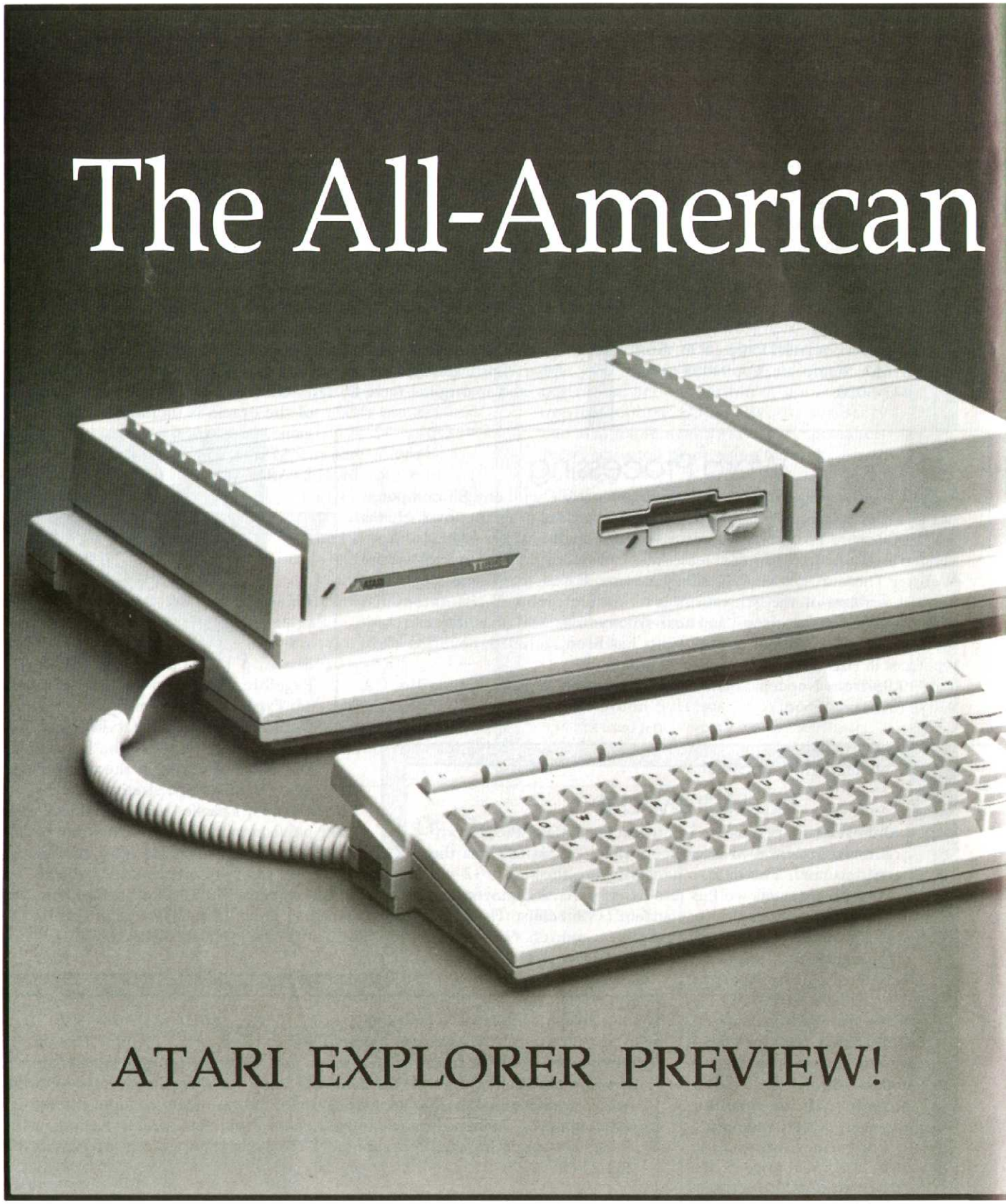
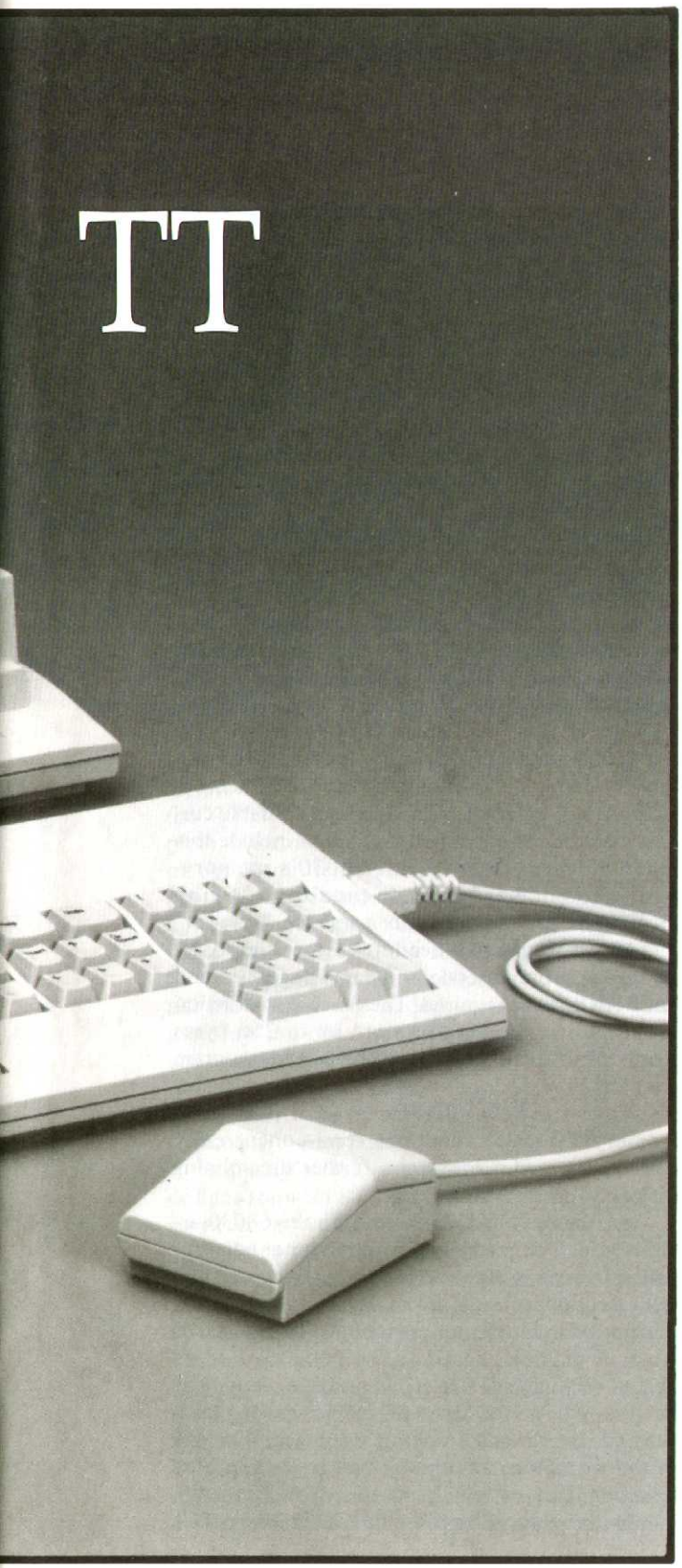

The All-American
ATARI EXPLORER PREVIEW!



