

# **A4000HardwareGuide**

Warren Block

<b>COLLABORATORS</b>
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<b>REVISION HISTORY</b>
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NUMBER	DATE	DESCRIPTION	NAME

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## Chapter 1

# A4000HardwareGuide

### 1.1 main

Amiga 4000 Hardware Guide 2.0  
compiled by Warren Block

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Introduction	Drives
Common Problems	Monitors
Common Questions	Sources
Tips	Editor
Internals	Credits
Boards	Index

### 1.2 introduction

Introduction

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#### Copyright

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#### Distribution

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#### Disclaimer

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Working on computer hardware can be dangerous, both to the computer and to yourself. If you are not a qualified technician, please do not attempt to perform any of these procedures yourself. Neither myself nor any of the people listed in the Credits make any claim that any of these tips actually work. In fact, they will probably destroy your computer or your self-confidence. Neither is any claim made that any of the information presented here is error-free, so if you do attempt any of these modifications or fixes and damage yourself or the computer, neither myself nor any of the persons listed in the Credits section will be held responsible.

## Introduction

The Amiga 4000 Hardware Guide was compiled from online messages posted by many different folks, various hints and tips I've collected elsewhere, and from my own experiences with the 4000. So it is by no means complete. Corrections or additions are welcomed.

The purpose of the guide is to help make A4000 troubleshooting easier by gathering all kinds of Amiga 4000 hardware information into a single, easy-to-use guide file.

This guide is specifically for the Amiga 4000; however, at the prompting of several other individuals, I've compiled a short A1200 hardware FAQ to address those same old questions I see popping up in c.s.a.hardware all the time. Both are or will be available in the hard/misc directory of Aminet.

All of the people who have contributed are listed under Credits. I can't thank them enough! At this point in time, information of this type can be very valuable in keeping A4000 systems alive and running, and they have been gracious enough to freely share this information with everyone.

Comments on this document should be addressed to the Editor.

## 1.3 common problems

### Common Problems

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Fan Problems

-5V Power Problems

Video Banding Problems

Green Display Problems

Backplane Problems

Cable Routing Problems

Battery Problems

Zorro-III DMA Problems

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SCSI Reselect Problems

Dead Machine Problems

Slow 2091 Problems

## 1.4 fan problems

Fan Problems

A4000 makes rattling noises, fan stalls on powerup, or fan does not turn. Solution: replace fan. Replacement fans: Radio Shack #273-243 or Panasonic FBK-08A12M, available from Digi-Key, Hosfelt, and others (see Sources).

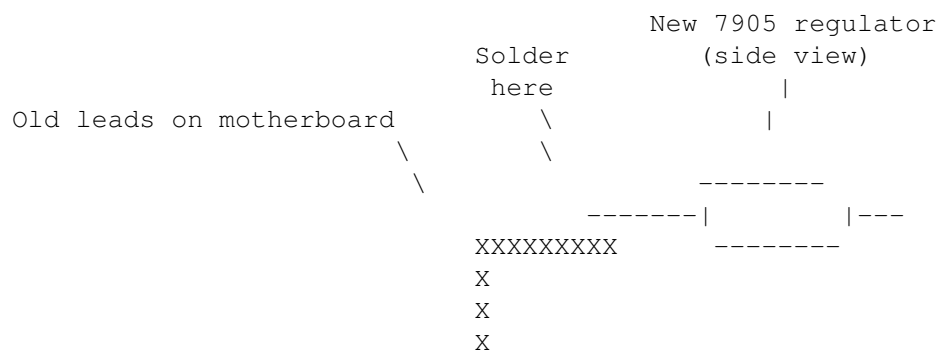
Please be aware that I've seen two styles of power supplies in the 4000; the fans may differ slightly. Some older 4000s had a power supply with a large hole for the fan, and a bolt-on grill protecting it. This power supply used an actual Panasonic FBM-08A12M. A newer power supply design has a built-in grill formed by holes in the side of the power supply; in this case, the fan is held in place by four odd-looking screws that tapped directly into the holes in the fan's plastic frame, and the fan itself is a "MAX FLOW" generic.

## 1.5 -5v power problems

-5V Power Problems

Problems with large hard disk transfers, discolored Toaster output (pink or magenta display of white areas), system crashes, or Emplant diagnostic failures. (See Emplant Reference.) Solution: U198 7905 -5V regulator is probably bad. Replace with new 7905 1-amp -5V regulator (see Sources).

The easiest way to replace this component may be to clip off the leads close to the body of the defective part, then trim the leads of the replacement and solder it to the old pins.



## 1.6 video banding problems

### Video Banding Problems

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Display on monitor has faint, darker vertical bands or stripes. See the Tips section for the Video Banding Modification.

## 1.7 green display problems

### Green Display Problems

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Video output from the A4000 has a greenish tint. This may be caused by the Sync On Green jumper (J500) being in the wrong position. Unless the monitor is set up to receive sync signals piggybacked on the Green video input, pins 1-2 of J500 should be jumpered. See Internals/Motherboard Jumpers.

## 1.8 backplane problems

### Backplane Problems

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After adding or removing expansion cards, system no longer boots, displays yellow screen. Solution: too-long resistor and capacitor leads on solder side of backplane daughterboard are bent and shorting together. Remove the backplane and trim leads.

## 1.9 cable routing problems

### Cable Routing Problems

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Make sure that signal and power cables aren't blocking the power supply fan air intake. The floppy ribbon cable can be routed from the motherboard between the power supply connector and the power supply itself. If there is only one drive installed, excess ribbon can be pushed under it.

## 1.10 battery problems

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## Battery Problems

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Battery (BT176) is "furry." Batteries can actually leak and destroy part of the motherboard, so replacement of corroded batteries is advised. Dalco's 3.6V 3-pin battery, part #46875, is an almost-identical part: the pins and size are identical, but it is rated for 60 mAh rather than the A4000 stock battery's 40 mAh.

## 1.11 zorro-iii dma problems

### Zorro-III DMA Problems

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Problems with transfers when using 4091 or Fastlane SCSI-2 controller boards. Check for revision of Super Buster; the revision 9 chip had problems with DMA transfers to or from Zorro-III boards (like the controllers mentioned above). Revision 11 of the Super Buster fixed this problem. (Note: it is unclear whether there is a problem with Zorro-II boards and the revision 9 Buster; Zorro-II or Zorro-III video boards that do not use DMA should not encounter this problem, which is not to say that there might not be others! Problems may also be encountered with the 2091 or GVP Series II SCSI controller boards. To isolate this problem, check disk transfers to Chip RAM with a program like DiskSpeed 4.2.)

There can be a software component to this problem, also. Check that libs:68040.library is at least version 37.30. Note that due to the way the library version numbers are handled, version 37.4 is an earlier version. The later 37.30 library handles Zorro transfers better.

## 1.12 scsi reselect problems

### SCSI Reselect Problems

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System reports "SCSI Bus Phase Error." Check that all SCSI devices support Reselect; if not, disable Reselect mode for the entire bus (how to do this varies depending on the SCSI host adapter).

## 1.13 dead machine problems

### Dead Machine Problems

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A4000 does nothing on power-up; keyboard light, power light, and hard drive

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spin-up show that power supply is working, but screen is gray or black, and disk drive doesn't click. Possible cause: the motherboard is not supported very well near the internal IDE connector. Solution: gently lift the motherboard near this connector. Installing an insulating support underneath the motherboard near here will be a more permanent solution.

