The Fastest Apple II Storage Card Available! **DMA!**

MicroDrive
TURBO

Owner's Manual

ReActiveMicro.com
ReActivate Your Vintage Apple Computer
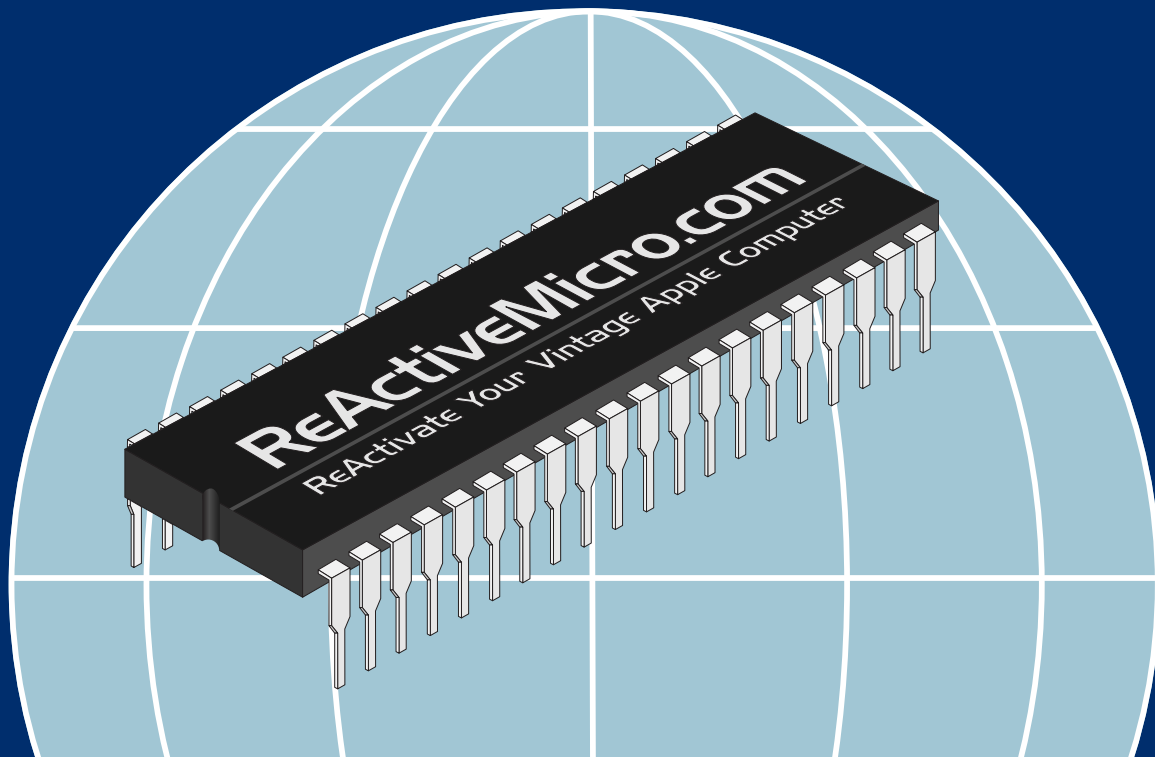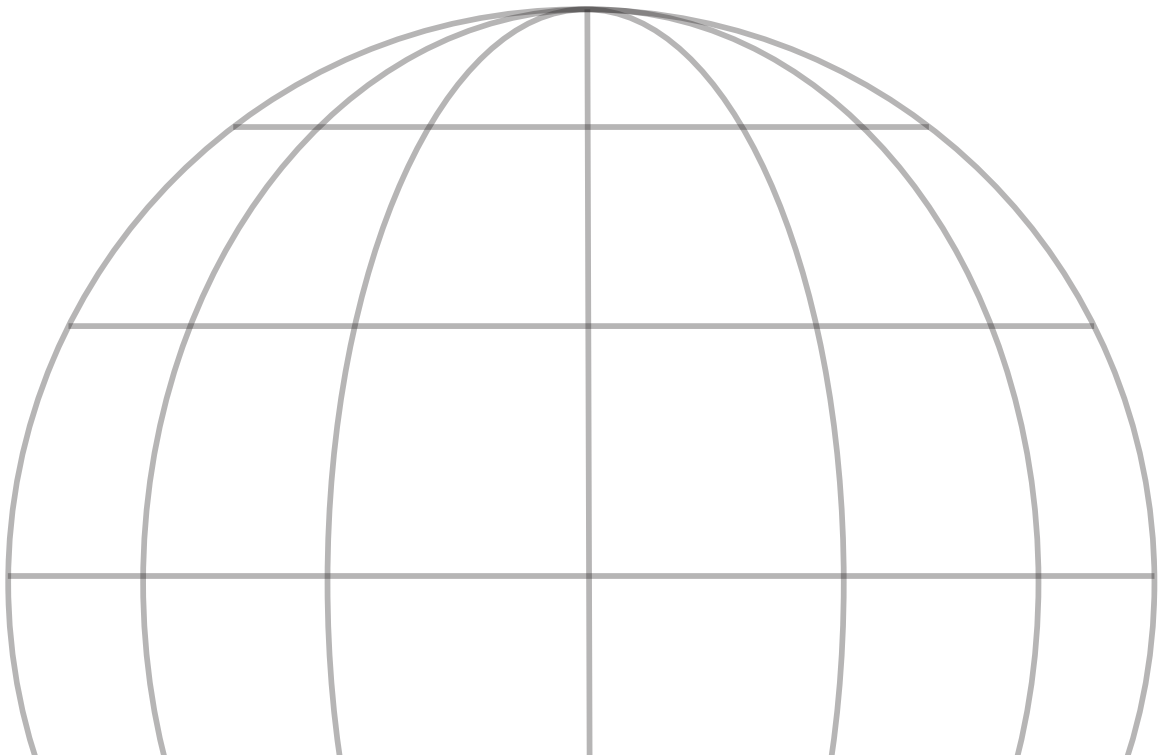
MicroDrive
TURBO

Customer Satisfaction

The MicroDrive Turbo Expansion Card comes with a lifetime warranty to the original purchaser only.

Limitation on Warranties and Liability

ReActiveMicro

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A Word About This Manual

Congratulations on your purchase of the MicroDrive Turbo from ReActiveMicro.com

This manual is designed to assist you in every phase of integrating the MicroDrive Turbo Expansion Card into your Apple® IIGS™ and Apple® IIe™ Enhanced Personal Computer.

The manual covers everything from the hardware installation, software configuration, and much more. The hardware is the most sensitive part; an improperly-performed hardware installation could damage the MicroDrive Turbo and the Apple Computer.

The MicroDrive Turbo is an Apple II Expansion Card that gives the Apple IIGS and the Apple IIe Enhanced Personal Computer a complete Solid State Storage Solution.

Everything is included to get you up and running right out of the box.

There are two categories of Apple II owners: those who have installed peripheral cards into their computers, and those who haven't.

Those of you who have ventured under the hood of their computer probably need little explanation of the process. You will see that the MicroDrive Turbo's installation is not much more difficult than any other card in your system.

Those of you who have never explored the insides of your computer the installation is not difficult if you follow the detailed steps in the Installation section. Nevertheless, you may decide that this process is not for you; in this case, arrange for a qualified computer technician to install the MicroDrive Turbo Expansion Card for you.

No matter what your level of experience, do not attempt to install MicroDrive Turbo until you have read the manual and understand all of the steps completely.

Static Precaution

Avoid any and all electrostatic discharges to the MicroDrive Turbo Expansion Board. Like all electronics devices, a static discharge can destroy or shorten the life span of the delicate components on the Expansion Card.

This risk is highest in areas where there is carpet, and especially during dry weather.

You can momentarily discharge any buildup by coming into contact with a grounded piece of metal, the most convenient method is touching the metal case of the Apple II's internal power supply, the computer must be plugged in for this procedure to work, the power cable has the grounded connection.

MicroDrive Turbo

Technical Specifications

- ✿ Requires an Apple IIGS or Apple IIe Enhanced
- ✿ Fully ProDOS and GS/OS compatible.
- ✿ Compatible with all known Apple II hardware.
- ✿ DMA Capable.
- ✿ Compatible with memory up to 8 MB on the Apple IIGS.
- ✿ GS/OS driver with GS/OS caching support included.
- ✿ Can boot a minimum GS/OS System in 12 seconds.
  With an Accelerator installed 9 seconds.
- ✿ Allows to boot any partition.
- ✿ Up to 8 partitions on one CF Card, 16 partitions on two CF Cards.

Fully compatible with all hardware such as:
TransWarp GS, ZIP GSX, PC Transporter, RAM Cards from Apple,
Applied Engineering, CV-Tech, Harris, Q-Labs, Sequential Systems etc.
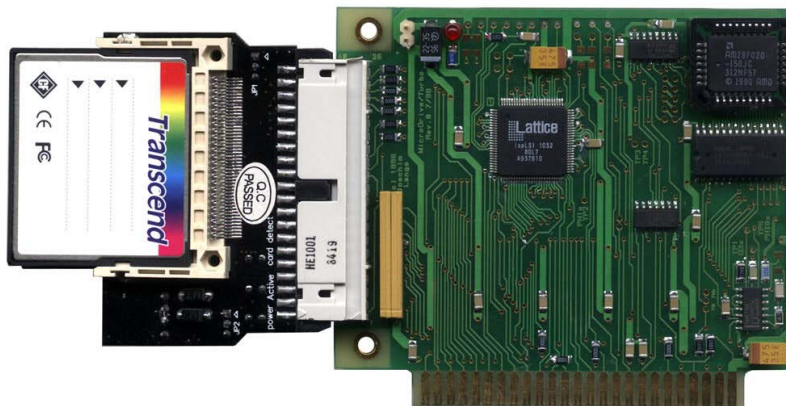
MicroDrive Turbo Expansion Card 1

Advanced Features

The MicroDrive Turbo uses CompactFlash Cards. Solid State, readily available, inexpensive, low power, noise free, high degree of durability with a very long lifespan, superb quality.

