

SONY[®]

SONY NETWORK STATION
NEWS



UC

Sony's Approach to Performance and Network Computing

The NEWS family of Sony workstations not only offers compact high performance but also leads the way in network computing. The Open Distributed Processing capability of these workstations helps build a heterogeneous, easily expandable network of shared resources. The featured dual-processor architecture demonstrates its power during I/O-intensive applications, delivering a constant CPU processing speed regardless of I/O loads and application programs. The NEWS family encompasses a wide range of products to meet the diversified needs of software engineers and technical professionals.

Open Distributed Processing

NEWS workstations provide communication across a heterogeneous network of machines from different manufacturers. Everything from personal computers to mainframes can be coherently integrated into the same network. Moreover, the network's resources are readily accessible to any user from any location on the network.

The key to this networking flexibility is the adoption of industry-standard hardware and software. All NEWS workstations use Sony's implementation of UNIX 4.3BSD, NFS and X Window System, combined with CGI graphics libraries and such languages as C, Fortran 77, Franz Lisp and Pascal. Network interfacing is based on the standard IEEE802.3 Ethernet and TCP/IP and XNS protocols.



Easy System Expandability

NEWS workstations are not only flexible in networking but also highly expandable in functions and system configurations. All models, with the exception of the diskless 700 Series, are equipped with three expansion slots. These slots allow users to customize their systems according to their needs with option board/peripheral combinations. These models also offer a VME expansion capability to assure accommodation of third-party VME boards. For further connectivity, SCSI, RS232C and Centronics parallel interfaces are standard.

Dual Processors

The NEWS 1850 and 1930 workstations feature Sony's unique dual-processor architecture. They use two MC68030's—one as the main processor, the other as a dedicated I/O processor. Equipped with a real-time multitask monitor, the I/O processor handles all I/O processing (except the VME bus) and direct memory access, thereby freeing the CPU to run applications. Consequently, the processing speed of the main processor can be maintained despite the increase in I/O loads caused by color graphics, network communications and disk access. The dual-processor NEWS can perform much faster in actual applications than single-processor workstations with the same MIPS value.

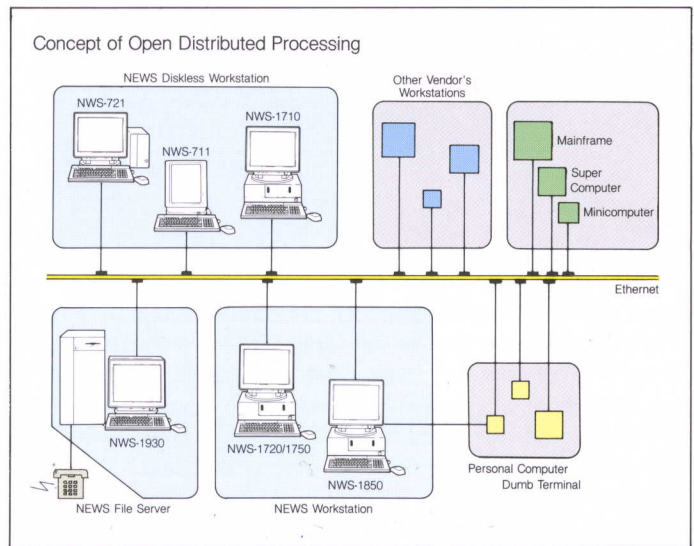
High-Speed X Window System

Established as the industry standard, the X Window System is one of the most important application software interfaces available for workstation users. Accordingly, Sony has placed a high priority on the implementation of the X Window software on NEWS workstations. In addition to the software, the X Window System used in NEWS workstations owes its speed to specifically designed display boards which make possible high-speed bitblt (bit boundary block transfer) and raster operations. Furthermore, a dedicated high-speed bus is employed between the CPU and the display board in order to

maintain the high performance of the CPU during window operations. This combination of software and hardware found in NEWS workstations has resulted in one of the fastest and most reliable X Window Systems in the industry.

Versatile Product Lines

NEWS workstations come in a variety of configurations: deskside file servers, desktop power machines, cost-effective disk-based workstations, and color/monochrome diskless nodes. The wide product line enables installation of the right machine for the right job, making it possible to achieve maximum efficiency at minimum network cost. Taking advantage of over 40 years of experience as a total electronics manufacturer, Sony also offers a wide selection of options, including high-resolution display monitors and ultra-capacity external storage devices.



Model	700 Series		1700 Series			NWS-1850	NWS-1930
	NWS-711	NWS-721	NWS-1710	NWS-1720	NWS-1750		
CPU	MC68020 (16.67MHz)	MC68020 (20MHz)			MC68030 (25MHz)		
I/O Processor			—			MC68030 (25MHz)	
Floating-Point Coprocessor	MC68881 (16.67MHz)	MC68881 (20MHz)			MC68882 (25MHz)		
Main Memory	4MB	4MB (expandable to 8MB)		4MB (expandable to 32MB)		16MB (expandable to 32MB)	
Cache Memory		—		16KB		64KB	
Streamer		—				125MB	
3.5" FDD (formatted)		—			1.44MB		
Hard Disk (formatted)		—		156MB	286MB		286MB × 1 (expandable to × 4)
Power Requirements	AC100—120V						AC120V
Standard Software	•Operating System: NEWS-OS (UNIX 4.3BSD + X Window System Ver. 11 + NFS Rel. 3.2) •Communications: TCP/IP, XNS •Languages: C, Fortran 77, Franz Lisp, Pascal •Graphics: CGI						

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NEWS 1930

Powerful Deskside Server for Integration Applications



In speed, capacity, function and cost, the NEWS 1930 is all you need in a compact, desktop server. Up to 32M bytes of high-speed main memory combine with large, easily expandable storage for effective file sharing with diskless machines on the network. Featuring five VME slots and one of the fastest X Window System servers in the industry, the NEWS 1930 is also ideal for VME and X Window server applications.

Large Storage Capacity

The NEWS 1930 offers a 286M byte hard disk, with room for three more internal disks. The storage capacity can further be expanded with the use of external storage devices daisy-chained on the SCSI bus. Sony's storage options range from expansion hard disk units to a 594M byte erasable optical disk drive unit and a 1.3G byte DAT data storage unit.

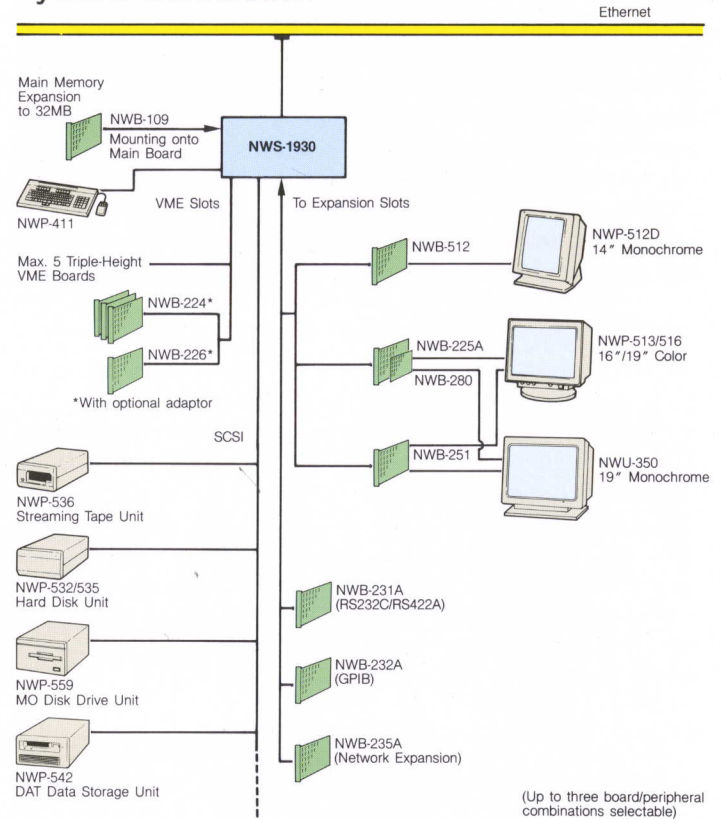
Dual Processor Architecture

The 5.3 MIPS performance of the NEWS 1930 is derived from the same advanced architecture used in the 1850. The 25MHz MC68030 dual processors are complemented by a 25MHz MC68882 floating-point coprocessor and a 64K byte cache memory. The 16M byte main memory is expandable to 32M bytes.

Versatile I/O Connectivity

In addition to three expansion slots and industry-standard interfaces, the NEWS 1930 has five VME slots for triple-height (9u) VME boards (or double-height boards with adaptors). The featured VME bus is the de facto standard for linking VME peripherals with a CPU.

System Connection



Specifications

Model	NWS-1930
CPU	MC68030 (25MHz)
I/O Processor	MC68030 (25MHz)
Floating-Point Coprocessor	MC68882 (25MHz)
MIPS	5.3
Main Memory	16MB (expandable to 32MB with NWB-109)
Cache Memory	64KB
Streamer	125MB
3.5" FDD	1.44MB (formatted)
Hard Disk	286MB x 1 (expandable to 286MB x 4)
Standard Interfaces	Ethernet, SCSI, RS232C (x 2) Centronics Parallel
Expansion Slots	3 (Sony Bus), 5 (VME Bus)
Power Requirements	AC120V
Power Consumption	1,200VA
Dimensions	300(W) x 770(D) x 600(H)mm (11 ⁷ / ₈ x 30 ³ / ₈ x 25 ⁵ / ₈ ")
Weight	47kg (103 lb 12 oz)
Operating System	NEWS-OS
Communications	TCP/IP, XNS
Languages	C, Fortran 77, Franz Lisp, Pascal
Graphics	CGI

NEWS 1850

Dual Processors in a Compact Desktop Machine



NWS-1850

The 5.3 MIPS performance and networking capability of the NEWS 1850 put the power of a super-minicomputer right on every user's desktop. With dual processors and Sony's implementation of the X Window System combined with a large-capacity main memory and 286M bytes of mass storage, this workstation can function in a variety of intricate and demanding applications including graphics processing.

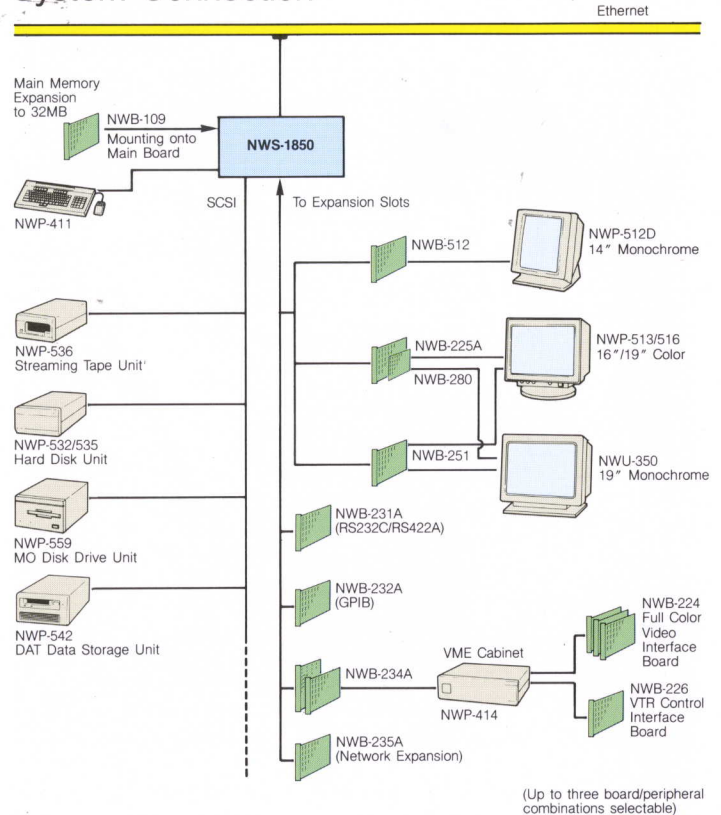
Consistent High Performance

Designed with two 25MHz MC68030 processors, the NEWS 1850 demonstrates its power in I/O-intensive applications. Because the I/O processor undertakes all I/O processing, operation of the main processor is impeded only during data transfer and communication between processors. In practice, therefore, the 1850 workstation provides a processing performance higher than what would be expected from the MIPS value.

Functional Versatility

The NEWS 1850 is complete with a 286M byte hard disk, a 1.44M byte 3.5" floppy disk drive and a 125M byte 1/4" streaming tape unit. The capacity of main memory is 16M byte and is expandable to 32M bytes. The rear panel offers SCSI, RS232C and Centronics parallel interfaces as well as three expansion slots, making it easy for each user to tailor the system to his or her particular needs.