## 1.14 slow 2091 problems

### Slow 2091 Problems

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2091 SCSI controller in A4000 performs very slowly. Solution: the 2091 controller has problems with the A4000 environment (see 2091 Reference in the Boards section). Several utilities are available in the "hard" directory of Aminet that can help speed up the 2091's performance in an A4000.

## 1.15 common questions

### Common Questions

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#### Memory Questions

Question: What type of memory does the A4000 use?

Answer: The A4000 comes with a single 2M SIMM installed for Chip RAM, and has four SIMM sockets for expansion memory (Fast RAM). These sockets hold 72-pin SIMMs, either 1M or 4M in capacity, 80 ns or faster. All Fast RAM SIMMs must be the same size. To fit properly, these SIMMs must be single-sided modules. (These specifications describe the motherboard memory; expansion boards may use other types of memory.)

Question: Can the A4000 use 36-bit SIMMs, instead of 32-bit?

Answer: Yes. The extra parity bits are ignored.

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#### IDE Hard Drive Questions

Question: Can the A4000 support two IDE hard drives?

Answer: Yes, since IDE supports a master/slave drive setup. Make sure the drive jumpers are set properly for two drives.

Question: Can the A4000 use IDE hard drives larger than 512M?

Answer: Yes. The supposed "limit" of 512M is a limitation of the BIOS in MS-DOS machines, and the A4000 is not subject to this limit. The maximum supported size of a hard drive is 2G (~2000 megabytes).

Question: Can "EIDE" or "Fast ATA" hard drives be used in the A4000?

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Answer: Yes. These are just revised versions of IDE, and should work fine with the A4000's on-board IDE controller.

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#### SCSI Hard Drive Questions

Question: Does the A4000 come with a SCSI or SCSI-2 hard drive controller?

Answer: No. The A4000T (tower) model did come with a built-in SCSI-2 controller, though. The A4091 and FastLane expansion boards are common SCSI-2 controllers for the A4000, and the 2091 is a fairly common SCSI-1 controller.

Question: Why doesn't SCSI work on the A4000?

Answer: It does. But because of a bug in early versions of the Zorro-III DMA controller (the "Buster" chip), DMA SCSI controllers didn't work properly. This problem can be fixed (by replacing the early revision 9 Buster with a revision 11 version) or avoided altogether (by using a SCSI controller that doesn't use the Zorro-III bus, like the one built into the Warp Engine accelerator).

Question: What are SCSI terminators?

Answer: Terminators are resistor packs attached at both ends of the SCSI chain. The resistance reduces ringing and noise on the bus, and is necessary for reliable operation. Terminators that install directly on a drive are usually black or yellow SIPs (Single In-line Package), and there may be one, two, or three of them. An alternate method is to package the resistors into a connector which may be plugged into an external SCSI port. These terminators may be of several types: a Centronics 50-pin connector, a DB-25, or a high-density 50-pin "SCSI-2" connector. Finally, there are "passive" terminators like the SIP packs described above, and "active" terminators that incorporate a voltage regulator to do a more precise job. An active terminator may work when a passive one won't, but they tend to cost somewhat more than the passive variety.

Question: What is the proper setup for SCSI termination?

Answer: Both ends of the SCSI chain need to have terminators, and there should be none in the middle. If you have a controller and one hard drive, there should be terminators on each. For a larger chain, just make sure that the end devices are terminated, and those in the middle are not. Don't forget that the controller counts as a device on the chain. (Now, the catch: some SCSI devices are not very compliant with the SCSI specification, and require oddball setups. Devices made within the last couple of years are usually pretty compliant.)

Question: Can a SCSI-1 drive be used with a Fast SCSI-2 controller?

Answer: Yes, and vice versa. SCSI-1 and SCSI-2 (and Fast SCSI-2) are compatible. Of course, a SCSI-1 drive won't go any faster when plugged into a Fast SCSI-2 controller; neither will a Fast SCSI-2 drive connected to a SCSI-1 controller go any faster than SCSI-1.

Question: What is the pin-out for a DB25 SCSI connector? What about the standard 50-pin SCSI header?

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Answer: See the Drives/SCSI Pin-Outs section for both.

Question: Will SCSI hard drives meant for the Mac work on an A4000?

Answer: Yes. The cable included with most external Mac hard drives is a DB25-to-Centronics 50 adapter, and this will work on a SCSI controller with DB25 external SCSI port. Software is available for accessing an existing Mac filesystem, so file interchange with a portable SCSI device is possible.

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#### CD-ROM Questions

Question: Will an EIDE CD-ROM drive work with the A4000's IDE interface?

Answer: Not unless you can locate a replacement for the scsi.device driver, which isn't capable of dealing with CD-ROM drives. SCSI is usually simpler to set up. Beware of pseudo-IDE CD-ROM drives, like the older Mitsumi, Panasonic, and Sony drives which will not work unless you have a special interface board for them.

## 1.16 tips

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### Tips

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Connecting VGA Monitors

Video Banding Modification

Processor Board Mounting

Processor Cooling

## 1.17 connecting vga monitors

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### Connecting VGA Monitors

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VGA monitors can be connected to the A4000; however, since the special circuitry in the Amiga video output can mistakenly identify a monitor as a genlock and thus cause problems, a special cable or adapter is the best way to hook them up. All this cable really does is buffer the horizontal and vertical sync signals by double-inverting them through a TTL gate. Commodore's DB23-to-HDD15 adapter (supplied with most A4000s) used a 74HCT08 for this, but you can use a 74LS04 or other low-power TTL-level inverters (or other gates wired as inverters, of course).

Remember that most VGA monitors won't sync at 15.75 kHz, so you'll have to set the A4000 to use the Double NTSC (or Double PAL) or Multiscan video modes. Even using these modes, the video output may not work with some VGA

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monitors, since some of the modes use horizontal sync frequencies as low as 23 kHz, and normal VGA starts at 31.5 kHz. Using the VGAOnly monitor driver will bump these frequencies up a bit, perhaps enough to make them usable with picky monitors.

#### A4000 VGA Video Cable

A4000 DB23	VGA HDD15
Red (Pin 3) -----	Red (Pin 1)
Green (Pin 4) -----	Green (Pin 2)
Blue (Pin 5) -----	Blue (Pin 3)
Grounds (Pin 16-20) -----	Grounds (Pin 5-8,10,11) and ground for inverter. Also use a .01 uF ceramic decoupling cap between +5V and ground at the chip power supply pins.
Horizontal Sync (Pin 11) -----	Horizontal Sync (Pin 13)
Vertical Sync (Pin 12) -----	Vertical Sync (Pin 14)
+5V (Pin 23) -----	Power supply for inverter chip.

## 1.18 video banding modification

### Video Banding Modification

Video Banding Modification: Many (most?) A4000s show some faint vertical bands on the display. There is a modification to prevent this, but, like anything else, it has advantages and disadvantages.

#### Advantages:

- Removes vertical bands from display.
- Simple modification.
- Relatively easy to disable.

#### Disadvantages:

- Interferes with operation of attached genlocks and deinterlacer boards like the Amber A2320 board (see Boards/A2320 'Amber' Reference).

