

# ST World

THE ESSENTIAL PERIPHERAL FOR YOUR ATARI ST



**Warren Cann, Ex-Ultravox, in conversation with ST World**

- ♣ **ST Connections** - Connecting the ST to other computers
- ♣ **Supertest** - Four font design and manipulation packages compared
- ♣ **Composers' Desktop Project** - MIDI developments at York University

# CYBER SERIES 3

## CYBER PAINT

CYBER PAINT is a powerful animation and paint program. Use it by itself to create colorful 2D animations; or add the final colorful 2D animations; or add the final touch to your three-dimensional Cyber Studio animated sequences.

Choose from a host of flexible paint box techniques to retouch individual Cyber Studio frames. Cyber Paint lets you overlay one image with another, so you can even add imported Degas or Neochrome backdrops.

Animation isn't limited to simple cartoon-style movements, either. Cyber Paint has a range of special effects to resize, distort, move, and superimpose entire screens, so you can produce sophisticated video effects just like the ones on television — and the one you need is your ST.

Whether you use Cyber Paint on its own or with other Cyber products, you'll be amazed at the results. Professional animation is here at last!



## NEW! CYBER SCULPT

Want to create your own 3-dimensional designs? Need more sophisticated modelling techniques? Then CYBER SCULPT is for you! A mouse-driven, stand-alone program that does just one thing: build 3D objects. And not just spun or extruded — but twisted, pushed, pulled, tweaked and pummeled! The most fantastic shapes imaginable.

Working with Cyber Sculpt is just like working with clay. Your object's not quite the right shape? Then mould it into a new shape! Grab some vertices and move them into a better position. Or use a "magnet" to stretch them.

Cyber Sculpt has cross-sectional modelling, for easy creation of complex shapes like boat hulls, and for engineers, there's support for digitizing tables.

## 3D DEVELOPER'S DISK

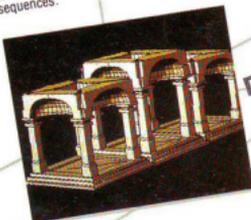
The 3D DEVELOPER'S DISK opens up a "pipeline" into Cyber Studio, allowing you to create your own 3D applications, without the need for specialised 3D mathematic knowledge.

## 3D PLOTTER & PRINTER DRIVERS

A library of drivers for use with Cyber Studio, supporting Hewlett-Packard pen plotters (and compatibles), plus Gemini, Star, Epson, Okidata, NEC, Panasonic and C.Itoh matrix printers.

## NEW! 3D FONTS I & II

Two packs of spectacular 3D fonts in a variety of styles and effects. Use them in your Cyber animations or design your own 3D greeting cards, logos, or letterheads. Plus... added bonuses: Tom Hudson's SUPER EXTRUDER TOOL, used to create these fonts, in pack 1; and multicoloured 3D clip art in pack 2.



## CYBER STUDIO

CYBER STUDIO combines STEREO CAD-3D 2.0, a three-dimensional design program, with CYBERMATE, a powerful animation control language. Together they transform your Atari ST and turn your ideas into realistic 3D moving images.

STEREO CAD-3D 2.0 allows you to create your own 3D objects and scenes — quickly and easily! Use the built-in 3D primitives to shape your ideas, then add more detail with CAD-3D 2.0's tools, combining several objects to build up more complex shapes. Add the final touch with subtle lighting effects and that's it! — from starting point to starship in a matter of minutes!

CYBERMATE is an animation control language designed specifically for use with CAD-3D 2.0. Cybermate's interpreter allows you to combine standard Forth commands, with specialised display control statements, to build up smooth, fast animation sequences.

## CYBER CONTROL

CYBER CONTROL is an easy to use, BASIC-like programming language specially designed to work with Cyber Studio. It enhances CAD-3D 2.0 with a host of new features. There are two new cameras, free to move around or through your 3D creations. Movable, multi-layered Cyber Paint blocks for colourful cool animations. And the power to create complex curved objects, using spline generation techniques. Together they let you animate complex objects you never thought possible — like a skeleton doing backflips!

Cyber Control is an independent desk accessory, so it's always ready for use from CAD-3D 2.0, or any other GEM program.



## NEW! CARTOON DESIGN DISK

A collection of 3D comic characters, plus special Cyber Control programs to move them. You decide which way their heads turn, where their eyes look, how fast they move — or fly — and Cyber Control brings them to life automatically.

## NEW! VIDEO TITLING DESIGN DISK

Add that professional touch to your home videos with spectacular animated titles, includes 3D font and objects specially designed for titling effects. Plus custom Cyber Control programs to animate them, create credit sequences, etc. All you need to challenge Hollywood!

## HUMAN DESIGN DISK

An accessory disk packed with humanoid forms and figures to add life to your CAD-3D scenes. Includes complete male and female skeletal prototypes, plus detailed heads, hands etc. Take a tour of the human skeleton!

## FUTURE DESIGN DISK

Turn your ST into a space engineering factory with this library of futuristic objects. Everything from androids, rocket engines, and command pods, to complete spacecraft.

## ARCHITECTURAL DESIGN DISK

An electronic architect's studio packed with doors, windows, stairways — all you need to build your own CAD-3D dream house.

## STEREOTEK

Want to get right in with the action on your Cyber screen? Well, now you can! The amazing STEREOTEK glasses give you a startling insight to your creations, with a true stereoscopic view. Includes cartridge interface unit, stereo desk accessory, animation and slide show, complete developer's instructions, and source code.

## G.I.S.T.

G.I.S.T. is a powerful GEM-based sound library for use in designing, editing, and playing sound effects. Used as part of the Cyber series, it allows you to incorporate sound effects into your Cyber Studio and Cyber Control animations.

# CYBER SERIES



- CYBER STUDIO
  - CYBER PAINT
  - CYBER CONTROL
  - CYBER SCULPT
  - CARTOON DESIGN DISK
  - HUMAN DESIGN DISK
  - FUTURE DESIGN DISK
  - ARCHITECTURAL DESIGN DISK
  - VIDEO TITLING DESIGN DISK
  - 3D DEVELOPER'S DISK
  - 3D PLOTTER & PRINTER DRIVERS
  - 3D FONTS I
  - 3D FONTS II
  - STEREO TEK
  - G.I.S.T.
- £79.95  
 £69.95  
 £59.95  
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 £29.95  
 £29.95  
 £24.95  
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 £29.95  
 £149.95  
 £34.95

# ANTIC

From Antic Publishing, Inc. An Information Technology Company

## THE CYBER SERIES

The Cyber Series from Antic Publishing, Inc. is a family of programs which turn fantasy into reality on your ST's screen. Watch your own three-dimensional universe come to life right before your eyes, with everything from skyscrapers to spacecraft. Fill your imaginary worlds with realistic walking figures. Add subtle colours and sound effects. You can even produce the same kind of sophisticated special video effects as a television studio.

Cyber packages are more than just fun to use — there's a serious side too. Use them in the office or studio to visualise your ideas at pre-design stage, saving time and money by getting things right first time. And since you're working in 3D, you can see above, below, even inside your designs, just as if they were sitting on the desk in front of you.

Start with Cyber Studio, mainstay of the Cyber Series, then add other Cyber products, each with their own exciting features, to build a powerful library of programs capable of breathing even more life into your Cyber creations. Everything from sound effects to a specialised animation control language. It's just what your ST's been waiting for!

Please send me more details of the Cyber series. STW0988

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# Desk File View Options



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PROGRAMMING



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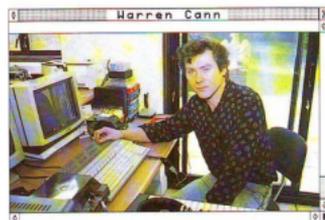
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# Credits



SUPERTESTS



INTERVIEWS

# ENTS

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**Connections** A concise guide to connecting your ST to a range of popular Micros. Lee

Cooke even explains the ins and outs of 'porting' software and data between the various machines, with advice about which software to use.

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**ST World at Large** Martin Walsh visits The University of York to sample the Composers' Desktop Project, a sophisticated ST-based Midi composition system.

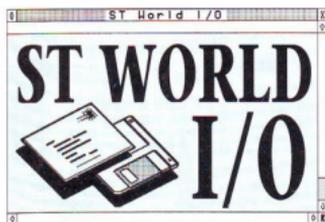
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**Programmers' Clinic** The clinic is open for business again, this time with plenty for C users to enjoy. Richard Seel also introduces trig functions from assembler, as well as a few other quick queries.

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# NEWS



## Atari at PC Show



Atari are set to demonstrate their strength and dominance at the forthcoming PC Show (formerly PCW Show) at Earls Court in London between 14th and 18th of September. In 1988, Atari will have sold over 1 million STs worldwide, including a predicted 200,000 in the UK alone.

The huge 'Atari World' stand at the PC Show will be populated by over 30 companies writing software or manufacturing peripherals for the ST. Visitors to the show can expect to see demonstrations of a wide range of business software including Desktop Publishing, and parallel processing demonstrations delivered by the ubiquitous Abaq. Signa Publishing systems will also be on hand to demonstrate some of their exciting new products, fast Hawk-based OCR and Calamus included.

The show features a separate Midi section, which should also serve to highlight the extensive popularity of the ST in the Music world. The games and entertainment arm of the ST scene will, no doubt, be a noisy and colourful addition to the show; the final play-off in the US Gold sponsored National Games Championship will be run on Atari ST computers.

## Easydraw Tools



A powerful GEM drawing accessory has been released by Electric Distribution. Migraph's Easy Tools is designed to enhance Easy Draw

2 and Supercharged Easy Draw 2. These tools are claimed to greatly increase the capability and drawing power of this popular object oriented drawing program. For users who produce technical illustrations, floor plans, mechanical drawings, newsletters, charts, graphs, forms or flyers, Easy Tools could make life a lot easier.

Easy Tools appears as a desktop icon which features five new tools: an Angulator, Inquisitor, Rotator, Converter and Polytext. The Angulator measures the length and angle of an object and saves the values for use with other tools.

The Inquisitor enables the user to specify or ask the size and x/y location of an object in numeric form. Depending on the object, the Inquisitor supplies additional information. The 'make grid' option allows grids for forms and graphs to be created quickly and easily. Rotator allows any object (except bit-images or text) to be rotated about its own or a user-defined centre, by any angle. It is also possible to create multiple copies of an object, specifying the angle of rotation, size of copy and distance from the centre of location.

Convert literally converts all objects (except text and bit-images, again) into polylines. Once converted, Easy Draw 2's edit polyline feature can be used to add, delete or move any point on the object. Convert saves time when creating figures from one object instead of grouping objects together.

Polytext enables text la-

els to be created. These may be rotated by any degree - useful for plans and layouts. It is also possible to create polyline fonts with this facility. Easy Tools costs £39.95 inc. VAT.

Electric Distribution are currently offering special price-reductions on a number of their ST products. The highly acclaimed Cyber Studio, real-time CAD, is reduced from £89.95 to £79.96 inc. VAT. Data Manager ST and SwiftCalc ST have been reduced from £79.95 to £39.95.

Contact Electric Distribution on 0954 61258

## Nevada Cobol for ST



A steady flow of enquiries heading in the direction of the ST World offices has prompted us to tackle the growing confusion over an ST implementation of the minicomputer oriented programming language, Cobol. Some readers are already programming Cobol on the ST, and the source, as we had suspected, is in fact HiSoft, who have confirmed that Nevada Cobol is available from them.

HiSoft are the UK publishers of Nevada Cobol, which is supplied with their own ring-bound manual (knowledge of Cobol assemblage) and a screen editor (ED80). Veterans of the microcomputer industry will no doubt have already guessed that Nevada

Cobol runs under interpreted CP/M-80 emulation. Yes, that historic

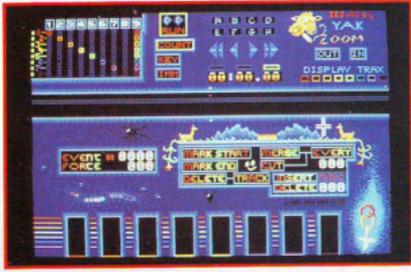
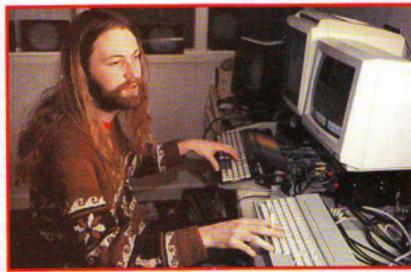
## Trip-A-Tron on show



Electronica '88, the 6th annual festival of synthesiser and computer music is to be held at St John's, Smith Square, Westminster, London on Saturday September 3rd. ST owners and Colourspace freaks should be interested in Jeff Minter's highly unique Trip-A-Tron performance. Jeff will be using his amazing new light synthesizer to create a stunning visual extravaganza which is going to be generated using 5 Mega STs all synchronised, working in parallel and running Trip-A-Tron. Called 'Merak' this performance has been especially devised to combine both audio and visual experiences, it will accompany music written and composed by Adrian Baddy.

There will be many other attractions at Electronica '88, several synth-based performances including, work from Ian Boddy, who's latest album, Jade, was composed and played entirely from an Atari ST running Steinberg software.

The Wagner/Minter performance is billed for Saturday afternoon. Tickets cost £5 for daytime performances, £7 for evenings, or £10 for both. For more details, phone 01 885 5665.



"...represents a significant advance in ST art..."

# SPECTRUM 512

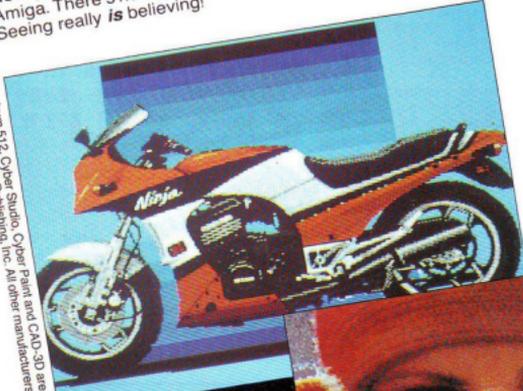
## The Ultimate Paint Program

Create photo-quality pictures with your Atari ST in 512 colours!

SPECTRUM 512 puts 512 colours on your ST screen... all at the same time, in a bright, flicker-free display. Create your own masterpiece - or bring existing images to life - in rich glowing colour.

Now your Atari ST has the same graphics power as the Amiga. There's no doubt about it - you'll love Spectrum 512. Seeing really *is* believing!

- 512 colour system palette
- User-defined custom palette
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- Choose from 38 brush styles
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- Add or subtract colour values
- Increase or decrease luminescence
- Vary contrast at colour boundaries
- Flip, scale and rotate selected areas
- Cut and paste functions
- Magnify window for fine detail
- Buffer holds up to 12 screens
- Multiple pictures on screen
- Import CAD-3D, Cyber Studio, Cyber Paint, Degas, Neochrome - even Amiga .IFF pictures!
- Programmable slideshow display



Spectrum 512, Cyber Studio, Cyber Paint and CAD-3D are trademarks of Antic Publishing, Inc. All other manufacturers trademarks acknowledged.

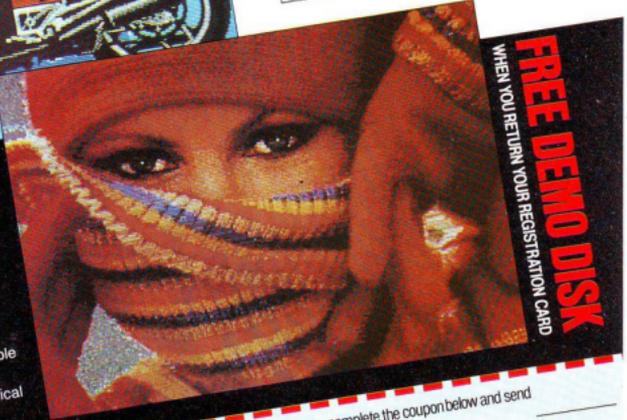
"...represents a significant advance in ST art..."  
"A direct comparison of pictures created with Spectrum 512 and other leading art packages shows that the others really can't compete"

"When it comes the crunch...  
Spectrum 512 is a clear winner"  
ST AMIGA FORMAT JULY 1988

The **SOFTLINE** total support scheme is available for this program:

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# LOGISTIX

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now available on the Atari.  
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promotion on 01-309 0300

"It's professionally produced with an excellent manual, plenty of examples, training courses if you need them, and it's a UK product".  
*Amstrad Professional Computing*

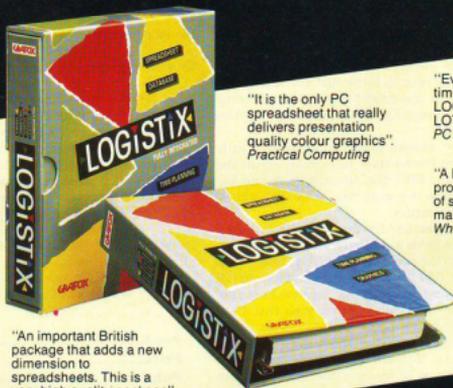
"It is easy to use and the manual is excellent — what more is there to say?".  
*Personal Computing with the Amstrad*

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*Which Computer*

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possible to edit the document you are printing, or start working on a new one.

Footnotes; automatically numbered at print-time.

Phrase/macro recording; allows edit and command mode sequences to be recorded and then re-activated at a single key-press. They can also be saved to disk.

First Word to Protexst file conversion; keeps ruler settings and all style codes.

Page break display; a line extends across the screen to indicate the current page break positions.

Protexst costs £79.95, upgrades from version 3.5x costs £15.

**K-Minstrel 2**

An updated version of Kuma's music composition program is now available. K-Minstrel 2 enables the user to compose and edit music

quickly and easily. The program can store 3200 chords in 4-channel mode which equates to about 20 minutes of music. Music can be played on 4, 8, 12 or 16 channels through the ST's built-in Midi ports.

The main improvements include: Step time and K-Minstrel 2 Real Time input from external midi instruments, operational scrolling on play back. K-Minstrel costs £29.95. Users of the original version of the program can upgrade for £10.00 Contact Kuma on, 07357 4335

**Floppyshop Birthday**

One of the country's most popular PD libraries is celebrating its first birthday. Floppyshop ST, who also publish a lively bi-monthly newsletter, are running nine separate free-to-enter competitions, although you must be a user group member to be

eligible. Contact:

Floppyshop ST,  
50 Stewart Street,  
Northfield,  
Aberdeen.  
AB2 5SR

**Obituary**

As from the next issue of ST World, the Dungeons and Disk Drives feature will cease to be. The Dungeon is about to be sealed up and filled with cement. Mitch, will of course, survive this terrible ordeal; his etchings can still be found in the pages of our sister magazine, ST Action. Mitch could well be revisiting the pages of ST World in various other guises, so watch out! If you feel that the Dungeon should not be closed down, then write in marking your letter 'Save the Troll'.



**Pro-Punter**



Pro Punter, by DGA Software, is a horse-racing expert system, programmed to apply a knowledge base to different types of race, and produce a race forecast. The price of Pro-Punter on the Atari ST is £57.50 inc. VAT and P&P.

Apparently, this software is issued as a special limited edition, the reason for which, they state, is 'to put all their energies back into R&D for further development of intelligent racing software'. It would be nice to think that the real reason was that DGA do not want absolutely everyone to become millionaires on the horses - imagine scenes of very angry bookies on DGA's doorstep.

This is a relatively unique program, with very little competition on the ST. Pro-Punter itself has grown up on the usual 8-bit machines like the BBC, the Amstrad PCW and the CPC, and the PC clones. Now it is available on the ST, and by Christmas, also on the Archimedes.

What do you get for your £57.50? Pro-Punter lives on one disk in a slim, green folder, with a similarly slim manual. This explains exactly how to use the program effectively, assuming a user to be already submerged in the terminology and logistics of betting - and specifically horse-racing. If you are new to racing, it does go some way to try and help you on your first steps towards understanding the racing press.

Surprisingly, for this day and age, Pro-Punter turns out to be a non-GEM program - i.e. it does not make use of the ST's mouse, menu bar and all those other GEM niceties which can make programs simple to use. Nevertheless, for a purely text-based program, it is surprisingly friendly to use, and reasonably intuitive. Nice touches, like the way it is able to cope with incorrectly entered data to a certain extent, give the program a rather comfortable 'feel'.

Operation is simple enough: There is a main menu from which you can enter data for the race under analysis in five stages, corresponding to menu options. Library disks can be used which contain your information on trainers and jockeys. Stage one is to enter a trainer's in-formable from the racing press, up to twelve trainers may be entered. Stage two is to enter the racecard date. Stage three is to enter the previous form and winning form, the collateral form and the breeding. Stage four concerns details for the winning and place form. Stage five is where you enter the ratings and the position in the S.P. forecast. Then Pro-Punter performs its analysis, after which you will be presented with the top twelve horses in the order in which Pro-Punter thinks they will finish,

together with a rating and a starting price. From here, the value of the price on each horse can be assessed. You end up with a table containing: ratings; computer s.p.; actual s.p.; assessment of value and investment advice. You can use your printer to print the race forecast.

**Expert system**

In so far as a computer program can be thought of as being intelligent, Pro-Punter is reasonably 'intelligent'. It is, primarily, an expert system, specifically geared to the world of horse-racing. The whole system seems anxious that you should not let go of your money unwisely, with the advice given in the manual to heed a 'No bet' warning, if that is what Pro-Punter suggests. To quote the literature, Pro-Punter 'tells you when to invest, and when to keep your hand firmly in your pocket.'

This is definitely a specialist market product, but quite an accessible one. For a total beginner, or an inexperienced novice, there is hope. If you are interested enough, and have the right attitude, you could possibly make money with this program plus the effort required to learn about the 'world' of racing.

**IKT**

Product: ..... Pro-Punter  
Price: ..... £57.50 inc. VAT and P&P  
Publisher: ..... DGA software  
Phone: ..... 061-330 0184



**PRO-PUNTER**

(c) DGA Software

PLEASE SELECT AN OPTION

- 1 - INPUT STAGE 1
- 2 - INPUT STAGE 2
- 3 - INPUT STAGE 3
- 4 - INPUT STAGE 4
- 5 - INPUT STAGE 5
- 6 - RESULTS MENU
- 7 - NOTES
- 8 - Exit.

TRANSLATED FOR THE ATARI ST  
BY COLIN ADAMS 1988.

## SIGNA NEWS

**Aladin 2.10 now available**

Signa Publishing are now marketing and supporting the impressive (it works) Aladin Macintosh emulator. The new version comes complete with a case for its cartridge, which is supplied sealed and complete, with the appropriate Mac operating system ROMs installed. The main features of this product are:

- Full Mega ST support; the full 4Mb of RAM in the Mega 4 is usable under emulation, and the ST's real-time clock is also utilised.
- Improved Superdisk (ramdisk); the reset-resistant superdisk is now GEM-resistant. This means that if you exit Aladin via the Control-Alternate-F5 key sequence, run a GEM application, and return to Aladin without powering-down or resetting, the contents of the Superdisk will remain intact.
- System 3.2 support; version 3.2 of the Macintosh system file can now be used without adaptation. This allows Pagemaker 2.0, Ready Set Go 4, Cricket Graf 1.1 and several other applications to work without problems.
- New adaptation program; more commands including ProtectRes and UnProtectRes. Also, new patches for: Light Speed Pascal, Pagemaker 2.0 & 2.0a, MS Word 3.01, and Switcher 5.1
- Improved disk system; disks formatted with Aladin 2.10 use different interleaving on the directory tracks, therefore reducing



the directory access time by 50%. It is also possible to use the reverse side of a GEM disk as a single-sided Aladin formatted disk.

- Excel and Write Now: Running either of these with a large Superdisk is now possible.
- Appletalk is not currently supported, however, dummy Appletalk drivers have been included so that access to Appletalk do not crash the system.
- PostScript printer support; the Mac's LaserWriter driver is now supported by Aladin. This allows DTP programs to drive Post-Script output devices.
- File transfer; the GEMload file transfer utility can now transfer WKS files from VIP professional into Excel for example.
- Improved I/O handling; serial and parallel port handling has been improved.

Aladin 2.10 costs £200 incl. VAT (ROMs included). Existing Aladin users can upgrade for £35 + VAT if they return the old Aladin cartridge board complete with Mac o/s ROMs. The upgrade kit includes a new cartridge and manuals. Aladin users would be well advised to make themselves known to Signa so that they can be kept in touch with the latest developments. Contact Signa Publishing on, 0252 875031 (voice), 0252 871086 (Fax).

**More Signum fonts**

The full range of additional Signum fonts now available is as follows: Souvenir Light 10pt/12pt, Souvenir Medium 10pt, Souvenir Medium Italic 10pt, Souvenir Demi-bold 10pt, Univers 45

**Times Roman 10pt**

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz  
!"£\$%^&\*(\_-+~"{}[]:;@""'/?\|<>.,#  
0\_1\_2\_3\_4\_5\_6\_7\_8\_9\_0\*

The quick brown fox jumped over the lazy

**Times Roman Italic 10 pt**

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
abcdefghijklmnopqrstuvwxyz  
!"£\$%^&\*(\_-+~"{}[]:;@""'/?\|<>.,#  
The quick brown fox jumped over the laz

and 46 10pt, Univers 49 10pt, Univers 55 and 56 10pt, Old English 10pt, Uncial 8pt/10pt, Rockwell Light 10pt, Times Roman 10pt, Times Roman Italic 10pt and Times Bold 10pt.

All font files are supplied in 24-pin dot-matrix form. A

**Univers 49 10pt**

ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890  
abcdefghijklmnopqrstuvwxyz  
!"£\$%^&\*(\_-+~"{}[]:;@""'/?\|<>.,#

The quick brown fox jumped over the lazy dog's back

**Univers 55 & Univers 56 10 pt**

ABCDEFGHIJKLMNOPQRSTUVWXYZ1234  
abcdefghijklmnopqrstuvwxyz  
!"£\$%^&\*(\_-+~"{}[]:;@""'/?\|<>.,#  
0\_1\_2\_3\_4\_5\_6\_7\_8\_9\_0\*5&^°

The quick brown fox jumped over the laz

conversion program is available to assist users who wish convert the fonts for 9-pin dot matrix and Laser Printer use. The sample below shows how well the familiar Times-Roman font has been implemented (NEC P6, 24-pin).

**OCR available now**

The highly impressive OCR Software, Augur (Latin for Sooth Sayer), is now available for £869.57 + VAT. The deal includes software in cartridge form, and a detailed manual. A premium price for a premium product, which, according to Signa, is very much in demand. See it at the PC Show.

## Citizen Printer



The printer has one of the oldest ancestries of all items of computer equipment used today. Originally developed from teletype and telegraphy equipment, taking in typewriter technology along the way, today's printer will represent one of a variety of different technologies. The most common printer type is the dot-matrix which uses a matrix of dots to produce reasonably legible text on paper.

The Citizen LSP-100 is a very highly advanced 9-pin dot-matrix printer. Within the category of dot-matrix printers, there are two main types catered for by most ST software, these being 9-pin printers and 24-pin printers. 24-pin printers are a newer concept, capable of great resolution and reasonable accuracy. 9-pin printers are less costly and often simpler, with inherently less resolution than a 24-pin printer, but they still fill many people's needs.

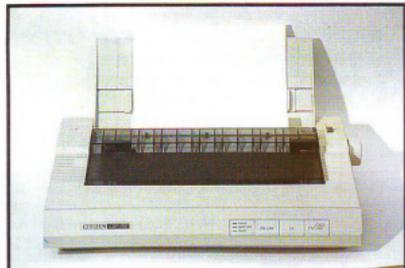
### About the LSP-100

When you get a Citizen LSP-100, all you need for printing will be included except the paper. What you get in the box is the printer plus an interface cartridge, a good manual, a single sheet-feed tray, an adequate tractor-feed unit with a pair of tractor-feed arms, and a mains lead for some foreign country. Snip off the moulded plug and fit a UK mains plug yourself - surely Citizen Europe, based in the UK, could, instead, supply a UK IEC mains lead?

The manual supplied is excellent - full of information. The style is pitched at both the total end-user / non-expert who just wants to get in and get it out on paper, and the programmer who needs to know every control code sequence and every detail.

### Paper Handling

Using the single-sheet feeder tray, you can use single A4 sheets - portrait only, not landscape. The Citizen LSP-100 is not particularly good at envelopes, I found, preferring to destroy them instead. With the tractor-feed mechanism in place, continuous fanfold A4 tractor-fed stationary can be

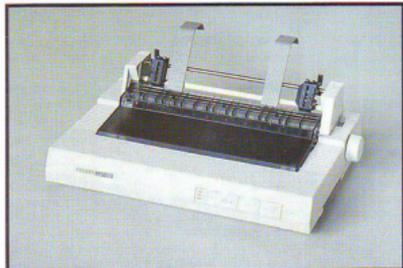


Citizen LSP - 100 with single sheet loader.

used. For multiple copies using the right kind of NCR forms, it can print through to one master and up to two non-carbon copies.

Fanfold paper is handled normally, from the rear, so it is up to you to find room for your supply of paper so

that it can have an uninterrupted path to this entry point. If you have certain types of printer stands, you can also take advantage of its bottom-feeding capacity. This means that the paper can enter via a slot in the underside of the printer, through a suitable slot in the surface upon which the printer is sitting.



Citizen LSP - 100 with tractor feed

For single-sheet use the tractor-feed mechanism is not needed and is removed, and the single-sheet tray is fitted - all of which takes seconds to perform. The reverse operation is equally quick and simple. Single-sheet printing is straightforward, and can auto-sheet-load a single-sheet. This is done by placing the sheet of paper into the paper slot with the lever set to 'friction'. Then you take the printer off-line and press FF / Auto-sheet-load once. This sometimes resulted in the paper simply form-feeding all the way in and all the way out again. Most times it worked fine. You also need to take into account the fact that some software will feed the top of the paper on a little, whereas it is already fed on and ready to print using the auto-sheet-load procedure.

### Room to manoeuvre

Here is a very stylish printer which is designed to be very compact, at least, until you try using it. The room taken up by having to have access to all four sides when in use counts for a lot if you have a cramped work area. Every available side of the printer is utilized: the front with the control panel; the left with the power switch; the right with the interface cartridge, into which the printer lead goes; and the rear with the IEC mains socket for a mains lead, plus, of course, the paper entry. This means that the printer cannot sit snugly against anything else on the desk, requiring room all round.

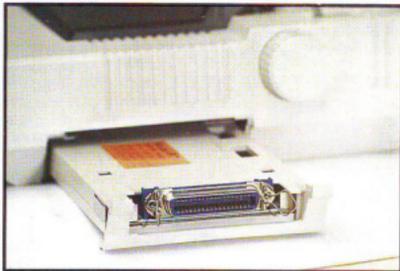
The list of print capabilities includes all the expected ones: expanded; compressed; emphasized; doublestrike; italics; superscripts; subscripts; line / block graphics and accented characters. In addition to the basics, there are some nice extras: correspondence-quality print - a reasonable imitation of Courier; a dot matrix printer; dual pitch; high-speed elite mode; reverse black-on-white print (which can give the print head and ribbon a good thrashing). International character sets are provided, via dipswitch selection, for 8 countries. There are two self-tests and a hex dump which can act as a debugging aid, as it prints all corresponding characters and control

more.....

code abbreviations, as well as the hex values of the codes it receives.

