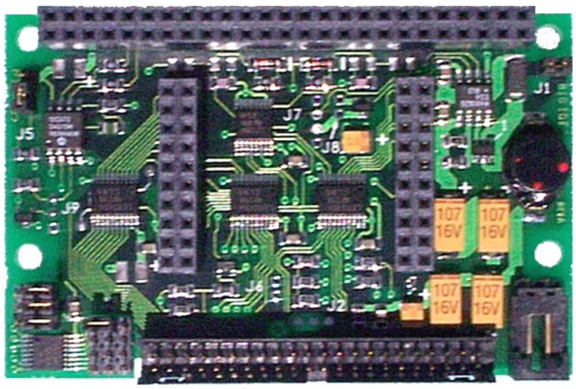
Persistor® BigIDEA User's Manual

Revision 1.0 - May 1999

PRELIMINARY



Introduction

The Persistor BigIDEA is a 2"x3" IDE adapter that sandwiches between a Persistor CF1 miniature single board computer and CF1 RecipeCards, other CF1 SandwichCard adapters, or your custom CF1 electronics. The BigIDEA allows the CF1 to control 2.5" hard drives (2GB to 14GB), 1.8" Type III PCMCIA hard drives (0.5GB and 1GB), or single/dual stack PCMCIA TrueIDE flash cards (Type II, to 440MB).

The BigIDEA's power-switched electronics keeps the current drain below 15uA while you collect and buffer data into RAM or the CF1's CompactFlash cards. When these fill up, you spin up the power hungry drive, spool off the buffered data, then quickly shut it back off.

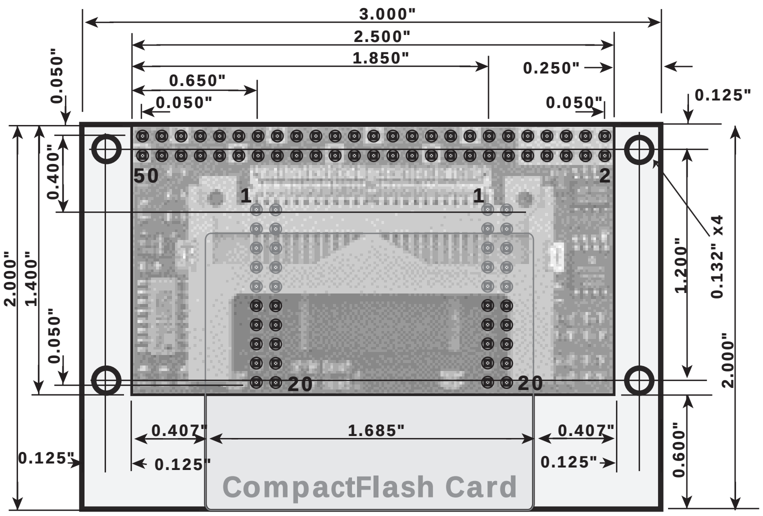
Each BigIDEA adds about 0.48" of height to a CF1 systems (you can stack several) and all BigIDEAs in the system share the same SandwichCard chip select and memory space which leaves your system with up to 31 additional SandwichCard chip selects for other expansion options.

Drives and Cards connected to the BigIDEA get to use the CF1's PicoDOS file system so they're directly compatible with DOS/Windows9x PCs. The flash cards and PCMCIA hard disk plug into standard PC Card slots and automatically mount as logical drives (E:, F:, etc.) for extremely fast and easy data recovery.

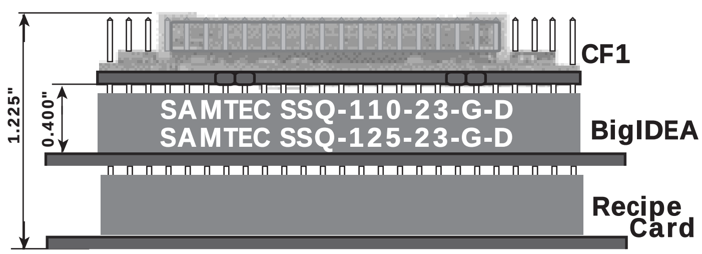
The included BigIDEA driver software lets you access the file system through standard C function calls (fopen, fread, fprintf, fwrite, fseek, fclose, etc.) and, if you're willing to trade file name/size flexibility for the most efficient power utilization, use the included recorder library routines to squeezes every last milliwatt out our your batteries.

Mechanics

The BigIDEA sandwiches between your CF1 and other other electronics ala PC104 and add about a half inch to the height of the system. The drawing at right shows that the BigIDEA circuit board is larger than the CF1, and that it juts out far enough in front to preclude front panel access to the CompactFlash. In BigIDEA systems, the CF card is typically just used as buffer storage so hopefully this will not be a problem.



