announcing NeXTstation Turbo and NeXTcube Turbo
by Ken Jochims

The engineers at NeXT have once again raised the performance   standards of NeXT computers, this time with the new NeXTstation Turbo and NeXTcube Turbo. At the heart of these new computers is the 33 MHz Motorola 68040 processor. Turbo CPU units are based on both the NeXTstation and NeXTcube platform design. And the NeXTstation Turbos are available in either 2-bits-per-pixel gray-scale monochrome or 12-bits-per-pixel color.

the NeXTstation Turbo and NeXTstation Turbo Color
The 68040 is part of an improved system architecture featuring two new advanced NeXT-designed VLSI chips as well as Motorola's 56001 digital signal processor (DSP). These design changes have streamlined the NeXTstation Turbo's board layout, eliminating over 60 board-level components.

a look at   NeXT's new chips
The new TMC (turbo memory controller) and PC (peripheral controller) chips manage memory, display, and all I/O communications. The TMC handles all memory transactions, both DRAM and VRAM, as directed by the 68040. The TMC has improved all memory-related performance by incorporating the functionality of several interface and controller chips into one, running at 33 MHz, standardizing all computers on an interleaved memory architecture, and quadrupling   the current DRAM maximum to 128MB. (The 64MB and 128MB configurations require 16MB parts. Pricing and availability have not yet been established.)

The TMC also features asynchronous parity memory support, which makes it possible to run with parity memory installed with virtually no performance degradation. The single exception to this is a configuration in which a Turbo product

is fully loaded with four double-sided parity SIMMs. Systems with this configuration will experience approximately 8 percent performance degradation.   All other configurationsÐtwo double-sided SIMMS or any combination of single-sided SIMMsÐexperience no performance degradation whatsoever. The TMC checks for parity errors in parallel with memory being sent to the 68040 and alerts the 68040 when an error has occurred. This form of parity checking allows the processor to run at nearly full speed until an error is detected.

The PC chip handles all DMA operations to critical I/O devices: SCSI/floppy disk, laser printer, sound channels, DSP, and Ethernet. Running up to 33MHz, the PC chip provides a very fast data channel between low-speed I/O devices and main memory.

All these changes add up to a NeXTstation Turbo line that, using Release 3 compilers, runs up to 40 percent faster than an equivalent 25MHz NeXTstation. This means 33-MHz 68040 systems run at 25MIPs, 2.9 MFLOPs, and 16.3 SPEC marks.

random access memory
All Turbo systems and 25 MHz NeXTstation computers produced after January 1992 will be standardized on the 72-pin, 70-nanosecond (ns) RAM SIMM chip, which currently is used in NeXTstation Color systems. This chip supports the TMC's two-way interleaving capabilities.

An added advantage of this memory architecture change is that all NeXTstation computers can be upgraded in two-SIMM increments, and both the 8 MB and 16 MB versions ship with two open SIMM sockets for easy expansion.

configurations
To maintain the most affordable NeXTstation prices, NeXT is still offering two 25MHz

systems, one monochrome system and one color, as shown in table 1. All NeXTstation Turbo computers run at 33MHz.

table 1: pricing for NeXTstation and NeXTstation Turbo configurations

monochrome	8 MB	16 MB	32 MB
105 MB/25 MHz	$4,995	n/a	n/a
200 MB/33 MHz	$5,995	$6,995	$8,995
400 MB/33 MHz	n/a	$7,995	$9,995

color	12 MB	16 MB	32 MB
105 MB/25 MHz	n/a	$7,995	n/a
200 MB/33 MHz	n/a	$8,995	$10,995
400 MB/33 MHz	n/a	$9,995	$11,995

Note: NeXTstation Turbo systems are 33 MHz

user serviceability
Turbo system users   can now service some aspects of their own computers. The warranty is no longer voided if a user opens a NeXTstation Turbo or Turbo Color system and adds or replaces SIMM modules, replaces a battery, or replaces the digital signal processor memory. The Turbo system will be shipped with a service guide that documents safety precautions and instructions for completing these three specific functions.