System Connection



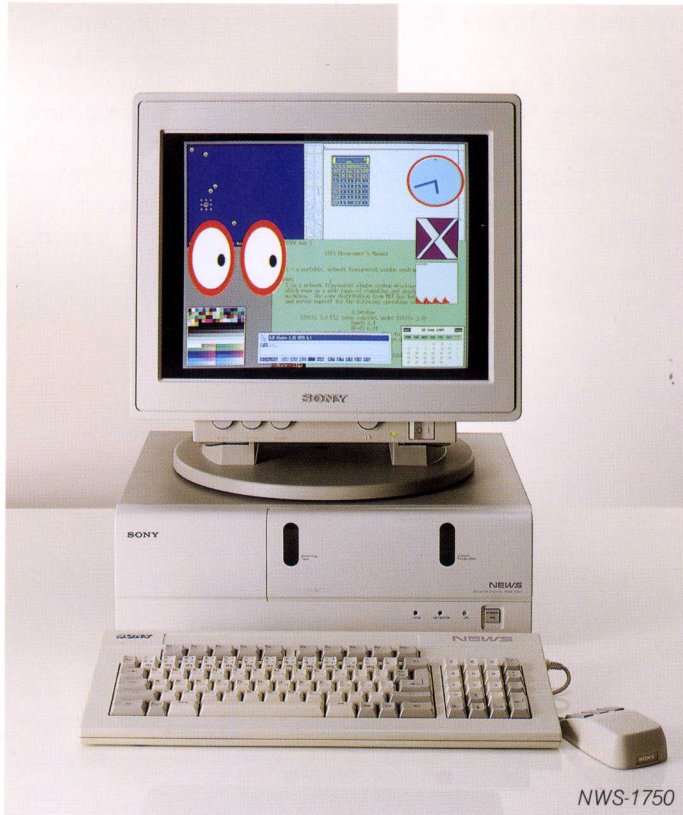
(Up to three board/peripheral combinations selectable)

Specifications

Model	NWS-1850
CPU	MC68030 (25MHz)
I/O Processor	MC68030 (25MHz)
Floating-Point Coprocessor	MC68882 (25MHz)
MIPS	5.3
Main Memory	16MB (expandable to 32MB with NWB-109)
Cache Memory	64KB
Streamer	125MB
3.5" FDD	1.44MB (formatted)
Hard Disk	286MB (formatted)
Standard Interfaces	Ethernet, SCSI, RS232C (x2), Centronics Parallel
Expansion Slots	3
Power Requirements	AC100—120V
Power Consumption	600VA
Dimensions	430(W) x 377(D) x 145(H)mm (17 x 14 ⁷ / ₈ x 5 ³ / ₄ ")
Weight	15kg (33 lb 2 oz)
Operating System	NEWS-OS
Communications	TCP/IP, XNS
Languages	C, Fortran 77, Franz Lisp, Pascal
Graphics	CGI

NEWS 1700 Series

Affordable, Flexible, High Performance



NWS-1750

With 4.3 MIPS of processing power combined with full UNIX BSD capabilities and high-speed X Window System, the NEWS 1700 Series outperforms other workstations in its price range. Thanks to the extensive use of Sony-designed LSIs, cost reduction has been achieved without sacrificing the functions essential to engineering workstations.

All models in the 1700 Series feature industry-standard interfaces as well as three expansion slots to allow flexible system configurations. With an appropriate interface board installed, the 1700 Series can be used with any of Sony's high-resolution color or monochrome displays.

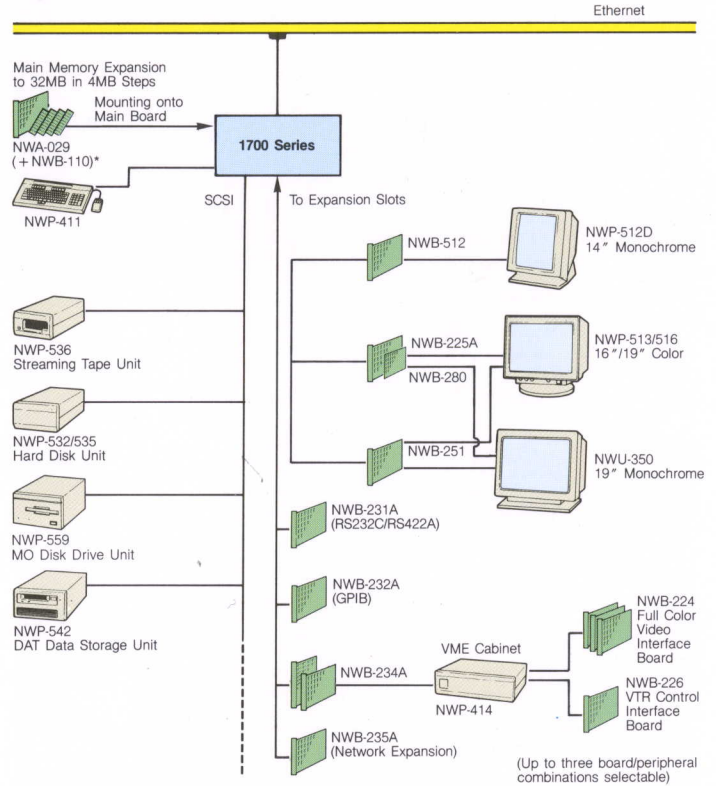
NEWS 1710: Diskless Workstation Configuration

Inside the NEWS 1710, the 25MHz MC68030 CPU operates with the 25MHz MC68882 floating-point coprocessor to deliver almost double the speed of our conventional diskless machines. The main memory is expandable to 32M bytes to minimize the memory-disk swapping via the network. Three expansion slots on the rear panel result in exceptional system integration flexibility.

NEWS 1720/1750: Unmatched in Cost Performance

The NEWS 1720 and 1750 are disk-based workstations with an exceptional price/performance ratio. Both models feature 25MHz MC68030 CPU, 25MHz MC68882 floating-point coprocessor, and 4M to 32M byte main memory. The capacity of the internal hard disk is 156M bytes for the NEWS 1720 and 286M bytes for the NEWS 1750. The NEWS 1750 includes a 125M byte steaming tape unit.

System Connection



Specifications

Model	NWS-1710	NWS-1720	NWS-1750
CPU		MC68030 (25MHz)	
Floating-Point Coprocessor		MC68882 (25MHz)	
MIPS		4.3	
Main Memory		4MB (expandable to 32MB in 4MB steps with NWA-029 & NWB-110)*	
Cache Memory		16KB	
Streamer			125MB
3.5" FDD		1.44MB (formatted)	
Hard Disk		156MB (formatted)	286MB (formatted)
Standard Interfaces		Ethernet, SCSI RS232C (x 2), Centronics Parallel	
Expansion Slot		3	
Power Requirements		AC100—120V	
Power Consumption		600VA (120V)	
Dimensions		430(W) x 377(D) x 145(H)mm (17 x 14 7/8 x 5 3/4")	
Weight	13.5kg (29 lb 2 oz)	14kg (30 lb 14 oz)	15kg (33 lb 2 oz)
Operating System		NEWS-OS	
Communications		TCP/IP, XNS	
Languages		C, Fortran 77, Franz Lisp, Pascal	
Graphics		CGI	

*An NWB-110 is necessary for a capacity above 16M bytes.

NEWS 700 Series

Compactly Designed Diskless Workstations



NWS-711



NWS-721

Combining a diskless design with a single processor architecture, the NEWS 700 Series can be used as inexpensive network nodes or X Window terminals. The introduction of diskless workstations helps build an efficient, easy-to-manage network by increasing the number of CPUs without increasing the number of storage devices. The NEWS 700 Series uses NFS and remote disk protocols to offer access to the server's disk. To speed up disk access via a network, it supports asynchronous transfer. Buffer caches operating on the LRU (Least Recently Used) algorithm are also designed into the remote disk I/O.

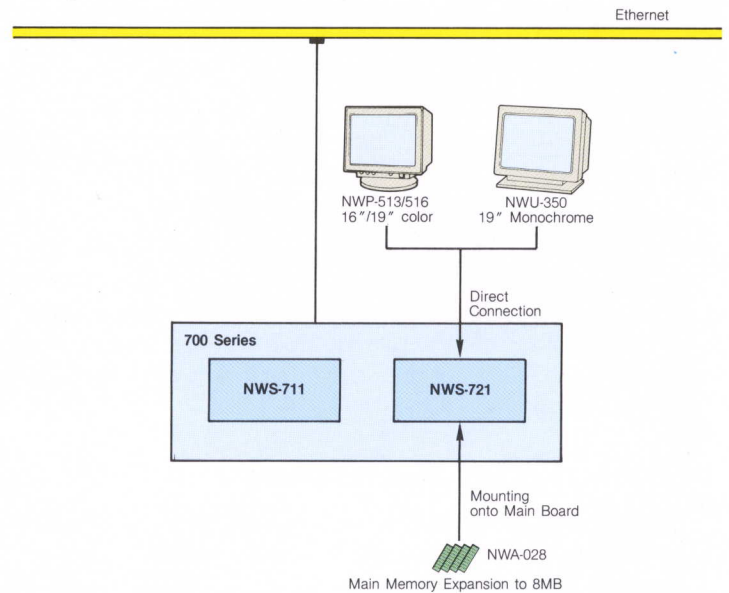
NEWS 711: Low-Cost Monochrome Workstation

The NEWS 711 is the most affordable workstation available from Sony. Approximately the same dimensions as a 14" portrait monochrome display, it is also the most compact workstation in the industry. All electronics, including the CPU board and bitmap controller with the bitblt (bit boundary block transfer) function, are contained compactly in the tilt base of the display.

NEWS 721: The Most Affordable Color Workstation

The NEWS 721 delivers 2.8 MIPS performance based on a 20MHz MC68020 CPU. The built-in bitmap controller utilizes an 8-plane frame buffer to provide a high-performance, economical color package. Up to 256 colors from a 16.7 million color palette can be displayed simultaneously on an NWP-513 16" or an NWP-516 19" high-resolution color display. In addition, the bitblt function is implemented in hardware for high-speed, versatile multi-window display.

System Connection



Specifications

Model	NWS-711	NWS-721
CPU	MC68020 (16.67MHz)	MC68020 (20MHz)
Floating-Point Coprocessor	MC68881 (16.67MHz)	MC68881 (20MHz)
MIPS	2.3	2.8
Main Memory	4MB	4MB (expandable to 8MB with NWA-028)
Standard Interfaces	Ethernet Monochrome Bitmap Display	Ethernet Color Bitmap Display
Power Requirements	AC100—120V	
Power Consumption	240VA	144VA (120V)
Dimensions	326(W) × 412(D) × 380(H)mm (12 ⁷ / ₈ × 16 ¹ / ₄ × 15")	139(W) × 332(D) × 250(H)mm (5 ¹ / ₂ × 13 ¹ / ₈ × 9 ⁷ / ₈ "
Weight	19kg (41 lb 15 oz)	5kg (11 lb 1 oz)
Remarks	Supplied with monochrome display (816 × 1024 dots), keyboard and mouse	Supplied with keyboard and mouse
Operating System	NEWS-OS	
Communications	TCP/IP, XNS	
Languages	C, Fortran 77, Franz Lisp, Pascal	
Graphics	CGI	

High-Resolution Displays with Improved Graphics Capabilities

Sony's display monitors not only offer exceptional resolution but also allow high-speed graphics operations. Designed with our expertise in Trinitron TV technology, they enhance the clarity of images and fonts. Minimizing glare, distortion and reflection, they also reduce eye strain for the benefit of engineers who spend all day in front of their computer screen. With the use of the NWB-251 color bitmap interface board, the speed of graphics operations on the 16" and 19" displays can be increased to 100,000 short vectors/sec.

NWP-513 16" Color Display

The NWP-513 displays clear, crisp images with 1.3M pixel resolution arranged in 1280 columns by 1024 rows. Two graphics display boards are offered for greater versatility. For high-speed graphics processing, the NWB-251 provides 100,000 short vectors/sec, in addition to simultaneous display of 256 colors from a palette of 16.7 million colors. The NWB-225A provides 4 planes for 16 colors from a palette of 16.7 million colors. With the optional NWB-280 4-plane color expansion board, 256 colors can be provided with the NWB-225A.

NWP-516 19" Color Display

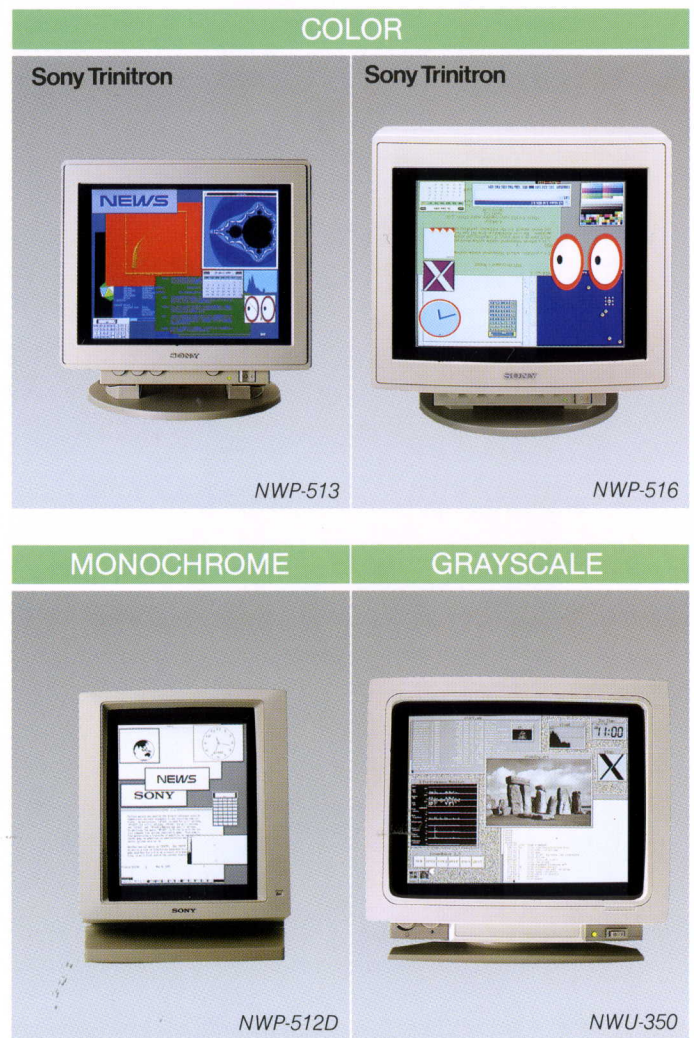
Featuring 1280x1024 pixel resolution and the largest screen size in Sony's display line-up, the NWP-516 is particularly well suited for CAD/CAM applications. Like the NWP-513, this display can be interfaced with NEWS workstations through the use of the NWB-225A (with or without NWB-280) or NWB-251.