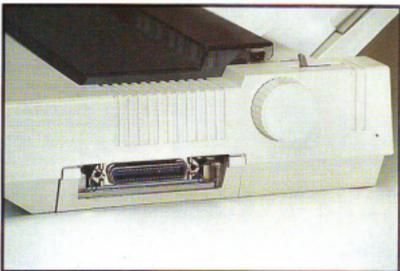
### Plug-in interface cartridges

An interesting facet of the Citizen LSP-100 is that it uses 'interface cartridges'. This is a cartridge which contains



The interface cartridge: In.....

most of the intelligence of the printer. The remaining circuitry in the printer consists primarily of power supply and motor-driving circuitry. The idea is that the same



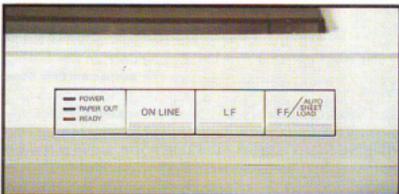
.....and out.

printer can be used for parallel and serial use simply by swapping over a plug-in cartridge.

Having all the intelligence mounted on the cartridge does have its plus and minus points. A good point is that in a complex working environment, more than one cartridge may be purchased, with the DIP switch set up for specific operating conditions. For example, how many of you do programming and also use word processors? You set the printer up under UK character set for WP use, so that the pound signs will print. When you print a program listing after that, all the hashes have turned to pound signs. Now you can have separate cartridges for WP and programming use, and a serial input cartridge (for your Z-88, perhaps!) The minus point is that additional cartridges, of course, cost additional money.

### In normal use

This must revolve around what one would buy a printer for in the first place. Using a program which drives a printer under graphics mode to achieve its output, the result will look marvellous, for a 9-pin printer. This is more a func-



The control panel - 3 L.E.D's, 3 buttons.

tion of GDOS, or a similar scheme, according to the program you are using. Examples of such programs include: Timeworks DTP; Degas Elite; Wordup; Fleet Street Publisher; Publishing Partner; Signum 2; Easy Draw 2; Cad 3D2. If you are using a straight word-processor which uses the system fonts on screen, then it will most probably use the printer's own in-built fonts for printout. In this case, it will emulate an Epson, which most WPs have a driver already configured for, or an IBM graphics printer, if you find that more useful.

Under normal printing conditions, you can control which font will be used from the front panel buttons. From an ON LINE state, pressing the FF button and holding it down while pressing the ON LINE button will allow you to enter the font mode, and pressing the ON LINE button the required number of times will step you through a list of in-built fonts: pica; correspondence; italic; emphasised; reduced; beep enable/disable. In a similar way, correspondence quality can be obtained by holding the LF button down and pressing ON LINE together.

Printing speed is quoted at 150 cps, or 175 cps in elite mode. Under graphics this figure flies out of the window, graphics mode always being slower. Many document processors, DTP packages, and even some of the more modern word processors will set the printer to graphics mode for high-quality, multi-font output. Degas Elite works fine with Degas' Epson driver loaded. There are eight distinct graphics modes:

Single 480: Double 960: Hi-Speed Double 960:  
Quadruple 1920: CRT Screen 640: One-to-one 576:  
Hi-res CRT 720: Two-to-one 1152.

The one-to-one mode looks interesting. Apart from being the same pixel-width as a Macintosh's screen, it has a dot density of 72dpi, which means that one dot equals one point - typographical points, that is. There is no match to the Atari's 1280 dot mode, so a straight screen dump will always result in most, but not all, of the screen being printed - unless the ST's control panel DA has been set to 960-dot mode, in which case you get the entire screen.

### Conclusion

The Citizen LSP-100 is a very attractive printer, which performs well. For a little extra, you step into 24-pin territory - admittedly the very bottom end of it. For a 9-pin printer, the LSP-100 could seem a little pricey, but one must take into account the fact that it is very well specified.

### IKT

Product: ...LSP-100 9-pin dot matrix printer  
Manufacturer: .....Citizen Europe Limited  
R.R.Price: .....£249.95  
Phone: .....0895 72621

## Atari ABAQ



**The most exciting new small computer on the horizon is Atari's transputer-based machine. Richard Seel comments on this innovative British project.**

Atari's transputer project, known as ABAQ, seems to be progressing reasonably well. Unfortunately, one thing at least will need to be changed - and that is the name! It appears that 'Abaq' has been registered as a trade name by a Belgian company and so the release version of the machine will have to have a new name. But for the time being, I'll continue to refer to it as the ABAQ because that is simpler than having to write, "The Atari/Perihelion Transputer machine".

There are two other partners in the ABAQ project, apart from Atari UK. Perihelion Hardware is headed by Jack Lang and Richard Miller. They produced the initial design and made the first five prototype machines. They are still working to further refine the hardware. In particular, they are trying to design specialized gate arrays to reduce the chip count and make the final version cheaper to produce.

Perihelion Software is run by Tim King, the man who was responsible for the Amiga operating system. They are developing an operating system for ABAQ, which is to be called Helios. In fact, Helios is designed for a range of transputer-based machines - not just for the ABAQ. This includes Kuma's add-on boards for the ST, as well as Immos's own B004 plug-in board for the IBM PC.

Perihelion would like Helios to be adopted as the standard Transputer operating system, but it is too early to say whether this will happen. Much will depend on how useful and useable developers will find it. I'll say a little more about Helios later.

#### Hardware

Atari UK accepted the design from Perihelion hardware in January 1988, and since then have built 50 prototype machines. These have been quite expensive to produce, since components had to be bought in small quantities. At least one prototype was sent to Japan for advice on how best to prepare it for volume production.

Atari hope to produce several hundred more systems during May and June, and to go into large scale production in August or September. The demand for development systems is greater than the number available, and it is unlikely that commercial systems will be available before full production is started.

Given the high price of the ABAQ, this must be encouraging for Atari. It also gives some indication of the true

power and potential of this machine - otherwise, there wouldn't be such interest.

The ABAQ, at present, costs £2999.99+VAT, which for developers comes down to £2500+VAT. For this you get a machine with one T800-20 transputer, 4 megabytes of RAM, 1 megabyte of video RAM, and the video display system.

However, you have to add to this the cost of a Mega ST - a 520 or 1040 will not do, since the link to the ABAQ requires access to the ST bus, which is only accessible on the Mega 2 and Mega 4 (there have been rumours of a Mega 1 to replace the 1040, but no definite news).

You will also need a suitable monitor, such as the NEC Multisync, which will set you back at least £600 or so. It appears that there is no one monitor which will allow you to access all of the ABAQ's graphics

modes so you will have to decide which monitor you need for your particular requirements.

#### Software

All this hardware will not be much use without software - and, in particular, an operating system. This is where Helios comes into the picture. For another £500, registered developers will be able to get Helios, a C compiler, editor, assembler, 'make' facility and other assorted tools, and free postal advice (telephone advice is £200 extra).

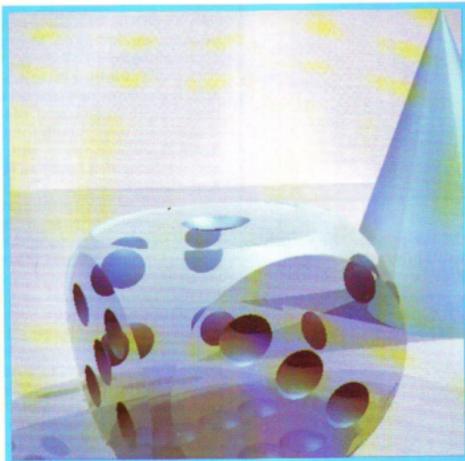
Version one of Helios can only support one processor, but subsequent versions will support multiple processors as well as X-Windows, the Unix windowing environment.

Helios is designed as a distributed operating system; one which can work with any number of processors. The idea is that the programmer will not need to worry about which processor will actually be working on a particular bit of code because the operating system will take care of it.

Although Helios is designed with the transputer in mind, it could in theory be implemented on other processors. It is certainly not specific to the ABAQ, and has already been configured for quite a wide range of transputer-based machines.

Helios is also a multi-user operating system. If there are several transputers available to each user (an individual ABAQ will be able to support up to 13 T800s), then multi-

**more.....**



tasking can take place by assigning different tasks to different processors, rather than by 'time-slicing' as is common on single processor systems.

Helios commands don't seem terribly friendly - especially to anyone who has got used to a WIMP environment. For instance, "ls" will list the current directory; "cp<file1><file2>" will copy the contents of file1 to file2 (retaining the original file1); "rm-file1>" will delete (remove) file1 from the current directory; and so on.

There are some friendlier features, though. For instance, "clock" will display an analogue clock on the screen showing the system time (only on the Abaq), and "date" will display as, say, 'WED APR 13 10:15:00 1988' - which is fairly comprehensive (and also my wife's birthday).

The eventual production machines will have the Mega ST hardware integrated into it, allowing the use of



ST peripherals (and software as well, I presume). No price has been decided yet, but it is clear that it will not be initially within the purse of most home users.

So although it would make a really great games machine (even better than the Archimedes), the first users will probably have rather different aims. The most obvious applications are for graphics, CAD, and number crunching - Atari claim that they have achieved 50,000 Dhrystones on an Abaq containing 13 transputers. (Incidentally, what are Dhrystones and Whetstones? Can anybody explain simply and concisely?)

In the short term, I think that the Abaq may well help Atari improve its position in higher education, though it will be a bit longer before we see it as a home or business machine. But it's an exciting project, and we'll keep you posted with the details as they become available.

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# Warren Cann

"In the early 80's Ultravox was known as 'THE tech rock group', experimenting in the latest audio and visual techniques. Therefore, I was interested to learn that drummer, song writer and technician, Warren Cann, had chosen an ST in preference to all other computers for his MIDI set up." - Jason Spiller

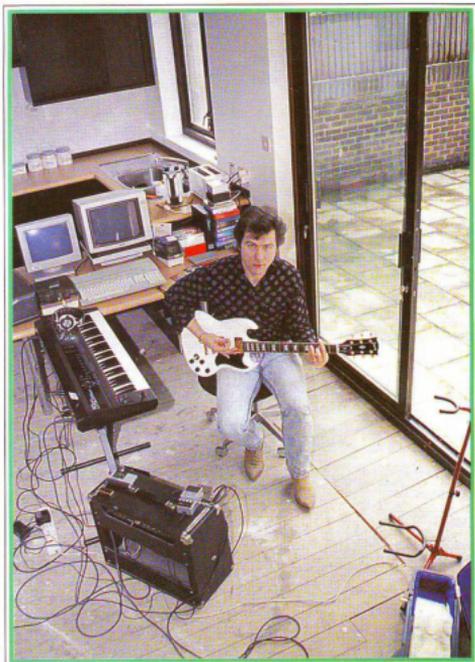
Warren Cann is best known for his long association with the highly successful synthesizer rock group, Ultravox. But during the course of the interview, I perceived that being remembered as 'just the drummer from Ultravox' was the last thing he wanted. His involvement in every aspect of the music was so much more than just being 'the beat man'. Additionally, his contribution to the synth/MIDI industry today is also noteworthy and he is widely respected for his musicianship and experience and knowledge in synthesizers, computers and recording techniques. He excused the stark emptiness of his impressive London home: 'I can just imagine the front page of *ST World*. **PRESS! EX-ROCK STAR IS FORCED TO SELL FURNITURE!** Actually, everything is in storage while I'm selling my house.' Everything, that is, except the essentials: an impressive selection of musical instruments, recording equipment and a 1040ST.

Warren moved from his home in Canada to London in the early 70's and he described his early days in London and how Ultravox was formed. 'The early 70's was an incredibly confusing era for music. I had grown up with the clear-cut sounds of the Stones and the Beatles, but when I arrived in London, 'Glam-rock' was in full swing and everyone was striving for individuality in a bid to get noticed - it was ludicrous and a bit sad really! My digs in London were near the Rainbow Theatre where you could go and see bands who were dressed as pirates, standing on one leg and going 'arrgh'. Others squeezed into silver lame catsuits and stomped around on six-inch platform heels. There were some notable musicians who were a part of the scene, such as Bowie and Bolan, but the majority of it was pure carnival.'

Ultravox will always be remembered for the classic songs from the early 80's. But the band and Warren's association with electronics and synthesizers goes back to the mid 70's. 'The only grapevine for struggling musicians was

through the NME and Rolling Stones and so I invested in a couple of adverts. One of the crazy calls I got was from this guy who said that he had been a flamenco guitar player since the age of two and his wife was a synthesizer player and flamenco dancer - his idea was to form an electronic-flamenco group. I meant it when I told him that it sounded fascinating and I really wished him the best of luck, but it wasn't quite what I was looking for. However, I saw a cheeky advert in the paper which stood out from the rest and so I answered it in a similar cheeky style and forgot all about it. A month later, I received a phone call from Dennis Lee (otherwise known as John Foxx), who explained that he was forming, of all things, a Glam-rock group. He already had a guitarist and bass player and was looking for a drummer. We met up for a rehearsal and almost immediately, I thought we might just have something here. Our saving grace was a deserted factory where we practised for two years, writing and working on our music. In 1976, the punk era had dawned and bands were recording dreadful two-and-a-half-minute EP's. But we really didn't want to be a part of that scene and so we continued moulding our own style. At this time, the band consisted of vocals John Fox, bass player Chris Cross and Billy Currie on violin and keyboards.'

John Fox and myself were developing a great interest in synthesizers and drum machines and as soon as we received some money from our first record deal with Island Records, I bought a Roland TR77 drum machine and a whole bunch of phasers and fuzz boxes. Meanwhile, Billy got an Odyssey synthesizer and we took it from there. My drum machine was the sort of push button, pre-set beat effort, with pre-recorded beats like the bossa nova and cha cha that you could change the



# Warren Cann

tempo on. However, I made the world-stopping discovery that if you held in more than one button at a time, you could mix a samba with a fox-trot and punch a third beat at strategic times during a song - it got really silly! Anyway, as more money came in, we invested in more and more equipment.'

'Recording outside of the controls of a studio was something that you could just get away with as long as you used instruments on which you could regulate the volume, such as electric guitars and keyboards. But my particular instrument, the drums, can only be played at one level - loud! Therefore, I had the idea of fixing a set of pick-ups to the underside of a set of practice drum pads - you know, the little lap-held drums that you can tap a beat on without irritating your neighbours. I then ripped the guts out of the Roland drum machine which made the sounds, combined it with some of the percussive circuitry out of an old Hammond organ and put it all together, so you could actually play the sounds by hitting the practice pads.' A crude prototype of the first synth-drums perhaps! 'Additionally, I wondered how, after a recording, I could go back and alter a specific drum part and synchronize it in. After quite a bit of thought and experimentation, I got an idea from the system that they use for audio visual slide-show presentation, where a little beep sounds on the accompanying tape to synchronize the slide change. I worked out a system where I could put a synchronization code in the recording and it would read it back. I had a series of sixteen mini toggle switches in this box of tricks and by cutting them in and out in various combinations, I could get this pulse to syncopate. So not only could we get my drum machine to play back off the tape, it would also fire the Mini Moog to run the bass line exactly syncopated to the drum beat.'

'At the early gigs, I had this flight case next to my acoustic drums with the CR78 perched on top of the TR77 with an MXR phasor and flanger. At certain points throughout a song, I would be messing around with all this equipment, synchronizing and mixing the whole sound. Anyway, after the show, when I was wiping the sweat from my brow after playing drums and doing the job of a sound engineer, people would say, 'what were you doing back there?' It really did irritate me as I had been holding the whole thing together, but it wasn't such a moronically stupid question as it sounded. So for the sake of showmanship, I had the drum machines taken out of their wood veneer cases and put into perspex so that you could see all the circuitry. Additionally, I had little LED flashing lights which did absolutely bugger all, but they would flash on and off and look great. From then on, people would say, 'wow that was terrific!' Before, it looked as if I was leaning off to one side to read a book, but now at least they realized that what I was doing was, in fact, connected with the sound.'

'What with Billy on a violin, me with this 'Heath Robinson' drum machine set-up and various keyboards, we were relying on a wing and a prayer that the whole thing would work - we were boldly embarking where no other band had gone before! For live performances, all this equipment was crudely

botched together and because we had very little control over it, it was making us prematurely old with worry.

The top technicians at the time were all filtering into highly paid jobs with IBM and the only guys that we could afford were college drop-outs, Mavericks who new just enough to get themselves and us in an awful lot of trouble. So there we were on stage up to our knees in dodgy wiring, determined never to use backing tapes or any pre-recorded stuff if anything kicked out - the margin for error was enormous! You can get away with that sort of thing in the studio because you're not working in real-time, but on stage it was a catastrophe waiting to happen. For the first time, we realized that we were at the mercy of our own equipment. Additionally, it was changing our creativity and we were beginning to write music around the sounds and moods that we created on the equipment. For instance, say I put the drum machine through a fuzz tone and turned the flanger to maximum and we liked the sound, we would work on building a song around it.'

'But the more we developed and utilized this 'creative process, the more complex emulating that sound on stage became - we were still doggedly determined to play everything live! We had this reputation for being an awfully serious and po-faced bunch, even though in reality we were all party animals. But when we went on stage, two things conspired to give us this serious image. Firstly, we thought that the 'happy mop-top' image was better left to other bands - we weren't into clowning around! But mainly, we were fraught with worry that something was going to break down. Our sound checks were a nightmare and when we finally got the equipment to work, there was no guarantee that it would still be functional when we stepped out on stage at the crucial moment. If anything did go



# Warren Cann

*wrong it was a catastrophe of biblical proportions! Half of what the bass player was doing was connected to my drum machines, and what Billy was doing was connected to the bass player and if one thing broke down, the whole lot went with it. Even human error often cocked the whole thing up! One false switch on that Odyssey meant that you wouldn't get something that was a reasonable approximation of what you intended, it would be so different that you would spectacularly manage to make yourself look like a complete prat!*

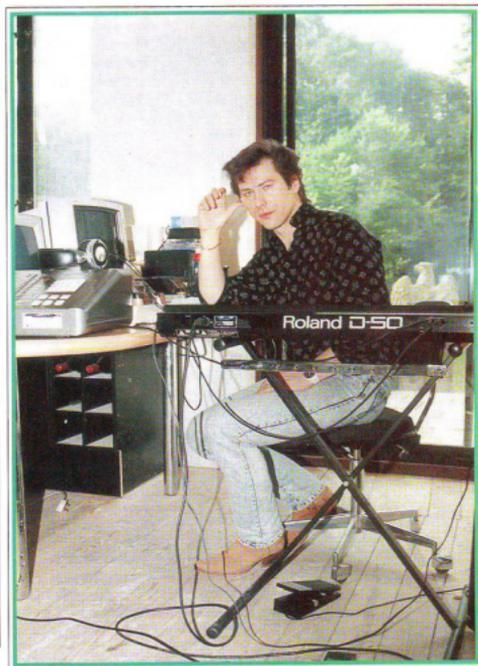
*The direct result of this blind fare was that the whole fun and enjoyment of live shows had gone and we realized that we would have to eliminate everything that was not a standard, off-the-shelf item. Therefore, if it screwed up in Glasgow, Brighton or Cleveland, we could hopefully get a replacement. Unfortunately, however, we ended up trading a whole load of old problems for new ones. The new equipment was cassette loading, which quickly proved to be unreliable - especially when some old and clueless stagehand would turn off the power during lunch and scramble everything. Slowly, technology began to catch up with our requirements and, as soon as we could, we bought synthesizers with performance memories and I discovered a drum machine with tempo readouts. Before that particular feature, I had to hook a volt-meter to the clock and read it as a direct DC voltage, and although it was an approximate figure, it did mean that whatever the specific number was, it was a certain tempo and reliable enough to play along to.'*

*'When we had a hit with 'Vienna', I had spent the last year working closely with an engineer at Roland, trying to create individual outputs on the CR78, which was the most advanced drum machine at the time. It made a 'thunk' noise through a small amp, but through 40,000 watts of PA, it sounded like a bass guitar with a sharp attack and quick decay. Suddenly, Roland scuppered the project and they were unwilling to give me any support to develop what I thought would have been a great product for them. This really irritated me because, to my knowledge, we had created the first number one (Vienna) with mainly synth-drums. Anyway they kicked me out and reminded the engineer that his job was to fix broken units for customers. Now what really annoyed me was that the next drum machine that Roland brought out contained all of the features that I had been working on; fine tune tempo and readout etc. Pioneering in technology is a thankless task - you go through all the headaches and then someone comes along and reaps the benefits! Anyway, going back to the group, we didn't manage to eliminate all our problems, we just created classier ones for ourselves and found more exotic ways to screw up.'*

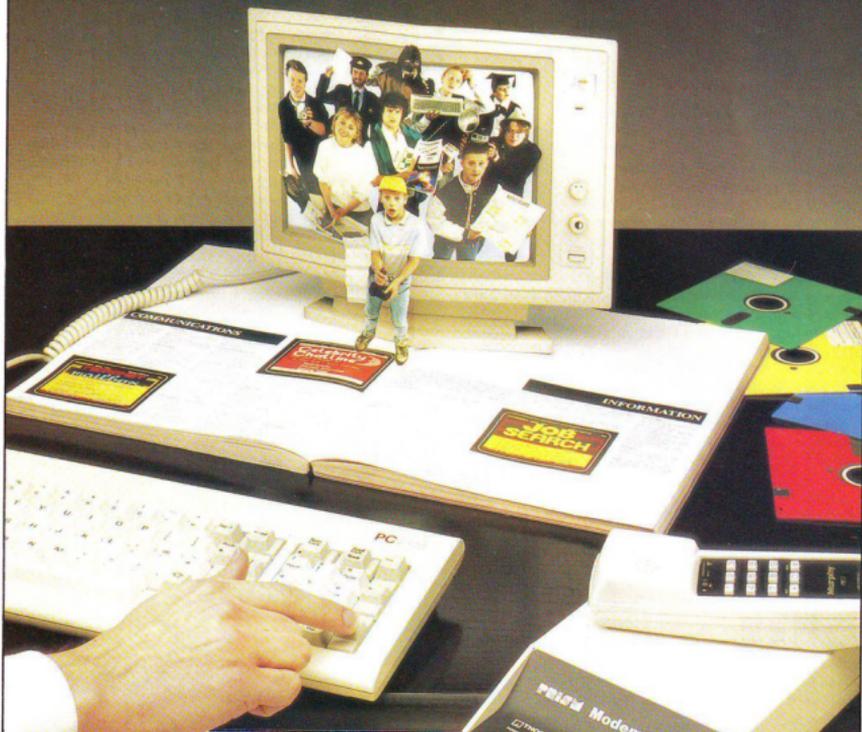
*'MIDI was just becoming available for certain expensive desk-top computers at about the time Midge Ure joined the group. Like us, Midge was very experienced in synthesizers and electronics and our combined knowledge meant that we were far more advanced than any of the engineers in the top studios, who were unable to cope with our technology. We were working*

*on the 'Lament' album and as we were thought of as 'THE technolology band', we looked into MIDI with great interest. Perhaps our spirits had been dampened from years of striving with crude equipment, desperately trying to improve and advance with prototypes, but nobody seemed interested in what it had to offer at the time. Generally, a great deal of indifference was shown towards MIDI in the early days, perhaps because it seemed so unnecessarily complex. For me, it was difficult to envisage how one could play tracks internally - the intangibility of it is frightening. Anyway, before expanders we were literally up to our eyeballs in equipment and what we thought that MIDI was capable of at the time really didn't justify spending time and money on it. As a result, MIDI never became a major part of Ultravox.'*

*'Obviously, there have been many advances since then and as I'm not in the band any more, I can see the obvious benefits of MIDI and its potential is exciting. Before the band split up, I was beginning to lose interest in the whole business for a number of reasons: I was eating, sleeping and drinking music 24 hours a day, the failing equipment was a continuous headache and the friction between the members of the group was becoming unbearable. Now my interest has been re-kindled and I'm determined to achieve something on my own merit as a musician and a producer and so I need this home studio set-up. I don't have millions in a Swiss bank account to invest in equipment and projects and so I have the same financial constraints as most people. Therefore I have to be choosy when selecting equipment and ensure that I get enough mileage out of it. One thing I would like to emphasize is that once you have decided on a piece of kit, as soon as something else comes out which is, quote, 'more advanced', it is foolish to sell your*



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# Warren Cann

Linn and eliminate the problems. My Linn has 16-bit sampling modules, 0.5 meg of memory and can load to all eighteen pads.'

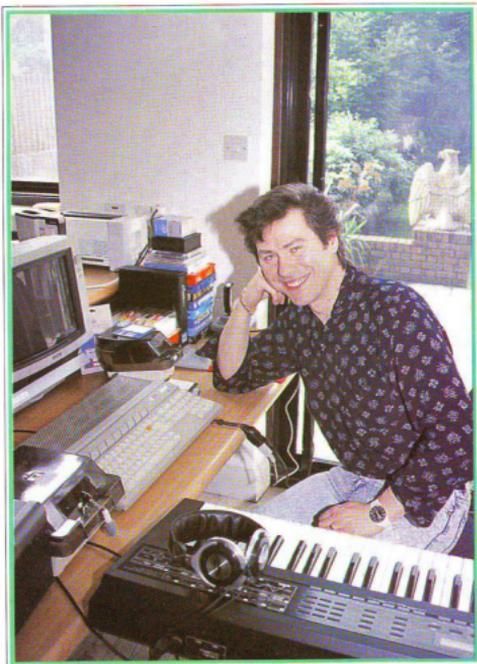
Warren played me some of the projects that he had been working on, which ranged from a very technical and European Ultravox style to Classical strings and hard Rock. He seemed able to adapt to all styles. 'Synthesizers are far more accessible than a 100 piece orchestra and so people make the mistake of relying on them too heavily. My attempts to simplify the Ultravox sound by using more conventional instruments ended in us parting company. But I stand by my convictions that the more you rely on intangible, internal sources, the greater the risk of error. Synthesizers have been exploited in the past! It was not necessary to be a musician to make music and so the synthetic sound suffocated the music. But now MIDI and synthesizers are being used by musicians as an integral part of making music, which is terrific. I am impressed by the advances made in synthesizers and MIDI - I think you will agree from my recollections that, in comparison to the equipment available today, I was driving around in cars with square wheels.'

We take the affordability, accessibility and usability of MIDI and synthesizers for granted, and so it was interesting to learn about the problems which had to be overcome before the synth and MIDI industry had even started. Warren and his contemporaries are pioneers, for they had the foresight to persevere with the crude prototypes which were available to them. 

equipment and buy new. You get so much more out of machines that you know inside out, than something that you have only had enough time to scratch the surface of. For example, I must have worked on my Linn 9000 every single day for two years, before I felt that I knew everything that it was capable of.'

When I was looking for a computer to use for the MIDI set-up, I looked at the Apple Macintosh and was impressed. But the guy in a shop in Birmingham where I buy my kit from, told me about the ST and I was intrigued. I looked into it and discovered that it was being heralded as 'THE MIDI machine' and so I bought a 1040 and I have been very happy with the results. In fact, since leaving Ultravox, where I was dealing in terms of beat and interval rather than tone and time, I have benefited from the accessibility of this MIDI set-up and have learnt a terrific amount. When I was looking for MIDI software to run on the ST, I looked at the Steinberg package which is supposed to be the industry standard and then concluded that the features on the Creator version 1.3 from C-Lab had all the features I wanted and was more comprehensive to use. There is an updated version due for release with the phrase template quantization within the quantize features, which is taken from Notator, but at the moment I'm quite happy with the one I've got. One thing that baffles me is that having been heavily immersed in electronic-assisted music for the best part of my career, I am only just scratching the surface of MIDI. Now either I've got a severe case of stupidity or there is something wrong with the way it is being presented. I don't think it has been trimmed up enough to be totally comprehensive and, once you have grasped the basic concepts, you need a lot of time to explore the potential of a package. My main keyboard is the Roland D550 which is linked up to my ST. With on-board processing it has 32 different types of reverb balancing, 8 chorus and flanging.'

I asked Warren whether he thought of sampling sounds? 'A friend of mine was asked to be an expert independent judge for a court case in which this guy reckoned Vangelis had taken his tune and used it for Chariots of Fire. I think the outcome was that there were many sounds in the music which sounded similar, such as the 'che che che' beat which runs through it. But from the actual notation point of view, there were few similarities. What with all this stealing and swapping of sounds I don't think anything is original anymore. Sounds have become public domain in a free traders' market. Roland have released the T110 which has a vast selection of on-board sampled sounds and there is the M1 Korg which has the same sort of facility. But what is the point in making music sound like something else. Of course, my primary interest is drums and drum machines and I know just about everything there is to know about the Linn 9000. My Linn was the last 1.7 software version available and, in my opinion, the release was rushed because Linn were in financial trouble. In its original format the 9000 has a lot of glitches and it does not sample or read MIDI. But a company called FORAT, in the States, can up-rate the



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ST World I/O is edited by Ian Tindale.

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## **The Value of Software**

Started by B Wigglesworth, STW29, p29  
+ Low-cost software, AB software, STW30, p34

### **The 8-bit parallel**

Why are ST games so expensive? (B. Wigglesworth, STW29). If you remember what happened when the budget market started on the 8-bit micros, it might answer the question. First the big name companies sneered that their games were such high quality that they needn't drop the price. When better budget titles arrived, the big boys said "we don't want or need to play with you - so there!" The budget market expanded and they whose names shall not be spoken turned to games of the film, of the book, of the TV series. Still they couldn't compete, so they started buying out the smaller budget companies, then bigger companies, finally spawning with 'things' from distant lands.

Now when people say that ST games are too expensive, the mighty ones modestly proclaim their games to be of tremendously high quality, and hope that no-one is left to chip away at their ivory towers. Actually, you may have noticed an increase in price of 8-bit budget software - from £1.99 to £2.99, and maybe more. Is this the influence of the big boys? Do they have a stranglehold on the industry? In the year and a half that I've owned an ST, I've only been able to afford five games, most of which claim great graphics, stupendous sound and awesome addictiveness. So why is my favourite an Infocom text-only adventure (which I'm hopeless at)?

Jonathan Scott, Dewsbury, W. Yorks.

### **Composed software prices**

Unfortunately, B. Wigglesworth has somewhat missed the point, as I will try to explain. However, before I go on, I would like to make it clear that I am just as unhappy as he at the price of software, but realise why the price is what it is. Firstly, the ST being 16 bit and having superior graphics, if not sound, to 8-bit machines, requires more programming effort to make effective use of its facilities. In all cases, although the name of the game may be the same, the program is a total rewrite. As this takes time, the costs go up. Sometimes a straight port is possible, but in almost all cases of this happening, the game has had bad reviews.