The modification involves connecting pin 15 of the video port connector through a 100 ohm, 1/4 watt resistor to ground. This can be done inside the

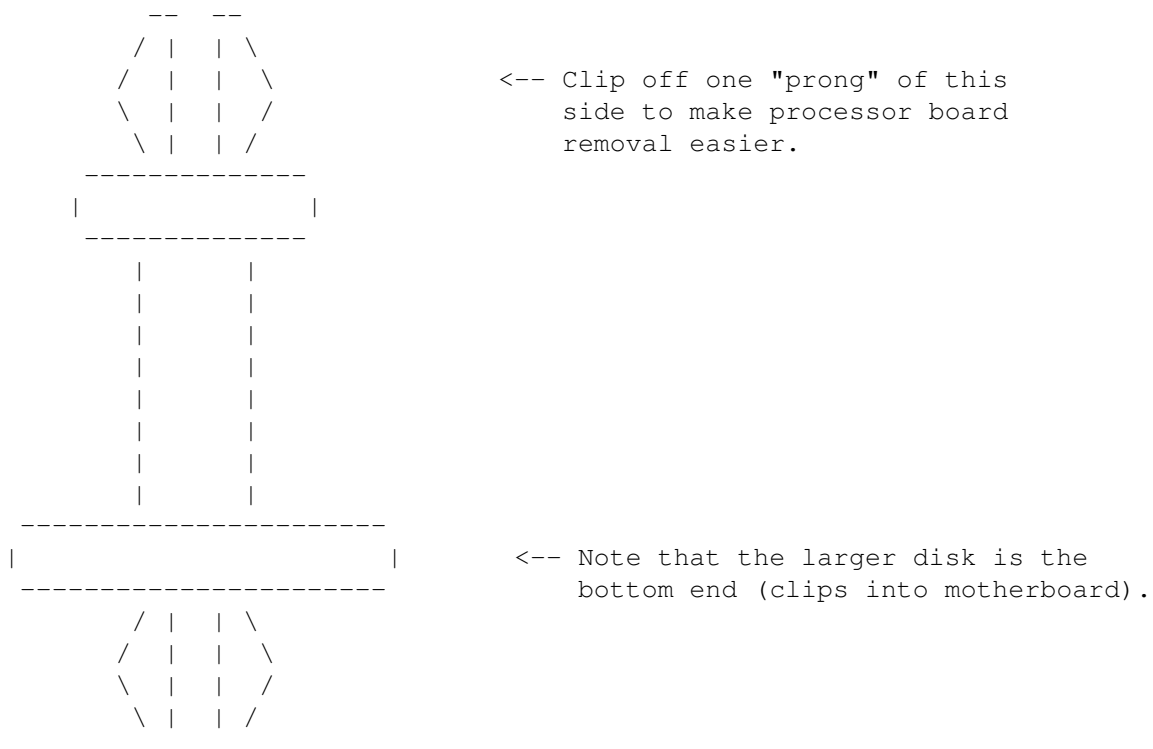
A4000, but it's safer and more versatile if the modification is performed on the DB23-to-HDD15 adapter that was included with the A4000. That way the adapter can be unplugged from the machine if a genlock or Amber board is to be used.

There are two grounds on the adapter PC board: shield ground and video ground (pins 16-20). Since all the other components on the board use the video ground, it seems reasonable to use it for this modification, rather than the more-easily-reached shield ground. The resistor fits nicely on the bottom of the adapter PC board, running from pin 15 to pin 18 of the connector's soldered pins.

## 1.19 processor board mounting

### Processor Board Mounting

The nylon standoffs that hold the A3640 processor daughterboard in place grip the board very, very tightly, making removal difficult and prone to flexing this fragile board. Pushing the two halves of the standoff together with needle-nose pliers makes it somewhat easier to remove the processor board, but it may still be a fight, putting stress on the motherboard, the processor board, and the person removing it. After removing the board, you can clip off one "prong" of the side that plugs into the processor board. If you leave one of these prongs in place, the processor board will still be held firmly in place, but removal will be much easier, next time, anyway. If you are afraid that the processor board will not be held firmly enough, do this modification on only two of the standoffs.



## 1.20 processor cooling

### Processor Cooling

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A company called PC Power & Cooling makes a stick-on cooling fan for the 486 processor that just happens to fit the 68040 perfectly. The fan uses a stick-on backing to attach to the chip, so you don't have to mess with little clips or spring wires. It spins on ball bearings instead of a bushing, so life expectancy is claimed to be 50,000 hours instead of the ordinary bushing fan's 5000 hours. A disk-drive power connector powers the fan. Finally, it's only .6 inches high, no more than the heat sink that comes with the A3640 processor board. PC Power & Cooling calls it the "CPU-COOL," and they sell it for \$24. In the United States, you can save a few dollars by ordering it from large mail-order companies like PC Connection.

PC Power & Cooling  
 5995 Avenida Encinas  
 Carlsbad CA 92008  
 (800) 722-6555  
 (619) 931-6988 Fax

## 1.21 internals

### A4000 Internals

---

Motherboard Jumpers

Connector Pin-Outs

Power-Up Self-Test

Keyboard Self-Test

## 1.22 motherboard jumpers

### Motherboard Jumpers

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A4000 Motherboard

	ooo		oo			
	Internal		DF1:			
	Audio		Enable			
	Connector				Power	

---

			Supply	
		ooo		
		ooo	Fan	
		ooo	-----	
		Power Supply		
		Connector		
		-----		
			Drive	
			Bays	
	oo			
	SIMM			
	Size			
-----				

#### Jumper Listing:

##### J351: DF1 Enable

Closed: Enable low-density (880K) floppy as DF1.

Open: No DF1 \*OR\* for high-density (1.76M) DF1.

##### J852: Fast RAM SIMM Size (Chip RAM is always 2M.)

256K: 1M SIMMs.

1M : 4M SIMMs.

##### CN404: Internal Audio Connector

Audio signals attached here will be mixed with the A4000 audio output. The A4000 audio is somewhat louder than the normal line level output from most CD-ROM drives, presumably to make sound effects audible over background music. Setting the software-controlled A4000 audio level lower (to 32 instead of 64) will help match the levels.

Pin 1: Audio In (Left)

Pin 2: Ground.

Pin 3: Audio In (Right)

#### Other Jumpers (Not Shown Above)

##### J100: CLK90 Clock Source

1-2 Closed: Internal (68020/68030)

2-3 Closed: External (68040)

##### J104: CPU Clock Source

1-2 Closed: Internal

2-3 Closed: External

##### J151: ROM Speed: 160 or 200 ns ROMs.

1-2 Closed: 200 ns ROMs (default).

2-3 Closed: 160 ns ROMs.



- J213: Chip RAM: 2M or 8M  
 1-2 Closed: 2M Chip RAM (default).  
 2-3 Closed: 8M Chip RAM. This option was apparently for use with the never-released AAA chip set, and won't work in a normal A4000.
- J500: Sync On Green  
 1-2 Closed: Sync on green disabled (default?).  
 2-3 Closed: Sync on green enabled (see the Common Problems section for the Green Display Problems note on this jumper).
- J501: Lisa Sync (Wide input on the Lisa chip.)  
 1-2 Closed: CSync from Agnus Pin 80.  
 2-3 Closed: +5V (default).
- J502: Select DAC Sync  
 1-2 Closed: DAC syncs on green.  
 2-3 Closed: DAC uses standard signal (default).
- J850: Enable DSACK (Used with 68020)  
 1-2 Closed: DSACK Enabled for 68020. U860 and U152 also required.  
 2-3 Closed: No DSACK.
- J975: "Options" connector. Apparently for some type of expansion, perhaps for use with mouse or joystick-type peripherals.

#### Power Supply Connector Wires:

Yellow: +5V  
 Orange: +12V  
 Blue: Ground  
 Red: -12V  
 Brown: Power Good (???)

## 1.23 connector pin-outs

### Connector Pin-Outs

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Note: Signals shown with a star (\*) in front of them are active-low. I recommend that you independently verify the pin-out information shown here with a logic probe, meter, or scope before using it.

