Introduction:

Thank you for selecting this **amr** product. A great amount of care went into its design and manufacture. We know that you will enjoy its benefits and appreciate its quality.

This product description and manual is **brief and important**. Please don't toss it aside...........................just yet! A few minutes spent reading it could save you from some incorrect assumptions and lost time. We're going to help you get up and running **quickly**.

Features and Specifications for the **amr** SCSI Host Card for the Apple //e and gs

The **amr** SCSI Host Card provides a high speed interface to SCSI hard drives for the Apple //e and gs. The card is included with all **amr** drive products for the Apple //e and gs. It offers the following features and specifications:

- **Automatic configuration**, including drive ID search, partition information and size determination

- **Support for 2 volumes per card** (2 separate drives **or** 2 partitions on 1 drive)

- **Full Prodos support**

- **Low power consumption** and minimal bus loading

- **Low component count** and efficient firmware for high reliability and **very** high performance

- **Very simple installation**

Utility software is included which performs the following drive operations:

Formatting
Initializing
Testing and diagnostics
Partition selection (User selectable partitions may be configured in 1 megabyte
increments up to the size of the drive, 32/32 meg. max., 64 meg. total).

Multiple host cards may be used in a single computer. This provides **expandability** for large storage needs and storage hungry applications, such as communication bulletin boards and software development.

*The host card provides support for 2 separate volumes per card. These 2 volumes may be 2 separate drives **or** 2 partitions on 1 drive.*

Installation and Getting Started:

First, determine which slot you wish to install the card into. The card may be installed into any slot **except 3**. If you wish to start (or boot) your computer with the SCSI drive attached to the card, install the card into the highest numbered slot (right most). Make sure that any other disk controller cards are installed below the SCSI card (to the left of it). If you wish to start your computer from a drive other than the SCSI drive, make sure that the card for this other drive is installed above or 'to the right' of the SCSI card.

*The SCSI card may or may not have been shipped with dip switches on it. If it does have a set of dip switches on it, the settings are not currently used. These switches are only to provide extensibility and possible future options. For now, the switches may be in any position. These switches are **not** ID switches. Drive IDs are determined automatically!*
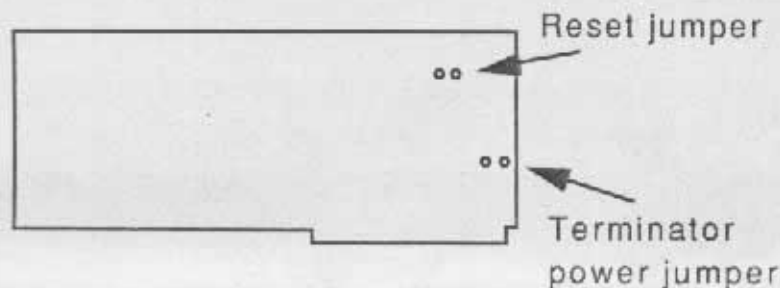

Figure 1. card jumpers

The SCSI card has 2 jumper options. The first is the Reset jumper. This jumper permits the computer's reset signal to perform a true SCSI reset. This jumper **should** normally be **installed**. The second jumper allows the card to supply SCSI terminator power to the SCSI bus. This jumper **should not** be normally installed. All **amr** drives are shipped preterminated and **do not** need this jumper to be installed. Only in very 'RARE' situations would this jumper need to be installed. It is provided on the card primarily for completeness of the SCSI spec. and for future rare occasions.
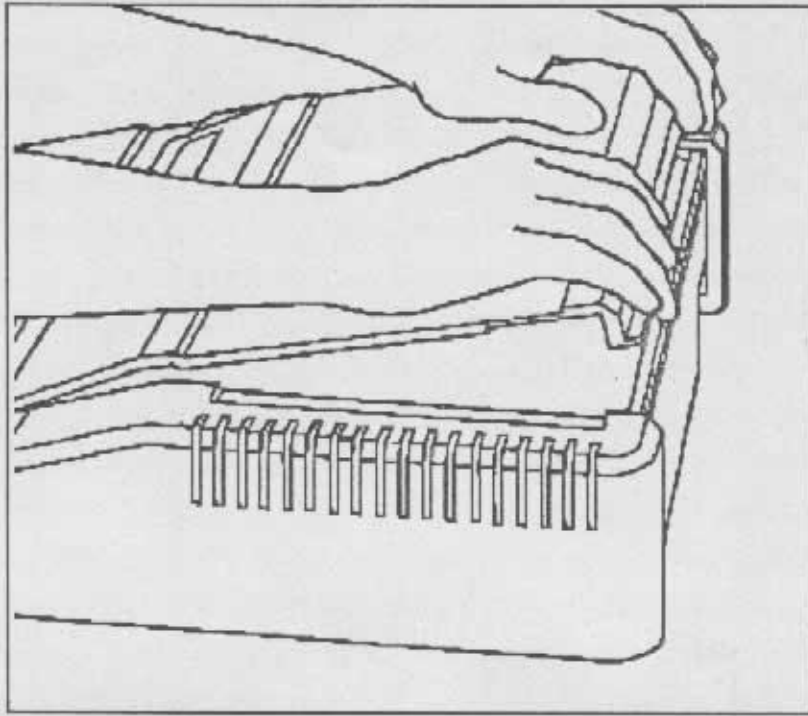
3