Secondly, the software companies are out to make a profit. There are far less STs in Britain than Spectrums, for instance, and in order to recoup development costs, a certain return must be gained. As less copies will be sold, the profit on each copy must therefore be higher. Also there is the factor of 'what the market will bear'. However cheap a product might be to produce, if it undercuts the competition too much, a price war will ensue. The tumbling prices may please the buyer initially, but with so many small firms being pushed out of the market, the buyer loses in the end. Therefore companies are careful to launch products at acceptable prices.

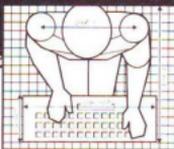
Thirdly, a piece of software is not like a recording of a piece of music; it is more like a copy of the manuscript. Its performance is like the computer running the program, not the programmer writing it. There is nothing truly creative about performing a piece of music. The orchestra is merely an imperfect human computer following a "program" (manuscript). All the real work is

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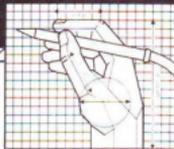
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done by the 'programmer' (composer). A computer program is not as simple as this. There are many paths you can travel through and these are not always fully tested before release. One misplayed note does not wreck the sound of an orchestra, but one faulty untested path can cause the computer to crash, hence the need for proper testing. As to the reason why a 'few seconds of software' is so expensive, a professional programmer produces on average 10 lines of debugged documented code a day, regardless of language, while in a few seconds, a computer can run many thousands of lines of code!

Roland Givan, Brentwood, Essex.

## 512 colours on TV

started by D Lee, STW29, p29  
+ Quantum paint on Ferguson MC05,  
Steve Bradshaw, STW30, p35  
+ 512 colours, software generated,  
Roger Cain, STW30, p35

### 512 colours at 50Hz

I have seen both Quantum Paint and Spectrum 512 on a Commodore 1084 monitor, and both work fine. However, only Quantum Paint works on a television, Spectrum 512 changes the sync rate to 60Hz.

Craig, Stony Stratford.

### On owning an MC05

I use a similar setup - 520ST and Ferguson MC05, but I don't have Spectrum 512 or Quantum Paint. However, here are some comments which could come in useful:

Programs that display at a 60Hz screen rate will not work on a MC05, or seemingly any other Ferguson TX chassis TV. I found this problem trying to use Hollywood Poker. Writing to Ferguson (Thorn / EMI) elicited the response that due to the circuitry, no adjustment / modification was possible to allow a 60Hz display. This reply seemed to apply to all Ferguson TX's. Sony, Philips, Normende colour TVs and Ferguson mono TVs seems to handle 60Hz with no problems at all (as do Atari colour monitors).

There is a program included on the Electric distribution version of Spectrum 512 called FIXIT, which is meant to allow Spectrum 512 to work on European monitors. However, this program does not change the program but instead configures the SHIFTER? chip in the ST to operate at 60Hz.

Steve Ridd, Wolverhampton.

## External Drive A:

started by B J Johnson, STW29, p29  
+ A software patch, Phil Randal, STW30, p35  
+ Hardware modification, Ian Tindale, STW30, p35

### Booting from external drive:

We have had several letters regarding the hardware solution given last month, although no circuit diagrams were offered. All mentioned one extra thing which was omitted

from last month's hardware mod: You will invalidate your guarantee if you open up your ST, let alone start cutting tracks and putting holes in your case. Also, various small programs were written, all of which tend to go along the lines of placing a non-zero number in address &H446. Among those who offered a solution were:

Stewart Burns and friend, Weston, Southampton.  
William Hern, Aberdeen.  
Steve Delany of Floppysoph Newsletter, Aberdeen.  
Craig, Stony Stratford.

Thank you all ...and as Craig states, this is really completing the job which Atari should have done in the first place!  
- Ian Tindale

## Basically Speaking

started by Les Barclay, STW29, p29

### HiSoft Basic v. Fast Basic

Being an owner of HiSoft Power Basic I am, of course, biased towards it. However, with it only having one window and no direct command mode, makes it very difficult to test out a new command in the middle of writing a program. Although FB is very good, I feel that the standardness of the HiSoft libraries and the fact that it can produce stand-alone applications outweigh the advantages of the friendly FB editor. One further point, the second STW disk is for the most part useless to non FB users, as so much of it is stored in FB format. Even though HiSoft supply a program for converting from FB to HPB, it can only cope with plain text files. A plea: Please, on future disks, supply programs in plain text files.

Roland Givan, Brentwood, Essex.

## Family Tree

started by B Pitman, STW28, p100

### Genealogy and computers

I have written a program for my personal use on my 1040ST, which may be of interest to Mr. Pitman, and if he cares to send me a DS disk and SAE, I would be happy to send him the code and documentation. Alternatively, Mr. Pitman might try writing to the Society of Genealogists, 14 Charterhouse Buildings, Goswell Road, London EC1M 7BA. They certainly have a group which discusses Genealogy and Computers, though I have not had dealings with it.

My program is still in a state of evolution, but I have been using it for my own genealogical researches for a year or more. Briefly, it allows dates and references on up to 1000 persons to be recorded or edited together with their relationships. Facilities are also available to record notes of up to 2000 characters on selected people. The program then enables you to print out a 'family tree' of essentially any number of generations in a choice of six different font sizes; this it does by writing it so the lines of text go down the page instead of across it. You end up, for large trees, with several strips which can be joined together. Dates of births, deaths and marriages are included as well as occupations and residences. There are currently two limita-



## Decent applications on the ST?

I have been a reader of ST World for a long time and always look forward to the next issue, although I do get disappointed, to be honest, with the quality of almost all of the software available for the excellent ST machine. I am a programmer with Southern Electricity and as such come into contact with a host of applications programs running on the IBM PC/AT, for example: SMART, DBASE III, EXCEL, PAGEMAKER, VENTURA, and my favourite Microsoft QUICK C. When, oh when, is software of this quality and user-friendliness going to arrive on the ST and running at AT speeds! With a design that makes the IBM machines look archaic, we must be able to have software this good. I often think that if only I could get the C sources for some of these, I would gladly generate ST versions for free (well, almost); but seriously, I would find it such a pleasure to be transferring software worthy of the machine to the place it deserves to run. If the ST really can't cope with this type of software, then someone please tell me why! Being a programmer of six years experience including two years assembler programming, I cannot see why any time critical parts cannot be written in assembler, although I certainly don't have the time to write software of such quality as a hobby from scratch (and why reinvent the wheel?) Please, all you brilliant software houses out there, do us all a favour. Forever hopeful!

Barry Rose, Havant, Hants.

## Unix for the ST?

Has anyone seen Unix for the ST? I heard it was available but then I didn't hear where from. Are things like that not available in the public domain? As an aside to my other communication about software for the ST, wouldn't Unix users the world over benefit if a Unix environment was available on such a popular and reasonably priced machine! I am now engaged in writing a Unix/C-based solution to an SEB problem on a CLAN 7 68000 series minicomputer, the program for which runs equally well when recompiled on a PC/AT. If I could take this work home and then run it on my ST as well, I would probably go on to transport other applications to my ST, the possibilities could be quite exciting using extensive experience gained in practical working environments to pass powerful 'real world' solutions to the world of home computing.

Barry Rose, Havant, Hants.

## SCART confusion

In issues STW25 and STW27, reference is made to the use of Philips Monitor type CM8852, which should, on specification, be rather better than the Atari SC1224. However, I am advised that this cannot be used with a 1040ST as the 1040 does not have a composite sync output. Further, no suitable unit is available and it is necessary to have a unit specially made. I feel this is a great pity, and I am rather annoyed by it as I would like to use a CM8852 with my 1040. Can any reader help?

John C. Hall,  
Newton Popholeford, Sidmouth, Devon.

## Composite sync or composite vid?

John, I feel you are being misled, as the CM8852 has a SCART input socket, and with a suitable lead (SCART to Atari ST 13-pin DIN) it will work fine. We ourselves use a CM8833, which is the next one down in the same range, and connection is made from a 1040STF to the SCART socket on the monitor. The confusion possibly arises from the difference between composite sync and composite video: the 1040ST has no composite video, the 520STFM and the newer 1040STFMs have composite video on pin 2 of the monitor socket. Any ST with a modulator (TV output) will have this composite video output. This can be used on a colour (or standard monochrome - not an ST mono) monitor, if there is a phono plug saying 'composite video input', or words to that effect. This is not a problem anyway, as the best way is to use the SCART socket, which accepts RGB+Sync inputs separately, and will possibly give better colour response. The other source of confusion arises from the fact that it is true the SCART socket on the monitor accepts only composite sync, and that the ST will not supply composite sync. This is not a problem. I have hooked an ST up to an open chassis Mitsubishi C-3419ELP high res colour monitor, and it only accepted RGB and composite sync. Somewhere in the lead, ideally in the SCART plug as they are pretty roomy, you will need to combine the Hsync and Vsync from the ST into one sync signal. The safe way is to take each one through a 2.2K resistor, and then twin them together after the resistors. This works. Working SCART to CM88xx leads are available at many outlets, try Lightwave.

Ian K. Tindale, ST World.

## Academic Enquiry

I am writing to hope that you will accept a piece of advice about a useful, I think, project. I saw, in your articles for example, that there is a quite great interest in U.K. Universities about ST machines.

It would be interesting firstly to know extensively which University and which departments some specific software has been developed (see the letter of Dr. Frazer in ST World of June '87). Mathematical, Statistical and Economic (simulation and descriptive software perhaps) software is probably available for a little number of students. It could be really interesting to make a carpet inquiry about kind of software developed for internal uses in universities and it's availability, prices and so on.

This means to spread high knowledge (or only useful knowledge) at low price, keeping in mind that such kind of "vertical" applications doesn't interest a common software house, because of the restriction of the users market, but are often exceptionally useful for single students, researchers etc., without time or skillness to write their own packages.

Federico Sartor, Via Padova n.4, 36015 Schio (VI), Italy.

*On that timely note - being the start of the new academic year - we put the letters away for another month. Many of you are writing enthusiastic at the potential that I/O holds. We agree, but it's up to you. Letters are always welcome, faxes too. I will be acting as a ST World I/O 'sysop'. In case you were wondering where the prizes have gone, now that the ball has started rolling, we will be offering the top three prizes from next month onwards. More I/O next month. - Ian Tindale. ♪*

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# MASTER

C·A·D

It seems as if every month sees the release of a new CAD package; but this month adds a new dimension: *Roland Tongue* takes a first look at Master CAD - a new £150 3D CAD program from Microdeal.

**W**ith Campus and GAF Draft Plus, the ST is now pretty well supplied with two-dimensional drafting packages, but until now there has been a great dearth of three-dimensional, affordable scale, drafting programs. This month sees the beginning of the end of this shortage.

Master CAD was developed in Venezuela by Industria Nacional De Informatica, published in the USA by MichTron and is distributed in UK by Microdeal. The boxed package is supplied with one double-sided disk and a comprehensive 263-page, spiral-bound manual. The program requires 1 Meg. RAM, but if the user only has a single-sided drive, then Microdeal will exchange the double-sided disk for two single-sided ones. Master CAD runs in either High (Monochrome) or Medium (Colour) resolutions.

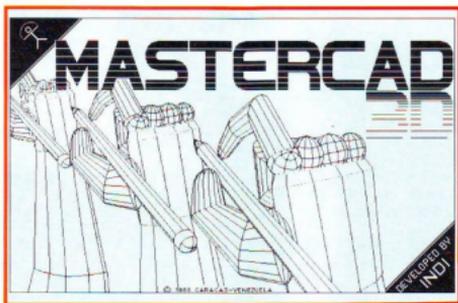
Master CAD is not merely a 3D modelling program, it is capable of producing high quality printed and plotted scale outputs of objects in both two and three dimensions.

## MASTER

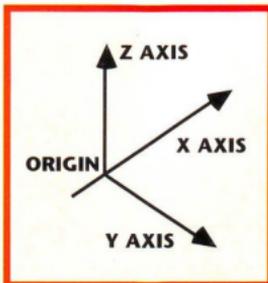
C·A·D

### 3D problems

Pieces of paper are two-dimensional devices. When drawing a representation of a three-dimensional object on



paper, what is produced is a two-dimensional representation; there is no way of producing a two-dimensional technical drawing which shows both the correct shape and size of all faces of a three-dimensional object. Computer screens are also two-dimensional displays, but computers can hold and manipulate the same data to enable the user to display a representation of a three-dimensional object as an accurate two-dimensional view



showing accurate dimensions and angles and to provide various presentations of the object designed to convey its shape.

When using a 2D CAD package the user 'draws' on the screen; the problem in designing a 3D CAD package is to provide an easy way for the user to enter the information relating to the third dimension. Master CAD attacks the problem by entering data on three

named axes.

The X and Y-axes are used to represent two adjacent sides of the plan view of an object - i.e. looking vertically down on it; these two axes may, therefore, be taken as representing length and width. Height is represented by positions on an axes at right angles to both the X and Y axes. This third axis is called the Z axis. Therefore, the front view of an object would be looking at the X and Z axes and the side view would use the Y and Z-axes.

## MASTER

C·A·D

### In detail

Booting Master CAD reveals the main 2D drawing screen. The menu bar at the top disappears during drawing but reappears when the cursor is moved to the top of the screen. The grid is optional and the spacing is user-selectable.

At the bottom is a comprehensive 'crib' box. In this case: Plan tells

the user that this is the view displayed; Line is the selected drawing tool; X and Y are the absolute cursor coordinates; DX and DY are the relative (units moved since last left mouse click) cursor coordinates; UP and DW give the settings of the limit planes (more of this later); D and A are the distance and angle moved since the last mouse click; Mm gives the percentage of free memory; Zm is the zoom setting and MT shows that

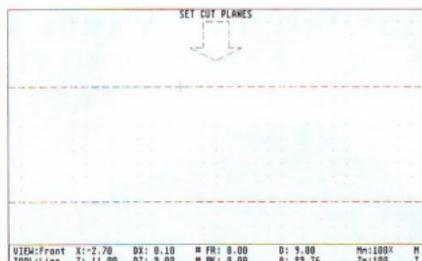
metric units have been selected.

All the usual basic drawing tools are provided, with 'Regular Polygon' providing a very easy way of drawing shapes with a user-defined number of

Tools:
Line
Rectangle
Regular Polygon(circle)
Polylines
Polygon
Clockwise Arc
Counterclockwise Arc
Text

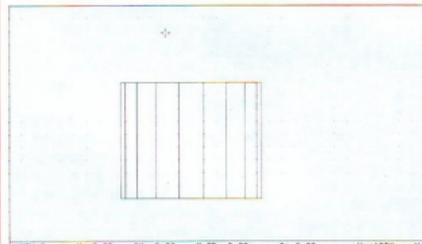
equal length sides. Master CAD lacks some of the refinements of the more up-market 2D packages; for instance, there are no Fillet, Parallel, Perpendicular or Trim to Corners functions. Editing objects

Select:
Points
Elements
Objects
All
Deselect Points
Deselect Elements
Deselect Objects
Deselect All

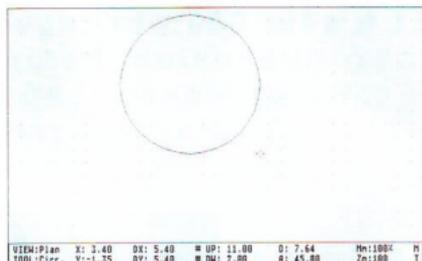
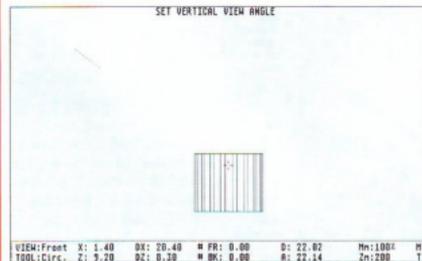


To demonstrate Master CAD in use, this next series of screenshots show the method of constructing a simple three-dimensional cylinder.

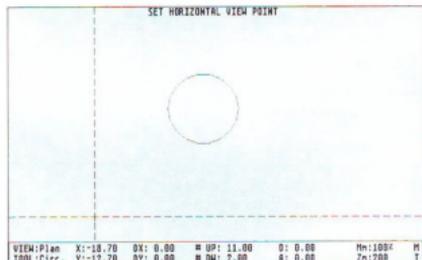
As it is only possible to draw in two dimensions at once, the first operation is to enter the data for the 'non-drawn' axes - in this case the Z axes. The top and bottom of the cylinder are defined by two 'Cut Planes' - here, the lower 'Cut Plane' has been set at 2.0 units above the origin and the upper 'Cut Plane' is being set at 11.0 units, as may be seen on the 'Crib Line'.



Switching back to the front view confirms that the program has, indeed, constructed the object in three dimensions. (The number of 'Faces' is user-selectable up to a maximum of 99.)

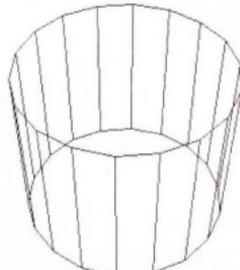


I have now switched to 'Plan' view and have selected and drawn a circle. Remember, although I am drawing in two dimensions the program will register the circle as a cylinder 9 units (the difference between the upper and lower 'Cut Planes') with its base at 2 units above the drawing origin.



In order to view the cylinder as a three-dimensional representation, it is necessary to first set the observer's view-point. Here, the 'Horizontal View-Point' is being set to the bottom left-hand corner of the screen.

Now the 'Vertical View-Point'. As well as setting the view-point it is necessary to tell the program which way the observer is looking. The view-point has been chosen as the top left-hand corner, and 'looks' towards the cursor, which may be seen in the centre of the cylinder.



The completed 3D wire-framed view. The cylinder may also be viewed with 'Filled Planes' and with the screen set to inverse video if preferred.

is made very easy: the user may select any number of objects, elements (parts of objects) or points (single line ends or junctions) which may then be manipulated in a wide variety of ways.

The Rotate and Rotate and Copy functions are particularly useful. For instance, after drawing one three-dimensional wedge and rotating it and copying it a set number of times in three dimensions, the user could construct a set of spiral steps in one

command - rather quicker than using a pen!

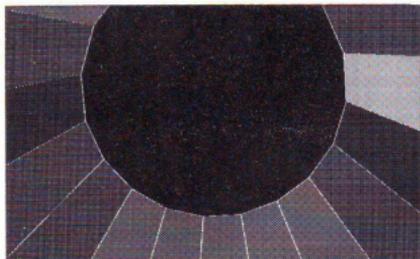
# MASTER C+AD

## Printing and plotting

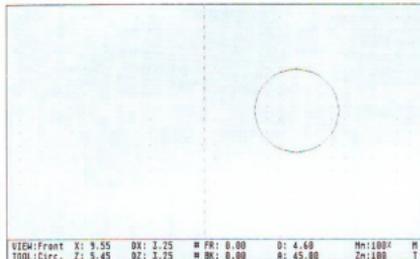
Master CAD uses a separate Output Program to produce hard-copies of

drawings. Epson FX-80-compatible dot-matrix printers are supported and I encountered no problems using my MP-165.

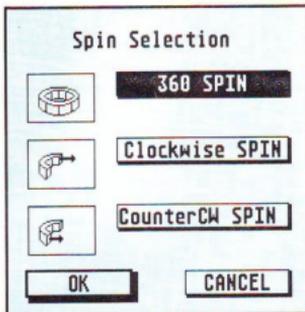
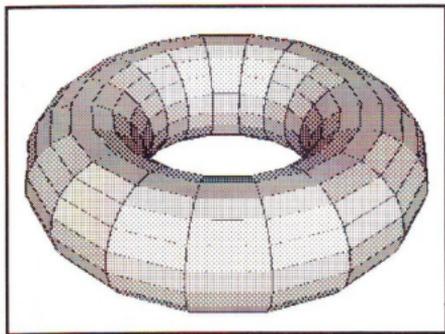
It is in plotter support that I met my only serious problem with this package, and I feel that this is a real problem for the serious user. The program supports three Hewlett Packard plotters, Color Pro, 7550 and 7580. The program may well work well with these plotters, I do not



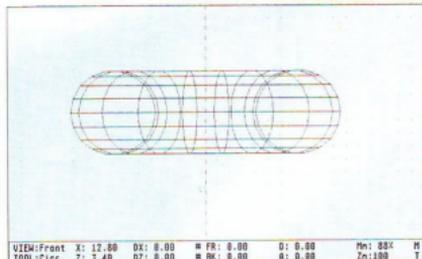
It is even possible to view the object from inside itself. The view shown on the screen may be saved to disk as either a plot-file for use with the 'Output Program' or as a Degas format file for further enhancement.



The vertical line represents the plane around which the object will be created. The cross section of the object is a simple circle, though it could be any shape.



One further function is worth a further look. The cylinder was produced by construction in a straight line along a hidden axis. 'Spin' creates objects along a curve of defined radius. Master CAD allows for objects to be 'Spun' as closed loops or as either clockwise or anti-clockwise arcs.



The spun object seen from the front....

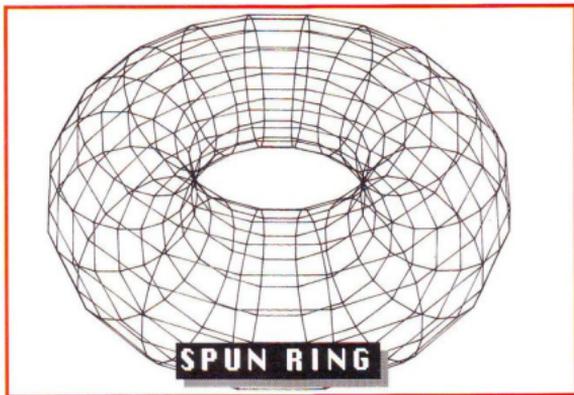
...and in three dimensions with filled planes. An object like this is both difficult and time-consuming to draw by hand: with Master CAD it took less than two minutes.

know; I haven't got one and they are very expensive machines costing thousands of pounds. What I have got is a plotter made by Roland UK which is HP-GL compatible and is, I feel, more the scale of plotter to which the average ST user is likely to have access.

Master CAD drove my plotter, but I could not make the plotter and ST handshake satisfactorily.

Because the H.P. plotters supported do not have Centronics interfaces, Master CAD does not offer the user the option of using the parallel port so one is thrown back on the RS232 port with all its Atari inbuilt idiosyncrasies. Although I have successfully used Campus CAD through the RS232 port, on this occasion I was defeated. The only way I could produce a plotted output was by slowing the ST's Baud Rate down to the point where the plotter's input buffer never became full - very slow and hardly elegant!

When working, the plotted output is impressive, with page sizes



usable working drawings in two dimensions with the bonus of 3D representations all from the same data - it would be quite possible to produce perspective views and detailed room plans or elevations from the same drawing data.

With the exception of the plotter driver I encountered no problems, indeed, Master

up to A1 being supported and large drawings being plotted, or printed, in several pages for pasting up if required.

## MASTER C+A\*D

### Conclusions

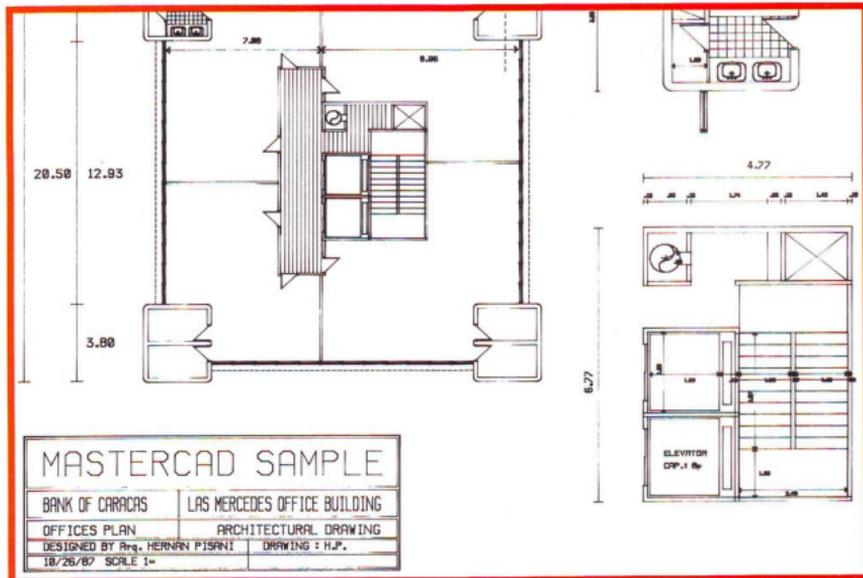
Master Cad is not a toy, it is capable of producing high quality technical plans and illustrations.

The provision of, slightly limited, automatic dimensioning allows for the production of quite

CAD was both easy and fun to use and would make a valuable addition to many ST CAD users' software collections.

I only hope that the publishers or distributors will soon offer a solution to enable the use of more commonly available plotters.

**Product : Master CAD**  
**Price : £150**  
**Author : INDI**  
**Publisher : Michiron**  
**Distributor : Microdeal**  
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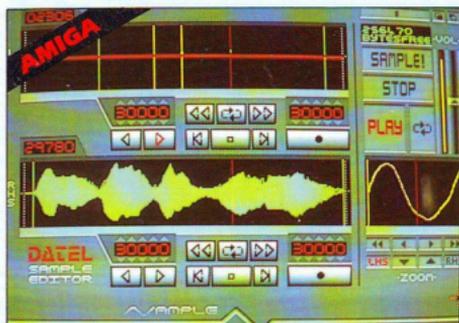
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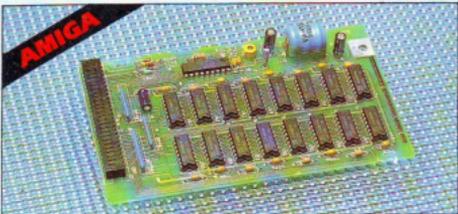


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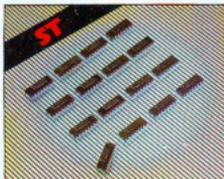
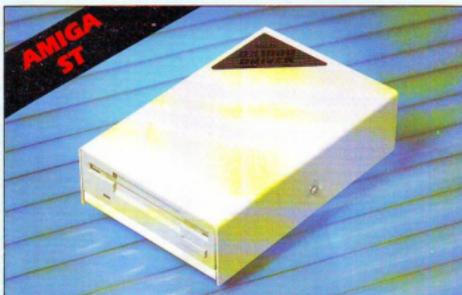
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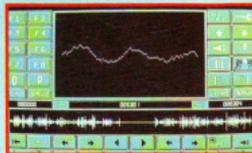
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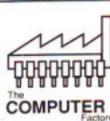
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**PostScript has become one of the buzz-names of modern computing. But what exactly is it? Richard Seel explains the nature and importance of PostScript for desktop publishing.**

# "PostScript"

**M**any readers, especially those using desktop publishing systems, will have come across the name "PostScript", but not everyone has a clear idea of what PostScript actually is, or why it is so important. In this article I hope to help clarify the nature of PostScript by giving a brief description of some of its main features.

In fact, the uncertainty has several causes. For a start, there are two different ways of looking at PostScript. It can be thought of as a Page Description Language - that is, a set of instructions which can allow a complete description of a page. This page may contain any possible combination of text, line graphics and bit images. The description is independent of any particular printer or display device, but it can be used to output a high quality image on a suitable output device.

On the other hand, it is also possible to look at PostScript as a fully-featured programming language; just one more to add to the list of BASIC, C, Pascal, FORTH, and so on. From this perspective, PostScript could be described as a "interpreted stack-oriented extensible procedural programming language with built-in high-level graphics support as a primary feature"(!).

## Unusual features

Both of the above descriptions are true - it mainly depends on what you are using PostScript for. But however we look at it, PostScript does have two unusual features.

Firstly, it is designed to give high-quality display with a raster image output device (i.e., one which creates its images as a pattern of dots - typically a laser printer, but ink jet printers and

computer screens are also in this category). There is an assumption that a program will be sent as an ASCII file to the printer where each statement will be considered, and then converted into a pattern of dots by a Raster Image Processor.

A Raster Image Processor (RIP) is a kind of dedicated computer having a processor (often a 68000, like the ST) and lots of memory (up to 2 mega-

vast majority of PostScript programs are actually written by computers, not by people! This is because most applications which use the language, such as desktop publishing systems, or CAD programs, or word processors, take the user's input and automatically generate the PostScript source code without the user being aware of the process at all. I think that it is this which has done more than anything

graphics. Some of the ideas developed here found fruit in Xerox's own Interpress page description language.

In 1982 John Warnock started Adobe Systems Incorporated with Chuck Geschke, and JaM was reincarnated as PostScript. By 1986 the company had a staff of over 100 and a turnover of over \$16 million. The company charges large fees to printer manufacturers who want to include a PostScript interpreter in their products. This is said to include an initial entry fee of \$200,000 with a royalty of \$500 for each printer sold.

Given this, it is not surprising that other companies are now trying to jump on the band wagon by offering 'PostScript-compatible' interpreters and RIPs. Phoenix Technologies (famed for its PC clones) and Bitstream are offering a new open-architecture page description language board which is claimed to be 100% PostScript compatible, and also supports other standards, such as HPGL (Hewlett-Packard Graphics Language).

Conographic Corporation are also now offering a PostScript-compatible RIP. This is claimed to be much faster than the RIP in the Apple Laser Writer - speed increases of up to 40 or 50 times are claimed. The activities of the clone makers may not be good news for Adobe, but it is good news for users, because it means that PostScript laser printers will become both cheaper and more efficient.

## Language features

PostScript is most similar to FORTH (although the two were developed independently), but it also has some LISP-like features. Since many readers will be

***Postscript could be described as a "interpreted stack-oriented extensible procedural programming language with built-in high-level graphics support as a primary feature"(!).***

bytes or even more). Its sole task is to convert from the incoming stream of commands to a bit image output suitable for the specific output device which is hooked up to the RIP.

It is possible to output PostScript to a computer monitor, and indeed to use it to write a whole application. The highly acclaimed 'Adobe Illustrator' is written almost exclusively in PostScript, with just a little machine code for speed (PostScript is interpreted, not compiled). Steve Jobs, one of the co-founders of Apple, is also working on a new computer (to be called NeXT) which will use PostScript for its display. Despite these notable exceptions, it is relatively unusual to use PostScript as a general-purpose language.

But the most striking thing about PostScript is that the

else to make PostScript such a mysterious language for most people.

## PostScript's origins

PostScript is derived from a language known as 'Design System', which was developed by John Gaffney and John Warnock in 1976. In 1978 John Warnock joined the famous Xerox Palo Alto Research Centre (PARC) - the place which pioneered a totally different approach to computing, which ended up with the development of the Apple Macintosh and WIMP environments such as GEM.

At PARC, the Design System was re-written as JaM (John and Martin - Martin Newell was involved in its own incarnation), and used by John Warnock to investigate printing and

unfamiliar with both of these languages, I'll give a brief outline of some of PostScript's main general-purpose features before looking at the graphics capabilities.

PostScript is an 'extensible' language; that is, you can extend it by defining new key words in terms of the supplied dictionary of operators and functions. It is also 'stack-oriented'; that is, it makes use of a kind of information structure called a 'stack'.

