

*User's Guide*

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# *A4091*

# *SCSI Host Adapter*

*AMIGA*



 Commodore



# **WARNING**

Installation information in this document is for reference only. All installation of internal optional devices or equipment including third-party optional devices or equipment, should be performed by an experienced and knowledgeable technician. All servicing or upgrading of original or optional devices or equipment should also be performed by an experienced and knowledgeable technician.

**UNAUTHORIZED INSTALLATION,  
SERVICING OR UPGRADING MAY  
VOID YOUR WARRANTIES.**

This manual provides a general description of various product configurations and features currently planned for inclusion in Commodore's product line. The configurations and features described may not be available or otherwise apply to your particular system. Please consult your Commodore dealer with any questions.

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- 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.

**CAUTION:** Only equipment with shield-grounded cables (computer input-output devices, terminals, printers, etc.) certified to comply with appropriate FCC limits can be attached to this device. Operation with non-certified equipment may result in communications interference. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the device.

FCC ID: BR9584091

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Printed in the Philippines and Hong Kong.

*This book was produced using a variety of Commodore systems by Michele Surkin, Ross Hippely, and Carina Ahren.*

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# **A4091 SCSI Host Adapter**

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The A4091 SCSI host adapter is a high-performance board that connects up to seven SCSI devices to your Amiga. The board installs in a Zorro III expansion slot and contains the following features:

- Full Zorro III implementation
- SCSI-2 implementation
- SCSI internal connector and ribbon cable
- High density SCSI-2 external connector
- Direct Memory Access (DMA) for fast transfers
- Hardware to install a 3.5-inch hard drive on the board

This guide tells you how to:

- Check for Zorro III compatibility
- Work with SCSI devices
- Set the DIP switches on the board
- Select and set SCSI addresses
- Set termination for multiple SCSI devices
- Install a hard drive on the board
- Install the board in an Amiga
- Install internal SCSI devices
- Install external SCSI devices
- Configure a hard drive

## ***Pre-installed Board***

Some A4000 systems come with the A4091 board already installed. This book accompanies those configurations. In this case, you do not need to read this guide to begin using your system. Save it for reference when you want to:

- Understand the SCSI interface
- Install additional internal or external SCSI devices
- Modify the default SCSI settings

## ***Related Documents***

The instructions and illustrations in this guide refer to an A4000 system. Along with this guide, you will need to refer to your system's hardware user guide and software guides, including the *Workbench User's Guide*. You should also check the README file on the A4091 Support disk.

## ***Before You Begin***

Select a clean, well lighted work space. Place your system unit on a stable work surface large enough to accommodate the components of the system unit you remove and replace.

As you work with your system you must:

- Protect yourself from electrical shock by turning the Amiga off, unplugging, and disconnecting all cables before removing the cover.
- Protect your system from electrostatic discharge (ESD).

## ***ESD Precautions***

Integrated circuit (IC) chips are sensitive to static electricity. When handling electronic components containing IC chips, including expansion boards and RAM modules, always take precautions to

reduce the chances of electrostatic discharge (ESD) harming the components.

Touching a nearby grounded metal surface before touching a component drains static electricity, reducing the likelihood of ESD damage.

To protect your system from ESD, observe these precautions.

- Do not remove any computer components that are wrapped in anti-static packing material until you are ready to install them.
- Discharge any static buildup as you work by periodically touching an unpainted metal surface. This is particularly important before you unpack a new computer component.
- Handle each component carefully. Avoid touching card edge connectors, electrical component connectors, and contact points.

## ***Checking for Zorro III Compatibility***

To ensure that your Commodore Amiga 4000 system is compatible with the A4091 SCSI Host Adapter board, the Fat Buster chip on your system motherboard must be later than revision I (part number 390539-09).