NWP-512D 14" Monochrome Display

The NWP-512D is a compact, cost-effective monitor for electronic publishing and office automation. It provides 816x1024 pixel resolution. With the addition of the NWB-512 monochrome bitmap interface board, the NWP-512D can be interfaced with the NEWS 1850, 1930 and all models in the 1700 Series.

NWU-350 19" Grayscale Display

The NWU-350 is an economical 19" grayscale monitor featuring 1280x1024 pixel resolution. When combined with the NWB-225A, this monitor is capable of 4-bit 16-level grayscale. When used with the NWB-251 or the NWB-225A with the NWB-280, it provides true 8-bit 256-level grayscale.



Monitor	Resolution	Display Capability	Interface Board	Workstation
NWP-513/516	1280 x 1024 dots	256 out of 16.7 million colors 100,000 short vectors/sec	NWB-251	NWS-1850/1930 1700 Series
		16 out of 16.7 million colors	NWB-225A	
		256 out of 16.7 million colors	NWB-225A + NWB-280	NWS-721
NWP-512D	816 x 1024 dots	Monochrome	NWB-512	NWS-1850/1930, 1700 Series
NWU-350	1280 x 1024 dots	256 gradations of gray 100,000 short vectors/sec	NWB-251	NWS-1850/1930 1700 Series
		256 gradations of gray	NWB-225A + NWB-280	
		16 gradations of gray	NWB-225A	

Video/Computer Interface to Expand NEWS Applications

The Sony name is known and respected in the video industry. With its vast array of high-quality products, including a number of world firsts, Sony has always been at the forefront of video technology.

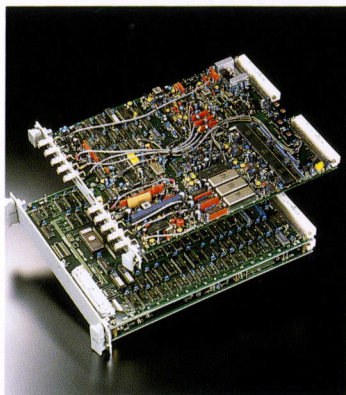
It's no wonder, therefore, that Sony has come up with video interface boards that make it possible to combine video images with computer-generated texts and graphics.



NWB-224 Full-Color Video Graphics Board

The NWB-224 is a frame memory board capable of freezing video images and then converting them into bit images for display on a computer screen. It accepts a wide variety of video signals from cameras, VTRs, monitors and projectors.

Using 8 bits each for red, green and blue, the NWB-224 features a video plane capable of displaying a total of 16.7 million colors simultaneously. It also has two character planes for superimposing titles and captions on the video image, as well as a cursor plane to display the cursor. The display area contains 768 x 480 pixels. The wide range of powerful image processing functions of this board includes the ability to selectively display each frame and to combine it with an external video signal.



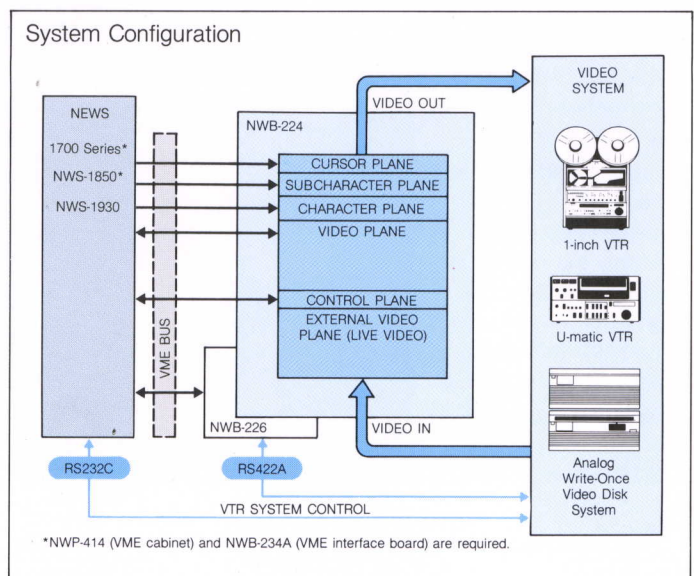
Note: The NWP-224 is unable to genlock to video signals containing considerable time base error.

NWB-226 VTR Control Interface Board

The NWB-226 allows real-time control of video tape recorder (VTR) functions from the NEWS workstation. It connects to any VTR via a standard RS422A 9-pin connector.

System Configuration

The NWB-224 and 226 can be interfaced with the NEWS 1850, 1930 and 1700 Series workstations through the VME bus. With the 1850 and 1700 Series, the use of the NWB-234A VME interface board and the NWP-414 VME box is required. The NWB-224 and 226 are installed in the VME box. With the 1930, these boards can be inserted into the VME slots in the rear panel by using optional adaptors.



Sony's Unique High-Capacity External Storage Options

Sony leads the way in introducing an erasable high-capacity optical disk system based on MO (Magneto Optical) technology. Equally as advanced is Sony's DAT (Digital Audio Tape) data storage unit which uses a compact cassette tape. Combining a new level of data reliability with the convenience of full rewritability, the MO disk drive unit points to the future in data storage. With the extraordinary storage capacity of 1.3G bytes, the DAT data storage unit suits a wide range of applications, from tape backup to data storage and distribution.

MO

NWP-559 MO Disk Drive Unit

- On a compact, double-sided 5.25" disk, Sony's MO disk can contain up to 594M bytes (297M bytes per side) of formatted data. Different from other optical media, the disk is fully rewritable. Just as important, the disk offers a projected archival life of 10 years.
- Capable of accessing 2M bytes of data in less than 22 msec, the MO disk drive unit is comparable in speed to many hard disk units. The sustained data transfer rate is 620K bytes/sec from the disk, while the average data transfer rate reaches up to 1200K bytes/sec. Provided with a SCSI interface, Sony's MO disk drive unit is easily installed with NEWS workstations.
- For applications ranging from large-scale database to CAD/CAM, imaging, electronic publishing and document storage, the superior capabilities of Sony's MO disk drive unit will not only make current applications more effective but also make new applications practical.



DAT

NWP-542 DAT Data Storage Unit

The NWP-542 is a compact, economical way of expanding storage capacity. On a DAT cassette measuring only 73 x 54 x 10.5mm ($2\frac{7}{8} \times 2\frac{1}{4} \times \frac{7}{16}$ "), up to 1.3G bytes of data can be stored at a remarkably improved bit error rate of 10^{-15} .

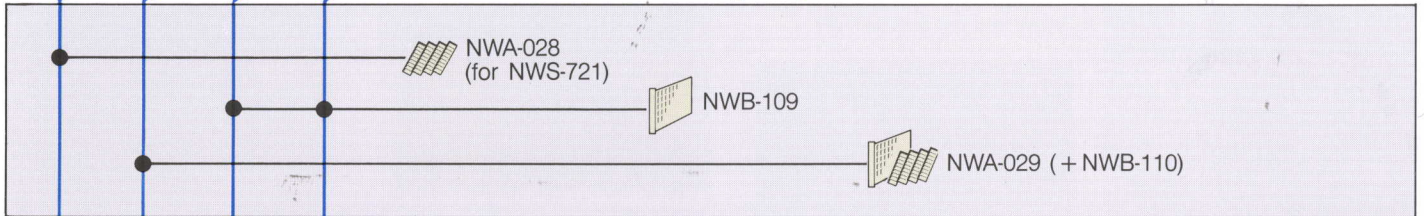
- Incorporating a 4-head system, the NWP-542 can read after write, providing the means to check if the data has been recorded correctly.
- The NWP-542 connects directly to the SCSI bus of NEWS workstations. The data transfer rate is 183K bytes/sec (max).



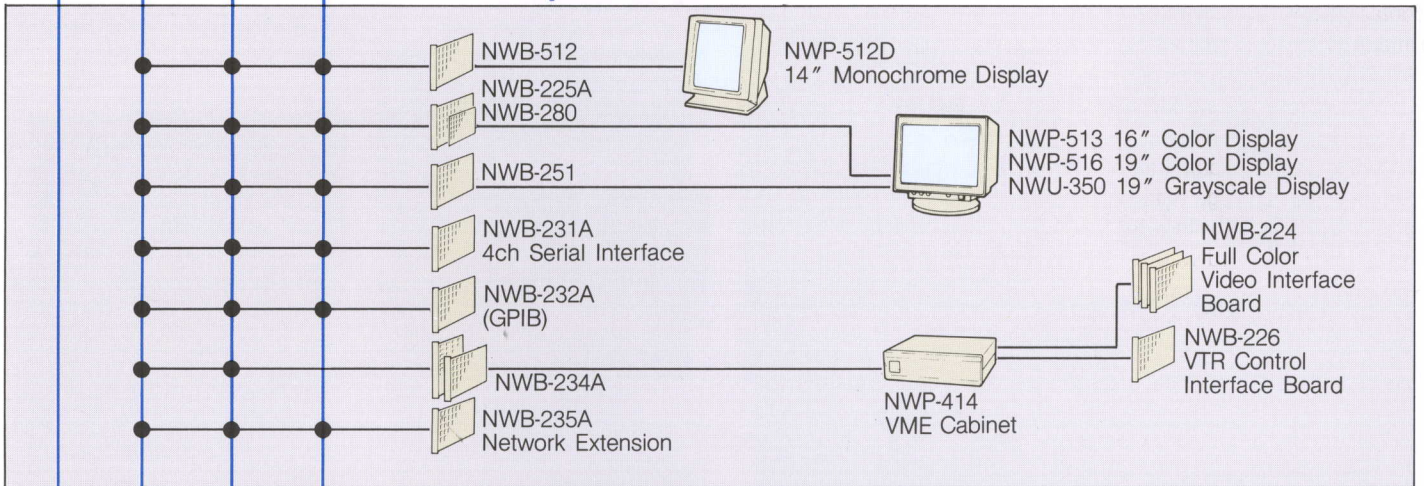
Board/Peripheral Connection

700 Series
1700 Series
NWS-1850
NWS-1930

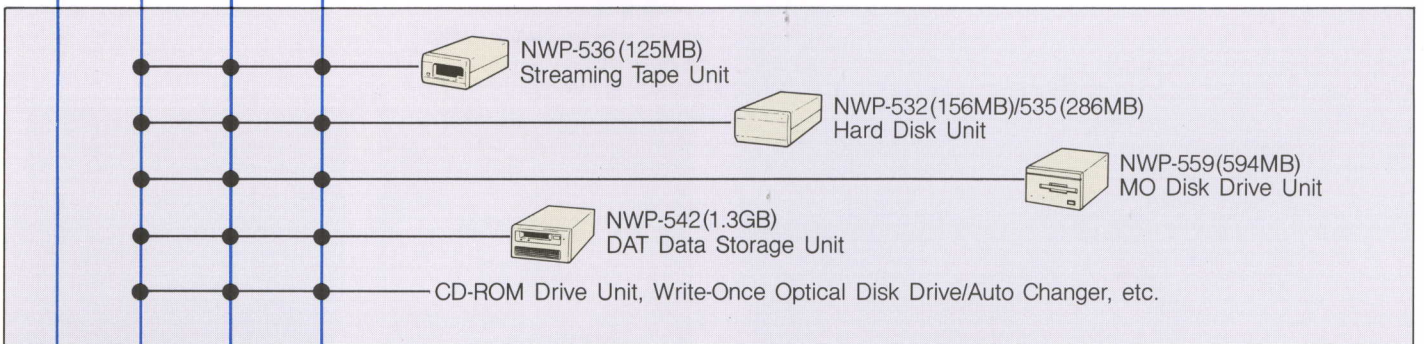
Internal Memory Expansion



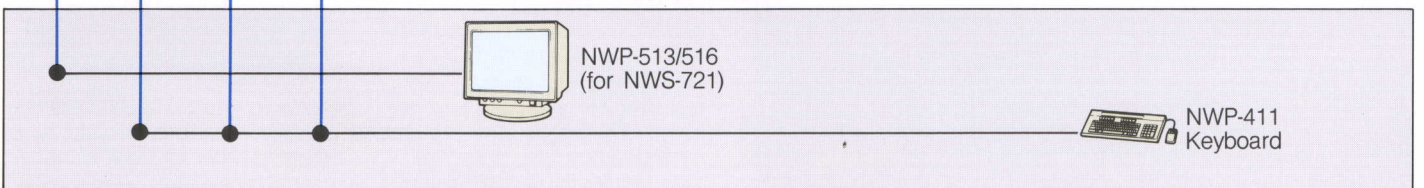
Expansion Slots



SCSI Bus



Direct Connection



Peripheral Units and Option Boards

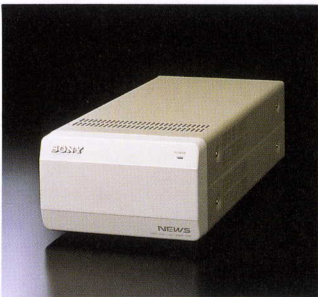
KEYBOARD



NWP-411

- Keyboard with 3-button mouse

EXTERNAL STORAGE DEVICES



NWP-532/535

- Expansion hard disk unit with 156MB (NWP-532) or 286MB (NWP-535) of formatted capacity



NWP-536

- Streaming tape unit with 125MB/ cartridge capacity ● Usable tape: 1/4" cartridge type (DC-600XTD or equivalent)



NWP-559

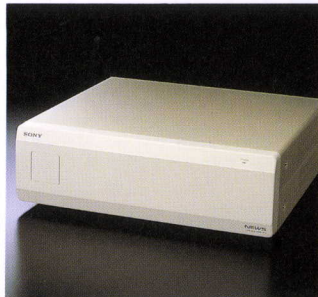
- MO disk drive units with 594MB/ disk capacity



NWP-542

- DAT data storage unit capable of recording up to 1.3GB of data on DAT cassette

VME INTERFACES



NWP-414

- Accommodates NWB-224/226 for connecting video systems to 1700 Series and NWS-1850

NWB-234A

- A pair of VME interface boards

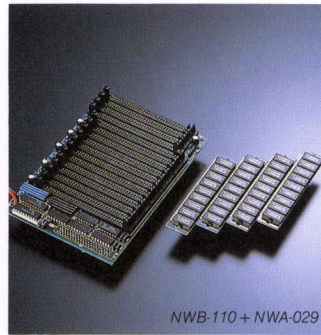
for connecting NWP-414 to expansion slots of 1700 Series and NWS-1850

(One of the boards is installed in the VME cabinet.)

