

Powermate Installation and Operating Instructions

Congratulations on the purchase of your new Powermate expansion unit for the Coleco ADAM computer! We at Micro Innovations believe that Powermate is the ideal companion your ADAM computer. Powermate adds two RS-232 ports, an ADAM-compatible parallel printer port, an ADAM-compatible memory board expansion port (for Orphanware and E & T memory expander boards), one or two hard disk drives, and one or two floppy disk drives.

This document contains all the information you'll need to get your Powermate up and running. It's as simple as plugging it in and booting. Detailed instructions take you from the unpacking and inventory stage to connecting cables, plugging in the Powermate interface board, booting the software, making boot disks or tapes, and configuring and installing the software (if you wish to change default settings). It also describes the public domain packages provided and tells you what document files to read to use each one.

We know you're anxious to get started. But first please read all the way through the instructions so you'll be somewhat familiar with the process before you actually start the installation.

A WORD OF WARNING ABOUT STATIC ELECTRICITY!

Before you get started, just a word of warning about static electricity. The integrated circuit chips used on the Powermate interface board can be destroyed by static charges. If you notice that you get shocks when you touch metal appliances after walking around the room, then you should take precautions to prevent static discharges when handling the interface

board. There are a couple of common precautions you can take if you suspect static electricity is a problem in your installation environment.

One precaution you can take is to discharge yourself each time before you touch the interface board. You can do this by performing your installation near an appliance that you can touch to discharge the static electricity just prior to handling the interface board. Another way is to connect a wire to a water pipe or the metal frame of a grounded appliance (like a refrigerator). AC power outlets in modern homes and businesses also can be a ground source (you can pick up the ground from the screw that holds the cover plate onto the receptacle). Wrap the other end of this wire around your wrist or a finger. Make sure you are using the frame of a grounded appliance.

By the way, the interface board chips are not particularly sensitive to static electricity, but like all normal 74LS series integrated circuits, they can be destroyed if hit with a big enough discharge.

UNPACKING

Powermate comes double-packed in a 12" x 12" x 24" box and weighs about 15 pounds, depending on configuration. Inside the box, you'll find ten items, counting this document -

- (1) your invoice,
- (2) the installation and operating instructions,
- (3) the Powermate disk enclosure,
- (4) the disk enclosure's AC power cord,
- (5) the Powermate interface board,
- (6) the Powermate distribution diskette or tape,
- (7-10) four ribbon cables:

two RS-232 cables (for the serial ports)
a parallel printer cable, and
the disk interface cable.

Please make sure that you have all of the components before going any further. If anything is missing, please give us a call so we can ship you a replacement. Assuming that everything is accounted for, let's proceed to installation.

INSTALLATION

The disk enclosure can sit anywhere near the ADAM, as long as the disk interface cable can reach it. All cables are six feet long so you should have plenty of choices about where to place the disk enclosure and the other attached peripherals.

Locate the cable bundle and separate the cables. Locate the one marked "DISK". You'll notice a 26 pin socket connector on one end and a 25 pin RS-232 type DB-25 female connector on the other. The socket connector plugs into the Powermate interface board at J1 and the DB25 connector plugs into the back of the disk enclosure. The socket connector is keyed so that it plugs into the interface board in only one location (J1) and one orientation in that location (with the label up). Now, place the interface board in front of you on the table or desk you're working at, with the printed circuit board edge connector towards you. Look at figure 1 below to identify the connectors.

edge connector). Align the pins on J1 with the holes in the socket connector. Make sure that all pins on J1 align with all holes on the socket connector.

Gently push the socket connector onto J1 until it seats. Now plug the other end of the cable into the disk chassis - it can only go in one way. If you don't need your serial ports or parallel printer port up and running yet, the disk cable is the only one you actually need to run Powermate. You can skip the next three paragraphs and come back to them later if you want to get it up and running quickly.

You're now ready to connect the parallel printer cable to the interface board. Locate the cable marked "PRINTER". This cable has a 26 pin socket connector on one end and a 36 pin Centronics connector on the other. Like the disk cable, the socket connector goes into J2 only one way. With the label, which says "PTR (TOP)", towards the far edge of the board, align all pins and holes as you did for the disk cable. Gently push the socket connector onto J2. For now, leave the other end unconnected. If you have too many things connected at first, you may have difficulty getting the cables to reach as you're installing the interface board into the computer.

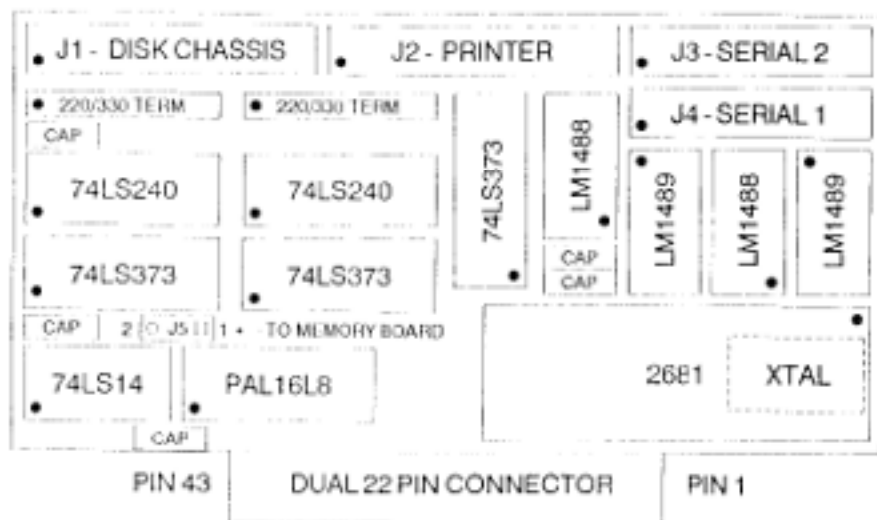


FIGURE 1 - INTERFACE BOARD LAYOUT (COMPONENT SIDE)