For more information on CF Cards see Compact Flash Overview at the end of this manual.

CF Storage - Benefits
Moving software downloaded from the Internet to your Apple II Personal Computer has never been quicker or easier. Just remove the CF Card from your MicroDrive Turbo, insert it in to your PC Card Reader, start CiderPress. You can read and write directly to the CF Card. Using your PC for transferring files and backing everything up, taking care of your Apple II files has never been so quick and painless!
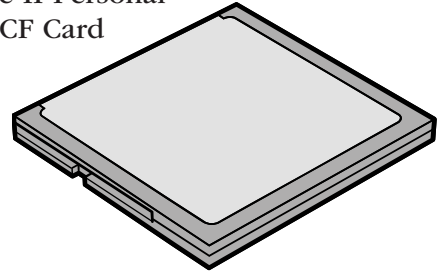
Standard IDE Interface
The 40 Pin IDE interface on the MicroDrive Turbo is a standard 16-bit IDE port. It is capable of addressing Primary and Secondary (Master/Slave) IDE storage.

IDE to Dual CF Adapter
The MicroDrive Turbo comes standard with a 40 Pin IDE to Dual CF Adapter. Users can control which of the Two CF Slots is Primary and Secondary using a Jumper on the Adapter.

Note: The Dual mode feature is only available on Apple IIGS Personal Computer.

DMA
As the name implies, the MicroDrive Turbo performs Direct Memory Access which bypasses the CPU and allows for an incredible 40% faster read and write speeds when compared to conventional controllers.

With an accelerator installed in your IIGS you can boot GS/OS in as fast as 7 seconds! The DMA option can be turned on or off using the Setup Utility.

ProDOS 8 and 16
The MicroDrive Turbo is ProDOS compatible. It's recognized as a **Standard Mass Storage Device** just like any Hard Disk Drive on your Apple II. Large Volume DOS 3.3 support is provided through the use of a program called **DOS.MASTER** (preloaded on CF Card).

Boot Options
By default, Volume 1 is set to boot. However, when setting up a New CF Card the user sets which Volume they desire to boot. Or on an existing CF Card the Setup utility can modify the default boot Volume. The MicroDrive Turbo also offers a temporary option to boot to ANY volume.

When powering on the Apple II the user will press and hold the [esc] key. This will pause the MicroDrive Turbo's splash screen.

The user then presses the corresponding Volume's number key, and the MicroDrive Turbo will boot to that Volume.

Apple IIGS and Apple IIe Enhanced Operation
The MicroDrive Turbo comes standard with the Apple IIGS Firmware. You can however order one with Apple IIe Firmware, or buy an upgrade ROM to convert a IIGS MicroDrive Turbo for use in an Apple IIe Enhanced.

Setup Utility

Make a Backup Copy

Before using your MicroDrive Turbo, make a backup of the MicroDrive Turbo Setup Utility. Without this Utility you will be unable to re-setup the CF Card(s) should your run into problems or accidentally format the original copy.

Note: It is advised to make copies of the Setup Utility (Backup floppy).

Step by Step Instructions:

1	Upon booting the MicroDrive Turbo you will be taken to Volume 1 which holds the ProDOS 8 utilities. You will see menu item named **COPYIIPLUS9.1**
2	Using the **Arrow** keys highlight the item and press [return].
3	Press the letter [C] to select **COPY**, and the letter [F] for **FILES**.
4	Use the **Arrow** keys to select the Slot where you installed the MicroDrive Turbo, and Drive 1. Press [return].
5	Use the **Arrow** keys to select the Slot and Drive where your backup floppy is located. Press [return]. You will see a folder named **MICRODRIVE**.
6	Using the **Arrow** keys highlight the folder and press [return]. You will see a file called **MICRODRV.SETUP**
7	Using the **Arrow** keys highlight the file and press [return].
8	Press the letter [G] to start the Copy Process. This assumes your Floppy Disk is preformatted with ProDOS. If not, then you can use Copy II Plus to also format the Disk.

Installation

Apple IIGS

When installing the MicroDrive Turbo in your Apple IIGS a few things need to first be taken into consideration.

For example, will you want to primary boot the MicroDrive Turbo, your Floppy Drives, or other bootable devices installed in your system?

For most installations users will want to boot primarily to the MicroDrive Turbo. In this case we recommend installing the MicroDrive Turbo in Slot 7.

And when you want to boot to the Floppy Drives hold down the [esc] key on boot. This allows the IIGS to **skip** booting the MicroDrive Turbo and move on to checking the other bootable devices such as a floppy disk drive.

For other configurations, the good news is that the Apple IIGS allows a lot of flexibility when it comes to booting. You will need to decide however what is the best to meet your needs.

If not installing the MicroDrive Turbo in Slot 7, then we usually recommend Slot 2. By default, the IIGS is set to use Slot 2 for a Modem. Since most users no longer use a Modem, Slot 2 is a good choice. The default setting in the Apple IIGS will need to be changed in order for the MicroDrive Turbo to work in Slot 2.

To edit the settings or change the way your Apple IIGS boots you will need to enter the Control Panel.

There are a couple of ways to do this:

A	Hold down the **Option** key on the keyboard and power on the IIGS. Select **1** for the Control Panel. Press [return] to select Control Panel. Once in the Control Panel use the **Arrow** keys to select the Slots Menu and press [return].
B	Power on the IIGS and at any time hold down the ⌘ Key and [control] keys, then press the [esc] key. Press [return] to select Control Panel. Once in the Control Panel use the **Arrow** keys to select the Slots Menu and press [return].

Most Apple IIGS Computers will be set to the default configuration, denoted by the **Check Mark** on the left of the option. Use the [↑] [↓] keys to select an option, then [←] [→] keys to set the option.

Be sure to press [return] when done to save any changes.

There is nothing needed to use the MicroDrive Turbo in Slot 7. It is already defaulted to **Your Card**. There is also no need to change the **Startup** Option if it is set to **Slot 7** or **Scan**.

If, however you want to use the MicroDrive Turbo in Slot 2 you will need to change the Slot setting to **Your Card**.

And if you would like the Apple IIGS to boot the MicroDrive Turbo in Slot 2 then you will also need to change the **Startup** Option to **Slot 2**.

Be sure to press |return| when done to save any changes.

☞ The **Startup** Option in the Control Panel allows you to control how the Apple IIGS looks for bootable devices when powered on. **Scan** will tell the Computer to look from Slot 7 to Slot 1.

☞ Selecting **Slot X,** (**X** refers to the Slot number) will tell the computer to **ONLY** boot that Slot. If no bootable devices are found, then the Apple IIGS will report **Check startup device**!

☞ You can however tell the IIGS to boot from another Slot by breaking into BASIC (hold down the |control| key and press the |◁ | **Reset** key), then type **PR#X** and press the |return| key, (**X** refers to the Slot number).

☞ The MicroDrive Turbo allows the IIGS to skip trying to boot it by holding down the |esc| key on boot.

Apple IIe Enhanced

When installing the MicroDrive Turbo in your Apple IIe a few things need to first be taken into consideration.

For example, will you want to primary boot the MicroDrive Turbo, your Floppy Drives, or other bootable devices installed in your system?

For most installations users will want to boot primary to the MicroDrive Turbo. In this case we recommend installing the MicroDrive Turbo in Slot 7.

When you want to boot to an external floppy drive(s) simply hold down the `Esc` key during the boot-up sequence. This allows the Apple IIe to **Skip** booting the MicroDrive Turbo and move on to checking the floppy drive(s) or possible other bootable devices in lower numbered Slots.

If, however you install the MicroDrive Turbo in another Slot then it may not boot and depends on what other bootable devices are installed in your Apple IIe Computer.

You can however tell the Apple IIe to boot to another Slot by breaking into BASIC if needed.

1	Hold the `Control` key and press the `Reset` key.
2	Then type **PR#X** and press the `Esc` key, (**X** is the Slot number).

CF Backup & Restore

One important feature of the MicroDrive Turbo the ability to remove the CF Card(s) and use **CiderPress** to back up the Volumes on it.

To do this you will need the following:

- ✔ **CiderPress** installed on your PC or Mac Computer.
- ✔ USB Card Reader that supports CF Cards.

32Meg Volume Images or whole CF Card images can be downloaded from the following wiki link: ReActiveMicro 32 Meg Hard Drive Image

Using the Setup Utility

Installation:
The MicroDrive Turbo is shipped Pre-Setup. Just install in any Slot. It is recommended that Slot 7 be used if possible since you will most likely want to boot from the MicroDrive Turbo more often than your Floppy Drive(s).

And when you want to boot to a Floppy Drive(s):

1	During the boot-up procedure, press and hold esc. This will bypass the MicroDrive Turbo in favor of the Floppy Drive(s).
2	Apple IIGS users may need to make a change to Slot settings in the Control Panel. To access the Control Panel first boot the IIGS, then press and hold down the key, control key, and then press the esc.

Setup Utility: Be sure to back-up the MicroDrive Turbo Setup utility to floppy! This disk will be for backup purposes or if you need to setup a New CF Card.