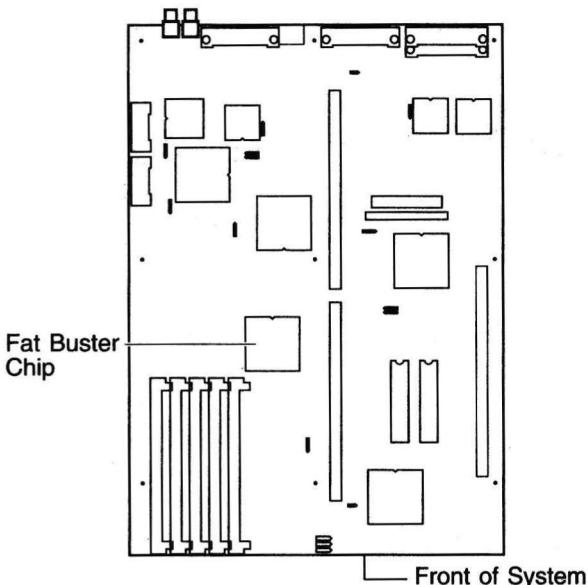


**Turn off your system and unplug the Amiga before checking the level of the chip.  
Disconnect cables for all external peripherals.**

### **Warning**

To determine whether the chip installed in your system is the correct level:

1. Remove the system cover as described in the *A4000 User's Guide*.
2. Carefully remove any expansion boards that obstruct your view of the chip, shown in Figure 1. Refer to the *A4000 User's Guide* for detailed instructions on removing expansion boards.



*Figure 1. The A4000 Motherboard*

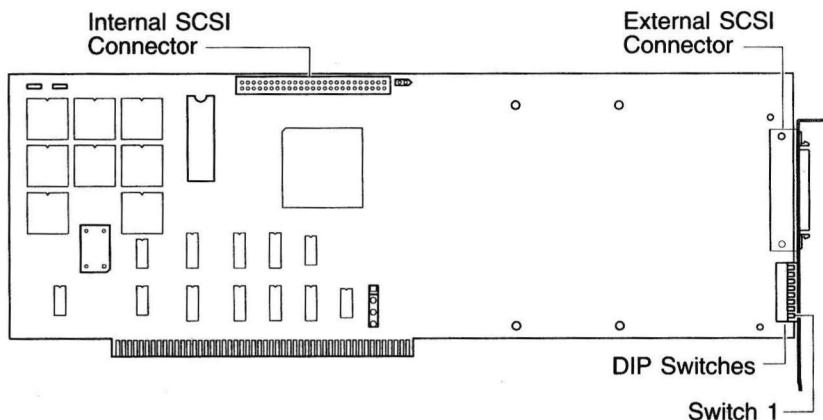
3. The chip can either be socketed or surface-mounted (soldered) on the motherboard. Check the part number on the chip. If the suffix is nine or less, it must be replaced.

**Caution**   **Only an experienced and knowledgeable technician can replace the chip. Return your system to your Amiga dealer if the chip must be replaced.**

4. Replace the expansion boards.
5. If your system contains the correct version of the chip and you have already installed the SCSI host adapter, replace the system cover and reconnect peripheral equipment. If you haven't installed the SCSI host adapter, you can install it now as described in this guide.
6. Replace the system cover.

# Working with SCSI Devices

You can connect up to seven SCSI devices (including hard drives, scanners, tape units and CD-ROMs) to your Amiga using the board illustrated in Figure 2.



**Figure 2. The A4091 SCSI Host Adapter Board**

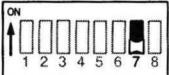
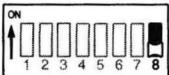
You connect internal SCSI devices to the internal connector with the ribbon cable provided. You connect one external device to the external SCSI connector on the board, then connect additional devices in a chain from the first device. The DIP switches control the SCSI address of the board as well as features such as SCSI Fast Bus, short/long spinup, synchronous mode and external termination.

## DIP Switch

A DIP switch is a component on a board that contains one or more switches with two settings: OFF (open) and ON (closed). The A4091 board, illustrated in Figure 2, contains a DIP switch with eight switches. The default setting for all eight switches is OFF.

The following table explains the purpose of each switch; note that switches 1, 2 and 3 are used in combination.