Make sure that the label on the socket connector which says "DISK (TOP)" is towards the far edge of the board (the edge farthest away from you, opposite the

Now for the Serial ports. Note that the two serial cables are labeled differently. This is because they are made differently. The way the cable exits the socket

connectors is different for each. Serial port number two's cable has the cable coming out the connector near the top of the computer while number one's has it coming out towards the bottom of the computer. This is to keep interference between the two socket connectors at a minimum - they are close together when both installed.

Now locate the cable marked *SERIAL 1*. Notice that it has a 20 pin socket connector on one end and a DB-25 female connector on the other. Align the 20 pin socket connector with the pins on J3 and push it onto J3. The label, which says *SER1 (TOP)*, goes toward the far edge of the board. Do the same with the cable marked *SERIAL 2*. The label on its socket connector says *SER2 (TOP)*. As before, leave the other ends unconnected for now.

Okay! We're ready to plug the interface board into the computer. Pick up the interface board with its dangling cables and take it to the computer. Assuming you are looking at the computer from its front, the board goes into the center expansion slot with the components towards the left. Some of the other ADAM add-on boards have the components on the right when they are installed. Make sure that the interface board has its components facing the left side of the machine. This means that the cables will exit the computer to the left side unless you wrap them back over the top of the board.

If you already have a board in the center slot, it will have to be removed. If you do have a board in the center slot, it is most likely a parallel printer interface or memory addressor board. The parallel printer port on the Powermate interface will replace all of the functions of the board you have to remove, so don't worry that you'll lose your printer port or memory expansion board addressing capability. You can now take the spare board to your next club meeting and sell it to someone who doesn't have a Powermate.

If you have a memory expander board installed in slot #3 (the right slot), you'll have a wire running from it to the board you're removing. The Powermate interface board provides the same signal to your memory expander board, so detach the wire at the printer board end.

Locate connector J5 on the back of the Powermate interface board. J5 consists of two pins - pin 1 is for the bank switch signal to the memory board and pin 2 is

for a ground line. If you experience erratic operation of your memory board, you'll have to use both pins and twisted wire between the boards. Twisted wire will reduce the amount noise that the signal wire will pick up. If you're using a single wire from the memory expander board, connect it to J5 pin 1.

Connect the memory board wire (if needed) to the Powermate interface board and insert it into the center expansion slot (remember, the cable connectors face the left side of the computer). Adjust the cables so they exit the computer on the left side. Make sure that the interface board sits straight up in the center slot (the cables can pull it towards the left so adjust their tension so that the board sits up straight in the slot). The top cover can be put back in place but won't close all the way unless you cut a narrow slot along the left side of the cover for the cables to exit.

POWERING UP

Plug the Powermate disk chassis into the same wall outlet or outlet strip you have your ADAM plugged into. With no disks or tapes in the ADAM, turn the ADAM on first. Smartwriter should come up and sign on. If it does, skip the next paragraph.

If it doesn't, turn off the power and remove the interface board. Try it again with the interface board removed. If Smartwriter comes up fine without the interface board installed, you probably have a bad interface board. We know it worked when it left the factory so something probably happened to it in transit or during installation. Static electricity is one possibility. Give us a call and we'll send a replacement.

Assuming Smartwriter comes up, turn on the power to the disk chassis. On the Powermate 2, the power switch is located in the upper left corner on the back of the chassis when viewed from the front. You should hear the hard disk motor start. If you have a 10 MB unit, the hard disk will reach it operating speed in a couple of seconds. It will then seek the beginning and end of the hard disk a couple of times. This is normal. No drive light will come on. If you have a 20MB unit, the hard disk will take longer to come up to speed - around 5 seconds. The hard disk will then make a fairly loud noise as the heads are brought to the home position. This is normal. It will then seek the end and back to the beginning of the drive and the drive light will come on. Do not boot the computer until the drive activity has stopped.

BOOTING UP

After the hard disk is finished testing itself, we can boot the computer. You'll need an additional formatted data packs or diskettes to create working copies of the boot media. The diskettes or tapes must have been formatted by the operating system you wish to install. Both the EOS and TDOS operating systems are pre-installed on the hard disk. However, the distribution tape or disk does not boot from the hard disk. This allows you to choose which operating system you want to boot normally. The boot media you create will boot the appropriate operating system directly from the hard disk.