1	Upon booting the MicroDrive Turbo you will be taken to Volume which holds the ProDOS 8 utilities. You will see a folder named **SHRINK.IT**
2	Using the **Arrow** keys to highlight the folder and press [return]. You will now see a file called **SHRINK.IT.V3.4**
3	Press [return] to Execute it.
4	Press the letter [O] to open an archive. **MICRODRV.IIE.S1** is for a 5¼" disk. **MICRODRV.TURBO** is for a 3½" disk.
5	Select One and press [return] Twice.
6	Next Select the Drive on which to write. When done be sure to boot the disk and run the Setup utility to make sure it restored correctly. Repeat the above process if needed.
👍	Done!

If you require a Setup utility disk be mailed to you, there will be a charge.
Email: ReActiveMicro for more information.

Check The DMA Setting: It is advised to check the DMA setting in the Setup utility to make sure it is set correctly. Usually there isn't any issue, however you can experience data corruption or loss if the setting is not correct.

1	Upon booting the MicroDrive Turbo you will be taken to Volume 1 which holds the ProDOS 8 utilities. You will see a folder named **MICRODRIVE**.
2	Using the **Arrow** keys highlight the folder and press ⌈return⌉.
3	You will now see a file called **MICRODRV.SETUP**. Press ⌈return⌉ to execute it.
4	Press the letter ⌈D⌉ to select **DMA Mode**. If it's set currently to your Apple II, then you are finished. If not, then continue to the next step.
5	Press ⌈return⌉ to change the setting. For Apple IIe users select **Enable**.
6	Press the letter ⌈W⌉ to Select **Write Configuration**.
7	Press ⌈return⌉, then the letter ⌈W⌉ to Save the New Configuration.
👍	Done!

Note: Set DMA Mode to "Disable" to experience the performance loss of your Apple II System if you were using a Non-DMA Mass Storage Device. DMA Performance is the key feature that you get with the MicroDrive Turbo, only from ReActiveMicro.

The Pre-setup and Pre-loaded CF Card: The MicroDrive Turbo comes with a Pre-Setup CF Card which has 4 ProDOS Volumes on it. The CF Card comes pre-loaded the same for the Apple IIGS or IIe.

- ✿ **Volume 1** has ProDOS 8 Utilities loaded on it and is bootable into ProDOS 8.
- ✿ **Volume 2** has GS/OS v6.0.1 loaded on it and is bootable. You will need at least 1Meg of RAM in order to RUN GS/OS or you will be forced to exit.
- ✿ **Volume 3** has DOS.MASTER loaded on it and is bootable into ProDOS 8 which loads BASIC. You will see a folder called DOS.MASTER.
- ✿ **Volume 4** is formatted in ProDOS and is not bootable.

Note: You can setup more volumes on the CF Card if you wish, however you will quickly run out of Slots under ProDOS 8.

ProDOS maps each Volume to a Slot and Drive, the same as what is done with the Floppy Drives. So the current 4 Volumes take up 2 Slots, which have 2 Drives each. If you don't have many peripheral cards in your Apple II then adding more Volumes may not pose a problem. However, users which have other devices in Slots which get a Volume mapped to them may not be able to use the card or the Volume.

Boot to Other Volumes: The MicroDrive Turbo comes set to boot to Volume 1 by default. You can however temporary boot to other Volumes on the CF Card.

1	Hold down the ⌘ key when powering on the Apple II. This will pause the MicroDrive Turbo's splash screen.
2	Lastly press the corresponding Volume's number key. The MicroDrive Turbo will boot to that Volume. You can also use the Setup utility to make booting to another Volume the current setting.
3	Upon booting the MicroDrive Turbo you will be taken to Volume 1 which holds the ProDOS 8 utilities. You will see folder named MICRODRIVE.
4	Using the **Arrow** keys highlight the folder and press [return]. You will now see a file called **MICRODRV.SETUP.**
5	Press [return] to execute it.
6	Press the letter [B] to select Default Boot Volume.
7	Press [return] to change the setting to the desired NEW boot Volume.
8	Press the letter [W] to select **Write Configuration**.
9	Press [return], then the letter [W] to Save the New Configuration.
👍	Done!

Adding Volumes to CF Card: To add more Volumes to your CF Card.

1	Upon booting the MicroDrive Turbo you will be taken to Volume 1 which holds the ProDOS 8 utilities. You will see a folder named **MICRODRIVE**.
2	Using the **Arrow** keys to highlight the folder and press `return`. You will now see a file called **MICRODRV.SETUP**
3	Press `return` to execute it.
4	Press the letter `E` to select Partition Editor. You will immediately be taken to the Partition Table area on the right side of the screen.
5	Press the letter `A` to add a New Volume. Press the `?` key for available commands.
6	Press and hold both **Apple** keys, then press the `➡` key. The Blk Size and Dec/Hex column values will start to change.
7	Keep pressing the `➡` Right Arrow key till the Blk Size reads **$010000**. Release the **Apple** keys.
8	Press the `⬅` key once. The Blk Size should now read **$00FFFF**. ProDOS can only use UP TO 32Megs of space. $00FFFF is 32Meg in Blocks. You cannot use volumes larger than 32Megs.
9	Press the letter `D` to delete any volumes or to Start Over.
10	Press the letter `Q` twice if you DO NOT want to save your changes and exit. Repeat the above steps if you want to add more Volumes.
11	Press the letter `W` to select Write Configuration.
12	Press `return`, then the letter `W` to save the New Configuration.
👍	Done!

Note: Don't forget you will need to Format any New Volumes before those volumes can be used to store files.

Deleting Volumes from CF Card: To remove Volumes from your CF Card.

1	Upon booting the MicroDrive Turbo you will be taken to Volume 1 which holds the ProDOS 8 utilities. You will see a folder named **MICRODRIVE**. Using the **Arrow** keys highlight the folder and press [return]. You will now see a file called **MICRODRV.SETUP**
2	Press [return] to execute it.
3	Press the letter [E] to select Partition Editor. You will immediately be taken to the Partition Table area on the right side of the screen.
4	Use the **Arrow** keys to select the Volume you want to delete.
5	Press the letter [D] to delete the Volume.
6	Press the letter [Q] twice if you DO NOT want to save your Changes and exit. Repeat the above steps if you want to add more Volumes.
7	Press the letter [W] to select Write Configuration.
8	Press [return], then the letter [W] to save the new configuration.
👍	Done!

Setting Up a New CF Card: To use a new CF Card (or one that has been accidentally formatted on your PC) you must first partition it.

However, if you do not have an existing bootable CF Card or a backup of the MicroDrive Turbo Setup Utility on Floppy Disk then you will need to contact ReActiveMicro support in order to obtain a new CF Card which is preloaded, or a Diskette with the Setup Utility.

If you have the Setup Utility, then see Adding Volumes to CF Card: above.

CiderPress — Backup & Restore

For the latest version of **CiderPress** visit the following web sites.
CF Card Reader is also required to access the CF Card.

⊞ Windows   a2ciderpress.com
 Mac   retrocomputingaustralia.com

Thanks to Michael Mulhern for his efforts and hosting.

Backing-up the CF Card

To Back-up a Volume:

1	Insert the CF Card into your Reader.
2	Allow a few seconds for it to be recognized by your OS.
3	**DO NOT** format the Card if prompted!
4	Launch **CiderPress**.
5	Click on the **Tools** menu and select **Volume Copier** (open volume).
6	Select **Physical Disk X**. (**X** is the disk number).
7	Click the **OK** button to continue. Users with a Computer that has more than one Hard Drive or CF Reader will have to determine exactly which Drive the CF Card Reader to be used is. In most cases it will be **1**. The size of the CF Card should also be displayed in the **Remarks** column. All Volumes will now be listed.
8	Select the volume you wish to backup and click the **Copy to file** button. You will now be asked where to save the backup file.
9	Select a location and a name then press the **Save** button.
10	**CiderPress** will now start to read the Volume and save it to your PC. When it is done the popup progress window will close. **Optional:** You can now select other Volumes to backup if desired.
👍	Done!

Restoring the CF Card

To Restore a Volume:

1	Insert the CF Card into your Reader. Allow a few seconds for it be recognized by your OS. **DO NOT** format the Card if prompted!
2	Launch **CiderPress**.
3	Click on the **Tools Menu** and select **Volume Copier** (open volume).
4	Select **Physical Disk X**. (X is the disk number). Users with a Computer that has more than one Hard Drive or CF Reader will have to determine exactly which Drive the CF Card Reader to be used is. In most cases it will be **1**. The size of the CF Card should also be displayed in the **Remarks** column.
5	**Uncheck** the **Open as read-only** Option above the **OK** button. **WARNING:** Data on your Volumes can now be over-written. Be careful, and make sure to select the correct Volume!
6	Click the **OK** button to continue. All Volumes will now be listed.
7	Select the volume you wish to restore an Image to and click the **Load from file** button.
8	Select the image file and click the **Open** button.
9	**CiderPress** will prompt you to make sure you want to overwrite a Volume if there is data there, and you need to confirm **OK** to continue. If it is blank it will start loading the image. You can load multiple images if you wish.
👍	Done!

Raw Disk Copier

You can use a utility to Back-up the whole CF Card using a program called HDD Raw Copy, download link: HDD Raw Copy Tool

CiderPress however has the advantage of being able to open and utilize the backup Images it creates. So in the future you could copy files from the Images or access data if needed. You would not need to fully restore the Image as with other backup programs.

Some Emulators can also access and use the Image files too. Raw Disk Copiers like HDD Raw Copy can however be useful if you would like to quickly duplicate a CF Card as it will copy the Partition information unlike **CiderPress**. So you do not need to run the MicroDrive Turbo Setup Utility before restoring the HDD Raw Copy Image.

