 can only run single density and, therefore, can only boot ATARI DOS. You could reconfigure the system and change the numbering of the drives to boot different DOSes (having an 810 be Drive 1 for ATARI DOS, and a standard drive be Drive 1 for the other DOSes), but the drive numbering doesn't need to be changed if a standard drive is Drive 1.

Because of this, if you are going to operate under OSA+ or CP/M (and, therefore, have at least one standard disk drive), we suggest that any 810 drives be designated as the highest drive numbers to avoid drive renumbering. (Changing the numbers of the drives requires that you reconfigure them internally. See Section II.6.)

If you have ATARI 810 drives and 8" drives, being able to boot all three DOSes from the same drive becomes more complex. For the stipulations involved, refer to Section II.3.A4.

II.3.A2. Percom Drives

ATARI Controller Drives:

A Percom ATARI controller drive can be used with the ATR8000 with some limitations. To operate ATARI DOS or OSA+, it can be connected (with no alterations) to the ATARI Daisy Chain Cable that connects to the PERIPHERAL OUT Port of the ATR8000. OR, it can be used as standard disk drive if the Percom ATARI controller board is disconnected and the drive's controller board is connected to the Standard Drive Cable (which connects to the FLOPPY DISK Port of the ATR8000). To run CP/M, the Percom ATARI controller board must be disconnected.

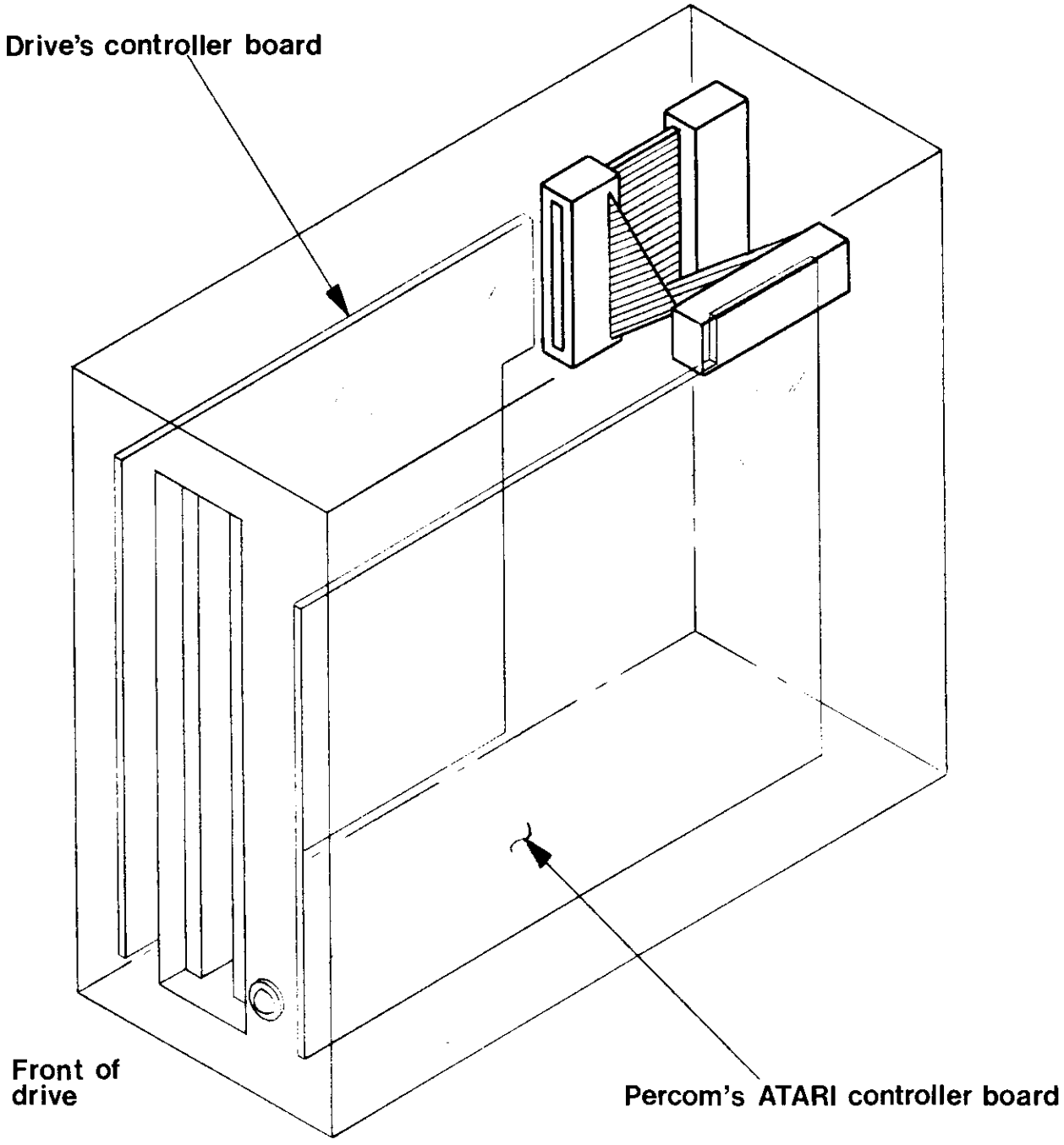
Use a screwdriver to take the screws out of the Percom drive enclosure and take the cover off. The Percom ATARI controller drive is shown in the diagram on the opposite page.

Notice that when looking at the front of the drive (where the RFD light is to the right side of the drive), the drive's controller board is on the left side of the drive (it is roughly 5" by 5") and the Percom ATARI controller board is on the right side of the drive (it is a larger card, roughly 5" by 8").

An internal cable connects the Percom controller board to the drive's controller board, then this cable connects from the drive's controller board to the connector on the back of the drive enclosure. To use the Percom ATARI controller drive as a standard drive, first disconnect the cable from the drive's controller board.

Now bring a connector on a Standard Drive Cable into the drive enclosure, and connect it to the edge connector on the drive's controller board (matching Pin 1s). Then thread the cable out the back of the drive. For now, leave the cover off, as later you will learn how to internally configure the drive for drive number.

DIAGRAM 9: The Percom ATARI Controller Drive



Percom ATARI Add-on Drives:

Percom ATARI add-on drives are standard disk drives. They have an internal cable that connects the edge connector of the drive's controller board to the pin connector on the outer edge of the drive. Remove the drive's cover and disconnect this cable and plug the Standard Drive Cable onto the edge connector of the drive's controller board. Leave the drive's cover off until the drive is configured for drive number later in this section.

II.3.A3. Using all 5 1/4" Drives

Connecting standard 5 1/4" drives with or without ATARI 810 drives is fairly straightforward. An ATARI 810 drive can only boot single density ATARI DOS, whereas a standard 5 1/4" drive can boot ATARI DOS, OSA+ and CP/M. Therefore, when assigning drive numbers for a system that consists of a mixture of these two types of drives, it is best to set the standard drives as the lower drive numbers and ATARI drives as the higher drive numbers. (Remember that the system is booted from Drive 1.)

Due to different interfaces, ATARI 810 drives and standard drives are connected on different cables. ATARI 810 drives are interfaced to the ATARI Daisy Chain Cable which is connected to the PERIPHERAL OUT Port of the ATR8000. Standard drives are connected to the Standard Drive Cable which is connected to the FLOPPY DISK Port of the ATR8000.

You must be careful to have unique drive numbers assigned to the drives. For example, if standard drives are designated as Drive 1 and Drive 2, an 810 drive must be either Drive 3 or Drive 4. (On the Standard Drive Cable there must be a drive connected on the connector that is furthest from the ATR8000 port connector. This drive can be configured to be any drive number.) After you decide on drive numbers and follow the correct hardware connection section, Subsection 6 tells how to internally set the drive for drive number.

II.3.A4. 8" Drives

ATARI 810s and 8" Drives:

ATARI 810 drives are connected to the PERIPHERAL OUT Port of the ATR8000 on the ATARI Daisy Chain Cable. Standard 8" drives are connected to the FLOPPY DISK Port of the ATR8000 using the Standard Drive Cable and one 8" adapter board for each 8" drive. Mixing ATARI 810 drives and standard 8" drives requires some preconnecting decisions. An ATARI 810 will not boot OSA+ or CP/M and a standard 8" drive cannot boot a 5 1/4" ATARI DOS disk. There are two options:

1) An ATARI 810 can be set as Drive 1 to boot ATARI DOS, with the 8" drives set as higher drive numbers. To boot OSA+ or

CP/M the drives would have to be renumbered so that an 8" drive is Drive 1. This means to switch between these DOSes, you have to reset the configuration of the drives. (Drives are set for drive number internally. See Section II.6. for details.)

2) Initially an ATARI 810 can be set as Drive 1 and an 8" drive set as Drive 2. Then ATARI DOS can be copied to an 8" disk (instructions are in Section III. Software). **LIMITATION:** This does limit the use of the 8" drive the DOS is run from. ATARI DOS formats by sectors. An 8" disk has 2002 sectors (single density), whereas a 5 1/4" disk has 720. ATARI DOS running on an 8" disk will only use the first 720 sectors of the 2002 available on the 8" disk.

   Although ATARI DOS on an 8" disk doesn't give full access to the disk, it does save you from having to renumber the drives when switching DOSes. After the ATARI DOS is transferred to an 8" disk, renumber (and internally configure the drives) so that Drive 1 is an 8" drive.

To connect an 8" drive to the Standard Drive Cable, plug the 50-pin connector on the 8" drive adapter board into the edge card connector on the drive, with the adapter board's connector on the upper side of the adapter circuit board. Then plug a connector on the Standard Drive Cable into the 34-pin edge connector of the adapter board.

II.3.A4A. ATARI 810s, 5 1/4" and 8" Drives

Before reading on, read the above information on ATARI 810 drives and standard 8" drives. The considerations for connecting all three of types of drives becomes complex, so after reading the above subsection, carefully read the following information.

To eliminate unnecessary drive renumbering, we suggest that all operating systems be on the same disk size (5 1/4" or 8"). This enables the same drive to boot all three DOSes.

If you have all three types of drives, a standard 5 1/4" drive is the best drive for running all three operating systems because it can boot both single and double density and it utilizes all available disk space on the disk in Drive 1. For users that only run OSA+ and CP/M, an 8" drive is equally qualified to run both DOSes as each is available on an 8" disk and both DOSes will use all available disk space.

ATARI DOS can be transferred to an 8" disk (with limitations explained in Section II.3.A4. and in the Software Section). So an 8" drive could be Drive 1 for all DOSes.

If your DOSes are on different disk sizes, the drives will have to be renumbered to boot the different systems. Drive 1 must be used to boot. It is better to have the same drive boot all DOSes.

II.3.B. Modems

Standard modems can be connected to the RS-232 Port of the ATR8000. Custom Modem Software for using a standard modem for ATARI DOS, OSA+ and CP/M will be available soon. To use a modem with the ATR8000 (or to connect any peripheral to the RS-232 Port), you must configure J12 on the circuit board of the ATR8000. This jumper option is explained in detail in Section II.5.D. RS-232 Configuring.

II.3.B1. ATARI 830 Modems

The ATARI 830 modem can be used in two ways. It can be connected to the RS-232 Port of the ATR8000 and run using our Custom Modem Software, or it can be interfaced through the ATARI 850 Interface Module. If it is connected to the 850, the 850 is connected between the ATARI and the COMPUTER IN Port of the ATR8000.

Using an 830 Modem through the 850 affects the printing operation of the ATR8000. The ATARI 850 Interface Module and the ATR8000 both respond to printer signals. As long as the 850 is interfaced to the ATR8000 system, the printer must be connected to the 850 and a special program (PRINTOFF.BAS) must be run to disable the ATR8000's printer signals (PRINTOFF.BAS is listed in Section III.1.B1).

The ATARI 830 Modem cannot be used under CP/M if it is connected to the 850 (no peripheral can), neither can a printer be used for CP/M operation if it is connected to the 850. These are the stipulations:

1) To use an 830 Modem with the 850 interface, it can operate for ATARI DOS or OSA+. The modem cannot be used for CP/M until it is disconnected from the 850 and directly connected to the ATR8000.

2) When using the 830 Modem and the 850, the printer must be connected to the 850 and the printer function of the ATR8000 must be disabled using PRINTOFF.BAS (PRINTOFF.BAS is listed in Section III.1.B1). Only 80 column printers will function -- the ATARI 820/822 printers will not interface with the 850. The printer will not print under CP/M until the printer is directly connected to the ATR8000 and the 850 is disconnected from the system.