Insert the distribution diskette or tape into the appropriate ADAM drive (you must boot from an ADAM diskette or tape drive). Pull the computer reset switch. TDOS 4.0 will sign on. This version of TDOS does not have Powermate drivers in it and is used only for booting the distribution media. You can see what programs are provided on the distribution media by typing "DIR" and hitting the return key. The exact collection of files on the distribution may vary but should include at least the following:

40TDS???.COM	40 column TDOS Install program
80TDS???.COM	80 column TDOS Install program
CLONE.COM	The utility program used to create a bootable EOS media
DSKSZ???.COM	Floppy disk format selection
EOSHD???.IMG	EOS Hard Disk operating system
EOS.COM	Utility to boot EOS from TDOS
FC???.COM	TDOS/ADAM File Convert Utility
FM???.IMG	AJM's File Manager program
FORMT???.COM	Floppy/tape formatting program
HDFMT???.COM	Hard disk formatting program
IMAGE.COM	Reverse utility program to CLONE
IOBYTE.COM	Utility to set TDOS IOBYTE
MIPART???.COM	Hard disk partitioning program
PATH???.COM	TDOS set path utility
RDPARM???.COM	Read floppy disk parameters utility
SMARTBAS.IMG	Coleco SmartBasic patched for the Powermate hard disk
STPARM???.COM	Set floppy disk parameters utility

The question marks in each file name will be replaced by the version number of the program.

CONFIGURING AN OPERATING SYSTEM

If you desire to boot up TDOS from the hard disk,

you need only to select which version you want (the 40 column for the ADAM screen or the 80 column for an external terminal) and execute the appropriate TDOS install program by typing its file name (without the extension) - 40TDS??? or 80TDS???. The install program will prompt you for information about your setup, then install the configured TDOS on the hard disk and write a boot block on your boot diskette or tape. Hitting the reset switch then causes the boot block to be read from tape or diskette and the operating system to be read from the hard disk. You can switch between the operating systems once either is booted from hard disk.

If you want to install EOS as the default operating system, the procedure is a bit more complicated. You'll have to use the CLONE program to place a bootable image of EOS on a disk or tape. You then reset the computer and boot EOS entirely from the diskette or tape. After EOS signs on, you can select a maintenance function (SMART key V) to install EOS on the hard disk. After installing EOS on the hard disk, it will write a boot block onto a boot diskette or tape. After this, hitting the reset switch will cause the boot block to be read from tape or diskette and the operating system to be read from hard disk.

INSTALLING TDOS

Assuming you want to install TDOS as the default operating system, you need to choose between 40 column and 80 column TDOS versions. Unless you have an external terminal or an 80 column add-on, you'll want the 40 column version. Execute the appropriate version by typing its name and hit the return key. For example, if the names of the TDOS install programs provided on the distribution media are 40TDS41B.COM and 80TDS41B.COM, then type its full name, 40TDS41B or 80TDS41B, followed by the return key to execute the one you want.

When the TDOS install program signs on, the TDOS release number is shown on the top line. The first screen asks for you to specify which ADAM disk or tape drive to write the boot block to. It checks immediately after your selection to see if the device exists on your system. If it doesn't, it gives you an error message and lets you try again. You can get out of the installation program at any prompt by typing a CONTROL-C (that is holding down the CONTROL key and hitting the "C" key). The next screen tells you what your TDOS drive assignments are. Drives A through D

are the Powermate hard disk. Powermate floppies are next, if any. ADAM disk drives are next, if any. ADAM tape drives are last, at least one. An example drive assignment for a stock single tape drive ADAM with a single Powermate floppy is:

- A - Hard Drive Volume 1
- B - Hard Drive Volume 2
- C - Hard Drive Volume 3
- D - Hard Drive Volume 4
- E - MI Disk Drive 1
- F - Tape Drive 1

The next screens ask you to specify the size of the MI and ADAM floppy disk drives - one screen for each drive. The choices are:

- 1 - 145K Standard Coleco single-sided 40 track format
- 2 - 254K Medium sized double-sided 40 track format
- 3 - 304K Full-sized double-sided 40 track format
- 4 - 356K IBM-sized double-sided 40 track format
- 5 - 702K Quad density 80 track format
- 6 - 714K Quad density 80 track format

Formats 1 through 4 are used for 5 1/4" floppy diskettes and formats 5 and 6 for 3.5" diskettes. The exact selection of formats available for your system will depend on the definition of the floppy disk drives connected. For example, if we set up your unit for a Powermate 5 1/4" floppy disk drive at the factory, only those options applicable to 5 1/4" floppy drives will appear on your menu. The full list will appear for ADAM floppy disk drives because the ADAM floppies can't tell us what format they are. Not all of these selections are valid - you can't have a 714K format on a 5 1/4" floppy disk drive. All formats except the 356K and the 714K formats are compatible with existing ADAM formats.

The DSKSZ??? program lets you temporarily change formats so that you can keep your permanent format different than one you might use only for information interchange. To permanently change to another format, you must re-install TDOS.

After selecting floppy diskette formats, the next two screens ask if you'd like to change the parameters on the Powermate serial ports. Serial Port 1 is wired for direct connection of an external modem and is set up for a default of 2400 baud, no parity, 8 data bits, and one stop bit. You can exit the screen without changing any of the parameters (by hitting a *0), or you can choose to change any of the parameters if you desire

(a *1* to change baud rate, a *2* to change parity, a *3* to change number of data bits, or a *4* to change number of stop bits). The default settings are normal for a 2400 baud external modem. After exiting the screen, you are asked the same questions about Serial Port 2, which is wired for direct connection of an external CRT terminal or a serial interface printer. Its defaults are 19200 baud, no parity, 8 data bits, and 1 stop bit - normally the highest speed an external terminal can run.