This could be a useful backup method should the Setup Utility backup disk you made see **Backing Up - Setup Utility** above ever becomes damaged, lost, or unusable.

CiderPress — Copying Files

Copy a File to the ▸▸ CF Card

1	Insert the CF Card into your Reader. Allow a few seconds for it be recognized by your OS. **DO NOT** format the Card if prompted!
2	Launch **CiderPress**.
3	Click on the **File** menu and select **Open Volume...**
4	Select **Physical Disk X**. (**X** is the disk number).
5	Click the **OK** button to continue. Users with a Computer that has more than one Hard Drive or CF Reader will have to determine exactly which Drive the CF Card Reader to be used is. In most cases it will be **1**. The size of the CF Card should also be displayed in the **Remarks** column.
6	Uncheck **Open as read only** and click the **OK** button. All Volumes and folders will now be listed. Locate the volume, and folder if desired, in which you wish to place the copied file. Roots of Volumes can be identified by the double name such as **MDVOL1::MDVOL1** for example. Folder and files can be identified by the name AFTER the **:** and the info listed in the **TYPE** column.
7	Right click on the location, then select **Add Files...**
8	Browse to the file's location, select any desired options, then click the **OK** button. You will now see the file located on the CF Card.
9	Repeat as desired to add more files.
👍	Done!

Copy a File from the ◄◄ CF Card

1	Insert the CF Card in to your Reader. Allow a few seconds for it be recognized by your OS. **DO NOT** format the Card if prompted!
2	Launch **CiderPress**.
3	Click on the **File** Menu and Select **Open Volume**...
4	Select **Physical Disk X**. (**X** is the disk number).
5	Click the **OK** button to continue. Users with a Computer that has more than one Hard Drive or CF Reader will have to determine exactly which Drive the CF Card Reader to be used is. In most cases it will be **1**. The size of the CF Card should also be displayed in the **Remarks** column. All Volumes and folders will now be listed. Locate the volume, and folder if needed, in which the file wish to copy is located. Roots of Volumes can be identified by the double name such as **MDVOL1::MDVOL1** for example. Folder and files can be identified by the name AFTER the **:** and the info listed in the **TYPE** Column.
6	Right click on the location, then select **Extract...**
7	Browse to the location you wish to copy the file to, select any desired options, then click the **OK** button. You will now see the file located where you selected.
8	Repeat as desired to copy more files.
👍	Done!

Technical Support

Uthernet/ADTPro with MicroDrive Turbo

An incompatibility exists in ADTPro versions 2.0.2 and earlier where ADTPro's Uthernet initialization interferes with the operation of the MicroDrive Turbo running IIGS firmware.

To be specific, if the MicroDrive Turbo is in a slot number lower than the Uthernet or Uthernet II, ADTPro will not start. Even if you create and save an ADTPro Uthernet configuration to specify an Uthernet slot using a different computer, the software/hardware will not operate correctly.

There are a number of solutions available:

1) Use a version greater than 2.0.2 of ADTPro
2) Move your MicroDrive Turbo to a slot higher than your
   Uthernet or Uthernet II expansion card.
   Typical slots are:
   ✿ 3 for Uthernet/Uthernet II Card.
   ✿ 7 for MicroDrive Turbo Card.
3) Use the IIe version of firmware in your MicroDrive Turbo.

Copy Protected Software

Some programs (especially copy protected games and programs that will not run from the Finder or require their own boot process) are not aware of the Apple IIGS Memory Manager and therefore will not run from a hard disk because the MicroDrive Turbo Card requests memory from the Memory Manager. When the memory is overwritten by these type of programs, the MicroDrive Turbo Card software will not function.

For Example:
The Immortal, PHOTONIX). This software does not adhere to the standards published by Apple Computer Inc.

If you can find a program that doesn't work with the MicroDrive Turbo Card and it proves to be OK with Apple's guidelines, you will receive a free update on any software or firmware part of the MicroDrive Turbo Card that requires updating.

Self-Powered IDE to CF Adapters

The MicroDrive Turbo comes with a self-powered IDE to CF Adapter with a pre-setup CF Card. Self-powered refers to the IDE to CF Adapter which uses power supplied on Pin 20 of the IDE connector and does not require an external power source. This means the Apple II Computer can supply power to the CF Card and no other power source is needed.

Boards sold from 2006 to Mid-2008 will have +5v connected to Pin 20 of the IDE Connector in the form of a small jumper wire on the rear of the board. Later boards have a small trace added to the face, left side of the board.

Over the years some users insisted on trying to install the CF Adapter backwards which would cause a short and burn the added trace from the board. So all boards from late 2017 and on have a fuse added to the small trace for added protection.

The photo below on the right with the fuse displays what the added trace looks like and its location.

IDE Pin 20 Power Mods

Pre-2008 MicroDrive Turbo

Flywire Power Mod and
Self Powered CF Adapter.

2018 MicroDrive Turbo

F1 Fuse and
Self Powered CF Adapter.
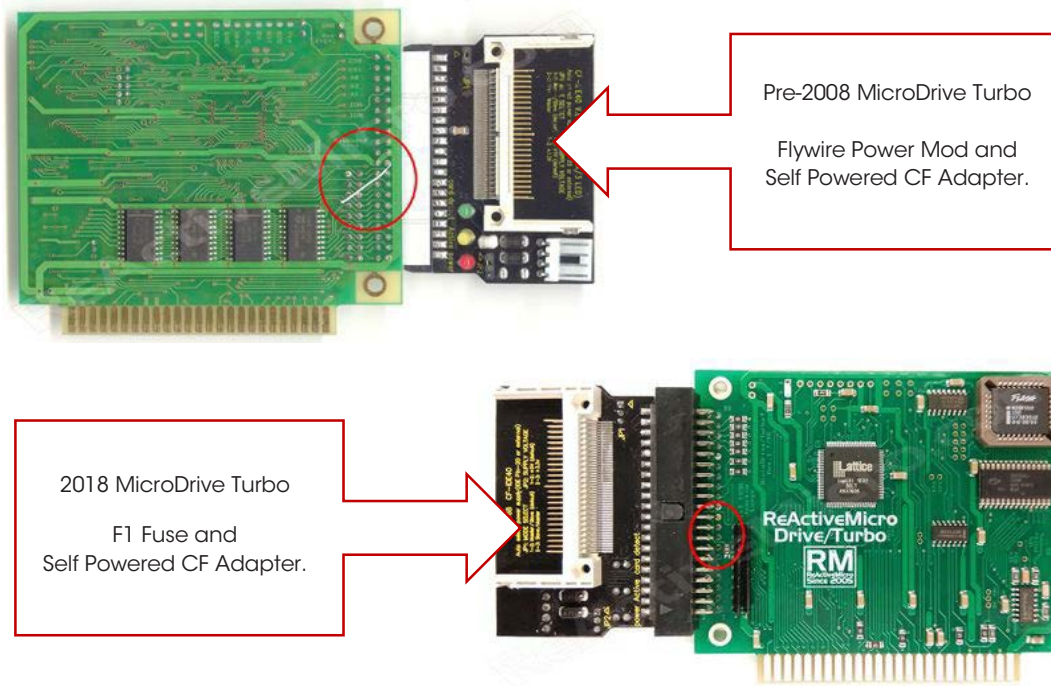
The HFS File System

HFS (MAC) File System

The MicroDrive Turbo Card does not allow partitions greater than 32MB, this is the upper limit for the ProDOS File System. The only reason to open the 32MB limit would be using HFS partitions.

There are several important reasons which should keep you back from using the HFS File System for regular hard disk usage:

- The HFS partitions does not give you any other advantages other than a larger partition size.
- GS/OS cannot boot from a HFS partition.
- If the HFS partition becomes corrupted, there are no ways to repair the directory structure. The partition will have to be reformatted, with a complete loss of data.
- Writing to a HFS partition is very slow, and such, any speed advantage has gone with using a hard disk (writing to a HFS volume is also slow when using diskettes and other storage media).
- Using a HFS partition at read operations is not faster than using a partition with the ProDOS File System.

Note: Due unforeseen circumstances it is recommended that you do not use the HFS feature.

Firmware

The MicroDrive Turbo comes Pre-Setup for the Apple IIGS or the Apple IIe Enhanced Personal Computer.

This can be determined by the Firmware ROM which is installed on the card. The ROM is the small square IC on the upper right of the card. It is the only IC that is removable (Socketed).

The IIe Firmware works on both the Apple IIe Enhanced and Apple IIGS; however, it is quite slow in the IIGS compared to the IIGS Firmware.

Note: The Apple IIe Enhanced will lock up if the IIGS Firmware is used on the MicroDrive Turbo.

ROM Chip Removal

The IIe Firmware ROM is marked with a label that displays **IIe**. If the label has been removed or fallen off. Try the MicroDrive Turbo in an Enhanced IIe, if the computer operated correctly then the **IIe** Firmware is installed.

Step by Step Instructions

To remove the Firmware ROM, you will need a **PLCC Extraction Tool**. These can be found online such as eBay for around $5.00.

- ◉ Do not pry too hard on the ROM Socket if possible. Reference the picture for the areas on which to pry up.
- ◉ The New Firmware ROM should be installed in the same orientation with the chip markings facing up.
- ◉ Installing the ROM backwards WILL damage it!
- ◉ Reference the picture and you will notice one corner of the Socket and ROM are CUT. The other corners are square. There is usually a DOT or mark on the case of the IC to help denote which side is which. In the case of the MicroDrive Turbo we want to make sure the Cut Corner and the DOT are facing to the LEFT.
- ◉ The chip markings should be facing up, legible, with the gold Edge Connector (aka - Slot Edge) on the bottom of the MicroDrive Turbo.