Switch	Default Setting	Function
<b>SCSI Address</b>	1, 2, 3: OFF	Set the SCSI address for the board. See "SCSI Addresses" on page 7 for more information.
<b>SCSI Fast Bus</b>	4: OFF	OFF indicates that the SCSI Fast Bus feature is enabled. Set this switch to ON if none of your SCSI devices support SCSI Fast Bus.  If the device does not work properly with SCSI Fast Bus enabled, try a shorter cable between the board and the device. If this does not correct the problem, set switch 4 to ON.
<b>Short/Long Spinup</b>	5: OFF	OFF indicates that your system uses the standard spinup (booting) time. Set this switch to ON to request a longer booting period.  If one of your SCSI devices has a long power-on cycle, the Amiga may not recognize it during the standard booting period.
<b>Synchronous Mode</b>	6: OFF	OFF indicates that the synchronous mode feature is enabled. Set this switch to ON to disable synchronous mode.  Synchronous mode does not require acknowledgment for every byte transmitted, which can mean improved response time with most SCSI devices.

Switch (cont'd)	Default Setting (cont'd)	Function (cont'd)
External SCSI Termination	7: OFF 	OFF indicates that you do not have any external devices. This activates the terminator on the board since this is one end of the SCSI bus.  Set this switch to ON when you install an external device, then set external termination as described on page 8. This disables the termination on the board since it is now in the middle of the SCSI bus (not at the end).
Logical Unit (LUN) Enable	8: OFF 	OFF indicates that unit 0 is the only unit recognized. Set this switch to ON to enable the system to recognize 1-6 as LUNs.

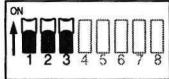
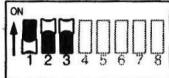
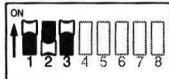
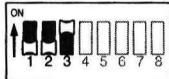
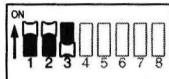
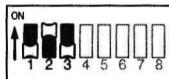
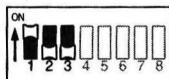
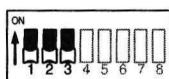
## SCSI Addresses

Each SCSI device controlled by the board must have a unique identifier known as the SCSI address. The board must also have a SCSI address. SCSI addresses range from 0 to 7 and must be unique (two devices cannot share an address; a device and the board cannot share an address).

Before you begin installing the board and/or SCSI devices, you must choose the SCSI address for each item. For example, select 7 as the address for the board (the default address set at the factory), 0 and 1 for two internal devices, and 4 for an external device.

Jumpers or switches on a SCSI device determine the SCSI bus identification (SCSI address) for the device. Refer to the device documentation to set the SCSI address for each device.

The first three DIP switches on the board determine the board's SCSI address. If you choose to change the SCSI address from the default, set switches 1, 2 and 3 according to the following table.

SCSI Address	Switch Settings	Switches 1-3
0	1: ON 2: ON 3: ON	
1	1: OFF 2: ON 3: ON	
2	1: ON 2: OFF 3: ON	
3	1: OFF 2: OFF 3: ON	
4	1: ON 2: ON 3: OFF	
5	1: OFF 2: ON 3: OFF	
6	1: ON 2: OFF 3: OFF	
7 (default)	1: OFF 2: OFF 3: OFF	

## ***SCSI Device Termination***

A chain of SCSI devices must have two and only two termination points, one at either end of the chain of devices. A terminator indicates the end of the chain (bus) and protects the SCSI devices from potential failure. For the best results with SCSI Fast Bus

enabled (switch 4 set to OFF), the terminator at both ends should be active, rather than passive.

For internal devices, an active terminator is attached to the end of the supplied ribbon cable. Before you install an internal device, remove or deactivate the terminator on the device. Refer to the manufacturer's documentation for terminator information.

If you have no external devices, set switch 7 to OFF. This enables the active termination on the board, since this is the other end of the chain.

If you install external devices:

1. Verify that switch 7 is set to ON.
2. Terminate the last SCSI device in the chain. For best results, use active termination. If the device has termination built in, you can enable it, or you can attach an external terminator. If you use passive termination, SCSI Fast Bus should not be enabled (set switch 4 to ON).
3. Remove or deactivate the terminator from each external device (except for the last one). Refer to the manufacturer's documentation for terminator information.