<u>Installation Steps</u>:

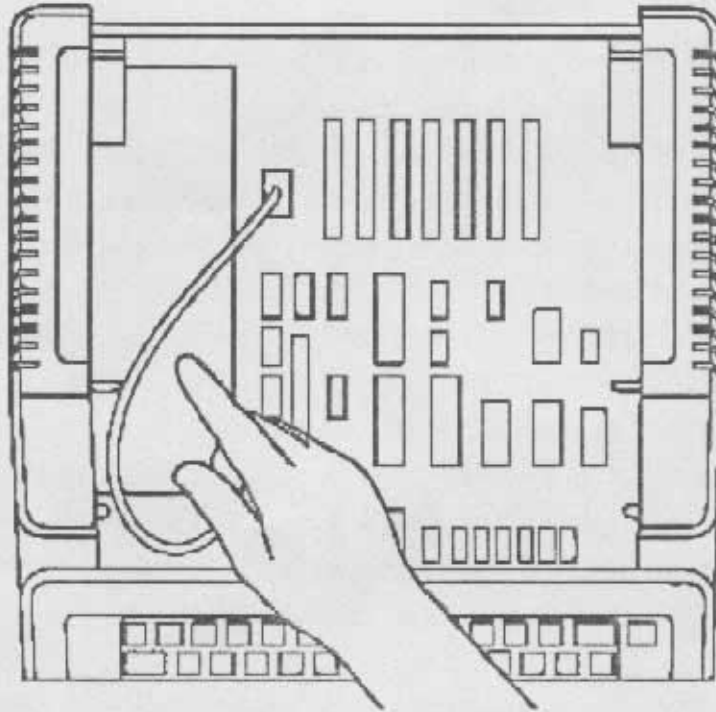- Make sure your computer is turned off
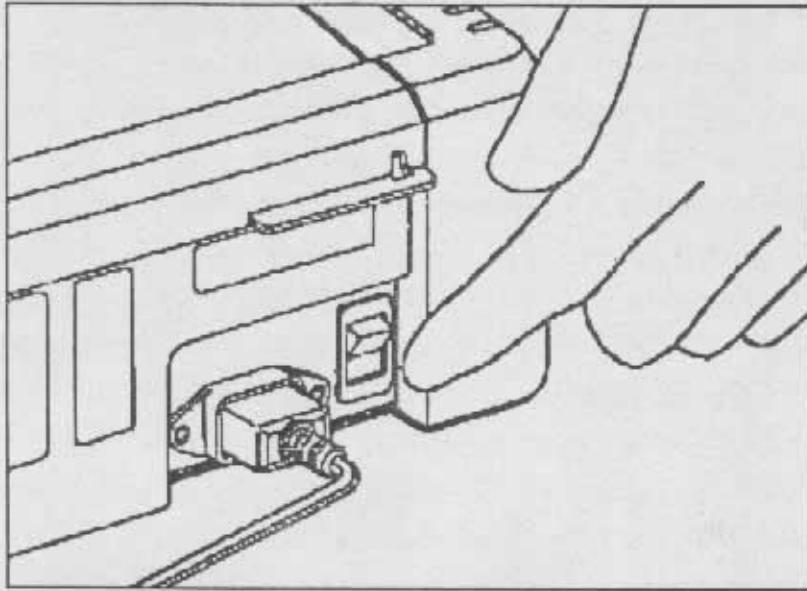
- Remove the lid on your computer
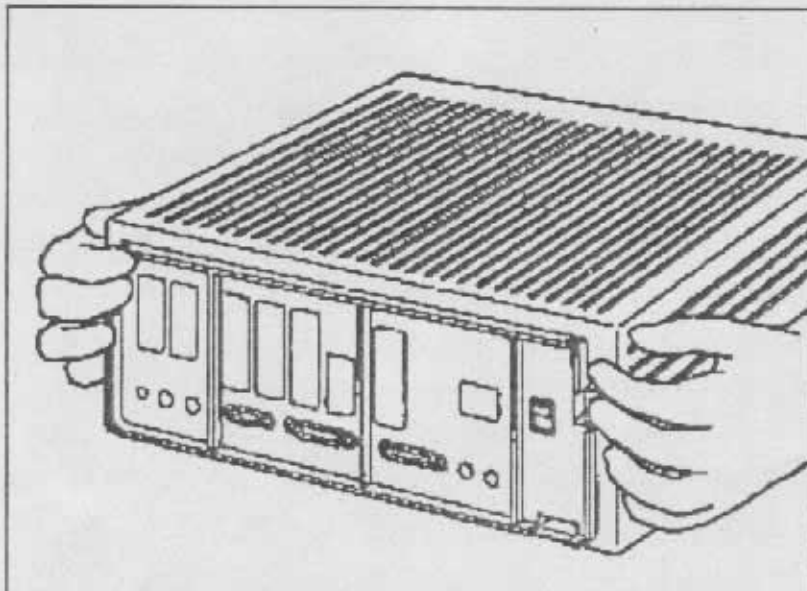
• Touch the power supply (this discharges any static which may be present on you)