The mounting hole pattern is a standard for CF1 RecipeCards, and the front two holes (CF side) line up with the mounting holes on the PicoDAQ RecipeCard and many other RecipeCards.



Not Quite Plug & Play

It's unlikely that the IDE drive controller in you PC came with a user's manual or is even mentioned anywhere in the PC's documentation. PC's can do this because:

1. Their drives and controllers are usually factory installed into convenient drive bays and card cages.
2. The PC BIOS and OS were pre-configured for the installed drive and controller at the factory.
3. PCs don't much care about power or startup time, so they can interrogate hardware peripherals with no negative consequences.

Though we've tried to make the CF1 mimic the simplicity of a PC, the BigIDEA and hard drives pose special challenges because:

1. There's no standard mechanical mounting arrangement, so they can't ship pre-configured even if ordered together.
2. The vast majority of CF1s will never see an add-on drive, so PicoDOS doesn't expect to find one.
3. PicoDOS can't poke around and look for offboard peripherals without incurring startup delays, and in the case of hard drives, significant power expenditures.

This means you have to learn enough about the BigIDEA and various drive options to correctly install the hardware and setup the software. Since you've chosen a CF1 and BigIDEA, you probably do care very much about power utilization and will want to learn everything you can about the tradeoffs between convenience and simplicity versus maximum battery life.

What's in the User's Guide

The remainder of this manual explains how to install, configure, and properly use your BigIDEA and cards/drive. Part one describes how to connect the BigIDEA between your CF1 and other peripheral electronics and how to properly setup the board's jumper options for your particular requirements. Part two describes the cabling from the BigIDEA to you 2.5" drive or PCMCIA adapter. Part three tells you how to get PicoDOS to recognize the new hardware and takes through a test run. Part four explains how to make PicoDOS automatically work with BigIDEA drives. Finally, part five describes the various software techniques you can use to make the most of your expanded CF1 system.

Packing List

Your BigIDEA ships with the following items:

1	BigIDEA SandwichCard Adapter
6	2mm configuration jumpers on the BigIDEA with standard default setting
1	8" 3 connector IDE-44 ribbon cable
1	18" power cable, tinned leads to 2-pin Molex C-Grid plug
1	Release Notes
1	User's Manual (this document)
1	Update and Examples Diskette (possibly also an update CD)

Read the Release Notes

You must read the printed release notes that shipped with your BigIDEA before attempting to install or run the hardware. This is where you'll most likely find the information fed back to us by BigIDEA pioneers, and a quick read could save you much time and frustration.

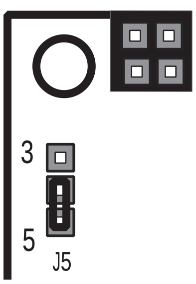
Setting up the BigIDEA

BigIDEAs install sandwich-like between a something and something else. Those something elses can be a CF1, a RecipeCard, your custom instrument electronics, some other SandwichCard peripheral, or even more BigIDEAs. Typically, it's a CF1 on top, a BigIDEA in the middle, and a RecipeCard or your stuff on the bottom. In multiple SandwichCard systems, the stacking order makes no difference. The remainder of the installation and setup instructions will assume a simple three board system with a CF1, BigIDEA, and PicoDAQ RecipeCard - though what's described applies similarly to more complex systems.

Jumpers

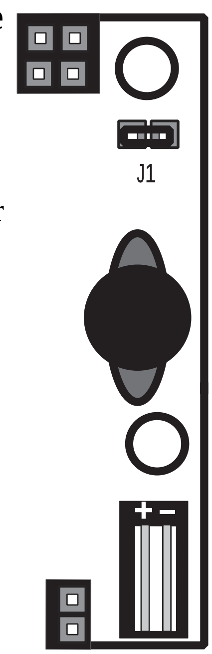
Before you plug your CF1 into the BigIDEA, you should make sure that the three groups of configuration jumpers are properly installed for your CF1 system. These jumpers select 3.3V or 5V IDE voltage, separate or common power supplies, and the SandwichCard memory slot. All of these jumpers are accessible when a CF1 is plugged into the BigIDEA, but most other full-sized SandwichCards will obscure all or some these when they plug into a BigIDEA.

3.3V/5V



The 3.3V/5V jumper J5 comes from the factory preset to the 5 volt position, and that's where it has to be for hard disk drives, and generally where you want it to be for flash cards. Flash cards write about 20% faster when operating at 5 volts, but they pull about 30% less current when you writing at 3.3 volts. However, most systems don't spend much of time actually writing, so the savings may not be all that significant.