## ***Installing a Hard Drive on the Board***

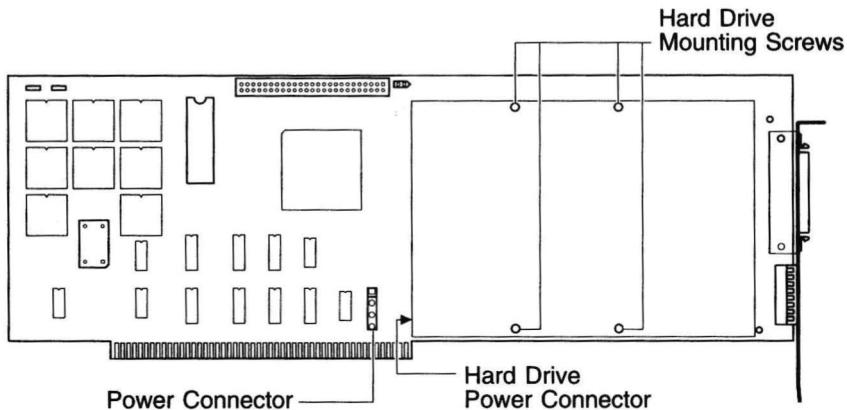
You can install a 3.5-inch low profile (1 inch/25 mm) or half-height (1.25 inch/32 mm) SCSI drive on the A4091 board.

If the board is already installed in your system, do the following:

- Turn off the Amiga's power switch, remove all connecting cables and disconnect the Amiga from the AC power outlet.
- Remove the Amiga cover.
- Detach any cables from the board and remove the board from the system.

Install a SCSI hard drive on the board by following these steps:

1. Set the address jumper of the hard drive to an unused address 0 through 7. For example, if the board address is 7, select an address from 0 through 6.
2. Remove the four hard drive mounting screws and nuts on the board, illustrated in Figure 3.



*Figure 3. Installing a Hard Drive on the Board*

3. Place the hard drive on the component side of the board (power connector facing up).
4. Attach the hard drive to the host adapter board with the mounting screws. If the screws that come with the board do not fit the hard drive, replace them with appropriate screws.
5. Connect the 4-pin power cable (included with board) from the board to the hard drive power connector. The power connector is shaped to fit only one way.
6. Attach the ribbon cable to the board and the hard drive as described in "Installing the Board" below.

## Installing the Board

Installing the A4091 board is similar to installing any expansion board in your system. However, there are a few things you must do before you install the board:

- Understand and determine which features to activate with the DIP switches on the board. See "*Working with SCSI Devices*" on page 5.
- Determine the SCSI addresses for the board and all SCSI devices. See "*SCSI Addresses*" on page 7.
- Terminate your SCSI devices properly. See "*SCSI Device Termination*" on page 8.
- Install a hard drive on the board (optional). See "*Installing a Hard Drive on the Board*" on page 9.

To install the board, do the following:

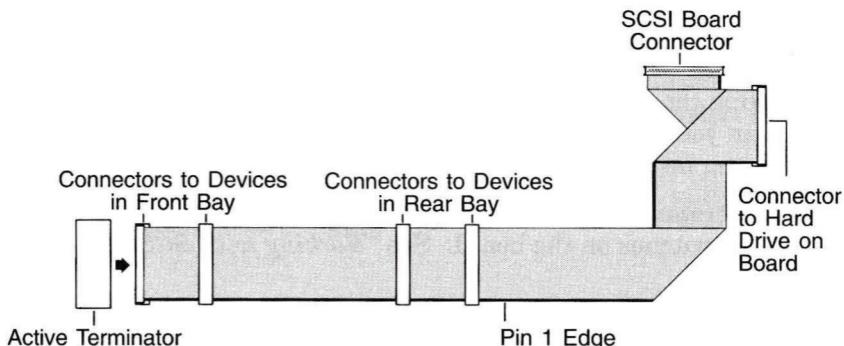
1. Turn off the Amiga's power switch, remove all connecting cables and disconnect the Amiga from the AC power outlet.
2. Remove the Amiga cover.
3. Remove the cover plate of the slot in which you intend to install the board.

If you did not install a hard drive on the board, install the board in any available slot.