As this article is going to press, staff at Atari's Sunnyvale, CA, headquarters are feverishly preparing the exhibits, new material, and hardware that will be shown at Las Vegas Comdex beginning November 12th. Over the past several months, Atari's hardware and software divisions have worked overtime to ready several new projects for this watershed date. Looming large among these: the long-awaited American version of the Atari TT computer.

Currently selling well in European markets, the TT represents a big step forward in Atari's race to stay on the leading edge of affordable personal computer and workstation technology. Four years in the planning, it

By Atari Explorer Technical Staff

represents the present culmination of Atari's desire to present business and the mass-market with a complete, vertically-integrated line of computing systems for every application. Sam Tramiel, Atari's President, has spoken of the TT in this context. "Atari equipment now covers the whole spectrum, providing platforms for home computing and entertainment, to small-business word-processing and basic productivity, through single-user executive workstation and DTP, and now, with the TT, into high-end desktop-publishing, CAD/CAE, presentation and video graphics, multiuser applications, and networking."

Atari Explorer's Technical Staff has recently been permitted to go hands-on with the latest, greatest revision of the proposed American TT. Helping us with our research have been Leonard Tramiel, Atari's V.P. of Software Development, and Terrea Thompson, arguably one of the most knowledgeable people in the world on the subject of the Atari TT from the user's perspective, and author of major sections of the TT's English-language manual.

A Bit of History

The name of the Atari ST derives from the nature of its microprocessor, the 68000 — a so-called "sixteen/thirty-two bit" processor (hence "ST"), by virtue of its 16-bit-wide data bus and 32-bit-wide internal registers. Though capable of exceptional performance and sporting a rich instruction set, the 68000's 16-bit-wide data path imposes certain restrictions. Most important among these, the chip cannot read a 32-bit quantity from memory in fewer than two bus cycles. Thus, although the chip's internal data registers and operations accomodate 32-bit numbers, filling them with such numbers requires twice the time it should. Moreover, most 68000 assembly-language instructions are four bytes (32 bits) in length, meaning that the processor requires two bus cycles to read the majority of steps in its own software. The 68000 also suffers somewhat from the fact that although its address registers and program counter are theoretically 32 bits wide, only 24 of these 32 bits are actually used. The chip is thus limited to addressing a total of "only" 16 Mb of memory.

As early as 1986, therefore, Atari realized that it would have to begin taking steps to exploit the added power offered by successor chips in the 68000 series. At the time, the most important of these was the 68020 — the first "thirty-two/thirty-two bit" chip — capable of fetching a 32-bit quantity in one cycle, and of addressing four gigabytes of RAM. The first TT (from "thirty-two/thirty-two") was prototyped around this chip.

As time went on, however, Atari realized that the 68020 was not an ideal stopping-point for the TT technology it was developing. Though powerful, the 68020 still lacked certain important features offered by the next successor in the 68000 line, the 68030. This chip features full 32/32-bit address/data bus and internal registers; separate Supervisor, User, Program, and Data virtual memory spaces; built-in memory-management hardware; and 256-byte, on-chip instruction and data caches.

What does all this mean? In layman's terms, the 68030 can run like a bat out of hell and can directly address a huge amount of RAM: theoretically up to 4 gigabytes. Though no affordable current machine architecture would ever include this much physical memory, the 68030's memory-management hardware is capable of using hard-disk space to create a usable "virtual" memory map that is indeed this large; simply by swapping program code and data "pages" in and out from disk, as required. The on-chip instruction cache allows the chip to store up to 256 bytes worth of instructions ahead of the current program counter address, decoding and executing these instructions from chip RAM instead of from main memory. Pre-fetch functions semi-concurrently with other on-chip operations, further streamlining the 68030's performance.

Atari knew it had a winner with the 68030 architecture: a chip capable of running not only optimized versions of the ST operating system, TOS, but of cooperating with the demands of popular multi-tasking/multi-user operating systems such as Unix. A machine based on the 68030 would be able to serve a wide variety of needs — serving as an ultra-high-performance ST, while offering business, industrial, and academic users access to one of the world's most popular and best-supported operating systems. Realizing this, they decided to gamble bravely; scrapping the 68020-based TT1

architecture in favor of one more powerful, on the surmise that by the time the design was ready for production, 68030 chips would be available in quantity, at reasonable prices. The gamble, as we'll see, paid off.

The TT030

Over the next three years, several revisions of the TT architecture surfaced in Atari's R&D labs, designed around chips spec'ed between 8 and 16 Mhz. At the same time, Atari's Industrial Design Division, under the direction of Ira Velinsky, began developing the aesthetic that would mark Atari's new top-of-the-line flagship system as unique. From the beginning, Velinsky steered away from the "gray wedge" and "gray box" aesthetics that dominate the ST line. Even very early case designs suggest the glimmerings of a more sophisticated sensibility, drawn from classical architecture.

Over time, Velinsky's vision for the TT — now referred to as the "TT030" — grew more complete, informed by the demands of the Technical Division to provide space and ergonomic conveniences that had never found their way into the earlier ST designs. Space for an internal hard drive was added, expanding the case laterally by several inches. Edges were sharpened and sloped more aggressively — ornamentation reduced to a minimum.

Velinsky's final production designs show an ST vastly transformed: a bipartite housing (CPU/hard disk) that functions as a single desktop unit, set upon a pedestal and colored marble-white. The keyboard, an ST-compatible 94-key detachable unit with mouse connector, can be rested on the pedestal, creating the appearance of a one-piece system. The image is one of substance and cool elegance, equally at home in the design studio or the executive suite. TT monitors, currently in the final design stages, will rest on tilt-swivel pedestals that integrate with the upper surface of the TT030 housing, creating a seamless system for the desktop. A 14-inch diagonal color monitor, among other options, is planned.