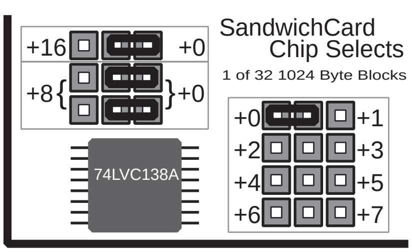
Power Source



The power source jumper also comes from the factory installed to let the BigIDEA use the CF1's VBAT (pin 13) as its source to the switching regulator for the IDE drives. This is convenient since a single power source and cable works for everything, but it also means that if the drive turns on and tries to gulp more power than what's left in your batteries, the CF1 will die when the voltage drops below about 4 volts. To preclude that possibility, remove the power source jumper and run a separate supply to connector J1 on the bottom right of the board.

Never connect a separate supply while J1 is jumpered!

Memory Slot



The SandwichCard memory slot jumper block comes pre-configured for slot 0 as shown in the drawing at right?. If you're constructing a complex SandwichCard system, refer to the appendix for details on setting up multiple SandwichCards, otherwise, just make sure your BigIDEA looks like the drawing.

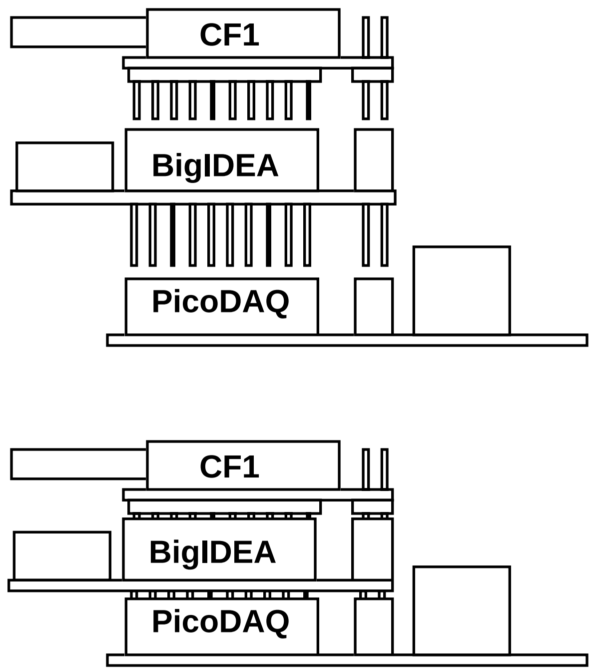
The appendix contains much more detail on SandwichCard memory addressing. This is not required reading for working with the BigIDEA.

Installing the BigIDEA

Plug in the CF1

Before plugging in the CF1, lets also make sure we've got a working system as a reference starting point. Hookup your CF1 and RecipeCard (or whatever) to a power supply and terminal, and make sure you can get to the PicoDOS prompt and that you have the latest BIOS and PicoDOS firmware installed. BigIDEAs will only work with version 2.00 or later of both the BIOS and PicoDOS.

Next, disconnect the power and we'll install the BigIDEA. First, unplug the CF1 from the RecipeCard (or whatever). Now plug the backside of the CF1 (the side without the CF header, but with all 90 pins in a π pattern) into the topside (component side with sockets) of the BigIDEA.



It is possible (we've done it) to misalign the pins and damage both boards if powered that way (we've proved it), but even the most cursory visual side-view inspection will reveal the mistake before any damage can be done - so make sure to look at it after you insert it. The drawing at right shows a side view of a CF1/BigIDEA/RecipeCard system before and after insertion.

Plug in the RecipeCard

Having plugged in the CF1 to the BigIDEA, there's only one way to connect the BigIDEA back into the RecipeCard - its pins go into the RecipeCard's sockets. We learned our lesson by frying a CF1/BigIDEA with powered misalignment so we don't know how much harm can be done by not paying attention. Hopefully you will examine the installation and not have to be the first to call us with a damage assessment.

Powering the BigIDEA

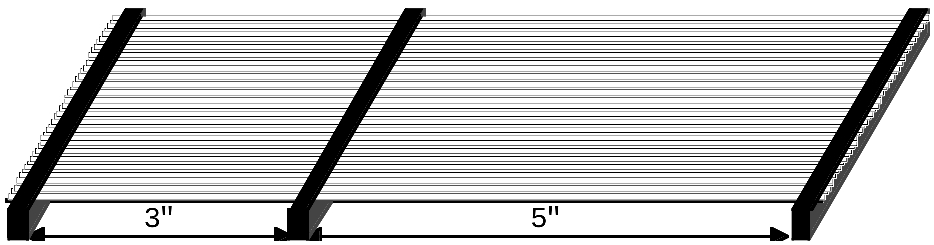
Whether powered from the CF1 VBAT or the Molex connector, the upper range of the supply must be limited to 16.5 volts, and the lower range must be 0.5 volts above the operating voltage selected by J5. One more reminder: ***Never attach a separate supply to the Molex connector while J1 is jumpered!*** There are no fuses, no diode isolation, and nothing else to protect the two supplies from trying to equalize each other - probably catastrophically!

