MICRO INNOVATIONS
12503 King's Lake Drive, Reston, VA 22091
Voice: (703) 620-1372
Fax/BBS: (703) 264-3908

Powermate IDE Hard Disk Installation and Operating Instructions

Congratulations on the purchase of one of four versions of our Powermate IDE hard disk drives for the Coleco ADAM computer! The Low Cost models (LC/20 and LC/40) have 70 ms hard disk drives and left expansion slot interface cards. The High Performance models (HP/20 and HP/40) have 28ms hard disk drives and center slot interface cards. The left slot cards have only the hard disk interface while the center slot cards also include a parallel printer port, a memory board bank switching port (for memory expansion boards), and a boot PROM. LC owners can purchase MIB3 or parallel printer cards with BOOT PROMs on them to avoid having to insert a BOOT media at power up.

This document contains all the information you'll need to get your hard disk 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 interface board, booting the software, making boot disks or tapes, and configuring and installing the software (if you wish to change default settings).

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 integrated circuits, they can be destroyed if hit with a big enough discharge.

UNPACKING

Your Powermate IDE hard disk drive comes in a single 14" x 9" x 9" box and weighs about 8 pounds. Inside the box, you'll find up to six items, counting this document -

(1) your invoice,
(2) these installation and operating instructions,
(3) the hard disk drive enclosure, with attached disk interface cable,
(4) the external power supply,
(5) the ADAM interface board (LC models come with a left slot card and HP models with a center slot card), and
(6) a printer interface cable (if you have a center slot card and chose to order one).

Please make sure that you have all of the components before going any further. If anything is missing, please call your dealer so he or she can ship you what you're missing. 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. The disk interface cable is already cut to the maximum length recommended by the disk drive manufacturer so you may have to rearrange your computer setup to get the cable to reach.

The disk interface cable is attached to the disk drive enclosure. You'll notice that it has a 40 pin socket connector on its free end. This connector has one hole plugged so that it will only plugs into J1 (on the interface card) in one way.

Now you're ready to plug the interface board into the computer. The HP's board goes into the center expansion slot while the LC's goes into the left slot. Because they are keyed, each board can only be installed in its expansion slot in one orientation (the correct one).

If you already have a board in the that slot, it will have to be removed. If you have a board in the center slot, it is most likely a parallel printer interface board. The parallel printer port on the Powermate interface will replace the board you have to remove, so don't worry that you'll lose your printer port. You can now take the spare printer interface board to your next club meeting

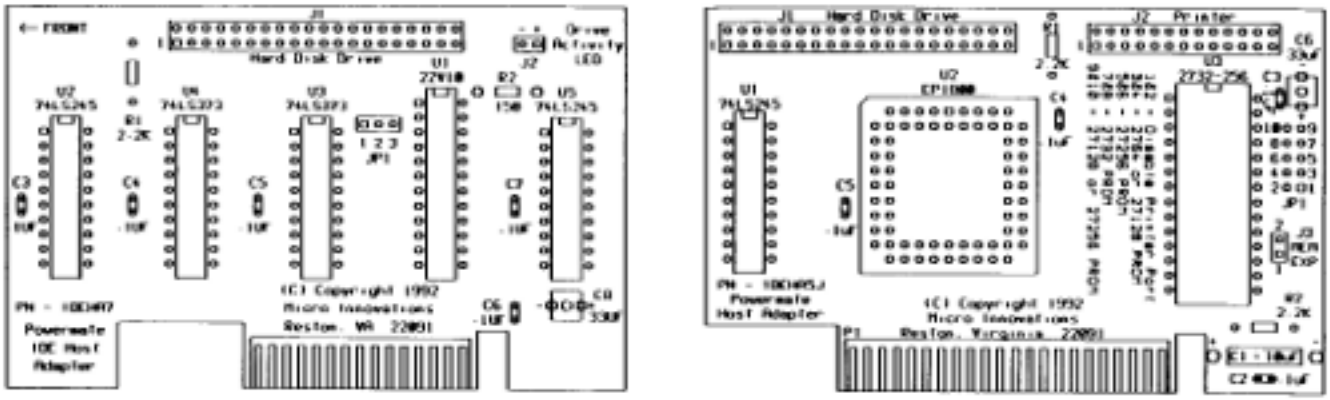

Figure 1 - IDE Disk Interface Boards (Component Side)

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 above to identify the connectors.

