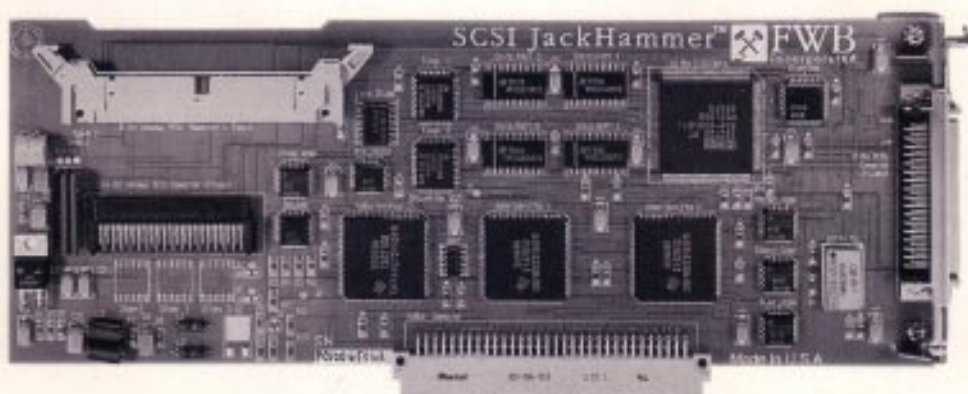




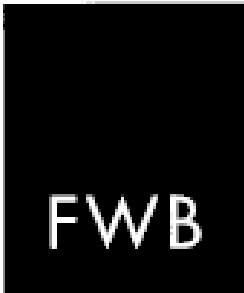
SCSI JackHammer™ Owner's Manual



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FWB



SCSI JackHammer[™] Owner's Manual

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Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

FCC RF Information

This equipment has been tested and found to comply with the Limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by FWB, Inc. may void the user's authority to operate this equipment.

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Welcome to the SCSI JackHammer Owner's Manual

Thank you for purchasing FWB's SCSI JackHammer! The SCSI JackHammer package consists of a high performance SCSI NuBus card, SCSI JackHammer™ software, and depending on which FWB solution you purchased, either Hard Disk ToolKit™ or RAID ToolKit™ software. By installing these components into your Power Macintosh or Macintosh, you will dramatically increase performance on all SCSI devices connected to the SCSI JackHammer.

The "Read Me" files on the JackHammer Utility disk, Hard Disk ToolKit disk, and RAID ToolKit disk contain information that was not available when this manual went to press, and may include information that is important to your specific needs. Please consult the Read Me file before installing and using the SCSI JackHammer.

This manual is divided into eight sections:

Section I — Introduction: This is a brief explanation of what the SCSI JackHammer is and what it can do for you. This section also outlines the minimum hardware and software configuration.

Section II — Installing the SCSI JackHammer: Provides step-by-step instructions for installation of the SCSI JackHammer card for each Macintosh computer.

Section III — Software Installation: Provides step-by-step instructions for installation of the SCSI JackHammer software.

Section IV — Using the SCSI JackHammer: This section details installing and accessing the SCSI JackHammer software, and using the software to your advantage.

Section V — Maximizing Performance: Important information and tips to help you get the most from the SCSI JackHammer.

Section VI — Software & Hardware Compatibility Tips: Valuable information to use in avoiding problems with the SCSI JackHammer.

Section VII — SCSI JackHammer Troubleshooting: Identifies problems you may encounter installing and using the SCSI JackHammer hardware and software.

Index: All relevant topics are cross referenced for quick access.

Before You Begin

Please read the following sections before proceeding with installation.

Unpacking the SCSI JackHammer

Your SCSI JackHammer package should contain the following items:

- SCSI JackHammer card in a protective static bag
- SCSI JackHammer software and manual
- Hard Disk ToolKit software and manual/RAID ToolKit software and manual (if purchased in bundle)
- Warranty card
- 24-inch SCSI ribbon cable
- 68-to-50 pin SCSI adapter cable

If you have not received one or more of the items on the above list, please contact FWB or your local dealer.

Registration

Please take a moment to complete the registration card and mail it to FWB, Inc. so we can inform you of changes or updates to the SCSI JackHammer. The warranty card must be returned within ten days of purchase to ensure the validation of your warranty.

Hardware and Software Requirements

- Any NuBus Power Macintosh or Macintosh which has at least one available full-sized NuBus slot or accepts a NuBus card adapter. (AWS 80, AWS 8150 and AWS 9150 are also supported).
- System 7.1 or newer. (System Update 3.0 recommended.)
- Four megabytes of RAM. (More is recommended.)
- A supported SCSI device.

If you are unsure if your SCSI devices are supported by the SCSI JackHammer, please consult the "Supported Devices" file installed by the Hard Disk ToolKit or RAID ToolKit software included in this package. If you have a drive that is not supported, please contact FWB and let us know what model it is, so that we can support it in the future.

The SCSI JackHammer automatically scans devices connected to it for configuration information. Most standard SCSI-2 drives should work, even if they are not specifically supported.

Section I — Introduction

What is the SCSI JackHammer?

The SCSI JackHammer is a NuBus card for Apple Power Macintosh and Macintosh computers that speeds up SCSI data transfers. By connecting your SCSI drives to the SCSI JackHammer, overall SCSI performance is dramatically improved. The SCSI JackHammer is compatible with any Power Macintosh or Macintosh that has a full sized NuBus slot or accepts a NuBus card adapter. The SCSI JackHammer improves performance in two ways— by breaking the SCSI bottleneck, and by its on-board intelligence.

Break the SCSI bottleneck

By installing the SCSI JackHammer, an additional high-speed SCSI bus is added that bypasses but does not disable the Macintosh's native SCSI bus(es). Most Macintoshes are constrained by older-generation SCSI controller chip that cannot transfer data at the rates of which today's high performance SCSI drives are capable. The SCSI JackHammer allows the Macintosh to transfer data at the full speed of the drive, eliminating the constraints and restrictions of the Macintosh's native, built-in SCSI bus. The SCSI JackHammer supports full 10 MB/second Fast SCSI-2 data transfers, and 16-bit SCSI-2 Fast and Wide transfers. Fast and Wide SCSI-2 technology allows data transfer rates as high as 20 MB/sec.

Depending on the computer that you are using, up to seven SCSI JackHammers can be installed. Multiple SCSI JackHammer usage is possible because FWB supports the SCSI-2, ANSI standard called CAM, the Common Access Method, otherwise known as Apple's SCSI Manager 4.3 (for more information on CAM and the SCSI-2 specification, please refer to the Hard Disk ToolKit manual provided in this package. For information on SCSI Manager 4.3, see Inside Macintosh: Devices). The amount the SCSI JackHammer will speed up your data transfers depends on several factors. The drive you are using is capable of transferring a certain amount of data, and regardless of the computer you have, the SCSI JackHammer will allow your drive to transfer at its full performance limit. Also, the SCSI JackHammer software can utilize some special features that can dramatically increase the performance of your drive on certain functions. Depending on how you set up your JackHammer, and the Macintosh it is installed in, you can see a 30-50% speed boost on any drive.

On-board intelligence

The SCSI JackHammer uses intelligent caching techniques to improve the performance of any drive that is connected to it. The SCSI JackHammer is a NuBus Bus Master that has an embedded RISC-based processor, and it can process read and

write requests to and from a SCSI device without motherboard supervision, which frees up the computer to manage other tasks, thereby increasing overall system performance even further. The SCSI JackHammer has 128K of static RAM on board, and its software allows you to allocate your Macintosh's RAM as an additional cache buffer to further fine tune performance.

How to use the JackHammer

Once you have the SCSI JackHammer installed and configured properly, it should be completely transparent in everyday use. The only difference is, your SCSI transfers will be faster, and you will be more productive. The SCSI JackHammer can speed up file saves in popular programs like Microsoft Word or Claris FileMaker Pro by 50% or more. Other disk-intensive procedures, such as everyday database use, image rotation, or software compiling, will also be faster.

You can boot from a hard drive connected to the SCSI JackHammer, simply by selecting it in the Startup Disk (or Startup Device) Control Panel window. You don't have to reformat a drive in order to connect it to the SCSI JackHammer, and Hard Disk ToolKit's password-protection, encryption, and other attributes are fully supported.

If you are installing all your SCSI devices onto the JackHammer, install the drive you plan to start up from onto the JackHammer first. Then boot from your Disk Tools disk, provided with your Macintosh System software, and switch the Startup Disk through the Control Panel to the startup drive connected to the JackHammer. You can then install the rest of the devices onto the JackHammer. Alternately, you could startup from a Mac motherboard SCSI drive and switch the Startup Disk through the Control Panel to the one connected to the JackHammer.

Simply read through the rest of this manual to get acquainted with the installation and configuration procedures.