EXPANSION RAM BOARDS

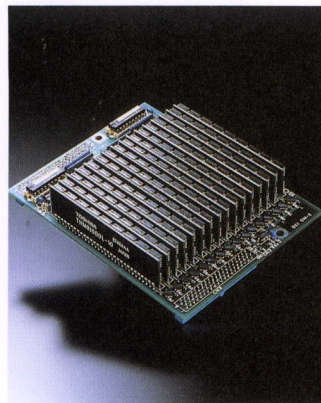
NWA-028

- 4MB expansion RAM kit for NWS-721



NWA-029

- 4MB expansion RAM kit for 1700 Series



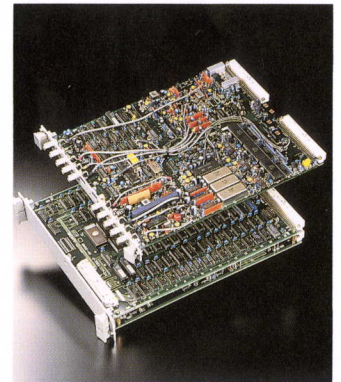
NWB-109

- 16MB expansion RAM board for NWS-1850/1930

NWB-110

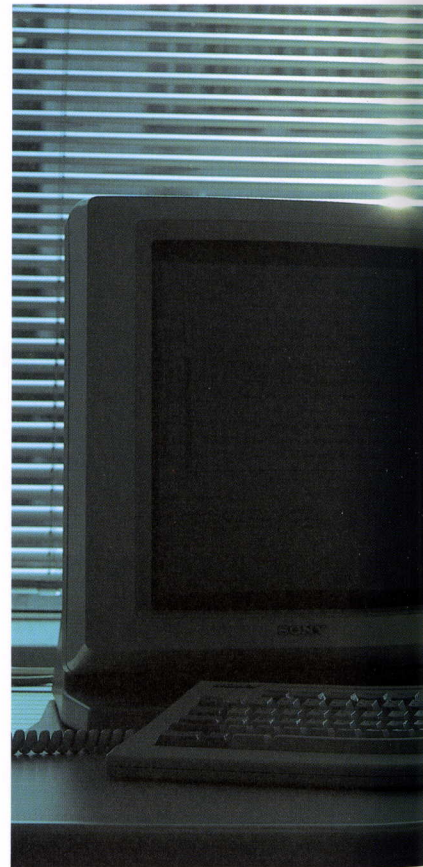
- Expansion RAM board on which NWA-029 units are mounted for a capacity above 16MB

VIDEO GRAPHICS I/O



NWB-224

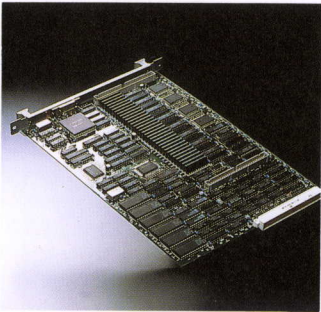
- Full-color video graphics interface boards for connecting video equipment to 1700 Series and NWS-1850 via NWB-234A VME interface board and NWP-414 VME cabinet



- 768 × 460 dots, 16.7 million colors
- NTSC/60Hz non-interlace selectable
- 3 boards/set

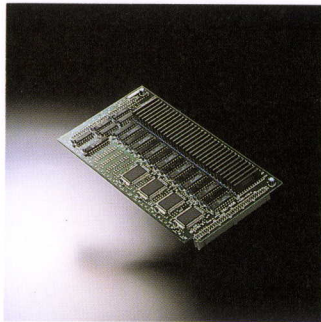
(With the use of optional adaptors, the NWB-224 can be inserted directly into the VME slots of NWS-1930.)

GRAPHICS BOARDS



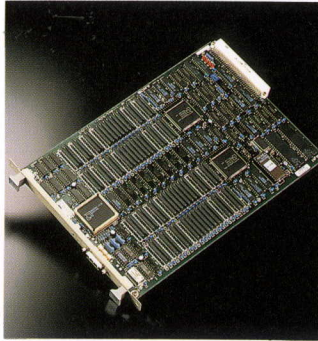
NWB-225A

- 1280 × 1024 dot color bitmap interface board
- Simultaneously displays 16 or 256 (with NWB-280) out of 16.7 million colors
- Connects NWP-513/516 to 1700 Series and NWS-1850/1930.



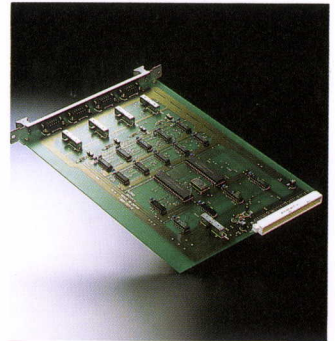
NWB-280

- 4-plane color expansion board to be mounted on NWB-225A, enabling the simultaneous display of 256 colors



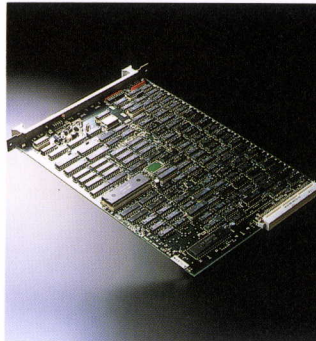
NWB-251

- 1280 × 1024 dot color bitmap interface board with 100,000 short vectors/sec high-speed graphic engine
- Simultaneously displays 256 out of 16.7 million colors
- Connects NWP-513/516 to 1700 Series and NWS-1850/1930



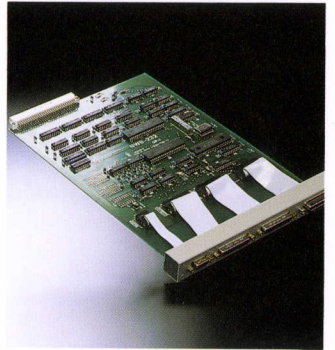
NWB-231A

- Serial interface board with 4 channels of switchable RS232C/RS422A interfaces
- For use with all models except 700 Series



NWB-512

- 816 × 1024 dot monochrome bitmap interface board for connecting NWP-512D to 1700 Series and NWS-1850/1930



NWB-232A

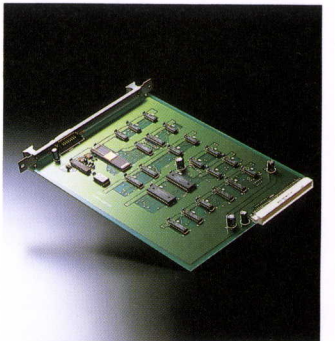
- GPIB interface board with two RS232C and one RS422A interface ports
- For use with 1700 Series and NWS-1850/1930



INTERFACE BOARDS

NWB-226

- Allows software control of VTR functions from 1700 Series and NWS-1850/1930
- (NWB-226 can be connected to 1700 Series and NWS-1850 via NWB-234A VME interface board and NWP-414 VME cabinet. In the case of NWS-1930, NWB-226 can be inserted into one of its VME slots with the addition of an optional adaptor.)



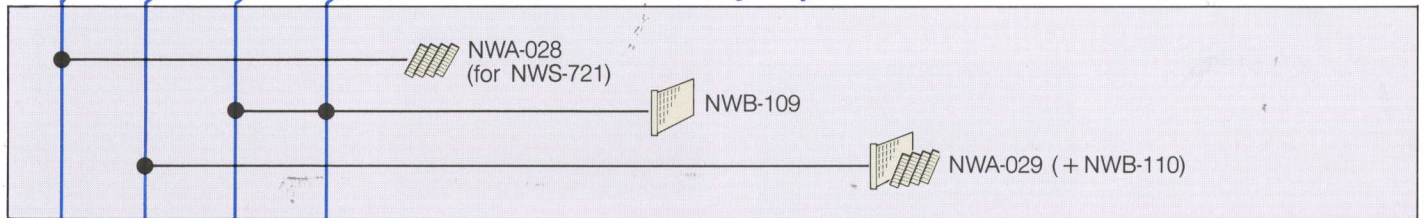
NWB-235A

- Network extension board with 10M bps, 16KB transmission/reception buffer for establishing Ethernet subnetwork
- For use with all models except 700 Series

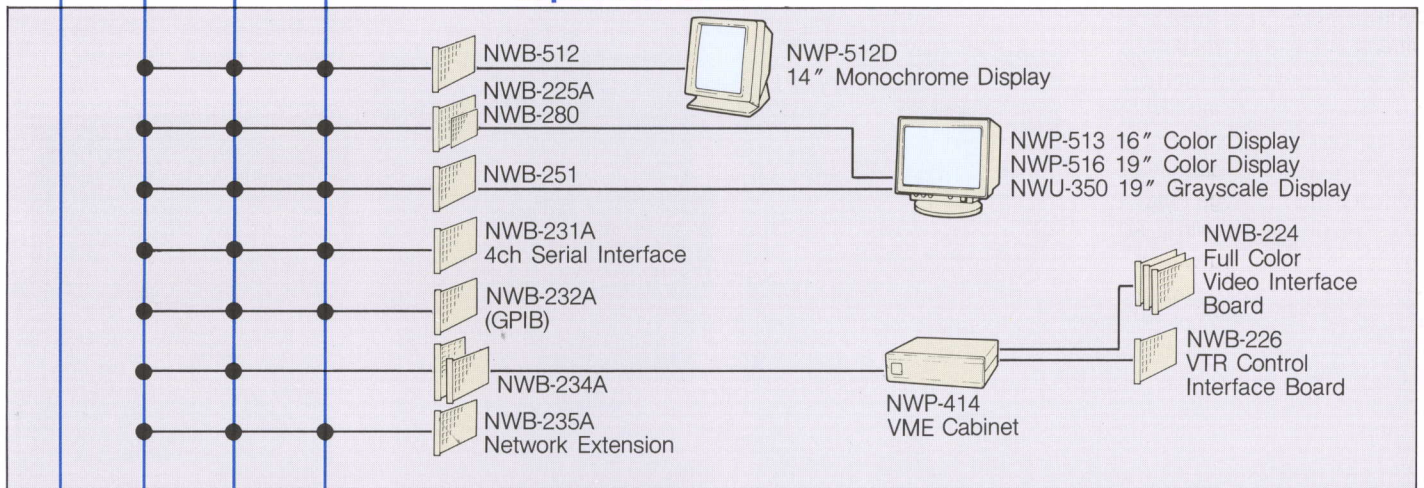
Board/Peripheral Connection

700 Series
1700 Series
NWS-1850
NWS-1930

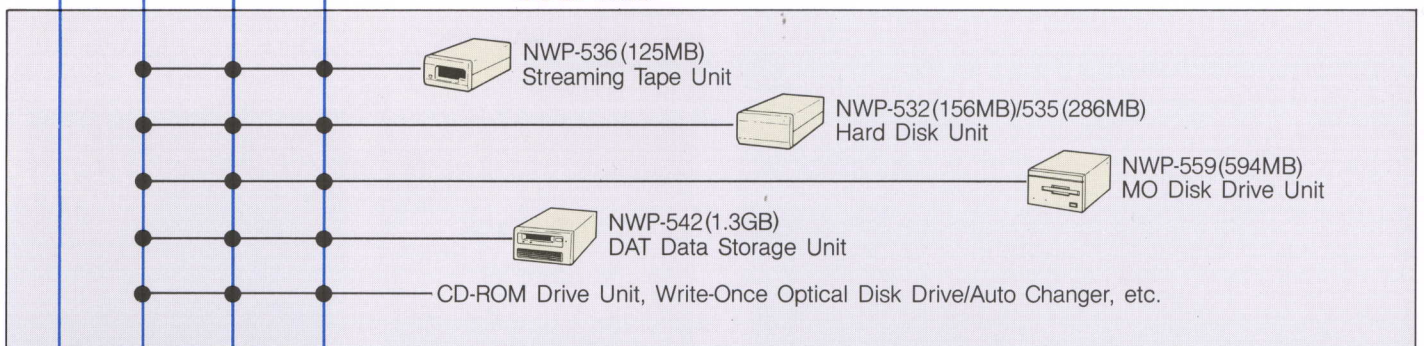
Internal Memory Expansion



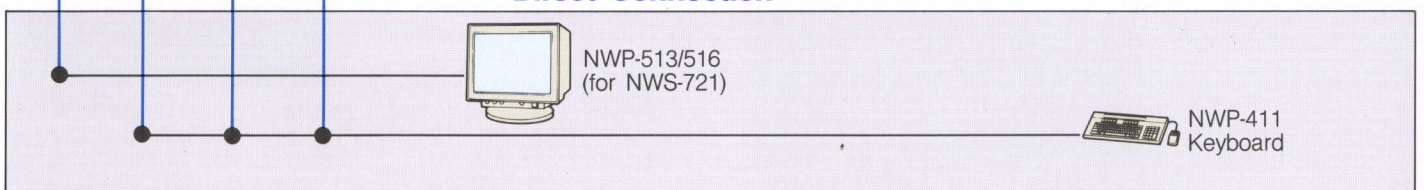
Expansion Slots



SCSI Bus



Direct Connection



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NEWS
NETWORK STATION

SONY® NWS-841 WORKSTATION

The Sony NWS-841 is a high performance member of the NEWS™ line of workstations, peripherals, option boards and software.