You are next asked if you would like to change the IOBYTE assignments. CP/M and TDOS use the IOBYTE to know which physical devices to use for each of their four logical devices. The four logical devices are CON: (the system console), RDR: (the reader), PUN: (the punch), and LST: (the system printer). The reader and punch device names are left over from the days when a paper tape reader or a paper tape punch were common microcomputer peripheral devices. Each of the four logical devices can be assigned to any of four physical devices, and the physical devices to be selected from can be different from logical device to logical device. The valid assignments for logical devices are shown in the table below:

Logical Device	Permitted Physical Device Assignments			
CON:	TTY:	CRT:	BAT:	UC1:
RDR:	TTY:	PTR:	UR1:	UR2:
PUN:	TTY:	PTP:	UP1:	UP2:
LST:	TTY:	CRT:	LPT:	UL1:

Definitions of the physical devices are as follows:

For Logical device CON:, the system console -

TTY: Powermate Serial Port #1 in and out
 CRT: The ADAM display and keyboard
 BAT: Powermate Serial Port #2 out, ADAM Keyboard in
 UC1: Powermate Serial Port #2 in and out

NOTE - on the 80 column version of TDOS, physical device CRT: is the ADAM Serial Port

For logical device RDR:, the reader -

TTY: Powermate Serial Port #1 in
 PTR: ADAM Keyboard

UR1: Powermate Serial Port #2 in
UR2: ADAM Serial Port in

For logical device PUN:, the punch -

TTY: Powermate Serial Port #1 out
PTP: ADAM Display
UP1: Powermate Serial Port #2 out
UP2: ADAM Serial Port out

For logical device LST:, the printer -

TTY: Powermate Serial Port #1 in and out
CRT: Powermate Serial Port #2 in and out
LPT: The ADAM printer
UL1: Powermate Parallel Printer Port

So it is possible during the installation to define where you want your printer output to go or what device you want to use for the system console. The reader and punch logical devices are not used by many programs. About the only one we know of is the PIP (Peripheral Interchange Program) program supplied with CP/M. You can use PIP to copy files in and out the assigned physical devices (for example - between computers) but no error checking protocol is used. You will be much better off to use one of the modem programs. We provide three on the hard disk, already patched for the Powermate serial ports. All of the modem programs are designed to talk directly to the physical devices and purposely bypass the reader and punch logical devices.

The default IOBYTE assignments are:

CON: CRT: (the ADAM display and keyboard)
RDR: TTY: (Powermate serial port #1 in)
PUN: TTY: (Powermate serial port #1 out)
LST: UL1: (the Powermate parallel printer port)

NOTE - The default system console (CON:) for the 80 column version is the ADAM Serial Port)

After you've selected your IOBYTE assignments or chosen not to change them, the installation program asks if you'd like to change the function key definitions. This is a rather long and technical operation so if you're even marginally satisfied with the function key translations, avoid this part of the process. By the way, the default function key definitions match normal Wordstar definitions.

The next screen asks if you would like to change the SMART key strings. These are the character strings that are sent to the operating system whenever you hit a SMART key. The default settings are:

I	COPY
II	REN (to rename a file)
III	DEL (to delete a file)
IV	LIST (to print a file)
V	TYPE (to display a file on the console)
VI	DIR (to display a directory listing on the console)

The last screen asks you to insert a tape or disk for the boot block to be written on. After you hit the return key, the installation program writes the operating system to the hard disk and the boot block to the diskette or tape. TDOS installation is now complete.

NOTE: The 80 column version asks three additional questions before it prompts you to insert a tape or disk. It asks you if you are using an ADAM keyboard for the console, if you want the SMART key definitions displayed on line 25 of your 80 column display (the display must have a command set compatible with the Heathkit H-19 or Zenith Z-19 terminal, which is what the ADAM uses) and whether or not ADAM Serial Port 2 is configured for an EVE 80 column display.

INSTALLING EOS

To install the EOS operating system on the hard disk, you will need two formatted tapes or diskettes. You must first copy the EOSHDT???.IMG file to a boot diskette or tape, reboot the computer from it, and use the EOSHDT???.IMG program booted from that tape or disk to install EOS onto the hard disk and generate a boot disk that reads the operating system from the hard disk.

To do this, use the CLONE.COM program to copy the EOSHDT???.IMG file to a diskette or tape. You do this by typing:

CLONE EOSHDT???.IMG X:

and hitting the return key. The ??? characters are the actual release number of the EOSHDT program on the distribution diskette. As of the time these instructions are being written, it would be EOSHDT34C.IMG. The release number on the copy you have on your distribution media may differ as updates are made to

the program.

The X: portion of the command line is the letter of the floppy or tape drive you are copying to. If you booted from the distribution diskette or tape, you are operating under a version of the TDOS operating system that does not talk to the hard disk. In this version, only two drives are defined - drive A: is the drive you boot the media from and drive B: is the first of the other type of drive in your system.

For example, if you boot from an ADAM disk, then disk drive 1 is the A: drive and tape drive 1 is the B: drive. The opposite is true if you boot from an ADAM tape drive (tape drive 1 is A: and disk drive 1 is B:). If you booted from the hard disk, then the definitions will depend on your hardware configuration. Run the DRIVES program to determine your letter assignments.

