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SOFT FILE:

Dreamlands

SUPERBASIC

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ISSN 0951-9335

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M.TAYLOR

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The best programs and peripherals for the QL

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A spelling checker that checks your spelling AS YOU TYPE. Based on a 30,000 word dictionary, works with Quill or The Editor V1.17 onwards on the expanded QL. *£30*

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This is a full feature desktop publisher that has to be seen to be believed. Ask for full details of this system and its support programs. £35

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Now £287

If you are not receiving our free QL catalogue just send your name and address and we will include you in future mailings

MODEM MADNESS!!!

SECTOR SOFTWARE has 100 **TANDATA QCOM STACKING MODEMS** and is virtually giving them away – for **ONLY £39 EACH.** Features include full RS232 output at 75 – 9600 Baud, autodial/answer, Prestel s/w, BT approved. They **NORMALLY COST £129** so don't miss out on the comms bargain of the century – **ORDER NOW** while stocks last!

Sector Software, in association with Qualsoft and T F Services, is also offering the Qualsoft Terminal program for only £2.50 (normally (£30) when you buy a modem. So that's two fantastic bargains for the price of one! (well, almost).

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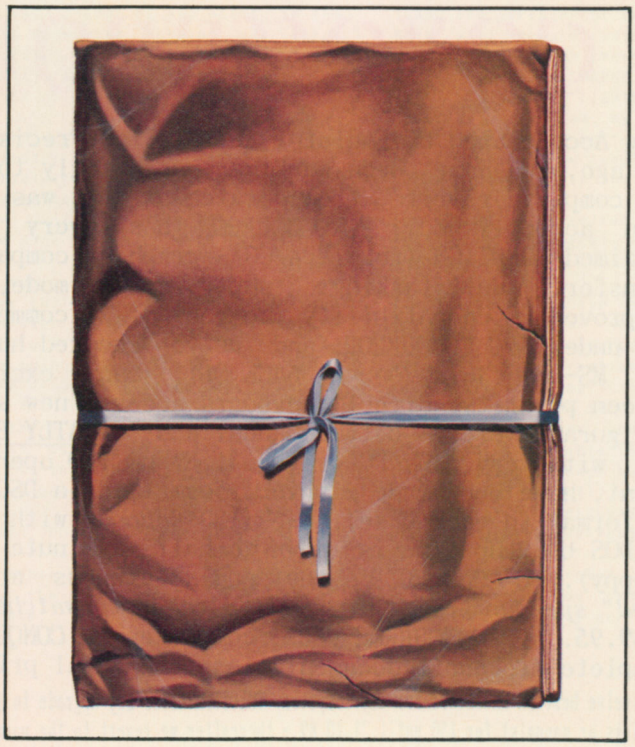

NEXT MONTH

QL ARTIST OF THE YEAR COMPETITION 1989
Software prizes for the creative.

MORE ROM BUGS
Including some fixes and new bugs on the scene.

PC CONQUEROR

PC CONQUEROR is the amazing **Accelerated PC Emulator** by Digital Precision Ltd. Since we completed SOLUTION a year ago, we have been working unceasingly to build an all-new software-based system - a complete rewrite from scratch - that was very significantly FASTER. This has now been accomplished. PC CONQUEROR has **every single** feature and advantage of the much-acclaimed SOLUTION (full MDA/CGA graphics compatibility, QDOS<>DOS bidirectional file transfer, multitasking, supervisor mode, configurability, key-redefinability) PLUS improved PC compatibility (we know of NO commercially marketed PC programs that don't work under PC CONQUEROR, and we've checked hundreds), increased availability of memory to MS-DOS (481K on a 640K QL), many exciting new functions (dynamically adjustable screen priority, direct keyboard access, new supervisor features, all optimisations pre-configurable etc), better manual and GREATLY ENHANCED SPEED, 80% faster than its predecessor with very many PC programs! Even I/O operations, whose speed is largely hardware-dependent, have been made zippier: formatting a DSDD PC disk (allowing for the same 85 sec QL pre-format in each case) takes 123 seconds with PC CONQUEROR vs 202 seconds with SOLUTION; MS-DOS boot-up time is down to half a minute (from Miracle hard disk - twice this from floppy). PC CONQUEROR's feel and smoothness are both far superior to SOLUTION's, so *"perceived" speedups are even greater than stopwatched ones.*

PC CONQUEROR costs only **£89.95**. PC CONQUEROR PLUS comprises PC CONQUEROR + very latest v4.01 MS-DOS/GW-BASIC + complete Microsoft documentation: the total price is **£139.95**.