II.3.B2. The D.C. Hayes Smart Modem

Purchasers of the Software Publishers's ATR8000 64k upgrade receive MODEM7.COM, a program for operating the D.C. Hayes Smart Modem from the RS-232 Port of the ATR8000. This program from the CP/M user's group, has been rewritten specifically for the ATR8000. It is only for CP/M modem operation.

To run this modem, Jumper Option 12 on the ATR8000 circuit board must be properly configured. Instructions for doing this are in Section II.5.D.

II.3.C. Printers

The ATR8000's PRINTER Port is a parallel port. Serial printers are connected to the RS-232 Port (J12 must be configured for any peripheral connected to the RS-232 Port). Certain printers can also be connected to the ATARI Daisy Chain Cable or to the ATARI 850 Interface Module.

II.3.C1. A 40 Column Printer: an ATARI 820 or 822

ATARI 820/822 printers can be used for printing under ATARI DOS or OSA+ when connected to the ATARI Daisy Chain Cable. Before printing, the printer function of the ATR8000 must be disabled by running PRINTOFF.BAS (listed in Section III.1.B1).

ATARI 820/822 printers cannot be connected if an ATARI 850 Interface Module is connected to the system. A 40 column printer cannot be used for CP/M printing.

II.3.C2. 80 Column Printers if an ATARI 850 is not Interfaced into the System (or 132 Column Printers)

A parallel 80 column (or 132 column) printer is connected to the PRINTER Port of the ATR8000. A serial 80 column (or 132 column) printer is connected to the RS-232 Port of the ATR8000 (and J12 is configured). Normal print commands for ATARI DOS, OSA+ and CP/M all function.

II.3.C3. 80 Column Printers if an ATARI 850 is Interfaced into the System (or 132 Column Printers)

If an ATARI 850 Interface Module is connected to the ATR8000 system, the printer must be connected to the 850 to print under ATARI DOS or OSA+ and PRINTOFF.BAS must be run to disable the ATR8000's printer function (PRINTOFF.BAS is listed in Section III.1.B1). The 850 must be disconnected to print under CP/M and the printer must be connected directly to the ATR8000.

II.4. The Connection

Before connecting the ATR8000, the ATARI and your other components together, you should have already read Subsections 1 - 3. If you have not done so, do that before continuing.

You now know the stipulations involved for connecting your equipment. It may be helpful to refer to the above subsections during the connection procedure. When you have made all the connections, DO NOT REPOWER THE SYSTEM UNTIL YOU HAVE READ AND COMPLETED ALL SUBSECTIONS IN THIS HARDWARE CONNECTION SECTION.

Before attempting any connections, thoroughly read the following subsections, then choose the section that best describes your equipment.

Tip: Peripherals directly connected to the ATR8000 are more efficient, especially in the CP/M mode. This is because CP/M software is more sophisticated, allowing faster printing, better modem transmission and faster disk I/O.

II.4.A. ATARI, ATR8000, 1+ Standard Drives, ATR8000 Cable, Standard Drive Cable, One 8" Adapter for Each 8" Drive

Connecting the above equipment is straightforward. When mixing 5 1/4" and 8" drives, decide which drive will be Drive 1 (the drive from which the system is booted). For help refer to Section II.3.A.

All 8" drives must have an adapter that connects them to the Standard Drive Cable. Plug the adapter's 50-pin connector onto the drive (with the connector on the upper side of the adapter board) and plug the Standard Drive Cable's connector into the adapter's 34-pin edge connector.

Refer to Section II.1. to learn which pin on each cable is Pin 1. Refer to Section II.2. to learn which pin on each port is Pin 1. **In connecting cables, make sure that Pin 1 on the cable is connected to Pin 1 on the Port.**

MAKE SURE THAT THE POWER IS TURNED OFF AND THE ATR8000 IS UNPLUGGED BEFORE MAKING ANY CONNECTIONS. DO NOT REPOWER THE SYSTEM BEFORE YOU HAVE COMPLETED ALL SUBSECTIONS IN SECTION II.

DIAGRAM 10A: The Ports of the ATR8000 (Back View)

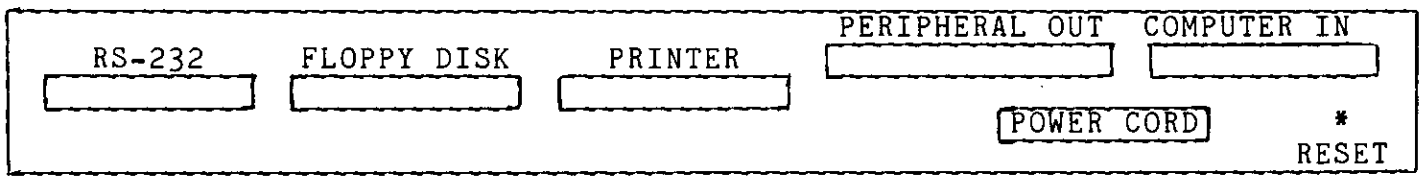
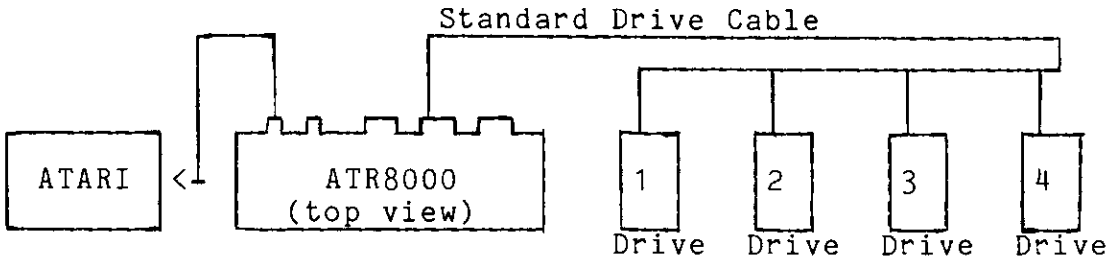


DIAGRAM 10B: Making the Connections (for II.4.A.)



CONNECTIONS: The ATARI is connected from the peripheral port on the side of the ATARI 800/400 to COMPUTER IN on the ATR8000, using the ATR8000 cable. The Standard Drive Cable connects from the FLOPPY DISK Port of the ATR8000 to the drives. A 4-connector Standard Drive Cable is pictured. Connection using the 2-connector cable is the same. **TO AVOID INTERFERENCE WITHIN THE SYSTEM, KEEP ALL I/O CABLES AWAY FROM THE ATR8000's POWER CORD.**

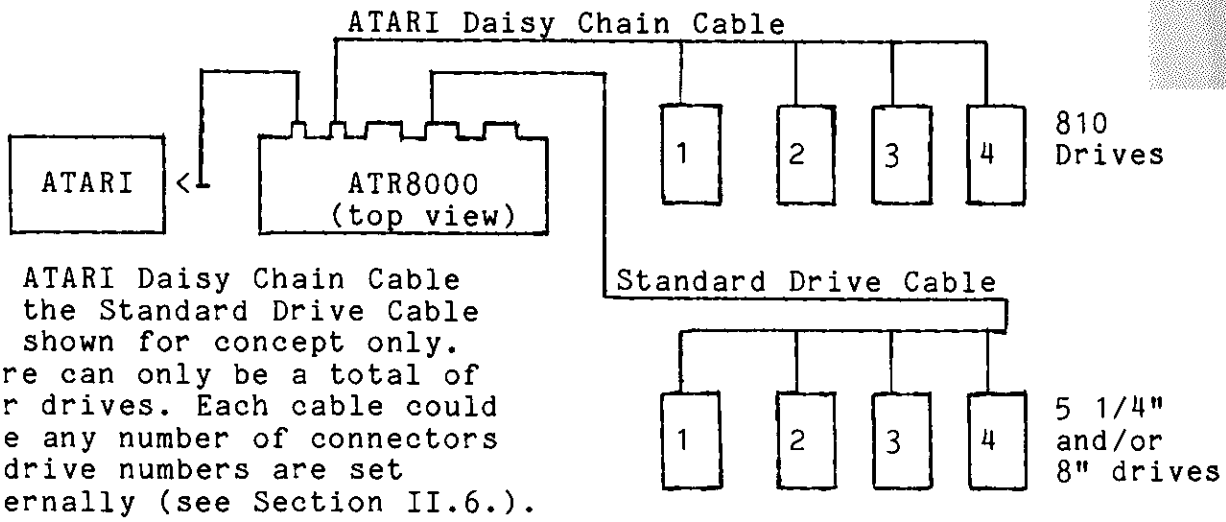
There must be a drive connected on the Standard Drive Cable's connector that is furthest from the ATR8000 connector (where Drive 1 is pictured above). The above diagram shows one method of drive numbering; drive numbers can be set in any order -- they do not have to be 1,2,3,4; they could be 4,3,2,1 or any other combination. Section II.6. explains this in greater detail and tells how to internally configure drives for drive number. When all peripherals and cables are connected, go to Section II.5.

II.4.B. ATARI, ATR8000, 1+ Standard Drives, 1+ ATARI 810 Drives, ATR8000 Cable, ATARI Daisy Chain Cable, Standard Drive Cable, One Adapter for Each 8" Drive.

Information on mixing types of drives is in Section II.3. Cable information is in Section II.1. ATR8000 Port information is in Section II.2. Familiarize yourself with all the above information before making any connections. For a detailed diagram showing the locations of the ATR8000's ports, refer to DIAGRAM 10A.

MAKE SURE THAT THE POWER IS TURNED OFF AND THE ATR8000 IS UNPLUGGED BEFORE MAKING ANY CONNECTIONS. DO NOT REPOWER THE SYSTEM BEFORE YOU HAVE COMPLETED ALL SUBSECTIONS IN SECTION II.

DIAGRAM 10C: Making the Connections (for II.4.B.)



The ATARI Daisy Chain Cable and the Standard Drive Cable are shown for concept only. There can only be a total of four drives. Each cable could have any number of connectors as drive numbers are set internally (see Section II.6.).

IMPORTANT:
There can only be one drive in each drive position. For example, if a drive is connected as Drive 1 on the Standard Drive Cable, a drive cannot be configured to be Drive 1 on the ATARI Daisy Chain Cable. There must be a drive connected on the Standard Drive Cable's last connector (connector furthest from the ATR8000, Drive 1 above).

CONNECTIONS:
The ATARI is connected from its peripheral port (on the right side of the ATARI computer console) to the COMPUTER IN Port of the ATR8000, using the ATR8000 cable. The ATARI Daisy Chain Cable connects to the PERIPHERAL OUT Port on the ATR8000. The Standard Drive Cable connects to the FLOPPY DISK Port of the ATR8000. **KEEP ALL I/O CABLES AWAY FROM THE ATR8000 POWER CORD.**

After connecting all peripherals, go to Section II.5. and then to the other subsections in Section II. **DO NOT REPOWER THE ATR8000 SYSTEM UNTIL ALL SEVEN SUBSECTIONS OF THE HARDWARE CONNECTION SECTION HAVE BEEN COMPLETED.**

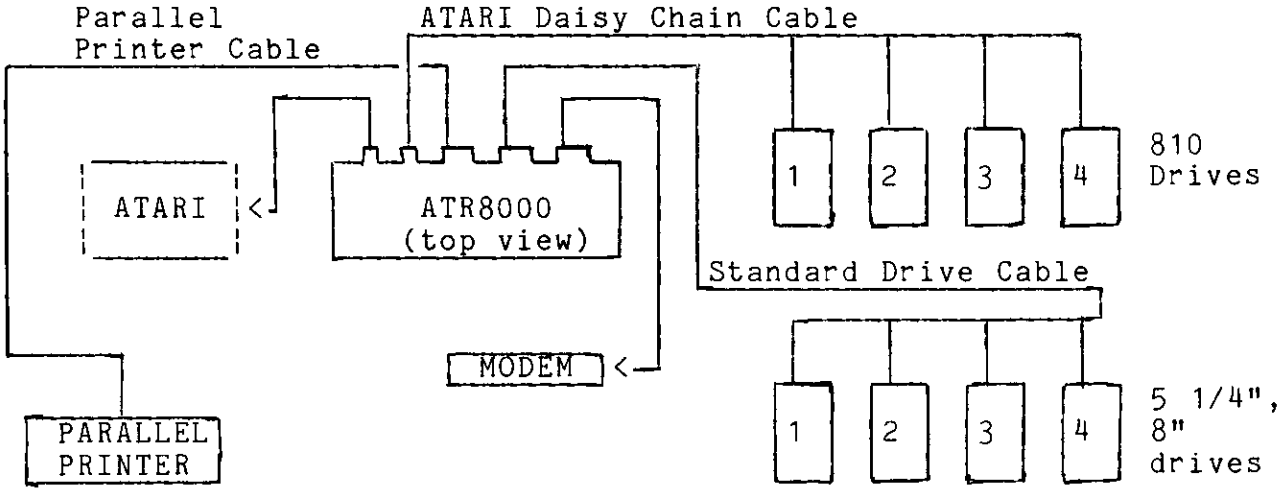
II.4.C. ATARI, ATR8000, 1+ Standard Drives, 1+ ATARI 810 Drives, Printer, Modem, ATARI 850 Box, ATR8000 Cable, Standard Drive Cable, ATARI Daisy Chain Cable, One 8" Adapter for Each 8" Drive.