ROM Location and
Where To Pry To Remove

Mechanical Hard Disk Drive Setup

The MicroDrive Turbo is fully IDE Compatible, with this in mind you can connect older style Mechanical IDE Hard Disk Drives to the card, keep in mind these older drives require external power, casing, cable exiting the Apple II and due to their age even when "NOS" new old stock, are prone to failure, in the end they offer no benefit in comparison to Solid State CF Cards.

Note: If you are unfamiliar with the configuration of Mechanic IDE Hard Disk
        Drives, this section of the Manual should be overlooked.

Setup

First, remove the IDE to CF Adapter from the MicroDrive Turbo. The unit should just slide off when pulled. Be careful to not bend any pins on the IDE male header.

Install a IDE Connector Cable

The IDE interface connector is a 40-pin header-type connector and generally is keyed to prevent the possibility of installing it upside down (see images on the next page).

To create a keyed connector, the manufacturer generally removes pin 20 from the male connector and blocks pin 20 on the female cable connector, which prevents the user from installing the cable backward.

The cable also incorporates a protrusion on the top of the female cable connector, which fits into a notch in the shroud surrounding the mating male connector on the device.

IDE 40-Pin Interface Connector

Cable Key 1

Pin 1

Pin 39

Pin 2

Pin 40

Pin 20
Blocked

10" min, 18" maximum

5" min. 12" max.

5" min. 6" max.

40 or 80 connectors

Pin 39   Pin 40

Pin 1   Pin 2

Grey Stripe
denotes Pin 1

Grey Connector
Slave Drive

Black Connector
Master Drive

Blue color
MicroDrive Connector
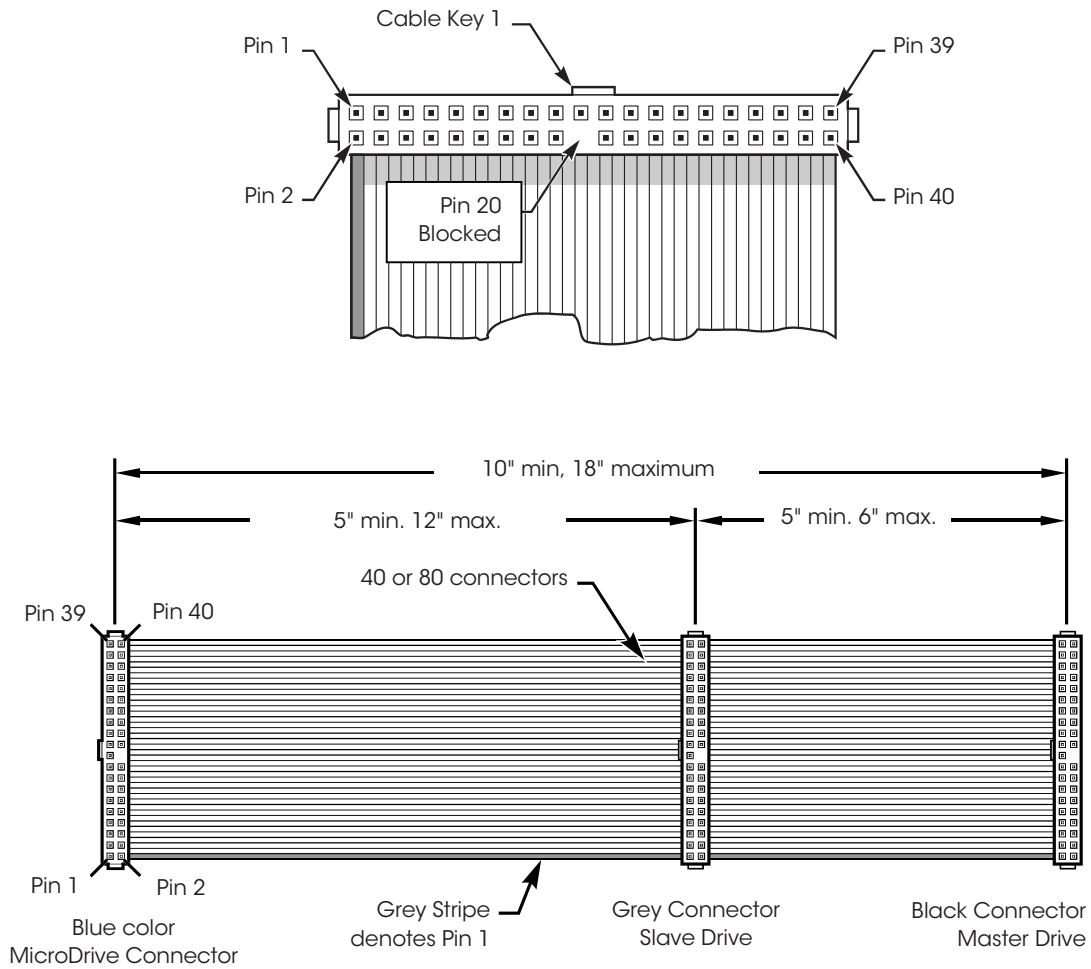
IDE Cable Colors

■ The Blue Connector attaches to the **MicroDrive Turbo** Card, be sure not to bend any of the pins, it should slide on without force.

■ The Grey Connector attaches to an optional Secondary Hard Disk Drive which is referred to as a Slave drive.

■ The Black Connector attaches to the Primary Hard Disk Drive which is referred to as the Master Hard Disk Drive.

The IDE Cable does not supply power to the Hard Disk Drives.

The External Hard Disk Drive(s) must be powered from a Secondary Power Source, either by power adapter or case with its own power source.

Caution:	Up-to-date MicroDrive Turbo boards' have +5v connected to Pin 20 of the IDE Connector. Be sure to use a cable as shown on the previous page.

You need to adhere to the following in order for all to work correctly:

- ✔ The Apple IIGS has to be turned on first.
- ✔ The Power Supply to the Hard Disk Drive(s) is then turned on second. Wrong order and the drive may not spin up.
- ✔ The Two Power Supplies must have a common ground. Without this the MicroDrive Turbo may not see the Hard Disk Drive(s).

Powering the Hard Disk Drives

External hard drives attached to the MicroDrive Turbo Card must be supplied by an external power supply. The MicroDrive Turbo Card was intentionally designed to not supplying power for the disk drives. Due to excessive current flow, the data integrity and proper functioning of the MicroDrive Turbo Card would suffer if power were drawn via the slot connector. This is a matter of precaution.

When using an external power supply, be sure to use the same wall outlet as your Apple II Computer (to avoid any potential ground loop problems).

Note:	Configuring a Hard Disk Drive requires proper documentation. Specifications for most Hard Disk Drives can be found with proper research via the Internet.

Typical IDE Hard Drive Connectors

Cable key prevents improperly plugging it into the drive

IDE Connector

Pin 1

Stripe on interface cable denotes Pin 1

Power Cable

Red (+5V)

Black (GND)

Black (GND)

Yellow (+12V)
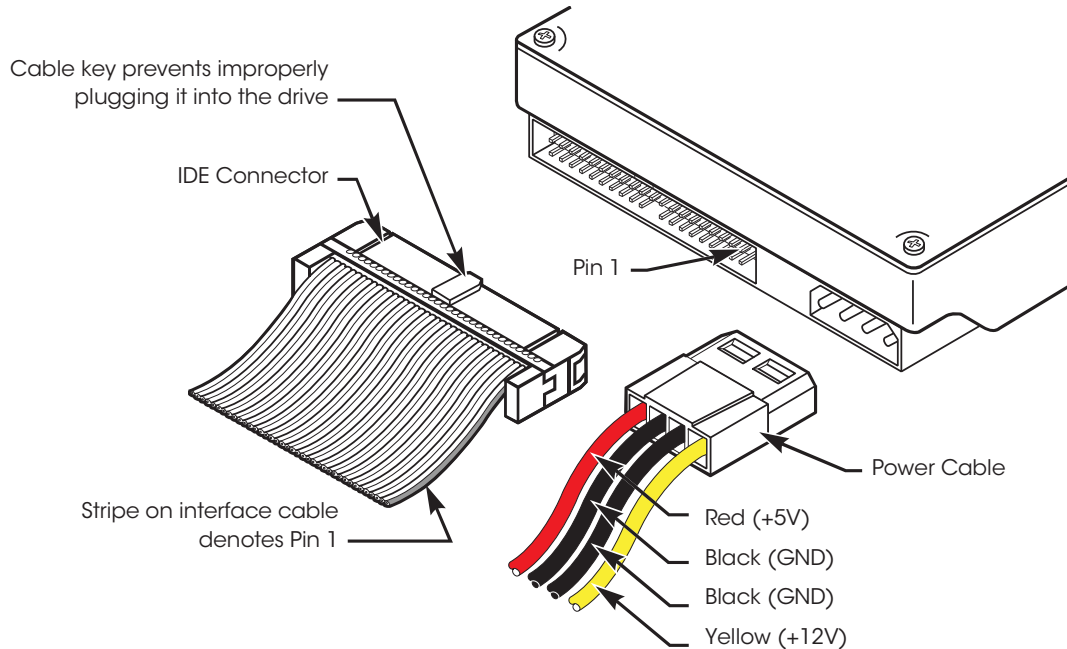
Preparing Your Hard Disk Drive

Starting from Scratch

Make a copy of the MicroDrive Turbo Card Utilities Disk. Use this copy now (we will call it the Installation Disk).