- Install the card into the desired slot
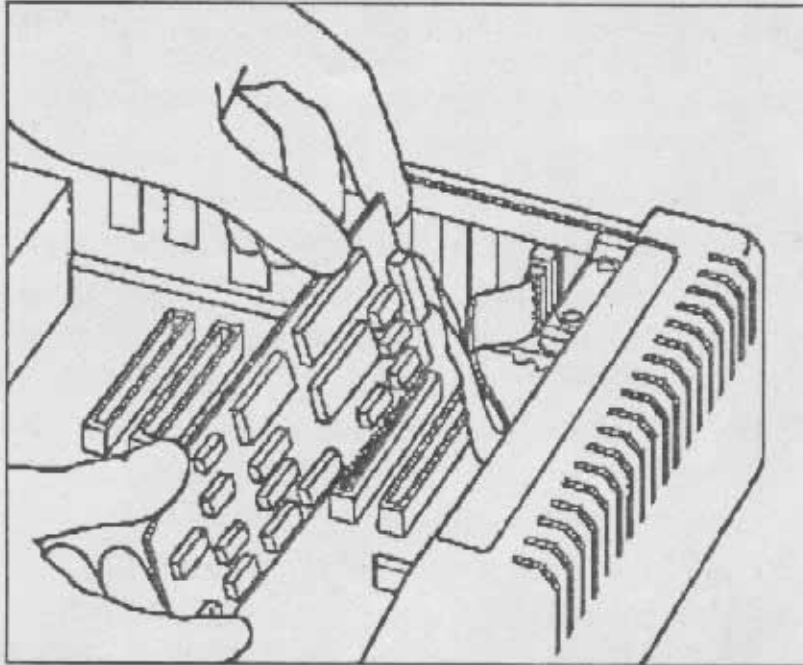
- Mount the card's connector in the closest opening in the rear of the computer
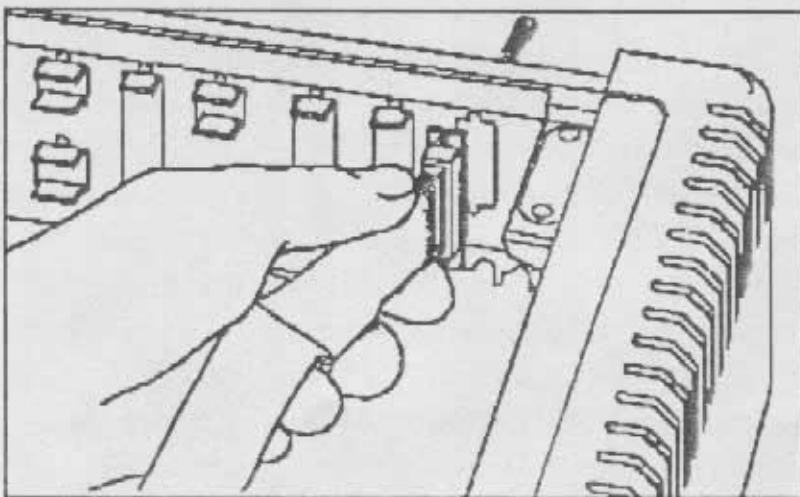
- Reinstall the computer's lid