At the top of this page is a list of the twelve best PC Emulators for any computer. SOLUTION users may upgrade to PC CONQUEROR (return only the SOLUTION manual+disk, NOT any Microsoft disks or manuals) for £50 until 31.10.89 - thereafter we revert to the normally-calculated charge of £60

THE SOLUTION PC EMULATOR

Put quite simply, THE SOLUTION automatically transforms your QL into an IBM PC clone capable of running those famous-name programs you've heard of so often. THE SOLUTION operates solely from software - there is nothing to plug in or disconnect, so you can still run all your QL software. It works this way. Boot up with THE SOLUTION disk. You are now in a PC, and you will be prompted for insertion of an MS-DOS disk (just as you would on a PC). End of story. Forget you have a QL, and run your PC programs (obviously we read/write direct to PC disks). Restrictions are virtually non-existent, as we support both monochrome and colour CGA graphics, and run ALL the benchmark PC software, including quite a few that won't run on a famous UK clone! You have 470K available on a 640K QL setup, or 667K with TRUMPCARD - more than you will get on your PC or XT! Speed is further improved by using LIGHTNING SPECIAL EDITION.

You can go further with SOLUTION than with a PC. You can multitask two or three PC programs, or run a PC program at the same time as any number of QL programs. You can convert files directly between QL and MS-DOS formats (either direction) at speed. You can re-configure your QL keyboard at leisure, so that you use keys of YOUR choice rather than those chosen by the author of the application program You have access at run-time to a powerful diagnostic supervisor mode. SOLUTION can even run other operating systems - CP/M-86, p-system, etc.

SOLUTION is available in two flavours - buy the CHOCOLATE SOLUTION unless you have legal access to a copy of MS-DOS.

LIGHTNING SPECIAL EDITION LIGHTNING

Here are 3 good ways to make things zip onto the screen three times faster: (1) Spend £1,500 on a THOR XVI (2) Spend £700 on an ST QL Emulator (3) Spend under £50 on SPECIAL LIGHTNING, which accelerates QL text printing, graphics and maths by mind-blowing factors, without compromising compatibility an iota. It is very simple to use - plug in a ROM and go, basically. If you want extra features, font-changers, channel-adjusters, smoother scrolling, black holes on line. Std LIGHTNING is 30% slower.

EDITOR SPECIAL EDITION EDITOR

These magnificent programs are not "just" word-processors, though if that is all you want out of them you will not be disappointed.

The EDITORs are for handling ALL types of data, at super-speed. We use the 200+ command SPECIAL EDITOR (vs 100 on Standard EDITOR) not just for preparing documents, letters and LONG manuals, but also as our random-access database (20,000+ customers - try that with Archive!), a printer driver capable of achieving virtually ANY desired result (multi-line headers and footers (which can use all printer effects like underline, bold, italics etc, andw which can change at any point in the document), user-definable page numbering "style" and start position, etc etc), a full-screen programming environment (you can even renumber lines within it), for formatting Accounts and other schedules and for all sorts of odd jobs.

Comparisons with Quill are absurd - both EDITORs are from 10 to 100 TIMES (1000% TO 10000%!) faster than Quill, have far more power and resources, and are absolutely logical and consistent in operation (making them easier to grasp). Most operations that you choose to avoid on Quill (because you know how sluggish it is going to be) are done INSTANTLY with EDITOR.

There is a fundamental philosophical difference between the EDITORs and Quill - with either EDITOR you are in the driving seat, whereas Quill assumes the user is an idiot who wishes to be hand-held ALL the time, who will never make any progress, and who will always want to do things in just one, inflexible, often awkward way. This feature of Quill's makes that program easy to master, but precludes it from being used seriously- after the first hour of use there is nothing more to learn about Quill. The EDITORs are just as simple to learn to use as is Quill - the difference here is that when and if you want to achieve more, you have the power under the bonnet.

