

# PMAX Boot information

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When configured properly, the NVRAM will instruct the firmware to automatically boot the OS, and the user never sees the boot prompt. In this case, if you want to get to the boot prompt, upon powerup wait until it starts to load the OS image. Then press Control-C once. The machine should now drop to the boot prompt. Shutting down most operating systems to "halt" mode will also get you to the boot prompt.

## Boot ROM Excerpt

This is from my personal DECstation 3100.

7..6..5..4..3..2..1..0

24M.....0

```
KN01 V7.0
08-00-2b-XX-XX-XX
0x01800000
>> help
CMD:
```

```
auto
boot [-f FILE] [-n] [ARG...]
cat FILE...
ctrs
d [-(b|h|w)] ADDR VAL
disable DEV
dump [-(b|h|w)] [-(o|d|u|x|c|B)] RNG
e [-(b|h|w)] ADDR
enable DEV
fill [-(b|h|w)] [-v VAL] RNG
go [PC]
help [CMD]
? [CMD]
init
printenv [EVAR...]
setenv EVAR STR
test [ARG...]
unsetenv EVAR
warm

RNG:
ADDR=CNT
ADDR:ADDR
>>
```

## Boot ROM

Some somewhat useful commands.

<i>auto</i>	starts the automatic boot process(Multiuser)
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<code>test -c</code>	shows some important stats about your DECstation, such as connected SCSI devices. <a href="#">Keith Huff [kshuff@fast.net]</a> has provided some more (undocumented?) <a href="#">test commands</a> .
<code>setenv bootmode a</code>	sets your machine to autoboot on reset
<code>setenv bootdev rz(0,1,0)vmunix</code>	sets the default boot device to SCSI ID 1 and the kernel image to <i>vmunix</i>
<code>setenv bootdev rz(0,1,0)netbsd</code>	sets the default boot device to SCSI ID 1 and the kernel image to <i>netbsd</i>
<code>printenv</code>	shows your current NVRAM contents
<code>boot -f rz(0,1,0)vmunix single</code>	boots <i>vmunix</i> on SCSI disk ID 1, and starts single-user mode. Ultrix 4.4's single user mode gives you user access 'bin' and can only fsck and mount drives via suid root. Can't do much else...

This also works for CDROM drives too! For NetBSD, you can follow [these](#) instructions to generate a bootable CD. The most important thing is to use the `installboot(8)` command to modify the ISO image that the DECstation will boot properly.

I finally got to test the NetBSD 1.6.2 CDROM. It does not seem to boot the DECstation with my Yamaha CRW8424S, but works fine with my Pioneer DR-U24X. They were both jumpered to 512-byte sectors. Note neither drive will run at full speed, this computer is too slow to keep up with these "fast" CDROM drives. Use `boot -f rz(0,x,0)` (where *x* is the device number of your CDROM drive) to boot the NetBSD 1.6.2 CDROM. It should be pretty self explanatory from there.

The Yamaha CDRW failing boot sequence on NetBSD 1.6.2 looks like the following on my DECstation:

```
>> boot -f rz(0,2,0)

NetBSD/pmax 1.6.2 ISO 9660 Primary Bootstrap
Can't load 'rz(0,2,0)/boot.pmax'
7449 scsi stp
open failed
open rz(0,2,0)/boot: 6
Can't load 'rz(0,2,0)/boot'
7449 scsi stp
open failed
open rz(0,2,0)/boot.pma: 6
Can't load 'rz(0,2,0)/boot.pma'

Excptn:    <vtr=NRML>
Excptn pc: 0x80700070
Creg:      0x30000010<CE=3,EXC=RADE>
Sreg:      0x30000000<CU1,CU0,IPL=8>
Vaddr:     0x9d
Sp:        0x806fffe8
exit(-1)

KN01 v7.0
```

## Power On Self Test

The machine will print out numbers in sequence as it performs each test. If the machine prints out this number and either says FAILURE or ??, that means that particular subsystem failed or didn't respond.

For instance, this excerpt means you should check your SCSI chain or turn on all your SCSI devices:

7..6..5..4..3..2..1..  
??

The Rear LED POST code is the 8 LEDs on the back of the machine. You can monitor them while the machine is booting to get more information if the monitor failed.

Console Code	Rear LED POST Code (0=off, 1=on)	Meaning
7	-	Video SIMM. Reseat it and try again.
6	-	vdac and / or pcc (video digital analog converter? PCC programmable cursor chip?)
5	-	dz11 serial chip failure (used for kbd/mouse/modem/printer)
4	01111111 (7f)	system module (Check scsi subsystem too)
3	11011111 (df) 11110111 (f7)	keyboard, mouse respectively. Keyboard/Mouse installed or at least a <a href="#">'mouse terminator'</a> ?
2	-	AMD Local Area Network Controller for Ethernet (LANCE). Is the coaxial cable in good shape and properly terminated on both ends of the chain, or a transceiver installed plus connected properly into the destination network? A 10baseT transceiver not attached to the network will bring this error too. Also make sure the media selector pushbutton switch marked # is enabling to the correct connector. A LED is lit next to the connector that's enabled for communications. If running without a network, the easiest way is to select the internal transceiver and hook up a T with two terminators on it to the BNC connector. Otherwise, it will fail boot with this error code. You can try ^C'ing and see if it will continue (most firmware revisions won't, but won't hurt to try.) You should still try to "fix" it so it will autoboot.
1	10111111 (bf)	SCSI Disk Subsystem. Drives powered up? All terminators in place?
0	00000000 (00)	All tests done - no failures found, boot or memory test will commence shortly.
-	11101111 (ef)	Memory Failure. This does not have a video display shorthand code as it's done after the initial segment of the POST.
None	11111111 (ff)	No response, no CPU cycles are working (machine is dead)

If you get a 7, 6, 5, 4... or LEDs stay ON - sorry, I'm afraid your machine is pretty sick and could need some serious repairs :(

### Other Stuff

- There is NO firmware boot password. Thus, physical console security is very important. However, it seems that the 7.02 F/W support a password? I don't have a copy of the 7.02 F/W - I only have 7.0 - so I can't verify this.
- Ultrix 4.4 won't boot into single user mode as root, rather it's 'bin' with suid binaries so you can fsck, etc., without knowing the root password. You'll need the root password to do much else. Ultrix 4.2 does not have this feature.
- NetBSD 1.6.2 uses the firmware bootloader and thus has NO console security for pmax, similar to any other UNIX that you can force the init program. Combined with the lack of a firmware password, you can trivially get root access at the console.