- Connect the drive interface cable between the card's connector and the drive
- Turn on the drive and allow it to come up to speed (approx. 20 secs.)
- Insert the SCSI utility disk into your floppy drive (the boot drive)

For Apple // gs:

- Turn on the computer
- Go to the control panel (described in the gs owner's manual)
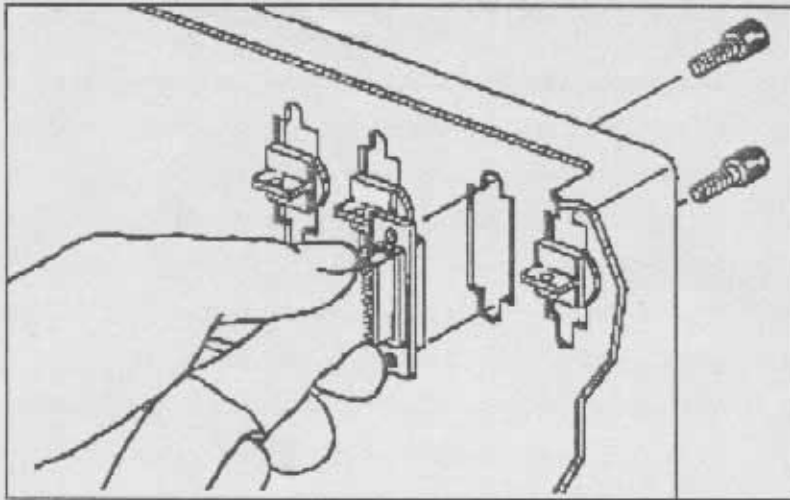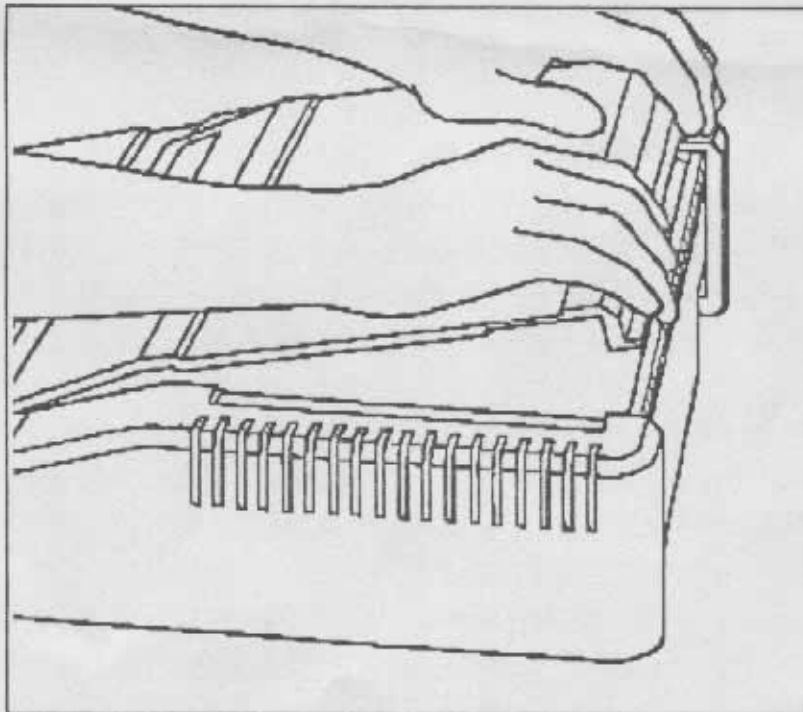- Set the slot which has the SCSI card in it to 'Your card'
- Set the startup slot to wherever your floppy drive is (so that you can boot the SCSI utility program from your floppy drive)
- Press the control-Open Apple-reset keys at the same time
- Go to the heading below titled 'Using the SCSI utility program'

For Apple //e:

- Turn on the computer
- Boot the SCSI utility program disk (If you have installed the card into the highest numbered slot you will need to press the control-reset keys at the same time and boot the SCSI utility disk in your floppy drive. After pressing the control and reset keys you will either see a '*' prompt or a ']' prompt. If your floppy drive is in a higher numbered slot you should now see the main screen of the SCSI utility program. Go to the heading below titled 'Using the SCSI utility program').