There are many ways to connect all or most of the above equipment. Before reading this section, read Section II.3. to learn about all the peripherals and the best way to connect them. Also read Sections II.1. and II.2. to learn where Pin 1 is located on both the cables and the ports. Pin 1s must match for proper connections. Follow the diagram below that best matches your equipment.

MAKE SURE THAT THE POWER IS TURNED OFF AND THE ATR8000 IS UNPLUGGED BEFORE MAKING ANY CONNECTIONS. DO NOT REPOWER THE SYSTEM BEFORE YOU HAVE COMPLETED ALL SUBSECTIONS IN SECTION II.

II.4.C1. Connection Without the 850

DIAGRAM 10D: Making the Connections (for II.4.C1.)



NOTES: If you connect a serial printer, the modem will have to be disconnected to use the printer. To use both peripherals at the same time, connect a parallel printer.

There can only be a total of four disk drives. ATARI 810 drives and standard drives are configured for drive number by setting internal switches. The drive cables showing four connectors are only for concept. There must be a drive connected to the last connector on the Standard Drive Cable (Drive 1 above).

CONNECTIONS:
The ATARI is connected to the COMPUTER IN Port of the ATR8000, using the ATR8000 cable. The ATARI Daisy Chain Cable is connected to the PERIPHERAL OUT Port of the ATR8000. The Parallel Printer Cable is connected to the PRINTER Port (a parallel port). The Standard Drive Cable is connected to the FLOPPY DISK Port. The modem is connected to the RS-232 Port. **KEEP ALL I/O CABLES AWAY FROM THE POWER CORD OF THE ATR8000.**

After making all connections, go to Section II.5. and continue following all other subsections in Section II before repowering the system.

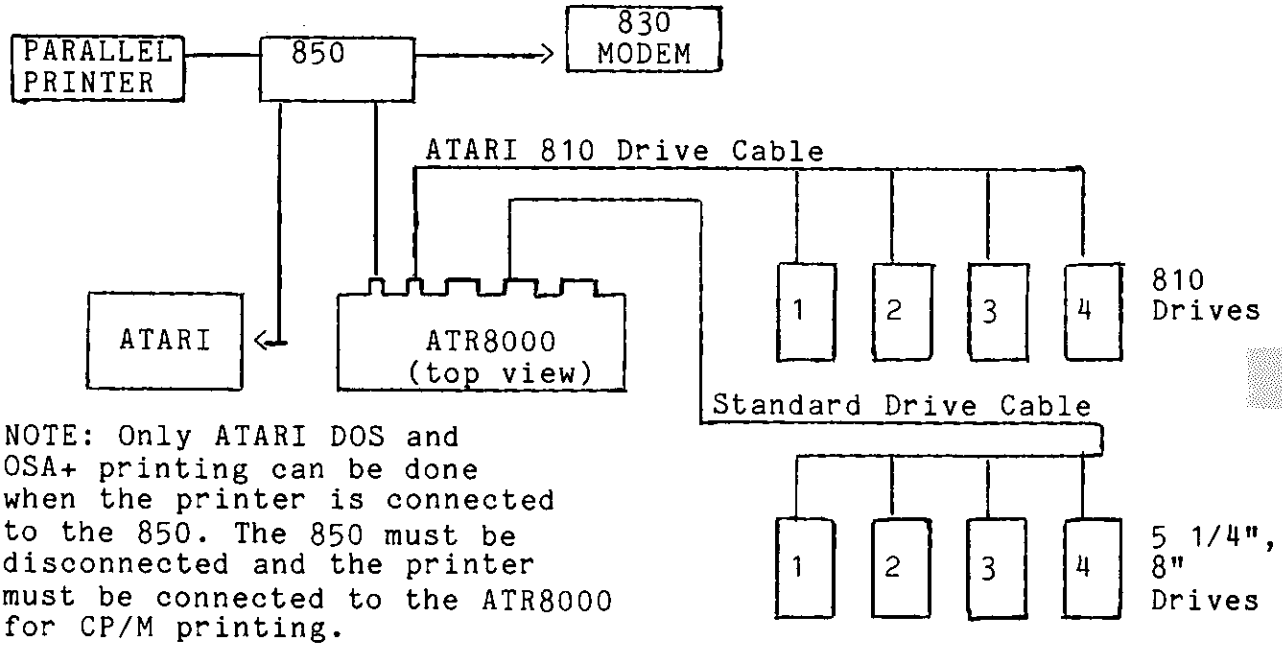
II.4.C2. Connection With the 850

The 830 ATARI Modem can be connected to the ATARI 850 Interface Module instead of to the ATR8000. However, to be used with CP/M, peripherals must be directly connected to the ATR8000, not through an 850. (Reread Section II.3. for further details.)

The ATARI is connected to the 850 which is connected to the ATR8000 COMPUTER IN Port. Then, the modem is connected to the 850.

MAKE SURE THAT THE POWER IS TURNED OFF AND THE ATR8000 IS UNPLUGGED BEFORE MAKING ANY CONNECTIONS. DO NOT REPOWER THE SYSTEM BEFORE YOU HAVE COMPLETED ALL SUBSECTIONS IN SECTION II.

DIAGRAM 10E: Making the Connections (for II.4.C2.)



NOTE: Only ATARI DOS and OSA+ printing can be done when the printer is connected to the 850. The 850 must be disconnected and the printer must be connected to the ATR8000 for CP/M printing.

NOTE: For CP/M a modem must be connected directly to the ATR8000. Remember that the ATARI Daisy Chain Cable and the Standard Drive Cable are shown only for concept. Drive numbering is done internally. There must be a drive connected on the last connector on the Standard Drive Cable (Drive 1 above). Drive numbers must be unique.

CONNECTIONS:

The ATARI is connected to the 850 which is connected to the COMPUTER IN Port of the ATR8000. The 830 Modem is connected to the 850. The ATARI Daisy Chain Cable is connected to the PERIPHERAL OUT Port. The parallel printer is connected to the 850. The Standard Drive Cable is connected to the FLOPPY DISK Port. **KEEP ALL I/O CABLES AWAY FROM THE ATR8000's POWER CORD.**

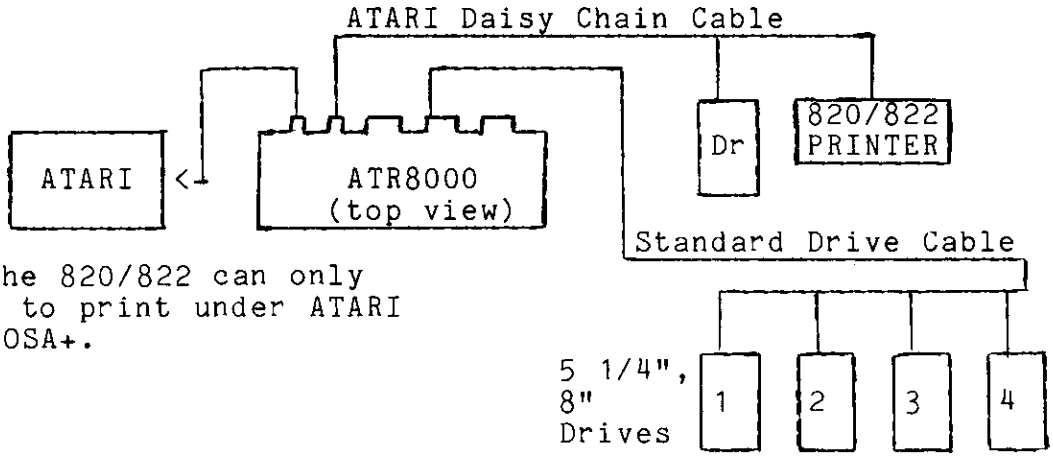
II.4.C3. Connecting a 40 Column Printer

A 40 column printer is connected on the ATARI Daisy Chain Cable. The 810 drive (or drives) are also on this cable. Remember that a 40 column printer cannot be used with CP/M.

Make sure that Pin 1 on each cable is connected to Pin 1 on the port the cable connects to. See Sections II.1. and II.2. for details.

MAKE SURE THAT THE POWER IS TURNED OFF AND THE ATR8000 IS UNPLUGGED BEFORE MAKING ANY CONNECTIONS. DO NOT REPOWER THE SYSTEM BEFORE YOU HAVE COMPLETED ALL SUBSECTIONS IN SECTION II.

DIAGRAM 10F: Making the Connections (for II.4.C3.)



NOTE: The 820/822 can only be used to print under ATARI DOS or OSA+.

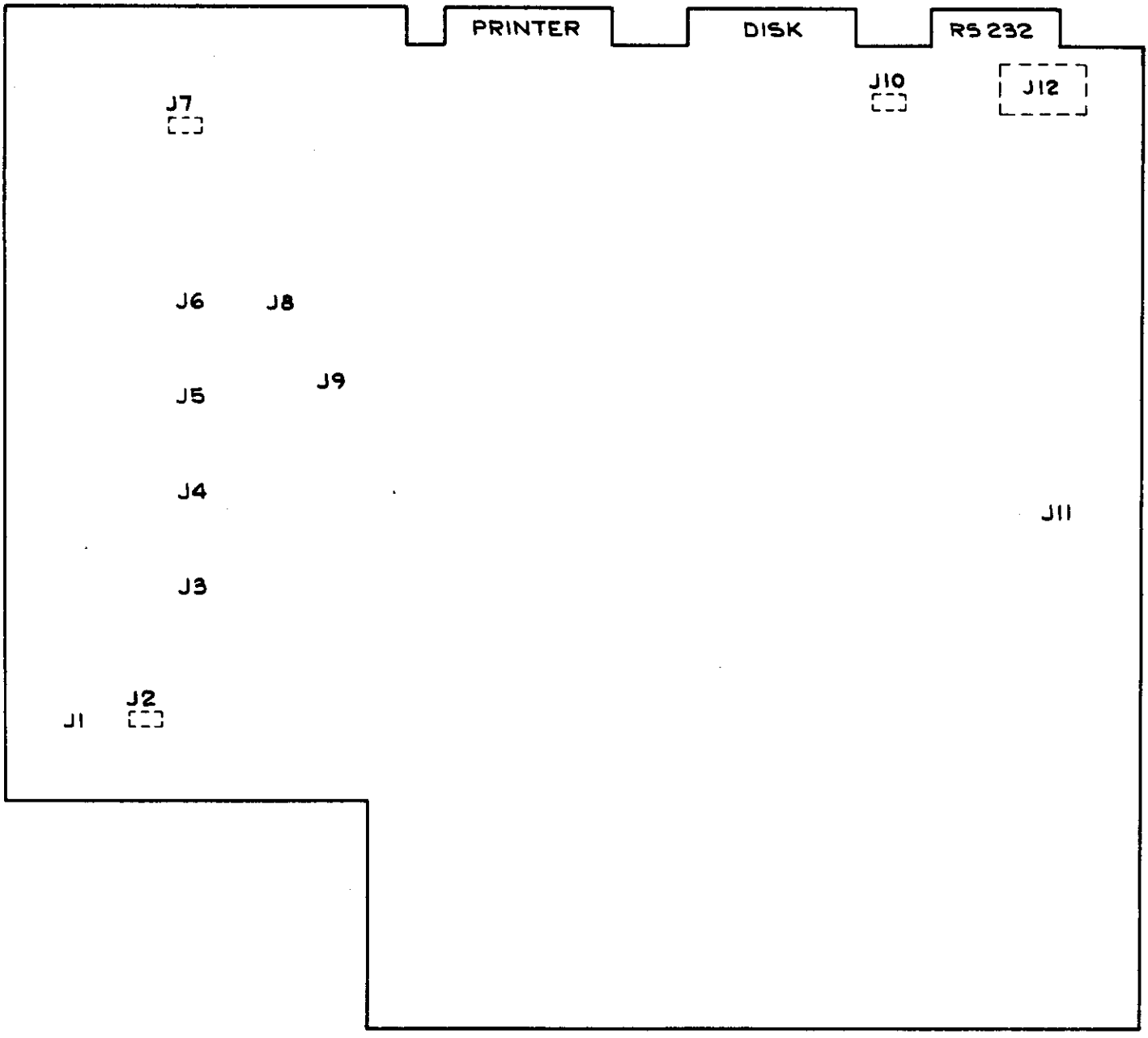
CONNECTIONS:
The ATARI is connected to the COMPUTER IN Port of the ATR8000, using the ATR8000 cable. The ATARI Daisy Chain Cable is connected to the PERIPHERAL OUT Port. The Standard Drive Cable is connected to the FLOPPY DISK Port.