Quick Checkout

Before going on, let's confirm that what we've done so far is working. Reconnect power and everything should work exactly as it it did in the preinstallation quick test. This doesn't prove the BigIDEA is working, but we'll know nothing is seriously wrong with the hookup.

Installing Cards and Drives

Cards and drives connect to the BigIDEA using 44-pin 2mm connectors and 1mm ribbon cables that can be any length up to twelve inches. The BigIDEA comes with a single eight inch cable with connectors at both ends, and with one additional connector three inches away from one of the ends. This one cable actually has many uses. It can be used as a eight inch cable and you can get rid of the annoying bump in the middle by prying apart and removing the center IDC connector. You can also make it into either a five inch or three inch cable using just a pair of scissors. You can also use it to connect two separate single slot PCMCIA adapter boards to the BigIDEA (though we're not sure why you wouldn't just buy the dual adapter).



The BigIDEA's IDE header is shrouded, but not polarized, and 44-pin IDE cable connectors come in a variety of widths, so the shroud does not always guarantee proper pin alignment (it does however with the included cable). Drive headers are neither shrouded nor polarized, so it's ever so easy to hook them up backwards (goodbye expensive electronics) or misaligned by one set of pins (poof goes the drive). You must take care to connect pin 1 of the BigIDEA header to pin 1 of the drive or adapter, and you do this by looking always assigning the striped side of the cable to pin 1.

The BigIDEA tries to help with a block of white silkscreen at the pin 1 side, but most hard drives give no indication of which side has pin 1. The 44-pin headers on both the BigIDEA and 2.5" hard drives are not symmetrical along the center of the devices, and in the field, you can figure out which way to hook them together by centering the BigIDEA board with the drive and noting that only one orientation gives a straight line connection between the headers.

Bad Vibrations

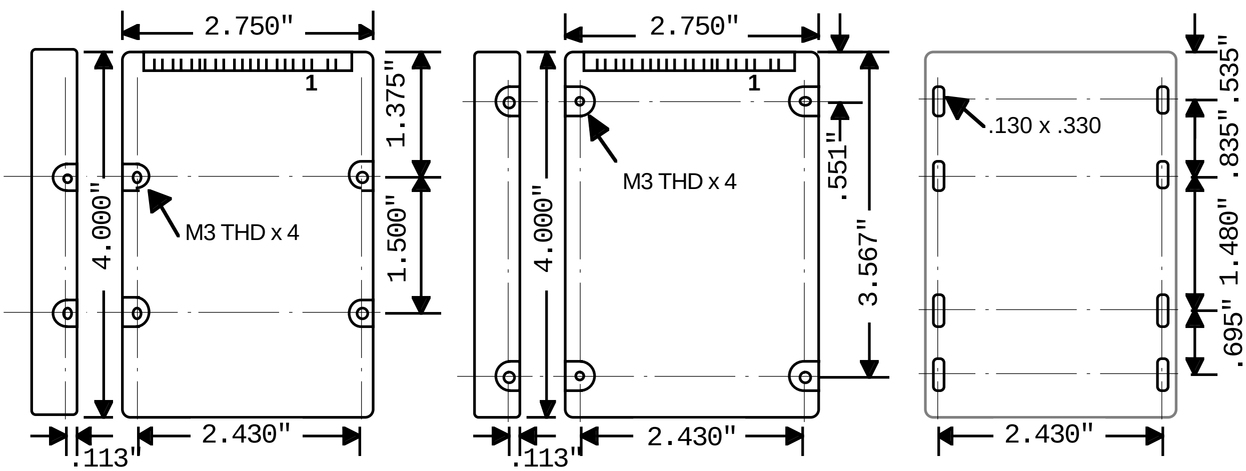
Neither the BigIDEA or the hard drives have locking mechanisms for the ribbon cable connectors and rely on the relatively high extraction force of 44 connections to hold the assembly in place. This works well for desktop, and even laptop computer environments, but it may not be sufficient to survive high vibration applications. We do not have a generic solution to this potential problem, but if you suspect your system will operate in a fashion where the cable could be shaken off, you'll need to do something to keep it attached (wire ties, tak-pak, clamps, etc.).