Velinsky states: "The design of the TT was driven by the desire to have each part of the system express the form of what it contains. The hard-disk enclosure expresses the form of the hard drive; the floppy section the form of the floppy drive; the "connectors section," — or pedestal slab — isolating and emphasizing the I/O connectors it contains, and acting as a keyboard support. We wanted, and I think succeeded, in making something unique."

The All-American TT

The Atari TT030 is essentially an ST, fully back-compatible both in hardware and systems software with current ST designs. Jim Tittsler, one of Atari's lead engineers, explains that Atari went to great lengths to preserve ST compatibility in the TT. "We bent over backward, in fact." He relates. "The biggest hardware-related problem we anticipated was with current ST software, written for the 68000, that didn't handle the high bytes of addresses correctly. The manuals for the 68000 clearly state that all software that hopes to run on later versions of the chip should be sure to set the high byte of an 32-bit address to zero. But a lot of compilers and assemblers set this byte to $FF. The result was that we had to add circuitry to the TT, capable of intelligently decoding addresses, and sending them to the proper places in memory."

The result is that a TT030 will run most ST software without modification, the exception being programs that use the high bytes of address

The Atari TT constitutes a step forward in affordable, high-performance computing that is nothing short of revolutionary.

fields in illegal ways (for example, as a type field for a pointer). Other problems may result from the use of the 68030's instruction cache, particularly with self-modifying 68000 code that doesn't know it's been read into an on-chip buffer. For this reason, the TT boots with the 68030 caches turned off, though they can be turned on, much like the Blitter on a Mega ST, with a desktop control.

Other minor problems may result from a slight difference between 68000 and 68030 architecture: the fact that the "move from Status Register" instruction is accessible from user mode on the 68000, but privileged on the multi-user 68030. Certain compilers use this instruction, which will cause a privilege violation exception if executed from user mode on the 68030.

To solve the hitch, Atari has incorporated a customized exception-handler in the BIOS that traps this error, replaces the offending instruction with a "move from Condition Code Register" instruction, and executes the passage again. This is said to reliably solve most problems of this kind, without significantly affecting software performance.

The main difference between the TT030 and an ST, of course, is speed. Running flat out, a 32 MHz TT030 is potentially better than eight times faster than an ST! (The developer's documentation laconically points out that ST software that employs software timing loops will not run correctly.)

By and large, however (and Atari has spent months testing software to prove the point), the TT030 will run every major piece of ST software on the market. Moreover, software that properly follows GEM standards in addressing such facilities as the screen, will immediately be able to make use of the TT's improved graphics resolution and color pallette. Software written to exploit STe-quality sound-generation hardware will find similar facilities in the TT platform. Software currently under development, of course, will be designed with the capacity to exploit all of the TT's advanced capabilities.

Fast RAM, and Faster!

There are three kinds of memory in a TT030. ST RAM is dual-purpose, shared (as in a standard ST) between the CPU and all ST devices, including video, ACSI DMA, and DMA digital sound (see below). Present versions of the TT come with 2 MB of ST RAM, expandable to 4 MB total, just like a Mega 4, though the final installed/expanded numbers remain a marketing decision. We note that no German TT is presently being sold with less than 4 MB of RAM installed. Programs executing in ST RAM force the TT CPU to share clock cycles with video and other devices, somewhat slowing the central processor; though execution will remain significantly faster than is possible on a standard ST.

TT RAM, by contrast, is single-purpose RAM, not shared among ST-compatible devices. TT RAM is not visible to ST devices. It is, however, visible to the TT's SCSI (Small Computer System Interface) DMA subsystem, meaning that it can be employed directly as a source or destination for hard-disk (or other SCSI device) data transfers. The TT030 presently has room for one TT RAM board containing 4 MB of RAM in 1 Mbit chips, expandable to 16 MB with 4 Mbit chips, when these become available. Again, final configuration is as yet in the hands of Atari's Marketing Division.

A third type of RAM may be installed on a board plugged into the TT's VME socket. VME-interfaced RAM is visible only to the CPU. However, use of it incurs a single wait-state per bus cycle, meaning that this RAM is somewhat faster than ST RAM, but somewhat slower than TT RAM.

New software, written expressly for the TT, will naturally take advantage of the distinction between ST RAM and TT RAM, likely doing much of its high performance calculating in the latter, where it can enjoy full processor speed, while leaving screen data, sound data, and other I/O-bound components in the former. However, although the present generation of ST software, written before there was any concept of "slow" (ST) or "fast" (TT) RAM, is not inherently designed to take advantage of the distinction, there is a way in which much of it may be made to do so immediately without significant revision.

Depending on what a current program is designed to do, it tends to fall into one of two categories: 1) programs that must run entirely from ST RAM, 2) programs that can execute from

TT RAM but must satisfy mass data-space requests (Malloc() calls) from ST RAM. Much entertainment software, dependent as it tends to be on display and sound, falls into the former category, while a portion of productivity and other less graphics-dependent software falls into the latter. The TT's revised operating system is capable of treating programs in either way, depending on the setting of bits in the header of the program's executable disk file. There is thus hope that by changing a single byte in the program header — something that may be done by the user with a simple utility program — certain present-generation software may be able to take full advantage of the TT hardware, without further modification.

TT Video

The TT030 supports all of the ST's normal graphics modes (low resolution, 320 x 200, 16-colors; medium resolution, 640 x 200, 4-colors; and high resolution, 640 x 400, 2-colors), while enhancing ST monochrome so that it can employ any two colors — not just black and white. In addition, the TT adds three new graphics modes of its own: TT low, 320 x 480, offering 256 colors (significantly exceeding the capabilities of standard IBM VGA); TT medium, 640 x 480, with 16 colors; and TT high — a special black and white mode offering stunning 1280 x 960 resolution. This latter resolution is available only on special monitors. All the TT's color modes draw from a pallette of 4,096 possible colors, as on the STe. Because of the new graphics modes, the TT's video RAM requirements have increased from the ST-standard 32K to 150K.

New XBIOS calls have been implemented to give access to the TT's larger color-tables, while back-compatibility has been maintained with ST norms for ST video modes. In addition, AES and VDI, the Application Environment Services and Virtual Device Interface software packages that make up the bulk of GEM from the programmer's perspective, have been enhanced and will work transparently with the TT's new graphic modes. Currently-available software that has adhered rigorously to GEM programming standards (and that has used only calls to GEM (VDI) to determine system configuration) will work in the new graphics modes.

I/O and Networking

The TT030 has hardware to support a total of four serial ports. Port 1 is ST-compatible, obtained from the 68901 Multi-Function Peripheral chip. That chip also supports Port 2, which works like the ST-compatible port, except that it has only transmit, receive, and ground signals. The remaining two ports are drawn from the TT's new 8530 Serial Communications Controller, and support full handshaking. One of these ports shares hardware with the Localtalk-compatible 8-pin female mini-DIN (Deutsche Industrie Normung) LAN connector on the TT's side (see below). Thus if one elects to employ the LAN, serial Port 4 is unavailable. The BIOS has been enhanced to provide support for all these ports, including flow control. Physical serial ports themselves are of the AT-style 9-pin variety.