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Serial Port

Parallel Port

Video Port

Keyboard Port

Mouse/Joystick Ports

-----

External Floppy Port

Internal Floppy Connector

Internal IDE Hard Disk Connector

## 1.24 serial port pin-outs

Serial Port (DB25 Male)

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Pin 1: Shield Ground  
Pin 2: Transmit Data  
Pin 3: Receive Data  
Pin 4: RTS  
Pin 5: CTS  
Pin 6: DSR  
Pin 7: Data Ground (Do not connect to shield ground.)  
Pin 8: CD  
Pin 9: +12V (20 mA maximum.)  
Pin 10: -12V (20 mA maximum.)  
Pin 11: Amiga Audio Out (Left)  
Pin 12: Unused  
Pin 13: Unused  
Pin 14: Unused  
Pin 15: Unused  
Pin 16: Unused  
Pin 17: Unused  
Pin 18: Amiga Audio In (Right)  
Pin 19: Unused  
Pin 20: DTR  
Pin 21: Unused  
Pin 22: RI  
Pin 23: Unused  
Pin 24: Unused  
Pin 25: Unused

## 1.25 parallel port pin-outs

Parallel Port (DB25 Male)

---

Pin 1: \*Strobe  
Pin 2: Data 0  
Pin 3: Data 1  
Pin 4: Data 2  
Pin 5: Data 3  
Pin 6: Data 4  
Pin 7: Data 5

---

Pin 8: Data 6  
Pin 9: Data 7  
Pin 10: \*Acknowledge  
Pin 11: Busy  
Pin 12: Paper Out  
Pin 13: Select  
Pin 14: +5V Pull Up (10 mA maximum.)  
Pin 15: Unused  
Pin 16: \*Reset  
Pin 17: Ground (Do not connect any of these grounds to a shield.)  
Pin 18: Ground  
Pin 19: Ground  
Pin 20: Ground  
Pin 21: Ground  
Pin 22: Ground  
Pin 23: Ground  
Pin 24: Ground  
Pin 25: Ground

## 1.26 video port pin-outs

Video Port (DB23 Male)

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Pin 1: \*External Clock  
Pin 2: \*External Clock Enable (47 ohm)  
Pin 3: Red Video (75 ohm)  
Pin 4: Green Video (75 ohm)  
Pin 5: Blue Video (75 ohm)  
Pin 6: Digital Intensity (47 ohm)  
Pin 7: Digital Blue (47 ohm)  
Pin 8: Digital Green (47 ohm)  
Pin 9: Digital Red (47 ohm)  
Pin 10: \*Composite Sync (47 ohm)  
Pin 11: \*Horizontal Sync (47 ohm)  
Pin 12: \*Vertical Sync (47 ohm)  
Pin 13: Ground Return (Digital ground return for pin 2.)  
Pin 14: \*Pixel Switch (Genlock overlay, 47 ohm)  
Pin 15: \*Clock Out (47 ohm)  
Pin 16: Video Ground (Do not connect any of these grounds to pin 13.)  
Pin 17: Video Ground  
Pin 18: Video Ground  
Pin 19: Video Ground  
Pin 20: Video Ground  
Pin 21: -5V (10 mA maximum.)  
Pin 22: +12V (100 mA maximum.)  
Pin 23: +5V (100 mA maximum.)

## 1.27 keyboard port pin-outs

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Keyboard Port (6-Pin Female Mini-DIN, PS/2 Type)

---

Pin 1: Data		6	---	5
Pin 2: Unused	Pin Layout:			
Pin 3: Ground	(Index key			
Pin 4: +5V (100 mA maximum.)	at top.)	4	---	3
Pin 5: Clock				
Pin 6: Unused		2		1

Note: A PS/2 keyboard will not work with the A4000.

1.28 joystick port pin-outs

Mouse/Joystick Ports (DB9 Male)

---

Mouse:	Light Pen:
Pin 1: Mouse Vertical	Pin 1: Unused
Pin 2: Mouse Horizontal	Pin 2: Unused
Pin 3: Mouse Vertical Quadrature	Pin 3: Unused
Pin 4: Mouse Horizontal Quadrature	Pin 4: Unused
Pin 5: Mouse Button 3 (Middle)	Pin 5: Light Pen Press
Pin 6: Mouse Button 1 (Left)	Pin 6: *Light Pen (Capture Beam Pos)
Pin 7: +5V (50 mA maximum.)	Pin 7: +5V (50 mA maximum.)
Pin 8: Ground	Pin 8: Ground
Pin 9: Mouse Button 2 (Right)	Pin 9: Unused
Digital Joystick:	Analog (Proportional) Joystick:
Pin 1: *Forward	Pin 1: Button 3
Pin 2: *Back	Pin 2: Unused
Pin 3: *Left	Pin 3: Button 1
Pin 4: *Right	Pin 4: Button 2
Pin 5: Unused	Pin 5: Pot X (Horizontal Control)
Pin 6: *Fire	Pin 6: Unused
Pin 7: +5V (50 mA maximum.)	Pin 7: +5V (50 mA maximum.)
Pin 8: Ground	Pin 8: Ground
Pin 9: Fire Button 2	Pin 9: Pot Y (Vertical Control)

1.29 external floppy port pin-outs

External Floppy Port (DB23 Female)

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Pin 1: *Disk Ready
Pin 2: *Disk Read Data

---

Pin 3: Ground  
 Pin 4: Ground  
 Pin 5: Ground  
 Pin 6: Ground  
 Pin 7: Ground  
 Pin 8: \*Disk Motor Control  
 Pin 9: \*Select Drive 3  
 Pin 10: \*Disk Reset  
 Pin 11: \*Disk Change (Latched Low)  
 Pin 12: +5V (250 mA maximum.)  
 Pin 13: \*Select Disk Side (0=Upper, 1=Lower)  
 Pin 14: \*Write Protect  
 Pin 15: \*Track Zero  
 Pin 16: \*Disk Write Enable  
 Pin 17: \*Disk Write Data  
 Pin 18: \*Step (Pulse: Low, then high.)  
 Pin 19: Direction (0=Inner, 1=Outer)  
 Pin 20: Unused  
 Pin 21: \*Select Drive 2  
 Pin 22: \*Disk Index Pulse  
 Pin 23: +12V (160 mA maximum, 540 mA surge.)

### 1.30 internal floppy connector pin-outs

Internal Floppy Connector (34-Pin Male Header)

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Pin 1: Ground	Pin 18: Direction
Pin 2: *Change	Pin 19: Ground
Pin 3: Unused	Pin 20: *Step
Pin 4: *In Use 1	Pin 21: Ground
Pin 5: Ground	Pin 22: *DKWD
Pin 6: *In Use 0	Pin 23: Ground
Pin 7: Ground	Pin 24: DKWE (Write Enable?)
Pin 8: *Index	Pin 25: Ground
Pin 9: Ground	Pin 26: *TRKD
Pin 10: *Select 0	Pin 27: Ground
Pin 11: Ground	Pin 28: *Write Protect
Pin 12: *Select 1	Pin 29: Ground
Pin 13: Ground	Pin 30: *DKRD
Pin 14: Unused	Pin 31: Ground
Pin 15: Ground	Pin 32: *Side
Pin 16: *MTRI	Pin 33: Ground
Pin 17: Ground	Pin 34: *Ready

### 1.31 internal ide hard disk connector pin-outs

Internal IDE Hard Disk Connector (40-Pin Male Header)