In creating the 841, Sony brings together a unique open architecture design with industry and de facto standards for UNIX® workstations (UNIX 4.2 BSD, X-Window System™, NFS™ and Ethernet™).

The result is a superbly designed workstation that delivers a true 2.3 MIPS of performance, and a multitasking system that easily outperforms competing workstations claiming a higher MIPS rate.

The NWS-841 features two MC68020 processors, one as a CPU, the other as an I/O processor (IOP). The IOP handles Ethernet networking, graphics and peripheral interfacing, freeing the CPU for applications processing. An on-board cache allows 0-wait operations of the MC68020.*

An MC68881 floating point co-processor also comes standard.*

The NWS-841, enhanced by Sony Trinitron™ technology, delivers unsurpassed color quality, while processing graphic applications at speeds that exceed competing workstations. Parallel bitblt transfers are performed at equal speeds in color and in black and white. A flat, non-glare screen significantly reduces eye strain.

Where desktop space is at a premium, Sony triumphs by offering the smallest footprint of any available workstation.

This combination of industry standard processors and system software with advanced Sony-designed ICs and our advanced design and manufacturing techniques, makes the 841 the unmatched price/performance leader.

DUAL PROCESSORS

With dual processors, the main MC68020 CPU is free to perform applications processing, while a second MC68020 processor is used for handling I/O processes and graphics. This design is especially useful in networks with heavy Ethernet traffic, applications with extensive graphics processing, intensive disk operations or systems supporting demanding I/O processing. •

The IOP features Direct Memory Access with dynamic bus-sizing capability from both 8-bit and 16-bit I/O devices. Main memory is shared by both processors. A segment of memory is partitioned for interprocessor communication.

I/O drivers can be implemented in a conventional manner while the dual processor nature is hidden from the software developer.

SCSI INTERFACE

The SCSI interface accommodates up to seven peripheral controllers. Since the SCSI protocol is not hardware-dependent, adding new interfaces is simple. Hard disks, magnetic tapes, optical disks and other SCSI peripherals can be easily connected.

HIGH PERFORMANCE HARD DISK

The 5¼" 286 MB hard disk is high performance at its finest, with an average access time of 16.4 ms. It supports up to 1.2 GB of on-line hard disk storage, a capacity increase of over 400%.

NFS FOR OPEN NETWORKING

Sony supports the Network File System (NFS) to provide transparent file-sharing access across a network of Sony workstations or a multivendor network. Via NFS, the NWS-841 can be a server for other workstations, including the economical NWS-711.

X-WINDOW USER INTERFACE

The X-Window System, developed by M.I.T., is quickly becoming an industry standard. Sony uses the X-Window System to allow a user to open any graphics window on any workstation within the network, even across different computer vendors. Processes can then be remotely initiated and the result passed between workstations.

ETHERNET IEEE 802.3

An Ethernet controller and serial interface adapter are built into the system board. Sony workstations directly connect to the Ethernet transceivers on a coaxial network cable.

MULTI-WINDOW DISPLAY

Both color and monochrome displays feature special hardware for high-speed bitblt transfer. The color display uses independent hardware for each color plane. Operated in parallel, multi-window processing is as fast in color as it is on the monochrome display.



EXCEPTIONALLY HIGH QUALITY

The 841 has proven itself to be the most reliable workstation in the industry. It also delivers the best resolution color graphics of any comparable workstation on the market.

With its modular design, virtually all repairs can be completed within minutes, thus minimizing downtime.

Its compact, ergonomic design fits in conveniently in any office or R&D environment.

SPECIFICATIONS

CPU

32-bit MC68020 (16.67 MHz)

I/O Processor

32-bit MC68020 (16.67 MHz)

Floating-Point Co-processor

MC68881 (16.67 MHz)

Memory Management Unit

4 KB page

Virtual Memory

2 GB/process

Main Memory

8 MB (expandable to 16 MB)

32-bit Data Bus

ECC Error Correction

Instruction Cache

8 KB with 35 ns RAM

Network Protocol

Ethernet-TCP/IP

10 Mbits/sec. Data Rate

Display Options

15" Monochrome

816 (w) x 1024 (h) Resolution

512 KB Frame Buffer

60 Hz non-interlaced Refresh Rate

Vector Draw Rate

Up to 15,000 vectors/sec.

Raster Ops

Up to 36 Mpixels/sec.

16" Color Landscape (Trinitron)

1280 (w) x 1024 (h) Resolution

60 Hz non-interlaced Refresh Rate

4-bit Plane Color Display

16 colors from palette of 16.7 million

8-bit Plane Color Display

256 colors from palette of 16.7 million

1 MB (4-bit), 2 MB (8-bit) Frame Buffer

Vector Draw Rate

Up to 15,000 vectors/sec.

Raster Ops

Up to 40 Mpixels/sec.

Keyboard and 3-button mouse

Interfaces

2 RS232C Serial Ports

1 Centronics Parallel Port

1 Ethernet Port

1 SCSI Port

VME (optional)

3.5" Flexible Disk Drive

1.44 MB (Formatted)

5¼" SCSI Hard Disk

286 MB (Formatted), Expandable to 1,200 MB

Average access time 16.4 ms

Operating System

NEWS-OS (UNIX 4.2 BSD)

Languages (included)

C, Fortran 77, Pascal

Networking

NFS

TCP/IP

Ethernet

Graphics

CGI

User Interface

X-Window System

Operating Temperature

10-35° C/50-95° F

Relative Humidity

8-80% non-condensing

Power

115 volts AC \pm 10%

50/60 Hz, max. 300 watts

Dimensions of system unit

5.5" (h) x 14.6" (d) x 16.9" (w)

14 cm (h) x 37 cm (d) x 43 cm (w)

Weight of system unit

37.5 lbs./82.5 kgs.

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SONY®

Standards for Open Systems

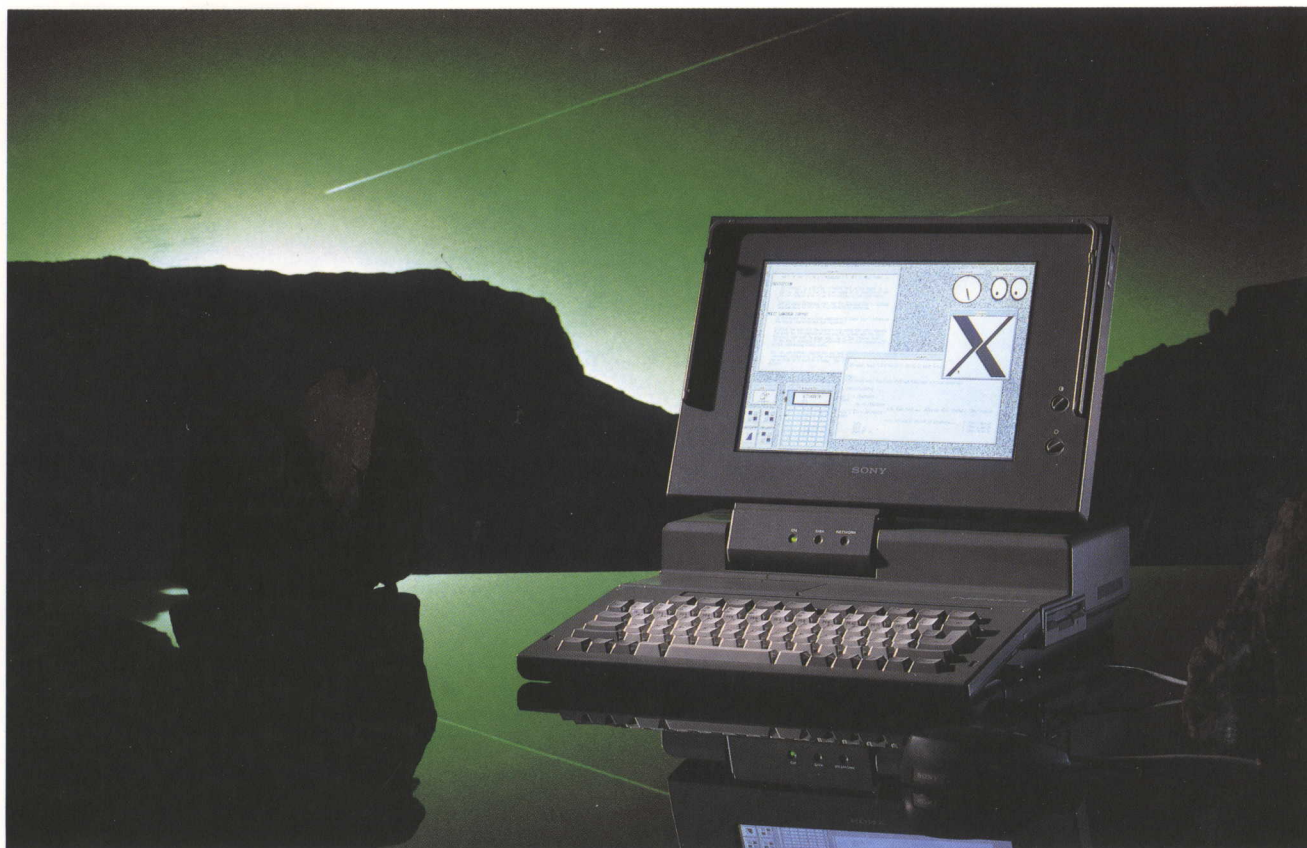
Sony Microsystems Company
1049 Elwell Court
Palo Alto, CA 94303
(415) 965-4492

SONY®

NWS-3250

Sony Makes the RISC Workstation Portable.

The Sony NEWS 3250 introduces a new dimension to the professional UNIX environment—a high-performance, full-functioned RISC laptop workstation that can be taken anywhere. The heart of this 17 lb miracle is a 20MHz R3000 processor, which together with an R3010 floating-point accelerator, delivers 17 MIPS and 1.8 MFLOPS. Equipped with up to 24MB of main memory, and a 240 or 406MB hard disk, the NEWS 3250 can handle any job expected of a desktop workstation. Never before has a workstation with a high-resolution screen been so compact and powerful.



NEWS
NETWORK STATION

UC

Power, Mobility and Flexibility—S

Compact Size

High powered processing is no longer limited to office-based networks. Sony makes the workstation portable. Measuring 348 × 415 × 96mm (13³/₄ × 16³/₈ × 3⁷/₈") and weighing only 8 kg (17 lb 11 oz), the laptop NEWS 3250 allows the user to take their entire UNIX and X Window System computing environment under their arm and be mobile.

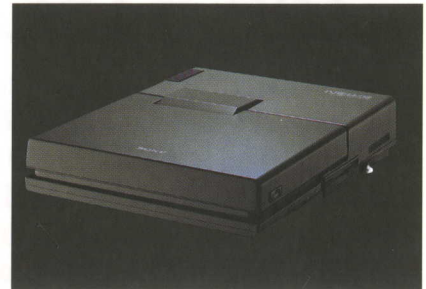
17 MIPS Processing Power

Taking advantage of Sony's advanced

high-density technology, the size reduction has been achieved without compromising performance. Delivering 17 MIPS of CPU processing power and 1.8 MFLOPS double-precision floating-point arithmetic computations, the NEWS 3250 not only offers a new level in laptop performance but also outperforms many desktop workstations.

The impressive performance of the NEWS 3250 is derived from a powerful RISC (Reduced Instruction Set Computer) architecture based

on a 20MHz R3000 CPU and a 20MHz R3010 floating-point accelerator. The R3000 CPU uses only 77 instructions and performs efficient 5-stage pipeline operations for single-cycle instruction execution. The



Sony's Laptop NEWS Has It All.

incorporation of a separate 32KB data and 32KB instruction cache minimizes the chances of a cache miss, making it possible to deliver one instruction to the processor for every CPU cycle. The R3010 floating-point accelerator executes instructions simultaneously with the CPU, eliminating mutual wait cycles.

Performance is further enhanced by the use of optimizing compilers. The optimizing C compiler and assembler are included as part of the system software. Fortran and Pascal compilers are optionally available.

Large Memory and Hard Disk

Despite its compact dimensions, the NEWS 3250 is available with a 406MB or 240MB internal hard disk, making it possible to install the entire NEWS operating system. A sufficient local user area and swapping area can also be secured for applications off the network. The main memory is 8MB and using optional expansion RAM kits, is expandable to 24MB.

High-Resolution Display

The NEWS 3250 features an integral 11" LCD monochrome display with 1120 x 780 pixel resolution. The screen is back-lit for easy viewing, with an adjustable viewing angle. A mouse is included for full easy usage of the X Window System and Motif graphics that may be displayed on the screen.

Other Standard Features

Each NEWS laptop workstation

includes a 3.5" floppy disk drive (1.44MB formatted), which can read and write MS-DOS or UNIX files. SCSI, serial and parallel ports are also standard.

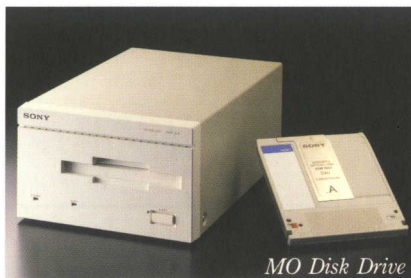
In a similar mode to the rest of the NEWS workstation line, a high-quality audio capability is included. 16-bit/8-bit stereo or mono, with sampling rates up to 37.8kHz, is supported via the built-in speaker and external input/output audio jacks.

Networking Capability

The laptop NEWS 3250 can also operate as a powerful multi-user node when used on a network. The built-in Ethernet interface combines with TCP/IP and XNS protocols to allow flexible networking, while NFS assures transparent file access across a heterogeneous network of personal computers, workstations, super minicomputers and mainframes.