If you installed a low profile drive on the board, install the board in the top expansion slot to avoid blocking a second expansion slot.

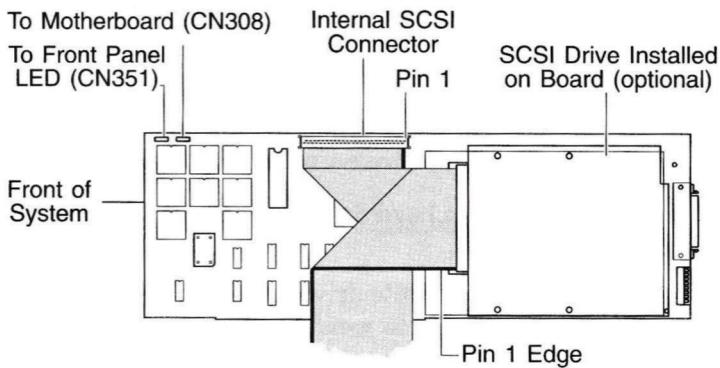
If you installed a half-height drive on the board, install the board in the second slot from the top; the drive will block the top slot.

4. Look at the 50-pin SCSI ribbon cable, illustrated in Figure 4. Locate the end of the ribbon cable that you will connect to the board. Note that the colored edge of the cable indicates pin 1.



**Figure 4. 50-pin SCSI Ribbon Cable**

5. Connect the ribbon cable to the board, aligning pin 1 on the cable connector (colored edge) with pin 1 on the board as illustrated in Figure 5.



**Figure 5. Connecting the Ribbon Cable to the Board**

6. Connect the ribbon cable to the hard drive on the board (if installed) as illustrated in Figure 5. Be sure to align pin 1 on the cable connector with pin 1 on the device, usually indicated on the device by an arrow ( $\leftarrow$ ) or the number 1.

**Caution** It is essential to align pin 1 on the cable with pin 1 on your SCSI device. The folds in the provided ribbon cable enable you to easily align pin 1 on the cable with pin 1 on most devices.

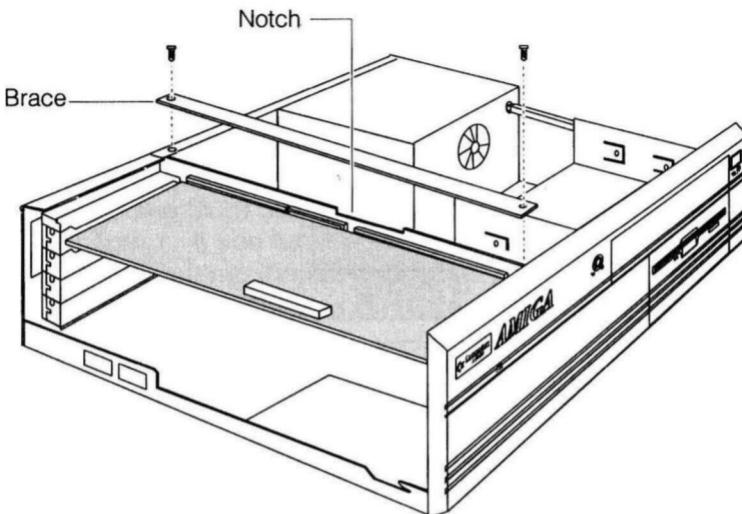
Some SCSI devices have reversed the location of pin 1. If you have such a device, you must carefully manipulate the cable to ensure that pin 1 alignment is correct. Failure to align pin 1 can result in damage to the SCSI device.

7. Insert the board in the slot and attach with the screw from the slot cover plate.
8. Unplug the hard disk front panel LED cable from the hard disk LED connector on the motherboard (if connected) and plug it into the To Front Panel LED (CN351) connector on the A4091 board, illustrated in Figure 5.
9. If you want the hard disk LED to operate for IDE drives as well, install the LED jumper cable (supplied with the A4091 board) from the motherboard LED connector to the To Motherboard (CN308) connector on the A4091 board, illustrated in Figure 5.
10. Install any internal SCSI devices (optional) as described in "*Installing Internal SCSI Devices*" on page 14.
11. Replace the Amiga cover.
12. Install any external SCSI devices (optional) as described in "*Installing External SCSI Devices*" on page 17.
13. Reattach connecting cables, reconnect the Amiga to the AC power outlet and turn the power switch on.
14. The Workbench screen should show a disk icon for each partitioned hard drive you connected. If you installed a new hard drive, see "*Configuring a Hard Drive*" on page 19.