Section II — Installing the SCSI JackHammer

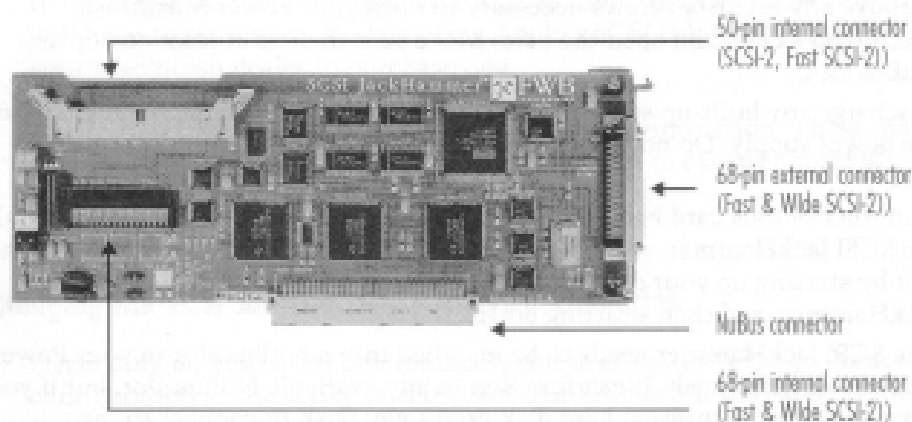


Figure 1: The SCSI JackHammer has external and internal SCSI ports.

Please read all installation instructions before beginning the actual installation procedure. Installation should be done by a certified Apple technician, to ensure safe handling and to fulfill warranty requirements. Incorrect installation will damage your equipment and void your warranty. JackHammer users that plan to connect both internal and external SCSI drives to the SCSI JackHammer must be certain that the on-board active termination on the SCSI JackHammer board is configured for their specific usage. See **SCSI JackHammer Termination** on page 6 for more information.

Precautions

There are several precautions to take before installing the SCSI JackHammer. Use this as a checklist before beginning the installation procedure:

- Make sure your valuable data is backed up.
- Follow proper electrostatic discharge procedures.
- Make sure you have turned off your Power Macintosh/Macintosh by selecting Shut Down from the Special menu and turned off the power switch if necessary. For grounding purposes, it is best to leave the power cord plugged in to a three-prong grounded, switched outlet, with the switch turned off.

NOTE: Quadra 900/950 owners must unplug their computer. Drain the power supply of your Macintosh by pressing the Power On key on the keyboard three times.

- Disconnect all accessory cables from the back of the Power Macintosh/Macintosh, including SCSI and monitor cables. Leave the power cord connected to provide a ground.
- Remove any security screws necessary to open your Power Macintosh/Macintosh's case, and open the case. Make sure there is at least one open NuBus slot.
- Discharge any built-up static electricity by touching the metal outer casing of the power supply. Do not touch any of the high-voltage parts of the power supply.
- If another NuBus card had been in the slot into which you are about to install the SCSI JackHammer, you need to clear the its Parameter RAM related to the slot by starting up your computer with the slot empty before installing the JackHammer, and then shutting down.
- The SCSI JackHammer needs to be installed into a NuBus slot in your Power Macintosh/Macintosh. It can function in any available NuBus slot, but if you have one or more internal hard disk drives you wish to connect to the JackHammer, it is best to select the slot that is closest to the internal drive bay.
- Make sure that the on-board, active termination of the SCSI JackHammer is configured for your specific SCSI environment. Refer to the sections, **SCSI JackHammer Termination** on page 6, and **Changing the SCSI JackHammer's Active Termination** on page 7, for more information.

SCSI JackHammer Termination

The SCSI JackHammer is a separate SCSI bus from the Macintosh's native SCSI bus. Connecting drives to the JackHammer is similar in principle to connecting drives to the Macintosh's SCSI bus, in that the last external drive on the SCSI chain needs to be terminated. But there are a few important differences.

SCSI protocol requires that both the first and the last devices on a SCSI bus be terminated. The SCSI JackHammer itself is the first SCSI device on the SCSI JackHammer bus. The SCSI JackHammer has active termination: terminating resistors have been pre-installed on the card. In most circumstances, you do not have to alter the SCSI JackHammer's active termination. Always make sure the last device on the SCSI JackHammer bus is terminated.

For most Power macintoshes and Macintoshes, the Apple-installed internal hard drive is terminated. Power Macintoshes/Macintoshes that have multiple internal SCSI devices usually have each device unterminated, but at the end of the multiple-device ribbon cable lies the terminated Apple internal hard drive, acting

as the terminator for the internal SCSI bus. Removing the Apple internal drive from the Apple SCSI 50-50 Conductor Ribbon cable also removes the termination for the internal SCSI Bus. If the Macintosh has multiple internal devices connected to the Apple SCSI 50-50 Conductor Ribbon cable, such as a CD-ROM drive, you will have to terminate this bus using Apple's SCSI Ribbon Terminator. Contact your Macintosh dealer to purchase one.

Always use high quality SCSI cables, and active termination. These may be purchased directly from FWB. Also remember not to exceed a total SCSI cable length of 16 feet per SCSI bus.

Changing the SCSI JackHammer's Active Termination

Depending on your SCSI environment, you may need to change the standard configuration of the active termination that has been installed onto the SCSI JackHammer at FWB (but the last external or internal device on the SCSI JackHammer bus must always be terminated.) Please read the entire manual before proceeding with this section.

Removal of the resistors from the sockets on the card should be performed carefully with a pair of needle-nosed pliers. Damage caused by incorrect removal of the terminating resistors may void your warranty. Keep the resistors in a safe, static-free place, as you may need them if your SCSI environment changes.

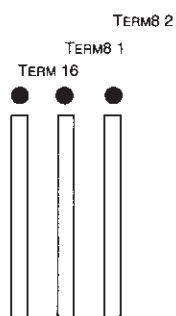


Figure 2: Detail of the SCSI JackHammer's terminators.

SCSI JackHammer with External Drives Only

In this situation, one or more drives may be connected to the SCSI JackHammer's external 68-pin connector, and no internal drives have been connected to either of the SCSI JackHammer's internal connectors.

- Leave all three resistors installed in the SCSI JackHammer
- Terminate the last external SCSI device on the SCSI JackHammer bus.
- Always use an active external terminator at the end of the external SCSI chain.

SCSI JackHammer with Internal Drives Only

In this situation, one or more drives may be connected to the SCSI JackHammer's internal 50-pin connector OR internal 68-pin connector (do not use both internal connectors simultaneously), and no external drives have been connected to SCSI JackHammer's external 68-pin connector.

- Leave all three resistors installed in the SCSI JackHammer
- Terminate the last internal SCSI device only on the SCSI JackHammer bus.

SCSI JackHammer with External and Internal Drives

In this situation, one or more drives may be connected to the SCSI JackHammer's internal 50-pin connector OR internal 68-pin connector (do not use both internal connectors simultaneously); and one or more external drives have been connected to the SCSI JackHammer's external 68-pin connector. Always use an active external terminator at the end of the external SCSI chain.

All External Drive(s) are Fast & Wide SCSI-2 (16-bit), and All Internal Drives are Standard SCSI (8-bit)

- Remove the two rightmost resistors, Term8 1 and Term8 2
- Do not remove Term16 - it remains installed

All External Drive(s) are Standard SCSI (8-bit), and All Internal Drives are Fast & Wide SCSI-2 (16-bit)

- Remove the two rightmost resistors, Term8 1 and Term8 2
- Do not remove Term16 - it remains installed

All External Drive(s) are Fast & Wide SCSI-2 (16-bit), and All Internal Drives are Fast & Wide SCSI-2 (16-bit)

- Remove all of the resistors: Term8 1, Term8 2 and Term16

Installing the SCSI JackHammer into the Macintosh/Power Macintosh

To install the SCSI JackHammer NuBus board into your computer, follow these steps:

1. Make sure all data on all hard drives is backed up.
2. Make sure you have turned off your Macintosh and have followed proper electrostatic discharge procedures.
NOTE: Quadra 900/950 owners must unplug their computer. Drain the power supply of your Macintosh by pressing the Power On key on the keyboard three times.
3. Disconnect all accessory cables from the back of the Macintosh, including SCSI and monitor cables. Leave the power cord connected to provide a ground.
4. Remove any security screws necessary to open your Macintosh's case, and open the case. Make sure there is at least one open NuBus slot.
5. Discharge any built-up static electricity by touching the metal outer casing of the power supply. Do not touch any of the high-voltage parts of the power supply.
6. The SCSI JackHammer must be installed into a NuBus slot in your Macintosh. It can function in any available NuBus slot, but if you have one or more internal hard disk drives you wish to connect to the JackHammer, it is best to select the slot that is closest to the internal drive bay.
7. If another NuBus card had been in the slot into which you are about to install the SCSI JackHammer, you need to clear the Parameter RAM related to the slot by starting up your computer with the slot empty before installing the JackHammer.
8. Further installation procedures of the SCSI JackHammer are dependent upon the model of Macintosh or Power Macintosh into which it is being installed. Please refer to the following section, **Macintosh/Power Macintosh Installations**, for specific instructions for the model of Macintosh or Power Macintosh that you are using.
9. When you have completed installing the SCSI JackHammer board, then refer to the section, **Connecting SCSI Drives to the SCSI JackHammer**, for information on how to connect your SCSI storage devices to it.
10. When you have completed the installation of the SCSI JackHammer and have connected your SCSI devices to it, then you are ready to install the software. Refer to **Section III — Software Installation**, for more information.