Copy the GS/OS driver from the installation disk to your GS/OS boot volume hard disk. Use any copy program to copy the driver to the /your.disk/SYSTEM/DRIVERS folder (your.disk is the name of your GS/OS boot disk, for example /INSTALL if the System 6 installer disk will be used). The driver is not required now, but later it will speed up the installation process of GS/OS on the IDE drive (everything works fine even without a GS/OS driver, but somewhat slower).

Boot the installation disk to run the configuration program MICRO.INSTALLER. Do not use a GS/OS program launcher.

After you have launched the program, the screen gets blanked. If your hard disk is brand new, you will notice a short time of hard disk activity while the screen says **one moment please…**

At this time, the installation program scans your hard disk to find the operating parameters (number of cylinders, number of heads and number of sectors per track).

After this primary and automatic setup process, you will find the parameters of your hard disk displayed on the top of the screen, right below the screen title. The only work that is left for you is to setup the number of partitions and their sizes.

1. Press the $\boxed{E}$ key to enter the partition editor.
2. Now you can press $\boxed{A}$ to add a partition or
   $\boxed{D}$ to delete the current partition highlighted.

You cannot add a new partition as long as the last partition created is still zero blocks large. If the number of blocks is greater than zero, the partition is considered as valid, and a new one can be added. Use the $\boxed{\leftarrow}$ $\boxed{\rightarrow}$ keys with or without the ⌃ and keys to adjust the sizes of the partitions.

The $\boxed{\uparrow}$ $\boxed{\downarrow}$ keys let you choose the partition to be modified. While you are setting up the partition sizes, you will find the total free number of blocks for your hard disk being growing or shrinking. You can add as many blocks as you like until the total free number of blocks is zero. You can hear a small beep if something is out of range. When you have finished creating your partition set, press $\boxed{return}$ or $\boxed{esc}$ to leave the partition editor. The light bar goes back to the menu list.

Now it's time to save the information you just created.

Use Menu Item **Write Configuration** to write your partition map and operating parameters to hard disk. The program should report success.

Leave the Installer program by pressing $\boxed{esc}$ or using the Menu Item **QUIT** and confirm quitting. This is the only way you should shut down this program.

Reboot your Apple II (this is required before the IDE drive(s) can be recognized by the MicroDrive Turbo Card).

At this time, trying to boot from the MicroDrive Turbo Card ends in the message **Volume not formatted** or **Unable to load ProDOS**. This is OK. So you will still have to boot from another System volume such as a System Disk or another hard disk.

Use any formatting utility to format your partitions.

You can use GS/OS and the FINDER, the Advanced Disk Utilities or PROSEL-16 for formatting your volumes. The default boot volume is volume (partition) number one.

Holding down the ⌃ key or the **Option** key while booting lets you choose an alternate boot volume by pressing the corresponding key for the volume number.

After a complete GS/OS system has been installed on the first partition, the MicroDrive Turbo Card is ready for booting. To install GS/OS correctly you must use the GS/OS Installer, the Finder or another 16-bit program (such as ProSel-16) which is able to copy resource forked files.

Do not forget to copy the GS/OS driver from the installation disk to the */System/Drivers folder on any of your boot volumes (* stands for the name you choose when formatting the volume). Only with the GS/OS driver installed you will get optimum performance out of your MicroDrive Turbo Card.

If you want to use two drives with your MicroDrive Turbo Card, you must repeat those steps listed before for your second drive. Just boot the MicroDrive Installer Program and press ⌈return⌉ after highlighting menu item **DRIVE CHANGE**. After this, continue setting up the partition map and repeat the other steps.

Changing Hard Drive Configuration

If you want to change anything, first boot the MicroDrive Turbo Card Installation Disk and run the **MICRO.INSTALLER**.

The installer automatically reads the configuration block from your hard disk. Now you can make changes on your partitions or on the boot volume for example.

It is recommended that making hard disk backups for reason of data security. In the case something went wrong, it is also useful to have written down the complete setup parameters of your configuration.

You may change any item without the risk of losing data, except the parameters listed here:

- ✿ The number of cylinders, heads and sectors.
- ✿ The number of blocks assigned to each volume.
- ✿ The number of volumes for your hard disk.

When you have finished modifying your configuration, save the configuration block by writing it back to your hard disk (Menu Item **Write Configuration**).

Every time you want to do that, you will get a warning message to remind you that you may lose your data on the hard disk. The message appears whether or not you made changes to the cylinders, heads and sectors and the volume parameters. As mentioned before, there is no danger to your hard drive's data as long as you have not changed these parameters.

Modifying Partitions

If you want to change a partition in size, the data on this partition will be lost. In addition, the contents of any partition with a number greater than the one you may want to change will be lost. So be very careful when doing changes and make a backup first.

If you reduce the number of partitions, the data on any partition greater than the new number will be lost.

After changing any partition size, it is absolutely necessary to (high-level) format the modified partition and all the partitions with the higher numbers! (use the Finder, the Advanced Disk Utilities or another disk utility).

Do not forget this step, it is required even if you can still read the old contents of this partition! Only after re-formatting the volume directory reflects the actual size of the new partition.

Another Look at the MicroDrive Installer

The **MICRO.INSTALLER** is a PRODOS 8 system file which is fully compatible and can be launched under ProDOS 8 or GS/OS without the need of any further accessories.

The **MICRO.INSTALLER** can be launched from any environment without the need of **BASIC.SYSTEM**. It even can be launched directly by booting the MicroDrive Turbo Installation Disk.

The **MICRO.INSTALLER** also can be run from any program launcher that supports launching SYS files (for example the built-in PRODOS 8 launcher or the GS/OS Finder).

After the program's startup, it tries to read the configuration data from the first hard drive and displays it on the 80-column screen. Now you can change any parameters as you like. The program should be self-explanatory. After you have changed any parameters, please don't forget to save your new configuration using **WRITE CONFIGURATION TO HARD DISK**. However, you have the option leaving the program without saving anything.

New Hard Disk Setup

When there is no valid configuration data found at start-up, the program assumes that a new hard disk was connected and needs to be configured. In this case, the program automatically does all the necessary things to set up a valid configuration including default operating parameters (it is basically the same thing as pressing $\boxed{control}$ $\boxed{R}$, re-read configuration parameters from hard disk). The only thing you have to do is to set up one or more partitions by entering the partition editor and to save your configuration data on the hard disk. As the last step, use a formatting utility like the FINDER, the Advanced Disk Utilities or PROSEL-16 to format your partitions.

The MICRO.INSTALLER does not check your configuration to see if a second drive (Slave) Drive is present. If you need a second drive to be configured, choose menu item CHANGE drive and the program will behave just like it has when dealing with the first drive.

Once you have run the **MICRO.INSTALLER** to create a new hard disk configuration, there is no need to launch it again from the installation disk.

The program writes itself on your hard disk into a safe area which cannot be accessed from any PRODOS or GS/OS program. At any time when you boot from your hard disk, you can choose launching the utility program first. When you reboot your computer, just hold down the key or the **Option** key and press **I** to run the **MICRO.INSTALLER**.

If you prefer to run the **MICRO.INSTALLER** from a program launcher, you can keep a copy on your hard disk.

Several additional options for setting up operating parameters can be found in this program. The functions are not implemented yet and won't be of any use for correct hard disk operation. These options will be added in a later revision of the card's software.

Installing the GS/OS Driver

For best performance and versatility, it is recommended to install the MicroDrive's GS/OS driver on your System volume (the floppy disk or the hard disk partition you boot from). If you don't install the driver, your MicroDrive Turbo Card won't give you the fastest speed you could expect. However, the card also works fine with no GS/OS driver installed.

To install the GS/OS driver, just use any file copy utility and copy the driver from the utilities disk to your /my.disk/SYSTEM/DRIVERS/ folder. **my.disk** is the place holder for the name of your boot volume.

This can be an Apple system disk, your hard disk, or a RAM disk.

If you are planning to use more than one volume as a bootable system volume, please be sure to copy the driver into every SYSTEM/DRIVERS/ folder. The driver's functions are available after the next reboot of a GS/OS system volume.

You also can use the INSTALLER to install the driver a bit more conveniently. For this purpose, a copy of the INSTALLER (present on the GS/OS system disk /INSTALL). should be launched from the MicroDrive Turbo Utilities Disk.

Note: Under the Apple IIGS Operating System a GS/OS driver is not available under ProDOS 8 operation. The driver is only active while GS/OS is active. If you launch a ProDOS 8 application, the driver is suspended until you return to GS/OS operation. This is true for any block device driver under GS/OS.

Using Two Hard Disk Drives

The MicroDrive Turbo Card supports the connection of two IDE drives. Drive one is called the MASTER drive, and drive two is also called the SLAVE drive. The Master/Slave condition is determined by the hard disk's jumper setting. There is no difference in connecting the hard disk to the IDE interface - same cable, same plug.

Setting the Hard Drives' Jumpers

In a One-Drive Configuration

Your drive should be jumped as MASTER, and NO SLAVE PRESENT.

In a Two-Drive Configuration

The first drive should be configured as MASTER (with jumper SLAVE PRESENT set). The second drive should be jumped as SLAVE. In some cases, you need to set additional jumpers as HOST SLAVE PRESENT or drive SLAVE PRESENT. Be sure to power up both drives at the same time.

Always have proper documentation for the drives you are using, otherwise you will be lost if you don't know how to jumper the drives.

Booting from a Different Volume

Using the MicroDrive Turbo Card, you can choose any volume for the boot volume. Just hold down the ⌘ key or the **Option** key at boot time. At the bottom of the screen you can see a message which tells you how many volumes you have. Now press any number ⎡1⎤ through ⎡9⎤ and ⎡A⎤ through ⎡G⎤ for the corresponding volumes 1... 16.