Advanced users can program both EDITORs - and with SPECIAL EDITION this goes way beyond simple macros. SPECIAL EDITION also has a Document mode for those who want to get closer to WYSIWYG. Beginners should choose the more user-friendly SPECIAL EDITION - it is much easier to use.

PROFESSIONAL PUBLISHER DESKTOP PUBLISHER SPECIAL EDITION DESKTOP PUBLISHER

If you want to produce high-quality pages incorporating text and/or graphics, you need one of our three DTP systems.

Fully WYSIWYG text and graphics page designers, all of which have cursor-dragged boxes, pixel justification, cameo overview, direct text entry, comprehensive graphics capabilities, importing of ASCII files and EYE-Q screens, a generous supply of fonts/brushes/symbols, font-editing, merging, independently variable X/Y magnification, EDITOR compatibility and much more.

SPECIAL EDITION, which has a higher hardware requirement than the standard DESKTOP, also has more powerful text-formatting, texture fill, larger windows, Quill _LIS file compatibility with the facility to communicate via control codes and translate tables, fast 16x16 font-handling, multi-tasking, improved command entry, enhanced drawing facilities and much more - in addition to all the features of the standard DESKTOP.

PROFESSIONAL PUBLISHER is in a league of its own, providing many features that £1000+ packages lack (in our opinion, the only micro package out there that equals PRO PUBLISHER is Pagemaker on the Mac). PRO PUBLISHER has all the features of the other two programs, plus windows of ANY shape (we mean ANY - convex, concave, circular, re-entrant, whatever), that can be independently saved and sequentially linked (flow-through), wrap-around graphics maintaining pixel-accurate text positioning, hassle-free usage even with Quill _DOC files, interpolation, character sizes upto a massive 192x192 (with spacing and descender position individually settable for each character), snap-to guides, layout templates, full compatibility with the Smiling Mouse (though we still think the program is best without any mouse!), auto grey scale conversions, bending/rotation/stretching, all Boolean functions, foreign character sets, page dimensions specifiable from 48x48 pixels to 960x1600, cut/paste to/from the page/EYE-Q/standard SBYTES screens, etc. Smoothness and control of this program are phenomenal. A good printer driver is supplied as standard - a startlingly excellent one, (with anti-aliasing, user specifiable output dimensions etc) grafiX, is available for a £10 premium.

The best thing about PROFESSIONAL PUBLISHER is that we have made this program the easiest of all our publishers to use....

There are too many words in THIS ad for it to be other than a text-list: it doesn't do any justice to our publisher's powers!

TURBO BASIC COMPILER SUPERCHARGE SPECIAL EDITION BETTER BASIC

Compatible with the entire syntax of SuperBASIC, the legendary TURBO and SUPERCHARGE compilers represent the state of the art. Both will produce instant-loading, stand-alone, multitasking jobs that will run phenomenally faster than interpreted BASIC - on average, SUPERCHARGE achieves 3000% and TURBO 5000% (better still if you use LIGHTNING SPECIAL EDITION in addition - the speedups produced by our compilers and LIGHTNING are multiplicative or better). Both compilers correct interpreter errors, both allow compiled code optimisation to be switchable between compactness and speed.

SUPERCHARGE is limited to a maximum of 64K output code size (excluding dataspace) and can only pass parameters by value, not by reference.

TURBO does not have these restrictions. TURBO alone allows instant linking of tasks, bi-directional pipe communication between tasks, shared variables/arrays/procedures/functions between tasks, creation of keywords, cache array access and rubber arrays, implicit datatypes (allowing integer FOR loops and integer/string SELect), WHEN ERROR on all QLs, more compact code, a 200 command, configurable toolkit, a supremely friendly front-end, selectable 16/32 bit addressing and much much more - including a 300+ page manual! Both compilers are very tolerant of badly/incorrectly written programs - TURBO is even more tolerant than SUPERCHARGE, and auto-corrects most errors, or gives a descriptive report where your intentions are unclear.

BETTER BASIC improves your BASIC programming, by analysing BASIC programs you provide it and correcting them , giving detailed commentary where necessary.