Installing a 2.5" Hard Drive

The BigIDEA makes no provision for physically mounting your 2.5" hard drive other than by offering a flexible cabling connection. Most modern drives can be installed and operated in any orientation, but you may need to check with the drive manufacturer for recommendations if you're pushing the technology limits. Various drives have different limitations on vibration and shock and these too should be considered when you design the mounting. Hard disk drives self heat when running (Toshiba MK2104 calls out 15°C maximum rise) so you should also provide for ventilation if you'll be running at ambient temperatures where that rise could have the drive working beyond specified limits.

You should also be aware that even though many of the 2.5" drives have similar top or side mounting holes, these are not standard, or guaranteed to remain the same from one generate of drives to another - even from the same manufacturer. About all you can count on mechanically is that 2.5" drives will be 2.75" x 4.0" but that the height may vary from from less than 0.2" to over 0.8".

For top mounting drives, we recommend slots instead of holes as shown in the drawing below, far right. On the left side of the drawing are the mounting hole dimensions for two different 2.5" drives we've actually worked with. For our own use, we've attached to the drives with M3.0 x 0.5 thd metric screws with a length appropriate to get about 0.1" to 0.2" of the screw into threaded holes after accounting for board thickness and spacers.



These drawings are meant to provide some guidance, but you must confirm these against a drive in hand or the drive manufacturers specifications before beginning your mechanical design.

2.5" Drive Connections

Some 2.5" drives have a separate power connector, but you do not need this with the BigIDEA. Power for the drives is brought over in the 1mm ribbon cable. Instead of a 44-pin header, most 2.5" drives have a 50-pin header with two pins missing to make one 44-pin header, and one 2x2-pin jumper block for drive options (discussed ahead). Most drives also provide little or no markings to help you properly connect the cable. The dimension drawing above shows how to identify pin 1 on the drive, and that pin is where you should always connect the striped side of the ribbon cable.

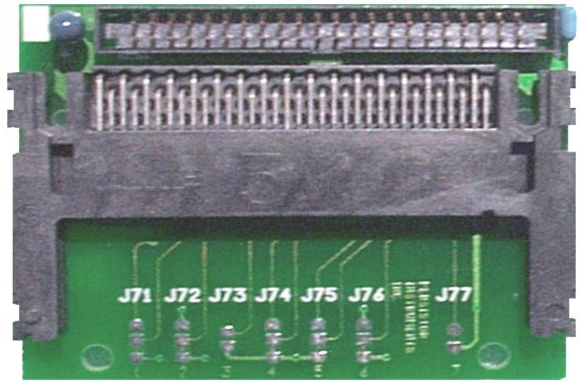
To save yourself some future catastrophes, this would be an excellent time to make some very clear markings on the drive where pin 1 is, and where you want the cable stripe to be so that at some future time, you or your technician will be able to confidently reattach the drive without this long-lost BigIDEA manual.

2.5" Master/Slave Options Pins

Most 2.5" drives have another four pins separated from the main group of 44 IDE pins for drive options. The option pins exist for multiple-drive (Master/Slave) configurations that are not supported by the BigIDEA. Though this might sound like a cheap and easy way to double your capacity, the protocol only works by having the two drives up and running, so it's twice the spinup surge current, and only a bit less than twice the operating current while filling each drive - probably not a goal for you CF1 based system. If you need more capacity, consider multiple BigIDEAs - each powering it's drive independently.

Generally, no jumpers is the correct option for the BigIDEA. If you drive came with jumpers installed, find out why before running it with the BigIDEA.

Installing a PCMCIA Adapter Card



To work the BigIDEA with PCMCIA hard disks or flash cards (including CompactFlash in a PCMCIA adapter), you need a single or dual PCMCIA to 44-pin adapter board. These are actually the same printed circuit board, but the single has one PCMCIA header which can work with Type I, II, or III PCMCIA cards, while the dual has a double-height header that can take a Type I or II card in the lower (slave) socket and a Type I, II, or III card in the upper (master) socket. The appendix shows the schematic for the PCMCIA adapter board.

Electrically, the single adapter and the upper socket of the dual adapter are identical. The single has the advantage of lower height (0.34") versus the taller (0.62") height of the dual, and the single sells for a little bit less. Dual operation really only makes sense when using only flash memory cards. The BigIDEA can only power switch the dual adapter in pairs, so either both are on, or both are off at any given time.

