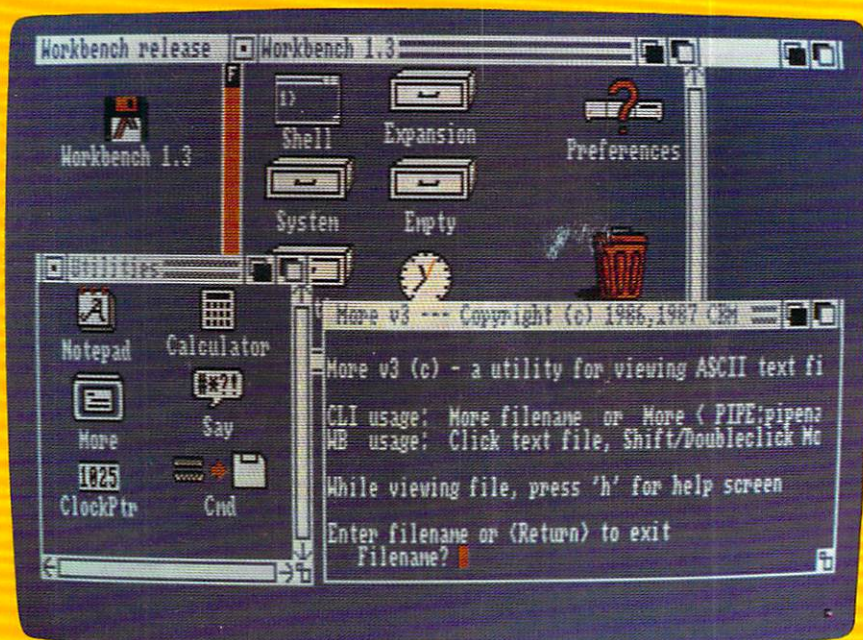


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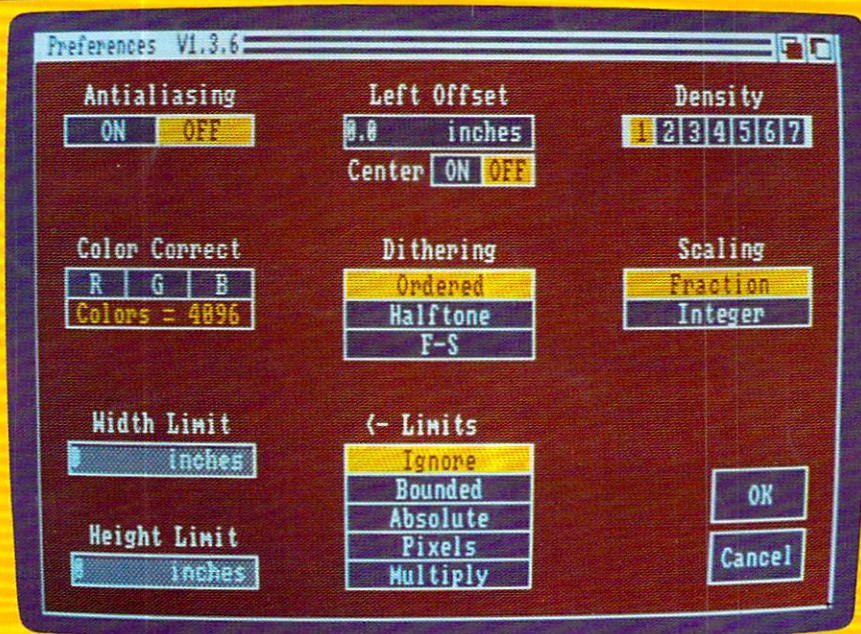


WorkBench 1.3

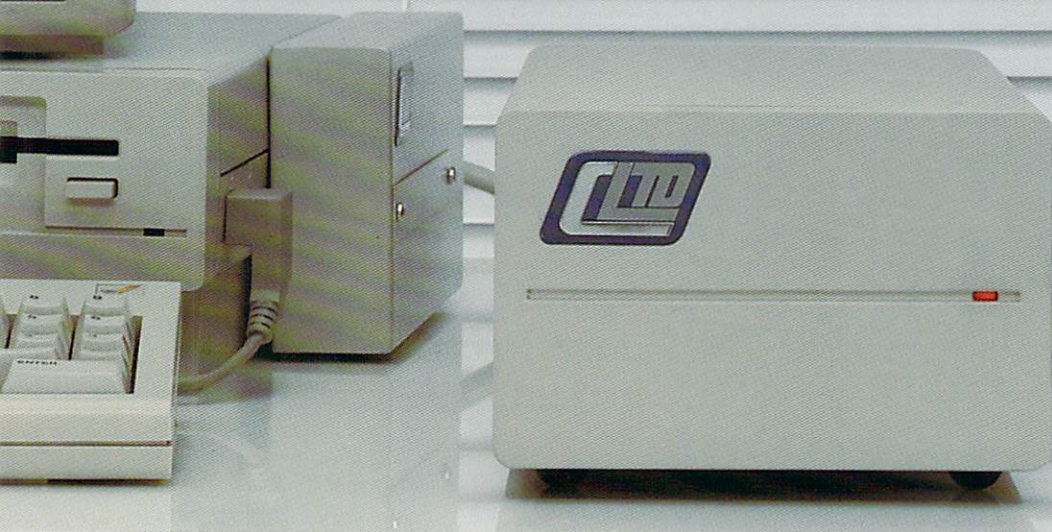
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On Point

Notes from editor Tom Bucklin

Uncertainty...that's how many of us first approached the Amiga back in 1985. Although it was a totally new kind of machine, bearing a totally new kind of technology within, there we were, lined up to purchase what we hoped would be the equivalent of a ride on the space shuttle. There were, to be sure, a number of important unanswered questions back then; not the least of which could have been "how long is this machine going to stay around?"

There was Commodore, solidly famous for the splendid C-64, now introducing a computer that would literally revolutionize the way many computer manufacturers view customer requirements in a personal computer.

However, the people pacing the floors of the few Amiga dealers in 1985 pondered much more basic questions like, "How am I going to convince my wife that I *need* this computer to perform useful economic forecasts instead of getting it to play forty straight days and nights of *Mindwalker*".

Of course, things do have a way of working out. Most of the real determined sorts did get

their Amiga. We also added a new word to the dictionary, "AmigaWidow" (If they only new then what they know now).

Still, in between Demos and DPaint, there was an uneasiness associated with this machine. It was *so* unique that it required the support of one specific company to keep it alive; a thought that came back to many when Commodore went through some of their hard financial times. With the release of the A500 and A2000 models, it was clear at last that Commodore intended to support a compatible technology on up the line.

Since the introduction in 85, the Amiga has gone through three official WorkBench / Kick-Start versions. Now, in this issue, we bring you the news about the latest and greatest, 1.3. This new version is packed full of new features and capabilities, some of which had been rumored, and others that took everyone by surprise.

Probably the most significant part about this new version of the operating system is the types of enhancements that were made. They seem to correspond very closely with the kinds of things that were on many a

user's wish list, and not just bug fixes. Also, there is built in support for additional expansion hardware and autobooting capabilities. The 1.3 printer.device and associated drivers will bring new expression to Amiga graphic output, while eliminating the need to take the day off when you have multiple screen dumps to print.

You'll also read about a variety of Commodore hardware products nearing completion that are bound to make people sit up and take notice of the Amiga's potential for vertical applications. In particular, you'll want to read about the specifics behind the forthcoming A2024 - 1280 x 800 display monitor. DeskTop Publishing on the Amiga will never be the same after using the A2024.

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WorkBench 1.3

1.3 adds some impressive and surprising abilities to AmigaDos

by Steve Dock & Tom Bucklin

Commodore is now in the Gamma 4 stage of Workbench 1.3. A Gamma release is considered almost final, with no new functions to be added, or deleted. The only changes will be bug fixes. Within a month or two, Workbench 1.3 and its associated disks should be availa-

ble to all Amiga owners. What new goodies will we find? The list is impressive and results in major improvements in functionality across many areas:

New Printer.device, Printer drivers, and Preferences

New Diskfont.library and Adobe screen fonts

New fast file system for hard disk users

Improved and additional CLI commands

New AUX: and Speaker: devices

New Recoverable/rebootable RAM: device

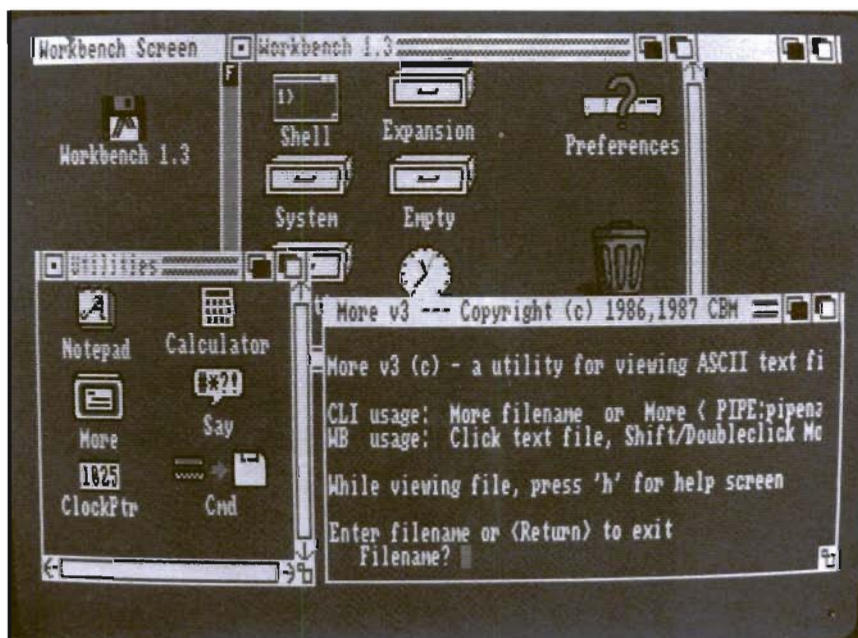
Improved math libraries and support for the 68881

The range and scope of these improvements show that Commodore has invested significant effort and resources in improving the Amiga operating system. The entire staff of the Sentry has been busy working with and testing many of these new features. The following pages will treat each major topic in enough detail to whet your appetite.

New Preferences, Printer Device, and Adobe Fonts

As we read the documentation and read.me files included with 1.3 WorkBench, it became obvious that improved print quality and productivity was a major emphasis. Whenever you select a print function, the Amiga operating system loads a program called *PRINTER DEVICE* along

Commands like "More" and "Cmd" now reside in the utilities directory



with the Printer Driver which you specified in Preferences. These translate the text, fonts, and graphics on screen into a language appropriate to your particular printer. This has proven to be a very flexible and easy to use system across a wide range of printer types, resolutions, and colors. The major problems with the existing 1.2 printer.device have been speed and resolution. It had been tedious to wait 8 minutes or more for a full page of multiple font text on an Epson printer. Painful pauses at the end of each line showed that the printer was waiting for more data. Worse yet, you couldn't easily use the higher resolutions of the newer 24 pin printers.

These problems were recognized by Commodore and have been addressed with the 1.3 software. The printer.device has been completely rewritten to improve speed and make use of more built-in capabilities of your printer. You can boot with a 1.3 Workbench, click on Preferences and select your printer as usual. Now try printing with Pagesetter, ProWrite, VizaWrite, Notepad etc. You should notice a dramatic improvement in speed. Depending on your printer and preferences settings, a full page of graphics will be produced from 2 to 20 times faster than with 1.2. No more waiting at the end of each line. This improvement in productivity is of vital importance to users of Desktop Publishing and Multiple Font word processors. In fact, some developers have held up release of their new software until the

1.3 printer.device was available, eg. ProWrite 2.0 and Shakespeare. When each page took 8 minutes or more, few in business or the professions would consider the Amiga for their applications.

In addition to improved speed, the *Preferences* program has been updated to offer many new printing options. You are probably familiar with the graphics screen in WorkBench 1.2 where you select color, page orientation, and positive/negative image. This screen remains the same in 1.3, however it is now called the Graphics 1 screen. A new screen has been added called Graphics 2. You get to the Graphics 1 or 2 screens from the Printer Select screen.

The Graphics 2 screen presents you with gadgets for setting such exotic options as Antialiasing, Dithering, Density, Scaling, Color Correction, and Limits. As usual, you will find default options in effect, therefore you will not be required to master every new technique.

In the upper right corner of the screen is a section labeled *Density*, with numbers from 1 through 7. These refer to the various graphic resolutions your printer may be capable of. For example, Epson MX and RX printers are capable of four different densities ranging from 90 DPI to 240 DPI. Some of the new 24 pin printers (Epson Q series) can print up to 360 DPI! In order to select the highest resolution your printer is capable of, you need some information about its specific printer driver. The printer driver notes

supplied with the disk specified which densities were available for each printer. For example, if you want the highest resolution available for the Epson X series, simply click on the number 2. The Epson Q series offers densities from from 1 to 4. You might want to use the lowest resolution to print out samples of a document in progress then switch to the highest resolution for the finished product. Obviously, the higher resolution printouts take longer.

Moving to the left we find gadgets for setting Left Offset. You can type a value into the box labeled inches, to shift the picture to the left in increments of 1/10 of an inch. or you can click on *Centering On* to place the image in the horizontal center of the page. These two selections are mutually exclusive. You can center or shift, not both. At the top left of the screen is a gadget which sets Anti-Aliasing ON or OFF. This imposing term simply means that diagonal lines will be smoothed by the printer.device to reduce "jaggies". As in the case of higher densities, anti-aliasing slows down printing speed. The slowdown is about half speed, which takes back a large chunk of the improvement in 1.3. However, the higher quality is definitely worth it, especially if you are using a low resolution printer

Moving back to the right and down, we find the *SCALING* option. Click on the word Fraction or Integer to make your selection. The default choice is fractional scaling which has been in

(continued on next page)

WorkBench 1.3 (continued from previous page)

use with Workbench 1.2. Integer scaling interprets the screen dots differently. Every dot on the screen will be an even number of printed dots in both the horizontal and vertical dimensions. A low-res screen of 320 by 200 pixels will print in even multiples of these numbers to assure that thin vertical and horizontal lines look the same. If you have ever printed a grid, you know that this has not been the case till now. The scaling option will affect the size of graphic printouts, so be prepared to experiment. Integer scaling will also produce better looking printouts of bit-mapped fonts so you may want to set this as your default option.

The next option is *Dithering*. When you are using a color printer with 4 or 8 colors, the printer.device produces the effect of thousands of shades using a process called "dithering". When dots of different colors are placed next to each other, our eye will blend them to produce the sensation of an intermediate shade. The default value for dithering is ordered. This has been in use with 1.2. Regular patterns of different color dots have been used to produce color shades. Two new options are now available. By selecting HalfTone, you can change the printing pattern to resemble the method used in newspapers and comic books. On a Canon PJ-1080, this results in varying sizes of dots mixed within an area to produce shades of color. The third option uses the "Floyd-Steinberg" method to produce dithering patterns. I can't explain the algorithm, but it

results in gently swirling curves which give different sensations of color.

On the subject of color, the next group of gadgets is labeled *Color Correct*. In trying to reproduce all 4096 colors possible on an Amiga, the printer.device had problems with solid blues, and shades of brown. You can click on R, G, or B to indicate that you wish correction applied to red, green or blue. Each click reduces the total number of color shades that can be reproduced by 308. If you select maximum color correction you will be "limited" to only 3172 shades. This option produces outstanding improvement with the Xerox 4020 and Epson Jx80 color printers, but didn't do much for the Canon PJ1080. Since there are new drivers for the Epson and Xerox supplied with 1.3, my guess is that I'll have to wait for an improved Canon driver to benefit from color correction.

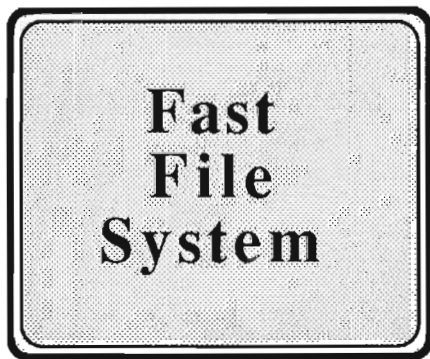
The final set of selections on the Graphic 2 screen is labelled *Limits*. Here you can override your software printer output format. You can define the exact height and width of Dpaint output to tenths of an inch for example. The options here let you manipulate in many ways. Choose *Bounded* to set maximums for horizontal and vertical size. This gives a convenient way to produce large graphic dumps without changing the text margin settings. The *Absolute* values are enforced regardless of the effect on aspect ratio. You can specify a page 2 inches wide and 8 inches long, and the printer.device

will distort the image to fit. Multiply lets you expand the number of pixels in the printed image. If you specify 2 in the horizontal and vertical dimensions, you will get 640 by 400 pixels from a low-res image. These tools will enhance image manipulation capability in creative hands.

I've already mentioned that WorkBench 1.3 comes with new improved printer drivers for Epson and Xerox printers. You'll find only two Epson drivers to support the whole range of Epson printers. The Epson X driver will work with all 8/9 pin printers, color or B/W. The Epson Q driver will work with the newer 24 pin printers, again color or B/W. This Q driver is important since other manufacturers use Epson emulation to gain wide acceptance. There are 24 pin printers from NEC, Fujitsu and others which will work with this driver. New 1.3 drivers have been included for : CalComp Colormaster; CBM MPS1000; Diablo C-150; HP LaserJet, DeskJet, PaintJet; Apple Imagewriter II (color and b/w); Okidata 92, 293I, and Okimate 20. Some of these are located on the "Extras" disk in order to make room on the workbench disk. Once you have made a copy of Workbench, it makes sense to delete all but the drivers you use.

The net result of the new Preferences and printer drivers, is to support more features of printers, greatly increased speed of printing, and provide higher quality printout from Amiga bit-mapped fonts. The final piece of Commodore's effort to improve Amiga

print quality is the licensing of fonts from Adobe. The Extras disk is slated to include a *FONT* directory with proportional Times Roman, Helvetica, and Symbol fonts. These will range from 8 to 24 points. Adobe licenses these same fonts to many manufacturers, and they have become industry standards which are used in PostScript Laser Printers. If you have ever envied printouts from an Apple Imagewriter, your time has come.



AmigaDos has a reputation as a "slow" file system. With more and more hard disks in use, the reason for this reputation has become clear. Harddisks on other personal computers are typically 8 to 10 times faster than a floppy disk, and can transfer data into memory at 300KB per second. On the current Amiga operating system, a typical hard drive is only about a 3-5 times faster than a floppy, and gives at best, 100 KB per second transfer rate. With Commodore positioning the A2000 as a business system, the time has come to improve this situation.

Turbo-charging a disk filing system must be done with care. The result must be completely compatible with existing software and AmigaDos functions. The approach taken by Commodore was to completely rewrite the system in assembler, develop new algorithms to improve response, and change the physical layout of the file structure. The new programs are found in the "L" directory with the name FastFileSystem (FFS) and in the DEVS directory as an entry in the mountlist. In the old system, a file consisted of data blocks. Each block contains 512 bytes. At the beginning of every block, a 24 byte header contained information about the file links. In order to load a program, the file system had to read one block at a time, strip off the header, then pass the remaining data on. Under the new system, the headers are gone. With only data in a block, many blocks can be loaded at once and passed directly on. A side effect of the new file structure, is that 4.9% more data can be stored on the same drive.

Simply booting with Workbench 1.3 will not activate the new Fast File System. A more conservative approach was chosen to ensure maximum compatibility. Each hard drive user must choose to implement the new file system since the default hard-disk.device has not been changed. If you're happy with your hard drive's performance, you can safely ignore the FFS. There is a certain amount of work involved in switching, so

read on before you make your decision.

Lets assume you have a 20 megabyte harddrive with one large partition. You will have a six step process to follow. First back up the entire contents of your drive. Now that your files are safely on 3.5 inch disks, you can proceed to reformat the drive. Next, copy the current high and low cylinder values to paper. Now, copy three files from the Workbench 1.3 disk to your boot disk. These are:

```
l:FastFileSystem  
c:Mount  
system:Format
```

You will need the new versions of the mount and format commands as well as the FFS itself. Next create a mountlist entry for the harddrive. You can use the existing Mountlist from your boot disk, all you need to do is add the following two lines:

```
GlobVec = 1  
FileSystem=L:FastFile System
```

These new parameters activate the FFS. (You may also have to change the LowCyl and HighCyl entries to the values you wrote down earlier). Now mount the harddrive using the command Mount Dh0:. You will get a requestor warning that Dh0: is not a DOS DISK. Click on Cancel and continue. Finally format your drive using the new format command as follows:

```
Format Drive Dh0: "FastDrive"  
( continued on next page )
```

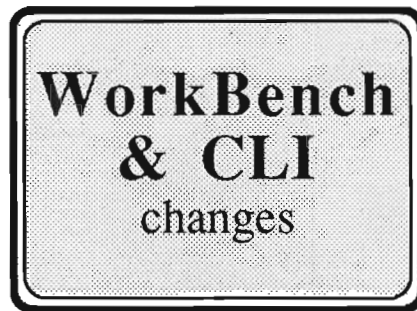
WorkBench 1.3 (continued from previous page)

FFS. The final parameter, FFS, will clue the format command to use the new physical structure. The drive is now ready to be restored from the backups and will show dramatic increases in most disk input/output.

This process gets a little more complex if you want to partition your harddrive into two or more logical drives. Multiple partitions are recommended by most "experts" for performance reasons. The same steps apply, but you will need an entry in the mountlist for each partition. You'll also have to mount and format each partition separately, and your finished startup-sequence must contain a mount statement for each.

One of the ironies of this improvement is that Commodore's own 2090 hard disk controller is not as compatible with FFS as some other units that have been produced through third party efforts. Its driver software was designed to automatically mount the first partition as DH0: using the old file system. In order to add FFS to a harddisk using the 2090 controller, you **MUST** use a second partition for the FFS. For most of us, this will mean running the PREP utility to create a small partition for DH0: and a large one for the FFS. This is an additional step, and precludes using the name DH0: for the fast partition.