WARNING! - If you booted from the hard disk, its partitions are assigned drive letters A through D. If you select a destination of A, B, C, or D, then you will wipe out the hard disk directory for that drive when you execute the CLONE program. Use the DRIVES program first to display your drive letter assignments. Then select the letter that corresponds to the drive you want to write to.

After you have CLONed the EOSHD???.IMG file to a boot tape or diskette, pull the computer reset switch. EOS will sign on with a nice ADAM graphic screen which identifies the release version of the program and the authors (Tony Morehen and Guy Cousineau of AJM Software). It immediately goes to a second screen that indicates that this version of EOS is for the Micro Innovations hard disk (it will not run on any other hard disk). This screen tells you what hard disk partition you are using and shows the SMART key definitions along with explanations of the functions associated with each (it will also show that you can go to TDOS by hitting the "WILDCARD" key, if you've installed TDOS, and can go to SmartWriter by hitting the "ESCAPE" key).

If you had just formatted and partitioned your hard disk, the screen would tell you that your current hard disk partition is "eeeeeeeeeeee". Only in this particular case, will you need to initialize your hard disk directories prior to installing the operating system on the hard disk. Select the "Maintenance Functions" option by pressing SMART key V. The Maintenance Menu will now appear. Note that the "Initialize Directory" function is accomplished by using SMART

key II, but is only needed after reformatting the hard disk. Your hard disk has already been formatted here at Micro Innovations so you shouldn't need to format it unless you've had a power glitch during a disk write operation or something has gone wrong with your Powermate unit or you simply decide that you should do it. You also may opt to format the hard disk if you decide to repartition it. If or when you do format the hard disk, make sure you have a back-up copy of everything on it, because everything will be overwritten when you perform a format.

The option you'll select to install the operating system on to the hard disk is "Install System", executed by hitting SMART key IV. This function will copy the EOS operating system from memory to the hard disk and prompt you to insert a diskette or tape to write a boot block on. After it finishes with the diskette or tape, you can pull the computer reset switch and EOS will be brought into memory from the hard disk. This completes the EOS installation process.

There are many other features of EOSHD not mentioned here during the installation process. Some of the other options on the maintenance menu allow you to format the hard disk or to repartition the hard disk. Any time you perform either of these two operations, you will wipe out the data on the hard disk. Make sure you've got a back-up if you use these functions. AJM Software's File Manager program, which we provide for patching EOS application programs to run on the hard disk, can perform the back-up and restore functions for EOS partitions. For TDOS partitions, we provide the public domain ACOPY program. Krunching your directory will be necessary if you use File Manager to delete files (the files are marked for deletion but aren't actually deleted until the directory is Krunched).

Another feature not apparent is the SHIFT-UNDO key combination. If you execute an EOS program and want to get out of it back to the operating system, you don't need to pull the reset switch to do it (pulling the reset switch requires you to put in a boot diskette or tape). Simply use the SHIFT-UNDO key combination and EOS will reboot itself directly from the hard disk. Also, the Shift-Wildcard key will park the drive. We recommend that you park the heads on your hard disk drive every time you turn off the power. Please don't forget.

INSTALLING EOS APPLICATION PROGRAMS

We provide SmartBasic already patched for the hard disk. If you have programs written in SmartBasic, use the File Manager to copy them from floppy or tape to the hard disk. You can put them in any partition you want. However, SmartBASIC must be in partition 0. You can change partitions to find your BASIC programs by using the *CATALOG* command in Smart BASIC.

The boot programs that we provide for the popular EOS applications programs are also on hard disk partition 0. The actual executable application programs can be on any partition. However, you must select that partition using Smart Key I before you boot the program.

If you desire, you can repartition the hard disk to have more than the number of EOS partitions we set up at the factory - up to the limit of the disk. You do not have to have any TDOS partitions. Conversely, you don't have to have any EOS partitions - they can all be TDOS partitions. It's up to you. Just be sure to back up your data before you re-partition.

We've provided patch programs for popular ADAM application programs and directions for performing those patches with Powermate. They're located on TDOS hard disk partition D:. The patch program files have .EOS file extensions and the directions for each have .DOC file extensions. The directions will tell you how to patch your applications.

As this document is being written, Micro Innovations is providing patches for ADAMCalc, ExperType, SmartLogo, MacAdam, Splat, and Flashcard Maker. Other patches are purported to be in existence and will be distributed on future units as they become available or are developed. Some of the directions for patching the programs tell you to change certain bytes in each program. We've included AJM Software's File Manager program, release 3.0, for that purpose. This version is custom for Powermate and will not work on a system without a Powermate hard disk.

SmartWriter works fine with the Powermate floppy disk drives and hard disk partitions. You have to remember, however, that all EOS application programs, including SmartWriter, think that the Powermate floppies are tape 1 and the Powermate

hard disk partitions are tape 2. You can only use one Powermate floppy and one Powermate hard disk partition at a time. You don't lose the ability to use the tape drives - File Manager can read or write all of the drives, so you can copy to and from them. You just can't execute programs from them or get or send data to them from an application.

INCLUDED SOFTWARE

We've included quite a lot of software for you on the hard disk. All of the critical programs needed to boot and configure the system are also on the distribution media - either diskette or tape. The following list of software is on the hard disk. Also listed is the name of the documentation file, if present, and the location of the files on the hard disk.

TDOS Hard Disk Partition A: Distribution Software

40TDS???.COM - the Install program for 40 column TDOS release ????. Documentation files are included.