Note: Be aware that you must have a bootable operating system on the desired boot volume. At any time, when no key is pressed, rebooting will use the default boot volume as specified in the utility program. Although you can boot from a partition on drive two, the operating parameters from drive one will be used.

The default Boot Volume can be stored on both drives with different values. The boot volume parameter only takes effect when coming from drive number one. This is for reason of compatibility in the case you want to exchange the drives (yes, you can do that with no problems) or you once prefer to use only one drive (this could also be your second drive).

Note: One of the handiest features of the MicroDrive Turbo is the ability to select the volume from which you would like to Temporally Boot.

Hold down the ⌘ key when turning on the computer or rebooting and press the number key of the desired partition from which to boot. When holding down the ⌘ key the boot process will pause until either a number key is pressed or the ⌘ key is released.

Releasing the ⌘ key and not pressing a number key will cause the default volume to automatically boot. You are able to boot from ANY of the first sixteen (16) partitions on the CF Card you desire. To boot from partitions ten (10) to sixteen (16) use the letter keys ⎡A⎤ to ⎡F⎤. The default boot volume can also be changed in the MicroDrive Turbo Partition Management Utility.

There can be issues when formatting partitions using some programs, such as Copy II Plus. If you try to format a partition and the size is different than expected we recommend using the format utility which is located on the MicroDrive Turbo Utility Disk called **IIE.PART.FORMAT**.

This will let you format partitions correctly. Also, there has been a rare issue reported on the IIe when ProDOS 8 maps the 3rd and 4th partitions to Slot 2, Drive 1 and Drive 2 rendering the partitions to report **Not A ProDOS Volume** or other such errors.

To resolve this issue either install a device, such as a RAM card, that will force ProDOS 8 to reassign 3rd and 4th partitions to something other than Slot 2 or change the Slot in which the MicroDrive Turbo is installed.

AE Vulcan Upgrade

Hard Disk Back Up

This section of the Manual is for users who wish to upgrade an AE Vulcan Hard Drive System to the MicroDrive Turbo. The end result will be a faster interface between the AE Hard Disk Drive and the Apple II Computer.

Before replacing the AE Vulcan IDE Controller, first make a complete backup of all data on the Hard Disk Drive.

The partitioning scheme of the MicroDrive Turbo Card is not compatible with the partitioning scheme of the Vulcan IDE Controller; the Vulcan Hard Disk Drive will be treated as if it were a New Hard Disk Drive.

Note: The easiest way to make backups is to use the Archive that comes with GS/OS System 6.

When using the Archive, be sure to make file by file backups. Only this kind of backup guarantees that you can restore the data on a different hard disk drive with different volume sizes.

Setting Up the Hard Drive

After you have made the necessary backups and the MicroDrive Turbo Card is connected to your Vulcan, you can run the program **MICRO.INSTALLER** on the MicroDrive Turbo Card Utilities Disk. Refer to Preparing your hard drive in this manual.

Be aware that it is possible with some old hard drives that they cannot be setup automatically. If you are getting error messages after the **MICRO.INSTALLER** has tried to find the hard drive's operating parameters, you must set these parameters yourself by using menu item **MANUAL SETUP**.

During a manual setup, you will be required to enter the native hard disk drive's parameters. If you are not sure about what kind of hard disk your Vulcan or InnerDrive has built in, you will need to contact ReActiveMicro, please let us know the hard disk drive model you are using (manufacturer, model number and capacity) and we will try to find the correct operating parameters. In many cases you can use menu item GET HARD DISK INFO to find the correct parameters.

Error Messages at Boot Time

To boot from the MicroDrive Turbo Card, the firmware must be able to access the first hard disk **Master** connected to the card. Even if you want to boot from a volume on the second hard disk **Drive 2**, the first hard disk must be powered up, must be configured as a master drive and must have a valid setup. The current operating parameters will always be the ones from the master **Drive 1**, regardless of the volume number you may want to boot from.

If an error occurs during the very first part of the boot process, the MicroDrive Turbo Card informs you about the error by displaying one of the following error messages and gives you control over your computer at the Applesoft Basic prompt.

Drive 1 Error

The MicroDrive Turbo Card cannot get access to the first hard disk.
There are many reasons that may cause this error:

    a) There is no hard disk connected
    b) The hard disk is not powered up
    c) The hard disk is jumped as a slave drive
    d) Two hard disk are connected and both are set to a master drive
    e) The hard disk has a defect
    f) The first hard disk is not ready within 15 seconds after power up.

Missing configuration data

The MicroDrive Turbo Card cannot load a valid configuration from the first hard disk (Master). A setup using the installation program **MICRO.INSTALLER** is required to create a valid configuration. Also, the sector on the hard disk containing the configuration data could be physically damaged.

Error reading boot sector

A read error occurred when trying to load the MicroDrive Turbo Card's private boot sector (not the ProDOS boot sector). This is because the boot sector is damaged (bad checksum) or has no valid code for the continuation of the boot process.

This sector is always automatically written to the hard disk when writing a configuration file to the disk from where you started the configuration program (this feature can be used for a **Refresh** if the boot sector has been destroyed occasionally).

Volume not formatted

This error message is related to the volume you want to boot from.

The MicroDrive Turbo Card could load a configuration, but it could not find anything that looks like a PRODOS boot sector. This sector is usually present after a volume has been high-level formatted by a system utility like the Finder etc.

Unable to load ProDOS

This message appears if the ProDOS boot routine (located on the boot sector of any PRODOS volume and loaded into the computer's memory at boot time) has found one of the following errors:

a) The boot routine cannot find a directory structure on the boot volume (directory may be damaged)
b) The boot routine cannot find a file with the name PRODOS in the root directory of the current boot volume. The file PRODOS usually is the PRODOS 8 operating system or the file that launches GS/OS
c) While loading PRODOS, a read error occurs because of a bad sector belonging to the file PRODOS.

Problematic Hard Disk Drives

CONNER

CP30204: Universal translation mode does not work correctly, replaced by CP30254. CP30104, 105 Mbytes Version: Universal translation mode does not work correctly. The 120Mbyte version of this drive (CP30104) works fine.

Seagate

Model: ST1144A: Unable to read or write 256 sectors at a time, this is required for the MicroDrive Turbo Card.

Western Digital

It is recommended that you use only WD drives manufactured in 1994 or later.

WD Caviar Series

If you want to use a WD Caviar Series Hard Disk Drives with the MicroDrive Turbo Card, you will have problems with the original MicroDrive Turbo software (this is the firmware marked Apple IIGS Rev. 1.2x and its GS/OS driver v2.xx).

The WD Digital Hard Drives cannot be handled on the Apple IIGS like other IDE drives, they require special handling due to some very special properties of these drives.

To use a WD Caviar Hard Drive, you need to re-burn your existing firmware EPROM on the MicroDrive Turbo Card. The image of the firmware v1.5x for the EPROM is included in this folder. If you cannot do it yourself, ask a friend or somebody at your local computer group whether he can erase and burn a 27C512 EPROM for you. Otherwise, send a request to us for getting a new EPROM.

You must also use the special GS/OS driver (file name is MicroDrive.v1.5) provided in this folder.

If you try to use a different driver, nothing serious will happen, however, you won't get the benefits (i.e. speed) from the driver's functions because it will refuse to work with this version of the firmware.

HD Installation

These instructions must be followed exactly as shown:

1. Before trying to launch the installer program, first do a dummy **Boot-from-Hard Disk**. We all know that this seems to be not very useful and the boot process will fail, but this step is required nevertheless. The hard disk must be connected and powered up.
2. Launch the installer program from disk. Use the latest installer you can find on the MicroDrive Turbo installation disk (a suitable version is included with this folder). The installer will start to scan your drive for hard drive parameters and display the information it has found.
Now, be aware that this information is not correct, i.e. we cannot use this set of parameters! Also, keep in mind that the Installer only scans the hard drive's parameters if it cannot find a setup saved to the reserved system area.
3. Use the menu item **Manual Hard Disk parameters** to setup your hard disk parameters. You cannot use the results from the automatic setup (this is only true for the Western Digital Hard Drives). This means you must know the native hard disk parameters of your hard disk. Usually these parameters (the native parameters) are printed on the hard drive's label.
You cannot use parameters different from the native hard disk parameters because the Western Digital drives always automatically return to the native parameters setup after a system reset, while the Apple IIGS still can be active after such a reset, and the MicroDrive Turbo firmware/software has no means to detect such a situation. This would result in a malfunction when trying to read or write data.
4. To be sure the manual setup process was correct; you can run a **Verify hard disk**. Once after you have started the verify process, the hard disk knows which parameters it should use and you can re-verify your setup by running the **Re-scan hard disk** menu item.
5. Setup your hard drive partitions as you like using the partition editor.
6. Save your hard disk configuration (**Write configuration to hard disk**). Continue the installation process as it is described in the manual.

IDE Interface Overview

Introduction

IDE is a generic name that could be given to any interface in which the controller portion of the circuit is on the drive; ATA and Serial ATA refer to specific types of IDE interfaces. Because the most popular form of the IDE interface was ATA, the terms often are used interchangeably, even though on a technical level that is not correct. What most people call IDE is more properly called ATA.

The primary advantage of ATA drives over the older separate controller based interfaces and newer host bus interface alternatives, such as SCSI is cost.

Because the separate controller or host adapter is eliminated and the cable connections are simplified, ATA drives cost much less than a standard controller and drive combination.

An interesting fact is that the true name of the interface ATA (AT Attachment), which refers to the fact that this interface originally was designed to connect a combined drive and controller directly to the bus of the 1984 vintage IBM AT computer, the first 16-bit bus capable personal computer - otherwise known as the ISA (Industry Standard Architecture) bus.