Macintosh/Power Macintosh Installations

Installation procedures of the SCSI JackHammer may be different between different types of Macintoshes. Please locate the type of Macintosh you are using in the subsections below and follow the appropriate instructions. If your specific Macintosh model is not mentioned in this manual, information on that model was not available when this manual went to print. Please see your computer's reference manual for any special instructions on installing NuBus cards.

Quadra 800, 840AV, Power Mac 8100, AWS 8150, or AWS 80

Place the computer on a flat surface with plenty of working room. Remove the case. Lay it on its side with the NuBus slots facing upward. Align the computer with its front panel facing you.

1. Remove the SCSI JackHammer from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.
2. Locate an open NuBus slot near the internal SCSI connector, preferably one of the left most slots. Remove the back plate corresponding to the chosen open NuBus slot. Remove the card holder before proceeding.
3. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card down into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh.

Quadra 900, 950, or AWS 9150

Place the computer on a flat surface with plenty of working room. Lay it on its side with the opening panel on top. Align the Quadra with its front panel facing you.

The Quadra 900, 950, or AWS 9150 can have more than one internal SCSI device. If you have more than one internal SCSI device, see the section immediately following. If you have one or no internal devices to connect to the SCSI JackHammer, see the corresponding section below.

Quadra 900, 950, or AWS 9150 with multiple internal hard drives connected to the SCSI JackHammer.

The Quadra's original SCSI ribbon cable has multiple SCSI connectors on it, so that more than one SCSI drive may be attached to it. The FWB-supplied SCSI Ribbon cable however, can only have one SCSI drive attached to it. To connect multiple internal drives to the SCSI JackHammer, it is therefore necessary to use the Quadra's original SCSI ribbon cable.

1. Locate and remove the Quadra's internal SCSI ribbon cable from the computer's motherboard. This is done by releasing the locking clips on either side of the SCSI cable's connector and carefully pulling the cable out.
2. Insert the Quadra's original SCSI ribbon cable into the SCSI connectors of the selected internal hard drives. (The connectors are keyed, so they may be inserted in only one orientation.) Be certain to follow proper termination guidelines: only the last drive on any SCSI bus should be terminated. If none of the internal drives that are to be connected to the SCSI JackHammer are terminated, then be sure to install a terminator plug on the last SCSI connector of the Quadra's original SCSI ribbon cable.
3. Remove the SCSI JackHammer from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.
4. Locate an open NuBus slot near the internal SCSI connector, preferably one of the left most slots. Remove the back plate corresponding to the chosen open NuBus slot.
5. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card down into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh.
6. Connect the Quadra's original SCSI ribbon cable to the internal 50-pin SCSI bus connector on the SCSI JackHammer. These connectors are keyed, so they may be inserted in only one orientation.
7. You may now close up the case.
8. Optional: If you wish to connect a single internal hard drive to the Quadra's internal SCSI bus, insert the FWB-supplied SCSI ribbon cable into the Quadra's internal SCSI connector. Ensure that the cable is installed and fully seated by locking it in with the locking clips on the SCSI connector. The other end of the FWB-supplied SCSI ribbon cable should be connected to the SCSI connector of a terminated, internal drive.

Quadra 900, 950, or AWS 9150 with one internal hard drive connected to the SCSI JackHammer.

1. Remove the SCSI JackHammer from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.
2. Locate an open NuBus slot near the internal SCSI connector, preferably one of the left most slots. Remove the back plate corresponding to the chosen open NuBus slot.

3. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card down into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh.
4. Connect the supplied 24 inch SCSI ribbon cable to the internal 50-pin SCSI bus connector on the SCSI JackHammer. Insert the SCSI ribbon cable into the internal hard drive's SCSI connector. (The connectors are keyed, so they may be inserted in only one orientation.)
5. You may now close up the case and reconnect your cables.

Quadra 900, 950, or AWS 9150 with no internal hard drives connected to the SCSI JackHammer.

1. Remove the SCSI JackHammer from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.
2. Locate an open NuBus slot near the internal SCSI connector, preferably one of the left most slots. Remove the back plate corresponding to the chosen open NuBus slot.
3. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card down into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh.
4. Before putting the case on, connect the 68-pin SCSI cable to the JackHammer's external SCSI port, making sure not to loosen the card in the NuBus slot.
5. You may now close up the case and reconnect your cables.

Macintosh II, IIx, or IIfx

Place the computer on a flat surface with plenty of working room, and align the Macintosh with the front panel facing you.

1. Remove the SCSI JackHammer card from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors. Locate an open NuBus slot near the internal hard disk, preferably the rightmost slot. Remove the back plate of the open NuBus slot.
2. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card down into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh.

NOTE: If you do not have an internal hard drive, you can skip to step 8. If you do have an internal hard drive that you wish to connect to the SCSI JackHammer, please continue.

3. Using a Phillips screwdriver, remove the four screws from the tray that holds the internal hard drive and floppy drive to the case.
4. Move the tray towards you a few inches. There should be a SCSI ribbon cable leading from the back of the drive to a connector on the motherboard. Remove the cable from the connector on the motherboard. If you have a Macintosh IIfx, please remove the SCSI filter that fits between the ribbon cable and the motherboard connector.
5. Realign the disk tray and replace the screws.
6. Connect the ribbon cable from the drive to the connector on the SCSI JackHammer card. The connector is polarity sensitive, so if the cable does not fit, try turning it around. If the ribbon cable is not long enough to reach the connector on the SCSI JackHammer, you can use the 24-inch cable provided in the Installation Kit.
7. You can now close up the case and reconnect your cables.

Macintosh IIfx, IIfx, or Quadra 700

Place the computer on a flat surface with plenty of working room, and align the Macintosh with the front panel facing you. For the Quadra 700, lay it on its side with the opening panel on top.

1. Remove the SCSI JackHammer card from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.

2. Locate an open NuBus slot near the internal hard disk, preferably the rightmost slot. Remove the back plate corresponding to the open NuBus slot (see Figure 3).

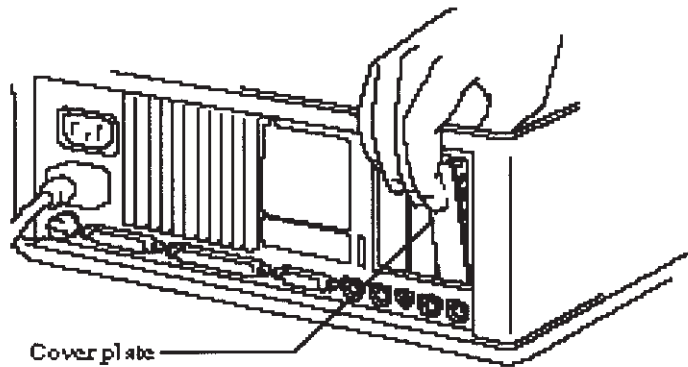


Figure 3: Remove the backplate for the open NuBus slot.

3. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card down into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh.
4. If you do not have an internal hard drive, you can now skip to step 7. If you do have an internal hard drive that you wish to connect to the SCSI JackHammer, please continue.
5. Locate the internal hard drive and lift the drive and bracket out of the drive bay. There should be a SCSI ribbon cable leading from the back of the drive to a connector on the motherboard. Remove the cable from the connector on the motherboard.
6. Connect the ribbon cable from the drive to the connector on the SCSI JackHammer card. The connector is polarity sensitive, so if the cable does not fit, try turning it around. If the ribbon cable is not long enough to reach the connector on the SCSI JackHammer, you can use the 24-inch cable provided in the Installation Kit.
7. Place the drive and bracket back into the drive bay. Make sure all cables and connectors are secure.
8. You can now close up the case.

Macintosh IIsi

1. Place the computer on a flat surface with plenty of working room, and align the Macintosh with the front panel facing you. The Macintosh IIsi requires a NuBus adapter in order to use NuBus cards; make sure the adapter is installed before installing the SCSI JackHammer. Please consult the NuBus adapter's manual for installation instructions.
2. Remove the SCSI JackHammer card from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.
3. Remove the back plate corresponding to the NuBus adapter.
4. Place the SCSI JackHammer alongside the NuBus adapter. Align the pins of the connector with the slot on the adapter, and gently but firmly push the SCSI JackHammer card into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh. If you do not wish to connect your internal hard drive to the SCSI JackHammer, you can now skip to step 7. If you do wish to connect your internal hard drive to the SCSI JackHammer, please continue.
5. Locate the internal hard drive and lift the drive and bracket out of the drive bay. There should be a SCSI ribbon cable leading from the back of the drive to a connector on the motherboard. Remove the cable from the connector on the motherboard.
6. Connect the ribbon cable from the drive to the connector on the SCSI JackHammer card. The connector is polarity sensitive, so if the cable does not fit, try turning it around. If the ribbon cable is not long enough to reach the connector on the SCSI JackHammer, you can use the 24-inch cable provided in the Installation Kit.
7. Place the drive and bracket back into the drive bay. Make sure all cables and connectors are secure. You can now close up the case.