    To boot the floppy from the '*' prompt, press the number of the slot containing the floppy drive controller card. Then press the 'control' key and the 'P' key at the same time. Then press the 'Return' key. Now go to the heading below titled 'Using the SCSI utility program'.

    To boot the floppy from the ']' prompt, type in PR#. Now type in the slot number of your floppy drive and press the 'Return' key. Proceed to the heading titled 'Using the SCSI utility program'.

Using the SCSI utility program:

When the program is run, several operations are performed automatically and many displays are updated. Just after the main screen is displayed the progress of an automatic drive ID search is shown at the bottom of the screen. A progressing row of '*' symbols at the bottom shows the progress of this ID search. What the program is doing is checking each valid SCSI ID to see if a drive is present and 'READY'. If two drives are connected each drive's ID will automatically be found. Remember too that if you have two drives connected that each drive must have a unique drive ID. The valid ID's are 0-6. ID 7 is reserved for the card's ID. Usually each drive's ID may be set through switches at the back of the drive's cabinet. For **amr** drive products, the table below shows the switch settings on the drive and their corresponding ID:

Note: If more than one drive is connected to the Apple // at the same time, you may need to change the SCSI ID (address) of the drive. Each drive **MUST** have a different **SCSI ID**. The following table shows the jumper or switch settings which correspond to the SCSI address (ID).
The jumpers are located on the back of the drive.

*Be sure to turn the drive off and on after you change its ID. The drive will only 'read' these ID settings **once** after it is power up!*

SCSI ID	Jumper			
	1	2	3	
0	off	off	off	*(factory setting)*
1	on	off	off	
2	off	on	off	
3	on	on	off	
4	off	off	on	
5	on	off	on	
6	off	on	on	

Table 1. Drive ID settings.

The purpose of these 'IDs' is to allow the computer a way of selectively accessing a particular drive without the other drives thinking that the communication is for them! Since the SCSI bus or interface is a parallel one, it should be easy to understand the need for these unique IDs. *Imagine if all of the houses on your street had the same address. How would the postman know which house is yours?! For the same reason all of the drives connected to an SCSI bus need to have unique addresses (IDs).*

When the utility program has found a drive which responds to a certain ID, it displays this ID on the main screen. The lowest number ID will be assigned to drive #1 and the higher ID will be assigned to drive #2 (if a second drive is connected). Note that this ID display is for your information only and that the program doesn't allow changing these IDs (IDs are almost always selected with switches at the back of the drive cabinet). Therefore, the only action required on your part regarding IDs is that you make sure that if two drives are connected to the same card that they each have a unique ID. Remember that the valid IDs are from 0 to 6, ID 7 is reserved for the card.

Another automatic function performed by the program when it is first run is the identification of which slot the SCSI card is in. This information is displayed on the main screen to remind one where the card is installed. If no SCSI card is found by the program, the program will not do very much, obviously. A message stating that no card was found will be displayed at the bottom of the screen.

Additionally, once a valid 'Ready' drive (or two) is found, the program queries it and finds out the capacity (in megabytes) of each drive. This information is then displayed at the top of the screen. Also, depending on the size of the drive found, the program chooses default partition sizes and displays them as well. Since partitions represent PRODOS volumes, and only 2 volumes are supported per card, partition displays and options will not be available when 2 physical drives are connected. Partitioning functions will only be displayed when a single physical drive is found.

Function descriptions:

Format:

When a drive is new or when problems arise with the drive (such as suspected bad media blocks) it is important to format it with the format option (by pressing 'F' at the main screen). Formatting will erase the drive completely! Be sure that if you have any data on it that it is well backed up first. This formatting operation performs a thorough 'low level' format which also verifies the drive media. If bad spots are detected during format, the drive will automatically perform a sparing operation in order to remove these defects. Generally, formatting is performed only once when the drive is new. As long as the drive is not physically abused reformatting should never be necessary.