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. If the cable's connector will not go on to the circuit board's header, check to be sure you have the plugged hole on the connector aligned with the missing pin on the header.

If you purchased a printer interface cable, you can connect it now. The printer cable has a 26 pin socket connector on one end and a 36 pin Centronics connector on the other. Like the disk interface cable, the socket connector goes into J2 only one way. 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. You can connect your printer after we get the hard disk up and running.

and sell it to someone who doesn't have a Powermate. The only boards we're aware of that fit in the left slot are modem boards. Although you may have to remove your internal modem to run the hard disk, you can run an external modem from one of our center slot boards (an MIB2 or an MIB3).

If you are installing a center slot board and have a memory expander board installed in slot #3 (the right slot), you'll have a wire running from it to the parallel printer board you'll be removing. The HP interface board provides the same signal to your memory expander board, so detach the wire at the printer board end. Locate connector J3 on the HP interface board. J3 is a two pin connector - 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 J3 pin 1.

Connect the memory board wire (if needed) to the HP interface board and insert it into the center expansion slot. 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 the tension they place on the interface board 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 external power supply into the disk enclosure (it will only go in one way). Now plug the power supply 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. If you have an HP unit (with a boot PROM), a signon screen that says "ADAM hard drive system by Micro Innovations" should come up first. Without the hard disk turned on, the screen will change to the familiar SmartWriter screen. If the screens come up properly as described here, then skip the next paragraph.

If the screens do not come up as described, turn off the power and remove the interface board and try it again. If Smartwriter comes up fine without the interface board installed, you probably have a bad interface board. All hard disk systems are tested before leaving the factory, so something must have happened to it in transit or during installation. Static electricity is one possibility. Call your dealer for a replacement interface board.

Now turn on the power to the hard disk. Its power switch is located on the right side of the back of the chassis (when viewed from the front). You should hear the fan and the hard disk motor start. The "ACCESS" LED will come one as the hard disk drive is spinning up to operating speed (takes about 2 seconds). After the light goes out, the Micro Innovations sign-on screen will appear, followed by the TDOS version 4.5 sign-on screen.

Selecting the default operating system

All Powermates come with the 40 column version of TDOS installed on the hard disk as the default operating system. If you prefer to boot up the EOS hard disk operating system instead, simply run the SETBOOT program to switch the default operating system. Type the command "SETBOOT" and hit the return key. The SETBOOT program will ask you to select which operating system you want to boot at RESET time. Enter your selection. The program will write your selection to the hard disk and the next time you hit the RESET key, your selected operating system will boot up.

If you want the 80 column version of TDOS to boot up at RESET time, you'll need to install it. Simply type the command "80ITD459" and hit the return key. TDOS will prompt you for information about your setup, then install your custom configuration on the hard disk for boot-up by the PROM. It will also allow you to create a boot diskette or tape (you'll need to create a boot disk or tape if you have the LC version). If you have the HP version, you do not need to create a boot diskette or tape.

A distribution diskette is provided for your use in case you need to reinstall either EOS or TDOS on the hard disk. This is normally needed only after a hard disk "crash". Keep in mind that the hard disk should not be reformatted or repartitioned unless you have read the instructions and know what you are doing. Unless you have backed up all of the programs provided on the hard disk, they will be lost when you reformat or repartition it.

Re-installing TDOS

The TDOS operating system can be re-installed directly from the distribution diskette by executing the appropriate version of the TDOS installation program - either 40ITD459 or 80ITD459.

When TDOS 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 is connected. If not, 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).

If TDOS finds an expansion memory board, it will then ask you whether you want it placed before or after the disk and tape drives. The following screen tells you what your TDOS drive assignments are. Drives A through D are the hard disk. The expansion memory board will be next if you selected "before". ADAM disk drives are next,

if any. ADAM tape drives are next, at least one. The expansion memory board will be last if you selected "after". An example drive assignment for a stock single tape drive ADAM with a single ADAM floppy disk drive and a memory board (selected as "after") is:

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

The next screens ask you to specify the size of the the ADAM floppy disk drives it found - 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
7 - 1418K High density 80 track format

Formats 1 through 4 are normally used for 5 1/4" floppy diskettes and formats 5, 6, and 7 for 3.5" diskettes. Any format can be selected but may be meaningful only on the proper size diskette. The proper operation of the format also depends on the PROM installed in your ADAM or Micro Innovations floppy disk drive. All formats except the 356K, the 714K, and 1418K formats are compatible with existing ADAM formats.