If you have not yet purchased a harddisk, you will probably want to use FFS from the beginning.



Although it's called Workbench 1.3, the view from the Workbench screen is not all that different from 1.2. If you open the WB Disk, you'll notice that the *Demos* drawer is gone to make room for other more essential items. The only other visible change is a prominent CLI type icon labelled *Shell* (more on this later). The Special, Disk, and Workbench menus remain the same. Preferences has a new screen which has already been discussed. We'll have to look into the drawers to find any other differences. The Expansion drawer remains empty, the Empty drawer is unchanged.

Not until we open the *System* drawer do we find anything new. *FIXFONTS* is a program which corrects the font header files to reflect the contents of the fonts directory. Lets say you have copied a new set of Topaz fonts into your Font directory. The topaz font file may not know about the new sizes you have added. Fixfonts will correct this situation.

FASTMEM FIRST is not new to owners of A500's and A2000's. This utility was included on your 1.2 Workbench. It changes the system memory configuration to

use autoconfig expansion ram first.

NOFASTMEM is another memory rearranging utility familiar to owners of A500's and A2000's. It turns off any expansion ram. Clicking the icon a second time will restore your extra ram.

INITPRINTER loads the printer.device, and sends the codes to initialize your printer. This may be useful in testing new Preferences settings, or simply to avoid a delay when actual printing is requested.

The *UTILITIES* drawer has also seen some welcome changes. The Calculator and Notepad remain unchanged, but have been joined by four new programs:

MORE is a text viewing utility. It provides several functions which are useful for scrolling back and forth and searching through a text file. To use from the WB, you first click on the text file's Icon, then while holding the left shift key down, double click on the *More* icon. Keystrokes are used to control *More* instead of sliding gadgets. The space bar advances a page at a time, the return key moves forward by one line, < returns to the top of the file, and > to the bottom, Q or CTRL-C is used to exit more.

CLOCKPTR is a handy new function to keep track of time. It changes your mouse pointer into a digital clock whenever the WB background is active. This is very clever. When you are active-

(continued on page 10)

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WorkBench 1.3

(continued from page 8)

ly using any program, the normal pointer returns. Need to check the time? Simply get to the WB screen and click.

There are other goodies here as well. When the Clockptr is active, it will display the month and day if you move it to the lower left of the screen. Moving to the upper left corner shows the amount of time Clockptr has been active. This can be very useful for interval timings.

CMD is the final addition to the Utilities drawer. Double click on *CMD* to capture any printer activity to a system file. This program will save the print image to *RAM:CMD_file* by default. You may change the storage location by changing the *FILE=* statement in *INFO* Tooltypes. *CMD* will be active for one printer activity, and will flash messages across the screen to keep you informed

of its progress, eg. 9725 Bytes Redirected from Parallel to *RAM:Cmd_file*. By saving screen dumps or other printed output to ram or disk, you can print multiple copies at your leisure.

There are other improvements which are not visible from the Workbench screen. One of these is the *FastFonts* program from Charlie Heath at Microsmiths. Commodore has included this screen speed-up utility in the *C:* directory. The Startup-sequence provided on the 1.3 disk activates *FF* automatically. *Fast-Fonts* has been available commercially and provided a much needed boost for screen scrolling.

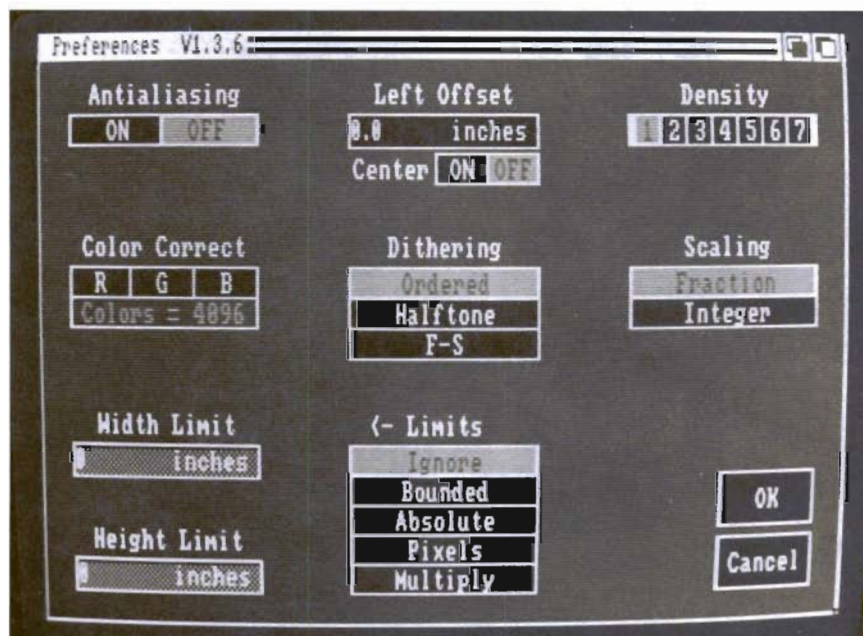
Now back to the new *SHELL* icon. When you click here, a standard CLI window will open. However, it will use the *NEW-*

CON: device as its handler. What that means in plain english is that Commodore has added command line editing and history functions to the CLI. If you have not used one of the public domain programs like *CShell* or *Conman*, this will take a little explanation. If you are working in the CLI and notice a mistake while typing a long command, you must back over and remove your typing to make the correction. With command line editing, you can use the left cursor key to move over your text and make corrections. This is a great help to five thumbed keyboard artists. The history function keeps each CLI line that you type in a memory buffer for recall. Lets say you need to repeat the command you typed four lines previously. Just press the UP cursor key four times to recall it. Again, this is a labor saving device with great utility.

The *SHELL* can do much more to provide an environment that is familiar to people who use other operating systems. MS-DOS users are accustomed to typing *Erase* instead of *Delete* and *Mkdir* rather than *Makedir*. In a Shell you can set up an *Alias* to execute the *AmigaDos* function even though you type another name. You can also save typing by creating short versions of common commands.

Shell will also automatically execute the *AmigaDos* commands found in the *S/CLI-Startup* file when it is opened. This means that you can store the *Alias* statements you require here for instant customizing. The Shell supports

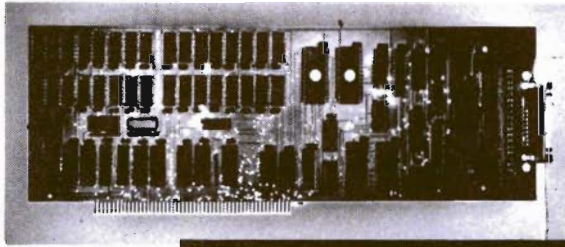
The new preferences "Graphic 2" screen allows you to set up a number of parameters to enhance your printed output





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Provides a combination 20MB hard disk and memory expansion add-on subsystem for the Amiga A500.

- Combines ANSI X3T9.2 compatible SCSI controller, 3.5" hard disk drive and up to 2 MB FAST RAM expansion for the A500, in a single compact, snap-on unit.
- Uses its own power supply
- AUTOBOOT feature. With the V1.3 Kickstart and this feature, floppies will no longer be required to boot the A500.
- Fully AutoConfigures both the SCSI Hard Disk Controller and the (optional) FAST RAM.
- 20MB, 3.5" Hard Disk Drive mounted internally.
- External SCSI connector.

use of the *Resident* command. Many other personal computers keep the most often used file commands in memory for instant execution. AmigaDos must load from the C: directory every DIR or COPY you type. By making these commands resident during your Shell startup, commonly used CLI functions will execute instantly. For example:

Resident C:copy
 Resident C:cd
 Resident C:dir
 Resident C:execute
 Resident C:info
 Resident C:list
 Resident C:makedir
 Resident C:type
 Resident C:rename

saved in your Startup-Sequence or CLI-Startup will give you the equivalent of MS-DOS Command.com. I have been using Public Domain programs to add this type of functionality to the CLI, but I am very pleased to see Commodore provide its own set of answers to these needs.

There is one more improvement available through use of the Shell. Currently, you must type *Execute* to invoke a file of AmigaDos commands. I have renamed *Execute* to *X* on my WorkBench, but this is still annoying. WorkBench 1.3 has added several new status bits to each AmigaDos file, and one of these is the *Script* bit. You use the *Protect* command to set these

bits like so:

Protect Greeting + S

This line would change the script bit of the file Greeting to on. Now, when you are in any Shell, you could type Greeting to execute the contents of the file. The Shell will invoke *Execute* automatically for you. This may seem like a trivial change, but it makes CLI menus much easier to use. There are other new and changed CLI commands:

ASK is used in script files to prompt for a Y or N response

AVAIL gives a useful display of Chip, Fast and Total memory.

(continued on next page)

WorkBench 1.3

(continued from previous page)

CMD has been described above, but offers many command line options.

FORMAT has been changed to support the FFS and Quick reformat for harddrives.

GRAPHICDUMP has been improved to offer sizable output options.

INSTALL can create a DOS non-bootable disk and the *CHECK* option looks for valid Amiga boot code (no virus).

LIST now shows the new Protection bits.

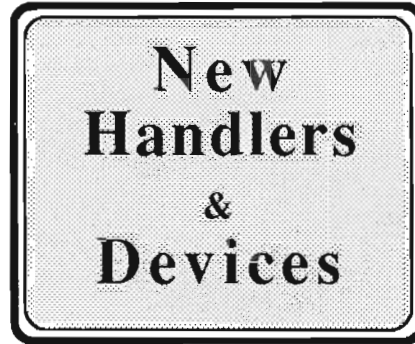
LOCK is a new command to protect Harddrive partitions and can use a four character password

PROTECT has new syntax and can make a file Hidden, Script, Pure, or Archive.

STATUS will now accept a task name as an argument to search for.

XICON executes a script file from the Workbench.

WorkBench 1.3 has concentrated on improving printed output and harddisk performance. For the CLI hacker or programmer, a whole new environment has been provided by Commodore. This new environment is bound to improve productivity and increase the capability of the machine.



The Amiga has a very modular and open operating system. It can make use of programs called Handlers and Devices. Handlers reside in the *L:* directory, and devices are found in *Devs:*. Workbench 1.3 provides several new capabilities through new handlers and devices.

SPEAK-HANDLER - provides a way to have any AmigaDos command speak its results using the translator.library and narrator.device. You must first *MOUNT SPEAKER:* then use redirection. For example:

```
TYPE>Speaker: Startup  
DIR >Speaker:  
DATE >Speaker:
```

will all result in the familiar Amiga voice speaking the words which would have printed on the screen. Many programs can also have their output directed to *SPEAKER:*. This is of obvious benefit to blind persons who wish to use the Amiga, as well as programmers who want to easily add speech to their projects.

PIPE-HANDLER - Pipes are a favorite device in UNIX systems and find some use in the MS-DOS world. This implementa-

tion of PIPES is courtesy of Matt Dillion. A pipe is a generalized I/O technique which lets one program communicate with another. This lets you pass data in ways the programmers may not have thought of. *PIPE:* must be mounted before you can use it. Lets say you want to sort a text file then join another file to it. You could type the following:

```
Sort fileabc PIPE:a  
Join PIPE:a filexyz
```

The two operations will happen much faster than if run sequentially since *PIPE:* passes data unbuffered from program to program. You might think that the *RAM:* device could be used to accomplish the same result, but *PIPE* is faster and more flexible

AUX-HANDLER - Have you ever wondered if your Amiga could be a multiuser as well as a multitasking machine? If you have experimented with a second user through the serial port, you ran into problems with buffers. The person using a remote terminal would have to fill up the serial port buffer before his CLI would respond. The *AUX:* device will resolve this problem and allow a remote or second user to operate a full fledged CLI. This is also a mountable device with an example entry in the *devs/mountlist*.

NEWCON-HANDLER - This is the brains behind the Shell's command line editing and history. Other programs which make use of *CON:* can add these capabilities by calling *NEWCON:*.

The L: directory is home for the *FASTFILESYSTEM* which we discussed earlier, and the *SHELL-SEG* which adds the new functions to the shell. Moving to the *DEVS* directory we find a new entry, *Ram-drive.device*. This is not a replacement for RAM: which we know and love. Instead, it is a mountable, Recoverable Ram Drive. There are several similar utilities available commercially and in the Public Domain, but Commodore's RRD: has a very special characteristic, it's *BOOT-ABLE*. The purpose of an RRD is to keep the programs and data you have in memory safe through a system crash. This can save a significant amount of set-up time in programming situations, or when AmigaDos asks for more memory than is available. The only catch to rebooting from the RRD: is that you must use Kickstart 1.3. A1000 owners can use a disk based version of the new Kick, but 500 and 2000 owners will need to replace the ROM in which Kickstart 1.2 is stored. This new Kickstart ROM will probably be supplied through the dealer channel at some future date. You will not want to replace the ROM yourself, since this would void your warranty. (Some enterprising programmer will no doubt find a way to patch the ROM Kickstart image in RAM soon enough.)

The Gamma release calls this device CARD:, but that name is likely to change in favor of a three letter name. You can call it

anything you like by changing the name in the mountlist. Unlike RAM: the RRD: is fixed in size by its entry in the Mountlist. To use, simply mount the RRD, and then you must format it. This happens quickly since it is a memory device. Now you can treat the RRD: just like another AmigaDos drive. Copy necessary files and programs to RRD:, then use the Assign command to point there. Now for the test. Reboot your Amiga (not a power off) then mount the RRD. Your data will still be available. If you have a 1000 and booted with Kick 1.3, try the same thing but remove the Workbench disk from df0:. Surprise, the system returns and executes the s/ startup-sequence you have copied into the RRD. This ability to boot from devices other than DF0: is the only change in Kickstart 1.3 and is a significant one; it will affect all those devices which have been longing to be bootable, like harddrives and network servers.

One other software enhancement is a new set of *MathIEEE* libraries. These libraries operate up to seven times faster, and more importantly, will recognize the existence of a Motorola 68881 math co-processor automatically. This previously caused a problem which required specially compiled versions of software in order to take advantage of the specialized math coprocessor. In order to make full use of this feature however, 68881 hardware developers need to make sure that their add-ons meet autoconfigure specifications.



The hardware engineers at Commodore have also been busy on many projects recently. Several new items will be officially introduced at the Hanover Fair to be held in Germany during March 1988. First shipments of these products will occur from April through August. Recent conversations with Commodore personnel have verified the following products, however pricing was not available.

One of the most interesting new products is the *A2024 Monitor* (also known as the "Hedley" monitor). This is a HiRes monochrome monitor which contains its own frame buffer. In its "standard" mode it will de-interlace Hi-Res screens to produce 640 by 400 flicker free displays. The standard mode will support 8 different shades of grey. A frame buffer is a specialized video memory area which can capture and manipulate video signals. Obviously this is the kind of HiRes display which desktop publishing and CAD users have been waiting for.

(continued on next page)

WorkBench 1.3 (continued from previous page)

The frame buffer in the A2024 is capable of even more magic. Using the special "extended" modes, displays of 1008 by 800 with four shades of grey are possible! Now we're talking really hi res. This new mode is also flicker free. Remember that two normal Amiga HiRes frames are combined in the buffer to create the standard mode. The extended mode uses either four or six modified frames to assemble the new very high resolution display.

When four frames are used there is a serious impact on Chip ram which could affect applications. The six frame mode does not have this penalty. Modifications to several system libraries which are contained in KickStart are required in order to support the extended modes. These libraries are EXEC, Intuition and Graphics. A temporary method of patching these libraries called JumpStart is currently being used. No doubt new Kickstart ROM chips will be provided by authorized dealers at a latter date.

Developers are receiving documentation which will enable them to make use of the extended modes with WB 1.3. The extended mode has some limitations, eg. 1 sprite, no dragging screens, but these should not cause any hardship in the intended application areas. The more serious implica-

tion is for Chip ram. Each 1008 by 800 bit plane uses 100K of Chip memory. This means that the 2 bit plane display (four shades of grey) uses almost 40% of the available chip memory. Sooner or later Commodore must address the 512K limitation on Chip ram.

Another video related product is the **A520 RF Modulator**. This low priced unit plugs into the RGB port and produces both composite color and RF signals. The A520 will allow owners of A500s and A2000s to send their color graphics and animations to video tape. The color composite signal can also be used on a composite monitor. The RF signal lets you connect your Amiga to an ordinary TV set. Expect the A520 in the April-June time frame.

A new memory board for the A2000 is due soon. The **A2058** unit will allow from 2 to 8 Megabytes on a single board. You would have to purchase four 2 megabyte boards to accomplish this at the present time. With memory hungry graphics programs proliferating, 8 Meg is really necessary for some applications. The 2058 should ship between May and July.

The **A2620** is the 68020 processor card for the 2000. This supercharger will operate at 14.3 MHZ, double the speed of the current 68000 Amiga processor. The 68020 will be accompanied by a Motorola 68881 math processor which will also be clocked

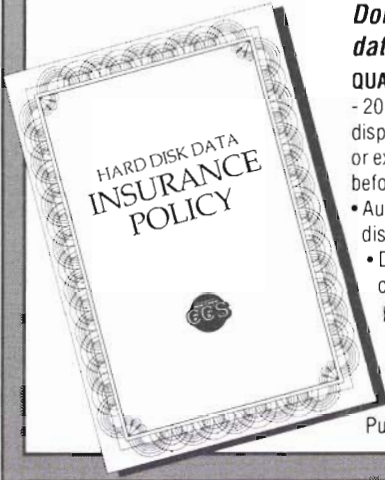
at 14.3 MHZ and a 68851 Memory Management Unit. The MMU is not needed by Amiga-Dos, so speculation about other operating systems, including UNIX, is widespread. This computer on a board is also slated to include a as of yet undetermined quantity of 32 bit memory. The 32 bit memory will be necessary to get maximum benefit from the "true 32 bit" 68020 chip. This add-in will work with all well behaved Amiga software and be especially useful in computation intensive applications like CAD and RayTracing. This product is scheduled to ship in the June-August period.

In a major corporation like Commodore, there are, at any given time, a multitude of engineering projects going on. A company must sort through the engineering proposals for products that are marketable and cost effective. All of these aforementioned products are far along in their development, with most having a proposed ship date for this summer. With all of these items targeted for release around the same time, it should be one *hot* summer.

As always, The Sentry will bring you the factual information on the stories concerning these products as more specifics become known.

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Return to Atlantis

The long awaited undersea adventure from Electronic Arts

by Ken McNeill

Giant glowing jellyfishes drift slowly past as I glanced at my air meter. It read near empty, which meant I would soon have to return to the ship to refill my tanks. I swam onward, scanning the ocean floor for any sign of the shipwreck. I was about to radio my ship and request pick-

up when something caught my eye near the coral reef. It was the rotting remains of an old Spanish Galleon that had become a home to many Caribbean fish.

My heart pounded with excitement as I swam closer to investigate. Just then, out of nowhere, came a large lobster throwing cans at me. A few moments later I realized it was not a lobster at all, but rather a lobster-shaped robot, and the cans were really explosive devices that nearly

blasted me out of the water. I tried feverishly to fire my own weapon, but my aim was off and I was so dangerously low on air...

Such is a day in the life of Return to Atlantis, the long-awaited underwater game from Electronic Arts. The game is set in the near future when the earth has been stripped of all natural resources, and the sea offers a last hope for mankind. An organization known as the "Foundation" has been formed by those wishing to preserve the sea from the same exploitation that ruined the land. As an agent for the Foundation and a recent graduate of the academy, it is your job to fight the forces that abuse the sea and undermine the efforts of the Foundation. The game includes fourteen different missions, each of which has a half-page "dossier" explaining the background and objectives of that mission.

Boot up, enjoy the cinematic introduction, and have a blank disk handy on which to create a character. You'll choose the character's name, and watch as values for six attributes are randomly determined. These are not the usual D&D attributes and each

(continued on next page)

You'll question a variety of characters in order to secure information for your quest



RTA (continued from previous page)

plays an important part in some facet of the game. Each character gets scores for psychology, athletics, telepathy, awareness, programming, and weapons. Each attribute is important, and you are allowed to add five points to one of the traits.

After your agent has been saved to disk, an eerie holographic face appears on the screen and briefs you on your present mission. When I say

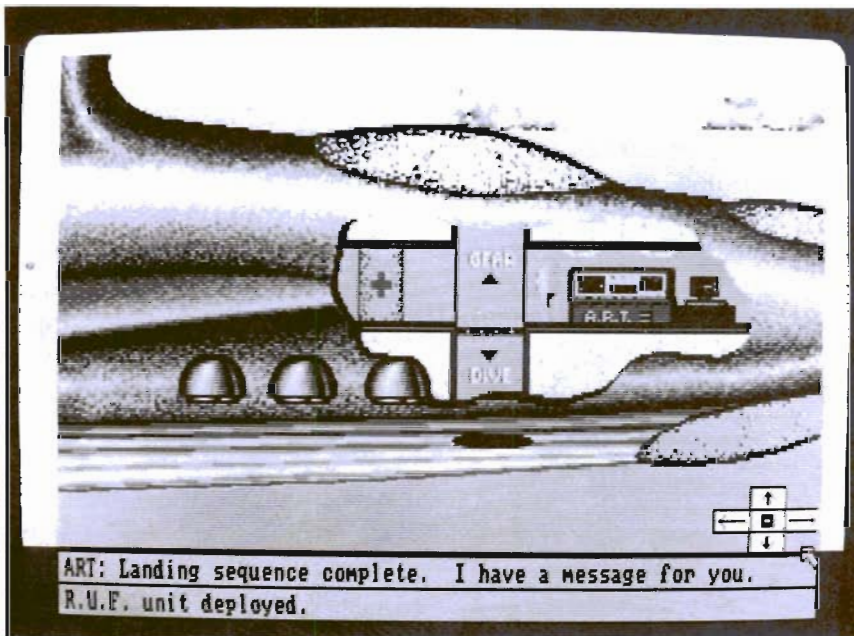
one-on-one conversations with the characters. Click a silhouette and you'll see a long view of the character in his surroundings, and a close-up of his/her face.