Macintosh IIfx, Performa 600, Centris 650, Quadra 650, or Power Mac 7100

Place the computer on a flat surface with plenty of working room, and align the Macintosh with the front panel facing you.

The Macintosh IIfx, Performa 600 and Centris 650, Quadra 650, and Power Mac 7100 can have an internal CD-ROM drive installed. If you have this configuration and you wish to connect one or more internal hard drives to the SCSI JackHammer, you will need to procure terminating resistors for the CD-ROM drive or a 50-pin IDC terminator plug. Contact your local Apple authorized service center for this equipment.

Macintosh IIsi

1. Place the computer on a flat surface with plenty of working room, and align the Macintosh with the front panel facing you. The Macintosh IIsi requires a NuBus adapter in order to use NuBus cards; make sure the adapter is installed before installing the SCSI JackHammer. Please consult the NuBus adapter's manual for installation instructions.
2. Remove the SCSI JackHammer card from the static-free bag. Be careful not to touch any of the chips on the board, or any of the pins on the SCSI or NuBus connectors.
3. Remove the back plate corresponding to the NuBus adapter.
4. Place the SCSI JackHammer alongside the NuBus adapter. Align the pins of the connector with the slot on the adapter, and gently but firmly push the SCSI JackHammer card into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh. If you do not wish to connect your internal hard drive to the SCSI JackHammer, you can now skip to step 7. If you do wish to connect your internal hard drive to the SCSI JackHammer, please continue.
5. Locate the internal hard drive and lift the drive and bracket out of the drive bay. There should be a SCSI ribbon cable leading from the back of the drive to a connector on the motherboard. Remove the cable from the connector on the motherboard.
6. Connect the ribbon cable from the drive to the connector on the SCSI JackHammer card. The connector is polarity sensitive, so if the cable does not fit, try turning it around. If the ribbon cable is not long enough to reach the connector on the SCSI JackHammer, you can use the 24-inch cable provided in the Installation Kit.
7. Place the drive and bracket back into the drive bay. Make sure all cables and connectors are secure. You can now close up the case.

Macintosh IIfx, Performa 600, Centris 650, Quadra 650, or Power Mac 7100

Place the computer on a flat surface with plenty of working room, and align the Macintosh with the front panel facing you.

The Macintosh IIfx, Performa 600 and Centris 650, Quadra 650, and Power Mac 7100 can have an internal CD-ROM drive installed. If you have this configuration and you wish to connect one or more internal hard drives to the SCSI JackHammer, you will need to procure terminating resistors for the CD-ROM drive or a 50-pin IDC terminator plug. Contact your local Apple authorized service center for this equipment.

JackHammer card will not function, and may cause problems with your Macintosh. If you do not wish to connect your internal hard drive to the SCSI JackHammer, you can stop here. If you do wish to connect your internal hard drive to the SCSI JackHammer, please continue.

2. Connect the supplied 24 inch SCSI ribbon cable to the internal 50-pin SCSI bus connector on the SCSI JackHammer. These connectors are keyed, so they may be inserted in only one orientation. Insert the other end of the SCSI ribbon cable into the internal hard drive's SCSI connector. These connectors are keyed, so they may be inserted in only one orientation.
3. You may now close up the case and connect your cables.

Macintosh PowerBook Duo Dock or Duo Dock II

1. Place the Duo Dock on a flat surface with plenty of working room, and align the Duo Dock with its front panel facing you.
2. Eject and remove the Macintosh Duo from the Duo Dock.
3. Remove the lid from the Duo Dock's case and unplug the power cable from the circuit board assembly. If you are uncertain on the proper procedure for this, please refer to the Duo Dock's documentation.
4. Using a straight-bladed screwdriver, unscrew the two retaining screws located in the computer bay. These screws do not come all of the way out. Slide the circuit board assembly toward yourself, then lift the assembly out of the case. If you are unable to slide the assembly out, try loosening the screws some more.
5. Place the assembly on the table, circuit board side down. Locate an open NuBus slot in the Duo Dock, preferably the closest one to you (the bottom slot). Remove the back plates corresponding to the chosen NuBus slot.
6. Remove the NuBus card locator from behind the floppy drive by sliding it toward the rear of the assembly. If you do not have an internal hard drive to which you will be connecting the SCSI JackHammer, or if you do not wish to connect your internal device to the card, please skip to step 8.
7. Locate the internal hard disk drive, next to the floppy disk drive. Remove the SCSI ribbon connector from the drive. Turn the assembly over and remove the SCSI ribbon connector from the circuit board. Completely remove the SCSI ribbon cable from the assembly.
8. Turn the assembly back over so that the circuit board faces down. Insert the supplied SCSI ribbon cable into the hard disk drive's SCSI connector, being sure that it is seated firmly, but gently. This connector is polarized, so it fits in only one orientation.

9. Place the SCSI JackHammer above the open NuBus slot. Align the pins of the connector with the slot, and gently but firmly push the SCSI JackHammer card into the slot until it is fully seated. An improperly seated SCSI JackHammer card will not function, and may cause problems with your Macintosh. If you have an internal SCSI drive to which you are connecting the SCSI JackHammer, insert the SCSI ribbon cable coming from this drive into the SCSI JackHammer's internal SCSI connector.
10. Install the NuBus card locator behind the floppy drive by positioning it in its slot and sliding it toward the front of the assembly.
11. Rotate the assembly so that the circuit board is facing upward. Place the assembly into the Duo Dock's case and slide toward the rear of the case until it stops. Screw the two locating screws into the Duo Dock's case.
12. You may now replace the Duo Dock's cover and reconnect your cables. If you have external hard drives you wish to connect to the SCSI JackHammer, you may move on the next section, **Connecting SCSI Drives to the SCSI JackHammer**.

Connecting SCSI Drives to the SCSI JackHammer

Connecting Internal Drives

After installing the SCSI JackHammer into the NuBus slot, you can connect any internal hard drive to the 50-pin connector on the card. (You can hook up 16-bit SCSI-2 Wide drives to the 68-pin internal connector on the card, located just below the 50-pin connector.) If your ribbon cable is not long enough, you can use the supplied 24-inch SCSI ribbon cable. Internal drives connected to the SCSI JackHammer need to be terminated, regardless of which type of computer they are in. If you have more than one internal drive connected to the SCSI JackHammer, only the drive farthest from the JackHammer in the SCSI chain needs to be terminated. Do not mix 8-bit and 16-bit SCSI drives on any one of the JackHammer's internal or external connectors. Do not use the 68-pin internal connector and the 50-pin internal connector simultaneously.

Connecting External Drives

The SCSI JackHammer has a 68-pin external connector to accommodate drives that support the SCSI-2 Wide protocol. Most existing drives have the standard 50-pin connectors, and FWB has included a 68-to-50 pin adapter cable. (If you wish to use a drive that only has non-standard 25-pin connectors, you will need to get a 50-to-25-pin converter - contact the manufacturer of the nonstandard drive.)

If you have a drive that has the 68-pin connectors for SCSI-2 Wide, you must connect it first in the chain to the SCSI JackHammer with a 68-to-68 pin cable,

which should be supplied with the drive. You can then connect other drives to the SCSI-2 Wide drive using the provided 68-to-50 pin cable. The SCSI JackHammer includes active termination installed on the card, so only the last external drive on the SCSI chain needs to be terminated.

If you have both internal and external SCSI devices connected to the JackHammer, you will need to customize the configuration of the terminating resistors on the card. Refer to the sections, **SCSI JackHammer Termination**, and **Changing the SCSI JackHammer's Active Termination**, for more information.

NOTE: FWB strongly recommends against using both Fast & Wide SCSI-2 (16-bit) and SCSI-2 (8-bit) cables simultaneously on the same JackHammer bus, because this will create termination problems.

Section III — Software Installation

The SCSI JackHammer software is shipped on three disks included in the package. The first two contain Hard Disk ToolKit™ or RAID ToolKit™, depending on the solution you purchased, while the third is the JackHammer Utility Disk. The JackHammer disk contains the JackHammer Installer, and Read Me files. The Read Me files, and Supported Devices file are text files which may be viewed or printed by running TeachText, which is provided for this purpose.

1. Before proceeding with the installation, restart your computer with all extensions off, making sure to disable any virus protection software.
2. Be sure to delete old copies of JackHammer software before installing this software.
3. Begin the installation by inserting the original SCSI JackHammer diskette in your floppy drive. Now simply double click on the "SCSI JackHammer™ Installer" file.

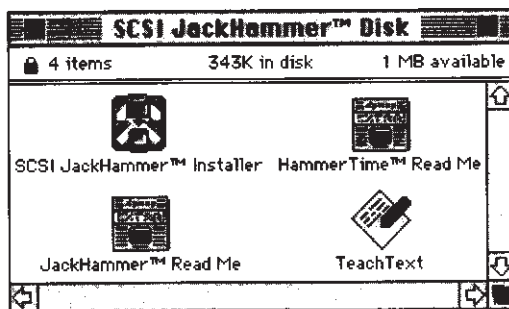


Figure 4: Contents of the SCSI JackHammer diskette.