The DISKSZ?? 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 your serial ports. If you don't have serial ports, you can select the "0" option to bypass these screens. Micro Innovations compatible serial ports are provided by the MIB2, MIB3 and dual serial I/O cards, which you must purchase separately.

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 logical devices. The latest version of TDOS has five logical devices. They are CON: (the system console), KEY: (the system keyboard), 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 five 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 Assignments	Permitted Physical Device			
CON:	CRT:	SR1:	SR2:	UC1:
KEY:	KYB:	SR1:	SR2:	UK1:
RDR:		SR1:	SR2:	
PUN:		SR1:	SR2:	
LST:	LPT:	SR1:	SR2:	PAR:

Definitions for the physical devices are as follows:

For Logical device CON:, the system console -

CRT: The ADAM 40 column display
SR1: Serial Port #1 out
SR2: Serial Port #2 out
UC1: 80 column terminal out

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

For Logical device KEY:, the system keyboard -

CRT: The ADAM keyboard
SR1: Serial Port #1 in
SR2: Serial Port #2 in
UC1: 80 column terminal in

For logical device RDR:, the reader -

SR1: Serial Port #1 in
SR2: Serial Port #2 in

For logical device PUN:, the punch -

SR1: Serial Port #1 out
SR2: Serial Port #2 out

For logical device LST:, the printer -

LPT: The ADAM printer
SR1: Serial Port #1 out
SR2: Serial Port #2 out
PAR: Dot Matrix parallel 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 a modem program to transfer files. All of the modem programs available for the ADAM are designed to talk directly to the physical devices and purposefully bypass the reader and punch logical devices.

The default IOBYTE assignments are:

CON: CRT: (the ADAM 40 column display)
KEY: KYB: (the ADAM keyboard)
RDR: SR1: (serial port #1 in)
PUN: SR1: (serial port #1 out)
LST: PAR: (the 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.

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 formatted tape or disk for the boot block to be written on. If you have an LC version, you'll need to create boot media (unless you purchased one of our center slot cards with boot PROMS on them - an MIB3 or a parallel printer card). 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 two additional questions before it prompts you to insert a tape or disk. It asks you 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.

Re-installing EOS

To re-install the EOS hard disk operating system, use the CLONE program to place a bootable image of EOS on a formatted disk or tape. Then reset the computer and EOS will boot entirely from the boot diskette or tape. After EOS signs on, select a maintenance function (SMART key V) to install EOS on the hard disk. It will also allow you to create a boot disk or tape if you need to (LC owners will, HP owners will not - normally).

To install the EOS operating system on the hard disk, you will need two formatted tapes or diskettes. Use the CLONE.COM program to copy the EOSHD??.IMG file to a diskette or tape by typing "CLONExx EOSHD???.IMG Y:" and hitting the return key. The ??? characters are the actual release number of the EOSHD program on the distribution diskette. As of the time these instructions are being written, it would be EOSHD39I.IMG. The release number on the copy you have on your distribution media may differ as updates are made to the program. Y: is the TDOS or CPM name of the drive you are copying to.

The distribution media boots up a version of TDOS without hard disk drivers in it. If you boot a distribution diskette in an ADAM floppy disk drive, the boot drive is the A: drive. If you have a second ADAM floppy disk drive, it will be the B: drive. The tape drives will be the C: and D: drives. If you boot a distribution tape, the boot drive is the A: drive and the other tape drive is the B: drive.

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. 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 and to SmartWriter by hitting the "ESCAPE" key).

If you had just partitioned your hard disk, EOS will give you an invalid name for your partitions. 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 unit or you simply decide that you should do it. You should 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 you will overwrite ALL files when you perform a format.