The graphics here are sharp and life-like, and the Amiga's built-in speech synthesis is used throughout the conversation. As you interact with each informant, responding to dialogue with mouse clicks, the facial expressions of the characters change

moment, and then you are aboard the Viceroy, your futuristic vessel. The agent appears as a small figure wearing flippers and scuba gear. The ship is shown in a cut-away side view, and is gently swaying with the waves. The faint sound of its engines can be heard in the background. Your figure is standing on a movable platform, and may go in any of four directions by clicking the appropriate arrow in the right hand corner of the screen. Click the left arrow, and the figure walks into a room containing the "medical beam", a device with the limited power of restoring your health when you become injured. On the right side of the ship, there is a large terminal with many flashing lights. This is A.R.T. ("Advanced Robotic Transcoordinator"), your computer and central intelligence for the mission. ART ties in with home base, gives you mission status, and conducts scans of the ocean floor to help locate your objectives. Clicking the up arrow raises the platform to the gear room where you can equip yourself with available items such as a current meter or underwater explosives. The fourth direction is down. Click this arrow and you make your plunge into the mysterious depths of the sea. Don't worry, the Viceroy will always be there to pick you up if you need it.

The first thing you notice when you reach the ocean floor is the variety and abundance of sea-creatures that swim past you going about their business. You

(continued on page 20)



The Viceroy is the futuristic vessel that serves as your base of operations

"briefs", I mean that the lips of the image actually move while a low, commanding voice speaks through the monitor. Next, you are taken to the "Sea Thief Cafe" where you see the silhouettes of various characters to whom you can speak. Your goal here is to use bribery, threats, or humility to extract vital information from the informants. You don't see the actual cafe, but engage in

depending on what is said or done. Even when the character is not speaking, the eyes are darting from side to side, and the head moves slightly. The effect is so captivating that I found myself talking back to the monitor screen.

After you are satisfied that you have fully questioned the informants, it is time to get down to business. The screen fades for a

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If you've owned your Amiga® for a while now, you *know* you definitely need more than 512k of memory. You probably need *at least* double that amount...but you might need as much as an additional two megabytes.

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The sculpted steel case of **StarBoard2** measures only 1.6" wide by 4.3" high by 10.2" long. You can access the inside of the case by removing just two small screws on the bottom and pulling it apart. We make **StarBoard2** easy to get into so that you or your dealer can expand it by installing up to one megabyte of RAM on the standard **StarBoard2** or up to two megabytes by adding in an Upper Deck.

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The basic **StarBoard2** starts out as a one megabyte memory space with 0k, 512k, or one megabyte installed. If you add in an optional **Upper Deck** (which plugs onto the Main Board inside the case) you bring **StarBoard2** up to its full two megabyte potential. You can buy your **StarBoard2** with the Upper Deck (populated or unpopulated) or buy the Upper Deck later as your need for memory grows.

And you can add other functions to **StarBoard2** by plugging in its second optional deck –the Multifunction Module!

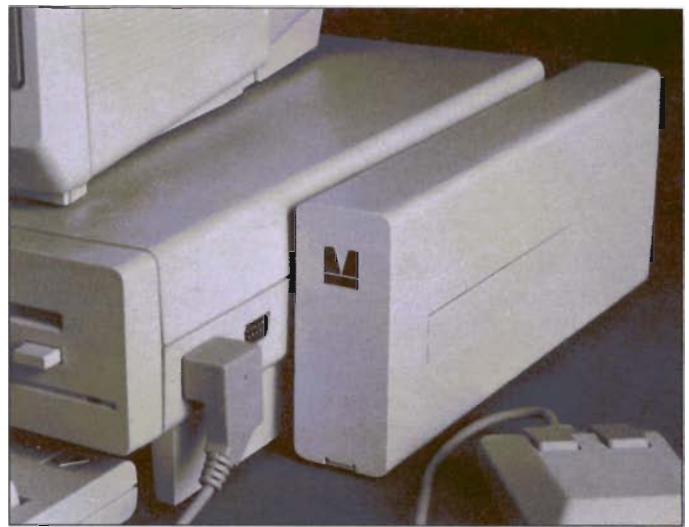
StarBoard2: functions five!

If we count Fast Memory as one function, the addition of the **Multifunction Module** brings the total up to five!

THE CLOCK FUNCTION:

Whenever you boot your Amiga you have to tell it what time it is! Add a Multifunction Module to your **StarBoard2** and you can hand that tedious task to the battery-backed,

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from 512k to
2 Megabytes
Bus Pass-Through
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Option: battery/
clock, FPU,
parity, Sticky-Disk**



real-time clock/calendar. A small piece of MicroBotics software in your WorkBench Startup-Sequence reads the clock and automatically sets the time and date in your Amiga. And the battery *is* included (we designed it to use an inexpensive, standard AAA battery which will last at least two years before needing replacement).

THE FLOATING POINT FUNCTION:

If any one aspect most characterizes the Amiga it's *fast* graphics! Most graphic routines make heavy use of the Amiga Floating Point Library. Replacing this library with the one we give you with your Multifunction Module and installing a separately purchased Motorola 68881 FPU chip in the socket provided by the Module will speed up these math operations from 5 to 40 times! And if you write your own software, you can directly address this chip for increased speed in integer arithmetic operations in addition to floating point math.

THE PARITY CHECKING FUNCTION:

If you install an additional ninth RAM chip for every eight in your **StarBoard2**, then you can enable *parity checking*. Parity checking will alert you (with a bus-error message) in the event of any data corruption in **StarBoard2**'s memory space. So what good is it to know that your data's messed up if the hardware can't fix it for you? It will warn you against saving that data to disk and possibly destroying your database or your massive spreadsheet. The more memory you have in your system the more likely it is, statistically, that random errors will occur. Parity checking gives you some protection from this threat to your data residing in Fast RAM. Note that the Amiga's "chip" RAM cannot be parity checked.

THE IMMORTAL MEMORY DISK FUNCTION (STICKY-DISK):

When you've got a lot of RAM, you can make nice big RAM-Disks and speed up your Amiga's operations a lot! But there's one bad thing about RAM-Disks: they go away when you re-boot your machine. Sticky-Disk solves that problem for you. It turns all of the memory space inside a single **StarBoard2**

into a Memory Disk that will survive a warm-reboot! When your Amiga attempts to grab a **StarBoard2** in Sticky-Disk mode, a hardware signal prevents the system from acquiring the **StarBoard2** as FastRAM (and thereby erasing your files) –instead it is re-recognized as a Memory Disk and its contents are preserved intact. If you want to work rapidly with large files of data that are being constantly updated (such as when developing software) you can appreciate the Sticky-Disk!

Fast RAM –no waiting!

StarBoard2 is a *totally* engineered product. It is a ZERO WAIT-STATE design, auto-configuring under AmigaDOS 1.2 as Fast RAM. Since AmigaDOS 1.1 doesn't support autoconfiguration, we also give you the software to configure memory in 1.1.

Any applications software which "looks" for Fast RAM will "find" **StarBoard2**. And you'll find that your applications run more efficiently due to **StarBoard2** on the bus.

A passing bus? Indeed!

What good is an Expansion Bus if it hits a dead end, as with some memory cards? Not much, we think –that's why we carefully and compatibly passed through the bus so you could attach other devices onto your Amiga (including another **StarBoard2**, of course!).

The sum of the parts...

A really nice feature of the **StarBoard2** system is that you can buy exactly what you need now without closing off your options for future expansion. You can even buy a 0k **StarBoard2** (with a one megabyte capacity) and populate it with your own RAM (commonly available 256k by 1 by 150ns memory chips). When you add **StarBoard2** to your Amiga you have a powerful hardware combination, superior to any single-user micro on the market. See your Authorized Amiga Dealer today and ask for **StarBoard2**

SUGGESTED RETAIL PRICING:	
StarBoard2, 0k (1 meg space):	\$349
StarBoard2, 0k (2 meg space):	\$395
StarBoard2, 512k (1 meg space):	\$495
StarBoard2, 1 meg (1 meg space):	\$595
StarBoard2, 2 megs installed:	\$879
StarBoard2, 2 megs & MultiFunction:	\$959
Upper Deck, 0k (1 meg space):	\$ 99
Multifunction Module:	\$ 99
<i>also available:</i>	
Standard 256k memory card:	\$129
MAS-Drive20, 20 meg harddisk:	\$1495
MouseTime, mouseport clock:	\$ 50



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can hear the sounds of your exhalations as they bubble upward, and the soft lull of the current. Move the mouse in any direction, and your diver kicks his flippers and glides through the water as the ocean scenery scrolls before you. There is contour to the seascape, and lots of coral and plant life add to the effect of realism. When I first started playing the game, I just swam around enjoying the view; but if you want to get anywhere, it's necessary to utilize your equipment and devise a plan.

The bottom of the screen contains the Underwater Action Menu for using tools and weapons. Double clicking the right mouse button transfers control from your man to the action

menu. Here you can elect to arm your weapon to use on enemy robots within your cross hairs. The Scan option lets you toggle off of the "armed" mode, and place an object in your cross hairs so that ART may identify it for you, or beam it to the Viceroy, (yes, just like in Star Trek). There are also three bar meters showing your relative health, air supply, and energy. There is a coordinate box with your position on an x/y axis that helps locate yourself in relation to the base ship, or search a specific area of the ocean floor. The Surface option returns the diver to the Viceroy in case of injury, low air supply, or completion of the mission.

Two more options remain at

your disposal, both of which have sub options to employ. The first is a direct link to ART, the computer. ART can be used to beam an object up as previously mentioned, or to have a tool not in your belt beamed down to you. ART can also give descriptions of scanned objects, or relay important information that he has discovered. The second and last option available is R.U.F (Remote Underwater Friend). RUF is a mobile robotic companion that helps you locate the various things you must find throughout the mission. He has his own underwater camera and you can see exactly what RUF sees by choosing this option. He can also be programmed to travel a certain course or to look for certain



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things such as metal, radioactivity, or chemicals. RUF is very useful and will alert you if he finds anything important. When a mission is completed, your performance is evaluated, you earn experience points that go toward your health, and you are sent back to the base to start a different mission.

In general, swimming is easy to learn, but firing the weapon is somewhat difficult at first. After being killed several times, I learned it's best to relax and let the robot swim into your cross hairs. Then ZAP!, reduce him to scrap metal left to rust on the sea bed forever. All of the options are easily controlled by the mouse, and it doesn't take long to master them. To complete a mission, you must use the scan option and plan your search of the area so that you will not waste time swimming around in circles.

Return to Atlantis is game of skill, strategy, action, and adventure. The manual is clear and concise, and I was well into my first mission in no time flat. The game comes in the usual EA "album" package and consists of two disks. Again, standard EA practice of copy protecting the first disk has been followed. The "Foundation" has provided almost everything its agent could desire. However, Return to Atlantis does have a couple of elements which could use improvement. The graphics and animation of the informants at the "Sea Thief Cafe" were stunning, but the speech synthesis was not. The game uses the Amiga's own

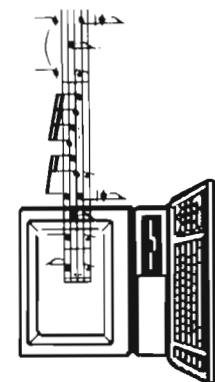
built in voice, while controlling pitch, gender, and inflection, but the results are disappointing. Here we see wonderful life-like renderings of people while hearing cheap imitations of voice that are well below the potential of the Amiga. I make this complaint only because the technology of digitized speech is available, and I have heard such beautiful speech synthesis in other Amiga programs. The other area for improvement is diversity of the enemy. Although there are plenty of fascinating sea creatures that cruise by, the only thing you are able to shoot is the lobster robot which becomes annoying after a while. This is a small complaint, and does not have any significant negative impact on the game as a whole.

I found Return to Atlantis to be an enjoyable experience. The missions require different skills and provide many hours of game play. The graphics are pleasing, and the music and sound are, for the most part, very well done. The game concept was obviously quite well thought out, and unique. I'm not aware of any other game like it for any personal computer.

So put on your flippers and mask 'cause there's a vast frontier of ocean and sea waiting to be explored.

Return To Atlantis

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Shakespeare

Infinity's entry into Desktop Publishing

by Bill Barker and
Walter Steuber

Lots of color and easy rearranging is what you get when you compose a page with Shakespeare. It's a page-layout program that fully uses the graphics capabilities of the Amiga, with mouse operations to select colors and fonts, to flow text onto the page, to insert graphics,

and to move the different elements around.

Input to the program consists of disk files of text and graphics. A text file written with Scribble!, for instance, is copied to Shakespeare by using the mouse and the frame tool to place it where you want it on the page. As much of the text file as you want to work with is quickly flowed into an area you have marked out with the mouse.

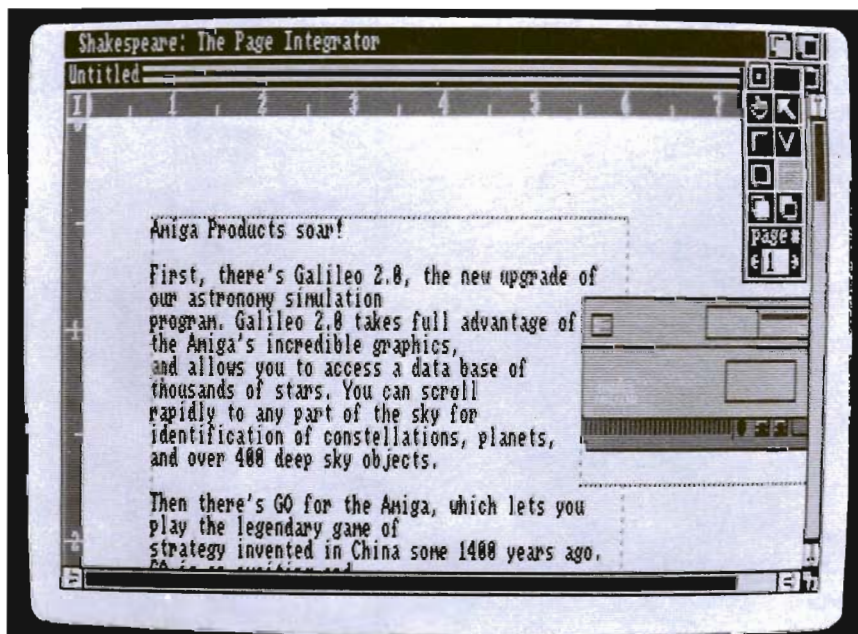
You then use the mouse to indi-

cate what fonts you want for the text, what colors, and what justification. Just as easily, a brush made with DPaint can be placed on the page. It can then, if your artistic feelings call for it, be cropped, resized, adjusted for color and moved around.

Writing text that will appear on the printed pages is normally done before starting Shakespeare, but minor changes are easily made directly on the *What-You See is What You Get* screen. New words can be inserted into the middle of a document, but the response is so sluggish in a long document that it is preferable to have the text correct before pouring it onto the Shakespeare pages. Short bits of text, on the other hand, can be changed or moved around reasonably quickly and satisfyingly. Shakespeare's WYSIWYG mode would be more practical if the field of view would move to keep the current cursor position on screen.

Shakespeare's handling of graphics is particularly convenient and powerful. For instance, a few mouse clicks will place a drop shadow around a box in a way that gives the user much more artistic choice in the size,

The Tool Box in the upper right corner of the screen holds the necessary tools for your page creation



color, and position of the shadow than is found in most other page formatters. Colors in each graphic element are under detailed control by the user. Graphic items can be cropped, sized and moved around very easily with the mouse. In fact, this looks like the central feature that the programmers concentrated on, and the one in which they excel—making it fun to arrange and then rearrange images on a page; and then changing them all around again.

Characters in extra large sizes print without jaggies! The two Shakespeare disks include fonts that have been properly designed for printing large headlines on a dot-matrix printer, a feature we have needed for a long time. The

font selection is extremely good for printing a colorful page to go on a billboard, or black and white pages for a newsletter.

We received many Guru visits and crashes during the learning period with the program. A panic call to the Infinity people had to be made to find that the default page width (8.5-inch) has to be changed with each use to 8.0 or less to keep the machine from freezing. After further practice and familiarization, the number of crashes diminished, but they happened often enough to be exasperating, and many little non-fatal glitches in the program made it cumbersome and unpleasant to use. One of the commonest reasons the Guru came was a steady loss of memory

while altering text on the screen. In the process of creating an issue (which is Shakespeare's equivalent of a project) all necessary text files and related clip art are copied to a work disk. All of the needed files are then selected and loaded into the the chart requester. Shakespeare allows the user the choice of creating frames prior to flowing text, or creating frames and flowing text as you go.

The fonts can be changed on any paragraph, block, line, word or letter in a piece of text by merely highlighting the text in question with the mouse and then selecting a new font. Font attributes can be changed as well. These features are currently available on City Desk, but are not as

(continued on next page)

Amiga memory designed with some thought ...

If you're an Amiga 2000 owner, you'd undoubtedly like to add more memory to your system. After all, the reason you chose the A2000 was for the expandability. The question now is "What's the best path for upgrading?" A 2 meg memory expansion card may seem the cheapest way, but it's too easily maxed out. You'd like to be able to expand beyond 2 megs, but the sticker shock of an 8 meg board populated with its minimum configuration of 2 megs makes this route unappealing as well. The Digitronics RC4 Ramcard was designed to solve these problems. The RC4 is auto-configurable as low as 1/2 megabyte, but as your memory requirements gradually grow, so can your memory, in steps of 1/2 meg, all the way up to 4 full megabytes of no wait-state fast memory!

If you're an Amiga 500 owner, adding memory to your system may seem a bit more difficult than simply plugging in an expansion card. Some vendors seem to think it's a good idea to tear open your machine and solder in printed circuit boards, voiding your warranty, overheating the inside of the case, and bringing an already overtaxed A500 power supply to its knees. Digitronics offers a much better solution. The same RC4 Ramcard designed to plug into the A2000 can be plugged into the expansion slot on the side of the A500 when installed in our adapter box. This adapter is a completely enclosed low-profile metal case with its own power supply, which can fit neatly under

your external A1010. This allows for a quick and easy way to add up to 4 megabytes of fast memory to your A500. Best of all, if you should ever decide to move up to an A2000, the RC4 ramcard you've been using in your A500 can go along as well.

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Shakespeare

(continued from previous page)

easy to accomplish as in Shakespeare. The program also allows the user to change the colors of the text, the background, frames, as well as the palette for each graphic. These features are fairly impressive, but I found the lack of a grid option with snap to grid was missed for accurate layout work. I also found no convenient way to create identical text frames or columns for all pages as is available on PageSetter, Publisher Plus, or City Desk.

Shakespeare has a large variety of commands that are not self-evident. Another way of saying the same thing: you will have to read the manual to get full use of the program. The 193-page spiral-bound manual is beautifully printed and clearly explains obscure as well as obvious features. There are three well-illustrated, carefully-detailed tutorials that beat the heck out of

hacking around, trying to guess what the buttons will do. This manual probably has both the best writing and the best typography of all Amiga manuals around.

The output from the program can go to a PostScript printer to get high quality black and white product, or it can go to a B&W dot matrix printer to get the same thing in dubious quality. But, black and white is not what Shakespeare is aimed at. Shakespeare is meant for color printing. It comes equipped with the brand-new Version 1.3 printer.device and Version 1.2.2 Preferences, and includes among its color drivers Xerox 4020, Okimate_20, HP PaintJet, and CalComp ColorMaster, besides the old stand-by, EpsonX.

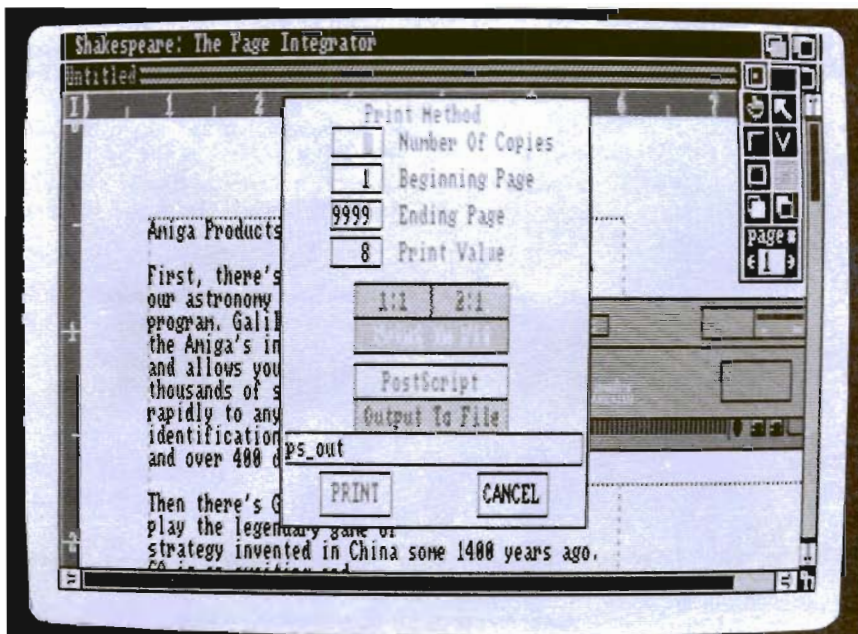
The printout for the pages created was the slowest of all the desktop publishing programs I

have used. Even though the program uses the new 1.3 printer.device, the speed increase was only moderately compared to other programs. There is a feature which will speedup printing, but this is only available for those who have extra memory available, otherwise you're stuck with exceedingly slow printouts.

Overall, we liked the concept and feel of the program but I must ask why Infinity put such a major emphasis on the use of color without concentrating on outstanding black and white rendition. The HP Paintjet produces excellent color output, yet is still far below Laser printout in quality.