### Stacks and pipes

Two of the main non-random ways of storing and retrieving information are often referred to as 'pipes' and 'stacks'. The main difference between the two lies in the way in which data can be recovered from them.

If you store items, say A, B, C, ..., in a pipe structure, and then try to retrieve them, you will first pull off A, then B, and finally C (figure 1). As you do this, the next elements in the data stream can enter the pipe. This method of data storage is often referred to as 'First In, First Out' (FIFO), and if you think about the term 'pipe' you can see that this is quite appropriate. A stream of objects entering a pipe at one end will still be in the same order when they emerge from the other end.

A stack is rather different. If you store A, B, C, ... F on a stack, you will retrieve them in the reverse order: first F, then E, and so on (figure 2). This is known as 'Last In, First Out' (LIFO). It is similar to the structure you would get if you stacked a pile of plates. Another point to note is that the stack size varies according to the number of data items you want to store on it. In other words, the stack is a much more flexible structure than, say, a pipe, which is usually fixed in size.

So using a stack has certain advantages, but it does also have consequences, and some of these may be quite hard to grasp. For instance, stack-oriented languages such as FORTH or PostScript tend to use 'postfix' or 'Reverse Polish' notation for their arithmetic - and this is a form of notation which is very different from the one most of us learned at school.

### Reverse Polish

Suppose we want to find the sum of 1 and 2. There are three elements involved in this: two 'operands', (the numbers 1 and 2), and an 'operator', (the addition or sum operator). Normally we would write down this sum

by putting the operator in between the two operands:  $1 + 2$ . This is known as 'infix' notation.

But, as provided we understood what was meant, there is nothing to stop us agreeing to put the operator first:  $+ 1 2$  (after all, that is what we often do in ordinary speech, as I did earlier, when I wrote about "the sum of 1 and 2"). This is known as 'prefix' notation. Users of GFA BASIC may be familiar with it, as that language uses the form "sum 1 2" for fast integer arithmetic.

### PostScript arithmetic

The following is a fragment of a PostScript program:

```
1 A add
```

Let us see what happens when the PostScript interpreter works on this program. Firstly it comes across the number "1". It recognizes this as a number (strictly, as a 'literal integer object'), and puts it onto the 'operand stack' (PostScript uses several different

equal to 3. So the interpreter looks through the user dictionary for the name "A", and when it finds it, puts the associated value (3) on the operand stack.

Now it comes to the name "add". Again it looks down the dictionary stack for the name. It goes all through the user dictionary and eventually finds it in the system dictionary (because "add" is a primitive system operator, and the system dictionary is always at the bottom of the dictionary stack). It then looks up the value associated with the name. In this case the value is not a number, but a set of instructions.

Now the interpreter carries out the instructions associated with the name "add". These involve removing the first and second numbers on the operand stack (3 and 1), adding them together, and putting the sum on top of the stack. So the end result of this small piece of PostScript program is that the operand stack size is increased by one element and this element is the number 4, which is now on the top of the stack.

### Defining your terms

I mentioned earlier that PostScript is an extensible language. The following code fragment gives a simple example of this:

```
/average (add 2 div) def
```

When the interpreter comes across "/average" it notices the backslash and so treats it as a literal object, not a name, and pushes it onto the operand stack. Then it comes to the array "(add 2 div)". This is treated as a single object for the time being (because it is between the braces), and is also pushed onto the operand stack. Finally the interpreter comes across the executable name "def", and looks through the dictionary stack for its associated value.

The value of "def" is a set of instructions which remove ("pop") the top two objects from the operand stack and associate them together as value and name in the user dictionary. In other words, we have just defined a new function, or procedure, which can now be called just like any other PostScript function. Its name is "average", and its value is "add 2 div". For instance:

```
10 40 average
```

will cause "10" and "40" to be pushed onto the operand stack. Now the executable name "average" will be searched in the dictionary stack, and its associated

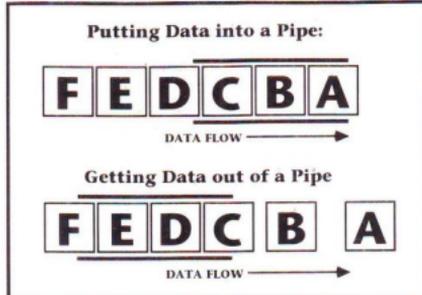


FIGURE 1

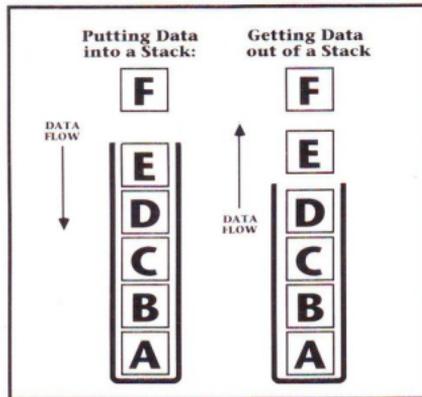


FIGURE 2

metic. Logo is another language which prefers to have its arithmetic expressed in this way, although the Atari implementation permits infix as well.

There is a third logical possibility, which is to put the operator last:  $1 2 +$ . This is the form known as 'postfix', or 'Reverse Polish' (because it was invented by the Polish mathematician, Lukasiewicz, in 1922), and is the kind of notation used by PostScript. The examples below will show how useful it is with a stack-oriented language.

stacks). Next it comes to the letter "A". It assumes that this is an 'executable name' and so looks it up in the 'dictionary stack'.

The dictionary stack contains at least two dictionaries: the system dictionary, which is supplied as part of the language, and contains the definitions of all PostScript's primitive operations; and the user dictionary. The entries in the user dictionary are in two parts: a name, and an associated value. Let us assume that earlier in the program "A" was defined to be

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value executed. This consists of performing the series of operations in the array (add 2 div) just as if they were any other part of the program.

In this example, "add" will pop 10 and 40 off the stack, add them together and push the result, 50, back onto the stack. Next "2" will be pushed onto the stack. Finally "div" is encountered. This pops the top two objects from the stack, divides the second by the top one, and pushes the result back onto the stack. This is 25, which is indeed the average (arithmetic mean) of 10 and 40.

### Graphics operations

The graphics commands are what make PostScript special. In this brief article it is simply not possible to do justice to their power or complexity. All I can do is to grossly over-simplify, and give the merest hint of what can be done.

PostScript has a number of operators which are used to construct a 'path'. A path can range from a simple enclosed space to a complex series of unconnected geometric shapes. Interestingly, the path commands do not cause anything to be displayed on the output device. Instead, a 'paint' command, such as "stroke" or "fill", must be used when the path has been created.

As well as simple drawing commands, you can have control of the smoothness of curves (the smoother the curve, the longer it takes to calculate), and the way two lines join (by default all angled joins are mitred, as in high-quality carpentry). Some of the other graphics operations are similar to those provided by GEM.

All graphics operations take place in 'user space' which has its origin at the bottom left (as in a conventional graph), and whose default units are 1/72 of an inch. This is approximately a printer's point (in fact, most people nowadays think that it is exactly the same as a printer's point), and therefore a very convenient unit for a system which is concerned with printed material. This will later be translated into a 'device space' which is particular to a specific output device.

### Transformations

One of the most powerful features of PostScript is its ability to permit flexible transformations within this user space. An example may serve to give an indication of the power available. First let us define a square of unit

length (i.e. 1/72 of an inch on each side) which is located at the origin (bottom left hand corner) of user space:

```
/square {newpath
  0 0 moveto
  0 1 lineto
  1 1 lineto
  1 0 lineto
  closepath
} def
```

This procedure sets up a new path, starting from the origin (0,0) ("0 0 moveto") which creates the square (with the "lineto" commands). Note that the last side of the square is created with the command "closepath"; this ensures that the join is neat and tidy.

Next the current graph-

***"The graphics commands are what make PostScript special. In this brief article it is simply not possible to do justice to their power or complexity."***

ics state (which is still the default state) can be saved with the command "gsave". Now we are ready to operate on the user space containing our square. For instance,

```
72 72 scale
```

changes the scale of the coordinate system, multiplying the X and Y coordinates by 72. In other words, each unit is now one inch. So if we now call "square", it will create a path which is a square of side one inch. Next we could,

```
2 2 translate
```

which moves the origin of the coordinate system to the point 2,2 (this is now in inches, remember). Or we could,

```
45 rotate
```

which would rotate the coordinate system through 45 degrees counter-clockwise. Now if we displayed the square with

```
square
stroke
```

it would be one inch on each side, rotated through 45 degrees, 2 inches away from the bottom left of user space in both X and Y directions.

Because a graphics state can be saved and restored, Post-

Script is able to treat each object in this way; defining it in its default mode at the origin, and then transformed as above. In fact, PostScript supports matrix operations which allow considerable control over these transformations, and also over the way they are mapped onto the output device (which will probably have a quite different coordinate system).

### Fonts

Because PostScript was designed as a page description language, it has a number of functions which cater specifically for text display. Each implementation of PostScript also has 13 built-in fonts from three type faces: Times Roman, Times Italic, Times Bold, Times Bold Italic;

as a pattern of dots.

(By comparison, GEM fonts are very inflexible because they are stored as a pattern of dots all the time. This has two main disadvantages: it takes a lot of memory for large sizes, and it does not permit scaling without loss of definition. Incidentally, Publishing Partner fonts are also stored as outlines, which is why one font can be used to output to a range of printers regardless of the printer resolution. The outlines and the display software are not as sophisticated as the Adobe ones, which is why Publishing Partner's output is not up to PostScript quality.)

### Displaying text

To display the letter "A" in 10 point Times Roman, one inch away from the user space origin in both X and Y directions, you might use a PostScript program similar to this:

```
/Times-Roman findfont
10 scalefont setfont
72 72 moveto
(A) show
```

This should be fairly self-explanatory: "findfont" looks for Times-Roman, which is a dictionary containing all the information about the characters in the Times Roman font, "scalefont" makes the font 10 units high (i.e. 10 points, since we are still in the default scale); "setfont" makes that the current font; we then move 72 units in X and Y (i.e., one inch); and "show" causes the character(s) in parentheses to be printed.

There is much more to PostScript. For instance, fonts can be displayed filled in black or a tint, or as outlines, and the outline can even be defined as a clipping path - i.e. nothing will be displayed outside the character outline. This means that many complex effects can be obtained.

As an example of a real PostScript application, I enclose part of the code output by Publishing Partner for a small demonstration with a little text and some object-oriented graphics, (FIGURES 3 & 4). As you will see, PostScript is a rather verbose language, taking many lines of code to do the simplest things. This is the price you pay for all that power and flexibility.

### Conclusion

Using and experimenting with PostScript yourself is difficult, since you really need a laser printer as your output device - as far as I know there are no ST

programs which will display PostScript on the screen. But even if you never learn anything more about the PostScript language, I hope that this little article will have clarified a few points and will help you to understand what is going on when you are using a desktop publishing program, or when someone asks you if you can generate a PostScript file.

If you want more information about the PostScript language, there are two books from Adobe Systems which will help you: 

"PostScript Language Reference Manual" (ISBN 0-201-10179-3) and "PostScript Language Tutorial and Cookbook" (ISBN 0-201-10169-6). Both are published by Addison Wesley (at £21.95 and £16.30 respectively).

This is 12 point Helvetica (*this is italic*)

This is 12 point Times (**this is bold**)



This is a 1" square



This is a 1" circle



This is freehand

FIGURE 3 (ABOVE), AND FIGURE 4 (RIGHT).

This is in 12 point Helvetica medium - and this in bold  
Below is a box with a circle in it:



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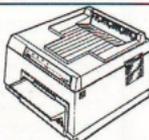
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## THE WORLD OF

**"In the final part of the World of Midi series, Chris Mullen considers the current state of the Midi scene and concludes with a brief look at EZ Score Plus and Musigraph."**

There can be little doubt that many musicians regard music notation with a certain fascination, continually attracted to the compelling visual nature of symbols representing aural ideas. Even in this world of technological change, the thought of being able to interpret a primary source such as an original manuscript, and present a subjective view of how the music should sound, still provides performers with one of the greatest challenges, just as it has done in centuries past.

With this in mind, it might be regarded as anathema that computers should now come in on the act. After all, surely a lifetime of study, involvement and experience cannot be encapsulated onto one computer disk, no matter how hard you try. "Computer music" is all right for those high-tech folk who clearly don't know the first thing about crochets and minims; "proper music" should be left to the guys who know what they're talking about - i.e. those who wouldn't recognise a bit, byte, or qwerty keyboard if it jumped out in front of them on the way home from work!

But, oddly enough, it seems that the "ostrich" syndrome is least likely to be found amongst working musicians. Such opinions are most often expressed by those who view the Arts in a different, reverential light - the same light, presumably, which shines upon a world that actively discourages the performance of 20th century compositions on the grounds that the public prefer Mozart and Beethoven. And although it may be regarded as being trendy to knock the established Academies and Universities for their diehard views, considering them somewhat similar to these "lovers of the Arts", there's considerable proof that a great number of educationalists welcome the intervention of computer programmers, and take seriously their attempts to ease the lives of all musicians, teachers and composers. As such, I have to admit that I don't really know what "computer music" is. Possibly some sort of tag thought up by those same people who consider Stravinsky, Bartok, Ives and Varese unfit for human consumption!

At a recent Music Advisers' conference in Ripon, as well as the usual musical instrument trade stands, a number of software companies were displaying their wares. Eventide had on show a Steinberg Pro 24



sequencer, with Argents offering visitors a detailed look at the Apple Mac and similar sequencing/scorewriting packages. In addition, Portastudios, MIDI keyboards and an electronic harpsichord were also on view, with one company demonstrating the possible use of SMPTE within the world of the audio visual arts. The fact that these trade exhibitions were there at all says a great deal about the current state of interest in new technology. Slowly, but surely, the main

message of this series seems to be taking root amongst those involved in music education, who may have initially had certain reservations about the computer in the classroom. All worthwhile music-related software demands thought, care and attention on the part of the user. It cannot replace original ideas, and does not threaten creativity. Programs are tools, designed to be used by musicians in exactly the same way as word processors are designed to be used by writers. They offer freedom, flexibility and a safe and simple method of data storage.

### *The "Music Processor"*

A certain percentage of the work carried out by those of us who are employed full-time within the world of music is repetitive, time consuming and, dare I say, downright boring! Be it the transposition of parts for rehearsals, or the re-arranging of music for schools or professional ensembles, vast chunks of our lives are taken up with daily tasks which tax our patience rather than draw upon our skills as communicators. The same can be said of those musicians who have opted for a slightly different life. Professional composers and arrangers need to be organised in their approach if they are to meet deadlines, produce legible manuscripts for rehearsals or publishers, and offer the flexibility necessary within any business. It's hardly surprising that many composers over the past years have opted to record their ideas using other mediums such as magnetic tape, vinyl or CD.

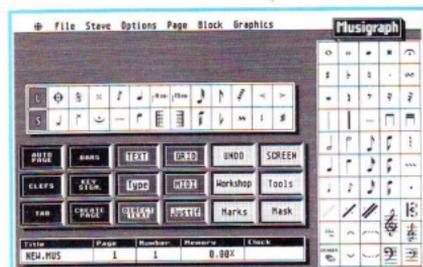
As suggested in the previous instalments, sequencers have grabbed virtually all of the limelight over the past years, but it's my view that this might well change in the near future. The idea of producing a "music processor" somewhat similar to a word processor is far from new. Indeed, it has been on the cards for quite some time, although as you may well have guessed, some of the problems are overwhelming! Early experiments forced the user to learn all sorts of peculiar commands or combinations of key strokes using the qwerty keyboard to alter note names or values, with very limited edit facilities. But as time has slipped by, a small number of useful programs have started to appear, with news of more extensive and powerful software arriving every month. The day of the professional scorewriter that can produce a full score, printed out on a laser printer as well as dot matrix, are fast approaching for those of us working from home. With luck, it won't cost an arm and a leg!

To make the discussion more interesting, I'm going to look in brief at two pieces of software for this final instalment of the World of MIDI. One is produced by Hybrid Arts (EZ\_Score Plus) and distributed by Syndromic Music - the other, designed by SARO

(Musigraph), obtainable from Evenload Soundworks. I've chosen these two programs because they reflect two distinct directions that can be taken by programmers when it comes to tackling the problems of music processing. One has roots in CAD, the other in MIDI.

### Musigraph

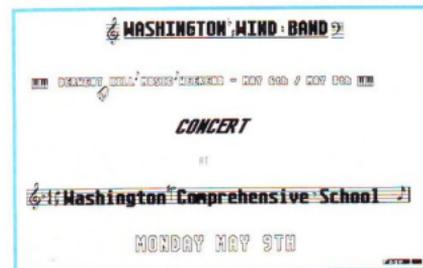
Programs like Musigraph are a form of "Easydraw" devoted exclusively to music. Basically, various screens can be drawn, and symbols placed by simple use of the mouse. Precisely how complex the program is will



Menu page from Musigraph Scorewriter

basically depend upon the cost, but you should expect to find several types and sizes of text, alongside an array of common musical symbols, such as, clef, sharp, flat and natural signs. You will need to be able to undo or alter things quickly, so look for neat and precise on-screen edit features, as well as automatic facilities for beaming notes together, choosing particular types of staves (solo, piano, vocal), and selecting different time and key signatures.

Initially, such programs seem rather



A Poster produced on Musigraph



weak. They can be time-consuming to set up and operate, and in most cases it would be just as quick to write out the music by hand. But to condemn such efforts on this evidence alone would be to miss the point of the software entirely. Programs such as these

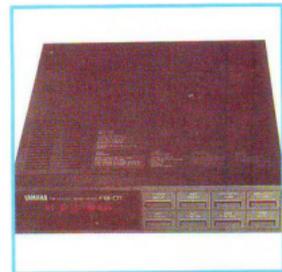
are not intended to convert sequencer files into music notation, nor are they intended to replace the skilful writer who can quickly carry out short manuscript-based tasks. They are designed to provide a clear, clean "typed" script which fuses written text with music text, offering all of the features one might expect from a reasonable music publisher. This means that they are absolutely ideal for the design of posters, tickets, programmes, examination papers, booklets and other educational material. In addition, if the program allows the user to design other items (music or non-music), there's the possibility of personalising the document or poster with suitable logos or symbols.

A couple of months ago, I took a party of thirty children to the Lake District on a music weekend, and used Musigraph as a base for all printed material that was required. An information sheet was compiled

for pupils and parents using several of the different texts available, along with small symbols of TVs, radios, a house, cross, telephone, tea-cup and car. These were placed alongside information about accommodation, trips, church services, travel and meal times. Music symbols and notes were positioned throughout the document, and a logo was designed for the name of the band using a staff, treble

clef, sharp, flat and natural sign. Displays giving details of kitchen duties, room numbers, activities and rehearsal schedules were posted around the building, and for the return journey and concert, tickets had been completed using the same musical logos that appeared on the information sheets. Posters advertising the concert had been distributed during the previous week - again, using a small handful of the music features available within the program.

Whilst this might seem an odd use for a scorewriter, it's one which many amateur or school-based organisations find useful. In the past, such material would have been expensive to produce, with the only alternative being hand-written copies, and probably several attempts at getting the treble clef sign correct! It also means that at any future date, the original designs can be re-used and slightly altered to suit the occasion. Simple, efficient and effective - exactly what is required of computer software! And the chances are that if Musigraph was handed to another musician, a totally different, yet equally striking use would be found for the features on offer. As suggested earlier, good music software requires thought, care and originality on the part of the user. Musigraph offers at a moment's notice, quality



dot matrix music and text printing that would previously have required considerable advance notice. I prepared the programme for the evening three hours before the concert took place, purely because we didn't know what the band was going to play until after the course!

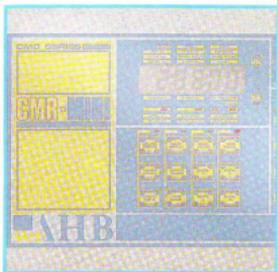
It should be said, however, that scorewriters often fall short of the mark when compared with the skill and speed of an experienced musician, and in the past they have tended to be criticised heavily. Part of the reason for this is the length of time it can take to complete one full print-out (some can take as long as half-an-hour per page in hi-res mode!), so certain CAD-type programs often become so time-consuming as to make them impracticable.

Pencil, manuscript and eraser are also considerably cheaper!

As far as musicians are concerned, the greatest interest lies with programs that are capable of producing a written script quickly (i.e. they need access to a Laserprinter), or, if they are to be hampered by slow dot-matrix printing, a system which offers the means to play the music on a keyboard, have the computer change that performance into standard notation, and then print out the end result. Because most players are fairly skilful at performance, they are often willing to wait several minutes for the printer to do the job, whilst they carry on with another task. The fact that they have to do little more than play a short passage on a keyboard, is attractive to those users who may not have the time to write out a part, or the inclination to concentrate on a legible transcription; rough copies for your own use is one thing, writing out a clarinet transposition for a nine-year-old is another! So, the next step is to consider the role MIDI has to play in scorewriting and find out whether sequencers and scorewriters can be used side by side.

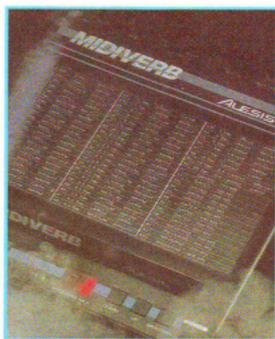
### EZ\_Score Plus

Bearing in mind that sequencers do not record music, but simply make a record of a



series of digital signals, it doesn't take a genius to work out that such data could be converted to some form of scorewriter file. In fact, because of the nature of MIDI (where each note is assigned a number), converting notes of different pitch is relatively straightforward. Where problems tend to occur is in deciding on the length of the note, and as you might have guessed, the quantize facility features heavily in the successful conversion of files from sequencer to scorewriter.

Before trying to auto-score a sequencer file, most user guides suggest that you quantize tracks, and ensure that the notes actually make sense in relation to the basic pulse. With such accurate digital data



now stored in the sequencer, it's simply a matter of taking each note in turn, searching for its MIDI note number (for pitch), and for the time at which the note was activated and ceased. Simple - in theory at least!

But at a recent demonstration of music software for the BBC micro, a designer tried to fob off a query concerning the fact that the computer took several seconds to convert every bar of music in the software package that he was promoting. Imagine scoring a piece of a page in length! Obviously you need a fair amount of memory to carry out some of these complex tasks,

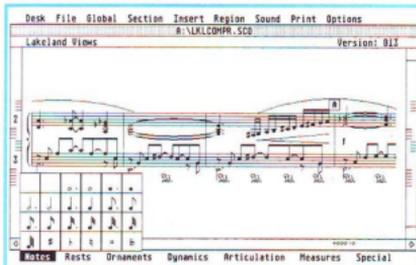
so check out the length of time you can expect to wait while the program gets its sums right and works out what should go where! On the whole, with a 1040ST, the job seems to get done fairly quickly; certainly EZ\_Score Plus copes with remarkable ease, usually completing the full task in seconds rather than minutes.

It's also interesting to note how this program solves the difficulties of accidentals. As you may be aware, the form of tonal music that we are all so accustomed to uses a system of flats or sharps to imply the "key" of the piece. EZ\_Score Plus allows you to select the key so as to ensure a minimum of accidentals, and handles all major keys with a keen eye. Minor keys, however, can pose a problem.

Initially, minor keys seem similar to major keys in that they also usually have a certain number of flats, or sharps, placed in the key signature. But one of the guidelines for minor scales is that having established a tonic (key note) and a key signature, at least one other note in the scale must be altered.

In the harmonic minor version, that note is the seventh degree of the scale - raised one semitone both in the ascending and descending form; in the melodic minor, both the sixth and seventh notes are raised a semitone when ascending, although they return to normal, descending. These changes must be reflected by accidentals placed within the music, and not in the key signature. Confused? Well, most programs certainly are.

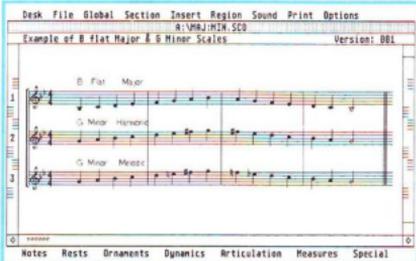
EZ\_Score Plus, like every other pro-



The main page of EZ\_Score Plus, by Hybrid Arts

gram that I have seen, fails to completely solve the problems associated with the correct auto-scoring of pieces in minor keys. But in fairness, it does at least address the real difficulties, which is more than can be said for a number of other pieces of software that have recently drifted my way. And it should be noted that these difficulties only arise in certain minor keys - so it may be regarded as some to be a relatively minor(!) problem.

Part of the reason for this is the existence of "enharmonic" note names. It's probably true to say that most people regard the black notes of a keyboard as "sharps" or "flats", although in fact this isn't absolutely



Three different scales, each with the same key signature.

accurate. The odd thing is, that each of these "black" notes can be referred to in at least two different ways. A note placed between the white notes "F" and "G", can be described as "F Sharp", or alternatively "G Flat". In the key of G major, which has one sharp in the key signature, the description would be "F Sharp"; in the key of D Flat Major, which has five flats in the key signature, the description would be "G Flat". Confused, yet again! Well, imagine the problems software designers face.

If you look at the enclosed screen dump from EZ\_Score Plus, you should see that I have shown three different scales using the key signature of two flats. The major version is in a key called B flat major, and whilst in that key the chances are that the composer might drift slightly away from the tonic (the home key) towards those keys that might be described as "near neighbours". This usually means a modulation towards a key such as F major, which has one flat in the key signature; no problem for EZ\_Score, which will simply insert a natural sign before any "E" flats. Should the composer move further towards the flat side (e.g. E flat major), the scorewriter simply adds the next flat (an A flat) as an accidental. Exactly what the normal "human" copyist would have done!

So the pattern seems to be: if the key signature is a flat side key, all accidentals are described as flats; if the key signature is a sharp side key, all the accidentals are described as sharps. C Major, should it come across any accidentals, opts for flat names rather than sharp names - a pity, when you consider the likes of A Minor!

But the difficulties faced with major keys are minuscule compared to those faced when using minor keys or whole tone scales etc. Following the guidelines above regarding how accidentals are linked with key signature, an obvious problem arises when using a flat side minor scale which has a raised sixth or seventh note! In the case of G Minor, the correct description for the seventh degree of the harmonic version is "F Sharp", yet EZ\_Score Plus would interpret it as "G Flat" - the flats in the key signature see to that!

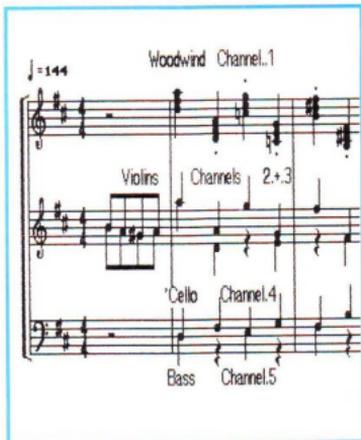
Hopefully, this short journey into music theory has given a brief glimpse of the sort of problems faced by designers, and it's clearly noticeable which pieces of software have been developed by companies who have little knowledge of music notation, those who have specialist knowledge, and those who have had the foresight to ask working musicians to try out provisional copies during the developmental stage of manufacture. And although I have quoted a particular deficiency within



the Hybrid Arts program, it is, by far, the most comprehensive scorewriting effort that I have yet come across. Well worth a look, and once the new version is released for review, well worth further exploration within these illustrious pages.

#### Using MIDI

In the first instance, it was necessary to input data via the computer keyboard, as sug-



**Prokofiev Classical Symphony  
- using EZ Score Plus!**

gested earlier. But, thank goodness, we now have a number of programs appearing which make use of MIDI in a constructive and intuitive way. For those owners other

than ST users, there's the added expense of a MIDI interface if the program allows information to be passed between those infamous 5 pin DIN sockets, so it's here where the ST programmers can offer MIDI as a useful extra, and if, by chance, you own an instrument suitably equipped, it's simply a matter of buying a couple of leads.

EZ\_Score Plus makes superb use of MIDI, and whilst it can be used as a stand-alone piece of software, it clearly comes into its own when hooked up to a more extensive network. You can input information via the music keyboard, as well as play back via MIDI. In addition, specific channels can be assigned to particular parts (a maximum of 6 in this case), so arrangements for several voices can be allocated different timbres if the expander/synth is multi-timbral. Having used a variety of scorewriters, it's clear that the future lies with programs such as these. Being able to record, from the keyboard, six different parts of a composition, have each displayed (two parts per staff) and assigned to a specific voice and MIDI channel, offers tremendous advantages to the musician who may wish to check out his arrangement before submitting it to a live rehearsal. When you consider that further exploration of EZ\_Score Plus reveals the possible use of the keyboard as a complete "workstation", by mapping certain key commands onto the synth, you begin to realise that the whole operation could be controlled from the one music keyboard, along with the mouse. Pretty impressive stuff!

Other features, such as a lyric editor and a facility for displaying guitar chords, simply add to the flexibility of the program, making it an ideal songwriter's tool. With this in mind, and with numerous aspects of the scorewriter's job covered by programs such as this, are the days of the human copyist numbered?

#### Back to the future

In the original instalment of this series, back in March, I suggested that scorewriters had created quite a stir in the music world, and asked readers to consider the possible advantages of converting compositions into a standard format. Whilst it may well be true that some writers will look back to past compositions, and consider using this new technology to bring their work up to date and present it in a more accessible form, it's unlikely that the person who is totally ignorant of standard notation will fare well.

Basically, the reason for this is that virtually all software in this department includes certain compromises, and particu-



larly with sequencer file conversion, things can go slightly (and sometimes drastically) wrong! Although such conversion might give the user a basic outline of the composition, in many cases it would mean little to the average musician, who is used to a certain number of traditionally-accepted working routines. The appearance of a "G flat" within the key of G Minor (rather than F Sharp) is virtually guaranteed to throw most musicians, particularly if he or she happens to be sight-reading. But the real problems come with the correct interpretation of rhythm. In virtually all conversions from sequencer to scorewriter that I have carried out, even after very careful editing in the sequencer, there has been quite a lot of tidying up to do. Without a certain amount of specialist knowledge, it's unlikely that you would recognise any of the possible failings.

In many respects this is hardly surprising. Music notation is exceptionally difficult to define, and whilst there are certain guidelines, hard and fast rules are few and far between. Indeed, there are occasions when several avenues lay open to the composer as

to how he might visually represent his own aural ideas. Composers throughout the centuries have struggled to come up with what they consider to be the best way to communicate their thoughts - with some returning again and again to certain works, mainly in an attempt to convey some sort of complex rhythm structure.

Scorewriting presents one of the most fascinating of challenges to any software company, and it's fitting that we should close this series of the World of MIDI on an optimistic note. The future lies in the hands of those ingenious designers who have, so far, come up with all sorts of ways around what would seem intractable problems. Of course, there will always be cynics who quote "computer music" as some ghastly racket that should be condemned to the depths or restricted to Radio 1. But there

are those of us who trust in the ability of designers to come with something that will silence these irritating "Rollos" who prefer to bury their heads rather than open their eyes.