IDE is a term originated by the marketing departments of some drive manufacturers to describe the drive/controller combination used in drives with the ATA interface.

Because the ATA interface was directly integrated into virtually all PC motherboard chipsets it became the dominate Hard Disk Drive setup.

The IDE Interface

IDE (officially referred to as ATA) is a generic term that applies to any drive with a built-in disk controller. It is an ANSI standard, or more accurately an evolving standard with various published standard versions. The term IDE can roughly apply to any disk drive with a built-in controller, whereas ATA denotes a specific interface. Referring to the original parallel version of the interface, what we call ATA originally referred to a hard disk drive that plugged directly into a version of the AT-bus, more commonly known as the 16-bit ISA bus.

ATA is a 16-bit parallel interface, meaning that 16 bits are transmitted simultaneously down the interface cable. Integrating the controller and drive frees the controller and drive engineers from having to adhere to the strict guidelines imposed by the earlier interface standards. Engineers can design what essentially are custom drive and controller implementations because no other controller will ever have to be connected to the drive. The resulting drive and controller combinations can offer higher performance than earlier standalone controller and drive setups. IDE drives sometimes are called drives with embedded controllers.

Many people who use systems with ATA connectors on the motherboard believe that a hard disk controller is built into their motherboards, but in a technical sense the controller is actually in the drive. Although the integrated ATA ports on a motherboard often are referred to as controllers, they are more accurately called host adapters (although you'll rarely hear this term). A host adapter can be thought of as a device that connects a controller to a bus.

IDE Origins

The earliest IDE drives were called Hardcards and were nothing more than hard disks and controllers bolted directly together and plugged into a slot as a single unit. Companies such as the Plus Development Division of Quantum took small 3 1/2-inch drives (either ST-506/412 or ESDI) and attached them directly to a standard controller. The assembly then was plugged into an ISA bus slot as though it were a normal disk controller, this concept was quite popular with Tandy based PC Compatible Computers.

Unfortunately, the mounting of a heavy, vibrating hard disk in an expansion slot with nothing but a single screw to hold it in place left a lot to be desired—not to mention the possible interference with adjacent cards because many of these units were much thicker than a controller card alone.

Several companies got the idea to redesign the controller to replace the logic-board assembly on a standard hard disk and then mount it in a standard drive bay just like any other drive. Because the built-in controller in these drives still needed to plug directly into the expansion bus just like any other controller, a cable was run between the drive and one of the slots.

These connection problems were solved in various ways. Compaq was the first to incorporate a special bus adapter in its system to adapt the 98-pin AT (ISA) bus edge connector on the motherboard to a smaller 40-pin header style connector the drive would plug into. The 40-pin connectors were all that was necessary because it was known that a disk controller never would need more than 40 of the ISA bus lines.

Control Data Corporation (CDC), Western Digital, and Compaq actually created what could be called the first ATA-IDE interface drive and were the first to establish the 40-pin ATA connector pinout. The first ATA IDE drives were 5 1/4-inch half-height CDC 40MB units with integrated WD controllers sold in the first Compaq 386 systems in 1986, all of which made Compaq a forefront competitor to IBM in the early years of the PC marketplace.

Eventually, the 40-pin ATA connector and drive interface design was placed before one of the ANSI standards committees that, in conjunction with drive manufacturers, ironed out some deficiencies, tied up some loose ends, and then published what was known as the CAM ATA (Common Access Method AT Attachment) interface.

The CAM Committee was formed in October 1988, and the first working document of the AT Attachment interface was introduced in March 1989.

Before the CAM ATA standard, many companies that followed CDC, such as Conner Peripherals, made proprietary changes to what had been done by CDC. As a result, many older ATA drives from the late 1980s are very difficult to integrate into a dual-drive setup that has newer drives.

By the early 1990s, most drive manufacturers brought their drives into full compliance with the official standard, which eliminated many of these compatibility problems.

Some areas of the ATA standard have been left open for vendor-specific commands and functions. These vendor-specific commands and functions are the main reason it is so difficult to low-level format ATA drives. To work to full capability, the formatter you are using usually must know the specific vendor-unique commands for rewriting sector headers and remapping defects.

The Evolution of IDE (ATA):

- ATA-1 (1986–1994)
- ATA-2 (1996) EIDE
- ATA-3 (1997)
- ATA-4 (1998) Ultra-ATA/33
- ATA-5 (1999) Ultra-ATA/66
- ATA-6 (2000) Ultra-ATA/100

Each version of ATA was backward compatible with the previous versions.

Compact Flash Overview

What is a CF Storage Card?

The CompactFlash Storage Card contains a single chip controller and flash memory module(s) in a matchbook-sized package with a 50-pin connector consisting of two rows of 25 female contacts each on 50 ml (1.27 mm) centers.

The controller interfaces with a host system allowing data to be written to and read from the flash memory module(s).

The CompactFlash Storage Cards on-card intelligent controller manages interface protocols, data storage and retrieval as well as Error Correcting Code (ECC), defect handling and diagnostics, power management and clock control. Once the CompactFlash Storage Card has been configured by the MicroDrive Turbo, it appears as a standard ATA (IDE) disk drive.

CF Card Internal Diagram

CompactFlash Storage Card
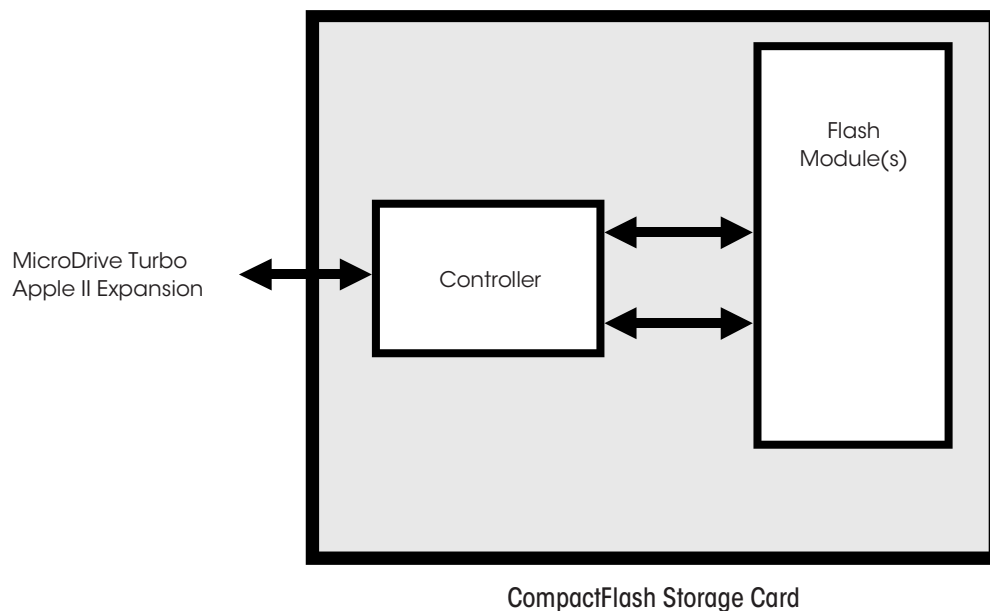
For more information on this type of storage device: compactflash.org

MicroDrive Turbo Revision History

The MicroDrive Turbo was originally designed by Joachim Lange of ///SHH Systeme - Germany and released in 1996.

First DMA IDE Controller

After its release the MicroDrive Turbo was the first Apple II IDE Controller that offered DMA capability, true performance was finally realized for Apple II Computer Systems.

Card Revisions

In 2004 Gerber Street Enterprises started reselling select items from ///SHH Systeme, however stock was very limited.

Mid-2006 ReActiveMicro took over reselling all ///SHH Systeme items in an effort to provide better service and a larger product variety to the Apple II Community.

Pre-2006 versions of the card were all hand assembled by Joachim Lange of ///SHH Systeme. After ReActiveMicro took over sales in 2006 the units were hand assembled by Henry from ReActiveMicro till mid-2015.
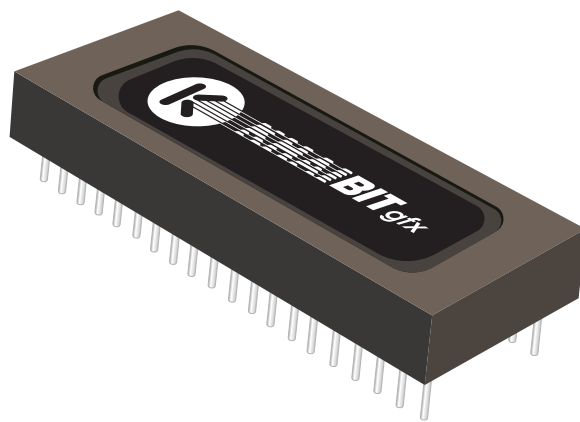
ReActiveMicro then started their structured move to a more automated vendor and set their sights to have projects assembled on a larger scale. The MicroDrive Turbo was the first such project to be fully assembled. However due to a learning curve and testing different vendors Henry continued to hand assemble some MicroDrive Turbo units until 2016.

Online Review

On August 13, 2016 Joe Strosnider from the YouTube channel Joe's Computer Museum posted a review of several Mass Storage options for the Apple II, and the MicroDrive Turbo was among them.

He gives some very good feedback regarding the differences between them and how the MicroDrive Turbo performs under real world conditions.

https://www.youtube.com/channel/UCyfwZvTPPJV4peBHupd6Ckw

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RM

ReActiveMicro
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