What I had hoped for with the release of this product was the breaking of new ground in ease of use and features. It has broken new ground, but in the wrong direction. The program seems to be temperamental and buggy, paying far too many visits to the wise indian teacher. Debugged, this could be a nice program, but PageSetter, City Desk or Publisher Plus is more suited for the average user in features and ease of use.

The print requestor allows you to print output to Postscript files



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V-1 Video Module

Add composite color output to your A500/A2000

by Ken McNeill

Unlike the 1000, the Amiga 500 and 2000 do not have a COLOR composite video output. This creates two problems. First, the Amiga's impressive graphics cannot be captured on video tape.

Second, those wishing to use a color composite monitor or television instead of an expensive

RGB monitor are unable to do so. Both of these obstacles can be very frustrating. Creative Microsystems' V-I Video Interface offers a remedy to these problems.

The interface is a rectangular box measuring about 5" by 2" that fits into the 23 pin RGB port in the back of the Amiga 500/2000. It converts RGB video into single composite video, luma, chroma, and 75 ohm RF signal. There is one output jack

for each of those signals, plus an audio input and a switch that selects channel 3 or 4, both of which are used with the RF output. The "chroma" and "luma" outputs are mainly for use with the Commodore 1702 series monitor that splits its video signal into those two elements.

I own an Amiga 1080 RGB monitor, so I used the Composite Out on the V-I Interface and switched my monitor from RGB mode to Composite Video. The picture quality was noticeably less than RGB (as is to be expected with composite), and slight picture adjustments had to be made, but the signal came through well. I loaded a few of my graphics demos and was impressed with the brightness of the graphics on the composite screen. They could still impress my friends just as effectively as they did in RGB mode.

Next, I attempted to do some word processing. Here my success was not as great. Unless your word processor has text and screen color options, you will not want to spend late nights in front of a composite screen. Half of the words are blurred into one another and some

The V-1 Video module



seemed to pulsate, but after several trials of different color combinations, I found one that was acceptably readable. The results from the RF signal were the same as the composite video. Commodore provides the 60 Column mode in Preferences for just this circumstance. If you plan to use a color composite monitor with the Amiga, you will probably be limited to using 60 columns for text.

For my next trick, I connected the Composite Out from the V-I interface to the Video In on my VCR. Then I connected the Video Out from the VCR to the Video In on my monitor. I popped a tape in the VCR and recorded some of the graphic titling dem-

onstrations from Deluxe Video 1.2. The playbacks revealed beautiful reproductions that would spice up any home video. Here is where the V-I Video Interface proves itself to be a useful and much-needed device.

I would suggest the unit be used mostly for recording graphics for those who have non-professional level needs. Certainly, the V-1 is not intended for such a purpose. It does, however, offer the user an affordable way to get a composite signal when needed (although it could be used in a pinch to word process with a 1702 or television). In addition to graphics and titling for video productions, the V-I also has other possible applica-

tions. Let us suppose you are going to make a presentation with your Amiga in front of a large group. Plug in your interface, and Voila! You can have one large screen monitor, or perhaps many small ones with the use of a splitter. Either way, Creative Microsystems has packed a lot of utility into a small package with their V-I Video Interface.

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Ebonstar

Competition in space from Microillusions

by Louis Green

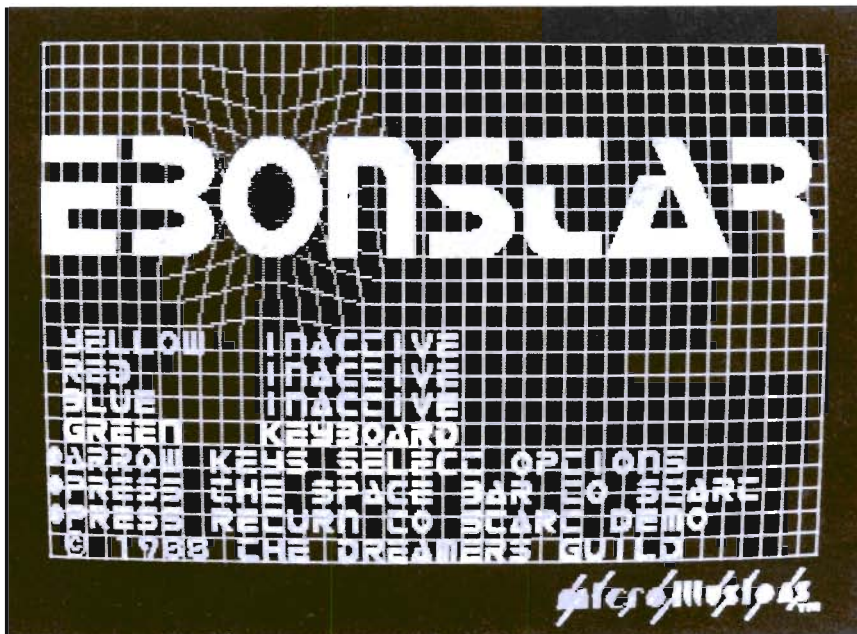
The time - the far distant future. A time when mankind has spread throughout the galaxy. All citizens of the Galactic Authority are assured of perfect health, and every material need. They are waited on by machines which are eager to satisfy every whim. Yet citizens long for

something more, something the authority cannot allow - the thrill of risking life and limb. Thus was born the Ebonstar competition. At the appointed time thousands gather to compete to the death around a synthetic black hole. Millions more watch and share the thrill...

There you are, in the middle of that piece of the galaxy which is sectioned off for the sport of Ebonstar. "Sport? Oh, no! Not an-

other shoot-em-up game to add to my collection!" Not quite. In this case, you and up to three other space-jockeys duke it out for the ultimate prize: power. "Sounds easy enough, but where's the challenge?" Don't speak so soon, reader. You have to avoid a gaping black hole that sucks in anything within a 2-block radius. And you must also deal with the Pink Phantom, a ship that looks just like yours but will destroy you. Finally there is the Flame Thrower, a ship that shoots fire bombs at passing ships and has its origin somewhere inside the black hole.

You may choose one of several methods of control from the main screen; two players can have a different control method



Upon booting, Ebonstar presents you with an options screen where you can activate from one to four players. Each player has a choice of joystick, mouse or keyboard controls. The joystick mode even has an option for absolute or relative action. The absolute mode is simpler, the ship moves in the direction you have moved. The relative mode is more realistic, the ship moves opposite to the thrust direction. Left, right, thrust and fire are the only con-

(continued on page 30)

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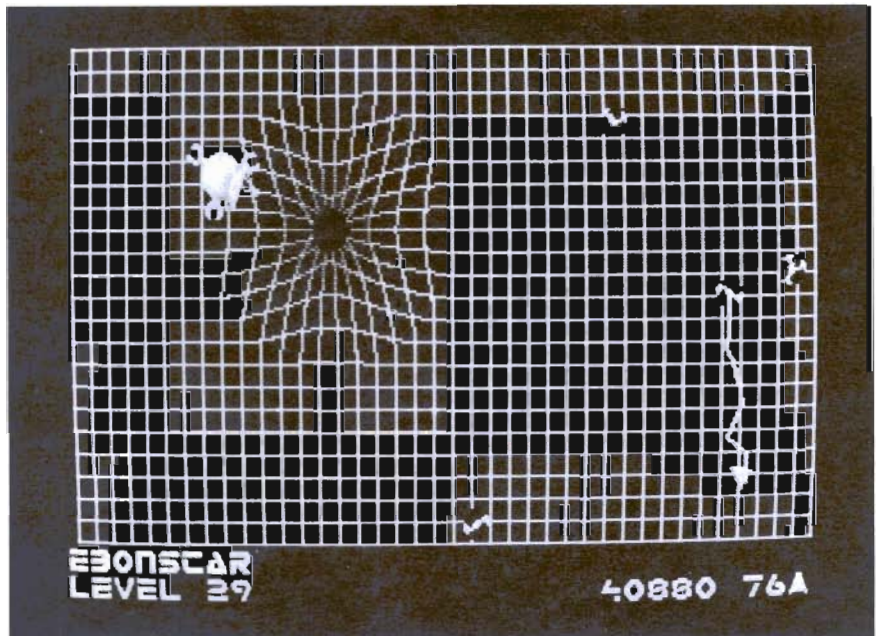
Ebonstar (continued from page 28)

trols to master but the fast pace of the competition doesn't leave much time for trial and error.

Once your choices have been made, the warp and Satellite will appear. The warp appears as a grid covering the screen. The Satellite spins and using its claws like a spider creates the black hole. The black hole is actually red & purple and looks like a section of the grid has bent into the screen. Both the Satellite and the black hole move around the screen during the competition. The Satellite is also the source of enemy ships and drones for the duration of the combat. You will have five ships of your chosen color. Keep moving, shoot the other contestants and wait for the chance to disrupt the Satellite's energy beam.

Ebonstar is a game of gravity. Your shots do not destroy the other players, but propel them towards the black hole. They in turn are trying to push you toward the same fate. The Satellite is constantly spinning, creating new and different drones, gravity buldges, or fireballs. As you advance to higher levels, the number and variety of oponents will increase.

One of the best aspects of the program are the sound effects. The explosions are great and the swirling noise the black hole makes when it is forming at the beginning of a game is chilling. The graphics are good but the moving effect of the black hole is the only especially interesting ef-



The Grid folds as the battle rages on...

fect. Action is what Ebonstar is about. You must move your ship constantly, and the other three ships will also swarm around the grid.

Amiga users who only have 512k will not gain entry to the Ebonstar as this is the first game for the Amiga which requires at least 1 meg to run. (If you decide to be daring and try to boot it up on a machine with less memory, a software error will occur).

The game becomes increasingly challenging with more than one player, so the more the merrier here. Ebonstar has 99 levels, each with different combinations of drones and hazzards. On the whole, the game is entertaining for one, and increasingly more fun for multiple players. It is a high-tech competition-shoot-em-

up game that will doubtless provide hours of entertainment for all you space-jocks out there.

"Warning! If you decide to take the Ebonstar challenge, your life insurance policy held by the Galactic Authority will be rendered null. The Galactic Authority cannot guarantee your safety or perform organic reconstruction in the event of death after entering the Ebonstar sector".

Ebonstar \$39.95

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PC Elevator

Raising the Bridge Card to New Heights

by George Rapp

The 2088 Bridge Board is an innovative product that can help bring the Amiga 2000 into the business environment. With the board in place, the Amiga is capable of running MS-DOS software exactly like an IBM PC XT. Most businesses do not want to take risks on a new com-

puter or operating system. The Bridge board gives the corporate buyer an additional justification for buying the Amiga. Many times, buyers are impressed with the graphics and sound of the Amiga, but are afraid of the differences. The 2088 card bridges this gap.

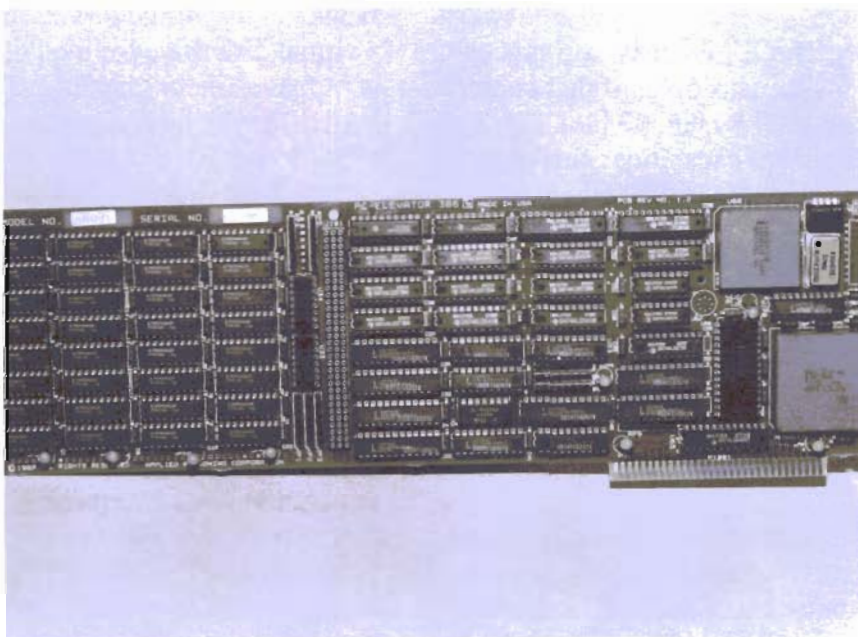
However, the bridge is limited in what it can do by its design. It is based around the Intel 8088 CPU running at 4.77 MHz which

is was the standard for MS-DOS but is now a dated system. Most systems are using the Intel 16 bit chips like the 8086 and 80286 running at clock speeds from 6 to 16 MHz. People who are used to the higher speeds of the newer clones are not willing to go back to a slower processor even if it comes with an Amiga attached.

One of the advantages of the huge MS-DOS market is that you can find almost anything in add-on hardware. Those of us who work with MS-DOS but own Amigas were well aware of the phenomenon of speed-up devices. These are widely used to replace the older 8088 in IBM PCs. When the bridge first became available it was only natural for us to try to speed it up too. Alas, neither the NEC V20 chips nor several Accelerator boards worked. The particular timing and interrupts used by the 2088 seemed to preclude speed ups. We had given up and were forced to wait for the rumormongered 80286 Bridge Card from Commodore.

Then a very improbable thing happened. An unknown Amiga
(*continued on next page*)

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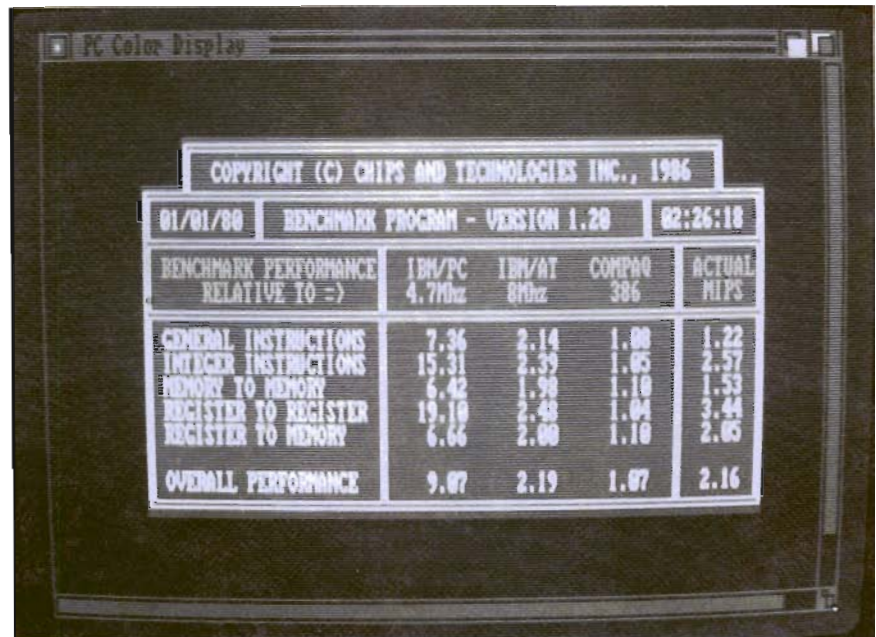


PC Elevator (continued from previous page)

user had recently installed an 80386 board in his PC and was so pleased with it that he tried it in his bridge-card equipped Amiga. Against all expectations it worked and worked well. This pioneer then called Applied Reasoning Corporation in Cambridge Mass. and described what he had done. "You've installed our 80386 Accelerator in a Motorola 68000 system?!" I can imagine the response from the technical support person. The good folks at Applied Reasoning had been busy making accelerator products for the MS-DOS market, they had no knowledge of the Amiga and thought that Motorola products were another world.

When they learned of the bridge card and its hybrid processing environment, they were intrigued. To their credit, they obtained an Amiga and installed their product. They studied the bridge card and its Janus library and modified their installation software to include the Amiga on its menus! More than that, they have provided a utility to ensure that the 80386 will work with the JDISK, a virtual MS-DOS hard-disk. Since co-processors are their speciality, we asked Applied Reasoning about the possibility of a 80386 bridge card. Their response was very positive. (Send those cards and letters today.)

Now the 80386 is the hottest item in the MS-DOS world so when we heard of this development, our touch-tones blazed to Cambridge. The staff there are



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01/01/88		BENCHMARK PROGRAM - VERSION 1.20		02:26:18
BENCHMARK PERFORMANCE RELATIVE TO ->	IBM/PC 4.7Mhz	IBM/AT 8Mhz	COMPAQ 386	ACTUAL MIPS
GENERAL INSTRUCTIONS	7.36	2.14	1.00	1.22
INTEGER INSTRUCTIONS	15.31	2.39	1.05	2.57
MEMORY TO MEMORY	6.42	1.99	1.10	1.53
REGISTER TO REGISTER	19.10	2.48	1.04	3.44
REGISTER TO MEMORY	6.66	2.00	1.10	2.05
OVERALL PERFORMANCE	9.07	2.19	1.07	2.16

In the Benchmark test, the board stacked up high against the competition

interested and enthusiastic about the Accelerator and the Amiga. They have found a new approach to the speed problem of the 2088, enhance it so that it is one of the fastest MS-DOS computers available.

The Elevator is a 6 layer PC XT expansion card that contains an Intel 80386, 32 bit CPU. This chip has capabilities similar to the 68020 that can be added into the Amiga (See March 88 for a review). The card contains one megabyte of 32 bit ram and a socket for a daughterboard that can hold 4 megabytes with a system limit of 13 megabytes. There is also a socket for a 80387 math coprocessor. The add-in card plugs into one of the PC type expansion slots in the A2000. Once it is physically installed, you must run a set up program, reboot the machine, and watch the

bridge card fly. The software included in the package does make the installation relatively easy, but it assumes that you are using a hard disk on the bridge card. You probably should either have a hard disk on the PC side or use a Janus library virtual drive. This is a virtual disk drive for the PC that is in fact a file on the AmigaDos hard disk which behaves as a MS DOS drive. We did not have this set up at first, but a call to Applied Research brought prompt and knowledgeable help in setting up a floppy based version. This requires a two disk boot up, but that is not a new situation for Amiga 1000 owners.

The board itself is very versatile in operation and is capable of different configurations. The on board memory can be configured as an virtual disk drive or used as expanded memory under the bi-

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zarre schemes used by MS DOS. We found that for almost all software we tried, it ran as expected. There are occasional problems with copy protected programs like Lotus 1-2-3 which caused erratic behaviour, but you can switch the Elevator to "downstairs" or the standard PC XT speeds, and the conflict disappears. One problem with the bridge card is that it shares the video screen of the Amiga. This is done through a special block of memory called dual port RAM.

This block of memory serves as the translator from the two systems. The additional step of translation causes a jumpy, slow video display on the PC side. Software that writes directly to the "video" memory on the PC

side performs much better and looks just like it does on a true blue IBM. If you really require EGA speed for MS-DOS video, it is possible to add a video controller card and monitor of your choice to the PC side and bypass the whole situation.

Some of the software we tested included popular titles like dBase III+ , Wordstar 2000, WordPerfect 4.2, MultiMate, Norton Utilities, MicroSoft Macro Assembler, and ChartMaster. Everyone of these showed definite speed improvement. Each of the utility programs that try to make MS-DOS easier to use, worked as expected. There was some increase in speed, but this is a result of the disk cache software included

with the card. The PC-Kwik is the IBM equivalent of FACC II but not nearly as effective or powerful. Flight Simulator and Jet also worked, but the controls seemed a little touchy. More impressive, was the proper functioning of task switching and terminate-and-stay resident software like DesqView, MicroSoft Windows, and SideKick. DesqView and MS-Windows try to make the PC run more than one task at a time like the Amiga. They do work, but the use of them is more of an artform than science. DesqView benefited the most from the Elevator's presence. Most games are unplayable because of the slow screen updates. The function of many can not

(continued on page 51)

SDB

This System Debugger from Manx sets new standards

by Dave Haynie

The C programming language is among the most popular languages in use on the Amiga, especially among developers and advanced hobbyists. The main reasons for this are undoubtedly that the C language is powerful enough to handle even low-level problems sometimes done in Assembler, and that

there are very good compilers available. Of course, I'm referring to Lattice C from Lattice Incorporated and Aztec C from Manx Software Systems.

The game so far

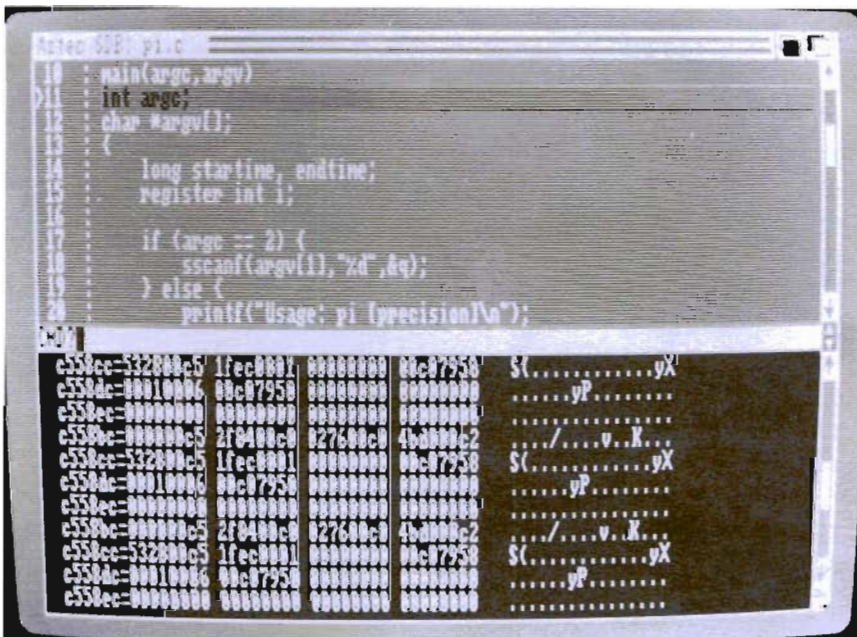
Lattice V3.02 was the C language originally supplied by Commodore Amiga for developers, back in 1985. The Manx compiler came out sometime later, but offered much more compact code and faster execution, although it was lacking in that it

didn't accept a fully modern C language, and its linker didn't support standard Amiga object formats. Since that time, the Lattice compiler has been revised to execute faster and produce more efficient code, and Lattice now supplies a version of the Blink linker, which is much faster than the standard Alink linker written by Metacomco and supplied by Amiga. Manx has countered by revising their compiler to accept a stronger C language, and revising their linker which now accepts Amiga standard object as well as Manx object. It seems that, with compiler performance running neck and neck, the race is quickly moving to accessories that complete a full C-based development system.

