NetBSD/alpha: Multia Frequently Asked Questions

NetBSD/alpha Multia Frequently Asked Questions

Hardware problems

Other questions

Hardware problems

My Multia/UDB keeps freezing, and giving me machine checks during boot (top)

Multias have a well-deserved reputation as unreliable and failure-prone systems, however, the good news is: your faithful NetBSD developers know almost everything, even how to protect and fix your Multia hardware. It appears that almost all the failures are due to a single root cause that can be prevented or easily fixed.

- **Note:** This page, like all pages on the NetBSD WWW site, is copyrighted material. Although this is an open source project, the web site content is *not* redistributable. Please see the © copyright notice at the end of this page, and please don't make copies of this FAQ or Multia hardware section without first getting permission from the NetBSD project. Thanks!

Multia Heat Death

It certainly helps to keep the CPU from overheating, but the cause of the typical Multia Heat Death is usually a bipolar TTL IC soldered to surface lands on the bottom side of the Multia system board. This chip is an octal (eight identical function) part from the *74F* family with the generic part number: **74F623**. It runs rather hot, and should never have been put on the bottom of a card with limited airflow.

Preventing Multia Heat Death

Always run your Multia in the vertical orientation using its stand. There are two benefits here:

1. Convection will be able to remove hot air from the ambient environment of the IC. (Otherwise, since it's on the *bottom* of the system board, the card will form a roof over the IC that traps heat.)

2. The fan will be blowing hot air straight up, so it will be working with the natural convection flow to keep the system as a whole cooler.

You can heat sink the 74F chip by thermally coupling it to a heat sink or to the case. The usual heat sink material is aluminum, and a random piece of scrap Al will do. You must use thermally conductive tape or thermally conductive grease between the HS and the IC. Copper, BTW, is even better, and silver is better still. (Note: USA pennies are not copper.)

The Multia fan is a variable speed fan. Some Multia owners have cut the yellow thermistor wires; this causes the fan to run at full speed instead of at a variable and usually rather slow speed. See below for an owner who upgraded his fan entirely.

Robert Redelmeier reports that the 3/8 inch nuts on the CPU heatsink can work loose. Naturally, this would add lots of thermal resistance to the processor/heatsink interface and would have the very undesirable result of the processor getting hot while the heatsink stayed relatively cool. The aluminum nuts have a torque specification, so be careful if you feel you need to crank them. (Don't.)

Fixing a Failed Multia

Note: *be careful*, surface solder lands are fragile and you don't want to separate a land or trace from the board.

1. Obtain a replacement part. It's best *not* to use an identical replacement, as there are more modern logic families that use much less power, and hence run much cooler. A popular logic family with a 623 function is the multiply-sourced 74FCT series. The 74ABT series is another excellent choice. Compatible IC's include:

Mfr	Part Numbers
TI	SN74ABT623DW
Philips	74ABT623D
Pericom	PI74FCT623TS, PI74FCT623ATS, PI74FCT623CTS, PI74FCT623DTS
IDT	IDT74FCT623TSO, IDT74FCT623ATSO, IDT74FCT623CTSO

   The next step is to remove the old part. If you have access to real SMT rework equipment, you won't need these instructions, so from now on, we will orient the instructions for a low-tech lab.

2. Cut all the leads off with small diagonal pliers or small wire clippers. (Bill Dorsey suggests using a Dremel tool with a cutoff disk instead of diagonal pliers, to reduce the chance of lifting a pad or trace. If you do this, wear eye protection and keep the conductive chips out of your Multia.) Remove the body of the IC.

3. Unsolder and remove the leads one by one.

4. Clean off all the solder lands using solderwick and a soldering iron.

5. Solder on the replacement IC. Don't cook the IC or the lands, but use enough heat to completely wet the lead and the land with a *small* amount of solder. Ideally, you will have a neatly concave meniscus rising from the land to the lead. (Look at the parts on the top side for a good example of how it should look.) If you have replaced the chip with one of the 74FCT or 74ABT substitutes then it does not need the heatsink discussed in the previous section.

