virtualweisslacker

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Reviving a dead M48T59Y-70PC1 NVRAM on a SUN Ultra 2 (Sun-4u)

After firing on my Ultra 2 after letting it gather dust for years (shame on me), I had to face the problem that the NVRAM battery on the ST Microelectronics M48T59Y died. The effect is well known: When you try to boot the machine, nothing will happen for a loong time - at least this was the behaviour of my Sun Ultra 2. After some time the machine starts up and in the OBP screen you'll get informed that you're in deep, deep trouble:
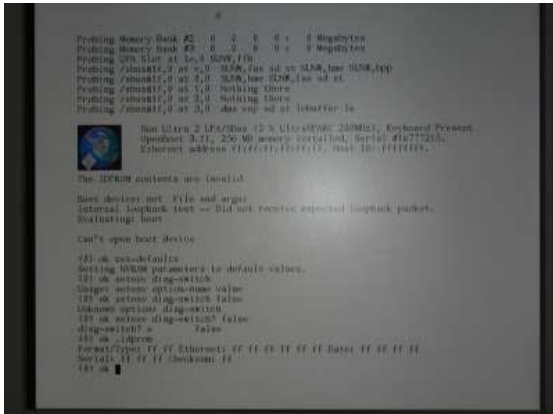
As you can see, the MAC address and the Host ID of the machine are all set to ff.

The NVRAM of a SUN workstation consists of a timer chip and a battery (yes, a battery, not a rechargeable battery) fitted together in one package. Depending on the system type, you'll find several types of NVRAMs (24pin, 28 pin, cap hat, diverse speeds etc. pp).
Ok, to be honest you're not as deep in trouble as I predicated above.

In many cases the machine will boot when you start the process manually.
But a wiped out NVRAM is ugly and setting the MAC Address manually or via script is at least dowdy.

So, what to do with a defective NVRAM? GIYF!
What you most probably will find is a link to Mark Hendersons famous SUN NVRAM FAQ: http://www.squirrel.com/sun-nvram-hostid.faq.html. You will find all the information you'll need to reprogram or revive a dead Sun NVRAM here. As you'll see, the site is a bit outdated because all the machines he deals with are rather outdated, too ;-).

One of the suggestions given in the FAQ is to replace the NVRAM with a new one. Unfortunately it is very hard to find a replacement nowadays. If you manage to find one, maybe it's so expensive compared to the raw value of your Sun workstation that you won't consider buying one.

Alternatively you can try to find another Sun with a living NVRAM in it - but this can be a long shot and you'll never know if the re-used NVRAM will run as long as you expect it to run.

I decided to follow the tips in the "Odds and ends" section of the FAQ and replace the battery.

The FAQ deals with another type ov NVRAM chip, the M48T02. This and the problem that I never tried to fiddle around with NVRAM chips lead me to this fine site with some pictures showing how to pimp a M48T02 NVRAM chip: http://gigawa.lt/gigawa.lt/Sun_NVRAM.html.

Because the bright fellow over there does not show all the details and does use another type of NVRAM chip I decided to document my work in order to complement the nice work the others have done.

I first removed some add-on cards and then gently pulled out the NVRAM chip.
You can see the position of the NVRAM chip in the next picture.
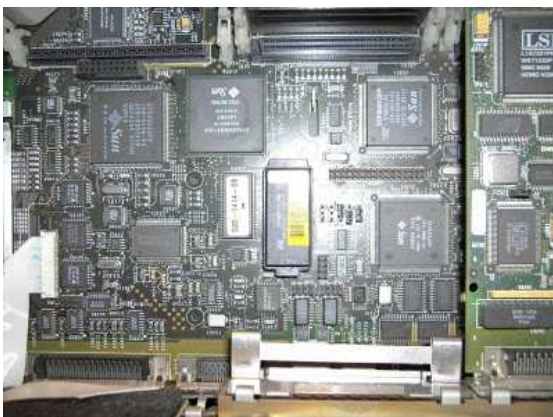
You can find infos about the correct location of the NVRAM chip in the NVRAM FAQ or in the Sun Ultra 2 Series Service Manual.
Please note that the NVRAM chip in my Ultra was placed in a plastic carrier which made it easier to remove the chip. Nonetheless, be careful when removing the chip, replacing broken pins is not everyone's cup of tea. Not to mention the warning about static electricity -but I'm sure if you're thinking about tinkering with a NVRAM chip you know what you're doing.
With the help of the pictures and some assumptions that the design concerning the battery/quartz package was not changed between M48T02 and M48T59Y-70PC1 I started the process:

With the chip lying in front of me I took down some notes because on the chip there often is a sticker with the last three bytes of the Host ID and therefore also the MAC address (although there is no mandatory cohesion between Host ID and MAC adress I think the default is as I described it).