System Components

While a C compiler and linker are two essential components of a C development system, they're far from all that's useful in a professional system. Both Manx and Lattice recognize this, and offer extra system components, such as assemblers, disassemblers, object librarians, and example code. To date, Manx has offered more in the full-blown

The Split window environment provides code and debugging information



package; some UNIX-inspired utility programs, a VI-compatible text editor, and a symbolic debugger. Lattice sells a text editor separately for those who don't already have a favorite, and recommends the highly-rated MetaScope symbolic debugger. Neither had a clear edge on the other in this area.

Until now, that is. Manx is now offering, at extra cost, SDB, their source level debugger. This tool promises to greatly speed debugging times for any Manx user.

The Flavors of Debuggers

Many programmers never see the need for a debugger, at least until they actually use one.

That's the point at which they realize they've already been using one. The simplest kind of debugger is the extra print statement inserted in your program code. This is the first debugger most programmers come across, and also very likely the least efficient. About the only time this technique can be efficient is when using an interpreted language, like BASIC, LISP, and APL (although some very popular compilers on other systems offer no debugger at all). Interpreters have no required compile or link phase during development, and the user is in an "environment" of some kind that provides tracing and stepping options, immediate access to all symbolic variables and func-

tions, and other immediate feedback, all at the source code level. That's because the user of an interpreter is essentially in a real-time environment.

The compiler user needs a separate program to achieve some of the same power. The problem here is that the compiled program has now been reduced to pure machine language, while the programmer still thinks in terms of the symbolic names he or she has given to things. Early compilers offered a map output, that would list the machine locations of various global variables and functions, and the relative stack offsets of local variables. With this output sheet, and a machine/assembly level debugger (old

(continued on next page)

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SDB (continued from previous page)

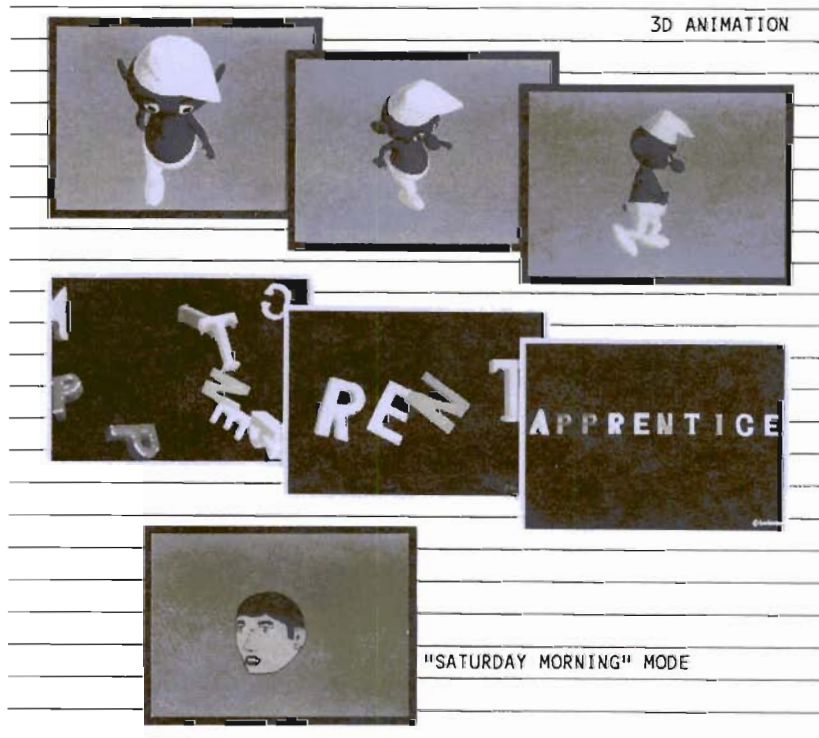
Commodore users probably call this program a Monitor), you would be able to hack away at your code with controls like single stepping, programmable breakpoints, and other devices designed to let you interactively swat those bugs. But all the interaction was on the assembler level with absolute memory locations.

Fortunately, compiler people got smarter, as did assembler people, and they figured out that programmers really think in symbolic terms. And so should sufficiently powerful debugging programs. Part of the driving force behind this change is the development of operating systems with program loaders, like the Amiga's. On this type of

system, neither the compiler nor the linker really know where any variables or functions will actually reside in memory when the program is run. So additional cleverness was added by enabling the compiler to pass down the symbolic names of things to the object file. This feature lets the computer worry about the translation of the symbolic names programmers use to the machine addresses that computers use. Most Amiga debuggers today work at this level, and that's about as far as an assembly debugger would ever need to go.

We're dealing with C language in this discussion, not assembly. Most C programmers think of their programs not just in terms of the symbolic names

they give to various memory locations, but in terms of the high level data and coding structures they're accustomed to, not the object code their compiler somehow magically produces. Fortunately, very modern debuggers have an answer to this problem too, they operate at the source level. They understand many aspects of the high level language and something about how it was translated to machine code. Again, the compiler and linker must be smart enough to pass down information detailing the translation of the source code to assembly code. Manx's compilers, as of version 3.4, have optionally been able to produce such additional information. The new SDB program accepts this



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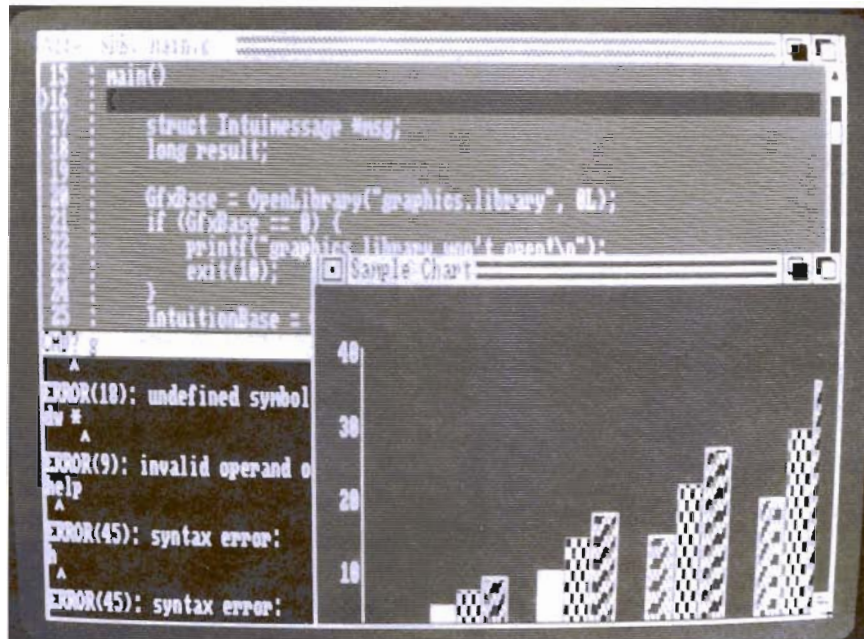
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extra information, to give you a view into your executing code as sharp as within any interpreter you're likely to come across.

Required Preparations

The Manx package I received for this review came with the preliminary manual for SDB, and the actual SDB program on a single disk. I had no complaints about the manual; it looked quite complete and finished, despite being marked "temporary". Symbolic debuggers like MetaScope can work across different products since the symbolic information they use is stored as part of the object code produced by assemblers and compilers alike. Source level information is a much more complex issue, and as such is not a standard part of object file format on the Amiga. Such information is likely to be very compiler dependent. Thus, if you want to use SDB, you'll need Manx C, which is the only compiler capable of creating the custom debugging files that SDB will need. It's up to the vendors of the other compilers out there, Lattice C and the various Modula2 compilers, to provide their own source code debuggers, though I know of no others yet announced. If you do have Manx C, version 3.4 or later, you can generate the proper information for SDB by compiling with the "-n" option, as in: `cc -n file.c` and then by linking with the "-g" option, as in: `ln -g file.o -lc`. This operation will produce a "file.dbg" file, which contains the source code information needed by SDB, along with the



You can view the results of your code as it is executed

expected "file" executable object.

Experienced users of the Manx debugger, or debuggers in general, can start right in on their own code with SDB. On-line help commands make SDB self documenting enough to use once you get the basic idea of command syntax. For those less experienced, Manx provides a tutorial on the SDB disk. The tutorial is very nice. SDB comes up just as it normally would, source display in the top window, command line in the middle, and text in the bottom window. Only in this case, the bottom window contains the tutorial text. So you learn while using the real thing.

Using SDB

SDB is invoked from the CLI command line much like any other Manx program. It accepts several options, then the name of

the program itself and any command-line arguments to be passed to that program. The command line options allow some initial mode and display options to be specified, and path options to be set. Paths allow SDB to find source code that's in directories other than your working directory.

When SDB starts, it opens a three-window display for its own use. (All input and output from the program loaded by SDB will show up in the place it usually would; on a CLI window, or any custom window it might open). The upper window displays the source code, with the current point of execution highlighted. The center window is a one-line window that accepts the user's input. This little window has command editing and history available via the cursor keys, and

(continued on next page)

a positioning gadget that very easily allows it to be moved, thus defining the split position between the three windows. In addition to simple commands, this window accepts the on-line help commands. The bottom window displays the output of any commands given in the center window. This output is buffered, for about 2000 lines, so the user can constantly review the text that's scrolled by if necessary. It can also be logged to an output file. The colors used in each window are completely user-configurable, though I was happy with the default colors chosen by Manx. If you really don't like the choice of colors, they can be respecified on the command line, in SDB, or by setting an environment variable with the Manx "set" command. Good news for users of screens other than 640x200. SDB let me resize its windows to fit on a 640x400 interlaced Workbench screen, and I suspect it would do well on a PAL or MoreRowed WorkBench as well.

The program you're trying to debug will begin halted at the entrypoint to the "main" function. From there, the simplest thing to do is single step the code, watching the flow in the upper window. A count can be specified to cause several steps to take place. Alternately, the program can be automatically stepped, at full speed, to a particular source line number. This is quite useful for stepping around loops that might otherwise take a long number of single steps to get around. Functions without source, like library functions, are always stepped

around, while functions that are part of the source can be entered or stepped past at will. Yet more powerful are permanent breakpoints, which will halt execution at any specific part of the program, such as when a particular function is entered, or maybe every 10th time such a function is entered. Another type of breakpoint stops execution when a particular variable is set to a given value, or is changed from a given value. On the way from the current position to a breakpoint, the program can be run at full speed or one instruction at a time. When a breakpoint is defined, a series of commands which will only execute when the breakpoint is taken can be supplied by you.

Another common debugging operation is to examine the value of a variable. As in most debuggers, the value can be dumped in bytes, words, longwords, or character strings. Much more powerful though, are the source oriented dumping commands, which know the type of any variable dumped, will display data in C syntax, by names of types, structures, etc. Most any C expression can be used as the argument to a command, so I can not only display variables, dereferenced variables, single elements in arrays and structures, whole arrays, structures, etc. Variables can be local, arguments, or global, and SDB worries about where they come from, not you. About the only difference seen here over what's expected in C language is that the #defined values, such as the

types found in <exec/types.h>, are expanded. I expected that, and find it quite reasonable. Throughout the whole display process, it's never necessary to use the actual memory value of any object.

Command parameters aren't the only place that C expressions can be used. The evaluate command accepts a C expression, which it will then evaluate. This allows many things to be very easily modified as the code runs, so one bug doesn't stop the entire debugging process. The C expression is an arbitrary one, which includes function calls (as long as the called function is included in the compiled code), as well as math and assignments.

Throughout the entire process, SDB knows exactly which source file any particular function resides in, which is particularly handy for large projects that tend to exist in several files at once. Also, program line numbers can always be referenced relative to any source file in the program, not just the currently displayed one.

More Advanced Options

There are several more advanced commands designed to help the programmer keep track of nested function calls. First of all, one can display all the functions called leading up to the current position, including the parameters they were invoked with. This can be used to figure out how the program got to the particular function a breakpoint may have trapped on. Once in a function, there's a command to easily

complete that call and bump up one function calling level. At times, it's important to see what's going on at upper levels without actually exiting the current levels. The problem here, is that the local variables at any calling level are referenced relative to the stack, and ordinary debuggers often require the user to play with some stack math to find such upper level locals. SDB provides commands to push back the calling frame of nested functions. So the programmer can pop back a few levels to examine or even change the value of a local at that level without having to terminate the current function call, then pop back to the current frame of reference.

One feature that I expected to be missing was support for debugging libraries and devices. This is more complex than normal debugging, since the operating system is responsible for launching such programs in response to other programs running the OpenLibrary() or OpenDevice() calls. Fortunately, I was wrong, SDB does in fact support debugging of devices and libraries. To debug a device or library, write a small test program that calls it. Run that program in SDB at least up to the point at which the Open call is made. At that point, a command is given to SDB which tells it to go find the device or library code, and bring that in. Now another command will swap between the code of the test program and the code of the device/library. Both sides of the interface can be seen in the same SDB

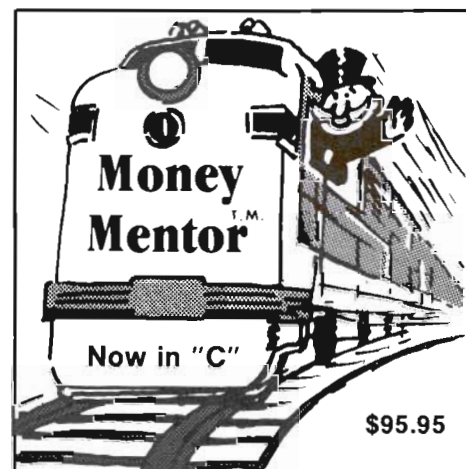
session. I didn't have any device or library code to try this out with, but I would expect it to work as well as the rest of the debugger.

SDB also has a macro definition facility. A series of SDB commands can be remembered and named for later use as a single entity. A different macro file can be created for each program. Thus, program specific macros can be defined. These are really useful in a variety of places. For instance, in debugging a loop, the user wishes to see some loop values after each pass. Define a macro that will print these out, then set a breakpoint that executes this macro at the end of the loop. While the sequence of commands could have been given to the breakpoint directly, defining them as a macro defines the printing sequence for subsequent debugging sessions too, since the macros are automatically saved at the end of a debugging session.

And It's Not Just Source

At any time, the actual assembly language produced by your program can be examined and debugged. When in assembly language mode, stepping happens in assembly language steps, not entire source steps. Code can be disassembled, either symbolically or in hexadecimal. Memory can be changed, filled, compared, and examined in hexadecimal. Or if you are one of those programmers who never trusts the compiler's code, here's the tool for you. In short, many

(continued on page 63)



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by Steve Dock

Most everyone knows that Jobs and Wozniak started Apple Computers in a garage near Sunnyvale California. However, it was almost a secret that they were employees of Hewlett-Packard at the time. What I find interesting is that Hewlett and Packard were two

young engineers who also started their high-tech firm about 25 years earlier in a garage near Sunnyvale! History repeating itself.... Or a nurturing climate for entrepreneurs?

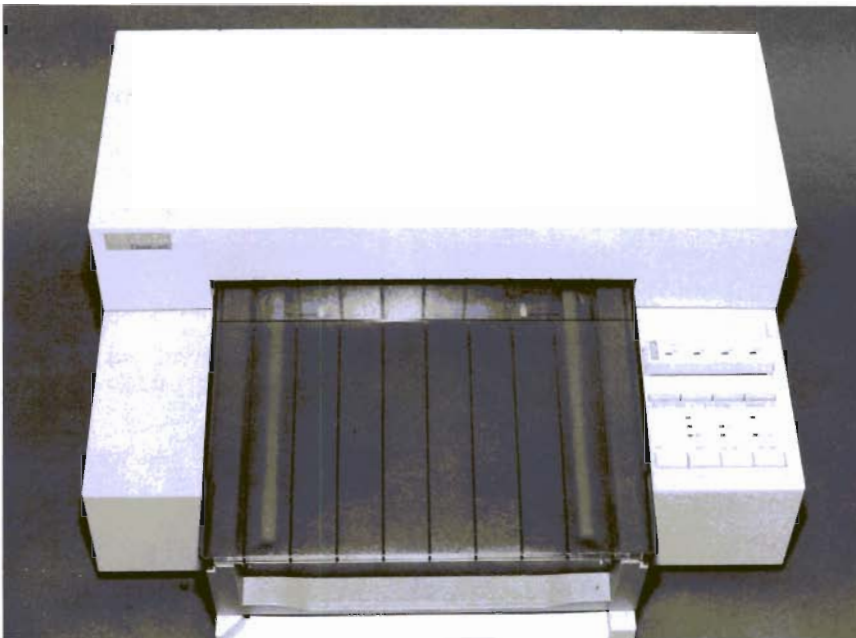
Over the years, Hewlett-Packard has done more than serve as a training ground for Silicon Valley start-ups. This 8 billion dollar per year electronics giant is probably best known for its HP LaserJet printer family. The LaserJet is by far the most

popular laser printer for personal computers. It is famed for producing crisp, sharp text and 300 Dots Per Inch graphics. At a price of around \$2000, it has found wide acceptance in the business world of MS DOS computers. (Ironically the LaserJet's main competitor is the Apple Laserwriter, which is a Postscript printer, and therefore much more expensive).

There must be a missionary somewhere in the Hewlett-Packard organization, someone who wants to improve print quality for the masses of personal computer users. Imagine offering a printer that is quiet (44 DBA), fast (100 CPS), has multiple laser quality fonts, full page 300 DPI graphics, fits easily on a desktop, prints on any 8.5 by 11 paper or envelopes, comes with both serial and parallel ports and is priced at \$995. HP calls it the DeskJet; after working with it, I call it super.

The DeskJet is not a cost-reduced laser. Instead, HP has created a very high quality inkjet printer which even emulates the HP PCL language. Each printed character is composed within a matrix of 30 horizontal and 50 vertical dots. The best 24 pin

DeskJet is a compact unit that features a serial and Centronics parallel port



dot-matrix printers can't come close to that. The quality of the DeskJet text is also enhanced by the "ink". Instead of using a liquid, HP uses a solid, wax-like, substance which is heated, then squirted onto the paper. This gives the letters the slightly raised feel and shiny gloss that is so desired in the business world. When printing graphics, the density and opaqueness of this "ink" give very black-blacks and smooth, even greys. HP is running ads which ask you to compare half of a page from the DeskJet with the other half printed on a Laserjet. It will take a magnifying glass to tell them apart.

Fortunately for us, Commodore has already developed a

printer driver for the DeskJet and has included it in the forthcoming 1.3 Workbench package. With this driver in hand, you will be printing within minutes of unpacking. The Deskjet is simplicity itself to set up. Remove the packing materials and find the small box which contains the ink supply. Lift the hinged top cover of the printer and snap the small cartridge into place. Now connect the printer to the Amiga parallel port (a serial port is also standard with the Deskjet), click on preferences until HP_DeskJet appears and you're all set. The power and parallel cables are all nicely hidden under the printer, and all controls and paper bins are easily accessed from the front. No need to be intimidated

here; the controls for form feed, font selection, letter/draft quality, and on/off line are easy to read and use.

Start up your favorite word processor and print a few pages. I'll bet my hat that your lower jaw will drop an inch or two. There's something captivating about watching the printhead buzz almost silently back and forth across the page (This printer even provides entertainment!). When the first page is finished printing, two plastic arms will click and whirr into place to gently guide the page into its tray. These robotic movements serve a purpose. Even with solid black graphics, the ink will be dry and smear proof when the page joins

(continued on next page)

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DeskJet (continued from previous page)

the stack. The time it takes for this action reduces total throughput. Although HP claims 120 CPS in letter quality mode, the highest I could measure was 70 CPS. That still means a full page per minute, and that is much faster than 90% of the daisy wheel printers. Did I mention that the Deskjet is a single sheet printer with a paper capacity of 100 sheets?

Now let's get fancy. Create or load a document with several Amiga fonts and styles. Start the print process and stand back. In a few minutes, you'll have some of the best looking bit mapped text ever produced by ProWrite, VizaWrite, Pagesetter, Publisher, etc. For maximum sharpness you should set the new 1.3 Amiga Preferences to Density 4 and AntiAliasing to ON. (See the article on Preferences 1.3 in this issue). Still, bit mapped fonts are only as sharp as their matrix allows. Even in high resolution the Amiga fonts use far less than the 30 by 50 cell matrix the DeskJet is capable of. Can we use the much higher resolution fonts and styles built into the DeskJet? In a word, yes. The base model DeskJet provides a non-proportional Courier font with bold, underline, foreign characters, subscript, super-

script, compressed and graphic characters. You can also vary pitch from 10 to 20 characters per inch. Amiga's "printer device" will work perfectly with existing software to mix and match these type characteristics. Using Scribble! or TextCraft for



This Graphic Studio painting was output to DeskJet at 300 dpi

example, you can produce outstanding letters and documents without any special commands or preparations. If you are a Word Perfect user, you can select the appropriate LaserJet driver to get fully supported multiple fonts and styles. However, we have come to the first limitation of the base model Deskjet, no italics.

For some reason HP didn't include an italic version of the Courier font in the internal ROM. The italics on your screen will print as bold characters. If you are used to a dot-matrix printer you probably rarely use italics, so this is not a serious problem.