This proliferation of serial ports means that it will be easy to use the TT in a variety of network-based and single-user telecommunications contexts. Hooked to modems, the serial ports can be employed to support multiple telecommunications sessions, either under the control of Unix or special TOS-based multitasking software.

As an affordable UNIX platform, the TT030 may leapfrog machines from IBM, Apple, NeXT, and Sun.

The TT might be used as the telcom server on a LAN. Under Unix, terminals can be attached to these ports, and the TT employed as a multi-user server.

The TT's network interface facilities are impressive. As noted above, the TT comes with a Localtalk connector installed. This medium-speed, industry-standard LAN protocol is designed for file and peripheral sharing in small networks. High-speed network interfacing is provided via two routes. The TT's industry-standard VME Bus slot offers room for a single-Eurocard-sized (3U) VME-based Ethernet board; and SCSI-interfaced Ethernet units can be added via the TT's external SCSI port or internal SCSI ribbon-cable connector.

SCSI Support

The TT030 will support the industry-standard Small Computer System Interface (SCSI) completely. In hardware, the TT will ship with both a motherboard-mounted 50-pin internal SCSI connector (plus space for mounting an internal SCSI hard drive); and a 25-pin, external, Mac-compatible SCSI connector, to which up to seven SCSI devices can be daisy-chained. Atari hard disk utilities can recognize, format, partition, and render bootable, almost any standard SCSI drive. The TT's SCSI direct-memory-access subsystem can send and receive information equally well, both from ST RAM and faster TT RAM, meaning that present and future software will be able to exploit SCSI peripherals efficiently.

The result of this level of support is that TT owners will be able to buy almost any SCSI hard drive "off the shelf," and attach it to their TT with a minimum of trouble. Other SCSI peripherals, such as streaming tape drives, 9-track tape, etc., are also "plug compatible," though device drivers for these units must be provided by a value-added-reseller or by the user.

Other System Facilities

Adding to the power of the TT030 as an engine for number-crunching, CAD/CAE, videographics, and other math-intensive applications; the machine will ship with a 68882 floating-point math coprocessor installed. The interface between the TT's 68030 CPU and the 68882 is via the 68030's "direct" routing, rather than the slower and clumsier method of peripheral I/O, such as was used in the Atari Mega ST-compatible floating-point peripheral daughterboard. The result, says Atari's Jim Tittsler, is "a vast increase in speed and simplicity of programming."

Sound on the TT030 is via stereo DMA, just as in the STe. Left and Right audio RCA jacks are provided on the TT backplane for output to stereo amplifier. An internal speaker is also provided. Additional standard ports will include most of the hardware found on STs, including MIDI IN and OUT, a port for attaching an external floppy disk, ST-compatible mouse and joystick ports, and a cartridge port. The TT's internal floppy drive is a 720 Kb ST-standard unit. At press time, it was also decided that TT030's would initially ship with both floppy and internal hard-drives installed, though the size of these units was still an open question.

System Software

The TT030's native operating system is Atari's ST-standard TOS/GEM, an enhanced version of which is burned into the TT's ROM. According to Leonard Tramiel, Atari's V.P. of Software, the specified TT enhancements to TOS, GEM (AES/VDI), and — in many ways most impressively and visibly — to the desktop, took several man-years to implement. So striking are the changes to the desktop that we've elected to describe them in a separate hands-on article (see page 36).

To summarize them, briefly, the TT's windowing system has been completely, if compatibly, redesigned, being rendered faster, more colorful, and more informative. A method for adding extensions to the Control Panel has been standardized. The Control Panel itself has been updated to handle the TT's new video modes and STe-compatible audio hardware. Finally, the system by which applications are installed on the system at start-up has been completely revised.

As an alternative to TT TOS, the TT030 is capable of running UNIX, the popular multitasking/multiuser operating system. Atari's initial UNIX product offering will be UNIX V.4, which is fully compatible with POSIX, and the X/Open Portability Guidelines. The X/Window System, one of the most popular UNIX Graphical User In-

terface packages, will also be provided, as will an actual graphic user interface, running on top of X/Window.

Unlike TOS, UNIX is truly a multi-tasking operating system, capable of supporting numerous simultaneous processes. Single-users can employ multitasking in a variety of ways to improve productivity: ranging from maintaining multiple simultaneous telecommunications sessions, to working and printing in parallel. Task-to-task communication facilities available under UNIX make relatively simple the task of sharing information between programs. UNIX is also multi-user, meaning that the TT will potentially be capable of acting as server to several independent workstations, each with multi-tasking capability. UNIX offers a wide variety of facilities for insuring the safety and security of data in multi-user installations. Moreover, unlike TOS, UNIX can exploit the 68030's built-in memory-management subsystems to create large "virtual" computing environments.

The availability of UNIX — particularly in such a complete form — is a significant development that may well affect the impact of the TT on business, in research, and in the academic sector. To start with, UNIX is a mature operating system that is exceptionally well-supported with software (several thousand packages are available, covering every conceivable category of application). TT UNIX adopters will thus immediately have a large library of applications on which to draw, many of which are available at low or no cost through academic and shareware distribution channels. UNIX is OS/2's major competitor for the office multi-tasking market, and is established as the operating system of choice in programmer training and computer science curricula, worldwide. As a UNIX platform, the affordable TT030 may leapfrog machines from IBM, Apple, NeXT, and Sun, as the best choice for mass installation of UNIX systems in these environments.

The TT Upshot

As the TT nears American release, Atari Explorer will be staying on top of developments, bringing you the first word on final production configurations and other details of the system. At the moment, however, certain things are already abundantly clear.

First, the Atari TT constitutes a step forward in affordable, high-performance computing that is nothing short of revolutionary. Though final system prices have not yet been established, it is certain that the cost of a TT with power approximately equal to that of a Macintosh IIC or fully-loaded high-speed 80386 PC clone with VGA will cost several thousand dollars less than the former, and on the street, perhaps a thousand dollars less than the latter.

Second, judging from the TT's architecture, which is optimized for throughput in math-intensive applications, the machine is an ideal platform for high-end desktop-publishing, computer-aided design, and computer-aided engineering applications. As such, it constitutes an ideal "top end" for the upward-compatible suite of hardware platforms Atari has fielded to serve these important vertical markets.