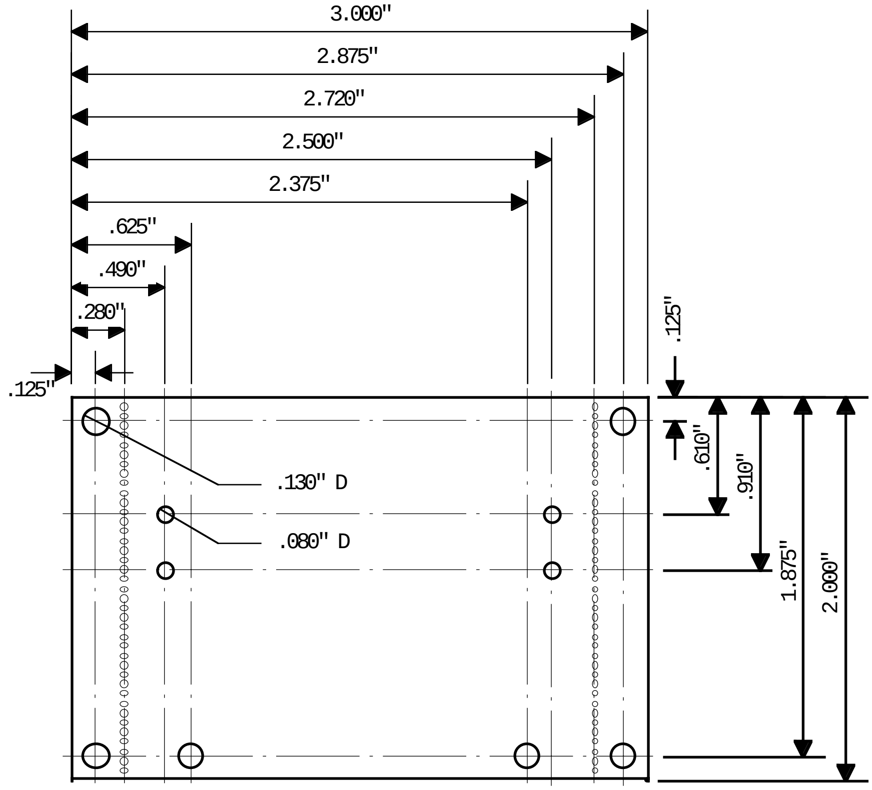
For flash card pairs, that's a small initial startup pulse of current to charge up capacitors and wake the cards processor, but each settles down to less than 500uA automatically. For hard drive pairs, that's instead a huge spinup surge current and twice the already onerous operating current. The combination of a flash card and hard drive in a dual adapter is also unwise since the relatively slow flash write operations will incur the full penalty of carrying the hard drive power burden over a long period of time.

Flash memory cards do not care at all about operating orientation, nor do the 512KB and 1GB Calluna 1.8" drives that we've worked with. If you're using something different, check the manufacturers data sheets for any restrictions on mounting. Various drives have different limitations on vibration and shock and these too should be considered when you design the mounting. Hard disk drives self heat when running so you should also provide for ventilation if you'll be running at ambient temperatures where that rise could have the drive working beyond specified limits.

The PCMCIA adapters have a shrouded 44-pin header which is not polarized, so you must take care to make sure that striped side of the cable connects to pin 1 of the adapter which is marked with the big white square.

PCMCIA Adapter Dimensions

The BigIDEA makes no provision for physically mounting the PCMCIA adapter board other than to provide a variety of mounting holes and breakaway panels with additional mounting holes as shown below.



Installing Disk Arrays with Multiple BigIDEAs

Your CF1 can control virtually any number of BigIDEAs to expand the total storage capacity to record truly huge amounts of data. Each BigIDEA adds only microamps to the idle current and each BigIDEA powers up its drive independently of other attached drives. However, only one BigIDEA can be active at any given time.

To install multiple BigIDEAs, simply follow the instructions for installing a single drive/adapter, but repeat for each BigIDEA in the system. You do not need to modify the jumper settings for each different BigIDEA, and in fact, all of the BigIDEAs should have identical settings. At startup, the CF1 interrogates its attached SandwichCards and discovers the unique serial numbers which will be used to select individual BigIDEAs. The lowest serial number becomes the default BigIDEA for programs that do not explicitly request a specific unit.

Installing BigIDEA Software

Always check the separate BigIDEA release notes for instructions that may supersede these directions. The release notes will give you up-to-date installation instructions and late breaking news on any new drives supported by the BigIDEA. Latest copies of the release notes can always be found on the BigIDEA page of the Persistor Instruments web site http://www.persistor.com.

BigIDEAs require PicoDOS 2.0 (plus patches) or later versions of the CF1 software. PicoDOS 2.0 shipped with partially stubbed APIs for BigIDEA operation and require that you install the latest CF1.Patch.Lib file into the CF1\Libraries directory. The examples that ship with the BigIDEA show how to test for valid patch installations and you should copy these techniques in your software programs.