Possibly, some day, Artificial Intelligence will be advanced enough to consider in detail the information presented and make some positive judgements: "All of the notes "B" and "E" played were flats, except on four occasions when they were "E" naturals; in addition, several of the notes "F Sharp/G Flat" were discovered scattered throughout the composition. Conclusion: the key is G minor, where the key signature should be two flats, and the possible raised 6th/7ths degrees would be described as "E" Natural and "F" Sharp"!!

Pie in the sky, or a real possibility? One thing for certain: as advances in music software attempt to make administrative tasks even easier for the working musician, ST World will be there checking out precisely what the technology of the future has to offer all and sundry. That's all folks! 

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# TWIST



*In an ideal world, our STs would all be multi-tasking, ultra-high-speed, super-colour, giga-memory, wonder machines. 'Switcher' programs, which originally saw vogue on the Macintosh, are one solution toward the multi-tasking desire, although they can't contribute to the other aspects.*  
**Ian Tindale looks at Twist, from HiSoft**



Computers should be multi-tasking. This is virtually a fact. Why shouldn't you be able to set as many tasks in motion as you desire - each with equal performance whether the computer is running one task or twenty? On the Macintosh, when Andy Hertzfeld created 'Switcher', everyone suddenly realised that this is the way such computers should have been created in the first place, and Switcher became instantly accepted in the Mac community.

The idea for a multiple-application switcher on the ST is not original. K-Switch and K-Switch 2, for example, do it very well. There is also a program called The Juggler, which attempts this sort of thing, not quite as successfully. Now here comes another contender: Twist, from HiSoft, under licence from Upgrade Editions, Paris. Twist is unusual and significantly different in operation, compared to K-Switch 2.

Twist will work on any ST, but you are in severe danger of wasting your time if you have less than 1MB, so HiSoft recommend no less than that, and also at least one floppy disk drive. It will work well with a Mega ST, and / or hard disk systems. Twist is primarily targeted at the Mega user but, having said that, if you have a couple of very small applications which you need to fre-

quently use together on a 520ST, it should still run fine - but they'd have to be pretty small applications indeed.



## Repetitive Situations

As an example, I recently wanted to create a PostScript program and send it to a PostScript typesetter from an ST. PostScript, being the expensive language to play with that it is, things will never go right first time. I used Uniterm - the PD comms program - to send the file, and Tempus - the excellent text editor - to edit and tweak it. It became tedious coming into and out of each of these programs and yet, with a switcher program like Twist, the task was now simple. I could edit and save the file in Tempus, and then Twist to Uniterm, from where I sent the ASCII file to the PostScript device, then Twist back again until I'd managed to get the program right. This was on a 1040ST, with not really enough room for anything else.

In addition to TWIST.PRG and TWIST.RSC, and a README.TXT file, there are three little extras on the disk. CHECKST.PRG - HiSoft's CHECKST Program version 1.2 - is a machine diagnostic program, distributed with most of their products, telling you these facts about your ST: DOS version number; ROM version number; ROM creation date; magic number; nationality; memory; blitter present; GDOS present; which monitor is in use. The retail ver-

sion of the manual will live in a slim folder in the same fashion as other HiSoft products in this price bracket.

FSEL is a folder which contains the HiSoft File Selector. I have, in the past, criticised that using this file selector can cause certain programs to act a little strangely. This is only a rarity and should not happen most of the time. Otherwise, it is a brilliant improvement over the standard GEM file selector, and far easier to use. Also included is a program called IMPORT2.PRG, which replaces IMPORT2.ACC in Publishing Partner, as Twist does not run successfully with accessories present.



## Proportional Representation

K-Switch 2 and Twist appear to approach the same concept from different angles. K-Switch 2 splits up whatever memory is available into between two and five equal partitions, according to the number selected and memory present. This is inefficient as far as memory usage is concerned, as some small programs will sit in a partition with lots of room to spare, and another, larger, application could feel cramped in that same space. It is a better idea to give each application only what it needs, proportionally. Twist takes a look at the program size, then suggests a figure by adding 100K to said program size, hoping that this will do the job. Often it is sufficient. The Twist program itself is only 22K long.

Depending upon the type of program, this approach may sometimes fail, needing successively greater memory allocation until the application loads to your satisfaction. For example, Uniterm will not run well at all, given the suggested RAM usage figure. If you increase this a little, it will run properly with a sensible buffer size. Degas Elite will appear not to load at all at first sight, although this is not the case. You need to increase the RAM allocation to about 400K for it to work.



## How to do the Twist

Twist is easy to use. If you are not a hard disk owner, you will not be aware of the tremendous ease of use a hard disk offers, because all the data, all the applications are there, you merely have to point and click enough times and you are out of one application and into another and back again, without changing disks. Twist is similar in some ways, as you load up each application only once, and the rest of your session consists of simply Twisting from one application to another, keeping them all running. This saves all the disk changing a floppy-based system owner normally has to go through.

To twist from one to the other, you hit LEFT-SHIFT, RIGHT-SHIFT and CONTROL simultaneously, or more or less, and you see a

more.....



spectacular change on the screen. The screen as you see it compresses in height, downwards, and at the same time, in a similar fashion, the new screen decompresses downwards from the top edge, replacing the old one in a second or so. The first time you see this, it really is impressive. If you keep twisting, you will see that the applications are arranged in a circle, so you will always come back to it, and you will pass the Twist desktop screen on the way.

If you press LEFT-SHIFT, RIGHT-SHIFT and ALT, you get straight back to the Twist desktop screen. From here, you will find

icons representing the applications in use, and double-clicking on these will show a window with the current view of the application. You can move this view around in the window, but you cannot perform anything useful here. If you double-click in that window, you will find yourself in that application directly. This is a more convenient way of getting from application to application, if you have many installed.

Twist looks very impressive except where it comes to the horrendous design of the trashcan. As HiSoft have adapted Twist for the UK market, why could they not have altered 'Trash' to 'Rubbish', and preferably redesigned it so that it no longer looked like it has been hit by a Re-

nault 5. The action of Twisting produces a truly impressive video-wipe type effect, and I liked that.

The Twist window on the Twist desktop contains echoes of itself, which you can play with, moving the echo around with the mouse. If you have ever shot a photograph with a mirror in front of you and a mirror behind you, or pointed a video camera at someone standing in front of the video monitor so catching the picture, you will appreciate the sort of 'visual echo' effect I mean. It's nice, but it performs no useful function. In the file menu there are two options - Delete Program and Delete Files - and I thought that this could create confusion. One simply ditches the application from running under Twist, the

other will wipe a file from the disk.



**What Twist is good at**

Twist is particularly good when it is running well-behaved applications. Ideally, a switcher program should be totally transparent, you should not need to know it is there. Somehow you find you can leave one application and join another, then another, and so on, coming back to where you were on the first.



**What Twist isn't good at**

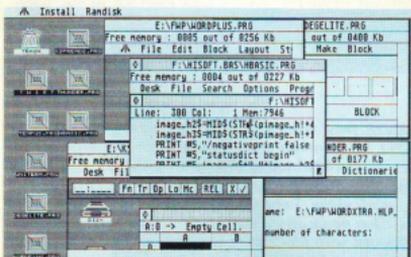
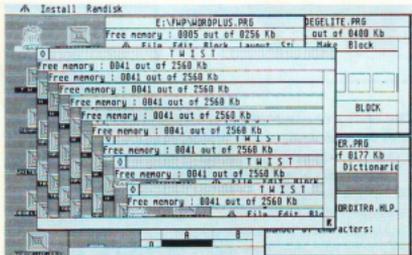
more.....



# TWIST

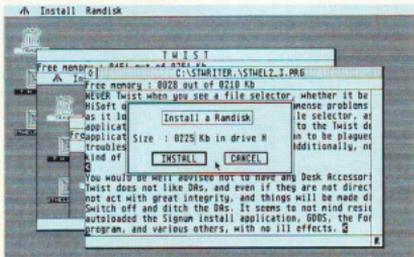


*Twist will run from floppy or hard disk-based systems, in low, medium and high resolution, and you can twist between low and medium resolution applications, even if they have differing colour palettes.*



You can run up to 14 programs if you have enough memory. When you start an application, in the dialog box which informs you how big the program is and how much memory you ought to allocate, there is a facility for Command line passing. In each application there may be 7 windows, which is a GEM limitation. Note - this is per application, not in total.

*Under a configuration, you can: create a ramdisk; copy files, either from disk to disk or disk to ramdisk; install applications. There is a built-in RAMDISK which can be used globally, and can still be used after leaving Twist, if you install a drive icon for it whilst in GEM. It's default letter is H, and it is not reset-resistant.*



Twist was tried on a Mega 4, with as many applications as could fit into memory. The information in Twist's window informed me that there was only 2601K to be had anyway, much of that could be explained by the disk caching which was still enabled, and possibly the laser printer's Diablo emulator. I had to disable all of the accessories normally in use, and then re-boot.

I managed to fit about seven major applications on at once, no doubt I could have fitted more, had the 1MB of caching been disabled. I found that things seemed just a hint slower in menu response time and certain mouse click actions. It could have been imagination, but Degas Elite seemed

to take just a marginally noticeable time to flip from the menu to the screen. On one occasion it gave me a spectacular disappearing-act type of crash, again in Degas Elite, with many other programs present. None of the others seemed particularly badly affected by this.



### The Conclusion

When using Twist, you lose all access to the desktop, which is a disadvantage. You cannot do all the DOS-level 'housekeeping' which it would be useful to be able to do in a switched application environment. Also, because of the need to experiment with actually needed memory sizes, you will have to take a while to try certain applications, and make sure they run safely when you can get them

running. Twist is just about useful on a 1040ST, and really comes into its own when you have a predictable setup for some task which you often need to perform and you can set up a configuration file for it. Obviously, on a Mega ST it's better and will be very useful indeed. If you have a hard disk too, then keep Twist close at hand and you will often use it.

Given the lack of real multi-tasking, this is the next best thing - perhaps the best solution so far. A similar approach is taken by the Z-88, where lots of tasks appear to run, but they are all actually asleep except the one you're on at the time. It's a pity that you can't keep your DAs in there. HiSoft suggest using programs which do the same job, which may prove a trifle taxing to find. Although it is the most expensive switcher on the market

for the ST, being £10 more than K-Switch 2, it is no doubt the best available.

**Product: Twist**

**Version: .. 1.1**

**Author:  
Upgrade  
Editions, Paris**

**Publisher:  
HiSoft**

**Price: £39.95**

**Phone: (0525)  
718171  
718271**

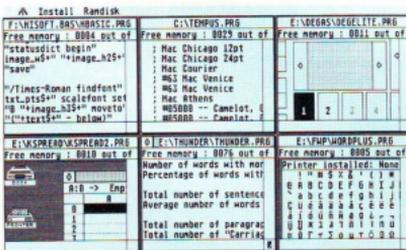
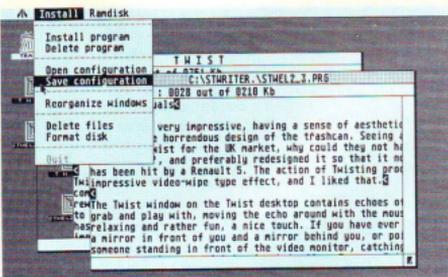
**Runs on: 1 MB  
RAM  
recommended.**



# TRWIST



*The ability to use configuration files should not be underestimated. Although the GEM desktop is lost while you are in Twist, everything which you could have done on the desktop can be performed automatically with a configuration file. However, it would be nice to have access to the GEM desktop, simply to be able to see what's on a disk, and execute functions like copying, or reading text files. From Twist, you can format a disk, and that's about it. I feel the Twist desktop should have been everything that the normal desktop has to offer, plus more - not less.*



*NEVER Twist when you see a file selector, whether it be GEM, HiSoft or any other. Tempus caused immense problems when I Twisted as soon as it loaded up, as it comes up with a file selector, as do many other applications, and I accidentally Twisted to the Twist desktop to load another application. This caused the whole session to be plagued with file-finding troubles and generally flakey behaviour. Additionally, never Twist during any kind of disk access.*

*You would be well advised not to have any desk accessories present either - Twist does not like DAs, and even if they are not directly invoked, Twist will not act with great integrity and things will be made difficult for you. Switch off and ditch the DAs. It seems not to mind*

*resident programs, I have auto-loaded the Signum install application, GDOS, the Forget-Me-Clock autolock program, and various others, with no ill effects.*

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# MIRAGE

# ST CONNECTIONS

**"In this new series of occasional articles by small-scale-network expert, Lee Cooke, you can discover how to get your ST to talk to various other machines."**

In this article, I will show you that getting documents, notes or programs from one machine to another (or even using a serial printer) is not as difficult as it is made out to be. Before explaining in depth the cables and wiring involved, the setup of the machines and communications software involved must be considered.

"Communications software? But I always thought that was only for use with modems", I hear you say. Not so, communications software, often shortened to 'comms' software, is also ideal for 'talking' or communicating between computers near to each other without a telephone line. Such communications setups are often referred to as 'direct' or 'machine to machine'.

A list of recommended comms software is given at the end of this article, as well as advice on configuration. Most software mentioned is available from the author at the address given, as most of it will be Public Domain. See BOX 1 for a list of required features if you are purchasing your own software. Do NOT worry if you don't understand all of them, just compare them against the features of the packages available and choose accordingly. *NOTE:* all the recommended packages have these features.

## Cabling

As with Hi-Fi equipment, screening is very important. Never use unscreened cable under any circumstances as data can be irretrievably garbled. Good soldering and good quality cable is also important. Even if you have only one job to do, (e.g. you upgraded to an ST and wanted to transfer all the files from your old machine) do not rush it, it's just not worth it. I should know, I tried rushing a job once, never again!

Individual practical examples now follow, with short recommendations as to the settings required on the example software.

## Recommended software and settings.

### BBC B Micro.

1. Kermit, available from Lancaster University. - Build a

## CONNECTIONS

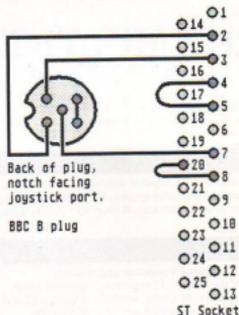
### 1. ST TO BBC B MICRO.

The link goes between the ST's modem port and the BBC's RS423 socket. The software used was STTERM2.TOS (on SHEERBYTE St Communications Disk 1, SB315 from StortSoft) and it was set to 1200 baud. Also usable for fairly solid and automatic file transfer was the new version of Kermit, available from SLUG (ST London User Group).

Note that hand-shaking is NOT used as the BBC's RS423 port does not appear to correctly accept and act upon RTS/CTS from the ST. The link is reliable enough using the RS232 settings shown (flow control set to XON/XOFF).

(Kermit settings: 1200 baud, parity NONE, file type BINARY.)

BBC software used was The Kermit package, available from Lancaster University for a nominal charge.



!BOOT to set up Function Key 0 as follows (where # is the BBC's special control key as detailed in the user guide):

\*KEYO SET BAUD 1200#MSET PARITY NONE#MSET FILE TYPE BINARY#M <ret>

Start *Kermit* at the BBC end by typing: \*Kermit, then press Function key 0. This will leave the BBC *Kermit* correctly configured for use, then follow the instructions in the *Kermit* manual.

### Atari 8 bit.

1. Amodem (Public Domain). - The version is already

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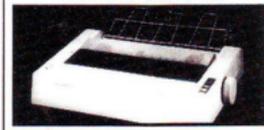
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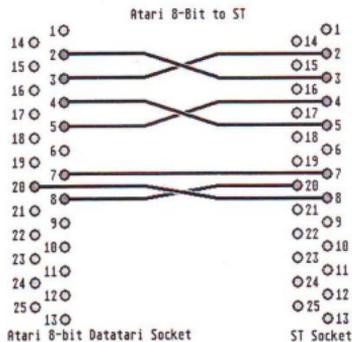
## 2. The 8 bit Atari (400,800 or XL,XE).

Connection is between the *ST*'s modem port and the appropriate end of the Datatari adapter cable. The cable arrangement above is known as a 'Null Modem' cable and is used in conjunction with the Datatari cable from Miracle Technology. Communications software used on the ATARI 8 bit end of the link was:

1. Amodem (Public Domain, needs TRANSLATOR on XL/XE)
2. Multi-Viewterm (Available from Miracle Technology)

Kermit can be used if an Atari 850 interface is available; contact me for wiring of the cable required if this route is chosen. Don't forget, *ST* Writer, the PD word-processor, has facilities for text transfer FROM an 850 TO your *ST*.

Once again, the link was run at 1200 baud, with NO parity. SELECT B twice on AMODEM, set Multi-viewterm for 1200 baud for the appropriate interface, teletype mode, parity 8.



# CONNECTIONS

## 3. The Apple II Computer (also applicable to Apple IIe in most respects).

Connection is made from the *ST*'s modem port to the Apple II's RS-232 25 way D connector. The above cabling arrangement is for the Apple Computer Inc. Serial Interface Card with SW1-3 on only, for 1200 baud, and is a 'straight through' arrangement. Take note, though, the connector used at the Apple end is a plug, not a socket as in the *ST* and PC cable versions.

As the Apple's Serial Cards are well supported by the machine's operating system, software is not needed (but makes things easier) to transfer ASCII files. The following method can only be used from *ST* to Apple II if the file being sent is either:

1. A valid Applesoft Basic Program, or;
2. A valid list of executable Apple II direct commands.

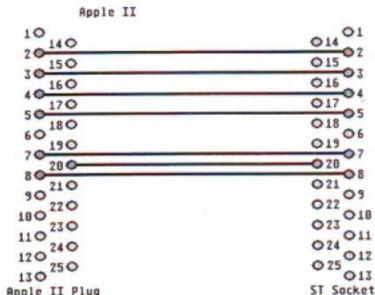
Set the *ST* up ready to SPOOL the file to its serial port. Type the command "IN#2" on the Apple and press RETURN (assuming the Serial card is in Slot 2 in the Apple). You will now find that the Apple now refuses to accept any commands from its keyboard. This is because the machine is now expecting all input from the serial port. You then start the *ST*'s software up to send an ASCII file from the *ST*, and the file will be transferred to the Apple.

For receiving a valid Applesoft Basic program on the *ST*, set up the comms software in use (as above) to 'capture' text or open a 'capture buffer'. Then type "PR#2" on the Apple and press RETURN as before. The screen output on the Apple will now be appearing on the *ST*. You can now load and list the program to be transferred from the Apple. This method can also be used to output word-processor files; just re-direct the output of the word-processor to the serial card and receive on the *ST* as above. (Software settings used were 1200 baud, 8 data bits, no parity, 1 stop bit.)

For transfer of other files (i.e. picture files and machine code files, etc.) a communications package is needed on the Apple. These appear to be more readily available under CP/M than under AppleDos, so some extra effort is therefore needed. The possible choices of action are as follows if a CP/M card is fitted to your Apple:

**A. Files written under AppleDos.** - Use APDOS.COM to translate the files to CP/M format and then use either a modified version of APMODEM7.COM or a commercial package called ZTERM available either from most Apple Dealers or direct from the United States (details on request).

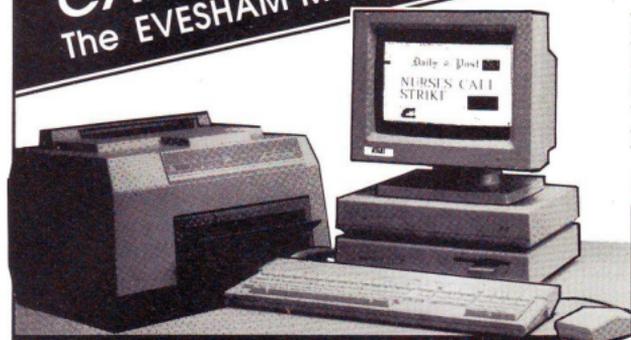
**B. Files written under CP/M** - These are operated upon as above except for the fact that the translation stage (APDOS.COM) is no longer needed. Versions of Kermit are available for the Apple under Appledos or CP/M and these can also be used for the above tasks.



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# CONNECTIONS

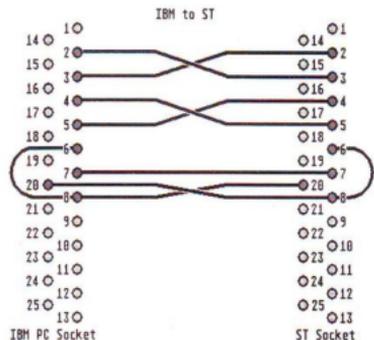
## 4. The Amstrad PC (1512 and 1640) and compatibles.

The connections are between the *ST*'s modem port and the Amstrad's serial port. Sending of ASCII text files to / from PCs requires only the use of two MSDOS commands, PRINT and COPY.

Type PRINT on its own. A message will come up on the screen asking for the list device, to which you reply COM1:. Once the software on the *ST* has been set up for 'ASCII Capture' as before, type PRINT <filename> on the PC and then press return. The PC will echo 'Printing <filename>' on its screen and the file will begin to appear on the *ST*.

To receive ASCII files, type 'COPY COM1: <filename>' on the PC, and set up the comms software on the *ST* to SPOOL the text file. Start both machines running (PC first), and when the transfer is completed the file will have been written to disk. (NOTE: both these transfers use the default baud rate on the PC, which is 9600, NOT 1200! Set your *ST* software accordingly.)

For transfer of binary files (i.e. picture or COM or EXE files) the best packages to use are the *ST* version of Kermit as mentioned above in the section on BBC communications, and use Kermit on the PC end. Packages for the PC are easily available in the Public Domain, such as Procomm v2.42, TELIX, PC-VT, QMODEM, etc. These packages should be configured along the same lines as the BBC setups.



configured to work with the Datatari cable and is also available for the *Atari 850* Interface module. When the program has initialised press <SELECT>. This will bring up the options menu. Typing B at this point causes the message '600 Baud' to appear in the bottom left of the screen. Press <RETURN> then press <SELECT> again when the terminal screen re-appears. Press B again will cause the message '1200 Baud' to appear on the screen under the options menu. Pressing <RETURN> will leave the program now ready for use. Note: a different version of Amodem to the one above may be supplied. If so, full configuration instructions will be included with the program.

2. Multi-Viewterm (Miracle Technology). - *Multi-Viewterm* is supplied with a good, easy-to-follow manual. The Serial IO device mentioned in the setup screen is the Option to select the Datatari cable, otherwise set for the *Atari 850*.

3. JTERM (Public Domain, available from me, naturally). - *JTERM* is menu driven, and fairly straightforward to set up. It's unlikely that you'll encounter problems with this one.

## Apple II

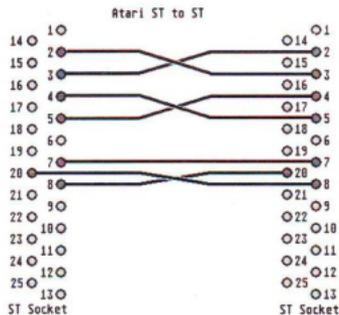
**WARNING:** a great deal of *Apple* communications software is hardware dependent on the type of serial card fitted in the machine, so CHECK FIRST! The normal way of choosing comms software for the *Apple* is to buy a complete package, i.e. Serial Card and software, as one item. This

# CONNECTIONS

## 5. The Atari ST itself!

The cable is connected from the modem port on *ST* No.1 to the modem port on *ST* No.2. "But why? I can just swap disks," you say. O.K. For one thing, if one is a 520ST and the other a 1040ST, it's a neat way of splitting a full double-sided disk across a couple of single-sided disks. If two *ST*'s are available it is quicker to 'port' the files across rather than building a ramdisk and re-building the disks in the other format, and it is also easier to share peripherals and allow two people to work on a file at the same time using Networking software (of that, more another day...).

An unusual use for this setup would be to simulate a serial peripheral with one *ST*, to capture the output of, for example, a DTP package with PostScript output running on the second *ST*. Or, perhaps, a CAD application thinking it's driving a plotter. That way you can possibly debug any problems in real-time, and understand the flow of signals visually. The software used can be SSTERM2 or Kermit as before, with both machines set as 1200 baud, 8 bit, parity none, 1 stop bit.



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ensures compatibility. Contact your nearest Apple dealer or use a correctly configured Public Domain CP/M program, bearing in mind the points made.

### IBM PC (or clones).

Where does one begin? There are a great many comms packages available for the IBM so I can only give a small sample here based on my experiences on various machines (IBM PC XT, AMSTRAD PC1512 and AMSTRAD PC1640, COMPAQ 2 and AMSTRAD PPC640).

1. **Procomm v2.42 (Shareware)** - Be careful! There are some versions of *Procomm* going around that are NOT Public Domain as they have been heavily enhanced by companies. *PROCOMM* has a very good manual on the disk with it and should be configured to 9600 baud with 8 bits, no parity and 1 stop bit.

2. **Telix (Shareware)** - *TELIX* is better than most comms packages for the IBM PC in that it is fully menu driven and has a certain amount of online help. The configurations are the same as for *PROCOMM*.

3. **MS-Kermit (Public Domain)** - *MS-Kermit* is available from Lancaster University 'ready-to-run' complete with manuals on the disk. **NOT RECOMMENDED FOR BEGINNERS!** It is however, very advanced and can cope with most problems. Configurations as for *Procomm*.

### Atari ST

1. **STTerm2.TOS (Public Domain)** - Available from StartSoft as mentioned above. DO NOT confuse this program with *STTERM* or *STTERMINL* as some of the features on *STTERM2* are NOT available. On running the program press the HELP key then type H for extended help. Set for 1200 baud.

2. **Kermit (ST London User Group or Lancaster University)** - Fairly good manual on disk, use similar set ups to the *BBC Kermit* or their equivalents on *GEM-Kermit* with baud rate, etc. being set by the RS232 configuration accessory, to the settings in Figure 6.

**RS232 PORT CONFIGURATION**

Baud Rate:

Parity:

Duplex:

Bits/Char:

Strip Bit:

**Flow Control**

Xon/Xoff:

Rts/Cts:

FIGURE 6

## Requirements for communications software

1. 300, 1200, 9600 baud settings AT LEAST or setup via the control panel's RS232 dialog (see Figure 6).
2. ASCII capture / spool facilities and some rudimentary file transfer (Xmodem / Kermit), ASCII-only is adequate in most cases.
3. XON / XOFF flow control as well as RTS / CTS, usually through the control panels' RS232 accessory.
4. Local echo options handy, but optional, otherwise you can't see what you're typing.

## Generic RS-232 connections

Here are the generic connections between an ST and a typical DTE device, with the pinout names in this respect.

Plug	Socket
1 1	1 1
RxD 2 14	2 2 Tx D
TxD 3 15	3 3 Rx D
RTS 4 16	4 4 RTS
CTS 5 17	5 5 CTS
DSR 6 18	6 Not used on ST
Ground 7 19	7 Signal Ground
DCD 8 20 DTR	8 DCD
9 21	9 9
10 22	10 10
11 23	11 11
12 24	12 12
13 25	13 13

(e.g., Modem end of a cable) (e.g., ST end of a cable)

Once again this is only scratching the surface. Other commercial packages have been reviewed already in ST World and there are many other Public Domain or Shareware packages available.

I hope the above article has been helpful to some of you. If you are still stuck, contact me by mail at my address, given below, or write in to the new I/O feature in these pages. I hope to be able to answer all your queries in a reasonable time and, needless to say, SAE's (and disks, single-sided, if applicable) must be sent if replies are expected. If you have a specific problem which you feel could be covered here in a future article, feel free, but you MUST give me full details of your setup.

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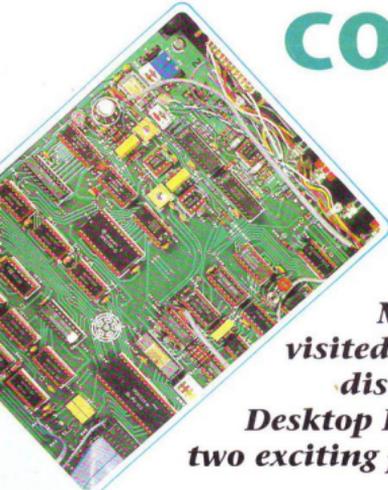
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# THE COMPOSERS DESKTOP PROJECT

*Martin Walsh recently visited The University of York to discuss the Composers' Desktop Project and Midi Grid... two exciting products for the Atari ST range.*



**T**he University of York has a considerable involvement with industry, and from its research teams several exciting products for the Atari ST have emerged. The York Electronics Centre, based within the University grounds, has a full-time staff who design and build equipment to specification. Prototype development and feasibility studies are also undertaken, and since the Centre is also part of the Department of Electronics in the University of York, it can seek specialist help from other University Staff when required. Companies who have used the Centre's services include British Button Industries; Micro Metalsmiths Ltd; McCain Foods Ltd; Rowntree Mackintosh PLC; and T. Vision Security Ltd. The Centre's output ranges from a microcomputer for measuring rates of cooling to a shirt button inspection machine; from a potato store temperature monitor to hardware for producing high-quality, computer-generated stereo sound, the SoundStream.

### *The composers' desktop project...*

The Composers' Desktop Project (CDP) enables the composer to have complete freedom to generate or record any sounds, from a single note to a full orchestral performance, to store these in permanent computer memory and to edit or replay them at will through any hi-fi reproduction system. More specifically, it makes it possible for the composer to make use of, in 16-bit digital format, a full range of electro-acoustic sound techniques. The emphasis is on composition, with the facility for professional digital sound quality at CD-ROM standards. The system can bring in real sounds from the outside world via a variety of means. These include a microphone, analogue recording, synthesiser output, or from sound stored digitally on video tape. The CDP can also generate sound internally by using one of the computer music synthesis programs which have been ported to the CDP system. MIDI equipment can be operated, and the system provides for pre-compositional work, sound analysis and re-synthesis, musicological research, teaching and self-learning aids, and documenting creative musical processes.

Further, the CDP enables the composer to have access to major computer music programs such as CMUSIC and CSOUND, as well as custom-designed editing, mixing and signal processing facilities. There is an increasing number of high-level composition tools available, all of which can be used by the composer at home...

without the need for access to large mini or mainframe computer systems as in the past.