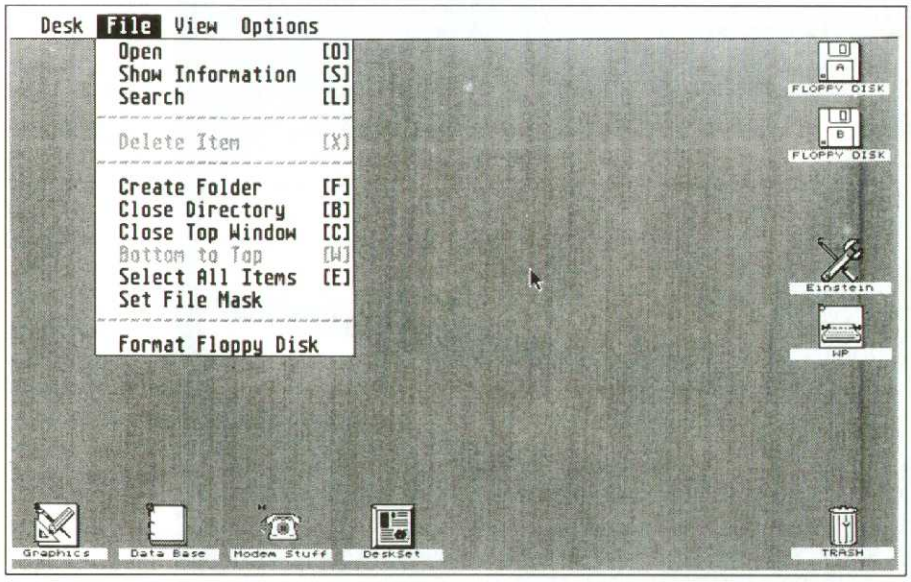
The TT will be an ideal platform for business, software development, and education, all markets that place a strong emphasis on low cost, connectivity, and standardization of resources.

Third, the availability of industry-standard network interfacing, SCSI support, and UNIX compatibility suggest that the TT may be an ideal platform for business, software development, and education, all markets that place a strong emphasis on low cost, connectivity, and standardization of resources. These, indeed, are what the TT offers in abundance. ■

The TT Desktop: Hands-on

A stunning new version of the GEM Desktop debuts on Atari's new flagship system

Since the introduction of the revolutionary ST computer in 1985, Atari has maintained a growing committment to the use of graphic user interface technology in powerful, low-cost personal computers. GEM, the GEM desktop, and the underlying TOS operating system have been consistently updated over the past five years, becoming ever more powerful, sophisticated, and easy to use. Some improvements, such as the ability to auto-start GEM applications, have come about in response to customer demand. Others, such as the improved File Selector implemented in Rainbow TOS, have been prompted and influenced by third-party products, such as Gribnif Software's NeoDesk and A&D's Universal File Selector. In general, the process of improving the mechanics of the ST's user-interface, and enhancing the functionality of its



The new Desktop, showing both device and application icons. Note the clarity that new icon types and customized icons add to the Desktop environment. Also, note the new Search and File Mask functions in the File menu.

metaphoric center — the ST Desktop — has by and large been gradual and evolutionary.

That's all about to change. With the release of the TT030, Atari will take a quantum leap forward in the amount of power it can offer the savvy personal computer user. And, as is only fitting, the advent of the TT has prompted a top-down reassessment of the system software that makes the ST line go.

Driving the changes has been the desire to offer greater access to information and greater power from within the desktop's basically familiar framework. As the metaphoric center of the TT working environment, the Desktop is a crossroads through which the user passes many times in the course of an average session with the machine. Most file- and disk-management; the majority of global system configuration work; device installation; application launching; and other important tasks are carried out within this domain.

The changes to the Desktop are many and various. In keeping with the TT's enhanced graphics capabilities, the Desktop now offers greater flexibility in defining the color of on-screen objects. The problems inherent with file proliferation on more and more capacious mass-storage media have been challenged by a new array of functions for defining the character and layout of items in a window, and for locating objects buried deep in complex subdirectory trees. All these new commands work to render simpler the kind of file-maintenance tasks that make up the majority of Desktop work.

Cosmetics, and More

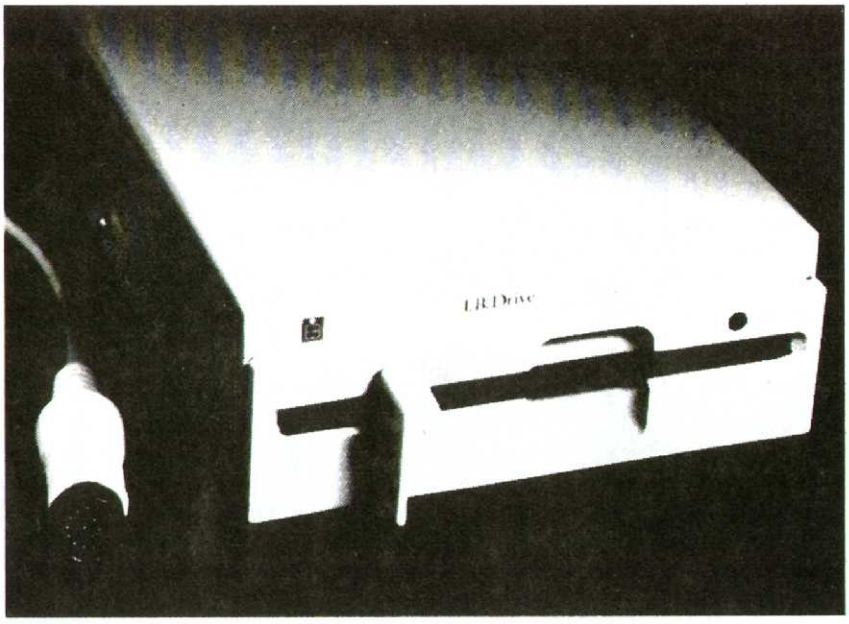
The View menu, which defines the look of things on the Desktop, has been enhanced with several effective changes. In addition to the usual range of options by which the order of files on display can be controlled (i.e., sort by Name, Date, Size, Type), a new option, "No Sort," has been added, which shows the files in the order in which they actually appear on the disk.

Having access to this information can be important in certain circumstances; for example, when trying to arrange files in an /AUTO folder so that they execute in appropriate order on system startup.

The Size to Fit command prevents icons from being hidden beyond the left and right boundaries of a window. When this command is selected, icons automatically reshuffle themselves into rows that fit within the window's current width, as it is resized.

Set Color and Style lets you define background fill pattern and overall color for windows and for the Desktop itself, adding a level of coarse control to the finer control permitted by the new Control Panel "Window Colors" extension (see below). Pattern and color changes may be previewed before being imposed, reducing the chance of suddenly "losing" Desktop objects by setting them to the same color as their present background.