PicoDOS 2.1 and later Developer's CDs will ship with full driver support for the BigIDEA to control Persistor Instruments flash cards (CompactFlash and full sized ATA PC Cards), 1.8" Calluna PCMCIA hard drives (512KB and 1GB), 2.5" Toshiba MKxxxx and IBM Dyla hard drives, along with generic IDE hard drive support which may or may not work with other IDE devices.

The BigIDEA may ship with a supplemental diskette containing updated drivers, header files, documentation, and example programs. Check the release notes, and if required, copy the updated files to the BigIDEA directory in your development PC at:

MotoCross Support\CF1\Drivers\BigIDEA\
which typically starts at:
C:\Program Files\Metrowerks\CodeWarrior\

Whether installed from the Developer's CD or update diskette, the BigIDEA directory will contain something like the following files and directories:

BigIDEA\bin\
    llformat.pxe   low leve format
    hdfdisk.pxe   hard drive fdisk partitioning
    torture.pxe   hard disk read/write torture tests
BigIDEA\Headers\
BigIDEA\Libraries\
BigIDEA\Docs\
BigIDEA\Examples\
BigIDEA\Stationery\
    CF1.BigIDEA\
    CF1.BigIDEA(4i)\

Getting Started with BigIDEA Software

GigaPicoDOS Example

GigaPicoDOS.mcp in the BigIDEA\Examples directory is a good place to start to familiarize yourself with the BigIDEA. GigaPicoDOS is based on the "MyPico" stationery (future PicoDOS 2.1) and builds a custom version of PicoDOS that is BigIDEA "aware". It includes all of the standard PicoDOS commands plus three new commands (ON, OFF, LPSTOP) just for the BigIDEA. It's main() function sets up your CF1 system to automatically mount a BigIDEA flash card or hard disk as drive "D", after which you perform all of the normal PicoDOS operations like DIR, COPY, CHDIR, and so on.

The SetupBigIDEA() helper function shows you what you'll need to do to integrate the BigIDEA into your own programs, and you can pretty much copy and paste this into your application. The ON and OFF commands let you power the card/drive on and off, and the LPSTOP command shows you what to expect when the card/drive is off and the CF1 is in its lowest non-SUSPEND operating mode.

GigaPicoDOS demonstrates the BigIDEA operations, and gives you an idea of what to expect in PicoDOS 2.1, but it is not PicoDOS, and it's services are not available when you exit GigaPicoDOS and return to normal PicoDOS. Until the 2.1 release of PicoDOS, you will have to incorporate something like the code from the SetupBigIDEA() helper function in each of your programs that work the BigIDEA.

BigIDEAMax146LPAD

BigIDEAMax146LPAD is a minor variation of the Max146LPFiledAD.c example except that it copies the CompactFlash data file to a hard disk when the CF card fills up. This simple mechanism necessitates a pause in the acquisition, but that's the price of the simplicity. You can extend the functionality by providing two files and ping-ponging between them, or use the methods demonstrated in the much more complex BigIDEADataLogger example.

BigIDEADataLogger

This builds a low-power, high-capacity data acquisition program from a Persistor CF1 mated to a BigIDEA hard drive adapters and a single Persistor PRCPDAQ PicoDAQ RecipeCard for the analog to digital converter and I/O connections. The basic operations and features of the system are:

Continuous recording of 1 to 8 channels of unipolar analog data in the range or 0 to 2.5 volts.
Sample rates from 50Hz to 1kHz (400sps to 8000sps aggregate).
8-bit (high or low byte) or 16-bit (12 bit resolution) samples.
DOS compatible file system on hard drive for simplified data recovery
Automatic startup and relaunch in the event of a system failure (100 second watchdog).
Three stage data buffering - A-D to RAM, RAM to CompactFlash card, CF to hard drive.
1mA (50Hz/1Ch) to 10mA (1kHz/8Ch) average current drain during acquisition
Password protection to change settings or erase files

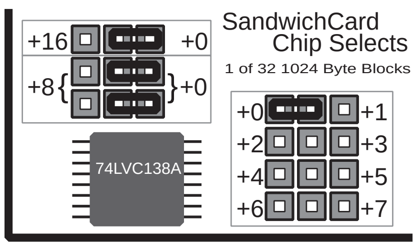
This is a much more complex example, and additional documentation can be found in the directory containing the project file.

Using SandwichCards in your CF1 system

Your new BigIDEA add-on for the Persistor CF1 complies with guidelines for standard SandwichCard peripherals which should make installation and setup a fairly simple and straightforward process. If the BigIDEA is the only SandwichCard add-on in your CF1 system, or if the BigIDEA is the only IDE controller SandwichCard add-on, you should be able to safely skip the rest of this section. If not, you may want to familiarize yourself with some simple SandwichCard concepts to help you hurdle any installation difficulties.