Easy System Expansion

The SCSI bus enables the daisy chaining of any of the SCSI peripherals supported on the desktop NEWS workstations. This includes various storage devices like the Sony MO (Magneto Optical) re-writable optical disk drive and the 1.3GB DAT Data Storage Unit. Expansion hard disks, tapes, scanners, etc., are also supported.



MO Disk Drive



1.3GB DDS
Data Cartridge

Wide Applicability

Given its exceptional performance, high-resolution screen, and mobility, the NEWS 3250 is ideal for a variety of applications. It allows software engineers and salesmen to work not only in their offices, but also at home, on the road, and at customer sites. For shows and sales promotion activities, it makes an easy-to-carry, effective demonstration tool. For the design engineer or research scientist, it provides the power and graphics for them to pursue and enhance designs and studies, while in the field, either in a stand-alone mode or connected to their labs. Because of its networking capability and small size, it also provides a powerful solution for a temporary or crowded office environment. The NEWS 3250 is one workstation powerful enough to be used on the desk or on the road.

The NEWS Family

The NEWS 3250 is the laptop member of the NEWS (Network Engineering WorkStation) family of RISC workstations. It is fully compatible with the desktop line of NEWS 3710 affordable and powerful workstations, and the NEWS 3870 desktop server/high-performance graphics units.

Why R3000?

The key to the unparalleled performance of Sony's RISC workstations is the R3000 processor from MIPS Computer Systems, Inc. which operates faster than other RISC processors on the market when tested at similar clock frequencies. The R3000's high performance is illustrated in such basic specifications as cycles per instruction and instruction count per task. The processor uses only 77 instructions selected through all-out analysis and evaluation, and performs efficient 5-stage pipeline operations for single cycle execution of instructions. Designed with UNIX machines in mind, the architecture of this processor is particularly suited to our workstation, providing a superior balance between hardware and software.

Inside Sony's RISC workstations, the R3000 operates together with a highly efficient optimizing compiler and the high performance R3010 floating-point accelerator. The compiler is designed not only to maximize the performance of the R3000 but also to enable simultaneous execution of instructions by both processors.

Superior processors combine with equally superior software in Sony's RISC workstations to offer a new level in workstation high performance.

Specifications

Hardware

CPU:	R3000 (20MHz)
Floating-point accelerator:	R3010 (20MHz)
Speed:	17 MIPS, 1.8 MFLOPS (double precision)
Memory:	8MB, expandable to 24MB
Cache:	32KB data and 32KB instruction
Floppy:	3.5", 1.44MB (formatted)
Internal disk:	406MB or 240MB (formatted)
Display:	11" back-lit STN LCD
Keyboard/mouse:	Full size keys, with 3 button mouse
Standard interfaces:	SCSI (half pitch), Serial, Parallel, Ethernet, Mouse
Audio interface:	16-bit/8-bit A/D and D/A, stereo/mono
Power requirements:	1.0A, AC 120V
Dimensions:	348(W) × 415(D) × 96(H)mm (13 ³ / ₄ × 16 ³ / ₈ × 3 ⁷ / ₈ ")
Weight:	Approx. 8 kg (17 lb 11 oz)

Software

Standard system software:	NEWS-OS (UNIX System V.4, with TCP/IP, XNS, NFS and X Window System Ver.11, Rel.4) Sound library and editor Optimizing C compiler
Graphical user interface:	Motif
Optional software:	Fortran, Pascal
Accessories:	Carrying cases, cables, etc. (Please see the peripherals catalog.)

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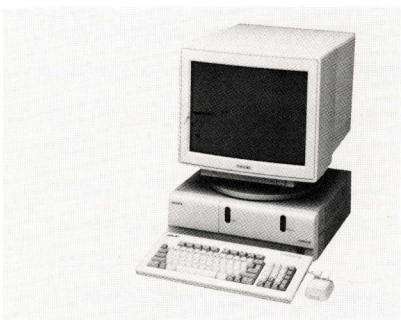
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Area Representative

NEWS UNIX Workstations to Incorporate Motorola 68030 Microprocessors



On June 1 Sony® Microsystems announced plans to incorporate dual Motorola 68030® microprocessors in high-end models of the NEWS™ UNIX® technical workstation family.

The NEWS 1800 Series, shown recently in Japan at the Tokyo Business Show, will be manufactured in the United States and available for shipment later this year. These workstations are among the first to support the new standard in workstation graphics windows—the X-11 Window System™ from MIT.

Expected to be priced between \$35,000 and \$45,000 per workstation, the NEWS 1800 Series provides users high performance graphics, software compatibility with existing UNIX applications,

and the performance of workstations that are more than twice as expensive.

“We are the first of the major workstation vendors to offer the ‘030’ chip in our product,” noted Masahiro Morimoto, Sony Microsystems president. “It is a natural addition to our NEWS family of workstations based on the 68020.”

The NEWS 1800 Series addresses electrical and mechanical design automation applications, particularly computer-assisted design, manufacturing and engineering-
(continued on page 5)

Artisan on Sony's NEWS Workstation

Announcing a cost effective, easy to use, high resolution paint and illustration package that runs on the Sony NEWS-OS UNIX 4.2 BSD Model 841 color workstation.

“After having the NEWS workstation for one day, we ported Artisan® literally over night,” said Hank Weghorst, Media Logic president. “We’ve

had problems porting our software on other companies’ workstations but the Sony NEWS workstation was a very clean port.”

Artisan provides 24 bit color performance and functionality on the NEWS 8 bit workstation color configuration without the need to add tablets, graphics cards or additional monitors.

Artisan manipulates images using a full spectrum of over 16.7 million colors. For display, on the NEWS 8 bit system, the images are dynamically reduced from 24 bits to 8 bits by a process called *dynamic dithering*. The process is unique in that the images are reduced as you paint and yet they are free of the color quan-
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How it controls your screen
- 5 3.5" Floppy as File System
Use your diskette as a hard disk

Sony Begins Synergy Program in U.S.

The Synergy program was a key element in making the Sony NEWS the number one selling workstation in Japan. It now will play the same role in the U.S.

The Synergy program is not just another catalog listing. It's the combination of commitments made by Sony and the Synergy member to create a total effect greater than the individual components.

"The combination of commitments made by Sony and the Synergy member create a total effect greater than the individual components."

Participants in the Synergy program will enjoy the following benefits:

Identify New Resellers

Because the Sony NEWS is sold only by VARs, Synergy members will find an immediate, high-quality market for their products. The Synergy program is designed to introduce member's company and products to these resellers.

Worldwide Market Penetration

In eighteen months, the Sony NEWS has become the most popular workstation in Japan. Sales and marketing offices have recently opened in the U.S. and Europe. Members of the Synergy program will be introduced to foreign distributors who can help develop these new markets.

Synergy Catalog Listing

Each Synergy member receives a listing in Sony's Synergy Catalog, a high-quality reference catalog given to every Sony NEWS VAR and End User.

Synergy Data Sheets

Catalog listings can also be reprinted as individual Synergy data sheets and made available for sales presentations when it is important to maintain a consistent format.

Equipment Discounts

Synergy members are allowed to purchase a limited number of Sony NEWS at a substantial discount. In addition to the attractive price, Synergy members can also take advantage of special leasing programs.

Direct Mail Services

Promotional literature supplied by Synergy members are included in Sony's special information packages mailed to VARs quarterly.

NEWSMAKER Newsletter

Synergy members are encouraged to publish articles in the NEWSMAKER. This newsletter is issued quarterly and distributed to VARs, end users, potential customers, at trade shows, and at press events.

To apply for the Synergy program or receive additional information, contact:

Sony Microsystems
Synergy Program
1003 Elwell Court
Palo Alto, CA 94303 ■

Printers, Parallel Ports and PostScript®

Sony expects that for many applications, the primary printer on a NEWS workstation will be the popular PostScript printers. While PostScript has become an industry standard, it does tend to be a long winded language. Users of these systems are familiar with 45 minute per page printing for scanned images. This is mainly a restriction of the serial link, and does not depend on the particular PostScript engine in the target printer, since even the older engines can process image data as quick as it is received over a serial line. Such a method of printing is available to all NEWS workstation users, via one of the standard serial ports. This process can be reduced by using

the serial line at 19.2k baud if your printer will allow this (e.g. TI OmniLasers®).

Parallel Ports Improve Printing Throughput

On the other hand, the NEWS workstations have a major advantage in that they also come equipped with a parallel port. Use of the printer in this port will improve the actual throughput of your printing as much as 10 times in the cases of printing images. All PostScript printers, except those supplied by Apple Computers Inc., now come with a parallel port as standard. Even when printing text only pages, this can result in a three-fold throughput improvement.

Since most of the pins in a parallel cable are not used, Sony

configuring the parallel port for a PostScript laser printer, refer to the "/etc/printcap" file entry table below, once the printer interface kit has been installed.

Filter Software Offers Control of Printed PostScript Files

In addition, the printer interface kit (Part Number NWU-670) includes a copy of the "devps" PostScript filter software from Pipeline Associates. This package provides the necessary filters for printing ditroff (the device independent version of troff and nroff) traditional UNIX files, as well as straight ASCII files and Encapsulated PostScript files. The "LW" module of the package becomes a PostScript printer manager once installed, so that one can control

the printer interface kit. Others are available from various font or printer vendors.

In total, the devps software package consists of a number of

"The Sony NEWS workstations provide an increasingly popular answer to the sluggish PostScript problem."

discrete functions, which can reduce the burden of application programs from doing all their own PostScript or printer control. These modules are:

DEVPS: a ditroff to PostScript filter

PRINTER: An ASCII file to PostScript filter

LW: A PostScript Printer Manager

LWPAGE: Page Selection Filter for PostScript Files

MKENV: PostScript Envelope/Label Generator

REVERSE: Page Reversal Filter

By combining a parallel port to a PostScript laser printer and the devps software package, the Sony NEWS workstations provide an increasingly popular

"/etc/printcap" PostScript File Entry

```
lp | PS | PostScript: \
:lp=/dev/PS:sd=/usr/spool/PS:lf=/usr/spool/PS/LOG: \
:mx#0:sf:sh: \
:nf=/usr/sony/lib/laser/ps.nf:tf=/usr/sony/lib/laser/ps.tf: }
:if=/usr/sony/lib/laser/ps.if:
```

has chosen to use a 14-pin Centronics-like interface connector on the rear panel. Sony is supplying a PostScript printer interface kit, which includes an appropriate cable, for connection to this port. One advantage is that the serial ports are still free for ASCII terminals which in turn can build ditroff files with any ASCII editor. To answer the many questions about

the printing of PostScript files whatever their source. This control includes printing sequence, orientation, selected pages, banners, etc.

The devps software generates efficient and compact PostScript, which further adds to the performance gains when printing, plus it includes font downloading capability. The first font that can be downloaded is the Hershey font included with

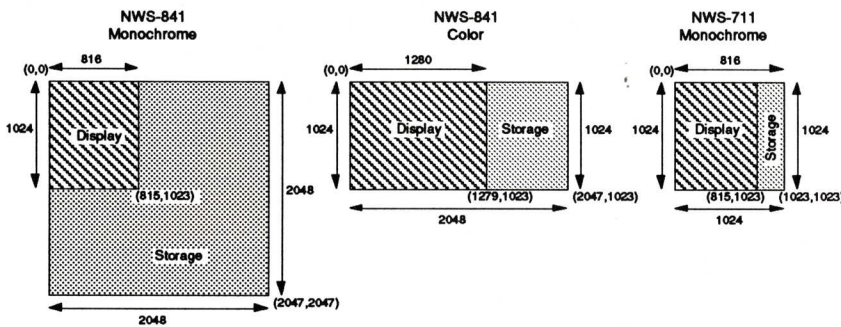
What is a Frame Buffer?

The Sony NEWS Frame Buffer controls everything seen on the screen. It is RAM memory which stores graphic data and a

The Raster Operation Controller is hardware with the primary function of transferring bitmap data between the Display and Storage sections of memory in the Frame Buffer. The ROP Controller can transfer bitmaps in different ways using many

making graphic display speed equal to the monochrome performance. However on the NEWS workstation these combined planes of information do not store the color values directly. These planes hold an address or color palette number to a Color Look Up Table (CLUT) where the actual color information is stored.

Display and Storage Memory Sizes



Raster Operation Controller (ROP) which transfers this graphic data back and forth in memory.

Memory dedicated to the Frame Buffer is located on the bitmap interface control board of the NWS-841 or on the main CPU board in the NWS-711. Depending on the NEWS workstations system configuration, the Frame Buffer memory size (or plane as it is often referred) is different. In all cases, this memory is divided into two sections: the Display memory which holds the information seen on the screen, and the Storage memory which is the holding area for bitmap graphics to be displayed on the screen. Refer to the figure provided for these dimensions.

commands available to the Frame Buffer. This is referred to as BITBLTs which is discussed later.

Color Bitmap Displays vs. Monochrome Bitmap Displays

For a monochrome monitor, only one bit of information is necessary for each pixel on the display, on/off or black/white. Therefore one plane is sufficient for the Frame Buffer.

Color displays need to retain more than one bit of information. For this reason, the NEWS workstation offers 4 or 8 planes as described above for storing the color information. Each plane comes with its own ROP controller which means that BITBLT color graphics commands are drawn in parallel

What is a Color Look Up Table (CLUT)?

The Color Look Up Table is where the actual color values for the Frame Buffer are stored. The table is made up of four fields: Red, Green, Blue, and Color Palette Number. On the Sony NEWS workstation, the CLUT is 8 bits deep for each of the primary colors (R G B). 8 bits per color equal 256 possible shades per primary color. The values range from 0 for no color through various shades of the color up to 255 for full color. By combining all the possible shades together of the primary colors, the total number of colors equals 16,777,216.