## ***Installing Internal SCSI Devices***

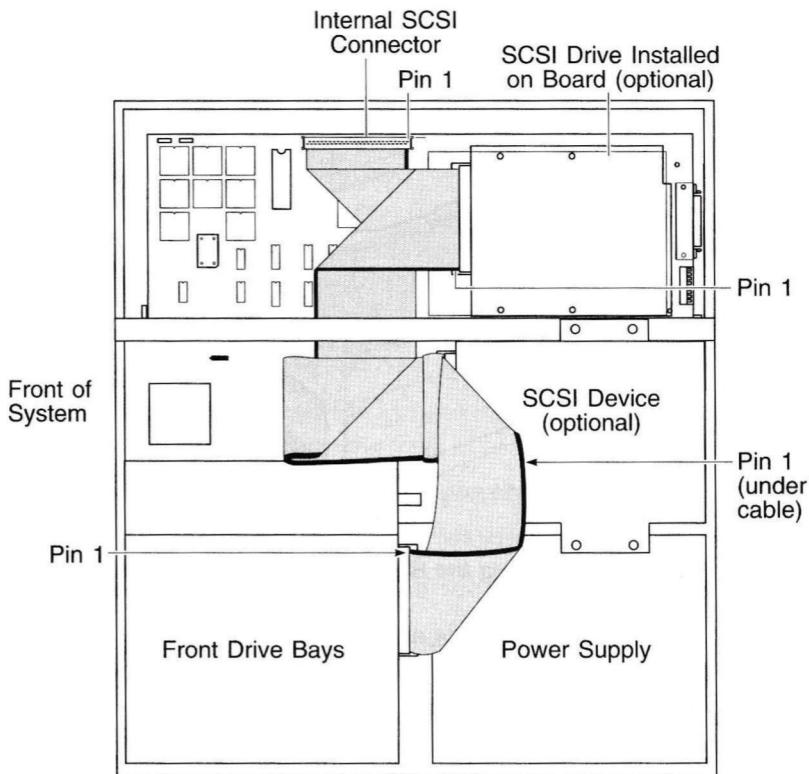
To install an internal SCSI device in one of the drive bays after the board is installed, follow the steps below. (To install a SCSI hard drive on the board see "*Installing a Hard Drive on the Board*" on page 9.)

1. Set the address jumper of the device to a SCSI address not used by the board or any other SCSI device.
2. Remove or deactivate the terminator on the device. See "*SCSI Device Termination*" on page 8 for more information.
3. Install the device as described in your hardware user's guide and the device installation manual.
4. Connect the device to the internal power supply.
5. Repeat steps 1 through 4 until all internal devices are installed.
6. If you have installed the board for the first time with the ribbon cable attached:
  - a. Remove the brace on top of the daughterboard by removing the screws that attach the brace to the frame of the Amiga, illustrated in Figure 6.



**Figure 6. Removing the Brace over the Daughterboard**

- b. Place the ribbon cable across the notch in the daughterboard.
  - c. Reattach the brace to the Amiga frame.
7. Fold the ribbon cable down and guide it towards the back of the Amiga as illustrated in Figure 7.



*Figure 7. Connecting the Ribbon Cable to SCSI Devices*

8. Connect the ribbon cable to the internal SCSI devices as illustrated in Figure 7. Be sure to align pin 1 on the cable connector with pin 1 on the device, usually indicated on the device by an arrow (←) or the number 1.