---

Pin 1: *Reset	Pin 21: Unused
Pin 2: Ground	Pin 22: Ground
Pin 3: Drive Data 7	Pin 23: *I/O Write
Pin 4: Drive Data 8	Pin 24: Ground
Pin 5: Drive Data 6	Pin 25: *I/O Read
Pin 6: Drive Data 9	Pin 26: Ground
Pin 7: Drive Data 5	Pin 27: I/O Channel Ready
Pin 8: Drive Data 10	Pin 28: Unused
Pin 9: Drive Data 4	Pin 29: Unused
Pin 10: Drive Data 11	Pin 30: Ground
Pin 11: Drive Data 3	Pin 31: Interrupt Request
Pin 12: Drive Data 12	Pin 32: Unused
Pin 13: Drive Data 2	Pin 33: Disk Address 1
Pin 14: Drive Data 13	Pin 34: Unused
Pin 15: Drive Data 1	Pin 35: Disk Address 0
Pin 16: Drive Data 14	Pin 36: Disk Address 2
Pin 17: Drive Data 0	Pin 37: *IDE_CS1
Pin 18: Drive Data 15	Pin 38: *IDE_CS2
Pin 19: Ground	Pin 39: *Active (LED driver output.)
Pin 20: Unused	Pin 40: Ground

## 1.32 power-up self-test

### Power-Up Self-Test

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Test Status	Color Shown	Description Of Error
Passed	Light Gray	Initial hardware configuration tests passed. Initial software tests passed. Final initialization test passed.
Failed	Red	ROM Error: Make sure ROMs are seated properly.
	Green	Chip RAM Error: Make sure Agnus is seated, and check Chip RAM SIMMs for proper seating.
	Blue	Custom Chip or CIA error.
	Yellow	Processor detected error before software trapped it.

## 1.33 keyboard self-test

### Keyboard Self-Test

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Number Of Caps Lock Blinks	Description Of Error
One	Keyboard ROM failed.
Two	Keyboard RAM failed.

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Three	Watchdog timer failed.
Four	Short detected in keyboard.

## 1.34 boards

### A4000 Boards

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A3640 Reference

68020/68030 Processor Board Reference

Warp Engine Reference

A2320 'Amber' Reference

Emplant Reference

2091 Reference

## 1.35 a3640 reference

### A3640 Reference

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The A3640 is the stock 68040 processor board that comes with most A4000s. It contains a 25 MHz 68040; some boards came with the 68LC040, which is a 68040 with no built-in math coprocessor functions. The A4000 User's Guide has instructions on upgrading from a 68EC040, which has no math coprocessor or memory management unit (if any A4000s were ever shipped with 68EC040 processors, there were very few of them). Some A3640 boards (notably, revision 3.1 boards with U209 marked as "-02" or "-03") can be used in A3000 or A3000 tower computers.

(See also Tips/Processor Board Mounting.)

Jumpers:

J100: Enable CDIS\* MDIS\* (???)  
 1-2 Closed and 3-4 Closed: Enable CDIS\* MDIS\* (default).

J400: Enable MAPROM: Enable remapping circuit for loading Kickstart into Fast RAM with a developer utility program.  
 1-2 Closed: MAPROM enabled (default).  
 3-4 Closed: MAPROM disabled.

## 1.36 68030 processor board reference

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## 68020/68030 Processor Board Reference

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This processor board is the board supplied with the A4000/030. It may contain a 68030, 68EC030 (functionally equivalent to the 68030 but without a memory management unit), or even a 68020 processor. The 68020 option was apparently for an extremely low-cost version of the A4000; it is unlikely that any boards using the 68020 were ever sold.

A possible cost-reduced variation of this processor board has no jumpers. This type of board has a PLCC socket for the math coprocessor, which runs at the same speed as the processor.

(See also Tips/Processor Board Mounting.)

Jumpers:

- J100: FPU Select
  - 1-2 Closed: Use FPU in the PLCC socket.
  - 2-3 Closed: Use FPU in the PGA socket.
- J101: FPU Clock
  - 1-2 Closed: Use optional on-board oscillator at U103 for FPU clock.
  - 2-3 Closed: Use CPU clock as FPU clock.
- J103: MAPROM Enable
  - 1-2 Closed: MAPROM disabled.
  - 2-3 Closed: MAPROM enabled (requires U100).
- J201: 68020 Select
  - 1-2 Closed: 68020 not selected.
  - 2-3 Closed: 68020 selected.
- J202: 68030 Select
  - 1-2 Closed: 68030 selected.
  - 2-3 Closed: 68030 not selected.
- J203: 68020/68030 Select
  - 1-2 Closed: 68030 selected.
  - 2-3 Closed: 68020 selected.

## 1.37 warp engine reference

### Warp Engine Reference

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The Warp Engine is a popular 68040 processor board that replaces the A3640. It includes four 72-pin SIMM sockets and a Fast SCSI-2 host adapter.

Memory: Any combination of 4M, 8M, 16M, or 32M 72-pin SIMMs, either 32-bit or 36-bit wide. Add them starting with SIMM4 and working down to SIMM1. It is advised that you put your largest SIMM in the SIMM4 socket.

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**SIMM Speed:** For a 28 MHz Warp Engine, 80 ns SIMMs are adequate. A 33 MHz Warp Engine requires 70 ns SIMMs, while a 40 MHz board needs 60 ns.

**SIMM Types:** Single or double-sided SIMMs will work, although the double-sided 16M SIMM is not recommended due to high power consumption. (This probably also applies to double-sided 32M SIMMs; the Warp Engine manual doesn't say so, perhaps because they are rare at present.)

**Upgrading:** All that is required to convert a 28 MHz Warp Engine into a 33 MHz or 40 MHz Warp Engine is to replace the oscillator and processor.

(See also Tips/Processor Board Mounting.)

#### Jumpers:

JP1: SCSI Termination Power

JP2:

A: Mode Select (Off: 68040 enabled, On: 68040 disabled)  
 B: SIMM Type (Off: double-sided, On: single-sided)  
 C: SIMM Bank Size (Off: 16M, On: 4M)  
 D: Wait State (Off: no wait state, On: 1 wait state)  
 E: reserved  
 F: MMU Disable (Off: MMU enabled, On: MMU disabled)  
 G: Cache Disable (Off: caches enabled, On: caches disabled)  
 H: SCSI Config (see below)  
 J: SCSI Config (see below)  
 K: SCSI Config (see below)

JP3: reserved

JP4: used for A3000 version \*only\* (connects to pin 21 of U350)

#### SCSI Configuration Jumpers (H, J, K on JP2)

K	J	H	(0=Open, 1=Closed)
0	0	0	SCSI autoboot disabled
0	0	1	10-second delay, LUN scan, not synchronous
0	1	0	10-second delay, LUN scan, 200 ns synchronous
0	1	1	10-second delay, LUN scan, 100 ns synchronous
1	0	0	no delay, LUN scan, 200 ns synchronous
1	0	1	no delay, LUN scan, 100 ns synchronous
1	1	0	no delay, no LUN scan, 200 ns synchronous
1	1	1	(default) no delay, no LUN scan, 100 ns synchronous

## 1.38 a2320 reference

### A2320 'Amber' Reference

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The A2320 is a video deinterlacer board originally built for the A2000. It is essentially the motherboard deinterlacer circuitry from the A3000 on a board. Based on the Amber chip used in the A3000, the board is often referred to as the Amber board. Physically, the board is designed to fit into the video slot of an A2000. Electronically, it works fine in an A4000.