All other repairsÐa failed CPU board, monitor, or hard drive, for exampleÐmust be performed by a NeXT Authorized Service Provider.

upgrades
Both NeXTstation Turbo and NeXTstation Turbo Color upgrade boards will be available to customers who wish to upgrade their current systems with the Turbo board. Availability is scheduled for early in the second quarter. Pricing is still to be determined. All upgraded systems must run Release 2.2 or greater in order for the system to function properly.

Customers upgrading from NeXTstation Color systems will be able to move their RAM over from existing boards. Those who have monochrome systems must upgrade all their RAM to the newer 72-pin, 70ns RAM SIMM module since the old 30-pin memory module won't work in a Turbo board.

NeXTcube Turbo
NeXT plans for the 33MHz 68040 NeXTcube Turbo to be available early in the second quarter. The 25MHz NeXTcube will continue to be available between announcement and availability of the NeXTcube Turbo.

configurations
The NeXTcube Turbo has three expansion slots and the capacity for up to 2.8gigabytes (GB) of internal hard disk storage space. One major change is that the NeXTcube Turbo will no longer support the 256MB Optical Disk Drive (which NeXT no longer produces). Until the NeXTcube Turbo ships, NeXT will continue to deliver 25 MHz NeXTcube systems. Table 2 shows pricing for the 25MHz NeXTcube configurations.

table 2: pricing for NeXTcube configurations

	16 MB	32 MB	64 MB
400 MB	$10,995	$12,995	n/a

| 1400 MB | $14,495 | $16,495 | $20,495 |
| 2800 MB | n/a | $22,295 | $26,295 |

Note: systems shown are all 25 MHz

upgrades
Upgrades will also be available for the installed base of NeXTcubes, although RAM must be upgraded to the newer 72-pin, 70-ns RAM SIMM modules. In addition, a NeXTcube Turbo board will not support the optical disk. Availability of upgrades is scheduled for the second quarter of this year.

SIMMs installed in NeXTstation and NeXTstation Turbo products

product number	configuration	SIMM type	interleave installed	quantity installed	open sockets
				memory	

NeXTstation (includes Software Release 2.2 and 2.88MB floppy disk drive)

product number	configuration	SIMM type	interleave installed	memory	quantity installed	open sockets
N1100-1768	NS 8 MB DRAM/105 MB SCSI	1 MB	No	8	0	
N1100-4486	NST 8 MB DRAM/200 MB SCSI	4 MB	Yes	2	2	
N1100-4487	NST 16 MB DRAM/200 MB SCSI	8 MB	Yes	2	2	
N1100-4488	NST 32 MB DRAM/200MB SCSI	8 MB	Yes	4	0	
N1100-4490	NST 16 MB DRAM/400 MB SCSI	8 MB	Yes	2	2	
N1100-4491	NST 32 MB DRAM/400 MB SCSI	8 MB	Yes	4	0	

NeXTstation Color (includes Software Release 2.2 and 2.88 MB floppy disk drive)

product number	configuration	SIMM type	interleave installed	memory	quantity installed	open sockets
N1200-2322	NSC 16 MB DRAM/105MB SCSI	4 MB	Yes	4	4	
N1200-4492	NSTC 16 MB DRAM/200 MB SCSI	8 MB	Yes	2	2	
N1200-4493	NSTC 32 MB DRAM/400 MB SCSI	8 MB	Yes	4	0	
N1200-4494	NSTC 16 MB DRAM/200 MB SCSI	8 MB	Yes	2	2	
N1200-4495	NSTC 32 MB DRAM/400 MB SCSI	8 MB	Yes	4	0	

NS = NeXTstation
NST = NeXTstation Turbo
NSC = NeXTstation Color
NSTC = NeXTstation Turbo Color¬