If you must have 300 DPI italics, or require Prestige, Times Roman, Elite, Helvetica or Letter Gothic fonts, HP will gladly sell you a font cartridge or two. Each cartridge adds about a dozen text styles to the internal set and will cost from \$75 to \$125. Another method for adding internal printer fonts is to purchase "HP SoftFonts" on diskette. These are downloaded to the printer prior to use. If you have "SoftFonts" for a Laserjet you won't be able to use them here. HP choose to change the format for some reason. In order to use "SoftFonts" you must first purchase the 128K extra ram cartridge for the DeskJet. The ram will cost \$150 extra. Let me be perfectly clear in this matter; for many applications, you probably won't need the extra fonts or ram. Unlike our poor cousins in the MS-DOS world, we have the capability to print any screen font we can display. In fact almost all Amiga software can use any font

placed in the "Fonts" directory. Currently, we lack the 300 DPI quality fonts built into the extra cost cartridges. But if you need Helvetica in 24 Points, you can create it with a font editor. (Commodore's 1.3 Workbench will also help here. A set of high quality Adobe fonts are slated to be included)

If page creation is your bag, then you will want to try mixing high quality graphics and text on the page. Here the DeskJet performs even better than the LaserJet. Since a laser is a page printer, it must compose the entire page in its memory before printing. This requires a lot of silicon; a LaserJet II comes with 1.5 megabytes of RAM in order to produce a full page of 300 DPI graphics. The humble DeskJet with only 16KB ram can produce the same graphics. This is possible since the inkjet prints one line at a time. There are no seams, just impressive hard copy graphics. Use the highest resolution clip-art and the best fonts you can find. The DeskJet will produce page after page of impressive copy.

When it comes to printing your favorite IFF pictures, the DeskJet is as good as black and white can be. If you've been impressed by the NewTek woman's face captured with DigiView, you'll get almost the same photographic effect from the printed copy. I printed a number of 32 color and HAM pictures and was only disappointed by King Tut (too much black). Here again, the new 1.3 Preferences gives us a variety of new dithering patterns

and a second grey scale to experiment with.

Should you choose the DeskJet instead of a LaserJet? If you are a home user or a small business printing 50 pages or less a day, I'd say yes. The only LaserJet capabilities which are missing are italics and the lack of any landscape fonts. For business correspondence I'd recommend purchasing at least one proportional font cartridge.

With a mean time between failure of 20,000 hours, you can expect years of trouble free operation.

Hewlett-Packard DeskJet \$995.00

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Palo ALto, Ca 94303

Printer Throughput Test:

Full Page 8 by 10 @ 300 DPI

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34 Seconds

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Bit Mapped Graphics -
3 minutes
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*Single Page Internal fonts
Letter Quality - 2830 Char -
40 Sec = 70.75 CPS

*Single Page Internal fonts
Draft Quality - 2830 Char - 30
Sec = 95 CPS

*Multiple (3) Pages Internal
fonts Letter Quality - 10376
Chars - 2 minutes 42 Sec = 61
CPS

JUMBO RAM

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for the
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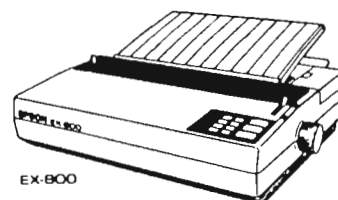
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Hunt for Red October

You read the book.... can you win the game?

by Carl Bennett

In 1984, one of the years most successful fiction novels was *The Hunt for Red October* (HFRO) by Tom Clancy. It told the story of a brand new Soviet nuclear powered submarine commanded by a captain who plans to defect to the US with his ship. The novel managed to convey both a sense

of realism and the neverending tension which modern submarine warfare entails. I enjoyed the book and presumed that it prepared me to play this new game from Datasoft. (HFRO was originally programmed in England by Argus Press Software) The packaging is lavish and includes: the game disk, a wall poster of Red October at sea, a ship identification chart, mission document folder, forty page command manual, and a

button inscribed with the Red October logo. You are captain of Red October on a mission to defect to the USA. Your crew are unaware of your plan, and think that your orders are to cruise close to the east coast cities to test US defenses. The Soviet fleet is in pursuit, since you foolishly sent a tape explaining your plan to the Admiral of the fleet. You must evade or destroy the Soviet ships without making the American fleet suspect a double cross. Fortunately the Red October has a new top secret *Caterpillar* propulsion system which gives you one advantage in this struggle. The rest depends on you...

You begin HFRO in the north Atlantic east of Iceland. Cruising at periscope depth, you have thousands of miles to navigate. Your control screen is made up of four sections. In the center is a large scale view of the whole ocean with your position indicated by a red circle. On the left of the screen is the main control panel where you set speed, heading, and depth. To the right side are buttons for the three principal officers and two other functions. Each is activated by clicking on an ICON. In fact the

As commander you use periscope view to identify other ships in your area



entire game is controlled through icons. The Sonar, Engines, and Weapons officers will bring up additional sets of Icons which control their functions. The Maps icon toggles the Atlantic view on and off and the Scope Icon brings up the periscope icons. Finally the bottom area is the message area. Here each action is acknowledged and alerts and messages are displayed.

The emphasis in HFRO is on realism. There are many controls to understand and master. The navigation controls, for example, all use a similar method to set new values. First you click on speed, heading or depth. This brings a new set of gadgets into view. The current setting will be displayed and you must click re-

peatedly on increase or decrease buttons to make the change. Now click on execute to proceed or cancel if you have changed your mind. Until you have mastered this technique, the attacking ships will blow you out of the water many times.

The Sonar officer presents four options, each of which requires action on your part. The first sonar option is Display. A click here will change the central map to a contour map of the ocean floor with your position and that of other ships indicated. This display is the result of your passive sonar equipment. It is a very detailed and well executed feature of HFRO. The *active* sonar option will send out strong beams of sound to probe the ocean. You

will gain more specific and definite information about enemy ships with this type of sonar. The trade-off is that the enemy will be alerted to your presence. Your course takes you through the mid Atlantic mountains and valleys known to submariners as "Gorshkov's Railroad". You must frequently keep an eye on the terrain in order to plan your route. The *terrain* sonar will bring up a new display of a cross section of the sea floor. It is wise to check this option more often as you approach the middle of your journey. Finally the Hydrophones option will open yet another window. This will show the sound pattern of the sonar contact, and allow you to com-

(continued on next page)

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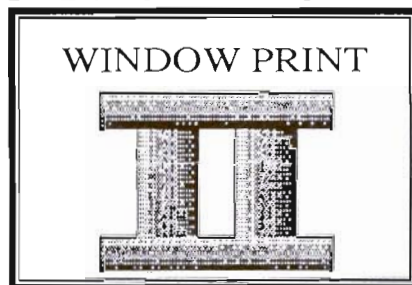
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HFRO (continued from previous page)

pare this pattern with recorded soundwaves of other ships and submarines in your databanks. In this mission it wouldn't do to mistake an American destroyer for a Soviet one. The Engines Icon takes you to another set of choices and trade-offs. Your nuclear engine is much faster than the diesel but it will be unavailable after 10 days. (Your defection plan calls for a fake nuclear accident.) So you must make as much speed as possible during the early phase of the game. You can also switch from propeller drive to the secret caterpillar drive. This may be advisable when you are in the midst of both fleets. Each set of functions includes an Exit Icon to return to the Captain's or master level.

As you proceed south and west of Iceland, you will soon encounter sonar contacts. Your mastery of engine, sonar, and navigational operations may get you close enough for visual sighting. Here the periscope options come into play. First use the Search Scope. This gives a horizon view while you check to be sure it's safe to surface. Scroll gadgets let you rotate to the left or right. You may sight your target and will need to refer to the identification chart before deciding to attack. The Attack scope includes a range finder and lock button for passing sighting information into the fire control computers. There is even a night scope which uses the latest technology. Activate the ESM to intercept electronic messages from the other ships. Once again, quite a set of tools to learn. If you are

certain of your target, click on the Weapons Icon. The Red October has 20 Nuclear Missiles, but these are useless in ship to ship combat. Your only weapons here are stealth, speed, and torpedoes. You must watch the status of your torpedoes since the supply is limited. Once you have set the course to the target, click on FIRE. You can take manual control of the torpedo, if you desire with elevation and heading at your command. It won't be long before you experience a torpedo attack yourself. Your weapons panel lets you expel electronic flak which may confuse the enemy torpedoe and let you escape.

All this creates a very real sense of the complexities of command. The actions of various navigation, sonar, engine, and scope options are realistic simulations, as is the requirement to respond to more than one threat at one time. The graphics quality of the various controls and sonar displays is excellent. Their actions are also very good. However, I was disappointed with the periscope views. The grey scale impression of the heaving sea with barely visible ship silhouettes is a bit too much realism for me. The sound effects are also weak in comparison to the rest of the game. The drone of your engines will change with speed and type and you will hear your torpedoes and explosions. Somehow these don't add to the illusion that you are really there. The very martial, very Russian theme music that plays as the game loads, and when the menus

are activated is much more impressive.

Yes, there are a set of menus which let you save your game and reload. This is almost a necessity, as many hours of play will be required to complete a mission successfully. The menus also include online help and ship identification charts. You will need to use the load option when Red October is sunk. This frequent event is followed by a newspaper report on the strange happening at sea. The newspaper will remain on screen and the theme music will play until you load the Start-Position or Quit.

There is no doubt that HFRO is a high quality submarine simulation. There is plenty of action in the never ending stream of subs and ships that you must evade. You will also learn a lot from the decisions that must be made constantly. All this should add up to a great game but didn't quite click for me. Somehow the tension of the book didn't come through into the game. Perhaps the length and complexity of the mission dulled my senses. But then my stints with Flight Simulator are never more than 20 minutes. If you enjoy realistic simulations, combat games, and submarines you will probably love HFRO. If your taste runs to shoot em ups, you'd better pass on this one.

The Hunt for Red October
\$ 49.95

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SuperBase Pro

A programable, relational database arrives for the Amiga from PP&S

by George Rapp

It seems like more than a year has passed since SuperBase Personal for the Amiga arrived. This event was both a pleasure and a disappointment. The pleasure came from the program in hand, the disappointment in having to wait for the Professional version, "soon to be released". If you've appreciated the ease of use and power of Superbase but needed a programming language, forms editor, and other high-end features, the wait is over; SuperBase Professional is here. Part of the wait may be due to SuperBase Professional's (SBP) marketing strategy. SBP is available for AmigaDos and MS-Dos systems using GEM. This means that the GEM version will be competing against MS-DOS "standards" like Ashton-Tate's dBase III and RBase. The manual reflects this slant with the screen shots and examples representing the GEM version and the Amiga commands listed parenthetically. Since SBP is aiming at the dBase market, it's only fair to draw some comparisons

as we proceed. A professional database requires professional documentation. Upon opening the package, you will find two spiral bound manuals. The first is essentially the same as the personal version of Superbase. There are minor improvements in the quality of the typography and clarity of the screen shots. The overall quality remains high, clear, and easy to read. The second manual is more exceptional and covers the items that distinguish SBP from other databases.

Another key feature of a professional database is the inclusion of a high level language that allows the user to customize for a particular application. SuperBase personal did not include this feature. dBase distinguished itself early on by including a Fortran like language. It also allowed customized screens, data entry, and some calculation, but it was difficult to learn and the included "word processor" was limited to 32k byte files. These features have become the accepted "standard" for a business quality database. SBP has provided these features, but in improved fashion. The internal SBP language is the more famil-

iar *Basic*. It is a very complete implementation, including the majority of AmigaBasic commands. Even the appearance of the menus and list window is the same as in AmigaBasic. In addition to being easier and faster to learn than the Ashton-Tate's package, it is much more powerful.

The manual uses close to two hundred pages to list and explain the roughly 175 commands in the language. The functions of these are so close to their basic counterparts, that experienced Basic programmers need only use the reference section and can start applications immediately.

A powerful language will not cover for a poor data base design. Modern databases must have flexible storage and retrieval structures, a wide variety of field types, and security features. SBP is not deficient in any of the major areas of importance. Superbase, dBase III, and other data bases claim to be relational, that is, able to organize information in any desired sequence (This is not the strict definition of a relational database, but it is the commonly accepted meaning). For a data base to search

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Superbase Pro

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quickly for any requested piece of information, it must be able to organize around that data. It's not necessary to create a separate data base for each piece of search criterion; instead, SBP uses indexes. An index is a small file of pointers created by SBP in response to your request to have information accessible by the contents of a data item. SBP allows up to 999 indexes to be created for each database.

A database consists of records containing related pieces of information. A record has a structure to contain the information which consists of a collection of fields. A field is then a single piece of information like name or an account balance. In SBP, every field has a type associated with it. The type defines the kind of informa-

tion that will be stored there. The more types that a database has, the more versatile it can be. SBP excels in this by providing text, numeric, time, date, logical, and external field types. There are special types within these fields as well. Most databases allow you to specify the format of a numeric field. You select the number of digits shown, the format for display, and the precision stored inside the computer. Date and time fields allow choices of

the style in which the date will be displayed. Logical fields are used to select between a limited number of choices. SBP has all of these fields, as well as special ones not found elsewhere. The external field is one example. This type of field contains the name of an AmigaDos file. When the proper button is clicked on the SBP screen, the external file is displayed. The file can be a text or IFF file. SBP automatical-

changed by the user. The *validation* and *lookup fields* provide much needed functions. You will often want to check the data which is being entered against a predefined group, range of values, or possibly the information in another database. The calculation field uses information in the same record or elsewhere in the system to compute a result which is then stored in the record.

There are still two special data types left in SBP. These are the *SER* field, which is a sequential serial number, and the ternary operator. The ternary operator lets SBP make decisions in the data by comparisons. An equivalent expression in AmigaBasic is the *If.. Then.. Else* structure. The lookup and validation attributes can also be used to save effort in programming. These

functions can reference other, or multiple files. For the applications that I commonly use, the combination of the ternary operators, lookups, and required fields will save many lines of code over an equivalent dBase III application.

Superbase Pro uses the familiar VCR style controls at the bottom of the screen. There are buttons to scroll through or jump to any point in the database. Most other database programs require cryptic



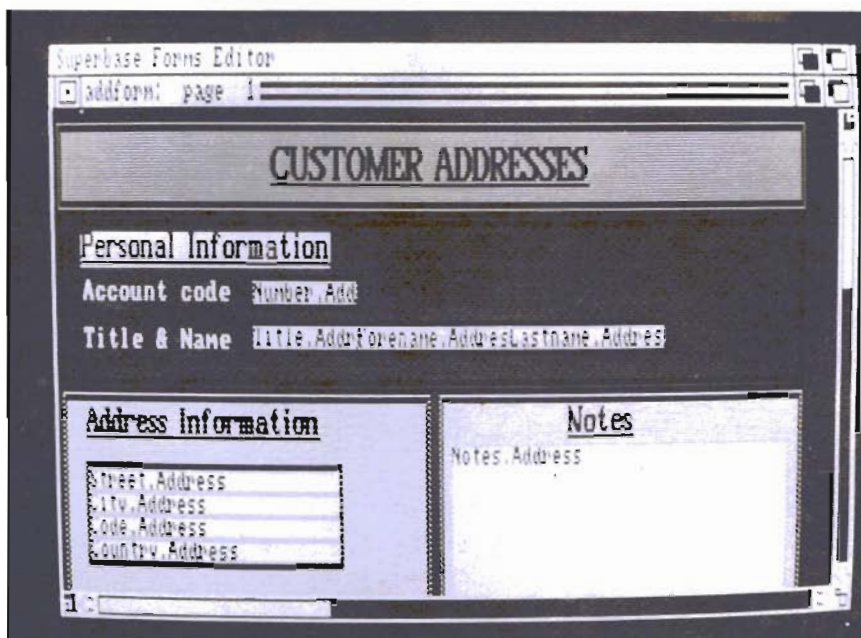
ly determines whether the file is text, picture or sound, and displays (or plays) the file.

Another aspect of the field type is the *field attribute*. The field attribute can be required, read-only, validation, lookup, or calculation. These features make data entry much easier than dBase III. The *required* attribute ensures that the user enters information for that field before proceeding to the next. *Read only* protects a field from being

commands or repeated key strokes to advance through records in the database. Another advanced feature of SBP is the choice of three styles of display from the pull down menus. You can look at a single record down or across the page, or view a screen full of records at once. SBP uses a full Intuition approach with windows, pull down menus, mouse selections, and keyboard equivalents for every function.

Another easy to use and powerful SBP feature is the *Query* requester box. In most databases, you need to learn a special command syntax in order to search for information in the database. The Query requester ends most of the painful memorization of obscure command syntax. Select Query from the pull down menu, and a requester with a collection of gadgets will appear. Here you can look for almost anything, anywhere, in one or more SuperBase databases. You don't even have to remember field names; just point and click on the names which are displayed for you. Create specialized reports using Query and then saved them to disk for use again at a later time. A new feature in SBP that I particularly like, is that when you reload a saved query, the required files are automatically opened for you. You can send the results of your query to disk or to printer. The output can even be sent through custom screens produced with the forms editor.

A much needed addition in SBP is the batch entry mode,



A sample document produced with the SuperBase forms editor

which sets up SBP for repeated data entry. In the personal version, a single record was entered, then stored. Next, the index(s) were updated, and finally a blank form was presented for the next record. The new batch mode cuts through all that.

The forms editor is a major enhancement over SuperBase Personal. Now you can produce customized printouts for invoices, statements, etc. The topic is covered in the second half of the second manual. The documentation includes a concise explanation as to why a graphics based interface to a database is important. The forms editor is essentially a simplified paint program for producing graphic screens. It can be used to produce a variety of forms and just about anything else that you want to look nice in print or on screen (My own pref-

erence is the use of forms to ease data entry).

The forms editor is a separate program with its own set of menus. You have the choice of 4, 8, or 16 colors and standard or interlaced displays. There is also a selection of Topaz or IBM fonts available to customize the display. The basic drawing tools are boxes, lines, areas, or external images. The mouse is used for drawing or marking the location for text. Multiple pages are allowed for flexibility, especially when designing lengthy reports. The drawing tools are like *Deluxe Paint*, and there is a switchable set of crosshairs, as well as a coordinate display. In addition to the palettes of colors available, there are dot patterns and border type lines. I achieved some very nice results by combining the dot

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Superbase Pro (continued from previous page)

patterns with the area fill and repeating this again in a different color as a solid outline. This gave the impression of a drop shadow behind the text window.

One helpful option when working on a form is the *Status* option. This shows all the open files, the amount of chip and fast ram used, and the amount of contiguous memory free. This is especially helpful if you want to use interlace or more colors and have a limited amount of ram. You are not limited to the screen size in designing forms. A reduce option has been included so that the image can be shrunk to fit the full 240 column by 62 row form on screen at once. The forms editor uses the Amiga Clipboards for cut, copy, and paste, and adds an option called move. Move lets you change the location of an object or group of objects on the form without the extra steps of the cut and paste approach. Some parts of the forms editor do not seem as complete or as well thought out as the database portion. The method of listing the directory and loading files is awkward. It requires two different menu choices from the project menu.

A text editor has been added in this release of Superbase. It is functional and efficient in design with control characters for positioning the cursor and edit functions. It is loosely arranged like Wordstar, but does not follow a predictable pattern. You would want to use a text editor within your database for developing script programs, or file descriptions. This is more important for the GEM versions since these machines do not multitask. On the Amiga, you will probably find it better to stick with your favorite text editor.

I've touched on some of the important enhancements over the earlier version of Superbase: the more powerful Query functions, the addition of report formatting, the customized screens, improved data entry, new field types, and the programming language. There are some other features that are new additions, but not as noteworthy. The text editor is one that I am not fond of. The addition of

mail merge functions is also nice, but I would prefer to use a good word processor for these. Other improvements do not show on the menu, but show up in performance. Buffering of the disk drives has been improved as well as the structure of the indexes. This translates into a little faster disk access for large files. However, in comparison to dBase, SBP's storage and retrieval are still slow. We can point to AmigaDos as being responsible for most of this I/O slowdown. Using a product like FACC (from ASDG) will better performance on a floppy based system. If you have a hard disk, the new Fast Filing System to be released with Workbench 1.3 will help here as well. (See article in this issue).

Overall, I have a very favorable impression of Superbase Professional. My work experience has been principally with dBase III, so my evaluation couldn't help comparing the two. DBase remains faster on searches and indexing. However, the addition of field types and attributes saves huge amounts of coding that dBase requires to produce a user friendly data entry or retrieval application. The lookup and passwording functions also help tremendously to reduce the programming job. Unlike dBase, SDB's indexes are easy to change and all are updated at one time. With all of this power and customizability, there is real potential for producing commercial applications based around SBP. The licensing agreement is excellent and geared towards this possibility. This is a package intended for the professional.

There are a few things about SBP that I do not like though. SBP pops up a requester before creating an index to tell you that this will take some time. After reading the manual, I am aware that this is the case, and do not need the computer to tell me that again. The batch entry option is a great aid in entering large amounts of data. Unfortunately, it does compromise some of the security of the most recently entered data in case of a crash. This may be unacceptable in a business environment. An annoy-

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PC Elevator

(continued from page 33)

ing omission is the lack of a hard disk installation utility. Just transferring the files by the icons does not result in a fully working copy. To get all the features and demos to work, you must use the copy command in CLI.

The major gripe that I have is the copy protection scheme based on a dongle (A dongle is a small piece of hardware which plugs into the second mouse port to provide copy protection). The disks can be copied as needed, but the dongle must be present for the program to be used. The SBP dongle is small and black and can be easily mislaid or lost. If this should happen, your data is useless and inaccessible. Worse still, the unusual shape of the Amiga 2000 and the dongle make it very difficult to install into the joystick port on the A2000. I wouldn't want to risk my business applications on a dongle. Hopefully, a future release will drop the dongle (or any copy protection). Professional software is used by professionals who will require continuing support from the vendor. They will not risk losing this support by spreading the software. On the other hand, software pirates have no need for this level of program sophistication or use for this much power.