Why does my Multia/UDB find bogus PCI devices at boot time? (top)

Some Multia/UDB systems, when booted using a serial console, print boot messages like:

```
unknown vendor 0x200d product 0x00c2 (class prehistoric, unknown subclass 0xc2,
revision 0x0d) at pci0 dev 0 function 0 not configured
unknown vendor 0x200d product 0x00c2 (class prehistoric, unknown subclass 0xc2,
revision 0x0d) at pci0 dev 1 function 0 not configured
unknown vendor 0x200d product 0x00c2 (class prehistoric, unknown subclass 0xc2,
revision 0x0d) at pci0 dev 2 function 0 not configured
unknown vendor 0x200d product 0x00c2 (class prehistoric, unknown subclass 0xc2,
revision 0x0d) at pci0 dev 3 function 0 not configured
unknown vendor 0x200d product 0x00c2 (class prehistoric, unknown subclass 0xc2,
revision 0x0d) at pci0 dev 4 function 0 not configured
unknown vendor 0x200d product 0x00c2 (class prehistoric, unknown subclass 0xc2,
revision 0x0d) at pci0 dev 5 function 0 not configured
```

and incorrectly recognize the TGA frame buffer as a PCI VGA frame buffer. This is a firmware bug, but unfortunately no official version of the Multia/UDB firmware released by DEC fixes it.

The clock battery is dead on my Multia, and now it won't boot! (top)

Ahh.. Yes, another part on the Multia that likes to die out on you. Luckily, your local Radio Shack sells an *exact* replacement for your Multia's battery. The stock number for the battery from Radio Shack is: CNB-840. It is a 4.5V/800mAh battery. Radio Shack can order these, and have them to you within 5 days, delivered to your door.

Reportedly, Radio Shack no longer carries the CNB-840 battery. However, Nesco Battery Systems sells a direct replacement for the Multia battery (part number AA102-4 - 4.5V/600mAh).

Also, as pointed out by Kevin George, "House of Batteries" sells the Rayovac 840, packaged as 'House of Batteries Computer Clock & Memory Backup' battery. Their model number is '840-1'. It is a 4.5v, 550mAh alkaline battery, and seems to be totally identical to the Rayovac 840 my 'new' multia came with when I bought it several years ago.

My Multia doubles as a space heater (top)

Tim Rightnour completely replaced his Multia fan...

I started noticing my Multia getting flaky again after running constantly for about 8 months. So I turned it off, to avoid any damage to it. Not too long ago.. I decided I would throw fans at the machine, until I could get it to cool off, assuming that the problem is the airflow.

Looking at the Multia, you can see that there is a small fan, near the CPU, right next to the power supply. Disconnect the mainboard, and put your hand in front of this fan. You can barely feel the air coming out of it! The fan is far too anemic for the high heat output of the Alpha CPU siting right in front of it.

So the right thing to do here, is replace it. This is about a 5 minute operation, with no complex tools necessary. Remove the mainboard, and then undo the two screws in the back, to lift the top of the case off. There are two screws on the side of the power supply, that can be undone, to free the power supply. Now carefully pull the powerswitch out the front, and disconnect the LED from it. You should now be able to wiggle the powersupply out the side. Be careful not to break the speaker wires, which are amazingly wired directly to the mainboard PS leads.

You can now flip the power supply over, and look inside to see where the fan wire connects to the inside of the power supply. **Be careful**, some of these components might retain a charge! The easiest thing to do, is to unscrew the fan from it's housing, and pull out the little grommet that keeps the fan wires from getting cut apart. Now you can gently pull the fan connector off the power supply breadboard, and out the hole.