80TDS???.COM - Install program for 80 column TDOS release ????. Same documentation files as for 40DOS???.COM

CD.COM - Change directory program. Allows user to change between named directories. Documentation file included.

CLONE.COM - Utility program used to create a bootable EOS media. Use is described in this document and in the EOS patch program documentation. It will tell you its syntax if you execute it without specifying parameters

CU.COM - Change user program. Moves files between user areas by changing directory entry. Documentation file included.

DELIB.COM - Utility to unpack files from LBR format. No documentation files provided.

DSKSZ???.COM - Floppy disk format selection program release ????. Self explanatory. No documentation yet.

EOS.COM - Utility program to boot EOS operating system from TDOS. No documentation files provided.

FORMT???.COM - Floppy/tape formatting program release ??? . Documentation file provided.

FF.COM - Find files program. Looks through all disks for files matching given parameters. Will give syntax if executed without parameters. Documentation file included. 80 column. Looks at all drives, whether occupied by media or not.

HDFMT???.COM - Hard disk formatting program release ??? . Be careful with this program. It will wipe out the data on your hard disk. Be sure to save your files first.

IMAGE.COM - Opposite of CLONE.COM. Gives syntax if executed without parameters. No documentation yet.

MIPART???.COM - Hard disk partitioning program. Self explanatory. No documentation needed.

SPOOLER.COM - Haven't used. Picked up from AWAUG BBS. Assume it spools print to disk and frees up program to continue. No documentation found.

SQ111.COM - Utility program to squeeze files. Will tell syntax if started without parameters. No documentation found.

UNARC16.COM - Self extracting de-archiving utility. Self extracting documentation.

UNCR.COM - Utility to uncrunch library files. Will give syntax if executed without parameters. No documentation found.

UNERA16.ARC - Utility to recover erased files. Haven't used. Assume documentation included.

USQ120.COM - Utility to unsqueeze files. Opposite of SQ111. Will give syntax if executed without parameters. No documentation.

WHEREIS.COM - Utility to locate files anywhere on any currently active drive. Will give syntax if executed without parameters. No documentation.

TDOS Hard Disk Partition B: TDOS PD Applications Programs

ACOPY22.LBR - Archived disk copy program. Documentation files included.

BD04.LBR - Program to locate and lock out bad sectors on a drive. Recommended for use after formatting your hard disk drive.

FBAD60.ARC - Archived utility to locate and lock out bad sectors on a disk or tape. Documentation files included.

LEARNCPM.LBR - Archived tutor program for CPM. TDOS commands are MS-DOS style. May not be much help. Documentation files included.

MLOAD25.LBR - Archived hex to com file utility. Documentation files included.

UNZIP099.LBR - Archived unzip utility. Haven't used.

VDE266.LBR - Archived Wordstar-like word processor program. Documentation file included.

Z80MAC.LBR - Archived Z-80 macroassembler. Assume documentation files included.

Z80MRA.LBR - Archived Z-80 macroassembler. Assume documentation files included.

Z8E35.LBR - Archived Z-80 debugger. Assume documentation files included.

ZMP15.ZIP - Archived communications program patched for Powermate serial ports. Documentation files included.

TDOS Hard Disk Partition C: - empty

TDOS Hard Disk Partition D: - EOS Software

SMARTBAS.IMG - Coleco Smart Basic patched to work on the Powermate Hard Disk Drive. Use standard Coleco documentation.

FM???.IMG - AJM Software's File Manager - specifically patched to work with the Powermate drives as well as the standard ADAM drives. Doc file is included.

EOSHD???.IMG - Coleco EOS operating system with Powermate disk drive patches built in. Documentation

file included.

*.EOS - Patches for popular EOS applications programs. Doc files included.

IN CASE OF TROUBLE

We at Micro Innovations have attempted to provide a solid product at the lowest price possible. We have tested each and every Powermate unit delivered. It is possible, however, for problems to crop up. If you purchased your unit from a dealer, please go to to him for your first level assistance. After all, he pocketed a profit from selling you the unit. Make him earn it. We will provide assistance if he cannot. If you purchased your unit from us, please contact us directly. Micro Innovations' technical assistance is available from 6-10 PM, Monday through Friday. Call (703) 620-1372 or write to Micro Innovations, 12503 King's Lake Drive, Reston, VA 22091.

REPAIR/UPGRADE POLICY

It is our philosophy that all Powermate products should be turnkey systems. That is, we believe that any skill level buyer should be able to install and use a Powermate system. It is in keeping with that philosophy that we discourage buyers from attempting to repair or upgrade their Powermate units. If the customer will return their unit to Micro Innovations or one of its approved dealers, we will repair or upgrade the unit at minimal cost.

WARANTEE

All Powermate units are waranteed for 90 days from date of shipment. This should give plenty of time for infant mortalities to appear in new units, given average use. All warantee work must be accomplished by an approved dealer or by Micro Innovations. If, in the opinion of Micro Innovations or its approved dealer, the failure of a unit returned for warantee service is deemed to have been caused by neglect or abuse, a reasonable fee shall be charged for repair of the unit.