IB Computers
THE 5¼" LEADER



The IB Drive. The leading 5¼" drive for the Atari ST. The ONLY drive recommended by Avant-Garde for use with their PC-ditto™ products. Fully compatible with standard PC-format 5¼" disks, the IB Drive has an internal power supply -- no external "brick"! -- is FCC Class B Certified and comes complete and ready to run on your ST. At a suggested retail of only $249.95, can you afford *less* than the best?

ALSO FROM IB COMPUTERS...

ANALYZE!

The spreadsheet for your ST! Analyze! is a powerful spreadsheet program with extensive math functions, macro capability, and outstanding graphing.

Analyze! is .WKS-file (VIP/1-2-3) compatible and makes full use of the GEM environment.

$34.95

IB Disk Utility

- Edits files or sectors on floppy disk
- Edits files or sectors on hard disk
- Multiple edit buffers
- Mouse or keyboard command entry
- Recovers deleted files
- Works on all ST models
- Not copy-protected

$34.95

ATARI OWNERS!

We are one of the LARGEST Atari dealers in America, stocking the full line of hardware and software for *all* Atari computers and video games.
Contact us for all your Atari needs.
FACTORY-TRAINED SERVICE DEPARTMENT
...YES, we have monochrome monitors!

IB Computers
9244 S.W. Beaverton-Hillsdale Hwy.
Beaverton, OR 97005
(503) 297-8425

IB HD Backup

- Backup to floppy or hard disk partition
- Supports single or double-sided formats
- Works on color or monochrome
- 520, 1040, STE and Mega compatible*
- Compatible with 1.44 megabyte 3 " drives
- Not copy-protected

$34.95

**Fast ramdisk backup option available on systems with 1 megabyte or more of memory.*

Volume Management

The Search command, new to the File menu, performs a file search on a floppy disk, logical drive, or folder. Highlighting a disk or folder icon and selecting Search causes a dialog box to appear, into which you may enter a wildcard expression denoting all or part of a filename. Clicking on OK begins the search, which proceeds in depthwise tree fashion through the current directory and all subdirectories within the selected volume or folder. If the Desktop finds a file that matches your search criteria, it opens a window and displays that file, then asks if it should continue the search. If you elect to do so, the same window is used to display additional files matching the same criteria. When all matching files have been found, an alert box is displayed.

The Set File Mask command also helps in gaining control over proliferating files, implementing a capability that users of NeoDesk have long enjoyed: the ability to display in a window only those files whose names match certain defined criteria. When you select Set File Mask, a dialog appears to let you enter a standard file-masking wildcard expression (for example, *.DOC), which is then imposed to define which files are displayed in the active window (the foregoing example will cause only those files with .DOC extenders to be displayed). The file mask remains in effect until changed, or until the active window is closed, at which point the mask is cleared and replaced with the "show everything" mask, *.*.

Window Management

A command called Bottom to Top has been added that is useful when you are working with multiple, overlapping windows. It causes the currently-active desktop window to be sent to the back of the window stack, and the one currently there to be brought to the top and made active.

File Maintenance

The command Select All Items causes all files and folders in the active window to be selected — very useful for doing mass deletes or file-by-file copies. Files hidden beyond window boundaries are also selected by this command, though files not displayed because they do not match file mask criteria are not selected, and will not be affected by subsequent global operations.

A universal Delete command has been implemented that permits mass deletion of groups of highlighted items: be these files, folders, or the contents of entire disks. Naturally, the command can be set to prompt before carrying out its function.

Several other, more global changes have been made to increase the amount of information about file history that is available to the user. Notable among these, read-only files are now marked with a triangle symbol next to their names.

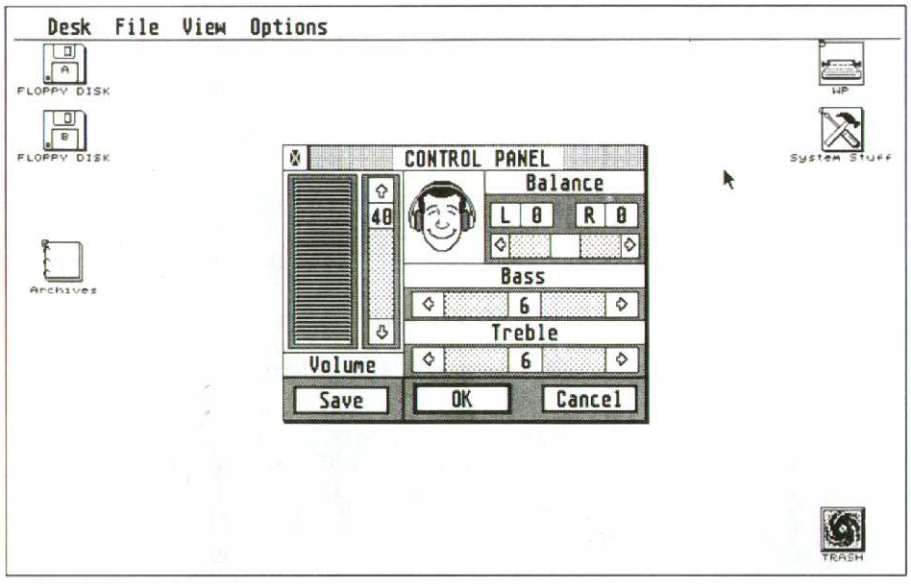
Icons on the Desktop

In keeping with the character of a graphic user interface, which treats files, disks, and other abstractions as if they were physical "objects," the new Desktop gives the TT user total flexibility in defining the appearance of Desktop icons and symbols.

Part of this freedom is granted through the new Install Icon functions in the Options menu. When Install Icon is selected, a dialog box displays, allowing you to select whether the icon you wish to install (or modify) is pertinent to the desktop itself (i.e., a disk, trash can, or printer icon), or to the display within a window (i.e., a file type icon).

In the case of the Desktop, sixteen detailed icon shapes are at your disposal, ranging from hard disks to printers. You can assign individual shapes to different objects, or by rubber-banding, to groups of objects, all at once. The point, of course, is to make the graphics on your Desktop more representative of the configuration of your system: making floppy disks look like floppy disks, hard-drives look like hard-drives, and printers look like printers. Individual files, or selected groups of files, can be dragged to printer icons for "text-dump" type printing.