After making all connections, go to Section II.5. and continue following all other subsections in Section II before repowering the system.

II.4.D. Other Connections

If your equipment does not directly match one of the above connection sections, then merge the portions of the various sections that describe your equipment. Follow the guidelines for limitations that some connections will incur. As a rule, whenever possible, connect directly to the ports of the ATR8000.

Diagram 11: Jumper Option Locations



II.5. ATR8000 Jumper Options

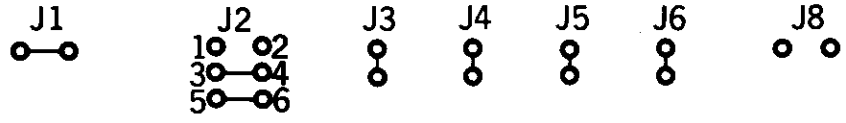
The circuit board of the ATR8000 has 12 jumper options. For the positions of these jumper options, refer to the diagram of the circuit board on the opposite page. Before making any jumper changes, turn the ATR8000's power off and unplug the unit. The jumper options and the meaning of the configurations are explained below.

II.5.A. 16k or 64k -- J1, J2, J3, J4, J5, J6, J8

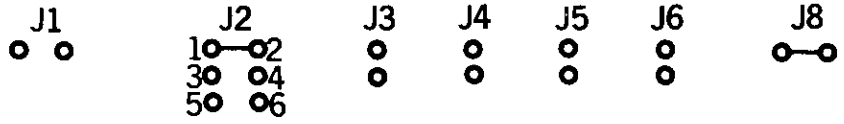
These jumper options determine whether the ATR8000 has 16k or 64k of RAM. The following diagram shows the proper configuration for each. A bar between two points indicates a connection; no bar means the space is open. The default for these jumpers is for 16k of RAM. If you purchased a 16k ATR8000, these default connections are traces on the circuit board.

DIAGRAM 12: 16 or 64k -- J1, J2, J3, J4, J5, J6, J8

For 16k ATR8000:



For 64k ATR8000:



Notice that the 64k jumpers are the exact opposite of the 16k jumpers. If you are changing the ATR8000 from 16k to 64k, cut the circuit board traces, making sure to fully break the traces, then make the proper jumper connections. Further instructions for converting the ATR8000 to 64k are in Section V.1.

TURN THE POWER OFF THE ATR8000 AND UNPLUG IT BEFORE MAKING ANY CHANGES. DO NOT TURN THE POWER BACK ON THE SYSTEM UNTIL ALL JUMPERS CHANGES ARE COMPLETED AND DOUBLE-CHECKED FOR ACCURACY. IF YOU DO NOT MAKE THESE CHANGES PROPERLY, THE ATR8000 MAY BE DAMAGED.

II.5.B. ATARI or RS-232 Terminal -- J7, J10

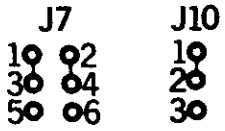
The configurations of these jumpers depend on whether an ATARI or an RS-232 terminal is connected to the ATR8000 at the COMPUTER IN

Port. An RS-232 terminal may be connected (in place of the ATARI) to the 64k ATR8000. (There are no handshake lines for the RS-232 terminal.) For other information about connecting an RS-232 terminal, refer to Section II.7.

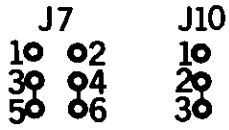
The standard ATR8000 circuit board is configured for the ATARI.

DIAGRAM 13: ATARI or RS-232 Terminal -- J7, J10

ATARI:



RS-232 Terminal:



To convert the ATR8000 to connect a RS-232 terminal, cut the "ATARI" traces on the circuit board, making sure to fully break the traces, then make the proper jumper connections.

TURN THE POWER OFF THE ATR8000 AND UNPLUG IT BEFORE MAKING ANY CHANGES. DO NOT TURN THE POWER BACK ON THE SYSTEM UNTIL ALL JUMPERS CHANGES ARE COMPLETED AND DOUBLE-CHECKED FOR ACCURACY. IF YOU DO NOT MAKE THESE CHANGES PROPERLY, THE ATR8000 MAY BE DAMAGED.

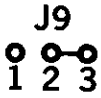
If you plan to switch between using an ATARI and a RS-232 terminal with the ATR8000, use burgs and shunts on J7 and J10. A burg is a pin strip that is soldered into each hole of a jumper option. A shunt is a movable connector that connects two burgs together. To see what burgs and a shunt look like, look at J11; this jumper option comes with these installed.

II.5.C. 2k or 4k Operating ROM -- J9

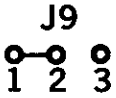
This jumper option relates to the operating ROM. The ATR8000 comes with a 4k operating ROM, so the default configuration is set for the 4k ROM.

DIAGRAM 14: 2k or 4k Operating ROM -- J9

4k (2732):



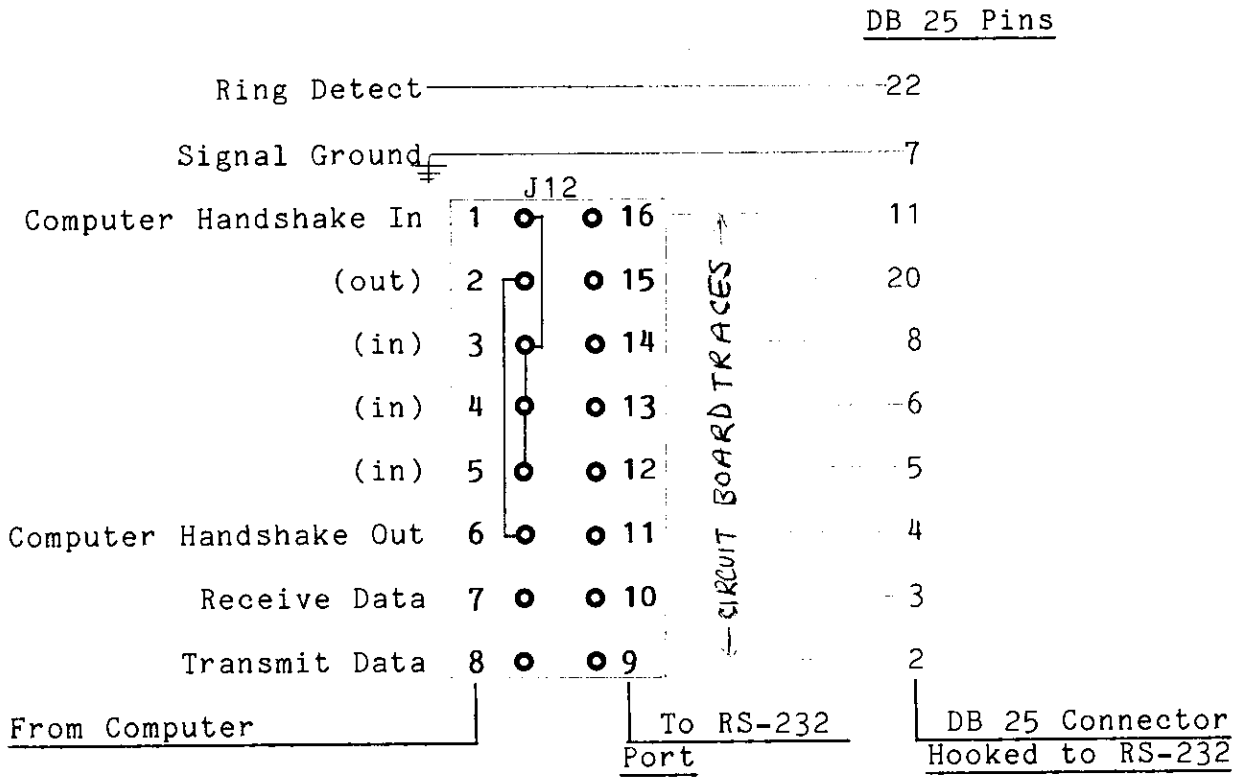
2k (2716):



II.5.D. RS-232 Configuring -- J12

This is the most complex of the jumper options. The configuration of this jumper option depends on what peripheral is run from the RS-232 Port of the ATR8000. Look at the diagram of J12 below.

DIAGRAM 15: RS-232 Configuring -- J12



Notice that the left side of J12 (Pins 1-8) has ATR8000 signals coming into it. When pins from the left side are connected to pins on the right side of J12 (Pins 9-16), the signals are sent across the jumper option to go to the DB 25 connector that interfaces the peripheral to the RS-232 Port.

The configuration of J12 depends upon what the connected RS-232 peripheral needs. Some sample configurations are shown below. To connect a peripheral not listed below, consult the connection section of that peripheral's manual to see what signals need to be interfaced. Rely on the diagram above to see what pins of the DB 25 connector are connected to Pins 9-16 of J12.

The default for J12 is configured to run an Epson serial printer.

BEFORE MAKING ANY CHANGES, TURN OFF THE POWER AND UNPLUG THE ATR8000.

DIAGRAM 15A: Configuration of J12 to Connect an Epson Serial Printer (the Default)

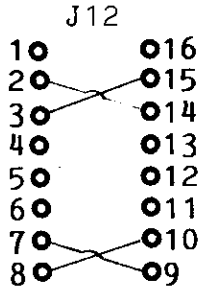


DIAGRAM 15B: Configuration of J12 to Connect a RS-232 Terminal to the RS-232 Port to Communicate with the ATARI

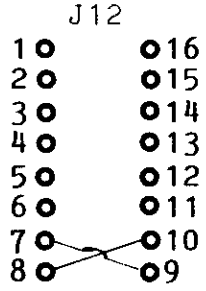
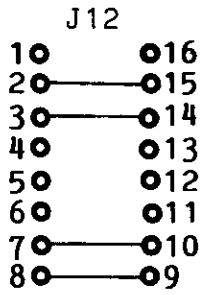


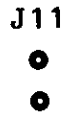
DIAGRAM 15C: Configuration of J12 to Connect the D.C. Hayes Smart Modem to the RS-232 Port



II.5.E. Undefined -- J11

This jumper option is not defined at this time. If you plan to use burg pins and shunts on any jumper options and aren't sure what they look like, look at J11 as it has burg pins and a shunt in it.

DIAGRAM 16: Undefined -- J11



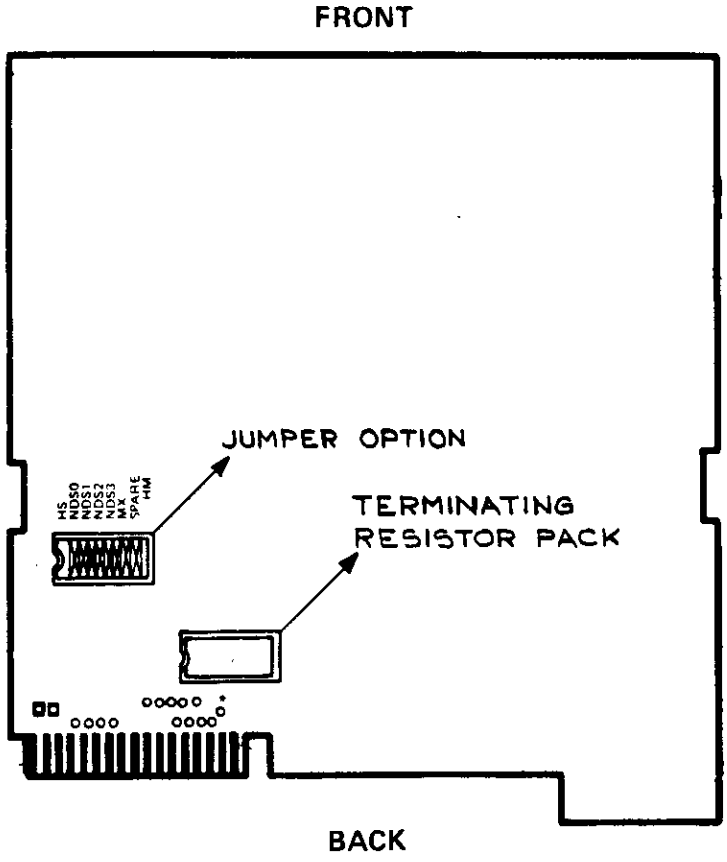
II.6. Internal Drive Configuring

This subsection details how to internally configure drives that are connected to the ATR8000. Before turning the power on the ATR8000 system, first follow these instructions for "setting up" your disk drives. (You should have decided drive numbers as you connected the drives in Subsection 4 above.)