Next, to install the operating system on to the hard disk, select "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. If you wish to avoid making a boot media, hit the ESCAPE key when it asks you to insert the tape or disk. After the boot media is made, you can pull the computer reset switch and EOS will boot from the hard disk. This completes the EOS installation process. You can also use the SETBOOT program to select the EOS operating system as the default operating system and it will automatically come up when you hit the RESET button if you have a BOOT PROM.

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. Simply use the SHIFT-UNDO key combination and EOS will reboot itself directly from the hard disk. **ALWAYS** park the hard disk when powering it down. The SHIFT-WILDCARD combination performs this function from either EOS or TDOS.

INSTALLING EOS APPLICATION PROGRAMS

We provide SmartBasic version 1 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 select the hard disk partition used as an executable or data partition on the opening screen (with SMART key I). Boot programs (such as BOOTCALC) are always stored on partition 0. Some executable programs (such as SmartBasic, and File Manager) are also stored on partition 0. The other partitions can be used for storage of executable programs (such as ADAMCALC) or for data and BASIC program storage.

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 .IMG file extensions and the directions are included in the EOSPATCH.DOC file. 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, Davinci, SmartBasic version 2,and Flashcard Maker. Other patches are purported to be in existence and will be distributed on future units or on the BBS as they become available.

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 Micro Innovations and will not work on a system without a Powermate hard disk.

SmartWriter works fine with the hard disk partitions. You have to remember, however, that all EOS application programs, including SmartWriter, think that the hard disk is tape 2. Therefore, you can only use one 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 recover from a hard disk crash and configure the system are also on the distribution media - either diskette or tape.

Hard disk drive A: contains all of the TDOS distribution files (programs and documentation) and some public domain utilities we thought you would normally need to use to the hard disk.

Hard disk drive B: contains all of the public domain files we felt might be of interest to you. They are usually compressed in some manner for transmission to bulletin board systems. You will need to use one of the uncompressing programs provided on the A: drive. LBR files will require the DELIB program and then the UNCR program. ARC files will require the UNARC program.

Hard disk drive C: is empty.

Hard disk drive D: contains all of the EOS hard disk programs and documentation. Also included are a couple of the public domain applications programs for your enjoyment.

PRINTER CABLES

If you desire, you can make your own printer interface cable for the HP version. You'll need a 26 pin socket connector, a 36 pin Centronics connector, and a 25 wire ribbon cable. Radio Shack used to carry all of these parts. Crimping can be done with a bench vise. Make the cable so that pin 1 of the socket connector connects to pin 1 of the Centronics connector.

All of the cables that we make at Micro Innovations have a hole plugged so that the cable will only connect to J2 in one orientation. You can cut a piece of solid wire to insert into the proper hole in the connector to accomplish this purpose, after you figure out which orientation is correct.

You can also use an Orphanware cable on the Powermate interface boards. If it does not work properly, just turn the connector inserted into header J2 upside down.

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 directly from us, feel free to contact us directly. Micro Innovations' technical assistance is normally available from 6:30 - 9:30 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 mimimal 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

Parallel Printer Port Signals
for
Powermate HP/20 or HP/40 Interface Board,
Parallel Interface Board, and
Multipurpose Interface Boards 2 and 3

Interface Board Signal Name	Interface Board Pin No.	Centronics Connector Pin No.	Centronics Printer Signal Name
\Strobe	1	1	\Data Strobe
Signal Ground	2	19	Strobe Return
D1	3	2	Data bit 1
Signal Ground	4	20	Data 1 Return
D2	5	3	Data bit 2
Signal Ground	6	21	Data 2 Return
D3	7	4	Data bit 3
Signal Ground	8	22	Data 3 Return
D4	9	5	Data bit 4
Signal Ground	10	23	Data 4 Return
D5	11	6	Data bit 5
Signal Ground	12	24	Data 5 return
D6	13	7	Data bit 6
Signal Ground	14	25	Data 6 Return
D7	15	8	Data bit 7
Signal Ground	16	26	Data 7 Return
D8	17	9	Data bit 8
Signal Ground	18	27	Data 8 Return
No Connection	19	10	\Acknowledge
Signal Ground	20	28	\Ack Return
Printer Busy	21	11	Busy
Signal Ground	22	29	Busy Return
PE	23	12	Paper Out
Signal Ground	24	30	\Reset Return
SLCT	25	13	Select
No Connection	26	31	\Reset