Your CF1 system can support up to 32 SandwichCards and generally most Persistor Instruments and third party SandwichCards will be pre-configured to automatically work in your system using default jumper configurations and default initialization specifiers for their respective software drivers. This means you usually need to just follow the instructions to copy the associated library and header files into the proper directories and merge them into your CF1 projects. However, some very complex CF1 systems may be built with SandwichCard components that compete for system resources and you will need to manually reconfigure some boards and make minor accommodations in driver initialization calls to get everything working.

The diagram below shows the pattern and placement of the recommended 2mm chip select jumper blocks for SandwichCards. Inevitably, some board designs will face physical constraints that make some other scheme compelling enough to veer from the standard. Electrically however, the effect will be the same.



The CF1 has just two chip selects to provide for system expansion. Without something like the SandwichCard chip select circuitry, that would limit you to two add-on devices. With it, you can have up to 32 devices, but at the expense of a large memory space. However, with the exception of RAM or Flash, almost all I/O devices need only a tiny block of addresses for full functionality.

Each expanded SandwichCard chip select corresponds to a unique block of memory addresses, but since the C language and supplied drivers means you will almost never need to be cognizant of these physical addresses, we refer to each expanded chip select by a reference number between 0 and 31. The numerical markings surrounding the jumper blocks combine to yield that value based on the installed jumpers.

In the diagram above, the top three pins of the jumper block in the upper left chooses which chip select controls the board. If you jumper the right pin as shown, the system uses CS8 (which you don't really need to know) and the chip select reference number begins with zero. If the left pin was jumpered, the system would use CS10 and the reference number would start with sixteen.

The lower six pins select the high or low bank of eight addresses, and the jumpers must always be moved in pairs (admittedly awkward, but it saves much circuitry) between right as shown for the low address bank with zero added to the chip select reference, or left for the upper bank and eight added to the reference number.

Finally, the jumper block in the lower right selects one of eight possible slots from the memory bank. One jumper connects from a center pin to any of the peripheral pins to complete the selection, and the corresponding number gets added to the reference number to complete its selection.

Fortunately, most SandwichCards manufacturers will supply their cards pre-configured to conform to the Persistor Instruments guidelines to simplify installation and setup. The table below details these selections.

SC#	Device Class	Base+	Size	CS	Default
0	BigIDEA IDE adapter	0000	1024	/CS8	FFFF8000
1	other IDE adapter	0400	1024	/CS8	FFFF8400
2	ATA Flash Card adapter	0800	1024	/CS8	FFFF8800
3	SCSI adapter	0C00	1024	/CS8	FFFF8C00
4	PCMCIA adapter	1000	1024	/CS8	FFFF9000
5	Quad UART	1400	1024	/CS8	FFFF9400
6	other UART	1800	1024	/CS8	FFFF9800
7	Ethernet controller	1C00	1024	/CS8	FFFF9C00
8	CAN controller	2000	1024	/CS8	FFFFA000
9	USB controller	2400	1024	/CS8	FFFFA400
10	IEEE488 Interface	2800	1024	/CS8	FFFFA800
11	68k bus to ISA adapter	2C00	1024	/CS8	FFFFAC00
12	LCD Display	3000	1024	/CS8	FFFFB000
13	undefined	3400	1024	/CS8	FFFFB400
14	undefined	3800	1024	/CS8	FFFFB800
15	user circuitry	3C00	1024	/CS8	FFFFBC00
16	parallel I/O	0000	1024	/CS10	FFFF0000
17	parallel A-D 1	0400	1024	/CS10	FFFF0400
18	parallel A-D 2	0800	1024	/CS10	FFFF0800
19	parallel D-A	0C00	1024	/CS10	FFFF0C00
20	counter/timer	1000	1024	/CS10	FFFF1000
21	Bank-switched RAM	1400	1024	/CS10	FFFF1400
22	Precision clock	1800	1024	/CS10	FFFF1800
23	undefined	1C00	1024	/CS10	FFFF1C00
24	}	2000	1024	/CS10	FFFF2000
25	}	2400	1024	/CS10	FFFF2400
26	}	2800	1024	/CS10	FFFF2800
27	} reserved for user	2C00	1024	/CS10	FFFF2C00
28	} custom circuitry	3000	1024	/CS10	FFFF3000
29	}	3400	1024	/CS10	FFFF3400
30	}	3800	1024	/CS10	FFFF3800
31	}	3C00	1024	/CS10	FFFF3C00

Keep in mind that these are merely guidelines and implementation considerations may persuade board designers to adopt different strategies. Check the vendors documentation as they will likely clearly state if you need to be on guard for potential collisions.

1-2-Punch PCMCIA Adapter Schematic