Why would you need a separate deinterlacer board when the A4000 already has AGA circuitry that can scan-double? If you have a VGA or multisync monitor, there are two main reasons:

- A. Not all programs can be mode-promoted to "double" screens through software (games, for instance). The Amber board will scan-double all 15.75 kHz screens.
- B. The AGA "double" modes are not truly double in frequency. A 640x200 "doubled" screen syncs at about 27.5 kHz, not the 31.5 kHz that you'd expect. Some multisync monitors can't sync this low. With an Amber board, the output is 31.5 kHz, the same as "stock" VGA.

#### Physical Mounting

A modified "slot cover" can be attached to the back panel of the Amber board to allow it to be attached securely to an A4000 slot. You'll also need to trim a bit off the "top" of the Amber's metal panel to allow clearance for the A4000 case (a nibbling tool is useful here). The board will only fill part of A4000 video slot; it looks funny this way, but it works.

Don't remove the enable/disable switch! The Amber gets confused by some of the "doubled" screen modes, and rather than passing them through, tries to double them to 55 kHz or above! On these modes, you'll need the disable switch to force the board to pass the video through. (Productivity mode is passed through correctly, since it was part of the ECS chip set that was around when the Amber board first came out.)

#### Disadvantages

The Amber board was designed before AGA came out, and doesn't really understand AGA. As noted above, some modes are not passed through properly unless the board is disabled with the switch. Also, I believe that AGA screens with more than 32 colors or HAM-6 will have the colors quantized to a certain degree, although I haven't really been able to prove this. It hasn't been a problem so far. Games that use the AGA color abilities but don't allow for promoting their screens to doubled modes are the only likely sources for this trouble.

## 1.39 emplant reference

### Emplant Reference

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Left: Signal pulled up to +5V.

JP3: Auto-Boot ROM/SRAM Socket Power/Address Select

Upper: Supply power to 28-pin DIP.

Lower: Supply address line for 32-pin DIP.

JP4: ROM/RAM Socket 3/4 ROM/SRAM Socket Power/Address Select

Upper: Supply power to 28-pin DIP.

Lower: Supply address line for 32-pin DIP.

JP5: ROM/RAM Socket 1/2 ROM/SRAM Socket Power/Address Select

Upper: Supply power to 28-pin DIP.

Lower: Supply address line for 32-pin DIP.

JP6: Mac Emulation Audio Mode Select

Upper: Mono.

Lower: Stereo.

JMP1: SCSI Terminator Power Enable

On: Supply SCSI terminator power.

Off: Do not supply SCSI terminator power.

RCA: Input Connector For Audio Digitizing Circuitry

## 1.40 2091 reference

### 2091 Reference

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The 2091 is a Zorro-II DMA SCSI hard drive controller that was originally introduced with the A2000HD. Because of the 2091's high availability, it is often found in A4000s, even though it performs very slowly in them. The 2091 apparently can't use DMA to transfer data to 32-bit Fast RAM, and so uses a very small buffer in Chip RAM, making for extremely slow disk transfers. There are utilities in the "hard" directory of Aminet that may help alleviate this problem.

ROM revisions are a common problem with the 2091; 6.6 or later ROMs are recommended.

Sixteen sockets allow for the addition of up to 2M of 16-bit Fast RAM, using CMOS 256K x 4 DRAMs (44C256) rated at 120 ns or faster. (This is not normally very useful on the A4000, since a SIMM added to the motherboard RAM sockets is simpler to obtain and install, and will operate \*much\* more quickly.)

Usually looked on as a cheap (sometimes very cheap) way to access SCSI peripherals from the A4000, the 2091 is certainly better than no SCSI controller at all.

Jumpers:

JP1: Memory Size

OK: Set for no memory.

---

512K: Set for 512K of RAM.  
 1M: Set for 1M of RAM.  
 2M: Set for 2M of RAM.

JP2: Autoboot Enable

AUTO: Set to enable autobooting from the 2091.

DIS: Set to disable autobooting from the 2091.

JP3: Interrupt Select

INT6: Select interrupt 6.

INT2: Select interrupt 2.

JP5: Options

Option 1: LUN Enable. When jumpered, enables scanning for Logical Unit Numbers numbers at each physical SCSI address.  
 Default value: Off.

Option 2: Time-Out Length. When jumpered, enables longer time-out for slow-starting drives. Default: Off. (Note: When on, this jumper disables parity during the message in phase.)

Option 3: Reserved. Factory default: Off.

JP201: Factory use only.

For pin-out information on the internal 50-pin header and external DB25 SCSI connectors, see Drives/SCSI Pin-Outs.

## 1.41 drives

### Drives

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Seagate ST3096A/ST3144A Reference

External SCSI Connector

SCSI Pin-Outs

## 1.42 seagate st3144a reference

Seagate ST3096A/ST3144A 120M IDE Hard Drive Reference

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The Seagate ST3096A (80M) and ST3144A (120M) are the stock drives included with most AA4000s.

### Jumpers

	1	3	5	7	9
	-----				
		o	o	o	o



## 1.44 scsi pin-outs

### SCSI Pin-Outs

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#### Internal 50-Pin SCSI Header Pin-Out

All odd pins are grounds, except for pin 25, which is unused.

Pin 2: \*Data 0  
Pin 4: \*Data 1  
Pin 6: \*Data 2  
Pin 8: \*Data 3  
Pin 10: \*Data 4  
Pin 12: \*Data 5  
Pin 14: \*Data 6  
Pin 16: \*Data 7  
Pin 18: \*Parity  
Pin 20: Ground  
Pin 22: Ground  
Pin 24: Ground  
Pin 26: Terminator Power  
Pin 28: Ground  
Pin 30: Ground  
Pin 32: \*ATN  
Pin 34: Ground (Unused?)  
Pin 36: \*BSY  
Pin 38: \*ACK  
Pin 40: \*RST  
Pin 42: \*MSG  
Pin 44: \*SEL  
Pin 46: \*C/D  
Pin 48: \*REQ  
Pin 50: \*I/O

#### External DB25 SCSI Connector Pin-Out

Pin 1: \*REQ  
Pin 2: \*MSG  
Pin 3: \*I/O  
Pin 4: \*RST  
Pin 5: \*ACK  
Pin 6: \*BSY  
Pin 7: Ground  
Pin 8: \*Data 0  
Pin 9: Ground  
Pin 10: \*Data 3  
Pin 11: \*Data 5  
Pin 12: \*Data 6  
Pin 13: \*Data 7  
Pin 14: Ground  
Pin 15: \*C/D  
Pin 16: Ground  
Pin 17: \*ATN  
Pin 18: Ground

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Pin 19: \*SEL  
Pin 20: \*Parity  
Pin 21: \*Data 1  
Pin 22: \*Data 2  
Pin 23: \*Data 4  
Pin 24: Ground  
Pin 25: Terminator Power

External Centronics 50 Connector Pin-Out

Pins 1-12 and 14-25 are grounds.

Pin 26: \*Data 0  
Pin 27: \*Data 1  
Pin 28: \*Data 2  
Pin 29: \*Data 3  
Pin 30: \*Data 4  
Pin 31: \*Data 5  
Pin 32: \*Data 6  
Pin 33: \*Data 7  
Pin 34: \*Parity  
Pin 35: Ground  
Pin 36: Ground  
Pin 37: Ground  
Pin 38: Terminator Power  
Pin 39: Ground  
Pin 40: Ground  
Pin 41: \*ATN  
Pin 42: Ground (Unused?)  
Pin 43: \*BSY  
Pin 44: \*ACK  
Pin 45: \*RST  
Pin 46: \*MSG  
Pin 47: \*SEL  
Pin 48: \*C/D  
Pin 49: \*REQ  
Pin 50: \*I/O

## 1.45 monitors

### Monitors

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1081 Reference

1084 Reference

1085 Reference

1940/1942 Reference

1950 Reference

1960 Reference

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Idek Iiyama Vision Master 17 (MF-8617) Reference

Mitsubishi DiamondScan AUM-1381A Reference

## 1.46 1081 reference

### 1081 Reference

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Information needed! Who made it? Common problems? Pinouts for connectors? Tips?