4. You will be presented with the SCSI JackHammer™ Installer window. Click on the **Continue** button (see Figure 5).



Figure 5: *Installer dialog box.*

5. You will have the option of choosing Standard installation, Custom installation, or quitting the Installer. We recommend choosing the Standard installation as it will install all the files necessary to use your JackHammer (see Figure 6).

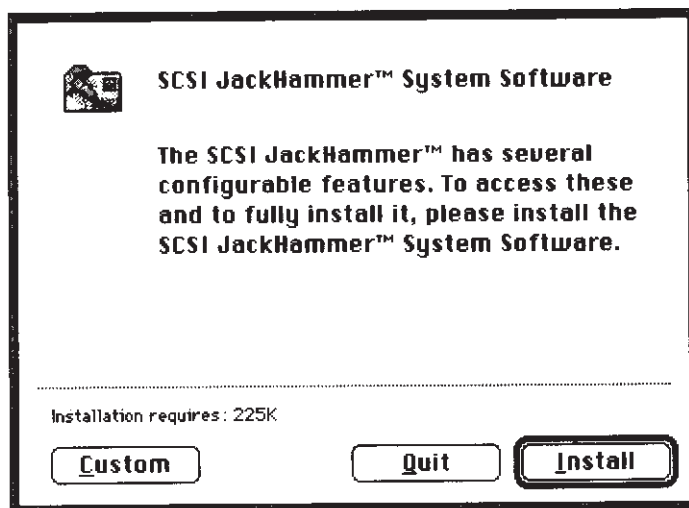


Figure 6: Standard installation window.

6. The Installer will install JackHammer™ and HammerTime™ directly into the Control Panel and Extension folders of your System Folder, and the Read Me file into an Installer created folder on your hard drive.
7. You must restart the system after installing the Control Panel and the System Extension in order for the installation to take effect. If you had an earlier version of the card, you need to open the JackHammer Control Panel once to get prompted to update the card's on-board software.
8. Hard Disk ToolKit and RAID ToolKit have version numbers independent from the JackHammer Control Panel. You should note that they are different and not directly related. Updates in JackHammer software will include all of the latest Hard Disk ToolKit or RAID ToolKit files, depending on which configuration you have. For installation of Hard Disk ToolKit or RAID ToolKit, please refer to their manuals.

Section IV — Using the SCSI JackHammer

If you are installing all your SCSI devices onto the JackHammer, install the drive from which you plan to boot from onto the JackHammer first. Then boot from your Disk Tools disk, provided with your Macintosh System software, and switch the Startup Disk through the control panel to the startup drive connected to the JackHammer. You can then install the rest of the devices onto the JackHammer. Alternately, you could startup from a Mac motherboard SCSI drive and switch the Startup Disk through the Control Panel to the one connected to the JackHammer.

In all other respects, a hard drive connected to the SCSI JackHammer should work just like a drive connected to the Macintosh's native SCSI port, only faster.

It is not necessary to reformat any drive in order to connect it to the SCSI JackHammer, and Hard Disk ToolKit's or RAID ToolKit's password-protection, encryption, and other attributes are fully supported. Some drives with older software (pre-1991, Inside Mac IV—see Hard Disk ToolKit or RAID ToolKit manual for details) or encryption or password-protection done by programs other than these may not work correctly, and may have to be reconfigured with the supplied Hard Disk ToolKit or RAID ToolKit software to function on the JackHammer.

FWB recommends that users run HDT or RTK Primer to scan for bad blocks and to remap or reformat to eliminate them. Better yet, you should reformat any drives that will be used on the JackHammer to ensure the drives are free of defects and fragmentation. Any drive used on the JackHammer must have no bad blocks. For best performance, make sure that **ARRE** and **AWRE** are enabled in Parameter Page 1 by using the HDT World Control program. (See manual for details) This is not mandatory; some drives do not allow ARRE and AWRE to be changed.

The SCSI JackHammer has many advanced features such as prefetch, write release, and write accumulation that will increase the performance of any drive that is connected to the card. To access these features, and to activate the SCSI JackHammer for first-time use, you must first install and use the SCSI JackHammer software.

The SCSI JackHammer software consists of a Control Panel device named JackHammer and a System Extension named HammerTime. The JackHammer Control Panel will allow you to configure certain special features of the JackHammer. It is not necessary to install the Control Panel in order to work with the JackHammer, but it is recommended to take advantage of the special features for performance gains.

The HammerTime System Extension

The HammerTime System Extension is designed to maximize QuickTime audio/video capture performance of any QuickTime-compatible digital video product when used with FWB products.

This HammerTime System Extension is used transparently by any product that uses QuickTime to capture audio/video. It prevents a drive's thermal recalibration from affecting capture by disabling it if possible, configures the JackHammer to maximize capture rates, and optimizes combined sound and video capture. With the Radius VideoVision™ Studio card, we have found that it increases capture performance by up to 100%. The HammerTime Extension will be enabled by QuickTime automatically. For more information, refer to the HammerTime™ Read Me file.

For information on the Hard Disk ToolKit software, including installation, formatting, partitioning, and general information on SCSI and hard drives, please refer to the Hard Disk ToolKit or RAID ToolKit manual bundled with the software.

Customizing the SCSI JackHammer

The JackHammer Control Panel

At this point, you must have completed **Section II — Installing the SCSI JackHammer** and **Section III — Software Installation**. To configure and control the SCSI JackHammer, follow these steps:

1. Power on all SCSI devices and start up the Macintosh/Power Macintosh.
2. Open the Control Panel called JackHammer which was installed when you ran the JackHammer Installer from the original disk. The JackHammer Control Panel by default opens up to show the **Volumes** dialog box.
3. The **Volumes** dialog box shows all the volumes (disk icons) that belong to drives connected to the JackHammer. Select the drive connected to the JackHammer you wish to configure from the list by clicking on its name and select the features you want to use. If you change any settings, they will take effect immediately.

NOTE: The special features (Prefetch, Write Release, Write Accumulate) should NOT be used on disk arrays or applications that are I/O efficient. (i.e. digital video and prepress work) The special features are designed to speed up application that perform inefficient I/O including word processing, database, and business applications.

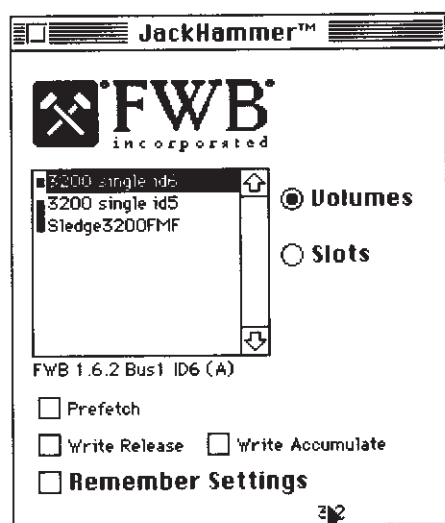


Figure 7: *The Volumes dialog box.*

Prefetch

On a read request, Prefetch will read the next several blocks of information into memory. This can significantly speed up the next read request. We recommend that you enable this feature for performance gains.

Write Release

When the computer writes to the selected drive, the SCSI JackHammer will write the information to RAM and immediately return control to the CPU. Write Release allows the computer to perform other tasks while the JackHammer supervises writing the data to the drive. We recommend that you enable this feature for maximum performance gains. This feature is also known as disconnect/reconnect.

Write Accumulate

Large transfers generally are faster per megabyte than smaller transfers. Write Accumulate will group smaller transfers together in order to eliminate this potential bottleneck. We recommend that you enable this feature for performance gains. This feature is also known as scatter/gather.

Remember Settings

The above features will normally only be active for one session, unless you enable Remember Settings. This will save the settings for the above features so that the features selected will be available after restarting. It is off by default, but we recommend that you enable Remember Settings for convenience.

1. The two radio buttons marked **Volumes** and **Slots** indicate the two dialog boxes of information that the JackHammer Control Panel can display. You can switch to the **Slots** dialog box by selecting that radio button (see Figure 8).

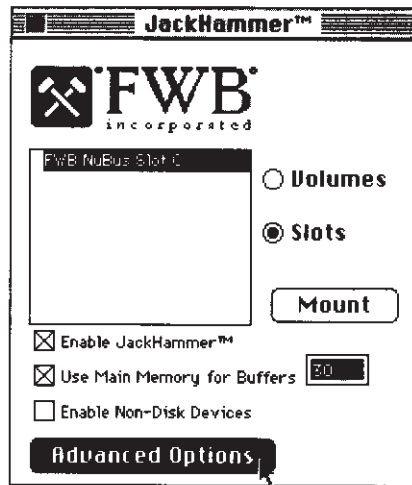


Figure 8: The Slots dialog box

2. The **Slots** dialog box shows the JackHammers installed, and which NuBus slots they are installed in. Select the JackHammer you wish to configure by clicking on the number of the desired slot and select the features you want to use. If you change any settings or values, you must restart for the new settings and values to take effect. The following sections explain the features you can customize from the **Slots** dialog box.

Enable JackHammer

This allows the JackHammer to initiate a SCSI bus, and allows your Macintosh to use SCSI devices connected to the JackHammer. This feature is on by default. If for some reason you would like to disable the selected JackHammer, you can uncheck this checkbox and the selected JackHammer will be disabled on the next restart.