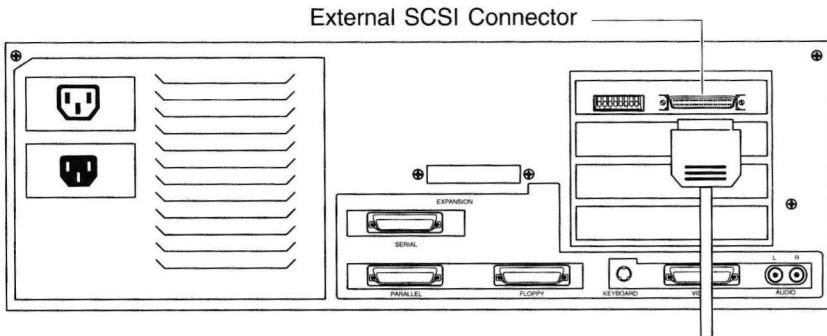
**Caution** It is essential to align pin 1 on the cable with pin 1 on your SCSI device. The folds in the provided ribbon cable enable you to easily align pin 1 on the cable with pin 1 on most devices.

Some SCSI devices have reversed the location of pin 1. If you have such a device, you must carefully manipulate the cable to ensure that pin 1 alignment is correct. Failure to align pin 1 can result in damage to the SCSI device.

## ***Installing External SCSI Devices***

To connect an external SCSI device after the board is installed in your Amiga, do the following:

1. Turn off the power switch and disconnect the Amiga from the AC power outlet.
2. Verify that switch 7 (External SCSI Termination) on the board is set to ON.
3. Set the address jumper of the first external SCSI device to an address not used by the board or any internal SCSI device.
4. Insert the connector of the SCSI device cable (or adapter) into the external SCSI connector on the A4091 board, illustrated in Figure 8. Align the two pieces to slide straight into one another, since they fit tightly together. Push until the retaining clips are secured. Press the rectangular pieces of metal on either side of the connector to release the retaining clips when inserting or removing the connector.



**Figure 8. Connecting a Device to the External Connector**

- Note** The external connector is a high density 50-pin SCSI-2 female connector. SCSI devices with a different connector will require an adapter cable with a 50-pin SCSI-2 male connector on one end and an appropriate connector for the device on the other end. See "*External SCSI-2 Connector Description*" on page 19 for the connector pinout information.
5. Set the address jumper of each succeeding SCSI device to an unused SCSI address.
  6. Connect each succeeding SCSI device to the previous SCSI device.
  7. The last external device in the chain requires termination. See "*SCSI Device Termination*" on page 8 for more information.
  8. Connect each external device to an AC power source.

## ***Configuring a Hard Drive***

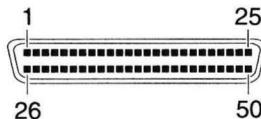
You do not have to reconfigure a previously used SCSI hard drive. If installing a new SCSI hard drive, follow these steps to complete the installation:

1. Insert the A4091 Support disk in the floppy drive.
2. Double-click on the A4091 icon.
3. Double-click on the A4091 Setup icon. Select your preferred language and follow the instructions that appear on the screen.

For further information on configuration options see the *Amiga Hard Drive User's Guide* and the *Workbench User's Guide*.

## ***External SCSI-2 Connector Description***

Figure 9 illustrates the external SCSI-2 female connector.



***Figure 9. External SCSI-2 Connector***

In the following pinout, a slash (/) preceding the signal name indicates that the signal is active low.

Pin	Signal Name	Pin	Signal Name
1	Ground	26	/DB(0)
2	Ground	27	/DB(1)
3	Ground	28	/DB(2)
4	Ground	29	/DB(3)
5	Ground	30	/DB(4)
6	Ground	31	/DB(5)
7	Ground	32	/DB(6)
8	Ground	33	/DB(7)
9	Ground	34	/DB(P)
10	Ground	35	Ground
11	Ground	36	Ground
12	Reserved	37	Reserved
13	Open	38	TERMPWR
14	Reserved	39	Reserved
15	Ground	40	Ground
16	Ground	41	/ATN
17	Ground	42	Ground
18	Ground	43	/BSY
19	Ground	44	/ACK
20	Ground	45	/RST
21	Ground	46	/MSG
22	Ground	47	/SEL
23	Ground	48	/C/D
24	Ground	49	/REQ
25	Ground	50	/I/O



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