Similar to the 1084, with SCART and composite video connectors. Probably made by Philips. The 1081 may have only been distributed in Europe.

A common problem is for the monitor to "pop," then go dark. Hitting it may bring back the picture. This is often caused by cold or cracked solder joints on the flyback transformer, which resoldering should cure.

## 1.47 1084 reference

### 1084 Reference

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Information needed! Who made it? Common problems? Pinouts for other connectors? Tips?

The 1084 and its variants (1084S, 1084S-P, 1084-P, 1084S-P2, 1084-D, and 2080) are all 15.75 kHz monitors. They do not handle AGA "double" screenmodes, nor will they display the deinterlaced output from the A2320 Amber board or the motherboard deinterlaced output on an A3000. However, they will show all normal 15.75 kHz displays, and many (most? all?) of the 1084 versions have a separate input for composite video.

Common problems:

- \* The door covering the front-panel controls is typically broken off.
- \* The attached cables or connectors on some models tended to fail, causing loss of color.
- \* Failed or insufficient insulation may cause arcing.

Only the six-pin DIN connectors are used for analog RGB. Some 1084 monitors also have digital RGB (PC clone CGA) inputs.

Other notes:

- \* The 2080 was a long-persistence phosphor variation.
- \* The 1084-D may have been made by Daewoo of South Korea.

Pinouts:

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Pin 1: Green  
Pin 2: Horizontal Sync  
Pin 3: Ground  
Pin 4: Red  
Pin 5: Blue  
Pin 6: Vertical Sync

## 1.48 1085 reference

### 1085 Reference

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The 1085(S) is a cost-reduced version of the 1084, with lower resolution (.52 mm dot pitch) and no non-glare screen treatment. Like the 1084, the 1085 is a fixed-frequency 15.75 kHz monitor, and is not compatible with most AGA screen modes.

Pinouts (DB9):

Pin 1: Ground  
Pin 2: Ground  
Pin 3: Red  
Pin 4: Green  
Pin 5: Blue  
Pin 6: Unused  
Pin 7: Composite Sync  
Pin 8: Unused  
Pin 9: Unused

## 1.49 1940 reference

### 1940/1942 Reference

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This monitor is a 13-inch bisync (not true multisync) monitor built by Samsung for Commodore. It has two ranges of sync frequencies to match both normal (15.75 kHz) and doubled screen modes. The 1942 differs from the 1940 only in that it has a smaller dot pitch. MonEd may be useful in getting the picture to fill the entire screen. Both variations feature stereo speakers.

Specifications:

Sync Frequency: 15.6–15.8 kHz and 27.3–31.5 kHz Horizontal  
47 Hz to 75 Hz Vertical

Dot Pitch: 0.39 mm (1940)  
0.28 mm (1942)

Sound Output: 1.0 W RMS/Channel at 5% max. THD

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Input Connectors: One permanently attached DB15 and Audio R/L

Pinouts (DB15):

- Pin 1: Red
- Pin 2: Green
- Pin 3: Blue
- Pin 4: Unused
- Pin 5: Unused
- Pin 6: Red Ground
- Pin 7: Green Ground
- Pin 8: Blue Ground
- Pin 9: Unused
- Pin 10: Digital Ground
- Pin 11: Digital Ground
- Pin 12: Unused
- Pin 13: Horizontal Sync
- Pin 14: Vertical Sync
- Pin 15: Unused

## 1.50 1950 reference

### 1950 Reference

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Information needed! Connector pinouts, specifications?

The 1950 monitor was actually produced by a company called AOC. Parts may still be available direct (although there have been conflicting reports). The AOC model of the monitor was known as the AOC CM314.

AOC International  
311 Sinclair Frontage Road  
Milpitas CA 95035  
(408) 956-1070

A sync problem may be caused by the monitor detecting sync on the Green input and then disabling the horizontal and vertical sync inputs. Removing the 10K R854 resistor or the 10uf C812 capacitor on the small vertical board may fix this.

The analog/TTL switch appears to be prone to failure. However, if switching the switch brings back the picture, it may actually be that the 74LS123 (IC805) on the same board is failing. The suggested course of action is to first replace (or at least resolder) this chip first, since it's a commonly available part.

Another common problem is the failure of a multifunction sync chip. Replacements should be available from Sony.

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## 1.51 1960 reference

### 1960 Reference

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Information needed! Connector pinouts, specifications?

The 1960 may have been made by Daewoo (Korea) or a Taiwan company.

A common problem involves a component that is insulated with electrical tape (inadequately) from the factory, resulting in arcing. Replacing this insulation can cure the problem.

Typical failures also result from cold solder joints on the 1960 boards, which can be repaired by resoldering.

The screen size adjustment pots may be prone to failure, making adjustments difficult.

## 1.52 idek iiyama vision master 17 (mf-8617) reference

### Idek Iiyama Vision Master 17 (MF-8617) Reference

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This is a fairly popular monitor for use with the Amiga, since it is a high quality, relatively inexpensive 17-inch monitor that can sync down to about 23.5 kHz, and therefore works with most (all?) AGA "double" screenmodes. All presets and controls are digital, set through three front-panel buttons and an LCD display. The image can easily be expanded to fill the screen in all modes. (See Boards/A2320 'Amber' Reference for information on the A2320 'Amber' board that may be used with this monitor.)

Specifications:

Sync Frequency: 23.5 kHz to 86.0 kHz Horizontal  
50 Hz to 120 Hz Vertical

Resolution: Maximum 1280 x 1024 at 80 Hz

Input Connectors: Five BNC connectors and one DB15 (not high density)  
(A cable is included to connect a HDD15 VGA-type connector to the DB15 connector on the monitor.)

Pinouts:

DB15:

Pin 1: Red  
Pin 2: Red Ground  
Pin 3: Green  
Pin 4: Green Ground  
Pin 5: Blue

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Pin 6: Blue Ground  
Pin 7: Ground  
Pin 8: NC  
Pin 9: NC  
Pin 10: NC  
Pin 11: NC  
Pin 12: NC  
Pin 13: NC  
Pin 14: Horizontal or HV Sync  
Pin 15: Vertical Sync

## 1.53 mitsubishi diamondscan aum-1381a reference

### Mitsubishi DiamondScan AUM-1381A Reference

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The DiamondScan is one of the few VGA-type multisync monitors that has a composite video input, and that made it relatively common for use on the Amiga (although I believe that Mitsubishi no longer makes this model). The official scan rates cover the range from 15.6 kHz to 36 kHz, so the DiamondScan should work with all normal Amiga video modes. User controls are standard knobs and buttons, and there are no digital memory features, so using it with the Amiga means that you have to juggle the monitor's picture location settings along with the Amiga overscan and screen position settings. The DiamondScan works fine with the Amber board (see Boards/A2320 'Amber' Reference).

One feature of the DiamondScan is particularly applicable to the video production uses of the Amiga: the "Composite/RGB Select" (pin 22) on the DB25 input. Connect this pin through a switch to ground, and then a flip of the switch will select composite video or analog RGB display without reaching for the switches on the back of the monitor.

#### Specifications:

Sync Frequency: 15.6 kHz to 36 kHz Horizontal  
45 Hz to 90 Hz Vertical

Resolution: Maximum 800 x 560 (Rated...normally considered  
to be an 800x600 monitor.)