Test:

Selecting the test button will begin a thorough drive validation procedure. This procedure is normally performed at the factory and should not be required again under normal circumstances.
This procedure will erase any data that may be on the drive.
Perform the **test** procedure only as a last resort before returning the drive for repair **and** only if you have backed up your data. This test performs a **rigorous** write, read, and seek test which is quite complete. If errors are reported, check for secure cable connections and retry. If errors persist, the drive may need repair (is your Apple // in perfect condition?).
This test will continue until a test error occurs or until you press 'escape'. Along with the drive, this test function also thoroughly tests the SCSI card. Therefore, if the test fails, it is possible that the card is failing and not the drive.
When a complete test pass has been performed by the program, the test screen will indicate this by incrementing the counter on the screen. The program will then start the whole test over again and continue this cycle of retesting until 'escape' is pressed. This is useful in finding intermittent problems and allows overnight or long term testing.

Save Parameters:

Once you have selected the desired partition sizes with the left and right arrow keys, it is **required** that you select the '**Save parameters**' option. This function saves the partition offset information onto a *reserved* area on the drive so that the card will have the necessary information next time it boots or is otherwise accessed. This saved information is also used by other programs (i.e. The Filer, The desktop etc.) to determine the size of the drives connected and whether or not multiple partitions are available. These other programs would use

this information when 'Initializing' (the Filer calls this formatting!) the drive and determining how large a directory to place onto the drive.

If the Save Parameters function is not performed, no partitions will be supported when the drive is subsequently accessed. Instead, the card will query the drive for its size (in absence of the saved parameters) and will default to a single volume which is the full capacity of the drive, up to the 32 megabyte Prodos limit.

If you have saved parameters previously and have used the drive to save data, it is important **not** to save parameters **again** if you have changed the sizes of the partitions. To do so would change the partition offset information and would likely result in losing access to the previous partitions forever! *So be careful here.* Generally, saving parameters is only required once. If you ever format the drive with the SCSI utility program it will be necessary to save parameters again since formatting with this program wipes the drive completely clean, even the saved parameters! The same is true if you ever run the 'Test' function since it also erases the entire drive.

Run Filer:

The SCSI utility disk also contains Apple's Filer utility program. When you press 'R', the SCSI utility program automatically switches to the 'Filer'. The Filer is a convenient place to perform an Initialize operation on the drive (this places a fresh directory onto the drive, **which is required**). Unfortunately, the Filer refers to this as formatting. But in this case it will simply place a new directory onto the drive. To do this, run the Filer. Then press 'V', and then 'F'. Answer the question regarding which slot and drive. That's all there is to it. The Filer also has some other useful operations such as a nondestructive verify volume function. It is also a good place to perform 'Catalogs' and file copies.

The Filer is not the only program that can Initialize your hard drive. Practically any of the other Apple file utilities can do this. Examples include Apple's 'System Utilities 2.1.1', the Apple desktop, and Apple's newer GS/OS finder. This SCSI utility has left the responsibility of initializing to these other programs because of the constantly changing Prodos versions and new file systems. This way you are assured to have the most current initializing on your drive.

Help:

Pressing the 'H' key will display some help screens. These screens include a step by step procedure to aid in the use of the program.

Quit:

Pressing the 'Q' key will exit the program.

General Information:

Discussions of desktop management and the most efficient ways to use and organize your drive are beyond the scope of this manual. Referring to the manual that came with your Apple //e or gs will acquaint you with the finder and other parts of the Apple // system software. When reading about these programs, the hard drive is very similar to a floppy disk. The hard drive simply holds more, seeks faster and generally doesn't eject.

There are many sources of tricks and tips, but each person has, or will develop, their own style and preferences when managing data on hard drives. The only offering of advice here, other than user groups - magazines and books, is simply to always have a current backup!

Note that when the card is **first** accessed, either by booting it or referring to it in a file operation, that it performs a simple 'Self Test' and SCSI ID search. This usually results in a short delay of about 5-7 secs.. Remember though, this only occurs when the card is **first** accessed. All other accesses will be handled instantaneously. This self test helps protect your data on the drive in case the card detects a problem. It also frees you from ever having to worry about SCSI IDs since the card searches for them automatically.

Troubleshooting:

Drive doesn't boot:

- If your using an Apple // gs , double check that you have set the control panel to 'your card'. Also be sure that you have set the startup slot to the slot the SCSI card is in.

- Otherwise, check all of the usual things: make sure the drive is on, the cables should be secure, and that the SCSI card is in a slot higher than any other disk drive cards (if you wish the SCSI drive to boot).

- Be sure that you have copied a version of Prodos or GS/OS onto the drive. This also requires that a .system program be in the 'Root' directory. This subject is covered in detail in your computer's owner's manuals.