II.6.A. 5 1/4" Drives:

The following diagram is for reference purposes. It shows the position of the terminating resistor pack and jumper options in a Tandon 5 1/4" disk drive. Your drives may be a different brand (i.e., Shugart, MPI, etc.) but they will have these components in a similar position.

DIAGRAM 17: Locations for Internal Drive Configuring



Terminating Resistor Pack:

The drive that is connected to the last connector on the Standard Drive Cable (the drive connector furthest from the ATR8000; the 2nd connector on the 2-connector cable, the 4th on the 4-connector cable) must have a terminating resistor pack in it. No other disk drive on the cable should have a terminating resistor

pack, if they do, remove the pack and store it. (This should be in a socket.)

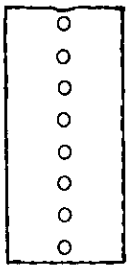
The last connector on the cable should always have a drive connected to it. If you only have one drive on this cable, plug it into the last connector and leave the middle connectors open.

Diagram 17 shows the location of this resistor pack for a Tandon disk drive. If you have a different brand of drive, look for it in a similar position (it should be socketed), or consult the operating manual for the drive for the location.

Jumper Options:

Each drive must have the jumper options set correctly. The location of the jumper options on a Tandon drive are shown on the previous page. The drive's circuit board should be marked for options. The following are the options for a Tandon drive.

DIAGRAM 18: Jumper Options for 5 1/4" Drives



HS ------Head Load with Drive Select
DS 0 ----Drive Select 0 (for Drive 1)
DS 1 ----Drive Select 1 (for Drive 2)
DS 2 ----Drive Select 2 (for Drive 3)
DS 3 ----Drive Select 3 (for Drive 4)
MX ------Multiplex
Spare ---No function
HM ------Head Load with Motor On

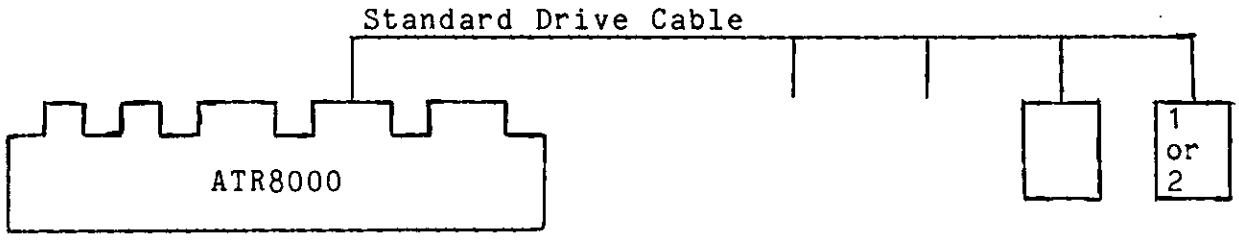
On most drives, the jumper options have a dip shunt connecting them. This is a "box" that has a plugged hole at each option, connecting signals from the incoming side of the box to the outgoing side. Punching out a hole (disconnecting the connection) disengages that option. A plug in the hole means that the option is active.

You may want to remove this dip shunt and replace it with a dip switch shunt. This box will have switches that are set to the left or to the right, turning an option on or off. This type of shunt makes it easier to renumber a drive, whereas, the straight dip shunt is harder to change.

Before setting these jumper options, determine what the drive number of each drive will be. (You should have already decided this in making the hardware connections.) There must be a drive connected to the last connector on the Standard Drive Cable. It can be set to be any drive number.

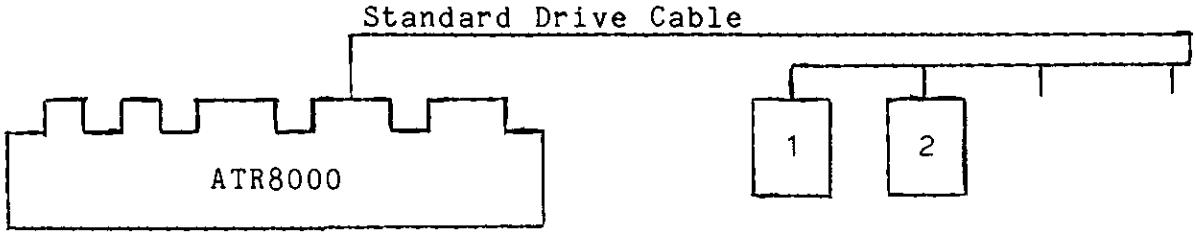
Look at the following example:

DIAGRAM 19: Drive Numbering #1



The drive on the last connector of the 4-connector cable shown, could be set to be either Drive 1 or Drive 2. Select the numbering system (i.e., 1,2,3,4 or 4,3,2,1) that suits you. It may help to place a small sticker on the front of each drive to indicate the drive number. The cable can also be looped so that the last connector on the cable is connected to Drive 1 and the drive numbers are in ascending order:

DIAGRAM 20: Drive Numbering #2



Regardless of the order you choose to number the drives, the drive on the last connector must have the terminating resistor pack in it. (Drive 1 in DIAGRAM 20.)

A Tandon drive (5 1/4") needs the following options set active (plugs in):

HM and one of the four Drive Selects. (Be careful to set unique drive numbers. Remember that a standard drive cannot have the same number assigned to an 810 on the ATARI Daisy Chain Cable). All other options need to be off (if using a dip shunt, the hole needs to be punched out). If using multiple drives, it is important that MX is open because this allows the input/output lines to be multiplexed.

Special Considerations for 5 1/4" Drives:

Some Tandon and MPI disk drives do not have head load solenoids. For these drives, only set a drive select to be active.

II.6.A1. Radio Shack Drives:

Some Radio Shack drives are nonstandard. The TRS 80 Model I drives have Drive Select 3 connected where side select is connected on standard microfloppies. This needs to be changed. There will be a blue wire connecting DS 3 to Pin 32 on a conductor pad of the drive's edge connector. (Follow the trace wire from the jumper option to the edge connector.) This wire needs to be disconnected and soldered to the pad going to Pin 6 of the edge connector. [Our system uses conductor 32 for side select. This is shown in the FLOPPY DISK Port definitions in Section II.2.B.]

If using a Radio Shack drive cable, drives are configured differently than described above. Their cables are constructed so that drive select is determined by the connectors on the cable. Their first connector makes the drive plugged into it Drive 1, the second Drive 2, and so on. Because the drive number is determined by position on the cable, all four drive selects are plugged active on all the drives. This way, any drive can be reconnected to another connector without changing jumper options.

When using TRS-80 Model I drives on a non-Radio Shack cable, use standard configurations. External Model III drives are standard drives, i.e., the DS 3 and Side Select are in the standard positions.

II.6.A2. ATARI 810 Drives:

When using ATARI 810 drives with the ATR8000, connect them to the ATARI Daisy Chain Cable. Decide what drive numbers the drives will be and consult the ATARI 810 drive manual for instructions on how to configure the 810 to be a particular drive number. MAKE SURE THAT YOU DO NOT HAVE MORE THAN ONE ATARI OR STANDARD DRIVE ASSIGNED FOR EACH POSSIBLE DRIVE NUMBER (1-4).

II.6.A3. Percom Drives:

Percom ATARI Controller drives can be used on the ATARI Daisy Chain Cable for operating under ATARI or OSA+ DOSes. To operate under CP/M, unplug the controller card, then connect the drive to the Standard Drive Cable, plugging the cable's connector onto the edge connector of the drive. (Detailed information and a diagram are in Section II.3.2.) Percom add-on drives are standard drives.

For information about internally configuring the drive for drive number, consult the Percom ATARI Controller manual.

II.6.B. 8" Drives:

8" drives are configured like 5 1/4" drives. The terminal resistor information is the same as for 5 1/4" drives. Refer to the 5 1/4" internal configuring information for details.

Rather than having the jumper options in one place (like the 5 1/4" drives), 8" drives have these options in segments in different locations on the board. For their locations, consult a drive manual. As with the 5 1/4" drives, one drive select needs to be active for each drive.

8" Drive Configurations for Shugart 800s and 801s:

For this description, jumper means connected (active), open means disconnected.

Jumper T1, T2, T3, T4, T5, and T6 on the drive connected to the last connector on the cable. These are the terminating resistors. (T2 is the drive select pullup resistor.)

* On all other drives, jumper T2 and leave T1, T3, T4, T5 and T6 open.

Jumper one drive select (DS 1, DS 2, DS 3, or DS 4), have the others open.

Open B.

Jumper HL, Z, A, C, X*.

* Jumpering X with B open allows the heads to stay loaded when the system switches between drives. This saves head wear-and-tear and quiets the drive noise caused by head-banging. It is possible to Jumper B and Open X.

  If your power supply can only handle one drive at a time, do not have X jumpered and B open or you'll blow the power supply. If the power supply can only handle one drive at a time, **Jumper B and Open X.**

II.7. Connecting a RS-232 Terminal to the ATR8000

A RS-232 terminal may be connected to the 64k ATR8000 in place of the ATARI. A terminal will run CP/M software. (Since it is not an ATARI, it will not run ATARI DOS or OSA+.) To connect a terminal, follow the steps below.

STEP 1 Turn off the power on the ATR8000 and unplug it from the electrical socket before continuing.

STEP 2 Make the changes in J7 and J10 as shown in Section II.5.B. If you plan to switch back and forth between using the ATR8000 with a terminal and with the ATARI, install burgs and shunts to facilitate the switching.

STEP 3 Purchase a special terminal cable from SWP. This cable has an "ATARI" connector on one end that plugs into the COMPUTER IN Port of the ATR8000. The other end of the cable connects to the terminal. Connect the cable.

STEP 4 Double check to insure that the jumpers are correct and that the cable is properly connected before repowering and plugging in the ATR8000.

III. Software

This section is divided into three subsections, one for each DOS that can be used with the ATR8000 (ATARI DOS, OS/A+ (Ver. 4), and CP/M). Each of these sections is a supplement to each DOS's separate operating manual.

Booting and operating instructions for ATARI DOS and OS/A+ are in their separate operating manuals. Subsection 3 contains booting information for the ATR8000 CP/M and contains operating instructions for ATR8000 CP/M programs. A separate CP/M manual is included which explains how to use CP/M and its utility programs.

Under ATARI DOS and OS/A+ the ATR8000 is a slave processor to the ATARI. It operates as a double density disk interface and can run printers or modems. To run CP/M, the 64k ATR8000 transmits a terminal program to the ATARI, then takes control of the system. The CP/M subsection includes diagrams listing keyboard and display character codes, as well as control and escape sequences used for CP/M.

III.1. ATARI DOS

ATARI DOS will run normally, i.e., as it ran on the ATARI before the ATR8000 was connected. This DOS (on a 5 1/4" disk) can be booted from a standard 5 1/4" drive as well as from an ATARI 810.

As Section II.3.A. explains, it is possible to run this DOS from an 8" drive. This will only access 720 of the possible 2002 sectors on the disk. Although this can be a disadvantage because all of the available disk space cannot be used, it saves having to reconfigure the disk drives when changing DOSes.

To copy ATARI DOS to an 8" disk, first connect the drives so that a standard 5 1/4" or an 810 drive is Drive 1 and an 8" drive is another drive number. Then follow the ATARI DOS procedure for making a systems disk from your master disk. If you are unsure about how to do this, follow the steps below.

III.1.A. Copying ATARI DOS to an 8" Disk

STEP 1 Connect the disk drives so that an 810 or a standard 5 1/4" drive is Drive 1 and an 8" drive is Drive 2. (For help refer to Section II.)

STEP 2 Turn the power on the system (ATARI, ATR8000, drives, etc.). If the ATARI BASIC cartridge is in the ATARI, the READY prompt will appear. Type DOS and press <RETURN>. (If no BASIC cartridge is in the ATARI, the DOS menu will automatically appear on the screen.)

STEP 3 We are now going to format the 8" disk that the ATARI DOS will be written onto. Type I for the FORMAT option. When asked which drive to format, type 2 and press <RETURN>. Insert a blank 8" disk into Drive 2 and close the drive door.

STEP 4 When prompted to TYPE Y TO FORMAT DISK 2, type Y and press <RETURN>. When the formatting is complete, the message SELECT ITEM OR RETURN FOR MENU will appear on the screen.

STEP 5 We are now ready to copy the DOS onto the formatted 8" disk. Type H and press <RETURN> to select the WRITE DOS FILES option.

STEP 6 When asked which disk to write the files to, type 2 and press <RETURN>. When asked for verification, type Y and <RETURN>.