I have two other suggestions for improvement. I would like to see a more powerful text editor and file requesters which show the date that files were last modified. However, none of these gripes change the basic conclusion: SuperBase Professional is able to compete with the established personal computer packages on an equal basis. It is about time that we have a package that shows how the Amiga's capabilities can be applied to productivity software. Now lets hope that SBP add-ins for particular applications, eg, inventory, payroll, etc. will become available in the near future as well.

SuperBase Professional

\$ 299.95

ProgressivePeripherals Inc.

464 Kalamath St,
Denver, CO. 80204

1-(303)-825-4144

even be tested since they must be booted and can not be modified to use DOS or check for the Elevator. At \$1795, the Elevator bears a significant price tag. Considering that this includes the hot 16 MHZ 80386 chip and a megabyte of 32 bit ram, it's not expensive either. When you consider the cost of the Amiga 2000, the monitor, a hard disk, and the bridge card, that brings the total to \$5000. This sounds like a huge amount of money to lay out for a computer. However, it's not so bad when compared to the IBM PS/2 Model 80. The Model 80 is a 16 MHZ one wait state computer that uses the new VGA graphics standard. This is the first IBM analog RGB monitor that can display 256 colors in low res and fewer in high res mode; and sells for \$8000. Benchmarks from another publication list the Elevator as out performing the Compaq 386, which is considered by most as the fastest of the MS-DOS machines. Two performance tests we ran showed that the Elevator installed in the Amiga did not loose any of its speed. A Norton System Index gave a result of 18. That is 18 times the speed of a standard IBM PC. The other battery of tests showed 3.44 MIPS for internal 80386 operations!

Should you rush out and by the Elevator? If your daily work requires you to use Auto-Cad, Ventura Publisher, or other heavy MS-DOS software, and you're also a confirmed Amiga addict the answer could be yes. If you are a technology junkie, or MIPS maven, then you must have at least one Elevator. (You can install three in the Amiga). Finally if you have been trying without success to persuade your firm to purchase Amigas, the PC-elevATor represents an outstanding value in computing power. The combination of it with the power of the Amiga 2000 brings a new level of computing power to the small business or home.

PC Elevator \$1795.00

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Dynamic Studio v 1.1

Run your MIDI studio with this New Wave in MIDI software

by Tom Bucklin

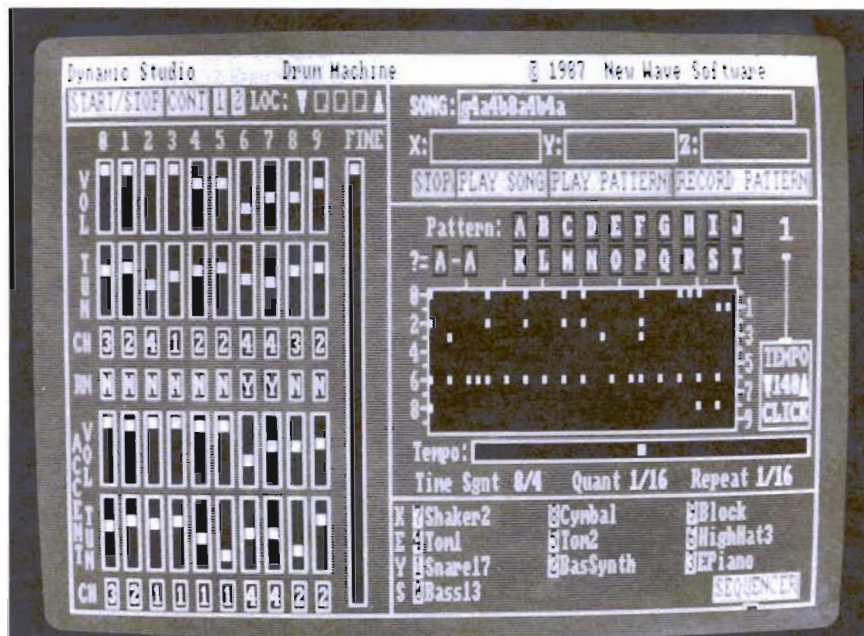
Dynamic Studio is the latest offering from the folks who brought you the innovative "Dynamic Drums". Hoping to improve upon a successful idea, New Wave has taken the Amiga drum machine concept a quantum leap further by integrating it within a full featured MIDI support pro-

gram. The package comes with two disks and a 46 page manual contained in a three ringed binder. One of the first things you notice about this program is that it is not copy protected and may be backed up using a simple diskcopy. It is obvious that the author felt the need to make this program readily accessible to the musician in the event of disk failure. I applaud New Wave's decision to go this route and hope that users will honor and

purchase, not pirate, this program. Certainly, the only way to encourage other companies producing music software to follow suit is by demonstrating that this *lack of protection* will not result in their *lack of sales*.

Although the program will run with 512K of memory, expanded memory is strongly recommended. This recommendation should apply to all full featured MIDI support programs so as not to hinder the creative process.

The Drum Machine screen allows slider control over volume and tuning for each individual drum sound



The Drum Machine

The program boots from the Workbench prompt and brings you into the drum machine screen. In this section of the program, 10 keys of the numerical keypad are mapped to various interchangeable drum sounds. The ten sounds associated with the keys make up one "drum kit". There are a variety of drums kits included on the disks, or you may choose to construct your own. Each one of the ten sounds are adjustable for pitch and volume via the sliders at the left of the screen. To the right of these slider sets is a main slider called "fine". By clicking on the appropriate short slider, you can use this to fine tune your sound to an

exact level of volume or pitch. To play a previously recorded piece, you chose "Load Song" from the Drum Song menu. A Drum Song is the total of all the parameters used in the creation of a given piece, including all pattern sections, information about the drum kit and the tempo. If the right drum kit has not already been loaded into memory, the program will inform you that the chosen song uses a different one, and ask if you wish that one loaded. Through experimentation, a variety of effects and new combinations can be achieved by altering the drum kit used once the drum song has been recorded. From this same menu, you may choose to Save, Delete, or Clear the song as well.

The pattern option in the menu bar works much the same way except that you are loading individual section, or patterns, of the entire song. You have all of the same options in the pattern menu selections as in the Drum Song, with the added ability of copying a pattern. This can be very useful for repeating sections of the rhythm without having to re-input the same lick.

At the upper right of the drum screen there is a box labeled "song:". It is in this box that you define the order and frequency of your patterns which ultimately make up your Drum Song. This multi-segment feature of the program is evident in both the Drum and Sequencer sections of the program, and allows the user to perform major composition feats with a minimum of effort.

In the example shown in the

photo, a Drum song has been composed of three individual patterns that have been arranged to construct a song. In the example g4a4b8a4b4a, pattern g repeats four times; followed by pattern A for 4 times; followed by pattern B for eight times, and so on.

The metronome can be used in either an audible or a quiet mode. In the quiet mode, the metronome continues in a silent left to right arc with the numerical indicator as your metering guide. There are up/down pointers within the metronome box with which you can make fine adjustments to the tempo. This is also where the overall beats per minute rate is displayed. For larger tempo adjustments, the tempo slider located just below allows sweeping changes in the beats per minute rate.

Below the tempo slider there are three configurable functions for setting rates for time signature, quantizing, and repeat. Time signatures can be altered to give ranges of between 1/4 and 8/4 (The latter setting is extensively used as it enables you to display and edit twice as much information in the pattern editor window as 1/4).

For the novice and the pro alike, few functions are as useful as quantizing. Simply put, the quantizing function attaches your playing to the nearest increment of timing as determined by the Quant: setting. With a duration adjustment of between a quarter note and a thirty second note, you can determine how much timing correction to use for a given pattern.

The sequencer:

Here you will find a full featured multi-track MIDI sequencer. Each track (numbered one through sixteen down the left hand side of the screen) can be given a name which will be stored with the track for future reference. By identifying the tracks in this manner, you can label each part as horns, strings, bass, or whatever you specify. Later, during playback, you may want to send these tracks to individual MIDI instruments that excel in creating the given sound. Along the bottom center of the screen there are controls that allow or restrict certain types of MIDI data transmission such as pitchwheel, aftertouch, and program change messages. By turning off the desired option, you can effectively filter out the given type of MIDI message, thereby conserving memory.

Each track is broken down into four segments labeled "A" through "D". These segments can be combined to form an entire track. It is, however, not necessary to use more than one of these segments to record a track. You may simply chose to record an entire performance using a single segment.

The value of this segmented recording comes into play when you have sections of a song (like most) which repeat. For instance, you may have a song which begins with the main lyrical line, then proceeds to a chorus, then on to a bridge, then back to the beginning line. Instead of playing the entire song all the way through within a single segment,

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Dynamic Studio (continued from previous page)

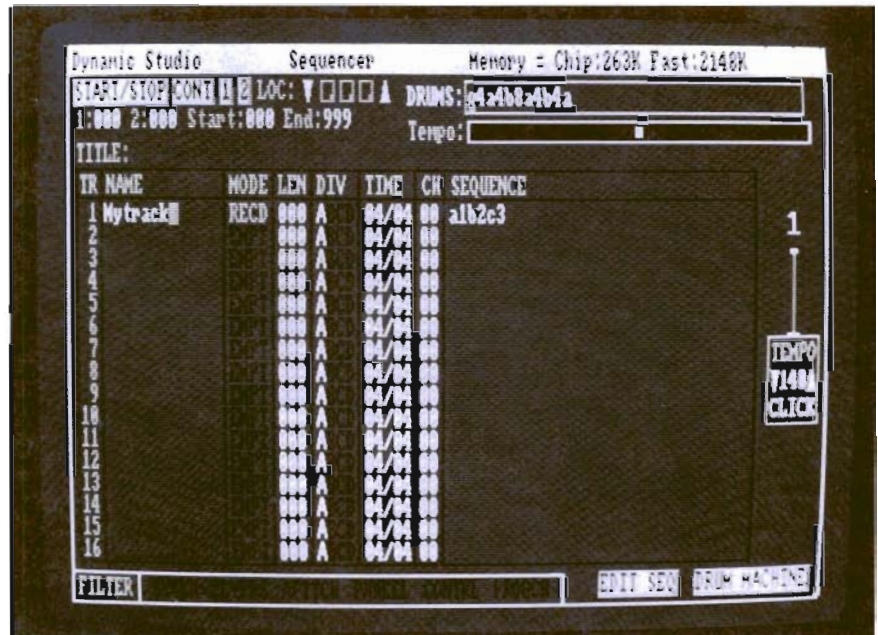
you could record record two sections split between the main lyrical line and the chorus/bridge. Afterward, you have only to specify during playback a sequencer sequence of A,B, and then A again. With a sequencer, there is never a need to play repeating components of a song twice!

Under the MODE column the letters EMPT appear on each horizontal line indicating that there is nothing contained on any of the tracks. To record a track, you simply click over the EMPT on the desired track with the left mouse button. The letters will change to RECD to indicate that the track is now in record mode. Clicking on the start gadget in the upper left screen will start the sequencer and this track will record the incoming MIDI data.

Some of the various commands available through the sequencer menu are; *Load Studio* loads all data associated with a piece of music. Using this option when saving or loading will also save the appropriate drum song. The studio selections also have Save, Delete, and Clear to name a few.

One option, *Format Data Disk*, is an option that should be present in many programs, but isn't. Being a multi-tasking machine has made many developers ignore simple but useful options like this from within the program.

The toggle filter selection from the project menu will toggle the 7K audio filter within the A500/A2000 models. The programmer has cleverly made use of the power light to indicate the status



DynamicStudio boasts a 16 track sequencer with advanced editing capabilities

of the filter; dim or off, and the filter is off, and vice versa. The effect of a non-filtered output with the drum sounds is dramatic.

Other functions available for sequencer data manipulation are;

Merge-merges two tracks or sections of tracks together

Rechannel lets you change transmit channels for selected tracks,

Alternate allows one track to play alternate notes on a series of channels,

You can *Randomize* a percentage of notes on a given track to a new channel.

You can also *Reverse*, *Scramble* Time shift a track in increments of 1/192 notes.

As if this wasn't enough, A basic librarian for system exclusive data has been included as well.

All in all, I am very impressed with the amount of work that the author has put into this program. New Wave offers both the novice and the professional a powerful MIDI support program in DynamicStudio.

DynamicStudio v 1.1
\$ 199.95

New Wave Software
P.O. Box 438
St. Clair Shores, MI. 48080

1-(313)-771-4465

CZ-Master

Editing support for the CZ series of synthesizers from SoundQuest

by Jay Levan

SoundQuest has released CZ Master for the Casio CZ 101, 1000, 3000, 5000 and other CZ compatible line of synthesizers. This Editor/Librarian has a very similar interface to the Mt-32Master program reviewed in the Feb. '88 issue of The Sentry. Many of the same bank and patch stor-

age and edit management conventions are employed.

As is SoundQuest's custom, the program is copy protected via the key disk system. Make as many backup copies of the disk as you want, but you will have to insert the original disk to get the program to run.

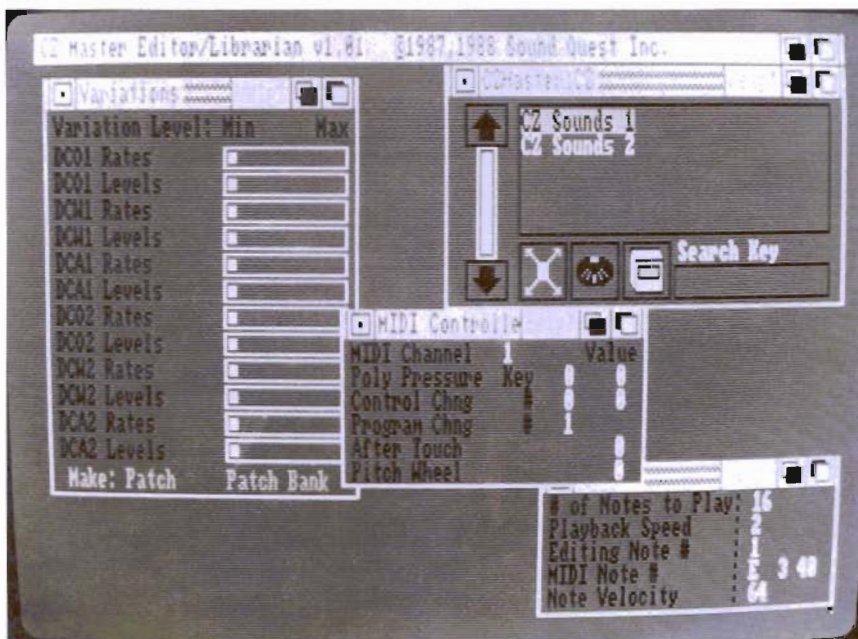
CZMaster autoboots and includes the Public Domain Quick-Send program which is very nice for sending patches and banks to your synth without loading in

the whole program. Once in the program, the interface is essentially an assortment of windows accessed via standard pull-down menus. You open a "drawer" which contains your banks of sounds, select a bank, and load it. You can then edit or reorganize any of the patches in the bank. The "last drawer" feature lets you recall the last drawer you opened.

Editing, or creating sounds is much easier with a graphic interface and mouse than with buttons on a synthesizer. However, any new tool requires some practice, until the subtleties of the system are fully understood and become second nature. CZ Master is not without its subtleties; although I'm happy to say that you can get started, and even load and edit sounds, without the manual in hand. The level of sophistication within CZMaster calls to an audience that is comprised of the more experienced MIDI user who doesn't mind investing hours and dollars to get the quality he needs.

Selecting "MIDI to Edit" brings up the editing screen with your currently selected patch. A "blank" for creating a patch from

CZMaster can use a multi-window environment for simplified control of your instrument

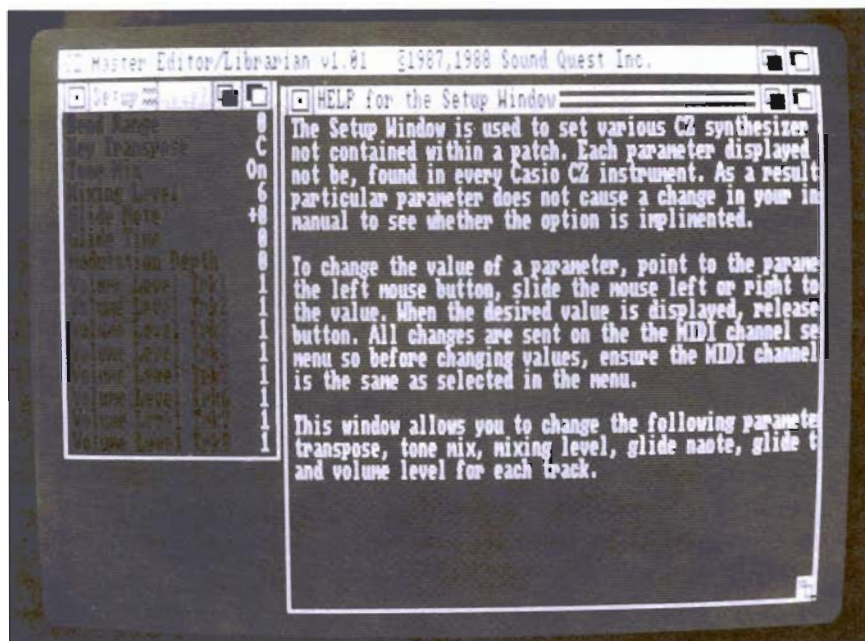


CZ-Master (continued from previous page)

scratch can be generated by selecting "Add New Data File." All of the patches' parameters are graphically displayed here in a modified CZ language. If you have ever edited or loaded sounds on your CZ from data sheets, the environment will be somewhat familiar. You can increase and decrease values by grabbing and dragging graphic representations of the parameters. You can also change values by clicking on their numeric representation, and moving the mouse left or right.

After you make any changes to a sound, you can instantly audition your modifications. Click the RIGHT mouse button as you move left to right for pitch changes, and top to bottom for variations in velocity (if your keyboard is velocity sensitive). This quick feedback is very convenient and can also be set to play a sequence (or an annoying chord).

The "lock" device is also very nice. If you have one sound in which you like some parameters, but not others, and you have another sound you want to apply the good part to, you can selectively use parts of both instruments. For instance, let's say I have a violin sound and I like the attack and decay on it, but I want to hear that attack and decay on my favorite brass patch. No problem. I just link together the parts of the sound I like with the "locks", and those parameters can be transferred over to the other patch. After having edited your patch, you close the window and get a requestor which



Online help is available throughout the program

allows you to direct the patch to disk, synth or printer. The Bank Editor also has a multitude of editing options.

No full featured editor would be complete today without some form of automatic patch/bank generation capabilities. After all, what good is having a powerful computer if you do all the work? There are two basic methods of patch/bank generation in this package. The first, called Patch Slide, generates a whole bank of new patches seeded with a selected existing starting and ending patch. It's just like using "SPREAD" in Deluxe Paint which gives you all the shades between two selected colors. The Variations Window is perfect for those who don't fully understand how sounds are manipulated in the normal editing window with its array of DCWs DCAs and DCOs. This creative tool allows

you to change these same parameters, but in a small window with 12 sliders and a "Make Patch" gadget which implements your changes. Other features include; the ability to name and make notes about patches, MIDI controller functions, 7 very handy help screens, a search key, "expand a drawer" (to see all the patches at a glance in a bank), Print, and a tone window to fashion the chord or sequence you'll hear while auditioning patches.

With SoundQuest's dedication to constantly improving the state of MIDI art on the Amiga, I think it's safe to say that your CZ has a friend in CZMaster.

CZMaster

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Toronto, Canada M8Y 2L2
1-(416)-234-0347

S l a y g o n

Operate a futuristic tank in this game from Microdeal

by Ken McNeill

Controlled from within by one highly trained specialist, it possesses the strength of a hundred men, the armor and weapons of a small tank, and the intelligence of its operator. In Slaygon, you control a futuristic, full-featured tank in an attempt to destroy a huge laboratory complex from within. It is your mission to seek out the fa-

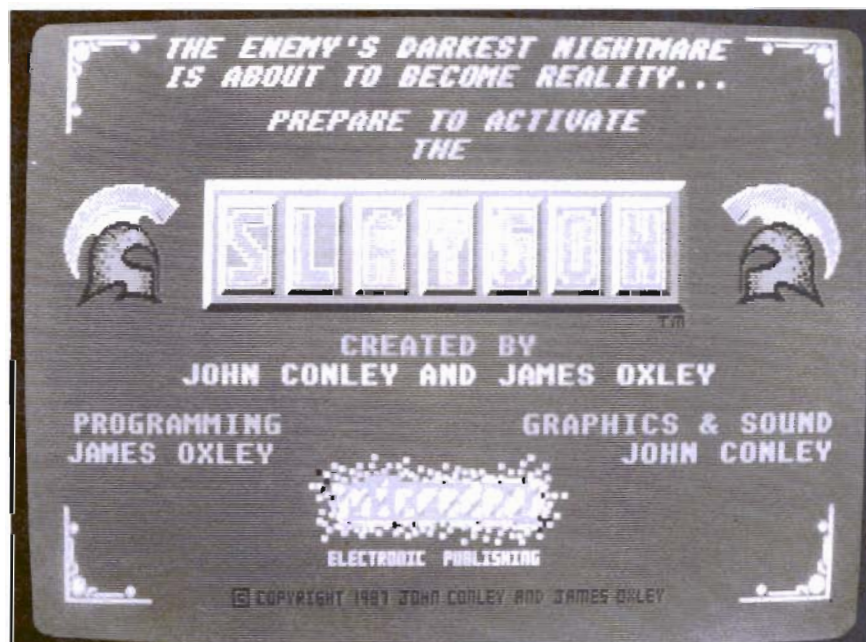
cility's main computer and disable it, causing the reactor to fail and overload, thus obliterating the complex. Now why would anyone want to do something like that? Well, a company called Cybordynamics Incorporated, a controversial business empire devoted to replacing human workers with robots, has developed a toxic virus capable of annihilating all human life. If that weren't bad enough, Cybordynamics could launch a large scale chemical attack and capture the world without the use of de-

structive weapons. As an officer in the United Defense Force, you receive a top secret dispatch explaining this crisis, and you immediately activate the Slaygon and prepare to infiltrate the Cybordynamics laboratory.