Use Main Memory for Buffers

This allocates RAM located on your Macintosh's motherboard to the selected JackHammer. The JackHammer will be able to use this RAM in addition to the 128K of static RAM on the card for buffering, as well as Prefetch, Write Release, and Write Accumulate (see above). When this feature is enabled, you can type in the number of buffers to use; 30 buffers is the default value, but you may find another value to be optimal for your use. Each buffer uses 16 kilobytes of RAM. You can experiment, but you will have to restart each time you change the RAM value or each time you enable or disable the buffers to have the change take effect. This feature is disabled at default, but it is recommended if you have the free RAM.

Advanced Options

This button allows you to access certain advanced options of the SCSI JackHammer. Clicking on the **Advanced Options** button first gives you a dialog box (see Figure 9) describing each of the options; by clicking on **Continue**, you will proceed to another dialog box (see Figure 10) where you will be able to change various attributes of the JackHammer.

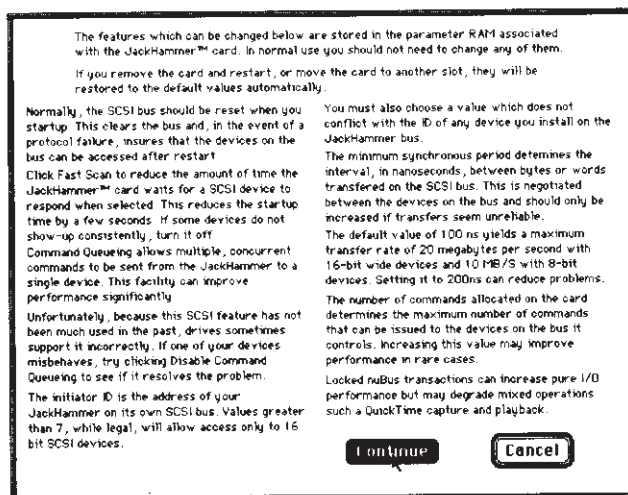


Figure 9: An explanation of Advanced Options.

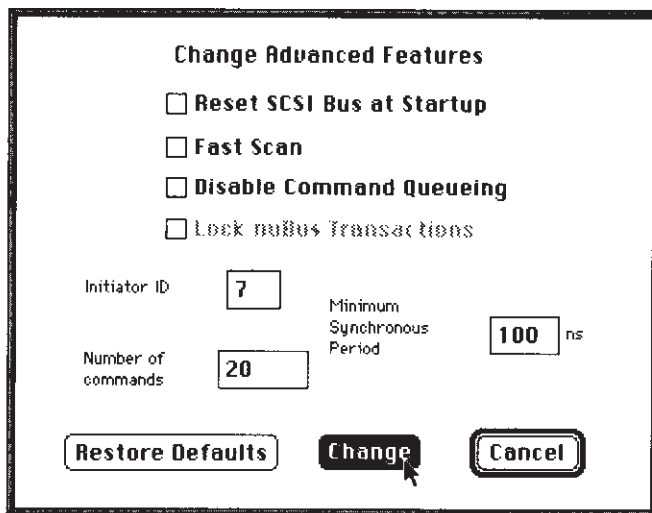


Figure 10: *The Change Advanced Features dialog box*

The Advanced Options features are available to be changed for special circumstances. In normal use, you will not need to change any of these attributes.

Reset SCSI Bus at Startup

Normally, the SCSI bus is reset at startup, which tries to clear up any problems that may be occurring and allows all the devices to start from same operating mode. You can disable this reset by disabling this feature and restarting. It is on by default, and we recommend that it is left on.

Fast Scan

The Macintosh normally waits approximately 250 milliseconds for a SCSI device at a specific ID to become ready and respond to a SCSI inquiry. The JackHammer normally speeds up this process 8 times using the Fast Scan feature, waiting only about 25 milliseconds per ID. Some devices may not respond in this time and fail to mount at startup, however, so you can disable the Fast Scan feature and restarting. It is on by default, and under normal circumstances we recommend it is left on. Turn the feature off if you have slow drives that cannot keep up with the faster requirements and aren't being mounted on the Desktop.

Disable Command Queuing

Refer to **Tagged Command Queuing** on page 38 for information on this feature.

Initiator ID

This is the ID of your Macintosh on the JackHammer's SCSI bus. It is set to 7 by default, and should normally be left there. If you set the ID to between 8 and 15, you will only be able to use 16-bit SCSI-2 Wide devices. In any case, make sure that the Initiator ID is different from all other SCSI devices you may use on this card.

Minimum Synchronous Period

This determines the interval (in nanoseconds) between distinct pieces of data transferred through the SCSI bus. The default value is 100 nanoseconds, and that allows for a maximum of 20 MB/second for 16-bit SCSI-2 Wide drives or 10 MB/second for 8-bit SCSI-2 Fast drives. At these rates, cable quality and length are very important; if you have problems with data transfers, check your cables. You can also raise the Minimum Synchronous Period value to slow transfers down for reliability; 200 nanoseconds would set the normal maximum data transfer rate to the 5 MB/second of SCSI-1. Setting this option to zero will disable it.

Number of commands

This determines the number of commands the JackHammer can send to drives connected to it. If you are working with large numbers of small (20-30K) transfers, raising this number may be able to increase performance.

Locked NuBus Transactions

This is configurable in the JackHammer Control Panel on JackHammer's used in SledgeHammer disk arrays and some others. They default to being locked but can be changed to unlocked to maximize performance in applications where multiple Nubus cards are present, such as video digitization, fileserving, or when doing large network data transfers with built-in Ethernet. This is mainly useful on 840AV and Power Macintosh machines, while it has minimal effects on older machines with slower Nubus slots. This option is grayed out on Power Macintoshes.

Change

Click on Change to store any changes you have made in the parameter RAM associated with the SCSI JackHammer. The changes will take effect with the next restart. If you zap the parameter RAM, remove the card, or

move it to another slot, the card will revert to its defaults. Restore Defaults will also revert all the above displayed settings back to their original defaults. Cancel will return you to the Control Panel window without saving changes.

Restore Defaults

Click on this button to return to FWB-specified default settings for all customizable features in this dialog box.

Updating the Flash ROM Firmware

It is not necessary to update the Flash ROM firmware on the SCSI JackHammer at the time of installation, but this is an operation that you may be required to perform when you receive a new version of JackHammer software whenever they become available.

To update the FLASH ROM firmware on the JackHammer card with a newer version, follow these steps:

1. Make sure you are not booted from a JackHammer SCSI bus drive, and unmount any partitions belonging to drives on the card.
2. Open the JackHammer Control Panel. It should automatically tell you that the Control Panel contains a newer version of JackHammer software and will ask you if you want to update it. Click on the Update button to update the Flash ROM firmware (see Figure 11).

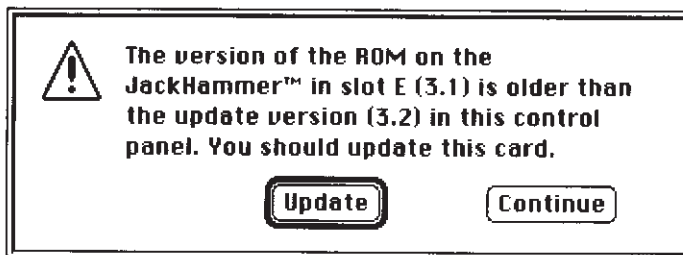


Figure 11: JackHammer Update dialog box.

3. Restart the computer to complete the firmware update.

Force Update of the SCSI JackHammer

You can also force an update of the JackHammer.

1. Open the JackHammer Control Panel device and select the Slots button. Select the JackHammer to be updated from the list by clicking on it.
2. Hold down the Option key and click once on the version number text in the lower right corner of the window (see Figure 12).

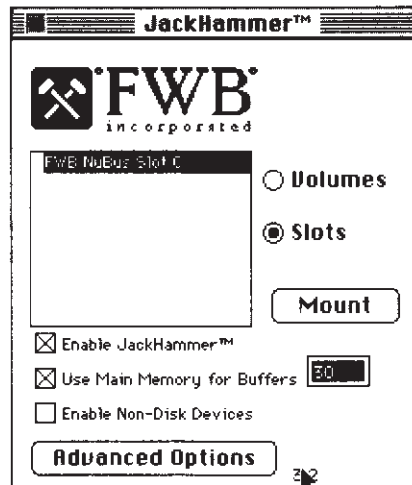


Figure 12: Hold the Option key and click on the version number in this screen to force update the JackHammer's Flash ROM.

3. Restart the computer after closing the window to complete the firmware update. Users should update the ROM on the JackHammer to incorporate new features and performance enhancements that may be released with future software updates.

Hard Disk ToolKit & RAID ToolKit Software

The SCSI JackHammer comes with Hard Disk ToolKit or RAID ToolKit, depending on the drive configuration you are using. Hard Disk ToolKit's and RAID ToolKit's drivers provide complete compatibility with both the SCSI JackHammer and the Macintosh's native SCSI port, and the SCSI Bus menu in the Primer software allows you to access the SCSI bus on any JackHammer you have installed.