STEP 7 When the operation is complete, the message SELECT ITEM OR RETURN FOR MENU will reappear on the screen. At this point you can write the MEM.SAV file on the disk as the ATARI DOS manual recommends. To do this, type N and press <RETURN> (for CREATE MEM.SAV). Then type Y and press <RETURN>. When the computer is through, the message SELECT ITEM OR RETURN FOR MENU will reappear on the screen.

STEP 8 Done!

III.1.B. Modems

To run a modem from the ATR8000's RS-232 Port, use Software Publishers' Custom Modem software. This software will run modems under ATARI DOS, OS/A+ and CP/M.

An ATARI 830 Modem may be run through an ATARI 850 Interface Module. For modem printing, the 80 column printer must be connected to the 850 and the SWP BASIC program, PRINTOFF.BAS, must be run before printing.

When connected on the same system, signals are sent to the printer from both the 850 and the ATR8000. PRINTOFF.BAS (an ATARI BASIC program) disables the ATR8000's printer driver so that it won't interfere with the signals between the 850 and the printer.

III.1.B1. PRINTOFF.BAS

Using ATARI BASIC, enter this BASIC program as listed below. It will disable the ATR8000's printer driver to allow the 850 box to run the printer. (As described later, it also is used to run an 820/822 printer from the ATARI Daisy Chain Cable). PRINTOFF.BAS will have to be rerun if the computer is rebooted or

after PRINTON.BAS is run.

Run PRINTOFF.BAS before printing. [From ATARI BASIC, type: RUN"D:PRINTOFF.BAS<RETURN>. The computer will respond: PRINTER OFF. If you attempt to print from the ATR8000's PRINTER Port while PRINTOFF.BAS is active, ERROR 38 will show on the screen.

```
100 REM <<PRINTOFF.BAS>>>
110 DIM BUF$(3)
120 Z=ADR("    ")
130 DATA 104,76,89,228
140 FOR I=0 TO 3
150 READ X
160 POKE Z+I,X
170 NEXT I
180 DCB=768
190 DATA 90,1,83,0,0,0,1,0,3,0,54,255
200 FOR I=0 TO 11
210 READ X
220 POKE DCB+I,X
230 NEXT I
240 X=USR(Z)
250 A=ADR(BUF$)
260 X=INT(A/256)
270 POKE DCB+5,X
280 POKE DCB+4,A-X*256
290 GOSUB 2000
300 POKE DCB+2,ASC("S")
310 POKE DCB+3,0
320 D=PEEK(A)
330 POKE DCB+10,D
340 D=PEEK(A+1)
350 POKE DCB+11,D
360 X=USR(Z)
370 GOSUB 2000
380 POKE A+2,255
390 POKE DCB+2,ASC("W")
400 POKE DCB+3,128
410 X=USR(Z)
420 PRINT "PRINTER OFF"
430 END
2000 POKE DCB+2,ASC("R")
2010 POKE DCB+3,64
2020 POKE DCB+10,3
2030 X=USR(Z)
2040 RETURN
```

III.1.B2. PRINTON.BAS

This program reactivates the printer driver of the ATR8000 after it has been disabled by PRINTOFF.BAS. (If the computer is rebooted, there is no need to run PRINTON.BAS.)

Under ATARI DOS, enter this program as listed below. To run it, type: RUN"D:PRINTON.BAS<RETURN>. The system will respond: PRINTER ON.

```
100 REM <<PRINTON.BAS>>
110 DIM BUF$(3)
120 Z=ADR("    ")
130 DATA 104,76,89,228
140 FOR I=0 TO 3
150 READ X
160 POKE Z+I,X
170 NEXT I
180 DCB=768
190 DATA 90,1,83,0,0,0,1,0,3,0,54,255
200 FOR I=0 TO 11
210 READ X
220 POKE DCB+I,X
230 NEXT I
240 X=USR(Z)
250 A=ADR(BUF$)
260 X=INT(A/256)
270 POKE DCB+5,X
280 POKE DCB+4,A-X*256
290 GOSUB 2000
300 POKE DCB+2,ASC("S")
310 POKE DCB+3,0
320 D=PEEK(A)
330 POKE DCB+10,D
340 D=PEEK(A+1)
350 POKE DCB+11,D
360 X=USR(Z)
370 GOSUB 2000
380 POKE A+2,64
390 POKE DCB+2,ASC("W")
400 POKE DCB+3,128
410 X=USR(Z)
420 PRINT "PRINTER ON"
430 END
2000 POKE DCB+2,ASC("R")
2010 POKE DCB+3,64
2020 POKE DCB+10,3
2030 X=USR(Z)
2040 RETURN
```

III.1.C. Printers

There are several considerations for connecting a printer to operate with ATARI DOS.

1) **820/822 Printers.** Either of these 40 column ATARI printers is connected to the ATARI Daisy Chain Cable. Before printing, the PRINTER Port of the ATR8000 must be told not to interfere; therefore, PRINTOFF.BAS is run. This program is listed and described in Section III.1.B1.

   To turn the ATR8000's PRINTER Port back on, you can either reboot the computer, or run PRINTON.BAS (listed and explained in Section III.1.B2).

2) **Printing While Using the 830 Modem if the ATARI 850 Interface Module is Connected to the System.** If the 850 has been connected to run the ATARI 830 Modem, then to print data received through the modem, the printer must be connected to the 850 box and PRINTOFF.BAS must be run so the ATR8000 won't interfere with the operation. (PRINTOFF.BAS is listed in Section III.1.B.)

   If the 830 Modem isn't being used at the time of printing, but it is connected to the ATR8000 system, there are two ways to use an 80 column printer for ATARI DOS:

   1) Disconnect the 850 and have the printer connected to the ATR8000's PRINTER Port.

   2) Connect the printer to the ATARI 850 and run PRINTOFF.BAS before printing.

   As with ATARI operation, an 820/822 printer will not operate if an 850 is connected to the system.

III.2. OS/A+ (Version 4)

OS/A+ (Ver. 4) is available on both 5 1/4" and 8" disks. It operates on any standard disk drive. For detailed use on how to use this DOS, consult the separate OS/A+ operating manual. **The ATARI must have a minimum of 32k RAM to run OS/A+.**

If you are going to run both OS/A+ and CP/M, we suggest that you have both operating systems on the same size of disk. This eliminates having to reconfigure the drive connections before booting and running the different DOSes.

The stipulations for using printers and modems with OS/A+ are the same as the ATARI DOS stipulations. Refer to Section III.1. (ATARI DOS) for this information. It is important to thoroughly understand the conditions that arise when the ATARI 850 is interfaced to the system.

Wherever possible it is best to directly connect peripherals to the ATR8000. This eliminates having to perform special operations before using the peripherals (such as running PRINTOFF.BAS) and avoids having to change the connections to use the peripherals for CP/M. (Peripherals must be directly connected to the ATR8000 to work with CP/M.)

ATARI 810 drives may be used with OS/A+, but only for single density operation. Drive 1 must be a standard drive so that it can boot this double density DOS. Then the higher drive number 810s can be used for additional storage (single density).

For booting and operating instructions, refer to the OS/A+ manual.

III.3. CP/M

The 64k upgrade for the ATR8000 includes CP/M configured for the ATR8000 and a CP/M manual. While CP/M is operating the ATARI acts as a smart terminal. The boot process of CP/M sends the ATARI a "terminal" program that tells it to be a terminal and to let the ATR8000 be the master processor. Then the 4MHz Z80 processor of the ATR8000 controls the system. (Whereas the ATARI is the master processor under ATARI DOS and OS/A+.)

The terminal program configures the ATARI to operate as an ADM 31/Televideo/Soroc terminal. Following subsections contain information pertaining to the terminal program. The keyboard controls that CP/M recognizes to perform certain screen operations are listed and explained in a chart. And for more advanced users, there is a listing of the CRT control and escape sequences, as well as display character codes.

This section also describes and tells how to use the Software Publishers double density CP/M programs. DDINIT.COM is used in place of the single density CP/M INIT.COM, DDSYSGEN.COM in place of SYSGEN.COM, DDCOPY.COM in place of COPY.COM. The other SWP programs are not associated with single density programs in the CP/M manual.

III.3.A. Booting CP/M

With the 64k upgrade you receive two disks. Disk #1 (P.N. ATR8000-TERM-1.0) is the terminal program. Disk #2 is the CP/M disk. To boot:

STEP 1 Turn the power on the ATR8000 and the disk drives (a standard drive must be Drive 1). Put Disk #1 (the terminal disk) in Drive 1 and close the drive door.

STEP 2 Turn the power on the ATARI. The drive will begin running. After 10 seconds the screen will show: #ATRMON.

STEP 3 Remove the terminal program disk from the drive. Insert the CP/M disk, Disk #2 and close the drive door.

STEP 4 Type: B<RETURN>. The CP/M prompt A> will appear on the screen. CP/M is now loaded. (To look at the disk's directory, simply type: DIR<RETURN>.)

As long as the ATR8000's power is on, the terminal will be active. The reset button may be used without reloading the terminal program and CP/M. However, if the power is turned off, the boot process must be repeated.

III.3.B. SWP Programs

Software Publishers' furnishes several CP/M utility programs for 64k upgrade purchasers. Each of these programs is explained below.

III.3.B1. Disk Initializing: DDINIT.COM

This is a dual density disk initialization program. It has four formatting options: one single density format (the standard) and three double density formats. (DDINIT automatically determines whether it is formatting a 5 1/4" or an 8" disk.) This program is used in place of the single density INIT program explained in the CP/M manual.

Before using new disks in the drives of the ATR8000, you must format them. Run DDINIT and select a format from the menu. (Once DDINIT has been run and its menu appears on the screen, the disk it was run from may be removed from the drive.) Like most SWP programs, the DDINIT screen prompts will lead you through the program. The screen will show these four selections:

Single density:	#1	128 bytes
Double density:	#2	256 bytes
	#3	512 bytes
	#4	1024 bytes

The larger the byte size, the more room there is on the disk for data storage. We suggest marking the format used on the disk label and recommend using Format #4 as a standard because it formats for the largest data storage. [It is important to know the format used for DDCOPY. DDCOPY only works between disks that have the same format.]

After selecting the format, you are asked to enter the number of the drive to be used for formatting. Enter the selection. Then you are asked whether to format a single or a double-sided disk. Enter your selection.

The selections show on the screen. Put a disk in the selected drive and to press <G> to begin. (If formatting an 8" disk make sure that there is a foil write-protect tab over the notch in the disk or the disk will not be able to be written to. 5 1/4" disks cannot have a write-protect tab on them.)

DDINIT will format and verify the disk. A "V" will appear for every track if it passes verification. If any "?"s appear, those tracks did not pass verification. Do not use disks that do not pass the verification 100%. (You can try reformatting a disk with "?"s.)

Once the formatting is finished, you have the option of formatting more disks with these same selections. When all

desired disks are formatted, make sure that a CP/M disk is in Drive 1 (if you removed the disk after running DDINIT), and press CTRL C to return to CP/M.

III.3.B2. Reading and Writing Systems Tracks: DDSYSGEN.COM

This is a double density program used to read and write double density systems tracks. [The systems tracks are the first three tracks of a 5 1/4" disk and the first two tracks of an 8" disk. The remainder of the tracks are called the user tracks. The data in the systems area of the disk is used to boot the computer.] This program is used in place of the single density SYSGEN program explained in the CP/M manual.

We recommend that you initialize all your disks with DDINIT before using this program. DDINIT initializes all the tracks of a disk (systems and user tracks), destroying any "old" data on the disk. For this reason, the systems tracks need to be written onto the disk after the disk has been initialized.

You can write a new set of systems tracks on a disk without reinitializing it. This is done when you change printer drivers (using CONFIGUR.COM) or if the systems area of a disk has been "zapped."

[It is necessary to write new systems tracks on the disk if you change printers (and, therefore, the printer driver) for the proper printer driver to be loaded when the system is booted.]

To use DDSYSGEN, put a disk with this program into Drive 1, type DDSYSGEN and press <RETURN>. There are two options:

#1 Read systems tracks from a double density disk.

#2 Write double density systems tracks to a disk.

To put systems tracks on a disk, first select #1 [Read]. You are asked which drive the systems tracks will be read from. Insert a bootable double density systems disk (CP/M disk) into Drive 1. Type 1 and press <RETURN>. Press <RETURN> again and the tracks will be read into memory from the disk in Drive 1. When the function is complete, the DDSYSGEN menu will reappear on the screen.

Now select #2 [Write]. Put the disk you wish to write the tracks to into Drive 1. Type 1 and press <RETURN>. Press <RETURN> again. The systems tracks of the disk will be reinitialized, then the system will be copied from memory onto the disk. When the function is complete the menu will reappear on the screen.