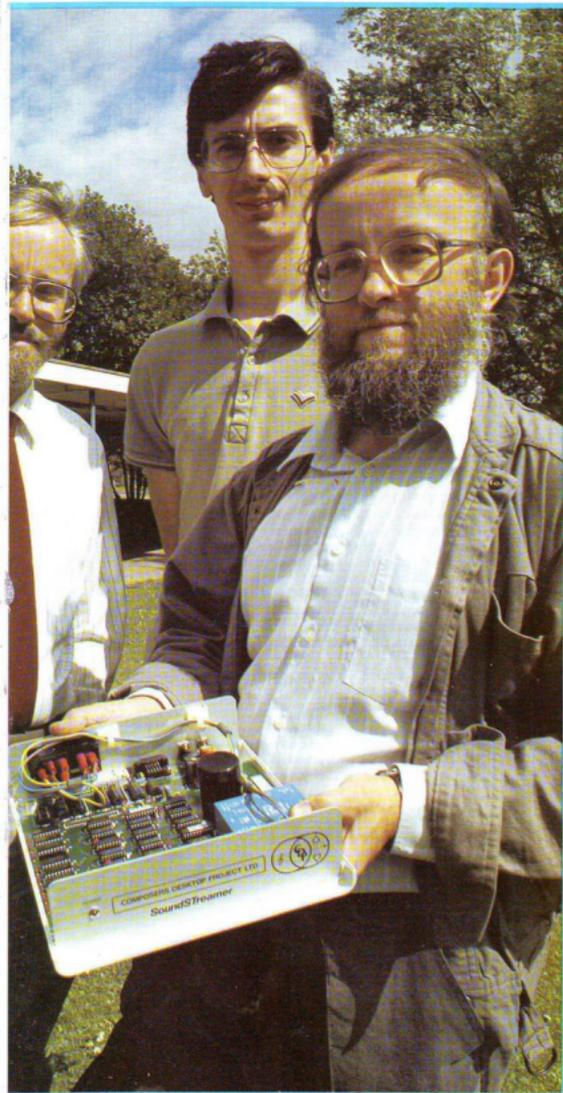
### *The hardware CDP requires...*

The four major components making up the Composers' Desktop Project are: an Atari ST system of at least 1 megabyte RAM capacity; a hard disk drive; the SoundStream interface; and the Sony Pulse Code Modulated (PCM) digital converter. Since the CDP currently only utilises the Atari ST's monochrome high-resolution screen output, such a monitor is essential.

The SoundStream interface unit is the only component designed and manufactured by the CDP itself; it is the key hardware element of the desktop system. The Sony PCM digital converter, together with the SoundStream, are what make it possible for the system to handle digital sound files, record from analogue source material etc. Since the Sony PCM also has a Video IN and Video OUT facility, a conventional video recorder can be used as part of the system. One application might be to store sound files or sections of musical pieces as they are created; another might be to use a tape for the storage of a digital master of a whole piece. Indeed, since even hard disk drives can soon be full to capacity when storing soundfiles of the quality enabled by SoundStream, a piece whose length exceeds the capacity of the drive can be stored to tape.

### *Development history...*

The hardware interface for the Atari ST - the SoundStream, and the operating software, were designed in the Music Department of York University. The actual production of the interfaces has been achieved by collaboration between the York Electronics Centre, CDP



Ltd of York, Audio & Design (Recording) Ltd of Pangbourne, and Precision Etching Ltd of Malton.

I was fortunate to be able to discuss the Composers' Desktop Project with Graham Long, the Manager of the York Electronics Centre; David Malham, an Electronic Design Engineer and Experimental Officer and Chief Technician of the York University Electronic Music Studio; and Richard Orton, the Senior Lecturer and Director of Music Technology at the University of York.

The history of the development of the Composers' Desktop Project is one of vision and determination. The CDP remains a package available in a cost-effective form for educational establishments and individual composers, with an enviable network of

support and information exchange.

It was back in June 1985 when four Yorkshire-based composers first considered the concept which has subsequently taken form as the Composers' Desktop Project. The four are:

Richard Orton, an eminent composer and one of the country's pioneering figures of electronic and computer music. Richard established the York Studio as far back as 1968, now one of the most developed in the United Kingdom. He was a founder-member of the Association of Professional Composers (APC), and is a Director of CDP.

Andrew Bentley, a Co-Director of the CDP, is a composer of Electro-Acoustic music. He was the winner of the Luigi Russolo Prize and Bourges Festival Prizewinner, both in 1979. He is a teacher and electronic music system designer, having designed and built several electronic studios for Finnish Radio and Helsinki University.

Trevor Wishart, a Director of the CDP and an internationally established composer. He too was a prizewinner at the Bourges Festival, in 1978, and received an honourable mention in the New England Computer Music Competition in 1983. He recently was commissioned as the sound designer for the internationally acclaimed Jorvik Viking Centre Museum in York.

Thomas Endrich is a composer of a wide range of instrumental, electro-acoustic and music-theatre works. He has devoted a lifetime of research into musical structure and syntax, and he retains a special interest in software design of high-level, interactive composing environments. He was a founder member of APC, and remains a Co-Director of the CDP.



THOMAS ENDRICH

Until the present time, anyone in Britain with a serious interest in the application of computer technology in composing has had to travel to the Boulez IRCAM centre in Paris, or to various research institutes in the USA, such as the Computer Audio Research Laboratory at San Diego in California, to access the latest developments. The alternative was to remain satisfied with the limited horizons of commercial products. The gradual standardisation of approach in music computing (focusing on the "C" and "LISP" programming languages and adopting the "MIDI" protocol) made possible the adoption of the powerful tools developed at major international centres to run on powerful low-cost personal microcomputers. This is exactly what the Composers' Desktop Project is doing.

The four were quick to see the potential of the Atari ST as early as its launch! With a significant amount of internal memory, a built-in MIDI interface and an affordable price - it

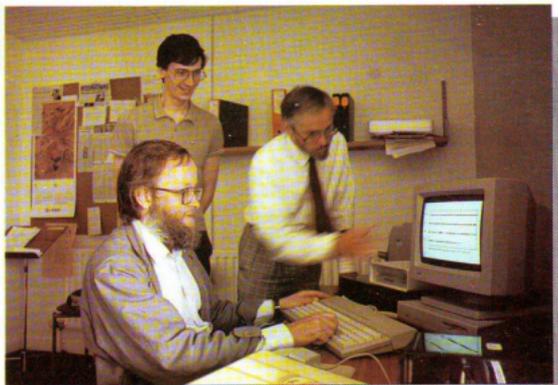
looked attractive even then in June 1985! Close links with the Music Department of the University of York were important from the start. The project began by acquiring the CARL software, originally written for the VAX environment, on magnetic tape from the University of San Diego - with a view to porting this to the Atari ST microcomputer environment. By the summer of 1986 this was successful, but during these early stages of development one could not hear sounds from the Atari ST! David Malham was invited to consider the possibilities of using the Atari ST to output the



DAVID MALHAM

sounds, and within three months, David had a working breadboard model. It was at this stage that the York Electronics Centre was approached.

In order to enter into agreements with other parties to manufacture hardware for the CDP system, and to be able to effectively administer the network of communications between individual and institutional software users and developers, the CDP formed itself into a non-profit-making company (CDP Limited). The York Electronics Centre was commissioned to take the SoundStream prototype circuit to the production engineering level of development ready for manufacture. This work was achieved in only two weeks by Tom Whitehouse, a graduate of York University and subsequently an employee of the York Electronics Centre.



## Technical problems in using the Atari ST...

There were several technical problems which soon became apparent in selecting the Atari ST as the basis for a quality digital sound filing system.

An affordable means of storing the digital data was an initial obstacle. Whilst a small hard disk could be used by low-budget users to manipulate the soundfiles, it would remain inadequate to store even short pieces of music. The SONY PCM (Pulse Code Modulated) system was chosen for its combination of mass-storage of digital sound, and its affordability. It also provides the means of recording digital sound for use in the Atari system, and to play back the results of composition or research. As one might imagine, an interface was needed to interface the PCM to the Atari, and this is the product today marketed as the SoundStream.

Designed by David Malham, the SoundStream unit is a large first-in, first-out memory system with a parallel, 16-bit interface at one end and a serial interface at the other. The memory currently consists of 128k x 16-bit dynamic array made up from 64k x 4-bit chips. Because of the need for a continuous high data throughput, no refreshing of the array is necessary. However, the controller has considerable work to do in arbitrating conflicts between read and write requests. The same memory is used for both input and output transfers since time constraints prevent the computer handling bi-directional transfers at the required rate.

## ROM Cartridge Port versus DMA Port..

The selection of the Sony PCM dictated a sampling rate of 44.1 KHz when in the stereo mode, and a sub-sampling rate of 22.05KHz in the mono mode. At this sampling rate an overall data transfer rate of 176 kilobytes per second is required. Convinced as the team was of the merits of the Atari ST range, this posed a formidable problem. Modifications to the Atari ST itself were ruled out, which limited the choice of available ports to two. The Read Only Memory (ROM) cartridge port and the Direct Memory Access (DMA) port.

The DMA port was finally ruled out since it almost, but not quite, conforms to the industry standard SCSI communications protocol. (Small Computer Systems Interface.) Instead, the Atari ST uses AHDI, and subsequent examination of the various timing and transfer rates suggested that any performance gain from utilising the DMA was outweighed by the difficulties involved in implementing a connection to the AHDI bus.

The choice was therefore the ROM cartridge port. This has a direct connection to the Atari ST's Motorola 68000 processor. The 16-bit data bus and the sixteen low order address lines are brought out to the port, as

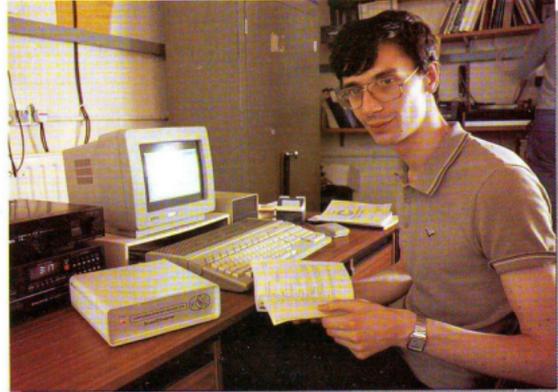
well as two strobes which select either the upper or lower 64k of the 128k of addressing space which it occupies. However, since this port, by definition, is read only, then input and output through this port was initially claimed to be impractical. Missing from the port is a read/write line which means that any attempt to write data to the cartridge area, through conventional means, results in a bus error being generated. This problem was overcome by Martin Atkins of the University of York's Computer Science Department.

Martin has since joined the Computer Desktop project team as a software consultant. He applied the technique of data offset addressing which involves adding the data word to a base address and then using a dummy read of the address generating so that the data is contained in the lower sixteen address bits. With suitable efficient software this technique has remarkably little overhead when compared to a normal write data operation.

## An alternative soundfile system...

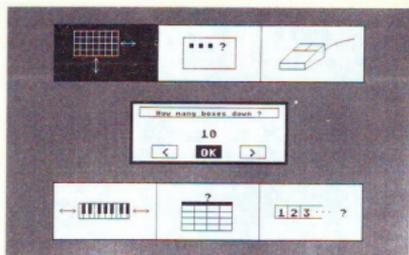
A further group of problems the CDP had to overcome included the inability of the GEM operating system to output data for consistently fast periods, and its use of scatter storage on the hard disk drive itself. Martin Atkins had to develop an alternative means of low-level access to the hard disk drive for the storage and retrieval of soundfiles.

A hard disk drive is needed as the work area for sound synthesis and processing, for work with the sound itself, as opposed to work only with MIDI codes. As every second of sound requires a minimum of 22050 samples x 2 bytes per sample per channel, a

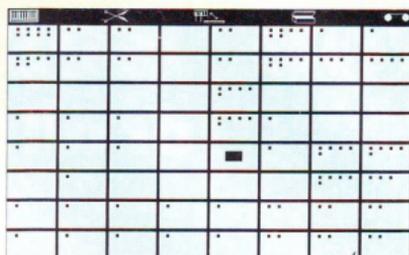


MARTIN ATKINS WITH THE STREAMER

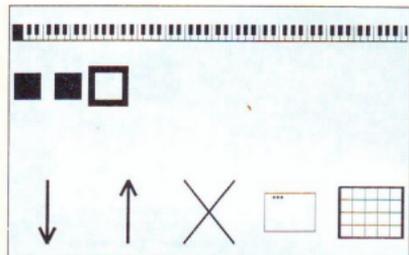




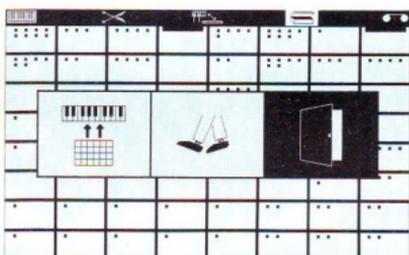
Midi Grid - Grid Size Initialisation



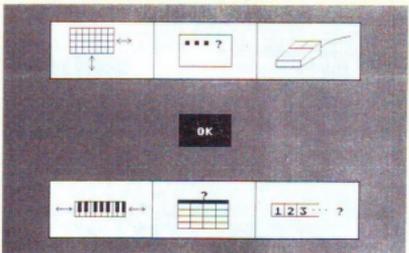
Midi Grid - Music Performance Grid



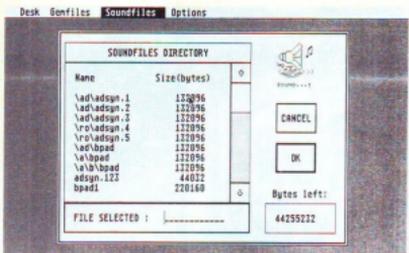
Midi Grid - Box Editing Feature



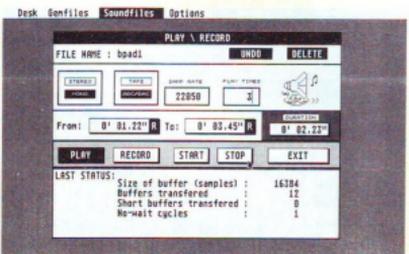
Midi Grid - Sample Options Menu



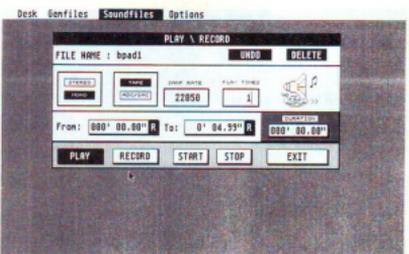
Midi Grid - User Configuration Menu



Soundstreamer - Soundfiles Directory



Soundstreamer - File Status Report



Soundstreamer - Play and Record Mode



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drive, via the proprietary soundfile handler, enables output to the SoundStream from the hard disk drive and input from the SoundStream to the hard disk drive.

This new means of handling the sampled data does not use a scatter storage technique. Whilst it is well documented that properly designed scatter storage has a number of advantages for digital audio, these can only really be achieved by the use of large capacity, fast hard disk drives used in large systems. Since the CDP addresses as part of its market many educational users, who usually can only afford lower performance drive units, the new soundfile handling system utilises a file structure where sectors are written consecutively on the disk in order to reduce the amount of time involved in seeking for the required sectors. This provides a sufficiently high average transfer rate for the SoundStream by reducing the need for reference to the hard disk drive directory.

The soundfile system is accessed through its own library of functions. To the end user, it appears similar to the resident gemfile system. Indeed, the soundfile system only operates when one seeks to save or read soundfiles; in all other instances the user is safely encapsulated within the standard GEM system. The system enables the user to have a designated amount of the hard disk drive capacity formatted in the usual way for regular access via GEM, and for the remaining capacity for use by the special soundfile system.

The software available for the CDP is user-friendly yet very powerful. Much of the graphics environment for the Atari ST, within the CDP, is the responsibility of Rajmil Fischmann, their Graphics Environment Developer. Rajmil reflects a growing trend amongst musicians exposed to advanced music technology. He holds a B.Sc. in Electronic Engineering from the Israeli Institute of Technology, and has studied music at the Conservatorio Nacional de Musica in Lima, Peru - and the Rubin Academy. His work for the CDP is alongside his current studies for a higher degree in Musical Composition at the University of York.

The CDP project is certainly one of extreme power and versatility, with increasing investment in its standards by many leading higher educational establishments and composers. However, for the less able student, or indeed performer, there is an exciting project from York University nearing fruition! A music performance program!

## Midi grid

This is a midi-based music performance program aimed primarily at people with either physical or mental disabilities. However, the development process has uncovered a tremendous potential for all persons interested in simply and effectively performing live music!

There are many music composition programs available for the Atari ST which to some degree take advantage of its versatility and user-friendly environment. Some use the Atari ST's built-in sound chip, others require midi equipment. None enable live performance of music. Midi Grid is the responsibility of Andy Hunt, a graduate of the University of York and retained by the Electronics Department specifically to complete the Midi Grid project.

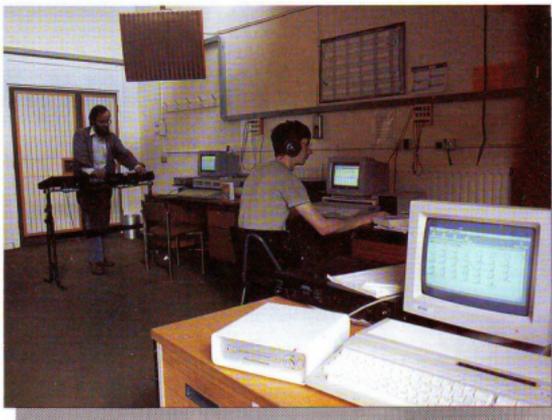
It has been under development for about 18 months, and throughout this period reference has been made to the many groups, associations and conferences representing both young and old alike - characterised by special needs. The project is near completion and Midi Grid is due for release in September - with a possible launch at the forthcoming PCW Show. Midi Grid has been used publicly, with a live performance by Richard Orton and Tom Endridge at the recent York Festival.

The concept behind Midi Grid is simple yet very effective. The user can configure the screen to display a desired number of boxes making up a grid. Each box within the grid can store a musical note, or several; representing a single instrument or many. The musical output from Midi Grid depends solely on the peripheral midi devices attached to it. The demonstration I participated in was using a Roland MT32 - a Multi Timbre Sound Module. This, in turn, was connected to an amplifier and speakers, so offering a low-cost entry into quality music performance.

The user stores the desired midi data in a chosen box and performance is achieved by simply passing over the desired box with the mouse. Since the mouse is such a versatile device, facilities exist within the program to control the relationship between the amount of actual movement required of the mouse and that achieved on the screen. Some users, for example, may be capable of minimal mouse movement yet require a correspondingly large screen movement. Indeed, the program even enables the user to use the mouse upside down, ideal perhaps where finger movement is seriously restricted.

The program does contain editing and recording facilities, along with a step time recording feature. The editing of the boxes is simple and straightforward, as is the process of mapping the contents of the boxes making up the grid to a midi device. Where necessary, all menu selections and additional features are accessed via very large, clear icons. For example, an open door representing the route to extra facilities! A comprehensive help facility is also planned for the release version. Since many users may have differing intellectual capacities, the screen display can be easily re-configured to restrict or enhance the complexity and versatility of the available features.

Midi Grid is sure to be a very popular program for many, many budding performers. Its greatest value is its ability to enable people who otherwise would have been incapable of performing live music to do so... for whom words offer an inadequate medium of expression. Midi Grid will receive a full review in a future issue of ST



World since the program can only take the Atari ST to greater heights of achievement. 

**The Composers' Desktop Project can be contacted at:**

CDP Ltd, 11 Kilburn Road, York, YO1 4DF  
Tel: 0904 623696

**Audio & Design can be contacted at:**

Audio & Design (Recording) Ltd  
Unit 3, Horseshoe Park, Pangbourne, Reading,  
RG8 7JW, Tel: 07357 861088

**The York Electronics Centre can be contacted at:**

The York Electronics Centre  
The University of York  
Heslington  
York  
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*by Eddy Yeung*

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# FONT PACKAGES

## Supertest

*"As more programs use GEM fonts, possession of a decent font editor becomes increasingly desirable.*

*Richard Seel looks at four possible contenders."*



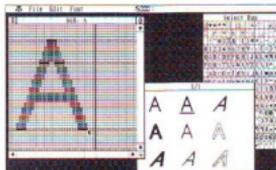
A font editor is a program which allows you to... edit fonts! More specifically, it will enable you to alter the parameters of an existing font, or create a new one. In practice, two of the most important features to look for in a font editor are the ability to change the shape of the characters (to create a new type face) and to change the size of the characters (to create a range of fonts, or to make fonts for different devices).

There is also a less glamorous, but more common, use for a font editor. When you create a type face, you give it an identification number which GEM uses to distinguish it from other faces. Since there is no controlled way of allocating id numbers, especially in the public domain, you may end up with two faces with the same number. A font editor is ideal for coping with this problem, since it will let you change the identification number.

I have been looking at four different font editors, although I will deal in detail with only two of them: Fontz! and Fontkit Plus. The other two are not really viable options (for UK users, at least) but I will refer to them from time to time.

### JackFont

JackFont comes from Vogler Software in Austria and was the first commercially available font editor for the ST. As such it had the field to itself. I must admit that I never liked it very much (it has the worst manual I have ever come across, for instance), and now it is looking very long in the tooth compared to some of



The basic screen layout of JackFont

the newer offerings.

JackFont is very slow in operation, mainly because its GEM windows are only updated when they are 'topped'. Jon Norlege of Mirrosoft tells me that a new version exists in Germany which has overcome many of the faults of the original. However, Software Express, who import JackFont into the UK, have no knowledge of this and I cannot recommend the existing UK version - especially at a price of £49.95!

### Font Expert

Font Expert is a German program which is not commercially available in the UK



The basic screen layout of Font Expert

at present. It has some attractive features, but I don't think that it is as powerful as the other two programs



The first level of Font Experts rounding function

featured in this review.

Font Expert is also able to edit Degas and Signum fonts, although the evaluation copy I have crashes when I try to load a Signum font. It also has the ability to load a Degas picture, and then cut and paste a block into a letter - possibly useful if you want to create a screen font.

### Fontz!

Fontz! is an American program, from Neocept, the firm which has also just released the WordUp word processor. It has the ability to convert fonts from a wide range of sources including Macintosh, Amiga and Degas. It also includes sample fonts from these sources, as well



The basic screen layout of Fontz!

as several sizes of an Old Face font called Camelot, for high resolution screen and FX80.

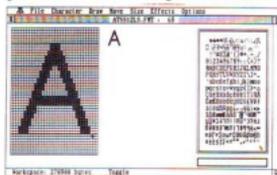
Mike Fulton, the author of Fontz!, started it as a font conversion program, and later added the editing facilities. Fontz! has a wide range of drawing tools and probably includes more features than any of the other programs. Unfortunately, some of these are not very well implemented, and there is a slightly unprofessional feel to it at times. For instance, when you pull down a menu over the editing grid, your button press will 'drop through' and give you a spurious set pixel on your character.

Fontz! also uses an extended font header, with two extra entries which give details of the pixel size for which the font is designed. This is useful for scaling, and should not cause any difficulty with well-behaved programs. However, it does represent a step away from standardization, and Atari UK have said that they would prefer programs to stick to the official GEM font

## Fontkit Plus

Fontkit Plus is a development of a public domain screen and printer font editor written by Jeremy Hughes. Jeremy is a research fellow in Biblical Hebrew at Oxford University, and the program grew from his need to be able to print Hebrew and Greek characters on his Juki dot matrix printer.

It has made tremendous strides since its early days and now includes the ability to edit GDOS fonts as well as system screen and downloadable printer fonts for a range of dot matrix



The basic screen layout of Fontkit Plus

printers. It can also be used to edit free images for inclusion in a resource construction set. (The screen character set seen in the screen dumps is my modification of one of the screen fonts supplied with Fontkit.) Fontkit allows me to configure an accessory so that this font will be loaded as the default at boot up.

This accessory also includes a feature which allows you to access the ST's extended character set. If you are using the Hebrew characters, there is even an option to allow you to type from right to left! It is also possible to reconfigure the keyboard with this accessory (like the Macintosh keycaps utility).

I must confess to a bias at this point. Jeremy Hughes and I have been corresponding about Fontkit for some time, and some of my suggestions have been incorporated into the program. So, it should not surprise you to know that I like it a lot. On the other hand, the vast majority of it is Jeremy's own work, and I think I can remain detached enough to give a reasonably objective assessment.

### Bit-mapped fonts

All the font editors considered here are designed for use with GEM bit-mapped fonts - that is, each individual size and style of character is stored as a pattern of dots, rather than using outlines from which the different characters can be generated. This means that they are suitable for use with a range of ST programs, including Degas Elite and PaintPro (screen fonts only for these

two), Easy Draw, Calligrapher, Super-base Professional, Timeworks DTP, and Fleet Street Publisher. They are not suitable for use with Signum (except Font Expert), or Publishing Partner which uses its own style of outline fonts (similar to Postscript, but not as sophisticated).

### General features

Although the programs offer lots of helpful facilities, the basic operation you perform in a font editor is drawing or erasing (setting or unsetting pixels) on the screen. You should be able to see the results of your work instantly (true of all except JackFont), and when you are happy with the result the program will alter the font information to accommodate your new character.

The editors reviewed have different ways of switching pixels on and off. JackFont uses a 'toggle' approach, which reverses the value of any pixel under the mouse pointer. This is quite good, but it does take a little while to get used to. Font! lets you draw with the left button and erase with the right, or choose draw-only or erase-only. Font Expert uses the 'Fat Bits' style of editing (my personal favourite); to draw, start on a blank pixel; to erase, start on a set pixel. Fontkit gives you the widest choice - it supports toggle, Fat Bits, and draw-only, and erase-only.

Another general consideration is the screen appearance. Like drawing style, this is partly a matter of taste. I prefer the approach of JackFont and Fontkit which allow you to see each individual pixel and the grid. You may prefer the more 'solid' look of Font!. Font Expert will either allow you to see the individual pixels, or it will display the grid with the character solid like Font!.

Selection of characters is also important. JackFont is infuriatingly slow in this respect. Font! has the best mouse selection, while Font! and Font Expert both allow you to select a character by simply typing it from the keyboard.

### Scaling fonts

One of the prime uses for a font editor is to produce versions of a font for different output devices. For instance, suppose you have a ten point Century medium which is suitable for output on your monochrome monitor. Unless you also have a ten point Century medium which can be output on your printer, this is going to be of limited use to you.

The problem is that the resolution of the mono screen is about 80 to 90

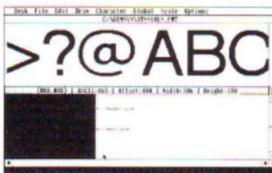
dots per inch, whereas the resolution of, say, the Atari laser is 300 dots to the inch. In fact many programs, including Fleet Street Publisher, Timeworks DTP, and Easy Draw, assume that it is 72 dots per inch because this means that each pixel is a 'point', the typographer's unit of measurement. This means that a font will need to be 12 pixels high to print at 12 points on the screen, but will need to be 50 pixels high to print at 12 points on a laser printer ( $12/72 \times 300 = 50$ ).

A good font editor will allow you to scale a font from one resolution to another. It will also allow you to generate fonts of different sizes for the same output device. But you need more than that because simple rescaling will leave you with letters with very jagged edges (often called 'aliasing'). A good font editor will provide some way of dealing with these, and the packages under review offer a variety of solutions.

Of the editors under review, JackFont cannot cope with large fonts, such as laser fonts, and Font Expert has very limited scaling options. Font! al-



A 36 pt laser font (scaled up from 18 pt) in Font!



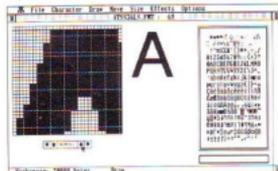
A 36 pt laser font (Scaled up from 18 pt) in Font!. The character grid is set to its smallest size.

lows the most flexible scaling (by resolution, by font size, and by percentage). It can also scale up to a 72 point laser font, but unfortunately is unable to edit it because the screen display will not allow you to get at the whole of a character! Fontkit permits the same range of scaling options (although the percentage option is presented in a slightly less user-friendly way), but will only go up to about a 39 point laser font.

Font Expert actually has a 'rounding' feature which is designed to help smooth away the jaggedness of scaled fonts. It isn't very effective, but is an idea which might be useful if implemented rather better. Font! and

Fontkit both have a line draw facility which can be useful to help smooth diagonal lines. Unfortunately, the Fontz! implementation doesn't start and end on the pixel you ask it to, so it's not as helpful as it should be.

When you are working with a very large font, the screen display is a problem. Fontkit adopts the strategy of



Fontkit's zoom window. Scrolling is very smooth

making the grid elements very small as the fonts get larger, and giving you a zoom option for fine detail. Fontz! does not scale the grid (the user has the option to change the grid size if desired), but instead uses the GEM scroll bars to allow you to move through the grid when it is too big to fit on the screen. I prefer the Fontkit approach.

### Creating fonts

The other major use of a font editor is to create a new type face, either by modifying an existing one, or by starting from scratch. In fact, this is what most people tend to think of as the prime function for a font editor, but it is actually a very skilled and specialized activity which is much harder than rescaling.

If you are starting from scratch, Fontz! may be your best bet at the moment, because it has a wide range of drawing tools: rectangular frame, line, filled box, 2-point circle (centre and radius), 3-point circle (click on 3 points on circumference), 3-point arc 2-point disk, 3-point disk and pie slice.

It's an impressive list, but not as useful as you might think. The 'undo' facility doesn't work smoothly with the first three options and the final three options are very slow and the end result is far from satisfactory. I also dislike the fact that an instructional dialogue box appears each time you select a drawing tool. This is timed and you have to wait for it to disappear until you can carry on with your work. Font Expert has fewer drawing tools (line draw, curve, and fill) while Fontkit only supports line draw.

Cut and paste is a useful facility, supported by all the editors. Fontz! and Font Expert also support block cut and paste, which is very useful for modifying a character. All but JackFont offer the option of copying or merging the cut block or character onto the current

character. Fontkit can hold up to ten characters in its paste buffer; the others can only cope with one.

Undo is another essential facility, supported by all but JackFont. Both Font Expert and Fontz! revert to the original character if undo is pressed but Fontkit is more sophisticated. It supports a ten-stage undo buffer which allows you to go back through your last ten editing operations on the current character. Furthermore, you can scroll through this buffer, using the undo and backspace keys. This is very useful because you often go some way down a particular design route before deciding that you are not really sure whether it works.

Fontkit has another facility which I find invaluable: it will allow you to insert or delete rows or columns into your character. I have used this to alter the heights of the numbers in the Swiss laser font supplied with Timeworks DTP, as well as to alter the widths of other characters.

Finally, Fontkit allows you to specify special effects. This is useful both for looking at the effect of the standard GEM functions (bold, italic,



Fontkit's 3D and Mirror effects

outline, light, underlined) and also for providing effects that GEM cannot create, such as shadowed and 3D. Using Fontkit I made a 3D version of the Timeworks Swiss fonts which is really quite effective.

### Documentation

I have already mentioned that JackFont has the worst manual I've ever seen, full of errors and misinformation. Font Expert was not supplied to me with any documentation, so I cannot comment on it (and my German is a bit rusty, anyway!).

Fontz! comes with a substantial manual, well typeset, with an index. It tells you all you need to know about the program, and also contains a lot of useful information for the beginner, both about typography and about GEM fonts and drivers and the dreaded ASSIGN.SYS file.

I've only seen the draft of the Fontkit manual. It promises to be very comprehensive, though not as informa-

tive to the beginner as the Fontz! manual.

### Conclusion

Since Font Expert is not available in the UK, it cannot be a candidate for best buy. Even if it were, its poor scaling facilities would probably disqualify it, although it is easy to use, and has one or two nice features. JackFont is simply not worth the money, and so that leaves Fontz! and Fontkit.