APPENDIX A - SERIAL PORT INFORMATION

This section describes the register addresses and pin assignments for the Powermate Interface Board's RS232 Serial Ports, connectors J3 and J4. Both of the serial ports are provided by a single integrated circuit, a Signetics 2681, which the manufacturer calls a DUART (Dual Asynchronous Receiver/Transmitter. The driver and receiver chips used are common 1488 and 1489 ICs. All of the other currently available serial port products utilize the Signetics 2651, which is a single serial port IC. The register addresses and bit assignments within the registers are different between the 2651 and the 2681. Therefore, software written for the 2651 will not function with the 2681 without patching. We provide already-patched overlays for the ZMP, IMP, and MEX communications programs so that the user will not have to patch those programs himself.

However, for those users who wish to utilize some other communications package or would like to talk directly to the ports from programs they have written, the I/O address information is given below. All addresses are in hexadecimal. Bit assignments within registers are in accordance with the 1983 Signetics MOS Microprocessor Data Manual.

```
;
;SIGNETICS 2681 DUART I/O PORT EQUATES
;NOTE: Port A is Serial Port 2, Port B is Serial Port 1
;
```

S2681	EQU	10H	;S2681 DUART BASE ADDRESS
MRA	EQU	S2681	;MODE REGISTERS 1A AND 2A
SRA	EQU	S2681+1	;STATUS REGISTER A
CSRA	EQU	S2681+1	;CLOCK SELECT REGISTER A
CRA	EQU	S2681+2	;COMMAND REGISTER A
RHRA	EQU	S2681+3	;RX HOLDING REGISTER A (RX DATA)
THRA	EQU	S2681+3	;TX HOLDING REGISTER A (TX DATA)
IPCR	EQU	S2681+4	;INPUT PORT CHANGE REGISTER
ACR	EQU	S2681+4	;AUXILIARY CONTROL REGISTER
ISR	EQU	S2681+5	;INTERRUPT STATUS REGISTER
IMR	EQU	S2681+5	;INTERRUPT MASK REGISTER
CTU	EQU	S2681+6	;COUNTER/TIMER UPPER
CTUR	EQU	S2681+6	;COUNTER/TIMER UPPER REGISTER
CTL	EQU	S2681+7	;COUNTER/TIMER LOWER
CTLR	EQU	S2681+7	;COUNTER/TIMER LOWER REGISTER
MRB	EQU	S2681+8	;MODE REGISTERS 1B AND 2B
SRB	EQU	S2681+9	;STATUS REGISTER B
CSRB	EQU	S2681+9	;CLOCK SELECT REGISTER B
CRB	EQU	S2681+10	;COMMAND REGISTER B
RHRB	EQU	S2681+11	;RX HOLDING REGISTER B (RX DATA)
THRB	EQU	S2681+11	;TX HOLDING REGISTER B (TX DATA)
IP	EQU	S2681+13	;INPUT PORT
OPCR	EQU	S2681+13	;OUTPUT PORT CONFIGURATION REGISTER
STARTC	EQU	S2681+14	;START COUNTER COMMAND PORT (READ)
SOPB	EQU	S2681+14	;SET OUTPUT PORT BITS COMMAND PORT
STOPC	EQU	S2681+15	;STOP COUNTER COMMAND PORT (READ)
ROPB	EQU	S2681+15	;RESET OUTPUT PORT BITS CMD PORT

An example of driver code for the serial ports is given below:

```

:
:  CONSOLE I/O ROUTINES FOR POWERMATE I/F BOARD SERIAL PORT 2
:
CONSTAT: IN    A,(SRA)      ;GET STATUS REGISTER A CONTENTS
          BIT    0,A        ;SEE IF RXRDY (BIT 0 = 1)
          RET    Z          ;RETURN IF ZERO (NO CHARACTER)
          XOR    A          ;CHARACTER AVAILABLE, FLAG BY
          DEC    A          ;      SETTING A REG TO -1 (0FFH)
          RET

CONIN:  IN    A,(SRA)      ;GET STATUS REGISTER A CONTENTS
          BIT    0,A        ;SEE IF RXRDY (BIT 0 = 1)
          JR    Z,CONIN1    ;NO CHAR, TRY AGAIN
          IN    A,(RHRA)    ;CHAR READY, GO GET IT
          AND    7FH        ;MASK OUT PARITY BIT
          RET

CONOUT: IN    A,(SRA)      ;GET STATUS REGISTER A CONTENTS
          BIT    3,A        ;SEE IF TXEMP (BIT 3 = 1)
          JR    Z,CONOT1    ;NO, WAIT UNTIL CHARACTER(S) SENT
          LD    A,C          ;YES, GET CHARACTER INTO A
          OUT   (THRA),A    ;SEND IT
          RET

:
:  PUNCH OUTPUT DRIVER ROUTINE FOR SERIAL PORT 1
:
PUNOUT: IN    A,(SRB)      ;GET STATUS REGISTER B CONTENTS
          BIT    3,A        ;SEE IF TXEMP (BIT 3 = 1)
          JR    Z,PUNOT1    ;NO, WAIT UNTIL CHARACTER(S) SENT
          LD    A,C          ;YES, GET CHARACTER INTO A
          OUT   (THRB),A    ;SEND IT
          RET

:
:  READER INPUT DRIVER ROUTINE FOR SERIAL PORT 1
:
RDRIN:  IN    A,(SRB)      ;GET STATUS REGISTER B CONTENTS
          BIT    0,A        ;SEE IF RXRDY (BIT 0 = 1)
          JR    Z,RDRIN     ;NO CHAR, GO TRY AGAIN
          IN    A,(RHRB)    ;CHAR READY, GET IT
          AND    7FH        ;MASK OUT PARITY BIT
          RET