If any problems occur (such as a bad disk), the message "Disk I/O error" will flash on the screen. If this happens, repeat the

Enter your selection. The screen nows asks for a word length selection and offers two choices:

7, 8

Enter your selction. The program will now install the selected printer driver into the BIOS on the disk in Drive 1. Test the driver to make sure it works correctly. [In CP/M, entering a CTRL P from the keyboard turns the driver on. Anything else typed after the command should print out on the printer (some printers require you to press <RETURN> first). Another CTRL P will turn the driver off.]

Once the driver works from this disk, read these systems tracks into memory using DDSYSGEN, and write them onto your other CP/M disks.

CUSTOM.COM:

This program allows the user to install a custom printer driver. This driver must be called CUSTOM.COM. It must begin at location F800 and cannot be more than 128 bytes long.

III.3.B4. Backing Up Disks: DDCOPY.COM

This program is a double density copy program. It makes an exact copy of the user tracks of the source disk on the destination disk, erasing any existing data on the destination disk. DDCOPY does not copy system tracks (DDSYSGEN does). This program is used in place of the single density COPY program explained in the CP/M manual.

DDCOPY requires that both the source and the destination disks be of the same double density format. To use DDCOPY, have DDOPY on the source disk (or on another disk with the same format as the source disk). Put the disk with DDCOPY in Drive 1, type DDCOPY and press <RETURN>.

When asked for the name of the source disk, have the source disk in Drive 1, type 1 and press <RETURN>. Put the destination disk into Drive 2. Answer 2 when asked which is the destination drive and press <RETURN>.

All the user tracks will be copied from the disk in Drive 1 to the disk in Drive 2. Since each track is copied REGARDLESS of whether it contains data, DDCOPY should only be used to copy disks with a large amount of data so you won't have to wait for it to copy several blank tracks. (Use PIP for smaller copy tasks.) REMEMBER that DDCOPY erases any existing information on the destination disk.

Enter your selection. The screen nows asks for a word length selection and offers two choices:

7, 8

Enter your selction. The program will now install the selected printer driver into the BIOS on the disk in Drive 1. Test the driver to make sure it works correctly. [In CP/M, entering a CTRL P from the keyboard turns the driver on. Anything else typed after the command should print out on the printer (some printers require you to press <RETURN> first). Another CTRL P will turn the driver off.]

Once the driver works from this disk, read these systems tracks into memory using DDSYSGEN, and write them onto your other CP/M disks.

CUSTOM.COM:

This program allows the user to install a custom printer driver. This driver must be called CUSTOM.COM. It must begin at location F800 and cannot be more than 128 bytes long.

III.3.B4. Backing Up Disks: DDCOPY.COM

This program is a double density copy program. It makes an exact copy of the user tracks of the source disk on the destination disk, erasing any existing data on the destination disk. DDCOPY does not copy system tracks (DDSYSGEN does). This program is used in place of the single density COPY program explained in the CP/M manual.

DDCOPY requires that both the source and the destination disks be of the same double density format. To use DDCOPY, have DDOPY on the source disk (or on another disk with the same format as the source disk). Put the disk with DDCOPY in Drive 1, type DDCOPY and press <RETURN>.

When asked for the name of the source disk, have the source disk in Drive 1, type 1 and press <RETURN>. Put the destination disk into Drive 2. Answer 2 when asked which is the destination drive and press <RETURN>.

All the user tracks will be copied from the disk in Drive 1 to the disk in Drive 2. Since each track is copied REGARDLESS of whether it contains data, DDCOPY should only be used to copy disks with a large amount of data so you won't have to wait for it to copy several blank tracks. (Use PIP for smaller copy tasks.) REMEMBER that DDCOPY erases any existing information on the destination disk.

III.3.B5. CP/M Disk Parameters: DISKDEF.COM

This is a program that defines CP/M disk parameters so disks from other computer systems can be used on the ATR8000. For instructions, refer to Appendix A.

III.3.B6. Running the D.C. Hayes Smart Modem: MODEM7.COM

This program is used to run the D.C. Hayes Smart Modem from the RS-232 port of the ATR8000. MODEM7.COM is a program from the CP/M users' group that has been reconstructed for the ATR8000. For operating instructions, refer to the file MODEM7.DOC on the distribution disk.

III.3.B7. Primitive Disk Access: DISKMON.COM

This program gives you primitive access to a disk. It will define tracks, sectors, blocks, and files that have disk errors and allow you to edit them. Diskmon's commands are listed below:

READ filename.ext<RETURN>. This command can be entered in several ways:

RBn	B for block, n for number
RTn	T for track
RTnSn	T for track, S for sector
R	reads next sector. This accesses the next sector in numerical order, i.e., Sector 2 follows Sector 1.

EDIT filename.ext<RETURN>. Allows editing of blocks, tracks and sectors. When editing anything larger than a sector, <RETURN> accesses the next sector. When all sectors have been accessed, X will show after <RETURN> is entered. <CTRL><S> holds display until another key is pressed (except for <RETURN> which aborts the command).

EDIT Bn
EDIT Tn
EDIT TnSn

<ESC> turns the insert on or off.
When the insert is on, the following keys are used to move the cursor for editing position:

<CTRL><D>	(left)
<CTRL><A>	(up)
<CTRL><C>	(right)
<CTRL><B>	(down)

<DEL> toggles between ASCII (letters) and HEX(numbers).

If changes are made in the edit mode, the program will ask, "write changes to disk?" Press <Y> for yes. <RETURN> or <N> for no.

ALLOC. A block map command. Entering ALLOC will display a chart like the one below.

```
 BLOCK #
  0....49  DD++++++++ ++++++++++ ++++++++++ ++++++++++ ++++++++++
 50....99  +++++++::: :::::::::: :::::::::: :::::::::: ::::::::::
100...149  :::::::::: :::::::::: :::::::::: :::::::::: ::::::::::
150...199  :::::::::: :::::::::: :::::::::: :::::::::: ::::::::::
200...242  :::::::::: :::::::::: :::::::::: :::::::::: ::
```

+ indicates used blocks, : indicates unused blocks

ALLOC filename.ext<RETURN>. This shows a block map like the one above, indicating by +'s where the file resides on the disk.

MAP B. Verifies the disk and shows a block map.
:'s indicate good blocks.
+'s indicate errored blocks.

MAP T. Verifies disk and shows a track map. <CTRL><S> will hold the display until any other key but <RETURN> is pressed. <RETURN> aborts the command.

:'s indicate good sectors.
+'s indicate errored sectors.

BACKUPsd. Sd are drive names. S is the source disk. D is the destination disk. This will backup using one drive for both the source and destination disks. The program will prompt disk changes. +'s show copy in progress.

BACKUPsd(v). The same as BACKUPsd with verification added.

SELECTa. Allows selection of drive to be analyzed where "a" is the drive number.

BYE. Exits DISKMON.

III.3.C. Keyboard Codes

X (M.S.) / Y (L.S.)		000	001	010	011	100	101	110	111	ASCII
		0	1	2	3	4	5	6	7	HEX
0000	0	CTRL ,	CTRL P	space	Ø	@	P		p	
0001	1	CTRL A	CTRL Q	!	1	A	Q	a	q	
0010	2	CTRL B	CTRL R	"	2	B	R	b	r	
0011	3	CTRL C	CTRL S	#	3	C	S	c	s	
0100	4	CTRL D	CTRL T	$	4	D	T	d	t	
0101	5	CTRL E	CTRL U	%	5	E	U	e	u	
0110	6	CTRL F	CTRL V	&	6	F	V	f	v	
0111	7	CTRL G	CTRL W	'	7	G	W	g	w	
1000	8	CTRL + *	CTRL X	(	8	H	X	h	x	
1001	9	TAB *	CTRL Y	)	9	I	Y	i	y	
1010	A	CTRL = *	CTRL TAB *	*	:	J	Z	j	z	
1011	B	CTRL -	ESC	+	;	K	[	k		
1100	C	CTRL *	CTRL 2	,	<	L	\	l		
1101	D	RET *	|	-	=	M	]	m		
1110	E	CTRL N	CTRL <	.	>	N	^	n		
1111	F	CTRL O	CTRL > *	/	?	O	_	o		

ASCII HEX

*Another key also produces this code

Diagram 21 shows the keyboard codes. These codes consist of two coordinates, X,Y, that represent a unique 8-bit code for each character. X represents the four most significant bits of the code; Y represents the four least signicant bits.

As marked, some of the codes are produced by more than one key. These are:

Code (HEX)	1st key	2nd key	3rd key
08	CTRL +	CTRL H	
09	TAB	SHIFT TAB	CTRL I
0A	CTRL =	CTRL J	
0B	CTRL -	CTRL K	
0C	CTRL *	CTRL L	
0D	RETURN	CTRL M	

III.3.D. The Terminal Program

During the boot process of CP/M, the ATR8000 sends the ATARI a terminal program. Running under this terminal program the ATARI operates as a ADM-31/Soroc/Televideo terminal.

Operating ATARI DOS or OSA+, the ATARI has a 40 column display width on the interfaced television's screen. Once the ATARI is being used as a terminal for CP/M, this display is a full 80 columns by 24 rows. The additional 40 columns are accessed by scrolling the screen display right and left. (As long as a television is used as a monitor there can only be 40 columns visable on the television's screen due to band width limitations. If a RS-232 terminal is interfaced to the ATR8000 in place of an ATARI, all 80 columns are displayed simultaneously.)

Think of the 40 columns shown as a 40 column wide window of an 80 character wide display space. Technically these 80 columns are referred to as Columns 0 - 79, rather than Columns 1 - 80. The normal position of the window shows the first 40 columns of the display, Columns 0 - 39.

Moving the Display Window:

There are three ways to move the 40 column display window. The first method is direct, i.e., entering the sequence from the keyboard will move the display window. The other two are escape and control sequences that must be transmitted from the ATR8000. These are described in Section III.3.CE.

From the Keyboard

1) CTRL ; Moves the window to show the last 40 columns of the display, Columns 40 - 79.

   CTRL . Moves the window to show the first 40 columns of the display, Columns 0 - 39. (A HOME code will also move the display window to show Columns 0 - 39.)

From the ATR8000

2) ESC > An ESC > sequence moves the display window one column to the right. (The window will not move if you try to move right and the window currently shows the last 40 columns, Columns 40 - 79.)

   ESC < An ESC < sequence moves the display window one column to the left. (The window will not move if you try to move left and the window currently shows the first 40 columns, Columns 0 - 39.)

3) CTRL > A CTRL > sequence may be used to set the Auto Display mode where the display follows the cursor. WARNING: Once in the Auto Display mode, it will appear that CTRL<;>, CTRL<.>, ESC > and ESC < no longer work. This is because the screen is repositioned after each character is received by the display part of the program.

III.3.E. Display Control Codes for the CRT

While running CP/M, there are several control sequences to enhance system operation. These control codes and escape sequences control the video display to perform sophisticated screen manipulations. The ATR8000 responds to the following codes when CP/M is running and they are sent to the CRTOUT routines in the BIOS.

CONTROL CODES

Code (hex)	Sequence	Function and Description
07	CTRL G	**Bell.** This code will sound a short tone to alert the operator.
08	CTRL H	**Backspace/ Cursor Left.** Moves the cursor back one column position (to the left) without altering the character under the cursor.
09	CTRL I	**Horizontal Tab.** Moves the cursor to the next tab stop. Tabs are preset for every eighth column.
0A	CTRL J	**Linefeed/ Cursor Down.** Moves the cursor down a line. If cursor is at bottom of screen, scrolls screen up.
0B	CTRL K	**Cursor Up.** Moves the cursor up one row without effecting the current column position. If cursor is at top of screen, scrolls screen down.
0C	CTRL L	**Cursor Right.** Moves the cursor one column position to the right without altering the character under the cursor.
0D	CTRL M	**Carriage Return.** Returns the cursor to the first column position of the current row.
1A	CTRL Z or CTRL TAB	**Clear Screen and Home Cursor.** Clears the entire screen and places the cursor in the home position (Column 0, Row 0).
1B	CTRL [	**Escape.** The first character of an escape sequence. (Escape sequences follow.)
1E	CTRL <	**Home Cursor.** Moves the cursor to the home position (Column 0, Row 0) without otherwise effecting the screen display.

Code (hex)	Sequence	Function and Description
1F	CTRL >	**Display Next Character Direct.** After receiving this display code, the next character is displayed directly on the screen without interpreting it as a special display function code.