Input Connectors: BNC (Composite Video)  
DB9 (EGA/CGA/Mono TTL) (DB9-to-DB9 cable was included.)  
DB25 (Analog RGB)

#### Pinouts:

DB9: (For TTL 16-Color CGA)

Pin 1: Ground  
Pin 2: Unused  
Pin 3: Red Video  
Pin 4: Green Video

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Pin 5: Blue Video  
Pin 6: Intensity  
Pin 7: Unused  
Pin 8: Horizontal Sync  
Pin 9: Vertical Sync

DB9: (For TTL 64-Color EGA)

Pin 1: Ground  
Pin 2: Secondary Red Video  
Pin 3: Primary Red Video  
Pin 4: Primary Green Video  
Pin 5: Primary Blue Video  
Pin 6: Secondary Green Video/Intensity  
Pin 7: Secondary Blue Video  
Pin 8: Horizontal Sync  
Pin 9: Vertical Sync

DB9: (For TTL Mono)

Pin 1: Ground  
Pin 2: Unused  
Pin 3: Unused  
Pin 4: Unused  
Pin 5: Unused  
Pin 6: High Intensity  
Pin 7: Video  
Pin 8: Horizontal Sync  
Pin 9: Vertical Sync

DB25:

Pin 1: Sync Ground  
Pin 2: Red Video  
Pin 3: Red Video Ground  
Pin 4: Green Video  
Pin 5: Green Video Ground  
Pin 6: Superimpose Control (YS)  
Pin 7: Superimpose Ground  
Pin 8: Video Input Select (AV)  
Pin 9: Composite Video Input  
Pin 10: Composite Video Ground  
Pin 11: Composite Video Out  
Pin 12: Composite Video Ground  
Pin 13: PGA Mode Control  
Pin 14: Blue Video  
Pin 15: Blue Video Ground  
Pin 16: Horizontal/Composite Sync  
Pin 17: Vertical Sync  
Pin 18: Unused  
Pin 19: Unused  
Pin 20: Unused  
Pin 21: INT (+5V ???)  
Pin 22: Composite/RGB Select (TTL level: Low for RGB, high  
or open for composite.)  
Pin 23: Analog/TTL Select (TTL level: Low for TTL, high  
or open for analog.)

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Pin 24: Remote (TTL level: Low to disable Mode Switch.)  
Pin 25: Shield Ground

## 1.54 sources

### Sources For Components

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Opinions in this section are strictly those of the Editor.  
This list includes sources for suppliers of parts and accessories like cables and connectors. If you don't know where to start, I'd suggest that you contact the following:

- \* For general or custom cables and connectors: Dalco or Redmond Cable.
  - \* For general board-level parts (not custom Amiga): Digi-Key and JDR.
  - \* For custom Amiga parts: Unknown at this point. Suggestions welcome!
- 

Altex Electronics  
Dalco Electronics  
Digi-Key Corporation  
Hosfelt Electronics  
JameCo Electronic Components  
JDR Microdevices  
Marlin P. Jones & Associates  
MCM Electronics  
Memory World  
Parts Express  
Redmond Cable

## 1.55 altex electronics

Altex Electronics  
11342 N IH 35  
San Antonio TX 78233-9903  
(800) 531-5369  
(210) 637-3264 Fax

I've not had a lot of experience with Altex, although they seem okay, and have a pretty good selection of connectors and components at good prices.

## 1.56 dalco electronics

Dalco Electronics  
275 Pioneer Boulevard  
Springboro OH 45066  
(800) 445-5342  
(513) 743-9251 Fax

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Extremely large selection of connectors, cables (including the relatively rare SCSI-2 and 2.5-inch IDE hard disk varieties), and pretty much everything in the way of computer assemblies. Oriented towards computer end-users. They will custom-build cables. Service is good, prices are excellent, and their catalog is filled with basically neat stuff.

## 1.57 digi-key corporation

Digi-Key Corporation  
701 Brooks Ave. South  
P.O. Box 677  
Thief River Falls MN 56701-0677  
(800) 344-4539  
(218) 681-3380

Huge assortment of electronic components, including chips, heat sinks, cables, connectors, fans, and every other electronic part you can think of except DB23s. Prices tend to be a little higher, which is offset somewhat by the fact that they have such a large selection. Their catalog can be considered a reference work. Oriented towards electronics designers and experimenters.

## 1.58 hosfelt electronics

Hosfelt Electronics  
2700 Sunset Boulevard  
Steubenville OH 43952-1158  
(800) 524-6464  
(800) 524-5414 Fax

Source for Panasonic replacement fans and other parts. Very low prices. I've had no experience (yet) with this company.

## 1.59 jameco electronic components

JameCo Electronic Components  
1355 Shoreway Road  
Belmont CA 94002-4100  
(800) 831-4242  
(415) 592-2503 Fax

Large selection of chips, power supplies, and other electronic components, including some that can be extremely difficult to find elsewhere.

## 1.60 jdr microdevices

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JDR Microdevices  
1850 South 10th Street  
San Jose CA 95112-4108  
(800) 538-5000 Orders (24-Hour)  
(800) 538-5005 Fax  
(800) 538-5002 Tech Support  
(408) 494-1430 BBS

Chips, cables, hard drives, generic computer parts. Oriented towards the end-user, quick to deliver, inexpensive, and nice on the phone.

## 1.61 marlin p. jones & associates

Marlin P. Jones & Associates  
PO Box 12685  
Lake Park FL 33403-0685  
(407) 848-8236  
(407) 844-8764 Fax

Chips, connectors, electronics and computer parts, much of which is surplus. They sometimes have parts unavailable elsewhere, like blue LEDs. Oriented towards electronics experimenters and designers.

## 1.62 mcm electronics

MCM Electronics  
650 Congress Park Drive  
Centerville OH 45459-4072  
(800) 543-4330  
(513) 434-6959 Fax

Large assortment of parts. Oriented towards electronic repair shops.

## 1.63 memory world

Memory World  
3392 Progress Drive, Suite B  
Bensalem PA 19020-5899  
(215) 244-7930  
(215) 244-7932 Fax

Source for SIMMs, ZIPs, other memory, Motorola processors. And they even know what an Amiga is! Prices tend to be excellent.

## 1.64 parts express

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Parts Express  
340 E. First Street  
Dayton OH 45402-1257  
(800) 338-0531  
(513) 222-4644 Fax

Chips, cables, other parts. Oriented towards electronic repair shops.

## 1.65 redmond cable

Redmond Cable  
(206) 882-2009  
(206) 883-1430 Fax

Excellent source of very unusual cables and connectors. They will custom-build cables or just sell the parts. They had SCSI-2 panel mount female connectors, which I was unable to locate anywhere else.

## 1.66 editor

Editor And Compiler Of The A4000 Hardware Guide

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Warren Block  
602 St. James  
Rapid City SD 57701-3658  
(605) 342-1632 (voice)  
wblock@silver.sdsmt.edu

Music that may have contributed to the mood of this guide, and that has definitely influenced me:

Pink Floyd: Wish You Were Here, Meddle, The Division Bell  
Peter Gabriel: Us, Shaking The Tree

## 1.67 credits

Credits

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People who have contributed information to this document, either directly or by posting public Usenet or BBS messages that have revealed information that was incorporated into this document:

Chuck Baker	Dr. Peter Kittel
Volker Barthelmann	Paul Kolenbrander
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Finally, a special note of thanks to Urban Müller, the main administrator of Aminet, for the Aminet itself.

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