```

```

:
: INITIALIZE ROUTINE AND VALUES FOR SERIAL I/O PORTS
:

```

```

INIT:  LD    HL,INITBL    ;POINT AT START OF INIT TABLE
IN1:   LD    C,(HL)       ;PUT BYTE INTO C
      LD    A,C          ;GET INTO A FOR TEST
      INC   A            ;SEE IF -1 (0FFH)
      INC   HL           ;POINT AT NEXT BYTE
      RET   Z            ;FINISHED IF BYTE WAS A (-1)
      LD    B,(HL)       ;NOT FINISHED, BYTE WAS PORT NUMBER
      ;      GET BYTE COUNT BYTE INTO B FOR OTIR
      INC   HL           ;POINT AT FIRST BYTE TO OUTPUT
      OTIR              ;OUTPUT UNTIL BYTE COUNT EXHAUSTED
      JR    IN1          ;AND GO DO IT AGAIN

INITBL: DB    MRA        ;MODE REGISTERS 1A & 2A ADDRESS
      DB    02          ;TWO BYTES TO SEND
      DB    13H         ;TO MR1A - NO PARITY, 8 BITS/CHAR
      DB    07H         ;TO MR2A - NO RTS/CTS CONT, 1 STOP BIT

      DB    MRB        ;MODE REGISTERS 1B & 2B ADDRESS
      DB    02          ;TWO BYTES TO SEND
      DB    13H         ;TO MR1B - NO PARITY, 8 BITS/CHAR
      DB    07H         ;TO MR2B - NO RTS/CTS CONT, 1 STOP BIT

      DB    CSRA        ;CLOCK SELECT REGISTER A ADDRESS
      DB    01H         ;ONE BYTE TO SEND
      DB    0CCH        ;TX/RX DATA RATE = 9600 BAUD

      DB    CSRB        ;CLOCK SELECT REGISTER B ADDRESS
      DB    01H         ;ONE BYTE TO SEND
      DB    0CCH        ;TX/RX DATA RATE = 9600 BAUD

      DB    CRA         ;COMMAND REGISTER A
      DB    01H         ;ONE BYTE TO SEND
      DB    05H         ;ENABLE TXA & RXA

      DB    CRB         ;COMMAND REGISTER B
      DB    01H         ;ONE BYTE TO SEND
      DB    05H         ;ENABLE TXB & RXB

      DB    ACR         ;AUXILIARY CONTROL REGISTER
      DB    01          ;ONE BYTE TO SEND
      DB    0F0H        ;BRG SET 2, TIMER INPUT XTAL/16

      DB    SOPB        ;SET OUTPUT PORT BITS COMMAND ADDRESS
      DB    01          ;ONE BYTE TO SEND
      DB    0FFH        ;SET ALL OUTPUT BITS

      DB    -1          ;END OF INITIALIZE TABLE

```


Handshaking Lines

The handshaking lines use the S2681's general purpose input and output ports and are assigned as follows:

Serial Port 2 (wired for direct connection of a terminal or a serial printer) -

Signal Line Name	Bit Number	Interface Board Pin	RS232 Pin
Data Terminal Ready	Output Bit 2	J3 Pin 11	6
Request to Send	Output Bit 0	J3 Pin 9	5
Carrier Detect	Output Bit 4	J3 Pin 15	8
Data Set Ready	Input Bit 2	J3 Pin 14	20
Clear to Send	Input Bit 0	J3 Pin 74	

Serial Port 1 (wired for direct connection of a modem) -

Signal Line Name	Bit Number	Interface Board Pin	RS232 Pin
Data Terminal Ready	Output Bit 3	J4 Pin 14	20
Request to Send	Output Bit 1	J4 Pin 7	4
Carrier Detect	Input Bit 5	J4 Pin 15	8
Data Set Ready	Input Bit 3	J4 Pin 11	6
Clear to Send	Input Bit 1	J4 Pin 9	5

APPENDIX B - ERROR CODES

The error codes that can be returned by TDOS from the Powermate disk controller are listed below:

ERROR CODE	Meaning of error code
00	No error detected
01	No index pulse from disk drive
02	No seek complete from drive
03	Write fault from disk drive
04	Drive not ready or not selected
05	Not used
06	Track 00 not found
07	Not used
08	Disk drive still seeking
09	Not used
0A	Controller not initialized
0B-0F	Not used
10	ID field read error
11	Uncorrectable data error
12	Address Mark not found
13	Write Protect error
14	Target sector not found
15	Seek error
16	Format track not complete
17	FDC busy error
18	Correctable data error
19	Bad track flag detected
1A	Format error
1B	Not used
1C	Direct access to alternate track
1D	Alternate track already assigned
1E	Alternate track not found
1F	Alternate track assigned to defective track
20	Invalid command
21	Illegal disk address
22	Illegal parameter
23	Copy completion mismatch
24-2F	Not used
30	RAM diagnostic failure
31	Program memory checksum error
32	ECC diagnostic failure
33-3F	Not used

Note: The address valid bit may or may not be set on an error message. If it is not set, the codes will appear as defined above. If it is set, codes 00-0F will appear as 80-8F, codes 10-1F will appear as 90-9F, codes 20-2F will appear as A0-AF, and codes 30-3F will appear as B0-BF.