The Color Palette Number field depends on whether 4 or 8 matrix planes are used. If 4 planes are used, then the Color Palette Number maximum value is 16. This means that a palette of 16 colors out of approximately 16 million are available. If 8 planes are used, the maximum palette size is 256 addressable colors out of 16 million. However, full use of CLUT

(continued on page 7)

3.5" Floppy as File System

Diskettes can be used just like a hard disk drive on a NEWS workstation. You can create directories, copy files, and use regular UNIX commands for files created on diskettes. The following procedure describes the commands required to use a diskette as a hard disk.

Format the Diskette

Insert the diskette in the drive and use the correct commands that correspond to the diskette density (2DD or 2HD).

```
> /usr/sony/bin/format /dev/rfd0a  
(2DD)
```

```
> /usr/sony/bin/format /dev/rfh0a  
(2HD)
```

Create a File System on the Diskette

After creating a file system, the diskette is prepared to be treated like any other hard disk file system rather than as a mere storage media. The following commands create file systems for a 2DD and 2HD diskette. You must be logged in as *root* to create a file system on a disk or diskette.

```
root# newfs fd0a mfd2dd  
(2DD)
```

```
root# newfs fh0a mfd2hd  
(2HD)
```

Create a Directory Where Diskette File System Will be Mounted

As a suggestion, create two directories: one to use when the

diskette is a 2DD, and one to use when the diskette is a 2HD.

```
root# mkdir /fd (2DD)
```

```
root# mkdir /fh (2HD)
```

Mount the Diskette

Use the following command to mount a 2DD or 2HD diskette as a file system on the respective directories.

```
root# mountfd /fd (2DD)
```

```
root# mountfh /fh (2HD)
```

Unmount the Diskette

You must unmount the diskette before removing it from the drive. This step is extremely important and must always occur.

```
root# umountfd (2DD)
```

```
root# umountfh (2HD)
```

Now it is safe to open the diskette drive and remove the diskette. You can insert another diskette and follow the same steps to mount it in a suitable directory. ■

68030 Microprocessors

(continued from page 1)

ing (CAD/CAM/CAE), and computer-assisted software engineering (CASE).

Twice the Performance and Functionality of the 68020

The NEWS 1800 Series features a 68030 central processing unit (CPU), a second 68030 input-output (I/O) processor, and a 68882 floating-point

coprocessor, all running at 25MHz and providing 5.3 MIPS CPU performance (based on the Dhrystone benchmark normalized for a VAX 11/780 at 1 MIPS) for true multi-tasking capability. The dual processor architecture provides significantly higher performance than single processor systems in applications with extensive I/O and graphics or heavy network traffic. The 68030 provides twice the performance and functionality of the most powerful and widely used 32-bit chip, the 68020.

"The 68020 family will continue to drive the UNIX market," said Murray A. Goldman, senior vice president and general manager of Motorola's Microprocessor Product Group in Austin, Texas. "We feel that the combination of Sony's system expertise and Motorola's microprocessor creates a market leadership product."

The 68030 is a 32-bit microprocessor based on a 68020 core. It retains all essential features of the 68020, and includes a number of enhancements that increase the processor's "parallelism"—the number of functions it can perform simultaneously—and its "bandwidth"—the rate at which it can feed information to its central execution unit. Since both chips feature the same internal architecture, the 68030 is completely compatible with the 68020 and

(continued on page 6)

68030 Microprocessors

(continued from page 4)

software developed for the 68020.

Floating Point Coprocessors Speed Mathematical Calculations

The 68882 floating point coprocessor, a high-performance single chip used for intensive mathematical calculations, features an enhanced parallel architecture that improves performance by two to four times over the 68881 used in the lower-end NEWS workstations. Floating point math coprocessors are used to speed mathematical calculations in applications ranging from spreadsheet calculations to electronic circuit simulation.

The NEWS 1800 Series is also one of the first workstations to support the new standard in workstation graphics windows—the X-11 Window System from M.I.T.—as part of Sony's new release of NEWS-OS, the operating system based on UNIX 4.3 BSD.

Who Will Use Sony NEWS Systems?

When first introduced in the U.S. in February 1988, NEWS workstations were initially targeted at the CASE and technical publishing segments of the \$2

billion general purpose technical workstation market.

The NEWS systems are sold through multiple value-added resellers (VARs) and original equipment manufacturers (OEMs) for use by scientists, engineers, programmers, office professionals and other workstation users in the aerospace, automotive, engineering, financial, industrial research, education and government market segments. The NEWS family of workstations is noted for reliability, adherence to industry standards for open systems, and a compact, space-saving modular design.

The first members of the NEWS family introduced in the United States are the NEWS 711 and the NEWS 841, priced at \$3,995 and \$15,900 respectively, and supporting more than 300 applications. The NEWS systems are the most popular workstations in Japan. ■

Artisan for Sony NEWS

(continued from page 1)

tization artifacts, such as contouring, that are normally associated with an 8 bit system. These reduced images are used only for interactive display; the complete 24 bit images are always available for output to files, film recorders, or color printers. Image resolution as high as 4000 by 4000 help ensure high quality results for any application.

Artisan features a mouse-driven, multi-windowed interface that provides the ideal environment for creating, capturing, editing, manipulating and comparing images. Cut, copy, and paste functions in conjunction with scaling and rotational operations provide unsurpassed flexibility for page layout. Image processing,

"After having the NEWS workstation for one day, we ported Artisan literally over night."

**Hank Weghorst
President, Media Logic**

painting, touch-up, and captioning are simplified with predefined object primitives, splines, antialiased text, and a multitude of brushes, lines, and area fill capabilities.

Artisan's specialized paint features include the following:

- A Color Palette of over 16.7 million colors
- Multiple Windowing Environment
- A variety of Brush types and sizes
- Object Primitives, including Splines
- Antialiased Lines

- Solid and Gradient Color Fill
- Soft Area Flood
- Tinting, Color Shifting, and Gamma Correction
- Antialiased Text
- Multiple Image Compositing, including Partial Transparency
- Image Flip, Scale, and Rotation
- Image Zoom for detail work
- Alignment Guides and Rulers
- Complete Input and Output Capabilities

Artisan includes format conversion specifications and utilities that enable the input of data from scanners and digitizing cameras, and the output of images to film recorders and color printers. The PostScript® output format is also supported for desktop publishing applications and laser printers.

Also available with Artisan are device drivers and operating software to handle direct image input to color printers.

Quality presentation graphics are no longer limited to expensive, customized workstations. ■

Frame Buffer

(continued from page 4)

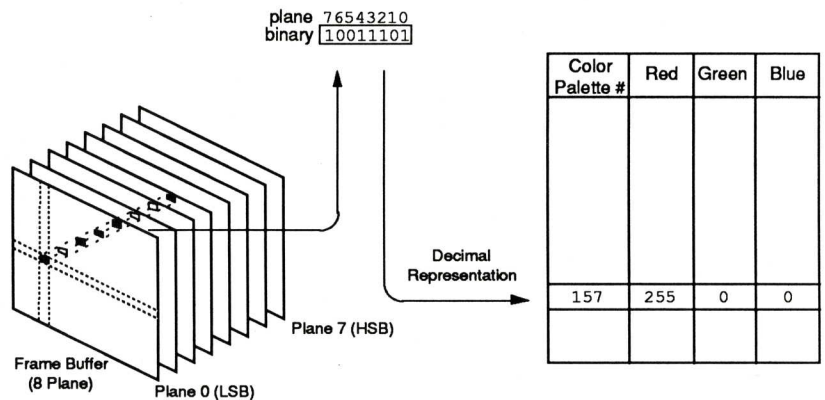
enables the colors of areas drawn with certain palette numbers to be switched instantly, simply by rewriting the corresponding table.

A conceptual diagram of CLUT is shown below with an 8-plane Frame Buffer.

palettes and perform BITBLTs (BIT Block Transfer).

BITBLTs transfer a bitmap from a certain part of the Frame Buffer to another part. When a window is moved from one part of the monitor to another part, this move is a BITBLT. A list of all these commands as well as complete descriptions and examples are

Color Look Up Table



Every graphics program has to use the CLUT to receive color information. The X Window System uses a file called *rgb* to receive all its color information. A text representation of this file is found in the */usr/lib/rgb.txt* file.

Conclusion

The */etc/fb* device driver operates the CLUT and ROP. Here are commands that draw points, lines and polygons on the Frame Buffer, change color

found in the NEWS-OS Operations Manual.

By learning the commands found within the */etc/fb* device drive, and using some of the techniques that Sony has designed into the Frame Buffer, many graphic applications can perform quickly and effectively. ■



SONY®

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XENIX®

UNIX® WORLD

MULTIUSER SYSTEMS AUGUST 1987

**Product Review:
XENIX System V
For the 80386**

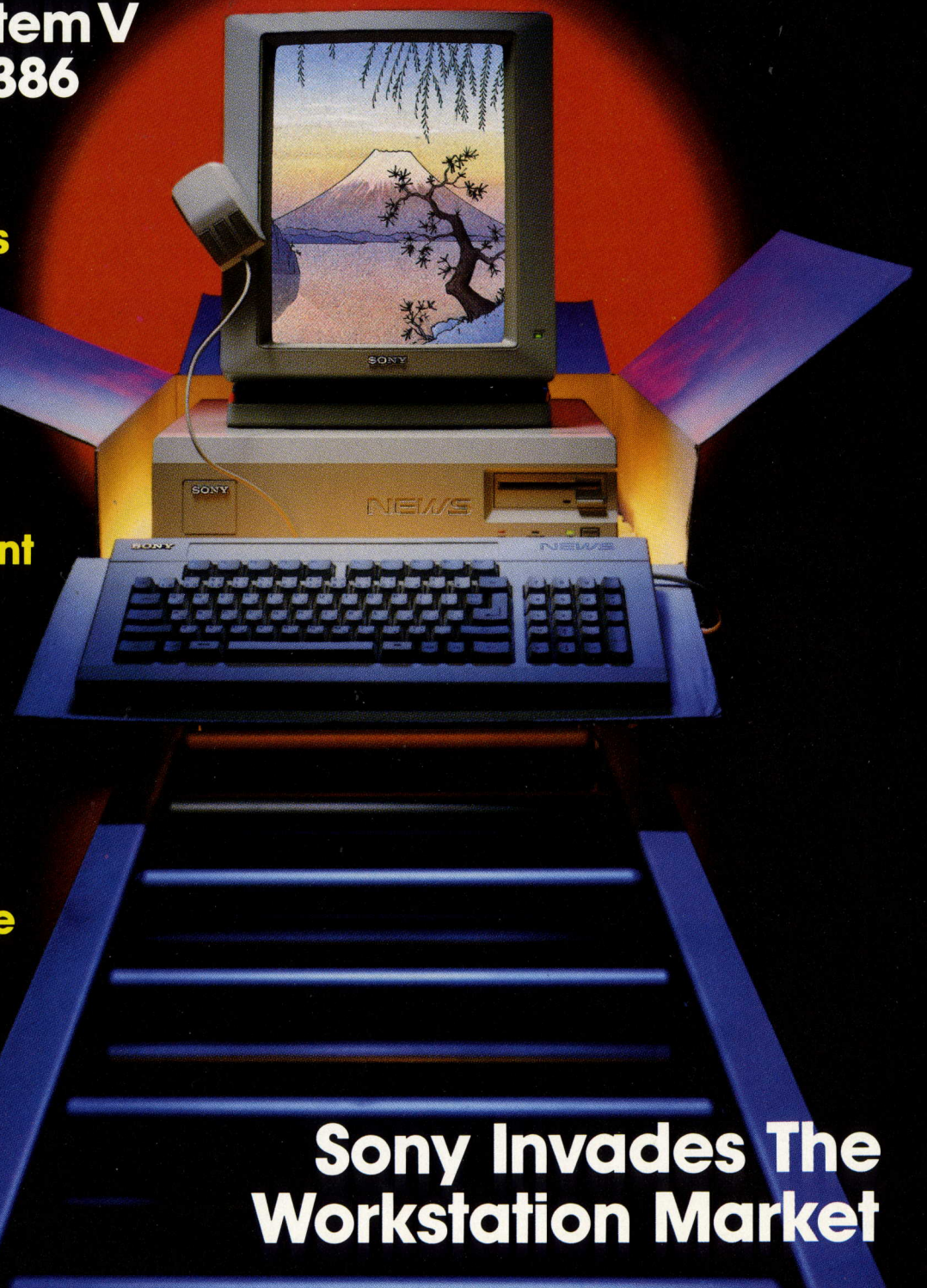
**Practical
UNIX Business
Graphics**

**New
CAD/CAE
386 PCs**

**IBM's Reluctant
Marriage To
UNIX**

**LEX,
The Talented
Text Tool**

**Dennis Ritchie
On UNIX
Culture**



**Sony Invades The
Workstation Market**



SONY
JUMPS INTO
THE WORKSTATION
MARKET

By Walter Zintz

*You read it
here first—
Sony's new
machine
has been
rumored in
the U.S. as the
"Sun-Killer."
Is it? Read on...*

It's fashionable these days to mutter about competition from Japan, something like, "Oh, they may have us in a corner on automobiles or RAM chips, but they'll never be our equals on anything that's complex and leading-edge, like technical workstations."

Now Japan has a few surprises for us. Since last April, a Japanese company has been shipping its own line of UNIX-based technical workstations to customers in Japan—workstations as powerful and solid as the major U.S. products. The prices are amazingly low. That Japanese manufacturer is Sony, new at building successful computers but always strong on marketing. Now Sony is ready to market these workstations in the United States.

Sony's new top-of-the-line workstation is the NWS-830 (pronounced "news"). It has two 68020s and a 68881 floating-point chip, all running at 16.67 MHz. Standard storage line-up is 8 Mbyte of parity RAM plus 8 Kbyte of RAM cache, 156 Mbyte formatted of hard disk with 16.4 MS average seek time, and a 1.44-Mbyte formatted micro-floppy drive. There are six I/O ports: an Ethernet, a SCSI, two RS232C, a Centronics parallel and the keyboard/mouse port. Bundled software includes 4.2BSD UNIX, Network File System, X Windows, Core Graphics Interface, and EMACS.