If you want to convert Macintosh, Degas, or Amiga fonts then Fontz! is the one to buy. Otherwise, my preference is for Fontkit. It lacks the drawing tools and block cut and paste of Fontz!, but substitutes some equally useful features which Fontz! lacks. I find it easier to use, and it is certainly a more accomplished piece of programming.

The final consideration is price. Fontkit is less than half the price of Fontz! and this will probably be the clinching argument for most users. Fontkit has all the features required by the average user, but if you are really serious about font design you could cover all options by buying both programs.

**Program  
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Publisher  
Neocept  
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Author  
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## Comparison Chart

JackFont      Fontkit+      Fontz!      Font Expert

### General:

Mouse drawing .....	Toggle	.....	Various	.....	L/R	.....	FatBits
Max grid .....	80x72	.....	160x160	.....	?(1)	.....	144x144
Zoom mode .....	-	.....	Y	.....	-	.....	-
Size grid .....	Y	.....	-	.....	Y	.....	-

### Tools:

Draw line .....	-	.....	Y	.....	Y	.....	Y
Draw arc .....	-	.....	-	.....	Y	.....	Y
Box .....	-	.....	-	.....	Y	.....	-
Circle .....	-	.....	-	.....	Y	.....	-
Fill .....	-	.....	-	.....	-	.....	Y
Smoothing .....	-	.....	-	.....	-	.....	Y

### Character manipulation:

Flip .....	Y	.....	Y	.....	Y	.....	Y
Rotate .....	-	.....	-	.....	Y	.....	-
Move .....	Y	.....	Y	.....	Y	.....	Y
Centre .....	-	.....	Y	.....	-	.....	-
Mirror .....	Y	.....	Y	.....	Y	.....	-

### Ins/del row/col:

Character .....	-	.....	Y	.....	-	.....	-
Grid .....	-	.....	Y	.....	Y	.....	Y

### Cut / paste:

Char .....	Y	.....	Y	.....	Y	.....	Y
Block .....	-	.....	-	.....	Y	.....	Y

### Scaling:

Scale char .....	-	.....	Y	.....	-	.....	-
Scale font by							
device .....	-	.....	Y	.....	Y	.....	-
size .....	-	.....	Y	.....	Y	.....	-
percent .....	Y	.....	Y	.....	Y	.....	Y(2)

### Undo:

Simple .....	-	.....	Y	.....	Y	.....	Y
Multiple .....	-	.....	Y	.....	-	.....	-

### Text effects:

Display fx .....	Y	.....	Y	.....	-	.....	-
Shadowed .....	-	.....	Y	.....	-	.....	-
3D .....	-	.....	Y	.....	-	.....	-

### Other fonts:

Convert .....	-	.....	-	.....	Y	.....	-
Edit .....	-	.....	Y	.....	Y	.....	Y

(1): Can cope with 72 point laser font

(2): Only 1/2, 2/3, 3/2, and double.

*s first programs were written in octal (numbers to base 8),*

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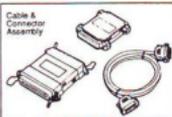
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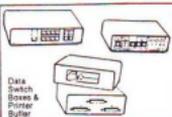


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P R O G R A M M E R



C L I N I C

**A**lthough the Clinic doesn't start with C this month, there's plenty for C users to enjoy. **Richard Seel** also introduces trig functions from assembler, as well as a few other quick queries.

#### Trig in assembler

Our first contribution this month is an example of how long some contributions to the Clinic must wait before getting into print. I received this one back in April, and have only just been able to fit it in (in fact, what we have here is only a part of the whole contribution, and I was hoping to find enough space to include it all - but this was not possible).

In the April edition of ST World there was a query from Mr Fairhurst about generating trigonometric functions in machine code. Henry Parten of Bracknell, Berks, has recently been addressing the self-same problem. Mr Parten has been programming for a long time. His first programs were written in octal (numbers to base 8), and he has a souvenir of the first computer he ever used; it is one word of memory (39 bits, actually) - and it is bigger than an ST!

For the application that Mr Fairhurst has in mind he will need to multiply small numbers, of the order of half of the screenwidth, e.g. 320, by sines and cosines which, of course, do not

exceed 1.0 in absolute value. The resulting values will, presumably, be the transformed pixel X- and Y- addresses, again of the order of 320. Specifically, the point at (x1,y1) will be transformed to (x2,y2) according to the expressions

$$\begin{aligned}x2 &= x1 \cdot \cos(\infty) - y1 \cdot \sin(\infty) \\y2 &= x1 \cdot \sin(\infty) + y1 \cdot \cos(\infty)\end{aligned}$$

and sufficient accuracy will obtain for plotting purposes if we calculate with integer values of, say,  $2048 \cdot \sin(\infty)$  and similarly  $2048 \cdot \cos(\infty)$ .

I suppose the origin of coordinates to be at the centre of the screen, in which case the pixel values need to be adjusted by adding x to 320 and subtracting y from 200. For example, rotating the point (200,100) through 25 degrees, results in

$$\begin{aligned}x2 &= 200 \cdot \cos(25) - 100 \cdot \sin(25) \\&= 200 \cdot 0.9063 - 100 \cdot 0.4226 = 138.99 \\y2 &= 200 \cdot \sin(25) + 100 \cdot \cos(25) \\&= 200 \cdot 0.4226 + 100 \cdot 0.9063 = 175.15\end{aligned}$$

corresponding to

$$\begin{aligned}Px2 &= 320 + 139 = 459 \text{ and} \\Py2 &= 200 - 175 = 25\end{aligned}$$

since pixel coordinates have to be integers, and we would "PLOT 459,25". The actual results will depend on whether truncated or

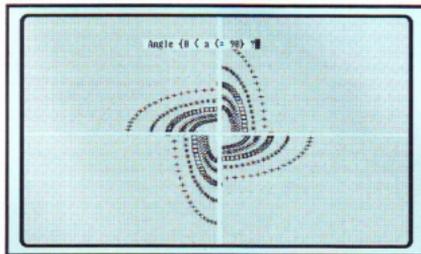


Figure 1 - the first frame

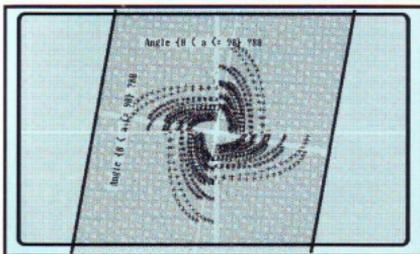


Figure 2 - the second frame

rounded values are used but, in any case, we cannot be more than half a pixel away from the 'true' position.

Suppose we use integers. Then  $2048 * \cos(25) = 1856 = \$740$  and  $2048 * \sin(25) = 866 = \$362$ . In hex,  $x1 = \$C8$  and  $y1 = \$64$ . So we now have

$$\begin{aligned} X2 &= \$C8x\$740 - \$64x\$362 = \$457B8 \\ Y2 &= \$C8x\$362 + \$64x\$740 = \$57990. \end{aligned}$$

The screen centre pixels, times 2048, are \$A0000 and \$64000 respectively, so our transformed point is at

$$\begin{aligned} PX2 &= \$A0000 + \$457B8 = \$E57B8 \text{ and} \\ PY2 &= \$64000 - \$57990 = \$C670. \end{aligned}$$

We are going to shift these results right 11 places ( $2048 = 2^{11}$ ) and we should therefore round them off by adding half a unit in the last place. So we add \$400 ( $2^{10} = 1024$ ) to each value, and then shift to get

$$PX2 = \$E57B8 + \$400 = \$E5BB8,$$

which when shifted gives

$$\begin{aligned} Px2 &= \$E5BB8 >> 11 \\ &= \$1CB = 459 \end{aligned}$$

(surprise, surprise) and

$$PY2 = \$C670 + \$400 = \$CA70$$

which when shifted gives

$$\begin{aligned} Py2 &= \$CA70 >> 11 \\ &= \$19 = 25 \text{ as before.} \end{aligned}$$

Like most programming activity, it's "horses for courses"; how the fine details are worked out will depend on the application and who is coding it. Listing one is an example of simple rotation about the centre of the screen. (See figures one and two.) It demonstrates the use of integer arithmetic



Figure 3



Figure 4

```

** LISTING ONE **
** Fast BASIC **
** Trig & rotate demo **
** Henry C Parten **

PROCsetup

WHILE INP(2)>>= 114
  PROCfillscreen
  REPEAT
    INPUT TAB(25,3); " Angle (0 < a <= 90) "; a$
  UNTIL a$ > 0 AND a$ <= 90
    DO = a$: CALL rotate
  PROCcentre(1,"ENTER to continue. Any other key to end.")
  WEND

STOP

DEFPROCsetup

TEXTRECT 0,0,SCREENWIDTH,SCREENHEIGHT
FILLIES 13
GRAPECTR 0,0,SCREENWIDTH,SCREENHEIGHT
LINELNTH 5
CLG 1

code$ = $7E80: RESERVE code,code$
\ Includes space for screen buffer

FOR pass$ = 1 TO 2
  PROCcentre(10,FORMAT$(pass$,"Assembling code. Pass>XD"))
  [
    OPT pass$, "L-"
    ORG code
  ]

  \
  \ SINE FUNCTION
  \ See "Handbook of Mathematical Functions"
  \ Edited by Milton Abramowitz & Irene A Stegun
  \ US National Bureau of Standards, 1964
  \ Formula 4.3.96 (on page 76 of the 1965 Dover reprint) is:-
  \ Sin(x)/x = 1 + a2*x^2 + a4*x^4 for 0 <= x <= PI/2 radians
  \ where a2 = -0.16605
  \ and a4 = +0.00761

  \ If x is in degrees, the formula can be written as
  \ Sin(x) = (P*x)*(1 + a2*(P*x)^2 + a4*(P*x)^4)
  \ where P = PI/180. Putting the outer P inside the brackets
  \ we have
  \ Sin(x) = x*(P + a2*(P^3)*x^2 + a4*(P^5)*x^4)
  \ = x*(b1 + x^2*(b2 + b4*x^2)), say
  \ where b1 = P = PI/180
  \ b2 = a2*(P^3)
  \ and b4 = a4*(P^5)
  \ On entry D0 = angle in (whole) degrees
  \ On exit D1 = 2048*sin(x) and D0 is unchanged
  \
  \ The EQUates incorporate factors of 2^n in order to
  \ preserve as many significant figures as possible at
  \ each stage of the calculation.

  sine_b4 EQU $6C68 \ (2^51)*(PI/180)^5*4
  sine_b2 EQU -$767D61B6 \ (2^51)*(PI/180)^3*a2
  sine_b1 EQU $23B8E844 \ (2^35)*(PI/180)
  sine_rnd EQU $8000 \ (2^16)*0.5 roundupf

  sine MOVEM.L D2-D3,-(SP) \ Preserve working registers
  MOVE.L #16,D3 \ Shift count
  MOVE.L D0,D1 \ Copy x
  MULS D1,D1 \ (x^2)
  MULS D1,D2 \ Copy (x^2)
  ADDI.L #sine_b4,D2 \ (2^51)*b4*(x^2)
  ADDI.L #sine_b2,D2 \ (2^51)*(b2+b4*(x^2))
  ADDI.L #sine_rnd,D2 \ Roundoff (Try removing this!)
  ASR.L D3,D2 \ (2^35)*(b2+b4*(x^2))
  MULS D2,D1 \ (2^35)*(x^2)*(b2 + b4*(x^2))
  ADDI.L #sine_b1,D1 \ (2^35)*(b1+(x^2)*(b2+b4*(x^2)))
  ADDI.L #sine_rnd,D1 \ Roundoff (Try removing this!)
  ASR.L D3,D1 \ (2^19)*(b1+(x^2)*(b2+b4*(x^2)))
  MULS D0,D1 \ (2^19)*SIN(x)
  ASR.L #8,D1 \ 2048*SIN(x)
  MOVEM.L (SP)+,D2-D3 \ Restore working registers

  RTS

  sine_len EQU PC-sine

```

to calculate sine and cosine of angles expressed in degrees.

Modified truncated Maclaurin series are used. The cosine function uses fourth, and the sine function fifth powers of the argument, which give four-place accuracy. The formulae can be expanded for higher powers to give greater accuracy but for applications such as this, i.e. manipulation of values of the order of absolute value of 320: half the screenwidth, there is little to be gained.

Mr Parten also included two programs which displayed the difference between the computed values and the built-in Fast BASIC trig functions (figures three and four).

## What, no C?

George Stavropoulos of Athens has written to say how much he likes the Clinic - but he also has a complaint...

*'I can't help wondering why you waste so much time and grey matter on Fast BASIC! Honestly, I can't see what makes you and the rest of its users think that it is any easier than C. And, please, let's not have any arguments of the kind, "it's easier for the average user, etc." for I can point at the simplicity of some of the listings, for example, in the Clinic issue 21.*

*It seems that you (and others from the magazine's staff) are obsessed with the inefficiency (and resulting complexity) of Fast BASIC and with the extreme efficiency (and resulting complexity) of Assembler. Do you really believe that all that is any good to the average user?*

*On the other hand, the magazine seems to 'snob' C (and at a very time when over 90% of all applications, including compilers of other languages such as LISP, are written in this language). It is evident that C emerges as the language, and I should think it's about time everyone takes a good look at it. It is the implicit responsibility of respectable magazines like ST World to spread the light instead of perpetuating the silly schemes of the past.'*

George believes that we on ST World have a missionary task - to 'spread the light' about the joys of programming in C. He may be right, and the editorial team is aware of the relative lack of C programs in the magazine. However, that isn't the way I run the Clinic. The Clinic is designed as an open forum: it responds to need. If I receive more letters about Fast BASIC than any other language, then I'll print more letters about Fast BASIC.

Unfortunately, the very success of the Clinic means that I now get more letters than I can print. But the balance of those printed still reflects the balance of those received. So, if there is a lack of C, this is because people are not writing in C - I'll print any language you care to write in, from APL to SNOBOL.

Personally, I do find C more difficult than a good structured BASIC, but I'm not a programmer and others may feel differently. But if you want more C, you can have it; all you have to do is write in.

## Fonts in C

Keith Wearing of Den Helder in The Netherlands agrees that C is under-represented in ST World. Partly for this reason he has written a solution to a problem first posed by Nicholas Goodall back in issue 23. He wanted to display 8x32 characters for use in a Prestel display, and was trying to use TEXTBLT. Keith Wearing suggests that there is a better way:

*GEMDOS fetches font information from a block of data preceding the line A data block whenever it outputs a character. We can manipulate this block to obtain our*

```

\          COSINE FUNCTION
\ See     "Handbook of Mathematical Functions"
\ Formula 4.3.98 (on page 76 of the Dover reprint) is:
\ Cos(x) = 1 + a2*x^2 + a4*x^4 for 0 <= x <= PI/2 radians
\ where a2 = -0.49670
\ and a4 = +0.03705
\
\ If x is in degrees then
\ Cos(x) = 1 + a2*(P*x)^2 + a4*(P*x)^4
\       = 1 + x^2*[b2 + b4*x^2], say
\ where P = PI/180
\ where b2 = a2*(P^2)
\ and b4 = a4*(P^4)
\
\ On entry D0 = angle in whole degrees
\ On exit D1 = 2048*cos(x) and D0 is unchanged
\
\ The EQUates incorporate factors of 2^n etc in order to
\ preserve as many significant figures as possible at
\ each stage of the calculation.
\
cos_b4 EQU $7620          \ (2^43)*b4
cos_b2 EQU -$4F59BB8     \ (2^43)*b2
cos_b1 EQU $8000000     \ (2^27)*1.0
cos_rnd EQU $B000        \ (2^16)*0.5 roundup

cosine MOVEM.L D2-D3,-(SP) \ Preserve working registers
      MOVE.L #16,D3       \ Shift count
      MOVE.L D0,D1        \ Copy x
      Muls.L D1,D1        \ (x^2)
      MOVE.L D1,D2        \ Copy (x^2)
      Muls.L #cos_b4,D2   \ (2^43)*b4*(x^2)
      ADD.L #cos_b2,D2   \ (2^43)*[b2+b4*(x^2)]
      ADD.L #cos_rnd,D2  \ Roundoff (Try removing this!)
      ASR.L D3,D2        \ (2^27)*[b2+b4*(x^2)]
      Muls.L D2,D1        \ (2^27)*(x^2)*[b2+b4*(x^2)]
      ADD.L #cos_b1,D1   \ (2^27)*[1+(x^2)*[b2+b4*(x^2)]]
      ASR.L D3,D1        \ (2^11)*Cos(x)
      MOVEM.L (SP)+,D2-D3 \ Restore working registers

      RTS

cos_len EQU FC-cosine

\
\ ROTATION PROCEDURE
\
\ On entry D0 = angle to rotate screen
\ On exit Screen rotated as requested
\ Copy screen to buffer

rotate MOVEM.L D0,-(SP) \ Save angle
      MOVE.W #2,-(SP)   \ Get PHYSBASE
      TRAP #14          \ XBIOS
      ADDQ.L #2,SP      \ Address screen
      MOVEM.L (SP)+,D0 \ Restore angle
      LEA rotate_0(PC),A1 \ Buffer address
      MOVEM.L A0-A1,-(SP) \ Save screen &
                          \ buffer addresses
      MOVE.W #7999,D7   \ 8000 longwords
                          \ (= 32000 bytes)

rotate_0 MOVEM.L (A0)+,(A1)+ \ Copy screen
                          \ to buffer area

      DBRA D7,rotate_0

\ Calculate rotation factors

      BSR cosine        \ 2048*cos(x) into D1
      MOVE.L D1,-(SP)  \ Save cosine
      BSR sine         \ 2048*sin(x) into D1
      MOVE.L (SP)+,D0 \ 2048*cos(x) into D0

\ Process saved screen

      MOVEM.L (SP)+,A0-A1 \ Restore addresses
      MOVE.W #399,D2     \ 400 rows: y = 0..399
      CLR.L D7           \ y = 0

rotate_1 CLR.L D6        \ x = 0
      MOVE.W #79,D3     \ 80 cols: x = 0..7;
                          \ 8..15; .. ; 632..639

rotate_2 MOVE.B (A1)+,D4 \ Next buffer byte

```

desired result. The 'C' source in listing two demonstrates how easy this is. Whatever you type at the keyboard is displayed in double-height characters; 8x32 for high resolution mode and 8x16 for the other resolutions.

The listing is, I believe, self-explanatory. All good 'C' compilers should include a header file containing the line A structure definitions which are used in the listing. However, for those without, the following will be useful.

la\_init is a structure holding the pointers returned by lineA0().

```

struct { long li_d0;
struct la_data *li_a0;
struct la_font **li_a1;
long (*li_a2) ();
} la_init;

```

la\_data is a structure describing the line A data block. VWRAP should be defined as la\_init.li\_a0->ld\_vwrap, where ld\_vwrap is the number of bytes per video line.

la\_font is a structure describing the GEM font header. The members used in the listing are: font\_data - pointer to the font data; font\_char\_off - pointer to the character offset table (not absolutely necessary here) and font\_height which is the font height in pixels.

### objc\_edit bindings

And, to finally convince C fans that we are not biased against them, here is yet another contribution concerned with that language. Lloyd Patton of Holbrook, Coventry, has written with a warning about the objc\_edit bindings in early versions of Megamax C. He points out that the correct function prototype for objc\_edit is:

```

objc_edit(obj_tree, obj_id,
character, char_idx, kind, &new_idx);

```

It appears that although the MEGAMAX documentation gives the correct prototype the GEM binding supplied actually uses the prototype:

```

objc_edit(obj_tree, obj_id,
character, &char_idx, kind);

```

which means that if you use objc\_edit as documented your program will crash with an address error.

Lloyd suggests that you should first compile the following code and add it to your personal library routines, ensuring that the library is linked with any program that uses objc\_edit.

```

/* objc_edit() - earlier vers of MEGAMAX C */

```

```

#include <gembind.h>
#include <obdef.h>

```

```

objc_edit(obj_tree, obj_id, character,
char_idx, kind, new_idx)

```

```

OBJECT *obj_tree;
int obj_id, character, char_idx, kind;
int *new_idx;
{

```

```

extern int int_in[], int_out[];
extern char *addr_in[];

```

```

MOVE.L #7,D5 \ Pixels x to x+7
rotate_3 BTST.L D5,D4
REQ rotate_5 \ IF white
\
Calculate new coordinates
MOVEM.L D3-D7,(-SP) \ Save registers
MOVE.L #11,D3 \ Shift count. Cos &
\ sin supplied * 2048
SUBI.L #320,D6 \ X = col-320
MOVE.L D6,D5 \ Save X
SUBI.L #200,D7 \ -Y = row-200
NEG.L D7 \ Y
MOVE.L D7,D4 \ Save Y
MULS D0,D6 \ X*cos
MULS D1,D4 \ Y*sin
SUB.L D4,D6 \ NewX = X*cos - Y*sin
ASR.L D3,D6 \ Save X
ADDI.L #320,D6 \ Newcolumn
BMI rotate_4 \ IF to left of screen
CMPI.L #639,D6
BGT rotate_4 \ IF to right of screen
MULS D1,D5 \ X*sin
MULS D0,D7 \ Y*cos
ADD.L D5,D7 \ NewY = X*sin + Y*cos
ASR.L D3,D7 \ -Newrow
SUBI.L #200,D7 \ Newrow
NEG.L D7 \ IF above screen
BMI rotate_4
CMPI.L #399,D7
BGT rotate_4 \ IF below screen
MOVE.L D6,D5 \ Copy x
ASR.L #3,D5 \ Col = x DIV 8
MULS #80,D7 \ 80xRow
ADD.L D5,D7 \ Offset of new pixel =
\ Column + 80xRow
ANDI.L #7,D6 \ (7-Bit) = x MOD 8
SUBQ.L #7,D6 \ -Bit
NEG.L D6 \ Bit number
BSET.B D6,(A0,D7.L) \ Set screen (black)
BCLR.B D6,(A0,D7.L) \ Set screen (white)...
\ Try this effect!
rotate_4 MOVEM.L (SP)+,D3-D7 \ Restore registers
rotate_5 ADDQ.L #1,D6 \ Next x
DBRA D5,rotate_3
DBRA D3,rotate_2
ADDQ.L #1,D7 \ Next y
DBRA D2,rotate_1
RTS
rotate_6 DS.L 8000,0 \ Screen copied to this buffer
rot_len EQU rotate_6-rotate
code_len EQU PC-code
] : NEXT
HIDEMOUSE: CLG 1
PROCcentre(1, "Results will look peculiar if this")
PROCcentre(2, "is not a high resolution screen!")
PROCcentre(4, "Total code $"+RIGHT$("000")+HEX$(code_len),4)
+FORMAT$(code_len, "62D")
PROCcentre(5, "Sine code $"+RIGHT$("000")+HEX$(sine_len),4)
+FORMAT$(sine_len, "62D")
PROCcentre(6, "Cosine code $"+RIGHT$("000")+HEX$(cos_len), 4)
+FORMAT$(cos_len, "62D")
PROCcentre(7, "Rotate code $"+RIGHT$("000")+HEX$(rot_len), 4)
+FORMAT$(rot_len, "62D")
PROCcentre(8, "Reserved $"+RIGHT$("000")+HEX$(code4), 4)
+FORMAT$(code4, "62D")
PROCcentre(10, "Repeats until a key other than ENTER is pressed")
PROCcentre(12, " So press ENTER, please ")

```

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```

addr_in[0] = (char *) obj_tree;
int_in[0] = obj_id;
int_in[1] = character;
int_in[2] = char_idx;
int_in[3] = kind;
crys_if(OBJC_EDIT);
*new_idx = int_out[1];
return (int_out[0]);
}

```

The problem has been fixed in the new version of MEGAMAX (now LASER) C, which Lloyd is very enthusiastic about. However, this fault has prompted some reflections on our attitudes towards 'legal' programming. His first thought was to suggest the GEM objc\_edit call itself, but since discovering that it was the compiler which was at fault, he suggests that we should be more cautious.

The experience was educational, and I suggest that we take reports of GEM errors with a large pinch of salt, until, that is, we can demonstrate that a GEM call fails in assembler i.e., when we can all see that the data arrays int\_in, addr\_in and control have been properly initialised and the returned values in int\_out and addr\_out contain erroneous data.

Concerning your request for our views on publishing undocumented GEM locations/routines/features; by all means do so with a warning, but it's a bit like a fence putting up notices saying that stealing is against the law. However, whether fencing is allowed or not, it should be considered a criminal offence for anybody to use undocumented features if the program is then distributed to others; as Dean Swift said, '(You) may keep poisons in your cupboard, but not vend them about as cordials'.

The aggravation is not in the fact that the program is guaranteed not to work on future releases of GEM, but that the memory locations may well be critical to other functions. Imagine, as a worst case, somebody poking rubbish into the control register of your disk drive and effectively trashing your File Allocation Table! Programming in a multi-tasking environment requires discipline. Use it! There are enough documented hooks in the VDI and TOS for everybody's needs; and if a final warning is required, remember that there are a number of programs that no longer work on the new versions of the Macintosh because programmers have used undocumented features and locations on that machine.

It was for the above reason that I was a little bit peeved to be associated in issue 28 with similar code to that supplied by Nigel Jarman; my solution was different and relied on the documented fact that the state of the mouse is returned by all evt\_multi calls, whether a button event occurred or not. Keith Wearing's solution is certainly superior as it also demonstrates the use of official hooks in the operating system.

Lloyd's views are interesting. They are almost persuasive enough to prevent me from publishing any more 'naughty pokes', and certainly give food for thought.

## Quick queries

Mr R Warwick of Southminster in Essex is a Fast BASIC user. He wants to know the meaning of the tilde (~) in Fast BASIC. He saw a reference to it as a keyword associated with HEX\$, but couldn't find any further reference in the manual.

```

ESCAPE OFF: \ When you're sure it is working!
ENDPROC

```

```

DEFPROCfillscreen

```

```

\ Insert your own routine to eg load a .IMG etc picture
\ or use this (just to draw something to rotate).
LOCAL xc%: yc% = GRAFWIDTH DIV 2
LOCAL yc%: yc% = GRAFHEIGHT DIV 2
LOCAL rx: rx = yc%/1600
LOCAL ry, a$, m$, cos, sin

```

```

CLG 1

```

```

REPEAT

```

```

REPEAT
PRINT TAB(25,1):" Fill style 2 or 3 ";
INPUT style%
UNTIL style% = 2 OR style% = 3

IF style% = 2 THEN tmax% = 24 ELSE tmax% = 12

```

```

REPEAT
PRINT TAB(25,2):" Index number 1...";STRING$(25, " ");
PRINT TAB(33,2):FORMAT$(tmax%,"d");
INPUT type%
UNTIL type% >= 0 AND type% <= tmax%

IF style% = 2 AND type% = 8 THEN
ok% = FALSE
PRINT TAB(25,2):"This combination is all black!"
ELSE
ok% = TRUE
ENDIF

```

```

UNTIL ok%

```

```

CLG 0

```

```

FILLSTYLE style%,type%
FRECT 10,10,GRAFWIDTH-20,GRAFHEIGHT-20

```

```

FOR m% = 1 TO 6: MARKTYPE m%
rx = 0.75*rx
ry = 0.5*rx

```

```

FOR a$ = 0 TO 90 STEP 5
DO = a$: CALL cosine: cos = D1
DO = a$: CALL sine: sin = D1
x% = rx*cos
y% = ry*sin
PLOT xc%+x%,yc%+y%
PLOT xc%-x%,yc%+x%
PLOT xc%-x%,yc%-y%
PLOT xc%+y%,yc%-x%
NEXT ,

```

```

LINECOL 0
LINE xc%,0 TO xc%,GRAFHEIGHT
LINE 0,yc% TO GRAFWIDTH,yc%
LINECOL 1
RRECT 10,10,GRAFWIDTH-20,GRAFHEIGHT-20

```

```

ENDPROC

```

```

DEFPROCcentre(line$, text$)
LOCAL column%
column% = ((TEXTWIDTH DIV 8) - LEN(text$)) DIV 2

```

```

PRINT TAB(column%,line%):" :text$:" ;

```

```

ENDPROC

```

```

/** LISTING TWO **/
/** C **/
/** 8x32 font output **/
/** Keith Wearing **/

```

```

/* Create character font twice the height of the system */
/* font and demonstrate its use. */

```

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In fact, it is a PRINT function which will convert a decimal number to hexadecimal on print out. Thus PRINT -255 will be output on the screen as FF. Very useful to save you having to do the conversion yourself.

David Barter of Lyneham in Wiltshire has a few queries about GFA BASIC. Firstly he wants to find a way of mimicking the BBC BASIC and Fast BASIC 'EVAL' command, so that he can input a function such as (3x2-x)/cos(x) as a string and then evaluate it for different values of x.

Secondly, David wishes to be able to produce multi-line recursive functions to find, for example, the greatest common divisor of two numbers; and thirdly, he wants to design and use his own fonts.

GFA BASIC does not have an EVAL command, and I imagine that to simulate it you'd have to write some sort of parser to read the input string and convert it into a set of BASIC commands. Has anyone tried to do this in GFA BASIC (or in HiSoft BASIC, which also lacks EVAL)?

I don't know whether GFA functions can be recursive, but they are restricted to a single line. However, GFA procedures can be recursive and multi-line, so David's problem should be easily solvable.

As far as fonts are concerned, yes, it is possible to load GEM fonts into GFA programs - although it isn't that simple (unlike Fast BASIC, there are no built-in font commands). Frank Ostrowski publishes details of a routine to do this in his book ('GFA BASIC: Advanced Programming' published by Glentop). As far as font design is concerned, you'd be better off buying a proper font editor such as Fontkit.

Our third quick query is from Mick Sulley of Melton Mowbray in Leicestershire. He has just upgraded to a 1040 with an 800XL. Most of his programming is in Pascal, although he has also used C.

*My problem is how to chain programs together, i.e. write a menu program which will call other programs which will then call the menu program again when they terminate. I have tried with MCC Pascal using the interface library and did get it to work provided no files were opened in any of the programs. I am sure that it must be easy to do, please will you tell me how?*

Is there an easy way to do this? Are there any Pascal users out there? We'd like to hear from you!

## DESKTOP.INF

In issue 29, Andrew Gansden gave an almost complete explanation of the DESKTOP.INF file. Now Ian Miles of Saffron Walden in Essex has written with some suggestions to fill some of the gaps in Andrew's account. The results of his investigations can be found in table one.

### Extra screen lines

To end with, something rather clever (but silly)! Simon Marsh of Ladybridge, Bolton, has sent in a listing which allows you to display an extra line on a colour display. (I don't recommend that you try it with a mono monitor.)

It works by switching the scan rate of the shifter chip from 50Hz to 60 Hz on the last line of the scan. This makes the chip think that there are more lines to display, and so it carries on. At the start of the next new line the shifter rate is returned to 50Hz and it now carries on writing lines until a vertical blank interrupt