For windows, even more freedom is at your disposal. The idea here is to permit you to define the icon display in such a way that not only file types (e.g., folders, executable files, document files, etc.), but arbitrary file categories are clearly distinguished from one another. Whereas the old default desktop icons would only distinguish between executable files and "documents," the new desktop will let you assign a unique icon to any single window item, specific group of selected files, globally to any file type (for example, assigning a "scroll" icon to word-processor docu-



The Control Panel's "Sound" CPX, one of several Control-Panel extensions included with the redesigned Control Panel. The image of the head turns left and right to graphically indicate stereo balance. Also note the customized "Black Hole" icon used for the trash can function. The "black hole as galactic epicenter" motif is more descriptive and accurate than similar "black hole" icons on competing GUI's.

ments and a "grid" icon to spreadsheet files), or even assign unique icons to arbitrary subgroups of files of the same type. For example, if you use the same word processor for both documents and correspondence, you can adopt a file-naming convention that distinguishes these types (e.g., ?????DOC.DOC for documents and ?????LET.DOC for letters), hand appropriate wild-card expressions to INSTALL WINDOW ICONS, and thus assign a unique "document"-type icon to each form of document file.

The actual icon forms are drawn from a configuration file called DESKICON.RSC, which since it takes the form of a normal resource file, can be edited and extended at will to provide new icon shapes not included in the default set.

Install Application

On the present Desktop, the Install Application function is somewhat limited. Though a specific file extender may be associated with an application, allowing autostarting of the application when an icon of that type is double-clicked, the file, the application, and its various support files must often reside in the same directory, or the application and support files must reside in the root directory of the relevant volume. The new Desktop adds significantly to this function, permitting you to control processing from Desktop level in much the same way as users of sophisticated command- line interfaces are accustomed to doing, but with far greater simplicity.

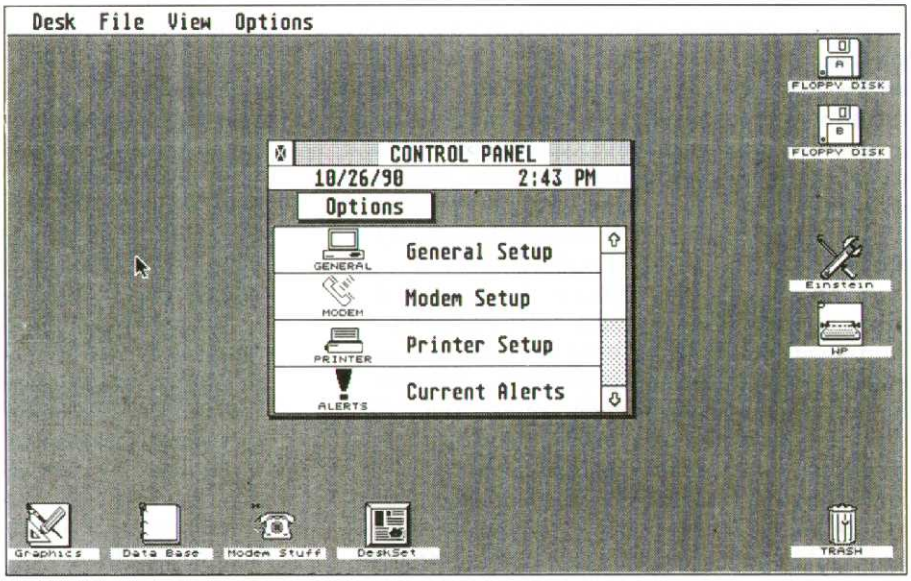
Not only can you link an application to a data file with a specific extension, but you can specify a full path for that application, so that the system can find it wherever it resides. You can also assign a default directory to the application, so that when executed via an installed link, it knows where to find its own support files (e.g., .RSC files), even if that differs from the current directory (top window). Certain current programs can make use of this information, while other's can't — all future software should be compatible.

The problem of programs that maintain partial paths, assuming, for example, that all text files are saved in a folder called "\TXT", is solved by a "parameter" assignment function that supplies only the filename of the relevant document, rather than the full path, to the auto-executed application. Again, this fix has been included to maintain compatibility with older software.

Arguments can also be passed to an application as a function of execution by installed link. While on the ST, arguments could only be passed to .TTP (TOS, Takes Parameters) programs, the TT now recognizes a new file type — GEM, Takes Parameters — that can also be used in this kind of transaction.

Further enhancements to Install Application include the ability to assign an application to open

from a function keypress (or shifted function keypress, permitting up to twenty applications to be so installed). As before, a single application can also be assigned an autoboot status, so that it starts automatically when you switch on your computer.



The new Control Panel's main CPX menu. Available Control-Panel Extensions are visiible in the window.

Desktop Configuration

Establishing general control over these parameters, and adding further functions of its own, is the new Desktop Configuration dialog. The first set of buttons in this dialog let you tell applications system-wide to treat either the top window or their own directory as their default directories. The second set of buttons lets you control globally whether installed applications are handed only the filename, or the full pathname, of document files. Both of these global parameters, of course, are overridden by any individual, application-specific parameters defined when you install an application. Desktop Configuration also lets you review — again globally — the assignment of function keys to programs for one-touch execution.

More significantly, Desktop Configuration adds a totally new feature to the Desktop: one-touch menu-item selection. The function lets you assign a single key to any menu item, allowing you to execute it with a keystroke, instead of via the mouse. The Configuration dialog also displays system free memory.

All configuration details: colors, patterns, display characteristics, icon assignments, function-key entries, etc., are saved in a single configuration file, NEWDESK.INF, when the function Save Desktop is selected. Another new function, Read .INF FIle, has also been added, that permits multiple .INF files to be saved on disk, and imposed without having to reboot the system. As before, the default .INF file, now NEWDESK.INF, defines the auto-start configuration.

Finally, two additional convenience menu items have been implemented. Print Screen performs the screen-dump function now performed by pressing ALT-Help, and requires that SDUMP.PRG be installed from the /AUTO folder if an SLM laser printer is being used. Finally, there is a menu item called Cache, that permits the TT's 68030 on-chip instruction and data caches to be turned on and off — a feature important in preserving compatibility with certain present-generation software.

The Control Panel

Desk accessory programs, ranging from the Control Panel to on-screen calculators, disk formatters, terminal emulators, and other "instant-access" utilites, have always been important features of GEM and the ST. In fact, one of the few consistent gripes against GEM is the fact that it lets you install a maximum of only six desk accessories at one time.

Back in the old days, when 520K systems were the norm, this limitation made some sense. Too many desk accessories could eat up the RAM space quickly, squeezing out normal applications.

These days, however, when 2 and 4 Mb ST's are commonplace, the memory requirements of DA's are less of a concern. Another reason for the limitation is that accessories are passively multiprocessed by the operating system, hence too many of them can consume an excessive amount of processor time. This objection is more cogent, though the high speed of a machine like the TT suggests it may be partially invalid, as well.