Drive sometimes works, and sometimes doesn't:

- Check the cabling for loose connections.
- Make sure your SCSI cabling is less than 19 feet in length.
- If multiple drives are connected, make sure that only the first and last drives are terminated. See your dealer for information about removing terminators.

Warning • Warning • Warning

Some things which should go without saying, need to be said!

• Never, Never turn off or reset the drive, or the computer, while a disk access is taking place. To do this is to gamble with everything on the drive.

Quick Start Procedure:

The following steps are designed to get one's new drive up and running in a hurry. They are the minimum recommended procedures to prepare a drive for immediate use:

• Follow the Installation procedures at the beginning of this manual to **connect** your drive hardware to the computer and install the SCSI card.
• Boot the **amr** SCSI utility disk in your floppy drive.
• Press 'F' to format the drive.
• Use the left and right arrow keys to select the desired partition sizes (if 1 drive is used)
• Press 'S' to save the partition parameters to a reserved area on the drive.
• Press 'R' to run the Apple Filer program.
• Press 'V' and then press 'F'.
• Answer the questions about slot and drive. (If you have set up 2 partitions on a single physical drive, you must refer to them as 'Drive 1 and Drive 2, even though they are on a single 'Physical' drive. Be sure to 'format' **both** using the Filer!)
• Press 'escape' twice to return to the Filer's main menu.
• Copy Prodos and a .system file of your choice to the drive with the file options.
• **That's it!**

If you're new to the Apple //, refer to it's owner's guide for instructions on how to install programs and maintain files on your new hard drive.

Questions and Answers:

The following section is provided to help answer often asked questions:

Q: Can I damage or ruin my SCSI hard drive via software? Could this happen by running defective software or by making mistakes while running programs?

A: Absolutely not. The worst thing that could happen would be the lose of data on the drive. The hardware **cannot be damaged via software**.

Q: Can I install DOS 3.3 onto the SCSI hard drive?

A: Yes. Several 'Third party' or 'After market' suppliers offer special software utilities which can accommodate the use of DOS 3.3 files and related programs. Usually this is not very desirable since the 'volume size limits' of DOS 3.3 do not permit the efficient use of large volumes. Additionally, when Prodos and DOS 3.3 share the same physical drive, there can be some confusion if the DOS 3.3 segments are invisible to Prodos. This can really complicate 'Backing up' the drive.

Q: Should I leave the hard drive on all the time or should it be turned off each time I shut off my computer?

A: Generally, it's fine to leave the hard drive on if you expect to be using it within a day or two. In fact, if your environment permits you to do this, it is recommended. No harm will come to the drive if it is left on continuously. However, to leave it on for weeks between uses will result in unnecessary wear. It's usually better to leave the drive on for the whole week if you anticipate using it daily. Turning the drive on and off constantly during the day is much harder on it than just leaving it on.
   The average hard drive has a design life of 5 'power on' years.

Q: Just how fragile is the average hard drive?

A: Generally speaking, hard drives are much more fragile than the computers that they are connected to. So if you wouldn't do it to your computer, you **definitely** wouldn't do it to a hard drive. As a rule of thumb, it would be fair to say that the average hard drive should be handled about the same as the average large video monitor.
   Even a short 'drop' can mean trouble for a hard drive. Be particularly careful with the drive if its power is on. This is when it is the most delicate. The drive should not be handled or moved when it is on. Also, do not handle the drive for at least 30 secs. after it is turned off. This allows the drive enough time to spin down.

Q: Do I have to make sure that each drive has a unique SCSI ID if each drive is connected to a separate SCSI card?

A: No. Each SCSI card represents an 'Independent' SCSI bus. Each capable of connecting up to 8 devices (including the card or 'Host').

Q: The cable which came with the drive looks just like a standard serial printer cable. If I wish to use a longer cable, can I just use a typical printer cable?

A: Nope. Though the supplied cable 'looks' like a printer cable, it is quite different. The cable supplied has substantially more shielding and is usually a shielded 'twisted pair' cable with each pair individually shielded. It's advised to consult the drive supplier for the availability of different length cables.

Many serial printer cables are wired differently than the drive interface cable. For example, some cables reverse pins 2 and 3. Some of these cables could result in damage to the SCSI card and/or the drive itself. It's usually not worth experimenting. Inexpensive cables represent a false economy when substituted for 'drive interface cables'.