Now you need to buy a new fan. The fan you want is a 2.36" square fan, with 1.97" mounting centers. The fan that comes with the Multia is a .75" deep fan, but I replaced mine with a 1" deep fan, and still have plenty of room left over. You can order a fan from McMaster Carr, or any other parts store. The McMaster Carr part numbers are:

Depth	CFM	Part Number	Cost
.59	12.4	1939K51	$23.52
.79	13.8	1939K53	$23.29
1	18	1939K31	$21.11

The 18CFM fan is about twice as loud as the original Multia fan, but pushes literally about 6-8 times the volume of air. I found that my Multia was cool to the touch, mounted either horizontally, or vertically, with the new fan, blowing over the CPU. In addition, I could actually feel air blowing out the other side!

I can't get sound working in my Multia (top)

Change the line in your kernel config that says:

```
wss*    at      isa? port 0x530 irq 9 drq 0    # Windows Sound System
```

To:

```
wss*    at      isa? port 0x530 irq 9 drq 3    # Windows Sound System
```

And recompile.. It should work fine after that!

Other questions

Why is my Multia so slow, it says *166 MHZ*? (top)

A Multia uses a 21066 (or 21066A, 21068) chip. This would be the PC equivalent of a 486 vs a Pentium. The 166MHZ alpha, while being a decent machine, is about equivalent to a P-100. It is however, a full alpha machine, and is functionally equivalent to any other big alpha, just a bit slower than the speed rating would suggest. Also note that while the integer performance is about equal to a P100, the floating point is much better. Before you consider overclocking, remember that vertically oriented the Multia CPU runs right about at the specified heat. Multia's are space heaters, and fragile at that.. don't make it worse, unless you are prepared to add a considerable amount of cooling to the machine.

Why doesn't my Multia netboot? (top)

Supposedly Firmware revision 3.8-2 is capable of netbooting. Unfortunately digital provides 3.8-3 on their website, and most Multia's come with that version as well. It appears there is a bug in this firmware version, which causes netboots to fail. Three alternatives:

- Make a custom floppy that can nfs mount root and usr, and boot off it.
- Get an external drive.

- R. C. Dowdeswell has a nice form that creates netboot executables with your hardware address hardcoded into the binary.

If you happen to find a copy of 3.8-2 somewhere, please let us know!

Where do I hook up an IDE drive? (top)

You may have noticed that your -current kernel now probes a wdc0 controller. If you pull out your mainboard, directly under the floppy, you will see space for a 2.5" laptop Drive. Directly underneath that, there is a 44 pin connector. This is the IDE connector for the drive. Any standard laptop drive will fit in here, and you can buy a 44 pin cable for about $10 from:

```
Hard Data Ltd.          Telephone: (780) 456-9771  Fax: (780) 456-9772
11060 - 166 Avenue      email:sales@harddata.com
Edmonton, AB, Canada  - T5X 1Y3
```

For those in the UK, they are also available from Eyetech.

Can I boot from my IDE drive? (top)

No, NetBSD needs the SRM console, and Multia SRM cannot boot from an IDE drive. You must boot off a floppy, a SCSI drive connected to the internal NCR controller, or the network. Once the kernel is loaded it can mount any filesystem (including the root) from an IDE device.

I want new firmware for my Multia! (top)

First off, I don't recommend updating your firmware unless you are positive you have a bug that couldn't possibly be anything else. It's a real pain, or nearly impossible to back it out and go downlevel, assuming you can even find a downlevel SRM anymore. If you think upgrading to the latest and greatest firmware will solve your netbooting problems, you are definitely wrong. The latest firmware on DEC's ftp site is known to have failures netbooting.

Having said that, new firmware can be had at http://ftp.digital.com/pub/DEC/Alpha/firmware/readmes/archive/multia/. There do exist firmware revisions that netboot perfectly, and don't display pages upon pages of PCI errors. DEC however refuses to release these. Very unfortunate.