The SCSI Bus Menu



Figure 13: *Hard Disk ToolKit's and RAID ToolKit's SCSI Bus menu*

The SCSI Bus menu will only be present if you have one or more SCSI JackHammers or 4.3 compatible busses installed in your Macintosh. If you select the slot marked Bus 0 (Apple), the devices connected to the Macintosh's native SCSI port will be displayed in the Drive Selection window. If you select any other slot, the devices on the SCSI bus corresponding to the JackHammer in that slot will be displayed instead. Additional 3rd party busses may be present.

When a device is connected to the SCSI JackHammer, the card automatically scans for configuration information. Most any drive should work, even if it is not specifically supported. If you have a problem connecting or making a SCSI device work with the SCSI JackHammer, please consult the Read Me and Supported Devices files on the JackHammer disks.

Section V — Maximizing Performance

1. The faster the drive, the faster its performance on the JackHammer. The faster the computer's NuBus, the faster the JackHammer. (840AVs or Power Macs 8100s recommended)
2. The JackHammer supports asynchronous I/O. This allows programs to queue up multiple I/O requests and perform other tasks in the meantime. Applications are arriving that utilize this feature. Some recent ones include AppleShare™ 3.0 or newer, QuickTime 1.5 or newer, and most database programs. More programs will use this technique in the future.
3. Faster CPUs such as the Quadra can benefit from increasing the number of main memory buffers from 30 to 45. Slower CPUs are not able to manage the cache as efficiently if there are more than 30 buffers. Change this in the JackHammer Control Panel.
4. The JackHammer performs best when doing large data transfers. Please attempt to maximize file sizes where possible. The JackHammer also accelerates applications that do a lot of writing.
5. The special features (Prefetch, Write Release, Write Accumulate) should NOT be used on disk arrays or applications that are I/O efficient. (i.e. digital video and prepress work) The special features are designed to speed up application that perform inefficient I/O including word processing, database, and business applications. Special features are also designed to implement caching for drives that do not have caches.
6. Do not insert multiple JackHammer cards in one computer unless they are meant for SledgeHammer II family of disk arrays.

Maximizing Digital Video Performance

The JackHammer has proven to be the ultimate platform for maximum performance for digital video. It has been tested with the Radius VideoVision Studio, SuperMac DigitalFilm, Data Translation Media100, and RasterOps MoviePak2. Optimal performance is achieved on the 840AV or Power Mac 8100 with their improved NuBus. It is fully compatible with Radius VideoVision Studio and SuperMac DigitalFilm.

To maximize performance, be sure to use the HammerTime™ System Extension, turn off AppleTalk, and set the System's Memory Control Panel RAM cache to 32K. Make sure write-caching is turned on for each drive, defragment your disk, use wide drives when possible, use the first partition created on the disk, use the drive only for capturing clips, turn off Locked NuBus Transfers in the JackHammer Control Panel, put a floppy in the drive to prevent polling (place a CD-ROM in the CD-drive, and/or place a cartridge in any removable drive if you have these

peripherals connected, also to prevent polling), use the minimal amount of System Extensions, turn special features off (Prefetch, Write Release, Write Accumulate), and create a disk array with RAID ToolKit. (Bundled with SledgeHammers, also available separately) The SledgeHammer Wide is especially well suited for digital video. For best performance, make sure that **ARRE** and **AWRE** are enabled in Parameter Page 1 by using the HDT World Control program. (See manual for details) This is not mandatory; some drives do not allow ARRE and AWRE to be changed. Also, make sure that **WCE** is turned on in Page 8 with World Control on any drive(s).

The SledgeHammer II (a disk array utilizing two JackHammer SCSI NuBus cards for ultra high performance) is best for other applications including pre-press because its dual JackHammer cards saturate the Nubus too heavily for a digitizer card to operate well.

Keep in mind that with some wide drives that have large write caches, it is possible to digitize a movie that would cause dropped frames to occur on playback. Reduce the data rate of the digitization to accommodate playback.

QuickTime 2.0

QuickTime versions 1.6 through 1.6.2 have been found to be very stable. The initial release of QuickTime 2.0 included a bug that causes a garbage frame to occasionally occur on playback of very high (3MB/s+) data rate movies on digital video cards. QuickTime 2.0 also includes a bug that causes disks with large amounts of contiguous free space to generate *disk full* or *file open* errors upon termination of video capture. The Apple Multimedia Tuner 2.0 System Extension, fixes this problem along with other problems in the original QuickTime 2.0 release and is available from Apple or on AppleLink or Apple's ftp site on the Internet.

Maximizing Array Performance

Disk arrays created by RAID ToolKit (Bundled with SledgeHammers, also available separately) are universal, in that both drives can reside on the JackHammer, one on the JackHammer/one on the Mac SCSI bus, or both on the Mac SCSI bus. On some computers, especially when there are no other Nubus cards in the system, additional throughput can be obtained by moving one drive to the Macintosh bus. (On the Quadra 650, 800, 900, 950) You must leave the drive with the *head* partition on the JackHammer bus. This is usually the drive with the lower SCSI id. You can bring up RTK Primer's Partition window and see which drive has the head partition. You can actually measure the performance with HDT BenchTest. This split bus array is not the fastest on the 840av and newer computers, or with digital video applications, where bus mastering is more important. Keep in mind that you can only setup arrays when both drives are on the same SCSI bus.

Section VI — Software & Hardware Compatibility Tips

3rd Party compatible SCSI Manager 4.3 savvy applications:

- Apple HD SC Setup 7.2.2 and newer
- Apple CD-ROM Driver 5.0.1 and newer
- Trillium, Inc.'s Remus and Remus Limited 1.2 and newer
- Retrospect 2.1 and newer. Retrospect 2.1 fully supports SCSI Manager 4.3 and the JackHammer and will automatically see tape drives hooked up it. Version 2.0 users must enable Non-Disk Devices in the JackHammer Control Panel to see tape drives on the JackHammer. Do NOT install the Retro.SCSI Extension. The JackHammer handles all disconnect/reconnect by itself.

Virtual Memory

This release of JackHammer software is incompatible with Apple's virtual memory. Future releases may support it. Performance oriented users should always avoid virtual memory. RAM Doubler (version 1.5 or higher) is compatible with the JackHammer.

System 6 Notes

1. Although System 6 is not explicitly supported, it is compatible with the JackHammer.
2. The System 6 Startup Device Control Panel does not correctly indicate a non Mac SCSI bus drive set as the startup drive even though it is set correctly. System 7 has no problems.
3. It is recommended that the 32-bit QuickDraw file be installed in your System Folder.

A/UX

The JackHammer does not support A/UX. If the JackHammer is on a computer that runs A/UX, it will disable itself and drives connected to it will not be accessible. FWB makes another product called RAID ToolKit A/UX that is designed to accelerate Workgroup Server 95 performance. Call us for details.

Hardware Compatibility

DayStar PowerPro

The initial release(Q2, Q3 '94) of the PowerPro does not work with bus master cards. Contact Daystar for a hardware upgrade to make it fully compatible with all bus masters including the JackHammer.

IICI Cache Card Support

- Early versions of the Apple IICI Cache card occasionally exhibit a problem with fast bus-mastering cards. If you encounter a problem, use a different cache card or use an accelerator card. This occurs especially if you are also running RAM Doubler.
- The IIR 32K IICI Cache card is fully supported.
- The Daystar PowerCache accelerator cards are fully supported.
- Micron Technology XCEED IICI-128 rev B is not compatible with bus master cards such as the JackHammer and should not be used or else data loss WILL occur.
- The older Daystar Fastcache IICI 64K cards are not fully compatible with bus master cards such as the JackHammer and should not be used or else data loss may occur. We have found that cards with serial numbers around 100168-138 work fine. Call Daystar for an upgrade.
- The Daystar Fastcache IICI 32K works fine.
- Daystar Turbo040 cards with revisions firmware less than 4.0 should be updated to version 4.0 or later, to fix a LockMemory problem. Call Daystar at 800-962-2077 for a free update.

RasterOps Video Cards

The following cards are not compatible with other bus masters when acceleration on their card is turned on: ProColor32, 24XLTV, 24Mx, 24MxTV, Paintboard Li, 24XLi, 8XLi, 24L/801, 24sx, Paintboard 24. (RasterOps Acceleration CDEV v3.02) They have no problem if acceleration is turned off. RasterOps' newer cards, such as the Paintboard Lightning and Horizon should be compatible.

Fast/Wide drive support

The current Hard Disk ToolKit software only supports devices from SCSI ID 0 to 6. Make sure your devices are not set to ID's above 6. The JackHammer's driver will mount drives from SCSI ID 0 through 15.

2.5" Drive support

These drives implement a power-saving pseudo termination. When connecting these drives, you can think of them as being not terminated internally thus requiring termination elsewhere on the SCSI bus.

Low-level Block Size

All drives should be formatted for 512-byte blocksize when used on the JackHammer.

Uninterruptable Power Supplies

FWB recommends that your computer and all its drives be connected to a UPS. UPS's will prevent data loss due to power loss at only a small cost.