The next step was to remove the plastic of the cap and the unterlying resin at the site opposite to the little dot inicating pin 1 of the chip. I used a mini drill for the first 2 millimeters and after that a sharp blade to remove the filling from two "wires" or solder bumps located in the lower half of the chip:
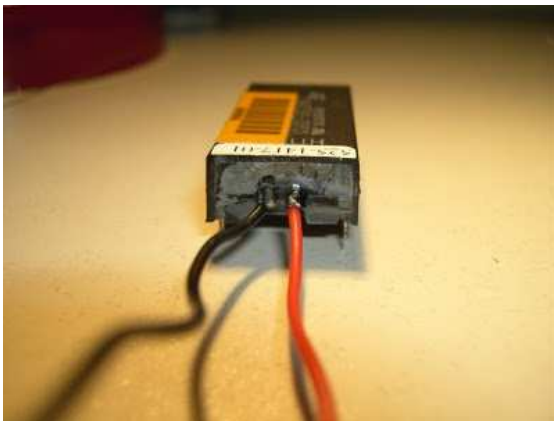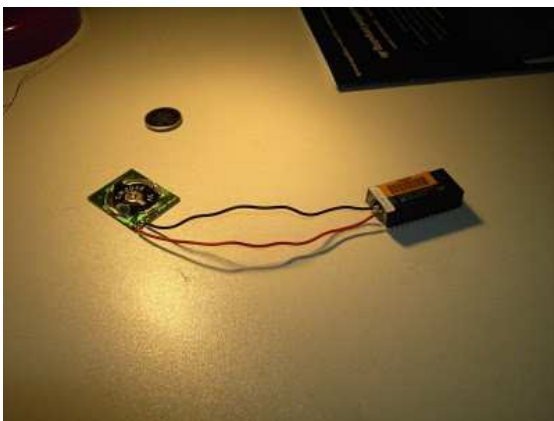
Phase 1:
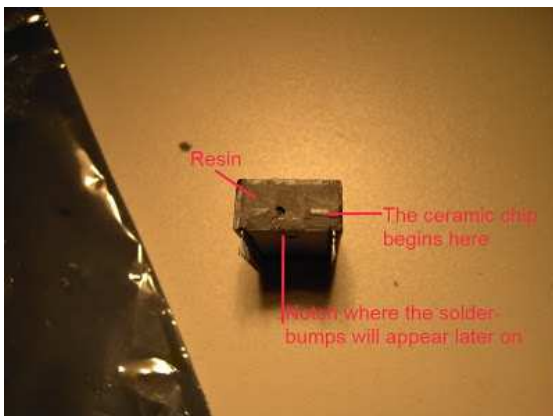
Phase 2:

Phase 2 cont.

Now you'll have to carefully solder two wires to the solder bumps. Please note the polarity of the bumps. If not sure use a multimeter on the bumps to assure that you don't mix them up. The connector closest to pin 14 is ground (black), the pin closest to pin 15 is +3V (red).

Then connect the wires to a battery pack equipped with a 3V-lithium cell:

Depending on your system, you can use shorter wires e.g. in order to place the battery on top of the chip.

Gently reseat the chip into the board, start the machine and start to reprogram the NVRAM. A very good how-to is given in the NRAM FAQ, I'll post the values I used to give one more example:

Remember the notes about the sticker on the chip, they say: 8A 09 04. These values will form the last three byte of the Host ID and the MAC address.

The machine type of am Ultra 2 is 80 so the sequence progammed in the OBP will be:

```
01 0 mkp
80 1 mkp
08 2 mkp
0  3 mkp
20 4 mkp
8a 5 mkp
09 6 mkp
04 7 mkp
0  8 mkp
0  9 mkp
```

```
0 a mkp
0 b mkp
8a c mkp
09 d mkp
04 e mkp

0 f 0 do i idprom@ xor loop f mkp
reset
```

And that's it!

Eingestellt von ohe um 12:44

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