After choosing the level of difficulty, the game commences. Your screen view is from within the Slaygon, and the screen is split into two parts with various options surrounding them. One half of the screen is a three dimensional view of the grounds of the laboratory. The other half contains a continually updated map of the area. Movement is performed by clicking the appropriate direction on a diamond-shaped compass.

There are small boxes with the words "quit", "load", and "save" on the left side which are self-explanatory. On the right side are boxes with the words "drop", "take", and "use" for the manipulation of various tools and weapons found along the way. At the top are eight empty squares that serve as storage areas for the objects that you find. There are six built-in features of your Slaygon, and their boxes are at the bottom of the screen.

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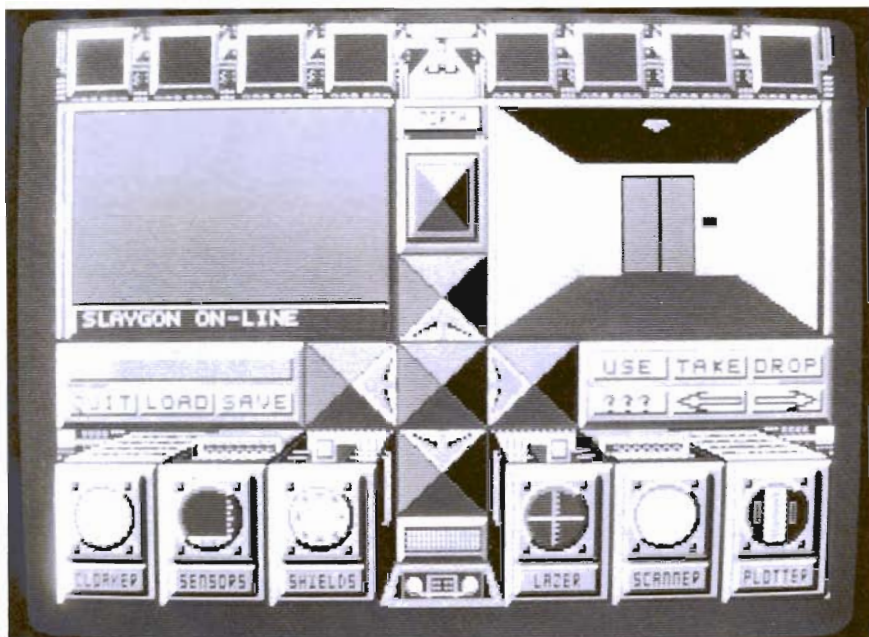


Slaygon (continued from previous page)

There is "cloaker", an option that prevents the Slaygon from being seen. The "sensors" give early warning of things ahead, and the "shields" provide some degree of protection from the enemy's weapons. Clicking the laser box fires two red beams for a short duration. Numbers five and six of the main options are "scanner", and "plotter" which are both used to map the area as you travel. Finally, there is a bar meter measuring the energy of the Slaygon which decreases with the use of any of the six previously described options, and which can be replenished by finding "energy pods".

Each time a direction is clicked, the three dimensional view scrolls accordingly, and the map is updated if the territory is new. There are miles of hallways and various doors to open (if they are unlocked). While playing, I encountered several robots which I fired at immediately, but could not seem to harm. The last two pages of the manual are entitled "Game Hints", and give a warning that reading may take some of the fun of discovery out of the game. In these two pages, there is an elaboration of how to disable the main computer, and a listing of some of the objects and what they are used for. There are also a few general tips about how to survive.

During my game, I stumbled into force fields and ion beams before I decided to keep my sensors on constantly, even though it saps energy faster. An example object that I found was a "force field neutralizer" that I



The Slaygon control panel

used to shut down a security trap.

The rendering of the laboratory is pretty good, and the three dimensional aspect is graphically inviting. The game play is not arcade, but it is also not "type your command" style either. It reminds me most of Mindscape's "Uninvited" or "Deja-vu", where you have mouse control over movement and use of objects. Although the idea for the game is very interesting, and I was entertained by the options of my Slaygon, I found myself a little hungry for action. The inside cover names the Slaygon "the ultimate infiltration device". While this may be true, I didn't think the game ever gave me a chance to prove it. What I mean is that I didn't encounter that many threatening situations where there was a real need for the Slaygon device. The laser doesn't even

scratch the wallpaper in the hallways, and it didn't seem to affect my robotic adversaries.

On a lot of other computers, the sound and graphics would probably be more than adequate, but on the Amiga, they are a little disappointing. Despite these complaints, Slaygon was still an entertaining experience. I enjoyed exploring my way around the catacombs of the complex. There is a certain strategy required, and there are many puzzles and mysteries to solve within Slaygon.

***Slaygon* \$ 39.95**

MicroDeal
576 S.Telegraph
Pontiac MI 48053
(313) 334-8729

Descartes

Get graphic about your mathematics

by Walter Steuber

Rene Descartes was a famous 17th century mathematician who is known for many discoveries, among which is the Cartesian Coordinate system. We've all used graph paper and drawn using Rene's X and Y axes. Now Mindware has produced Decartes, an AMIGA product which makes it easy to

graph mathematical functions. The graphs can be examined on the screen, saved in an IFF file, or printed on paper. The natural beauty of hypercycloids, parabolas, quadratics and other mathematically defined curves make it artistically entertaining to specify a function and look at the quickly drawn display. There are many uses of a graphing tool beyond making pretty pictures, though. Descartes is a boon to the student of analytical geometry, to the design engineer and to

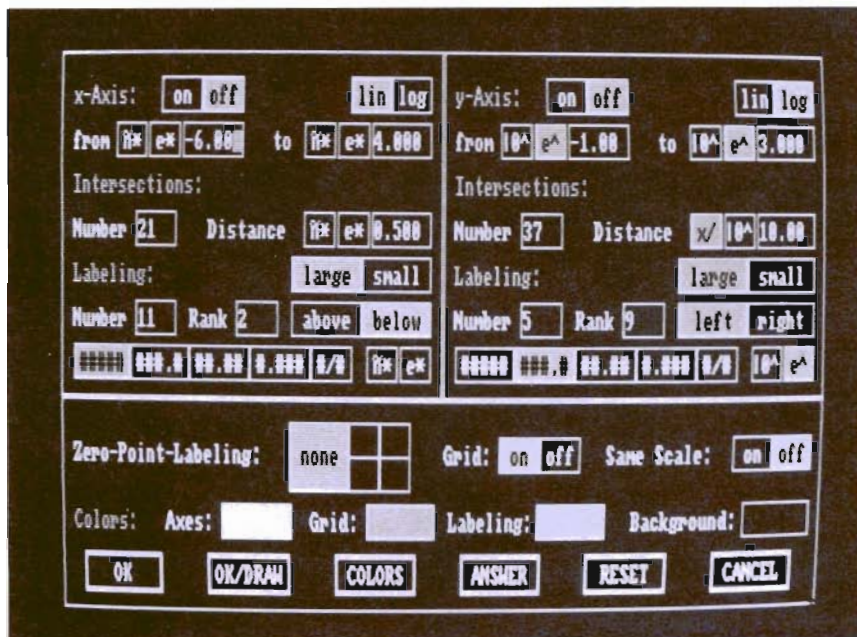
the teacher looking for visual aids.

Graphing mathematical functions is natural, easy work for any computer, especially for Amiga, and any Amiga enthusiast with even a mild interest in such things should be equipped to plot out a curve at a moment's notice. Descartes is well suited to this work. It has pull-down menus and mouse-click buttons that make it straightforward to tell the machine exactly what you want and to specify the many necessary little details in the making of a graph. Besides stating the function of x you want to plot, for instance, there is the range of x and y over which it is to be shown, the coordinate system in which it is to appear, the axes, the tick marks and labels on the axes, the color, whether a grid is on or off, and four or five more details like that.

One noteworthy feature of Descartes, is that any number of functions can be graphed on the same plot. For instance, $\sin(x)$ might be plotted over a range of x and, for comparison with it, the very similar function $x - x^3/6 + x^5/120$. When you specify

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The Parameter Screen

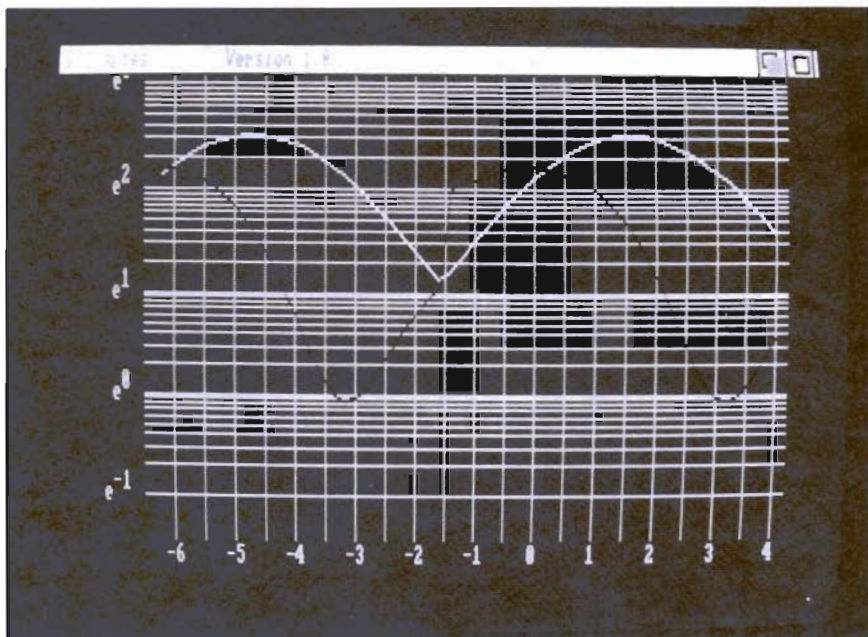


Descartes (continued from previous page)

a range of 0 to 1 radians for x , there is no visible difference between these two functions, but changing the range to 1.0-1.5 reveals a noticeable difference and they are seen to be totally different in the range 2-4. It is easy to zoom in on a narrow range and get precise measurements of the difference or to zoom out and see qualitative differences. Similarly, two functions that intersect can be plotted over a large range for their appearance or zoomed in to solve for the exact values at their point of intersection. This graphing tool quickly and easily conveys a feeling for the behavior of complicated functions, a feeling that would be very hard to come by otherwise.

Basic Know How

Descartes presupposes familiarity with BASIC and some knowledge of analytical geometry. All the mathematical operations are limited to plotting expressions that involve a single specific variable, x , and are in BASIC nomenclature. That is, multiplication is expressed by the operator '*', division by '/', exponentiation by '^', etc. The program recognizes fifteen familiar BASIC functions like $\text{sqrt}(x)$ and $\tan(x)$ but has no provision for the user to add to this list. The available operators and functions will meet most needs, and they can be combined in very complicated ways, but some additional flexibility would be nice. When starting out with a clean slate, the user is presented with a self-explanatory, intuitive screen that



The expon_logarithmic graphic is one of several examples provided on the disk

will end up as a list of the functions that are to be plotted together. There are numerous options available at this point: Functions can be called in from disk storage or typed in directly. The derivative of a function can be included on the list by simply pressing a button. Any function on the list can be edited in the same way text is edited in BASIC. Duplicate copies of a function can be added to the list by clicking another button. (This duplication is a neat feature, because it makes it easy to generate a family of similar curves by editing in the desired differences in the formulas.)

The graph can be snapped between logarithmic and linear coordinates with a single mouse click, an enormous help in getting a feel for the nature of a function. Another click can snap

the graph either into high resolution for cleaner but slower plotting or into a fast plotting mode that is practically instantaneous. Other buttons change the aspect ratio, background color and similar features.

Graphic Output

Printing a hardcopy of the graphs is initiated by a pull-down menu click. (Once started, there is no way to abort the printout.) Curves and gridlines on the printed output are clean and sharp, but the numbering on the axes is smudgy and there is no provision for typing in a description of what the curves are. Such hardcopies are good for internal or shop use, but they are deficient for showing around or for publication. In this respect, De-

(continued on page 62)

AmigaBASIC

Inside and Out

By Walter Steuber

Amiga people fall into two fairly separate camps; the large group of users who enjoy programs prepared by someone else, and the relatively small group of programmers who prefer to be the ones that tell the computer what to do. If you have a hankering to take control and program your machine, here is the book for you!

The EXTRAS disk that comes with every Amiga contains some wonderful information on writing AmigaBASIC programs, but it is really directed towards people who already have experience in programming. This new Abacus publication takes the reader carefully and skillfully over that awkward threshold of getting started for the very first time. After that, *AmigaBASIC-Inside and Out* proceeds to take the reader a long way down some selected programming paths.

Books on programming often drown the reader with details before he is ready for them, but *AmigaBASIC--Inside and Out* is

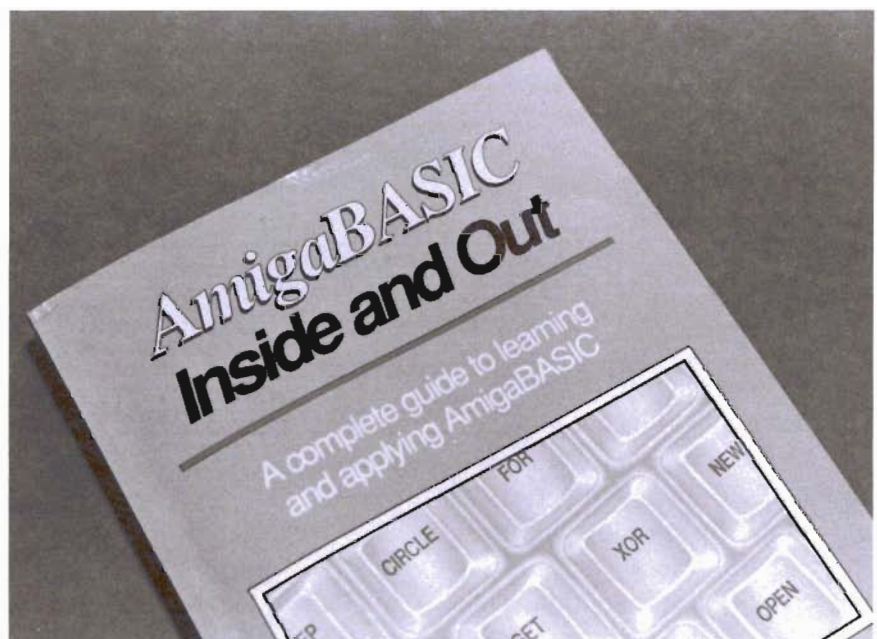
careful to present only a single element of the language at a time, getting the reader to use it and digest it before going on. Although this procedure makes for a very long book (500 pages full of material) and requires the reader to carry out each example before moving on, it is done in a way which gives the beginner a very clear understanding of what is happening. The exercises are designed to be more than just instructive--they are charming and fun. If you go through this book line by line and don't find

Exploring the world of Basic on the Amiga can be fun with this helpful guide from Abacus

the process absolutely fascinating, then programming will probably never be your bag. It just doesn't get any better than this.

Everything in *AmigaBASIC-Inside and Out* is Amiga-specific, even tending to be Amiga 500 specific. For instance, very early in the exercises the reader finds himself programming the movements of bobs and sprites across some display

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AmigaBasic (continued from previous page)

he has arranged on the screen. Animation seems like a pretty tough subject to start right out with, but the textbook explains things clearly and extensively before it leads its reader through actual, hands-on programming.

Other topics covered in the same carefully explained manner include windows, mouse functions, pull-down menus, paint functions, disk drive operations, file formatting, custom commands, and generation of music, voice or other sounds (the machine has awesome power, does many things, and the serious beginner must be prepared for a long, long, course in learning how to use all its intricacies). After the tutorial explanations, the reader is taken through short programs whose purpose is primarily to illustrate the use of particular commands.

The authors take the reader line-by-line through serious, large programs that include a graphics routine, a video titling utility, a data base program you may use in preference to a commercial one, a full-featured paint routine, a pie-chart and bar-graph generator, a speech utility, and finally, a music synthesizer.

The style of writing is chatty and personal. You might expect to find such a style obnoxious when dealing with a technical subject, but it's done well here and turns out to be quite pleasant. In little parenthetical discussions the authors enlarge on topics that the reader may be meeting for the first time and consequently finds strange and formidable. The discussions go

far towards reducing tough topics to reasonableness and acceptability before anything is said about actually programming them. Topics handled this way are items like bitplanes, pixels, ASCII control codes, ram disk, directory tree structure, and event trapping. There are so many of these terms, in fact, that you may find it overwhelming unless you already have an acquaintance with some of them. In order to cover a range of Amiga users, Abacus publishes a lighter book; and a heavier one for those who want to go beyond the material presented here! There is a small amount of useful reference material in addition to the tutorials. For instance, error messages are tabulated and explained fully and understandably. Demos on the EXTRAS disk are discussed in an interesting way. A glossary of technical terms is included as well. Bits, bytes, and numbering systems are discussed as topics separate from the presentation of the language. Throughout the book, the authors tuck in little bits of information that make programming more understandable and less intimidating.

It's a lot of work to learn AmigaBASIC whatever way you do it, but Abacus has delivered a book which makes it a little easier and a lot more fun.

AMIGABASIC- Inside and Out \$24.95

Abacus Software
5370 52nd Street S.E.
Grand Rapids, MI. 49508
1-(616)-241-5510

Descartes (continued from page 60)

Descartes is behind the performance of similar programs for the IBM and the Hewlett-Packard personal computers. I know, I could save the plot as an IFF file, and enhance it with Dpaint, etc., but just because we have the IFF standard doesn't require using it for every task.

There is one feature lacking in Descartes that I very much want in a graphing tool. That is the facility to accept a table of arbitrary x,y values and plot them, along with a best-fit curve. This would be the typical situation when plotting experimental data, rather than experimenting with mathematical functions. (There are several programs for this in the public domain, but they are in a primitive state and do not have Descartes' ease of operation and management of the axes.) If you are a frequent, serious user of plotting software, Descartes is also limited by its restriction to the operators described above. For the rest of the world Descartes provides a full featured tool for understanding and exploring the world of curves which underly much of mathematics. I happily welcome Descartes as an important addition to my toolkit. With its smooth intuitive operation, it is easy and pleasant to use.

Descartes \$ 34.95

Mindware International
110 Dunlop St. West
Barrie, Ont., Canada L4M 5R3

of the functions of the normal symbolic debugger are here in addition to the features added for source level debugging.

In fact, for any user of the normal Manx debugger "DB", SDB should be familiar territory. While not all of the DB commands are available, those that are have the same names and syntax. I suspect that if you weren't at all interested in source level debugging, DB is a better tool to use, but I can't think of many reasons why a programmer writing in C language would choose DB over SDB.

A Few Minor Weak Points

The DB debugger is one place to look for shortcomings in the SDB debugger. They are of the same family, and yet there are a few DB functions missing from SDB. First of all, DB has a series of Amiga specific functions for managing multiple tasks. It lets you start and stop multiple tasks and even run a "post mortem" debugging on a task that's generated the famous "Software Error" requester. There is also no way I've found to define new symbols, though of course symbols defined in the source code can be modified at will. I suppose this means that if you want some user-definable symbols, you can define them in your source code instead of within the debugger. I think these are pretty minor points. And using SDB never precludes the use of DB, so if the need for DB use comes up, the Manx user probably already has it. One thing SDB

can't fully handle is multiple threading in programs. It's pretty simple to start one or more functions in a single source as separate tasks or processes. SDB will only track the flow of the main program; it doesn't understand what the CreateTask() or CreateProcess() functions do, so it can't follow the code they execute, even though it may be readily available. While this is certainly a limitation, I'm not sure how SDB could do this properly. It's a very complex issue, and something that source level debuggers for other personal computers haven't yet had to deal with. As more systems use multitasking, perhaps Manx or someone else will find a solution to this problem. Another thing I should point out about SDB is that symbols not used in the source being debugged are not available to the user. This is not a big problem, and certainly not a specific problem with SDB. It would either have to be psychic or import every symbol in the system to give you those that aren't in the program. But it should help encourage good programming style. If you want to examine a "struct Item" symbolically, make sure you really use this structure in the program. Old C programmers often use "int" or "long" as a synonym for "pointer", and it isn't, especially in this context ("int" is especially bad, as it's not going to be a longword in the standard Manx setup). If you want "struct Item*", it is important to say so!

Conclusions

SDB performed flawlessly for me so far. I've used it long enough to run the thing through its paces, get bitten by some bugs, and decide if it does what it's supposed to do. In that test, SDB passes with flying colors. It does everything the way it's supposed to. The user interface is very clean and very well suited to it's operation. SDB is very solid, as a developer level program should be, and didn't crash or otherwise annoy me in any way. I suspect I'll get much more experience with it in the future though, as I have no desire to go back to any of my old methods of code debugging having used SDB.

I would strongly recommend SDB to anyone doing serious development work in C language on the Amiga. If you don't have a C compiler yet, the availability of SDB as a real product today is enough reason to recommend Aztec. It's even a good reason to learn C language even if you were leaning toward Modula2. If you already use one of the other compiled languages for the Amiga, I wouldn't necessarily recommend switching just yet. All the others are going to have to build source level debuggers for their compilers, or Manx is going to leave them in the dust. They can start with SDB as the goal they've got to reach.

SDB \$ 75.00
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One Industrial Way
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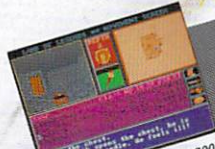
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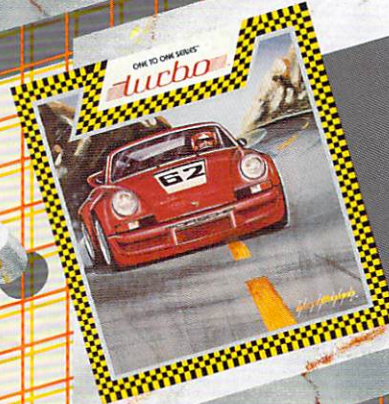


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