Second Wave Nubus Expansion Chassis

The JackHammer should only be used in "24/32 bit" slots and not the "32 bit" only slots.

Non-disk device support

The JackHammer can support many non-disk SCSI devices attached to it. These devices should run with your present software transparently. Enable the **Enable Non-Disk Devices** option in the JackHammer Control Panel and reboot to enable this. Devices that are emulated, should have unique SCSI IDs to both buses. (i.e. if there is a tape drive on the JackHammer bus at ID 3, there cannot be a device on the Mac bus at ID 3.) This feature has been tested with CD-ROM drives, tape drives, and scanners. Some devices will benefit from the JackHammer's support of disconnect/reconnect, while others will not. Any device that fully adheres to SCSI-1 or SCSI-2 protocols will be compatible. This option should mainly be used with tape drives. The JackHammer has been tested with scanners from Agfa, Apple, and Microtek.

Disabling Synchronous Transfers

Setting the Minimum Synchronous Period in the JackHammer control Panel to 0 will disable synchronous data transfers and force the JackHammer to use only asynchronous data transfers. Use this on old drives that are causing problems.

Tagged Command Queuing

Tagged Command Queuing is an advanced SCSI-2 feature that is supported on only a few new drives. Because it is so difficult to implement, few drive manufacturers fully test their implementations. Because the SCSI JackHammer fully exploits tagged command queuing, it requires the drive to have a bug-free implementation. We have found that early revisions of firmware on certain drives do not support tagged command queuing properly and will cause data-loss, system crashes, or hangs to occur. You can tell if a drive supports command queuing by running HDT World Control and selecting the Info button and then the More button.

Command queuing is only used when the special features (Prefetch, Write Accumulate, Write Release) are enabled. It is not necessary for maximum performance in digital video or prepress applications where caching doesn't help performance much.

Do not enable for drives with revision levels AT or LOWER than these:

- Maxtor MXT-540SL, MXT-1240S H1.2
- Seagate 41600N Rev 0100
- Seagate ST1400N, ST1480N, ST1581N
- Seagate ST3600N, ST11200N
- Seagate ST12550W Rev 0002
- Seagate ST12550N Rev 0010

Section VII — SCSI JackHammer Troubleshooting

Many things can happen to create errors, crashes or problems with your SCSI JackHammer, or drives connected to it. Power surges or outages, viruses, and system errors are just a few. These errors can potentially corrupt the data the Mac uses to keep track of the contents of the drive. Depending on what data has been corrupted and how badly it has been corrupted, the result can be barely noticeable or could render your hard drive unusable.

The following is a list of common problems, their probable causes, and what you can do to correct them. If the proposed solutions fail to correct the problem, reformatting the drive and installing a clean System Folder, or disabling the special features of the JackHammer may do the trick. Remember that formatting will erase all data on the disk. Make sure that the replacement System Folder is not corrupted and has no special INITs or System Extensions in it.

You may wish to also consult the Troubleshooting sections in the Hard Disk ToolKit or RAID ToolKit manuals. If you cannot solve the problems, call FWB technical support for assistance.

Installation problems

Symptom:

Drives connected to the JackHammer do not mount after installation.

Cause:

Cables or JackHammer not installed correctly.

Solution:

Make sure the JackHammer is seated securely into the NuBus slot. Check each cable's connection, to make sure the connections are secure. Make sure the JackHammer is enabled in the JackHammer Control Panel. Make sure termination is correct; please consult the Installation chapter for details.

Cause:

Parameter RAM corrupted.

Solution:

If you're using System 7 or newer, restart and hold down the Command, Option, "P" and "R" keys until you hear the startup sound again. If you're using System 6, hold down the Command, Option, and Shift keys while selecting Control Panel from the Apple menu, and click OK on the resulting dialog box. This will clear the parameter RAM, or the RAM that

is backed up by a battery on the Macintosh's motherboard, and should allow the SCSI JackHammer's settings to be saved.

Cause:

Drive not formatted/partitioned, or using Inside Mac IV style partitioning.

Solution:

Back up all data and then use the HDT or RTK Primer software included with the SCSI JackHammer to format and partition the drive, so it can be used with the card. Please consult the Hard Disk ToolKit or RAID ToolKit manual for details.

Cause:

Drive not responding fast enough to SCSI JackHammer Fast Scan.

Solution:

Disable Fast Scan in the JackHammer Control Panel's Advanced Features dialog. If this does not work, disable Reset SCSI Bus at Startup. Please consult the Instruction Guide for details.

Symptom:

Trouble connecting external cable to SCSI JackHammer.

Cause:

Connecting cable with case closed.

Solution:

It is best to connect the external cable with the Macintosh's case open, so you can hold the edge of the JackHammer card to secure the connection.

Symptom:

With internal and external drives connected to the JackHammer, none of the drives will mount or show up on the JackHammer's SCSI bus.

Cause:

JackHammer termination not removed.

Solution:

When both internal and external drives are connected to the SCSI JackHammer, the JackHammer's rightmost two terminating resistors, marked "Term8 1" and "Term8 2," should be removed from the card. Please refer to the Installation chapter for details.

Cause:

JackHammer fuse blown.

Solution:

Change the fuse on the JackHammer card. It is a two-amp, fast-blow fuse; you should be able to find or order one at an electronics store. If you have

reason to believe the fuse is blown, contact an Apple authorized service technician or FWB to verify the situation and for information on changing the fuse.

Symptom:

With the SCSI JackHammer installed, the internal hard drive will not spin up, or does not spin up reliably.

Cause:

Internal hard drive draws more power than the Macintosh's power supply can give.

Solution:

Certain internal hard drives tend to use the power that is reserved for NuBus cards in order to spin up. In addition, some NuBus cards exceed the power limit for a single card, tapping into the power reserved for other cards. Before installing the SCSI JackHammer, this setup may work perfectly regardless of the power limitation. Installing an additional NuBus card such as the SCSI JackHammer may, by reclaiming the NuBus power, upset the balance that allowed the drive to spin up in the first place. The only solutions are to get a drive that will work within your Macintosh's power limits, remove the offending NuBus card (or cards) that exceeds the power limitation, or install the SCSI JackHammer into a Macintosh with a more robust power supply.

Operation Problems

Symptom:

Multiple icons appear on the Desktop for the same drive. If you have partitioned your drive, there should be a separate icon for each partition that is mounted, but no more.

Cause:

SCSI ID conflict.

Solution:

Make sure that no two SCSI devices, including the JackHammer, share the same SCSI ID. The JackHammer is normally set to ID 7, but this can be changed in the Advanced Features dialog box in the JackHammer Control Panel.

Symptom:

The Macintosh crashes with the SCSI JackHammer installed.

Cause:

Possible NuBus conflict.

Solution:

You can disable the SCSI JackHammer without physically removing it by holding down the Command, Option, and “J” keys when booting up. If this seems to solve your problem, try reconnecting the JackHammer’s devices to the native Macintosh’s SCSI port.

You may also try a Force Update of the JackHammer Flash ROM – refer to the section, **Force Update of the SCSI JackHammer** on page 31 for more information. If the problem remains when no drives are connected to the JackHammer, please contact FWB or your local dealer for further instructions.

Symptom:

The drive on the JackHammer Bus seems slower than it should be.

Cause:

Features are not enabled when they should be or disabled when they should be.

Solution:

Check the boxes marked Prefetch, Write Release, Write Accumulate, and Remember Settings in the Volumes dialog box of the JackHammer Control Panel, and Use Main Memory for Buffers in the Slots dialog box. See the Software chapter for further details.

Symptom:

The SCSI JackHammer reverts to its default settings after each restart.

Cause:

Parameter RAM corrupted.

Solution:

If you’re using System 7 or newer, restart and hold down the Command, Option, “P” and “R” keys until you hear the startup sound again. If you’re using System 6, hold down the Command, Option, and Shift keys while selecting Control Panel from the Apple menu, and click OK on the resulting dialog box. This will clear the parameter RAM, or the RAM that is backed up by a battery on the Macintosh’s motherboard, and should allow the SCSI JackHammer’s settings to be saved.

Symptom:

Drive connected to the JackHammer card will experience errors.

Cause:

If it happens during times of heavy transfers, driver or NuBus card interfering with JackHammer's NuBus Block Mode Direct Memory Access.

Solution:

Uncheck the box marked Use Main Memory for Buffers in the Slots dialog box and restart. If it continues to give you problems, uncheck the boxes marked Prefetch, Write Release, Write Accumulate, and Remember Settings in the Volumes dialog box of the JackHammer Control Panel and restart.

Cause:

Drive does not support necessary SCSI-2 features.

Solution:

Uncheck the box marked Use Main Memory for Buffers in the Slots dialog box and restart. If it continues to give you problems, uncheck the boxes marked Prefetch, Write Release, Write Accumulate, and Remember Settings in the Volumes dialog box of the JackHammer Control Panel and restart.

Symptom:

Remember Settings option in JackHammer Control Panel grayed out, and not checkable.

Cause:

JackHammer Preferences are corrupted.

Solution:

Remove JackHammer Preferences file from the Preferences folder in the System Folder and restart.

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