ESCAPE SEQUENCES

Code (hex)	Sequence	Function and Description
28	ESC (	**Disable Attribute Display.** Will cause all succeeding characters displayed on the screen to unconditionally have the upper bit reset, so that the selected attribute mode will not be displayed. Display will continue in this mode until changed by the "ESC)" sequence.
29	ESC)	**Enable Attribute Display.** Setting this mode will cause all following characters displayed on the screen to unconditionally have the upper bit set, thereby causing the selected attribute mode to be displayed. This mode will continue in effect until the "ESC (" mode disables it.
2A	ESC *	**Clear Screen.** Clears the screen and moves the cursor to the home position.
37	ESC 7	**Set Inverse Video Attribute Mode.** This code will not actually begin displaying inverse video characters on the screen. An ESC) sequence is used to enable the display of the attribute characters, or storing characters on the screen with the upper bit set, as described above. Thus, different attribute modes can be selected without affecting the screen display as long as there are NO characters on the screen with the upper bit set. If there are characters displayed on the screen with the upper bit set, changing attribute modes will cause an immediate change in the way the upper bit characters are displayed, depending on the attribute mode.
3D	ESC =	**XY Cursor Position Leadin.** Position the cursor to the location indicated by the following two row and column codes. The

Code (hex)	Sequence	Function and Description
		"home" position is designated as Row 0, Column 0. An offset of 20h must be added to the X and Y position codes. The positioning formula is: ESC=(X+20h)(Y+20h) where legal Y (column) values are between 0 and 79 and legal X (row) values are between 0 and 23. If a column or row position code exceeds the normal 80 column or 24 row boundaries, that row or column is set to 0.
45	ESC E	**Line Insert.** Will move the entire line the cursor resides on down one line, filling the cursor line with blank spaces, and causing the bottom line on the screen to disappear.
51	ESC Q	**Character Insert.** Will insert a space at the current cursor position, causing the character under the cursor and all characters after the cursor to be shifted one position to the right. The last character on the line will disappear.
52	ESC R	**Line Delete.** Similar to the line insert function. The line on which the cursor resides will be deleted from the screen and all lines below it will be moved up one line. The position of the cursor will not change.
57	ESC W	**Character Delete.** This will delete the character under the cursor and cause all characters to the right of the cursor to move one position to the left. The last character position of the line will be replaced by a space.
54	ESC T	**Clear to End of Line.** Clears all characters from the current cursor position to the end of the current line, inserting spaces. The cursor position is unchanged and the characters before the cursor are unchanged.
59	ESC Y	**Clear to End of Screen.** Clears all characters to spaces beginning with the current cursor position and ending with the end of the screen. Characters before

Code (hex)	Sequence	Function and Description
		the cursor remain unchanged and the cursor position remains the same.
3C	ESC <	**Scroll Left.** Scrolls the screen display to the left. When the first 40 character positions are displayed on the screen no further action takes place. This and the Scroll Right function allow the display of any 40 character section of the 80 character line width.
3E	ESC >	**Scroll Right.** Scrolls the screen display to the right. When the last 40 characters of a line are displayed on the screen, no further action is taken.
59	ESC Zn	**Auto Return/ Auto Scroll Up/ Auto Scroll Down/ Auto Display.** These four features of the terminal program can be turned on and off by an ESC Z sequence. The key following the sequence (n) is stored by the program and is used to control these features. Diagram 22 lists the options. **Auto Return.** The default is on. This feature automatically performs a carriage return line feed when the cursor is in the last display column, Column 79 (the 80th column), and the terminal program is sent another character (the character goes to the first column, Column 0, of the next row). **Auto Scroll Up.** The default is on. This automatically scrolls the screen up when the cursor is in the 24th row, Row 23 - the last shown row), and it is moved down. **Auto Scroll Down.** The default is on. This automatically scrolls the screen down one row when the cursor is in the first row, Row 0, and it is moved up. **Auto Position.** The default is off. This automatically switches the display window to show the first 40 columns of the display space, Columns 0 - 39, or to show the last 40 columns of the display space, Columns 40 - 79, depending on the location of the cursor. Thus, when the display window shows the first 40

Code (hex)	Sequence	Function and Description

columns, and the cursor is moved to Column 40, the display window shifts to show the last 40 columns so that the cursor is kept in view.

WARNING: If this feature is turned on, the ESC > and ESC < features will appear to not work. This is because the Auto Position feature repositions the screen after the ESC > and ESC < functions position the window.

DIAGRAM 22: ESC Z Codes

Code \ Action n	Auto Return	Auto Scroll Up ↓	Auto Scroll Down ↑	Auto Display
0	ON	ON	ON	OFF
1	OFF	ON	ON	OFF
2	ON	OFF	ON	OFF
3	OFF	OFF	ON	OFF
4	ON	ON	OFF	OFF
5	OFF	ON	OFF	OFF
6	ON	OFF	OFF	OFF
7	OFF	OFF	OFF	OFF
8	ON	ON	ON	ON
9	ON	ON	ON	ON
:	ON	OFF	ON	ON
;	OFF	OFF	ON	ON
<	ON	ON	OFF	ON
=	OFF	ON	OFF	ON
>	ON	OFF	OFF	ON
?	OFF	OFF	OFF	ON

III.3.F. Display Character Codes

This table shows the code for each character to be displayed by the ATR8000 system. Each character is defined by a unique eight bit code which is represented by a hexadecimal code "XY" where X represents the 4 most significant bits of the code and Y represents the 4 least significant bits of the code.

There are a total of 128 characters in the font set. Therefore, Y represents a hexidecimal number from 0 to F and X represents a hexidecimal number from 0 to 7. Thus the complete font set is defined by codes from 00 to 7F.

DIAGRAM 23: Display Character Codes

Y LS / X MS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
1																
2	space	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	•	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	•	|	•	•	•

The display characters in the first two lines of this chart, Lines 0 and 1, can only be displayed after a CTRL > sequence. This can be done by using an echo program (a program that reads in keyboard entries and sends it back) or can be done in a program running on the ATR8000. They cannot be directly accessed from the keyboard.

For example, using an echo program to display the charaacter at the coordinates 0,1 (X,Y) in this chart, you first send a CTRL >. Then you refer to the Keyboard Code chart (Diagram 21) and get the code for 0,1. This code is CTRL A. Send CTRL A and the character will be displayed on the screen.

•These codes cannot be generated from the ATARI keyboard. They can only be displayed if a program sends the code to the ATR8000. (Notice that these coordinates are not coded in Diagram 21.)

IV. Testing the Installed System

Check the ATR8000 system and make sure that all necesary cables are connected and that drive numbers are unique. Then turn the power on the ATR8000, the ATARI (or RS-232 terminal), drives and any peripherals. To test ATARI DOS operation, boot the system using the standard ATARI DOS boot precedure.

To test OS/A+, follow the boot instructions in the OS/A+ manual. To test CP/M, follow the instruction in Section III.3. of this manual.

If you have a printer connected to the ATR8000 system, test it using the print commands of the current operating DOS. If the printer doesn't print properly, check the hardware section for proper connections. If the printer doesn't work under CP/M and you changed the default parallel printer driver to another using CONFIGUR.COM, make sure that the printer's parameter settings are the same as the parameters of the printer driver.

Try a sampling of DOS commands to test your system. For instance, under CP/M type DIR<RETURN> to get a directory listing or STAT<RETURN> to find out how much disk space remains. For ATARI DOS and OS/A+ test similiar operations.

That's it! Refer to the ATARI DOS, the OS/A+, the CP/M and the ATR8000 instruction manuals for operational details.

V. Expanding the ATR8000

Because of its versatility, the ATR8000 system is capable of expanding as you can afford to add to it. To add components to the ATR8000 after the initial connection, find the hardware connection section that best describes all of your equipment, and follow the connection guidelines. The following subsections contain tips and instructions.

V.1. Converting to 64k

Read this subsection carefully to convert the 16k ATR8000 to 64k. If you do not feel competent to make this change (or if you're unsure), send your ATR8000 to us to have this done. The charge for us making the conversion is $20 plus the cost of the upgrade.

To make the conversion:

STEP 1 Turn the power off and unplug the ATR8000. Do NOT repower or plug in the unit before this entire process has been completed.

STEP 2 Consult Section II.5.A. and make the necessary changes in J1, J2, J3, J4, J5, J6, and J8.

STEP 3 Remove the 16k RAM I.C.'s from sockets U1 to U8. These sockets are directly above J3 - J6 on the ATR8000 circuit board. A thin screwdriver blade may be used to gently pry the chips from the sockets. Store these chips in the conductive foam the 64k RAM chips came in.

STEP 4 Put the eight 64k Dynamic RAM chips (200 nanoseconds) into the now-empty U1 - U8 sockets. Make sure that Pin 1 on each chip (marked by a small circle in the upper left corner or by a semicircular notch cut in the upper edge of the chip) is placed in the socket so that it matches Pin 1 on the socket (marked by a semicircular cut in the upper edge of the socket). Pin 1 on the sockets and the 64k D RAMs should point towards the white letters denoting U1 - U8 on the ATR8000 circuit board.

STEP 5 Carefully inspect the circuit board to insure that the above procedure was performed EXACTLY. If you turn the power on and did not correctly follow this procedure, the ATR8000 may be damaged.

V.2. Adding Drives, a Printer, a Modem

If you add a printer or a modem (or buy a different one), read

all information pertaining to the connection and configuration BEFORE installing it. To add disk drives, follow the instructions for internally configuring a drive, making sure that each drive on the system has a unique drive number.

After making any changes to the ATR8000 system, carefully inspect the changes for accuracy before repowering and testing the system.

VII. Warranty and Software License

ATR8000 Warranty

The ATR8000 is under warranty for 90 days from the original end user's date of purchase. To be valid the enclosed registration card must be thoroughly completed and mailed to Software Publishers, Inc. within 10 days from date of purchase. The serial number on the ATR8000's circuit board must be entered in the proper place on the registration card.

Software Publishers, Inc. is not responsible for any changes the user makes to the ATR8000 circuit board, including the user installing the 64k upgrade, or the user improperly connecting and configuring the ATR8000 and any peripherals. The user is responsible for correctly connecting all interface cables in the proper way (i.e., matching Pin 1s on the connectors on both ends of the cable). Detailed instructions for such connections are contained in this ATR8000 manual.

Software Publishers, Inc. is not responsible for any damage done to peripherals connected to the ATR8000 system. Again, all connections are thoroughly explained. If the user has any uncertainties about connections, it is his responsiblilty to consult his dealer BEFORE connecting his system.

Software Publishers, Inc. is responsible for replacing malfunctioning components on the under-warranty ATR8000. This responsibility is void if the user has damaged the circuit board in any way. This warranty becomes void if the end user resells the ATR8000.

The user is responsible for shipping charges to Software Publishers, Inc. for any warranty work. Software Publishers, Inc. will pay return shipping within the continental United States.

Warranty for Drives Purchased From Software Publishers, Inc.

Disk drives purchased from Software Publishers, Inc. are under warranty for 90 days from the original end user's purchase date. This warranty covers the drive and included power supply. To be valid, the end user must complete and return the enclosed registration card.

Software Publishers, Inc. is responsible for thoroughly testing the drive before shipping it. Any malfunctions in an under-warranty drive will be repaired without charge if the user has not tampered with the drive and power supply. The user is responsible for thoroughly understanding how to configure a drive before doing it. This user responsiblility includes consulting his dealer about any uncertainties BEFORE configuring the drive.

The user is responsible for shipping charges to Software Publishers, Inc. when sending a drive under warranty for repairs. Software Publishers, Inc. is responsible for return shipping charges within the continental United States.

Repairs on Components Not Under Warranty

Once the warranty has expired, or if the user has voided the warranty, Software Publishers, Inc. will repair malfunctioning ATR8000s and other peripherals sold by Software Publishers for repair charges. These charges will include the cost of materials used in the repair and labor.

The user will be assessed for all time spent analyzing and repairing the unit. Any pertinent information sent by the user regarding the nature of the malfunction will decrease the analyzation time, and, therefore, the charges assessed.

The total charges will depend upon the severity of damage. The user is responsible for shipping charges to and from Software Publishers, Inc.

Injury to Customer

Software Publishers, Inc. assumes no responsibility for any injury to CUSTOMER resulting directly or indirectly from the operation of, or connecting to, or configuring of the ATR8000 and its peripherals. This manual fully cautions CUSTOMER to turn off the power and unplug the unit from electrical outlets when performing any operation in potentially hazardous situations. Software Publishers, Inc. is not responsible for any injury incurred if CUSTOMER makes any cuts in the traces of the ATR8000 circuit board (such as changes for jumper options).

CUSTOMER assumes full responsibility for all of his actions in dealing with the ATR8000 system. If CUSTOMER is unsure of his ability to perform any such operations, it is his duty to consult a technical expert.

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