```

/*
/* If in low or medium resolution (8X8 system font) */
/* install the 8X16 system font. If in high resolution */
/* create a new 8X32 font from the 8X16 font and install
/* in a similar manner. */
/*
/* The header file 'linea.h' should contain structure
/* definitions for the line A data structure la_init
/* (which is initialised by linea0()), la_data (which is
/* the standard line A data block), la_font (which is a
/* GEM font header structure) and definitions of the
/* standard Atari line A variables (VWRAP).
/*
/* The program should be installed as a TOS program.
/* (extension .tos) lines to be added are marked in the
/* source should you prefer to install as a GEM program.
/* (extension .prg)
/*
/*****
#include <eesbind.h>
#include <vdiind.h>
#include <linea.h>
#include <osbind.h>
#include <xbios.h>

/* MAGIC NUMBERS! */

#define HIDE_MS 256 /* Only for .prg programs ...*/
#define SHOW_CS 1 /* ...not necessary ... */
#define HIDE_CS 0 /* ... for .tos programs. */
#define HIGH 2
#define FONT_EXS 1
#define FONT_EX16 2
#define TABLE_OFF 46
#define CLR_HOME "\033H" /* ESC H */
#define WRAP_ON "\033w" /* ESC w */
#define EXX 3 /* CTRL-C to exit program */
#define CR 13
#define LF_BEL "\012\007"

/* GENERAL GLOBAL VARIABLES */

int contrl[12],intin[128],ptsin[128],intout[128],ptsout[128];
int work_in[]={1,1,1,1,1,1,1,1,1,1,2};
int work_out[57];
int vdihandle,dummy;

/* OTHER GLOBAL VARIABLES */

struct la_font *fnt_ptr; /* Font header defined in linea.h */

/* Not well documented block of data set up as a
/* structure. It is situated in memory TABLE_OFF
/* from the line A data block. */

struct la_extra {
int cel_ht; /* Cell height in pixels */
int cel_mx; /* Max cells per line */
int cel_my; /* Max cells per page */
int cel_of; /* Offset to next row */
int col_bg; /* Background colour */
int col_fg; /* Character colour */
unsigned int *cur_ad; /* Cursor address */
int cur_of; /* Cursor offset */
int cur_cx; /* Cursor x coord */
int cur_cy; /* Cursor y coord */
unsigned char cur_ct; /* Cursor interval count */
unsigned char cur_tm; /* Running cursor count */
unsigned char *fnt_ad; /* Address of font data */
int fnt_la; /* Last ascii code in font */
int fnt_fr; /* First ascii code in font */
int fnt_wd; /* Font width (bytes) */
int pix_hr; /* Max horizontal pixels */
unsigned char *off_ad; /* Address of offset table */
unsigned int txt_st; /* Text status (5 bits) */
int pix_vt; /* Max vertical pixels */
};

main()
{
int res;

```

occurs. Using this technique it is possible to display up to 40 extra screen lines (about five lines of text in low resolution), depending on the monitor or TV set.

Simon points out that if you intend to alter his listing (listing three) for your own use, it is the switch back to 50Hz which is critical:

*Switch back too early, or too late, and distortion occurs. I have found that a MOVEM to stack variables used in the HBL routine, and then the switch to 50Hz provides the right timing. It must be noted that when using the routines, programs will slow down by a considerable amount due to the processing needs of the HBL. Using similar routines, though, I have managed to display 17 colours a line, over 250 lines (I think that is about the maximum before the VBL), which is a staggering 4250 colour changes every 50th of a second, and still manage to do animation and graphic displays - all at the same time!*

*You are now probably thinking there must be a drawback - there is. Since the shifter is switched to 60Hz, it finishes the last line slightly faster than it should when it is in 50Hz. The result is that the shifter doesn't display the last 16 or so pixels at the very end of the right-hand side of the bottom of the logical screen, leaving them the same colour as the border.*

*Also, it might be thought that the extra 50ish lines should start at screenstart + 32000 but they don't; they actually start at screenstart + 31998, again due to the fact that the last line is in 60Hz. This means that the lower border graphics are on a different screen 'plane' compared to the rest of the screen, making it more difficult to swap graphics between the two. Also, normal line-A or GEM graphics commands will not work in the lower border, so your own routines must be written. Another thing is that, since the timing must be perfect, the technique is greatly affected by key presses and mouse movements that interrupt the HBL.*

And what is the point of all this screen activity? Well, even Simon doesn't think it has any practical purpose - but I suppose someone might come up with some kind of use for it.

That's it for this month. If I haven't managed to get round to your letter yet, please be patient - it will be two months or more before it gets into print. Some contributions may have to wait much longer; I have to try to get a good mix of topics, and it may be better to keep yours for another issue. Please don't write and ask for individual replies; I haven't got time to deal with them, and I don't want to disappoint you.

Thank you all very much for your support. Keep the letters rolling in - especially the solutions and comments on other people's problems and ideas. Please remember to include your full name (or title, if preferred) and phone number if possible. If you have a listing, please include it on a disk - if you want the disk or listing back, also include a stamped addressed envelope.

Write to me at:  
**Richard Seel,**  
 80 Windermere Road,  
 Ealing, London, W5 4TD,  
 United Kingdom.

more.....

```

unsigned char *create_font();
void font_load(); typewriter();

/* Initialise AES and VDI etc. */

appl_init();
vdihandle=graf_handle(dummy, dummy, dummy, dummy);
v_opnvwk(work_in, vdihandle, work_out);

/***** Add these lines for a GEM program *****/
/*
/* graf_mouse(HIDE_MS,0);
/* Cursconf(SHOW_CS,0);
/*
/*****

/* Get screen resolution and initialise
/* line A data structures. */

res=Getrez();
linea0();

/* Get the address of the 8K16 system font
/* from the line A structure. */

fnt_ptr=la_init.li_a1[FONT_8K16];

/* If in low or med resolution then load this font
/* else create a new font. */

font_load(res=HIGH ? create_font():fnt_ptr->font_data,
fnt_ptr->font_char_off,
res=HIGH ? 32:16); /* Pixel height of
/* character cells. */

typewriter(); /* This is where we
/* demonstrate the font. */

/* Get back to our old font before exiting the program.
*/

fnt_ptr=la_init.li_a1[res=HIGH ? FONT_8K16:FONT_8KB];
font_load(fnt_ptr->font_data,fnt_ptr->font_char_off,
fnt_ptr->font_height);

/***** If .prg program then add the line. *****/
/*
/* Cursconf(HIDE_CS,0);
/*
/*****

v_clsvwk(vdihandle); /* Exit ...
appl_exit(); /* ...gracefully! */
}

/* The new fonts have the same character width
/* as the old fonts (8), so there are only five
/* new entries to be made. */

void font_load(data,offset,pix_hgt); /* Put new font data
/* info data structure */
unsigned char *data; /* Address of font data */
int *offset; /* Address of font offset table */
register int pix_hgt; /* Character cell height */

{
register struct la_extra *data_ptr;
char *temp;

/* Initialise our data structure... */

temp=la_init.li_a0;
data_ptr=temp-TABLE_OFF;

/* ...and fill in the necessary information. */

data_ptr->cell_ht=pix_hgt;
data_ptr->cell_wm=(data_ptr->pix_vt/pix_hgt)-1;
data_ptr->cell_of=VWRAP*pix_hgt;
data_ptr->fnt_ad=data;
data_ptr->off_ad=offset;
}

/* Creates a 8K32 font by copying each line
/* of the 8K16 Font twice! */

```

## Table one: More on the DESKTOP.INF file

#D: Directory icon installation

Example: #D FF 01 @ \*. \*@

Format: #D 11 22 @ filename.ext @

Byte	Meaning	Values
11		Always FF
22	Icon type	0 = disk drive 1 = folder 2 = waste bin 3 = program 4 = document
filename.ext		Any valid file name chars or wild cards

e.g. #D FF 00 @ CLASS.\*@

will display all folders with the name  
"CLASS" as disk drive icons.

#F: TOS file installation

Format: #F 11 22 filename.ext@  
parameter.ext@

Byte	Meaning	Value
11	Application icon	00-04 (icon types)
22	Parameter icon	00-04 (icon types)
filename.ext		Application filename
parameter.ext		Name of file to be passed to application

Note: If byte 11 is FF then the format is  
as for #D above - i.e. #F FF 02 @ \*.BAK@  
will display all "BAK" files as dustbins.  
However, if this is the only #F line then  
files without the extension .BAK will not  
be displayed.

#P = TTP file installation

Format as for #F including the note.

#G = GEM file installation

Format as for #F including the note.

#d is completely ignored and can contain  
your own comments or be omitted alto-  
gether. You may have as many #d lines as  
you like.

If you install a disk drive, trash can,  
folder, file, or program with an icon  
number of 07 then GEM will install it as  
an invisible icon. GEM will allow all the  
normal operations on these icons, it just  
won't draw them!

```

unsigned char *create_font()
{
    static unsigned char new_font[32][256]; /* Don't destroy it! */
    register unsigned char *rn_ptr;
    register int i,j;

    rn_ptr=fnr_ptr->font_data; /* Take the 8x16 font data...*/
    for(i=0;i<16;i++) /* ...line by line and... */
    {
        for(j=0;j<256;j++)
        {
            /* ...make two. */
            new_font[2*i][j]=new_font[2*i+1][j]=*rn_ptr++;
        }
    }
    return (new_font); /* The address of our new font */
}

/* Nothing too exciting but it demonstrates the fonts.
*/

void typewriter()
{
    unsigned char ch;

    Coons(CLR_HOME); /* Clear screen/home cursor.*/
    Coons(WRAP_ON); /* Line wrap on. */
    while((ch=(unsigned char)Cncin())!=ETX) /* Get key. */
    {
        /* (CNT C ends) */
        Coonout(ch); /* Print character. */
        if(ch==CR) /* If return pressed... */
            Coons(LF_BEL); /* ...add line feed and bell*/
    }
}

```

'Listing three  
'Assembler  
'Extra screen lines  
'Simon Marsh

```

bra start

bios: macro
move #1,(-a7)
trap #13 set
addq.l #2,a7
endm up

xbios: macro
move #1,(-a7) macros
trap #14 that
addq.l #2,a7
endm are

xbios1: macro
move #1,(-a7)
trap #14
add.l #2,a7
endm

gemos: macro
move #1,(-a7)
trap #1
addq.l #2,a7
endm

gemos1: macro
move #1,(-a7)
trap #1
add.l #2,a7
endm

hbl_count: ds 3
vbl_timer: ds 1
new_scrn: ds.1 1

start: move.l a7,a5
move.l 4(a5),a5
move.l $c(a5),d0 set stack
add.l $14(a5),d0 and reserve
add.l $1c(a5),d0 memory requirements
add.l $1000.d0 for program
move.l a5,a7

```

# SOFTMACHINE AT SCC MAIL ORDER

```

add d0,a7
move.l d0,-(a7)
move.l a5,-(a7)
move #0,-(a7)
gensd01 $4a,12 MSHRINK

move.l #41000,-(a7) new screen space
gensd0 $48,6 MALLOC

lea new_scrn(pc),a0
add #256,d0 make sure
move.b #0,d0 its on a 256
move.l d0,(a0) byte boundary
move.l d0,a0 @address into a0
move 10249,d0 (10000/4)-1

fill_loop
move.l #-1,(a0)+ fill screen so it
dbr a d0,fill_loop shows new border

move #-1,-(a7) don't change res
move.l new_scrn(pc),-(a7) display
move.l new_scrn(pc),-(a7) new screen
xbiosl 5,12 SETSCREEN

pea vbl(pc) install my VBL
move #28,-(a7) routines
bios 5,8 SEYEXC

bbr wait_vbl make sure

moveq #15,d7 16 MFP interrupts

disable_loop
move d7,-(a7) disable interrupts
xbios 26,4 DJISINT
dbr a d7,disable_loop

pea hbl(pc) HBL routines
move #-1,-(a7) every line
move #11000,-(a7) event count mode
move #1,-(a7) timer B (HBL counter)
xbiosl 31,1 XTIMER

again: bra again oblivion

vbl: movem.l d0-d7/a0-a6,-(a7) stack registers
lea hbl_count(pc),a0
move #0,(a0) number of lines
move 4(a0),2(a0) which colour
addq #1,4(a0) scroll up

lea vbl_timer(pc),a0 show vbl
addq #1,(a0) is working
movem.l (a7)+,d0-d7/a0-a6
rte

wait_vbl: lea vbl_timer(pc),a0
move (a0),d0

timer_loop: cmp (a0),d0 check for change
beq timer_loop no change
rts

hbl: move.l a0,-(a7) stack
lea hbl_count(pc),a0
move 2(a0),#ff8240 border colours
move.b #11111110,#ff820a
addq #1,2(a0) colour count
addq #1,(a0) line count
cmp #199,(a0) bottom?
bne hbl_ret
move.b #11111100,#ff820a set to 60 Hz
move.l (a7)+,a0 restore stack
bclr,b #0,#ffa0f clear in service bit
rte
    
```

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# Dungeons and Disk Drives

In my opinion, the Dungeon Master game should be required by law to have a Government Health Warning label on the packaging. I don't think I've felt so tired since I toilet-trained the Dragon! When I first reviewed this box of delights I was impressed with the graphics and, quite rightly, recommended it. However, in the short time available I did not appreciate how much more was hidden in its depths. During this month I have had time to play the game for many hours and I now think the gameplay is nothing short of brilliant. If this is not the greatest role-playing game ever written, I'll kiss the Troll. It's been a long time since the rosy fingers of dawn have crept under the Dungeon door to find the Dragon and myself still wrestling with the phantoms in the haunted fish-tank, but this game contains all the agony and the ecstasy that role-players have been searching for. This game should not be pirated. Remember how many times you have claimed that you only copy

software because the original is not worth the asking price anyway? Well now is the time to put your gold where your mouth is. A software house that produces this kind of quality must be encouraged to bring us more of the same or we will all be the losers. When you consider that you can buy it for at least half the recommended retail price through a mail-order company, this is a bargain not to be missed. Incidentally, if you, like me, are completely useless when it comes to mapping the labyrinths of this game, you will be pleased to hear that a complete set of maps can be obtained by contacting SOFTWARE EXPRESS on 021-3283585. Did you know that there are lock-picks in the early American version of the game. They appear to serve no useful purpose however, as it was decided not to fully implement them into the final version. A French version is being completed at the

moment, then work will begin on an Amiga version. There, I said the Amiga would come in useful one day!

Moose bolted because he received some arrowing gnus!

Perhaps you know a better reason?

If you do, and you have an original beermat, don't delay, post today and free games for life could be yours. Whilst on the subject of Jinxster, if you want to find an amusing response in the game, try tap-dancing on top of the train.



## FIST

Having decided that all the software houses had shut up shop for the summer season, I decided it was time to dust off the old 'telling bone', fate took my hand with unexpected results. No sooner had the duster flicked over the keys, than the handset cracked into life and began filling the Dungeon with unearthly noises. In the initial moments that followed,

Do you know, 'Why the Moose bolted?' If you are one of the many purchasers of the Magnetic Scroll's game, JINXSTER, then perhaps you entered their beer-mat competition. By simply making up an amusing answer to the above question, the winner wins free copies of every future Scroll's game for life.

As the competition has a fresh draw carried out every six months, the Dungeon team went along to cast an eye over the first selection. It turned out that the majority of the first entries were unmentionable slogans concerned with the immoral uses of screws! Some of the more quotable entries were: 'Because he saw the Ant - Elope', 'Because he saw the rhinoceros hide' and 'Because he saw the cow slip' However, it can now be revealed that the winner of the first batch is, Gerald Sgroi from Litchfield, Staffs. Gerald's winning entry was: 'The

the Dragon and I were transfixed as a ghostly voice uttered: 'The number you have just dialled is not of this world. Your telephone has been connected to the world of FIST!' At this point the Dungeon door opened and the Troll arrived. Hearing the voice, and seeing our boiled-egg eyes, he neatly resolved the situation by snatching the receiver from my nerveless fingers and biting it in half! With sanity restored, we resolved to abandon the cleaning and investigate further the source of the ghostly interruption.

Hours later we arrived at a small building in Gullford which appeared to be the source of the emanations. It transpired that these were the offices of Computerial Ltd and inside, surrounded by a maze of telephone lines and glass cabinets, we found Nick-Simon. Here, amid a jumble of Eprom programmers and electronic test

equipment, we were introduced to the new adventuring phenomenon which is causing so much controversy in the press. FIST stands for Fantasy, Interactive, Scenarios by Telephone and is the result of the combined skills of the telecommunication and computer-technology engineers. FIST is also an exciting adventure world which can be accessed by anyone in the country who has access to a push-button dial phone. Dialing the FIST number will activate a computer system which will let you hear all the sounds and voices which are to be found in Castle Mamma - the lair of Kaddis-Ra. Your task is to enter the castle dungeons and defeat the monsters which guard the legendary gold treasure.

As with a traditional computer adventure, you will need to pass your commands to the game's computer and, in this game, it is achieved by pressing the appropriate buttons on your telephone key-pad. Before we could launch ourselves at the nearest telephone, Nick dragged us to the control centre and proceeded to blind us with science!

Here sits a cluster of IBM PC micros surrounded by what appeared to be six large, glass telephone boxes.

Crammed into each glass cabinet are two 150Mbyte disks each holding 16 hours of digitized voice and sound effects. Above the disks are 4 cards which are manufactured by the Voicetek company of Boston. These cards have the dual task of digitizing the original sounds (at a sampling rate of 32Khz) and then reproducing the sound from the disks for up to 32 telephone games simultaneously. More racks of line control cards from the French Fermo company, plus a host of 280 processors which control the disks, filled the upper portion of the cabinet. Each IBM PC is fitted with an AST 4 Port DOS which enables a single micro to control up to 4 cabinets. A complete copy of the \$40K FIST game is held on each micro which ensures that if any one system crashes the others can take up the load. The game was written by Steve Jackson, the well-known writer of the Fighting Fantasy books, and programmed in Microsoft Quick Basic by Monte Harkins of Computerdial. As we watched the screens of the IBM's we could see the monitor displaying the present location of the many telephone players currently accessing the system.

At this point the Troll began to complain of a headache caused by a surfeit

of technical details, so it was decided to grab a telephone and get into the game itself.

Huddling around the receiver, we dialled the number (0898-800876) and listened as the hissing voice of a Vincent Price clone again filled our ears. Our immediate options were to either enter the Black Claw tavern which stood before us, to journey immediately onward to Castle Mamma, or to reload a saved game position from Limbo. Entering the tavern allowed us to listen to the rumours surrounding the castle and pick up a few tips which might come in handy later, but you could easily skip this portion of the game as it is not

ters scrambled out. The two new arrivals were an old woman and a bearded old man. Each new arrival pleaded with us to follow them down into their respective entrances as they knew the safest way into the dungeons. At this point the voice of the narrator returned and offered us the three choices of whom we should follow. Deciding that no true-blue adventurer would abandon a maiden in distress (we never learn, do we?) we selected to rush to her aid. Surprise, surprise - it was a trap! We listened as our alter-ego fell crashing and clanking into the darkness below. Then things really started in earnest. Much bellying and roaring down the phone announced the

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essential. Journeying onward, we arrived in the central courtyard of the castle and, as we listened to the ghostly voice describing our surroundings, we could hear the wind whistling around the stone battlements. A sudden shriek, which made our eyes bulge even further, announced the start of the action. A hole had magically appeared in the floor of the courtyard and a young girl appeared to be trying to clamber out. At the same time a large, clawed hand was attempting to pull her back into the black depths. As we listened to the screams we were informed that two more holes had appeared, from which two further charac-

ter arrival of some form of monster and we quickly entered a combat sequence which forms a large part of this game. During combat you are required to select any number between 1 and 8 and listen to the consequence. If you select the correct number the monster will be killed, otherwise you will simply swap blows. If you survive long enough to discover the correct number, you may use this information should you need to replay that section of the game again, as the correct number for dealing with each monster does not change. Having gained entrance to the Dungeons you are then free to move in the normal method of adventuring, selecting your direction of movement with the numbers 1 to 4 representing N, S, E and W. There are objects and puzzles to be found, but as it is obviously difficult to interact with such a game, each situation is presented as a number of options. This reduces the scope for original thinking on your part and, in the main, there appears to be no way of using logic to solve the problems - it's really a case of 'suck it and see'. That being said, it is nonetheless, exciting and fun. At any point during play you may select to 'Save' your game-state and this will result in you being given a code number which you may use to retrieve your game at a later time.

In addition to the FIST game, enthusiasts can also join an Adventurer's Guild which has been formed to provide a player's club. For an annual subscription of ten pounds you will receive a membership card and badge plus a monthly newsletter containing information on FIST developments. The Guild also sells a Tone Dialler which can be fixed to the old rotary-dial phones which will make them more compatible with the system. Send cheques to

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And what, you may ask, is the aim of this adventure? Simply put, it is to get in, grab as much gold as possible and get out! Providing you are carrying at least 20 pieces of gold when you exit from the dungeons, your score will be recorded and you will be given a code number which will enable you to be entered for the monthly competition. The person with the highest number of gold pieces will win a cash prize, while a number of other players will win items, such as, FIST "T" shirts and other goodies.

During our visit to the FIST headquarters I noticed a certain uneasiness amongst the staff. At first I regarded this as the natural reaction to the unannounced arrival of the Troll, but it transpired that there were other reasons. It appears that the FIST concept and cost, have been receiving a drubbing by some of the Fleet Street tabloids and the staff are naturally becoming a little defensive. But let's face it, if the SUN is against you, you must be doing something right. The old argument has been dredged up that allowing children to play adventures which feature monsters and demons is going to warp their minds and lead them into devil worshipping. It's obviously too late for me!

The cost, however, is the real nub of the problem as it, quite rightly, worries the press and parents. At 38p for 1 minute peak time and 25p off-peak, bills can mount dramatically. To be fair, this fact also concerns Computerdial. Unfortunately, the ball lies in British Telecom's court and they are being quite pig-headed about the situation. The original concept that 'added-value' calls such as, Test Match Scores, Dial a Recipe, etc. were of short duration and therefore could be subject to a high rate, was reasonable, but this new idea requires a rethink. A low rate would attract a huge response from the users, which would result in lower bills for them and even higher profits for BT. While Computerdial continue to put this argument to BT, they are investigating other ways in which they can make the service cheaper. A regular signal has been added to the game to remind players of the passing time, and a new scheme to use a freephone 0800 number combined with a FIST subscription charge is being considered.

A new adventure is in the process of being written by Steve Jackson and it is hoped that this will be available by the Autumn. When this happens I will let you know. In the meantime, if your gold-pouch can stand it, Castle Mammom is there lurking behind the dial. For a free information



pack, send a large S.A.E. to FIST, Computerdial Ltd, 7 Leapale Rd, Guildford, Surrey GU1 4JU.

## Eamon

Having spent all of the Dragon's pocket money on the telephone bill, I decided that any other expenditures this month had better be as small as possible. And where better to look for something cheap than in the Public Domain lists. The disk which attracted my eye was the Eamon Fantasy Role Playing System. I obtained my copy from the Page 6 magazine's library of PD disks, number ST50.

The Eamon system is supplied as a GFA Basic Run-time Interpreter file, plus five separate adventures. The software supplied will enable you to play the games, but does not enable you to create games of your own. Although, according to the READ.ME file, there is a Dungeon Designer's disk available for this purpose in the PD lists. Running the Eamon system for the first time will allow you to enter an Adventurer's Hall and get signed into the book. Once your identity has been created and stored on disk, you are free to buy some weapons and then select to go adventuring in the Beginner's Cave. The purpose of this cave is to introduce you to the simple gameplay of the Eamon system and to enable you to win some easy gold which can be used, upon your return to the Hall, to purchase some additional hardware. The Hall has a Weapons Shop, Wizard Spell Training, Weapon Training and a Bank.

With my 'charisma' bubbling over (as a result of me practising smiling for many hours) I decided to get in amongst the hard stuff and try one of the full-length adventures. The selection on offer is: The Devil's Tomb, The Death Star, The Quest for the Holy Grail and The Zephyr Hero Adventure. The documentation explains that

upon your successful return from each adventure any treasure and experience gained will be added to your character file. Conversely it also means that, should you be killed in a game, your whole character file is deleted and you must start again from the very beginning. For this reason the wise virgin should create a copy of his file elsewhere!

My first taste of these adventures was in the 'Deathstar' game and, frankly, it was awful. There is no gameplay, boring text descriptions and precious little other interest. This did surprise me as the initial set-up in the Main Hall was amusing and quite well done. Nothing daunted, I tried the 'Zyphur' adventure and this was a little better, but not much. So far both games had a minimum of text descriptions and relied on an endless round of simplistic combat sequences for any interest. As the Eamon system is aimed more at the Fighting Fantasy enthusiasts rather than the straight adventurer, a large dictionary is superfluous to this type of game. Fighting fantasy fans seem to be only interested in one direction - Forward! And they recognize only one basic command - ATTACK! The other characters who are to be found in the sparsely described locations appear to randomly attack or befriend you. If you are lucky (and you smile a lot) they will follow you and take the brunt of your enemies' bad-temper.

In desperation I set off in the 'Quest for the Holy Grail' and happily found more than I had bargained for. The writer of this game had realised that if he was to make anything of the simple system available, he must inject a lot of work into the text, in addition to squeezing into the gameplay every possible gimmick he could. The result is a very amusing Monty Python-type game which is as rude as its bawdy original. The dictionary of words understood by all the games is very small, but this game shows what can be done when you are determined to achieve a high standard.

There are supposed to be 150 Eamon adventures scattered around the PD lists and once you have obtained the basic system, it should be possible to play them as well. If there are many more up to the standard of 'The Quest for the Grail' then they are well worth looking out for. Basically the games are free, but a small charge for a disk plus a servicing fee will mean a bill around four pounds or less. One bonus of playing such games is that it convinces you that you could do better yourself. That is the spur which has been responsible for the flourishing of many a new talent. Perhaps it's time you finally sat down and began planning that adventure you always promised you would write? **A**

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(ST World May 1987)

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'Information Representation and Manipulation using Pascal'

E.S. Page and L.B. Wilson  
Cambridge University Press

272 Pages

UK Price £8.95, ISBN 0-521-27096-0

Reviewer : David Gristwood

'CD ROM'

Edited by S. Lambert and S. Ropieque

Microsoft Press

620 Pages

UK Price £19.95

ISBN 0-914845-74-8

Reviewer : David Gristwood

"There are other topics [apart from having been taught a programming language] which it is important for a computer user to know", comment Messrs Page and Wilson, "and the foremost among these are the ways in which information of different kinds can be represented and manipulated in the computer." The resulting book has become one of the standard University texts for Computing subjects.

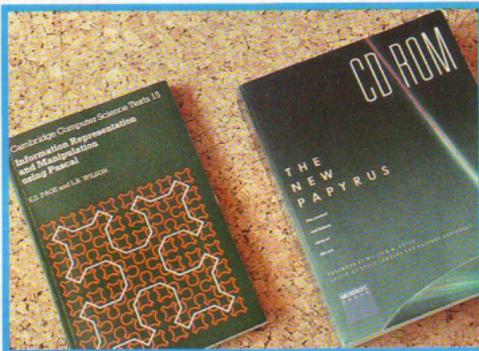
The book starts by introducing the basic ideas of coding theory and how data, such as integers and floating point numbers, is stored. The book progresses to explore the different ways in which data can be grouped together, using structures such as arrays, lists and trees. Finally, the major techniques available for performing searches and sorts on data are examined.

The text is clear and the subject matter well explained, though some may find the academic style of writing a little terse at times. There are plenty of sketches and pieces of code to back up the in-depth study of the various topics.

At the end of each chapter there is a bibliography, as well as a set of comprehensive examples with answers supplied. Working through these questions, some of which are taken from actual University exam papers, is not only a thought-provoking exercise, but will certainly test the reader's understanding of the subject.

As this book is aimed at first and second-year students, the reader is assumed to have a basic knowledge of programming and, in particular, to be reasonably familiar with Pascal. The mathematical analysis of some of the algorithms goes beyond elementary algebra, but fortunately these sections can safely be skipped if preferred.

The importance of the subject, and the excellent way in which it is covered, mean this book can be highly recommended.



Atari, with plans to launch a CD ROM player later this year, will join

several other companies involved with this new form of media. Based on the already well established technology of the audio Compact Disc, the new CD ROMs are capable of storing over 550 Megabytes of data, in a read-only format, on a single disc. Compared with the miserly third of a megabyte available on a standard single-sided magnetic disk, the CD ROM promises cheap mass storage for all.

The book, which is subtitled "The New Papyrus", is actually a collection of some forty or so articles, written by people working in various fields who have become involved with CD ROM. The articles have been arranged into several broad categories, which include how CDs actually work, the processes involved in producing the discs and the vast range of potential CD ROM applications. As with what seems like all Microsoft Press publications, the book contains an introduction by Bill Gates, head of Microsoft.

The authors all have very different styles of writing: some are very precise and exact, whereas others are rather more verbose and vague in their discussions. Some are very interesting while others are, unfortunately, a little slow. The subject matter of the texts also varies enormously. Some refer to their work with existing CD ROM systems, while others debate what future systems may be capable of. Some concentrate on how to put the data on the discs, and others consider how people will interact with the huge store of information that will readily be available. What all the writers do have in common is a belief that CD ROMs will have a profound effect on information technology.

The book contains useful information and thoughts about CD ROM, though the sheer size of this hefty tome may well restrict its audience to those with more than a passing interest in the subject.



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... "At last one that seems to fit most of what I call essential in a word processor" PAGE 6 #34

... "Extremely good for manipulating and merging large text files". "Wins hands down as the all round package". ST USER 8/88

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 Exec files store sequences of commands in files for easy use  
 File conversion flexible file conversion utility for other WP files  
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Program Listings, from  
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Program	Author	Issue/page	Language
3D Vector Graphics	Nick Brown	Issue 18 page 72	Fast Basic
Date/Time	Andrew Bain	Issue 19 page 86	GST Asm
File Editor	Barry Silver	Issue 20 page 72	GST Asm
Picture Dumper	Paul Hellier	Issue 21 page 90	Fast Basic
Menu Demo	J H Taylor	Issue 22 page 92	Hisoft Asm
Plinker	Mark Annetts	Issue 23 page 88	GFA Basic
Grabber	J M Millar	Issue 24 page 109	Fast Asm
Space Duel	Chris Jeffery	Issue 24 page 94	Fast Basic
Encryptographer	Aston Fong	Issue 24 page 98	Fast Basic
Viewtree	David Roberts	Issue 26 page 104	Fast Basic
Pallete Selector	J M Millar	Issue 27 page 104	Fast Basic

For further details of the programs on this disk refer  
to the relevant back issues of ST World, most of  
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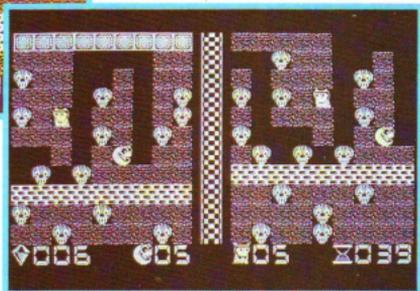
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