So why not simply increase the number of desk-accessory slots? Because that's only half a solution. For one thing, it doesn't provide an answer to the problem of accessory management. In any given work session, the average user will only call on one or two of his DA's, so why waste memory and processor time loading and multiprocessing the others? And what about the problem of always having to store accessories on the root directory of the boot volume? Almost all ST power-users resent the annoyance of having to copy DA's from a storage directory to the boot drive and rebooting in order to install them, or having to pull down Show Info and change the extensions of three or four accessories from .ACC to .ACX (or similar), in order to prevent them from being installed on the next go-round.

There are other problems with GEM Desk Accessories, notably the fact that DA's are not informed correctly when video resolution changes occur without rebooting. So clearly, adding more DA slots isn't the way to go. Instead, Atari software engineers have come up with a more elegant solution that answers admirably to three opposing needs: the need for more desk accessory space; the need to conserve system resources; and the need to facilitate management of add-on programs. Their idea was to redesign the Control Panel, turning it into a manager for a new class of programs called CPXs, or Control Panel Extensions. The idea is loosely based on that of the Apple Macintosh's CDEV (Control DEVices) concept, though Atari's implementation is far more flexible, orthagonal, and extensible.

CPXs come in two flavors: resident and non-resident. They can be named active or inactive. Active, resident CPXs are loaded at boot time and remain in memory, instantly accessible through the Control Panel and its associated window for the duration of the session. Non-resident CPXs can also be accessed rapidly through the Control Panel, though these must be loaded from disk prior to execution — the advantage being that they can also be UN-loaded and/or RE-loaded without rebooting. Under normal circumstances, it's assumed that most of a user's CPXs will be non-resident, their memory requirements while inactive being thus reduced to an amount of RAM sufficient to store their icons and their names. And even resident CPX's are not multitasked, so if the user prefers — and has the RAM to spare — a large number of them can be loaded without imposing on system throughput.

The management problem is solved by the fact that CPXs can be stored in their own folder, distinct from the root directory of the boot drive. Managing them, through the Control Panel CPX menu and Setup dialog, plus the Configure CPXs CPX (note: a CPX that helps manage CPXs), is thus reduced to a series of procedures not unlike those used to manage resident fonts under GDOS.

Naturally, the fact that CPXs are not multitasked prevents them from doing some of the things that DA's can. For example, a CPX can't, while inactive, monitor and respond to GEM timer events. But a majority of DA-type applications don't require these facilities. A calculator DA, for example, does background processing sufficient only to determine when the user wants it to wake up and be a calculator. How much more efficient, then, to save processor time (and perhaps memory), by recasting such a program as a CPX, and pulling it into memory only when it's needed? Once activated, the CPX can take over the Control Panel window as long as it's required, and can be made to work more or less exactly like a normal DA.

When selected, the new Control Panel accessory (XCONTROL.ACC) displays a window full of CPX icons or filenames, any one of which can be activated by a double-click. The Panel itself has its own pull-down menu, whose first two selections are About (which displays copyright information for the Control Panel), and Setup, which gives access to additional system and CPX-management functions. When a CPX is highlighted in the Control Panel menu, three more menu selections are made active: Open CPX (which works the same as a double-click on the CPX name or icon), CPX Info (which gives version and status information about the highlighted

CPX), and Unload CPX (which causes a non-resident CPX to be removed from the CPX menu).

Clicking on Setup reveals another dialog box, bearing several items. One of these is a button that allows you to switch the displayed system time between 12 and 24-hour (European) format. The remainder of the Setup dialog is concerned with further aspects of CPX management. You can set the minimum number of slots available for CPX identifiers to any number between 5 to 99. Another editable object lets you enter a directory path for CPXs. Finally, buttons in the Setup dialog permit immediate reloading of all CPXs (under the assumption that you've changed the status of a CPX or made some other change), and permit access to a further dialog that allows you to move CPXs between the active and inactive list.

All further functions normally associated with the Control Panel are actually performed by CPXs. Five of these are included with the TT. The first standard CPX actually manages CPXs, letting you change their names, associated text and icon colors, and define them as RAM-resident or not.

Window Colors enhances the Desktop's own color and pattern-select functions. Window Colors lets you assign different colors to different elements of desktop windows (scroll-bars, bar backgrounds, full box, size box, etc.). In all, different colors can be assigned to each of the 15 elements of an active window, and up to five elements of an inactive window.

Window Colors includes ten preassigned color sets (as Leonard Tramiel says: "these range from very pretty to 'we couldn't think of any more pretty combinations.'"). The CPX also lets you select whether text in a window will be printed transparently over any background pattern, or will appear surrounded by solid color.

Further color sets can be custom-designed using the second CPX, Color Setup. The challenge of designing this CPX lay in figuring out a method for organizing selections from the TT's huge color range. The final design organizes the TT's 4,096 potentially-available colors in banks of 16 "inks", letting you scroll through ink-banks until you find one that approximates the set of colors you want. Individual inks can then be further modified, via a set of conventional RGB scroll-bars, before assigning the inks to a set of "pens" (actual color registers). Low-resolution, which can display up to 256 simultaneous colors, is an exception — when in low-res, Color Setup lets you scroll through the 256 available "pens" directly, modifying the color of each as you desire.

The General Setup CPX actually contains most of the functions that used to be associated with the Control Panel. It allows you to set the keyboard response and repeat rate, the mouse click response rate, and lets you turn keyclick, bells, and the internal speaker on or off. General Setup also includes a Cache select button, that gives global control over whether the 68030's caches are active or inactive at powerup. A cute "double-click test box" has been included that lets you experiment with changes in mouse response.

Sound Setup is particularly charming, letting you adjust the balance, volume, bass and treble quality of the TT's STe-compatible stereo sound output. Balance adjustments are done with reference to a little animated head, wearing earphones, that actually turns from left to right as sound pans from one speaker to the other. Finally, there's the Accelerator CPX, the latest and greatest version of Ken Baedertscher's Mouse Accelerator program. As in earlier versions, the program lets you select mouse speed from among three options and introduce a time-based screen-saver utility that changes screen colors after a period of inactivity, in order to prevent image burn-in. As in the Stacy, the "modem recognition" feature is included in the screen saver, which forces the system to monitor both modem and keyboard activity to determine what constitutes "inactivity."

Conclusions

Though the new Desktop and CP were designed for the TT, much of the software is fundamentally compatible with current ST systems, particularly the STe. It is likely, therefore, that within the next several months, the entire Atari ST community may benefit from its release.

Atari has succeeded in creating a successor to the original ST Desktop that very much parallels, in software, what the TT is designed to accomplish in hardware. Considered together, the new Desktop and Control Panel work within basically familiar contexts to extend, in economical, meaningful, and striking ways, the power of the ST line. ■