How can I overclock my Multia? (top)

Do NOT do this. Multia's can barely survive on their own at 166Mhz. The last thing you want to do is make them run hotter. However, just in case you have completely lost your mind, or are replacing the CPU, the below chart shows the jumper settings for a VX41 or a VX42.

W9	W8	W7	speed (MHz)
1	1	1	66
0	1	1	100
1	0	1	133
0	0	1	166
1	1	0	200
0	1	0	233
1	0	0	266 (unsupported)
0	0	0	300 (unsupported)

What are the video modes on my Multia? (top)

It is important to remember that a Multia has a fixed frequency framebuffer, which is not software compatible with VGA. It uses fixed frequency video modes set by a jumper on the motherboard. You will often find that many monitors cannot handle some of these modes. If you have a modern enough high bandwidth monitor, there is a good chance at least one or more of these modes will work for you however.

W6	W5	W4	W3	Standard	Resolution	Vertical Refresh	Pixel Clock (MHz)
0	0	0	0	VGA	640x480	59.94	25.175
0	0	0	1	ERGO VGA	640x480	72.79	31.50
0	0	1	0	SVGA	800x600	60.32	40.00
0	0	1	1	ERGO SVGA	800x600	72.19	50
0	1	0	0	VESA	1024x768	70.07	75

W6	W5	W4	W3	Standard	Resolution	Vertical Refresh	Pixel Clock (MHz)
0	1	0	1	Digital 1024x768	1024x768	72.033	74,367
0	1	1	1	1280x1024 60Hz (S3 86C928)	1280x1024	60.10	110.15
1	0	0	0	1280x1024 66Hz	1280x1024	66.51	119.843
1	0	0	1	1280x1024 72Hz	1280x1024	72.556	130.808
1	0	1	0	1280x1024 72Hz (S3 86C928)	1280x1024	72.05	130.08
1	0	1	1	1280x512 Stereo	1280x512	139.336	130.804

Please note, I have not tried most of these modes, and have no idea what some of them do, or might do to your monitor. Be careful, and use at your own risk.

What are the rest of these jumpers on my Multia? (top)

I have no idea what some of these things do, but here is a chart showing you all the various jumpers, and what functions they control:

VX40 (166 MHz)	VX41 (166MHz)	VX42 (233 MHz)	Descriptientry
W9	W12	W12	Mini console (auxiliary)
W8	W10	W10	Normal Powerup Sequence
W7	W11	W11	Causes system to attempt a floppy boot fail safe load
W2	W2	W2	When connected to a switch, causes a halt or reset (see J8)
J8	J8	J8	When set to (2,3) causes a reset, when set to (1,2) causes a halt request CPU interrupt

How do I hook up a second serial port? (top)

You may have noticed that your Multia has only one serial port connector, but the kernel probes two. Multias use the EIA-232E secondary channel pin assignments for the DB-25 connector to provide two com ports in one connector. The primary port is at the standard pin locations, but the secondary needs to be broken out. DEC sells a splitter cable for about 25-30 US dollars, or you can make your own:

Signal	COM1 pin	COM2 pin
TxD	2	14
RxD	3	16
RTS	4	19
CTS	5	13
DSR	6	23
Ground	7	7
DCD	8	12
DTR	20	11
RI	22	25

What are all these model numbers? (top)

- VX40L-F2/VX40B-F3 166Mhz Alpha w/ 256KB cache, 340MB SCSI Drive.
- VX42B-F2/VX42B/F3 233Mhz Alpha w/ 512KB cache, 528MB SCSI Drive.
- There are more, if you have information, please tell me.

Credit where credit is due (top)

The jumper charts on this page were taken with permission from Eric Smith's UDB Information Page. His page is an excellent source of information about the Multia and some of its lovely quirks. Other sources of information were Ross Harvey (the port-alpha co-portmaster), and various posts on the port-alpha mailing list. If anyone feels they were left out from the above list, or would like to add something to this FAQ, please send mail to: Tim Rightnour

Back to *NetBSD/alpha Port Page*