Sony considers this model a direct competitor to the Sun 3/160, and independent benchmark tests (summarized in Table 1) confirm this at the performance level. Users liked it, too. Everyone I worked with who had tried the NWS-830 came away saying what a sweet machine it is, and how solid—no one could make it crash or even twitch. The technician who ran the benchmarks remarked that this was the easiest benchmarking job he'd ever done; every test ran the first time, without adjustments or patches.

Yet Sony put the NWS-830 on the market in Japan at a basic price equivalent to \$19,300. The NWS-820, essentially the same machine with half the RAM and hard disk and without niceties like cache, went out at \$12,300. The diskless NWS-810 with 2 Mbyte of RAM

was priced at \$6700. These prices are far below U.S. prices for that caliber of workstation, and even more of a bargain in Japan. At press time, Sony had not set final U.S. prices, but even in the United States, Sony is expected to substantially undercut competitors such as Sun, Apollo, and the DEC MicroVAX II.

Actually, Sony's workstation strategy is a reasonable response to a complex set of problems, involving subtleties that are quintessentially Japanese and others that are rare in Japan but very much Sony.

GROWING A MARKET

Japan has chronically been weak, even feeble, in software development. The Japanese recognize that this must change, soon, if Japan is to sustain its export-driven economy. Their approach is to turn to technology, and software technology these days is built on top of high-powered workstations. Several factors make imported workstations far too expensive for the Japanese to buy in quantity, nor can they handle the thousands of characters used in the Japanese language. Japan, then, must develop its own.

Japan's answer is the Sigma project, a huge UNIX workstation development program involving the government and hundreds of Japanese companies. But Sony was not impressed by the slow pace of Sigma, nor by its early decision to go with System V while America's technical people were generally using 4BSD.

So Sony went its own way on UNIX-based technical workstations. But the Japanese software industry was not big enough to sustain a major workstation project that had no government subsidy. Sony did notice, though, that only a small fraction of the technical people in the United States who could make use of real workstations actually had them, mostly because they cost so much. In a characteristic response, Sony decided that much lower priced workstations would sell in far higher volumes in both

countries, making them a profitable activity.

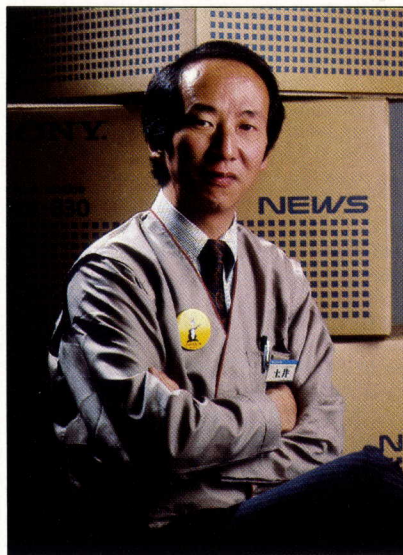
CAUTIOUS BRAVADO

Sony hadn't done at all well in computers in the past, however, and couldn't afford to court another fiasco either by going wild or by being too cautious. Sony's solution was to gather a team of young, pliable engineers and put them under Dr. Toshi T. Doi, creator of the 3.5-inch microfloppy for Sony.

Dr. Doi's team has been adventurous when the prize was worth the risk, cautious when it wasn't, and rarely anything between. For instance, the choice of the established 68020 chip over the newer 80386 or Fairchild Clipper as a CPU avoided new-chip problems without running any serious risk of missing out on something important. But using a second 68020 for I/O and DMA while everyone else was using 68000s or Z8000s was a real leap—one that paid off. A lot of the extra cost of a 68020 was made up because it's much easier to synchronize DMA when the chips on both ports are the same, and the 68020's extra power improves operations in a variety of ways, such as its ability to handle 32 bits per memory cycle rather than 8 or 16.

Another example is the RAM cache, which caches only instructions, never data. It escapes the pestilential problems of keeping the cache and the main RAM in sync as the data is modified; it gives a higher hit rate than a data cache, and it allowed the Sony team to design in only a single wait state when the instruction cache misses.

Software is the same mixture of the safe and the bold. Both the bundled software and the extensive list of optional packages are tried and true from start to finish. But Sony and its software suppliers have adapted much of it to work with the Japanese language as well as with English, without tearing the software to shreds as some other Japanizing methods do. Japanese



Dr. Toshi T. Doi, creator of the 3.5-inch microfloppy, heads the computer division of Sony.

has a short character list for the 70 or so possible syllables in the language, as well as the thousands of pictographic characters it borrows from Chinese. The breakthrough here was to create programs that could look at any list of Japanese syllables and determine which pictographic characters they represented. That lets Japanese users

simply type in the syllables, which are easy to accommodate on an ordinary-sized keyboard, while the workstation converts them to pictographs on the fly.

Sony has taken pains to have a roster of third-party, supported software available, and some of the more forward-looking suppliers have worked with Sony to turn out Japanese-language versions of their products. Two well-known products that have been adapted to the Japanese language by their makers in conjunction with Sony are Informix, a relational database manager from Informix Software Inc. (Menlo Park, CA), and WordMARC technical word processing software from MARC Software International Inc. (Palo Alto, CA).

Roger Sippl, cofounder and Chief Executive Officer of Informix, says, "Informix sees the News filling the need in the U.S. and Japan for a powerful software development workstation. Sony adhered to the standards—X Windows, UNIX, and major networks. We see the News being especially attractive because of the reputation for quality that Sony brings to any marketplace it enters."

Other established software that's been ported to Sony workstations include C Interpreter and Runtime Analyzer from Catalytics Corp. (Cambridge, MA); X-Ray, a C cross-compiler and a cross-assembler from Microtech (Tokyo, Japan); Proasm-II, C-Symbolic Debug, and ICE from Iwasaki Electronics (Tokyo, Japan); C-Cross Environment from Ascii Corp. (Tokyo, Japan); Cobol Dataflow Analysis Tool and AP Generation System Toolkit by JIP (Tokyo, Japan); Fortran Program Maintenance Tool by CRC (Tokyo, Japan); ICD Series by ZAX (Tokyo, Japan); and C-Testbed, Pygmalion, Zodiac, and Midas from SRA (Tokyo, Japan).

In addition to porting existing products to the workstations, Sony is working actively to create original software packages, because Sony is beginning to see itself as a software company. Doing software inhouse for the many embedded microcomputers in other Sony products has given them the experience and self-confidence to take on at

TABLE 1: Comparative performance of Sun 3/160 and Sony NWS-830 workstations on selected benchmark tests. Higher numbers indicate better performance.

SOFTWARE FUNCTIONS:	SUN 3/160	SONY NWS
system calls	100	100
function calls	100	109
pipes	100	106
HARDWARE FUNCTIONS:		
integer math	100	81
RAM access	100	79
disk access	100	76
OVERALL:		
average of 36 areas	100	100
workstation-weighted average	100	87

AND ON THE TAIL OF SONY...

Another potential giant-killer is entering the UNIX technical workstation market: Apple's Macintosh II with A/UX. The Sony and the Mac use the same CPU, math chip, and micro-floppy drive; both manufacturers claim 2 MIPS speed, and pricing is similar for comparable configurations. Otherwise they go separate ways.

Mac II's UNIX system is derived from Uniplus+ from Unisoft Corp., which is based on System V. There are plenty of Berkeley features inserted into Uniplus+ (Unisoft's founders came straight off the Berkeley campus), but the kernel is pretty pure System V.

Mac II features the same kind of flashy, graphics-based user interface that earlier Macintoshes are noted for, but now full color is an option. This icon interface is being adapted to work with the optional UNIX port, A/UX. The Mac II also has the traditional Mac sound port, in stereo now.

This is Apple's first detachable-monitor computer. Both the 12-inch monochrome monitor and the 13-inch color version are large compared to the original Macintosh, but small by technical workstation standards. The same goes for resolution, at 640 by 480 pixels on either monitor, but windowing enthusiasts can easily attach multiple monitors.

There is a six-slot card cage, making Mac II the first open-architecture system from Apple. The bus is Nubus, vendor-independent but not a bus for which a lot of stock cards are available. The disk interface is SCSI, with a data-transfer rate just over an Mbyte per second. Mac II has no independent I/O processor.

The preferred network communications system is AppleTalk, built into every Mac II. Ethernet/NFS capabilities require a separate board.

Performance is not easy to evaluate because the Mac II has not been available to us for testing. But the capabilities of its individual hardware and software components are known, and with the help of reports filtering in from Apple's beta test sites it's possible to make realistic estimates. Table 2 gives estimated performance ratings for the Mac II in comparison to the Sony NWS-830, in the same areas as our Sun/Sony benchmarks. They're a clear indication that Mac II will be a very strong competitor when the job is primarily number crunching, and mediocre to weak everywhere else.

Although the similarities between Mac II and technical workstations like Apollo and Sun (at much higher prices) are striking, they're mostly coincidence. Like previous Apple computers, Mac II is aimed at the computer store market. It's to be sold through a select list of Apple's current dealers, most of whom are storefront retailers, and it continues most of the toy aspects of the Macintosh line, from undersized screen to electronic noisemaker. Still, it could be a competitor in the professional workstation market nonetheless. Shortly after Apple announced Mac II, Sun cut its own workstation prices significantly. It's not easy to come up with a plausible explanation for this cut that doesn't involve Mac II.

—W.Z.

least a few pure software projects.

The Sony workstations do have a few eccentricities. One is that they're designed to take up very little room on a desktop, so they look like little IBM PCs or Apples. Another is that Japanese characters are sprinkled all over the keyboard, which looks rather peculiar to some Americans, and inadvertently hit-

Any new entrant faces a roster of well-established competitors

ting the wrong key can put the user into Japanese language mode, which unnerves many English-speaking users. Finally, the screen of the monochrome monitor is higher than it is wide. This is obviously a holdover from the original emphasis on a software developer's workstation—it's just the right shape for scrolling through listings or single-stepping through balky code—but for any technical use except programming the color monitor will be a necessity for some users.

TO MARKET, TO MARKET

So what looked like a blatant try to buy U.S. market share with unreasonably low pricing turns out to be an astute combination of market savvy and good technical work. Frankly, this analysis won't convince rival workstation makers (including other Japanese contenders: NEC is importing its entry-level EWS-E workstation to the U.S. with a conservative \$27,500 price tag). But these competitors may soon have other problems to fret about. Newer American workstation makers, such as Apple (see sidebar) and Hewlett-Packard are starting to apply price pressure pretty hard with their own latest offerings.

Nonetheless, Sony's workstation line won't automatically succeed in the United States market. Any new entrant faces a roster of well-established competitors and strong brand loyalty among users. Sony

TABLE 2: Comparative performance of Sony NWS-830 and Apple Macintosh II workstations; figures for Sony are benchmark results, figures for Apple are estimates. Higher numbers indicate better performance.

SOFTWARE FUNCTIONS:	SONY NWS	MAC II (est.)
system calls	100	50
function calls	100	30
pipes	100	50
HARDWARE FUNCTIONS:		
integer math	100	120
floating-point math	100	130
RAM access	100	100
disk access	100	30
OVERALL:		
average of 36 areas	100	80
workstation-weighted average	100	60

also has to deal with one challenge that confronts only overseas vendors, and another that applies only to Sony.

Because the American market for workstations is much more mature than Japan's, price competition is sharper here than there. This works

Sony can't very well raise its U.S. prices enough to satisfy our anti-dumping policies

in American manufacturers' favor; their profit margins get a substantial boost in Japan because they set their prices higher there — more than the extra expense of exporting to Japan requires — and the Japanese government is happy because the higher margins have the effect of a self-imposed tariff. But if Sony follows the same pattern, they'll be selling workstations abroad for less than they charge in their home market. American manufacturers will promptly yell "dumping" and "predatory pricing," and although Congress and the administration shouldn't listen to these protests, there's too much political risk in the

trade deficit issue for any elected official to listen to reason here.

Sony can't very well raise its U.S. prices enough to satisfy our anti-dumping policies; to do so would blunt Sony's principal tool for enlarging the U.S. market. Their only plausible alternative is to cut prices in Japan. American manufacturers would then take a profit loss of their own, by having to cut their own prices in the Japanese market to stay competitive, but Sony would lose the benefit of a lucrative home market to support their workstation operation while facing a lean year or two gaining acceptance in the United States.

Then there's the matter of image. Sony is as successful in professional electronics as in consumer products, but how many Americans know that? Television networks favor Sony video cameras and Profeel monitors, but most Americans think of Sony video in terms of home TV sets and VCRs. Sony digital tape recording equipment is a mainstay in recording studios, but to most of us a Sony tape system means a Walkman. That majority of unconvinced Americans includes almost everyone in computing, because there's no history of great Sony computers that could bring the other side of Sony to our attention.

Even at Sony's prices, workstations are a major investment, not a place to try out slick toys. If Sony's NEWS gets branded as a Sony Hackman in American minds, its price and performance won't save it. Overcoming this disinformation problem will require a well-crafted and extensive public relations campaign; at press time Sony officials have not revealed their strategy. I'm hoping to find out soon, because this is by far the largest unresolved factor that will determine whether NEWS sinks, floats, or flies. □

Editor's Note: As we go to press, Sony is waiting for U.S. retaliatory trade tariffs to stabilize so the machine can be priced as competitively as possible for the U.S. market. At this time, Sony expects U.S. prices to range from \$7000 to \$25,000, depending on configuration.

A Sun 3/160 M-P6 system, a direct competitor to Sony's high-end model, lists for \$31,500, or \$42,500 for the color monitor (C-P6).

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