DIGITAL C SPECIAL EDITION
DIGITAL C COMPILER

Ultra-fast, concise, multitasking, portable code, comfortably exceeding the Small-C standard, and a comprehensive C and QDOS library is what both these compilers share. Wherever possible, QL BASIC names have been used for library keywords, with identical parameter requirements - this makes "getting into" either DIGITAL C very easy. Compared to Metacomco C, the speed of DIGITAL C is EXTREMELY gratifying - and the power of DIGITAL C is such that the whole compiler (parser, code-generator and linker) were all written in C and compiled by DIGITAL C! Speed of compilation is stunning - DIGITAL C takes 10 seconds to code-generate from a large intermediate file, where other products on the market take anything from 45 seconds to 45 minutes.

The SPECIAL EDITION goes much further than the standard version, discarding the 64K code-size limit, providing long ponters, constants and integers, giving direct m/c access to traps, adding new library commands, redoing old ones in handwritten assembler, giving selectable 16/32 bit addressing.

The latest SPECIAL C provides support for Structures too!

EYE-Q GRAPHICS SYSTEM
ULTRAPRINT
3-D PRECISION CAD SYSTEM
SPRITE GENERATOR

EYE-Q is a beautifully smooth 2-D graphics system, easy to master, characterised by absolute consistency of operation: the same key combinations do the same work, whatever the mode. This makes mastering this program very easy! Free-hand or technical drawing, magnification, pan/scroll, stretch, transfer, hierarchical undo (so finger-slip isn't fatal), recolour, intelligent fill, variable cursor size/speed, all colours/stipples supported. Remember the 15-20 QL graphics programs that used to be around? This one made all the others obsolete. EYE-Q has that hard-to-define "feel" of a real classic system: it is silky smooth. It is an excellent complement to our desktop publishers too, and with PROFESSIONAL PUBLISHER it is absolutely unbeatable!

ULTRAPRINT is a revolutionary printer-driver allowing the STYLE of output (high contrast? edge sharpness? smooth tones? size?) of EYE-Q screens to be under user-control: no one style can possibly be "correct" for all picture types. With its 22 output modes, ULTRAPRINT is a must, irrespective of whether your needs are artistic or technical.

3-D PRECISION lets you define and manipulate 3-D objects, with full control over perspective, magnification, orientation, rotation etc using a user-friendly front-end program. High resolution, extreme accuracy. Even fast enough for real-time movement! No programming is involved. But IF you can write in BASIC or assembler, access to the supplied 100+ command graphic manipulation toolkit means you can program everything with great ease! The screen output of 3-D PRECISION may be directed to a plotter or saved (producing an SBYTES screen) for use with EYE-Q, ULTRAPRINT or PROFESSIONAL PUBLISHER.

SPRITE GENERATOR moves objects around the screen with flicker-free smoothness. As many as 256 sprites each with up to 16 "frames" and individually variable speed, 256 object planes, 4096 exciting special effects, many serious uses.

SUCCESS CP/M EMULATOR
SUPERFORTH COMPILER

SUCCESS is to CP/M what SOLUTION is to MS-DOS. With SUCCESS, you have access to thousands of CP/M programs - and this emulator works at HIGH speed, equivalent to a 2 MHz Z80. No knowledge of CP/M is assumed or required. Full details of public domain sources for CP/M software is provided within the manual. Some CP/M utilities are supplied gratis.

SUPERFORTH is THE CLASSIC QL FORTH-83 compiler, quickly producing ultra-fast, stand-alone, multitasking code. The FORTH standard is rigorously adhered to. Many extras are supplied, including a full QDOS library. REVERSI is supplied free with SUPERFORTH - in FORTH source form too. The manual contains a detailed FORTH tutorial.

IDIS SPECIAL EDITION
IDIS INTELLIGENT DISASSEMBLER

These programs translate all 68000 machine-code (= what all QL commercial programs comprise) into something that makes sense.

The BEST way to learn machine code is to use a disassembler: but non-intelligent ones make you spend all your time on the boring, time-consuming, repetitive hassle of discriminating between code and data, of untangling "mingled" routines/hierarchies, of working with addresses instead of names, etc. IDIS is super, doing away with all that and leaving a minimum of decision-making to you.

IDIS SPECIAL EDITION does ALL the hard work, having the highest level of automation - it is only for use on expanded machines. It even allows you to disassemble keywords, do trial/scout disassemblies etc. The use of IDIS SPECIAL EDITION for criminal purposes is NOT encouraged.

MONITOR is a straightforward tool intended for dynamic use, examining programs as they run (as opposed to the disassemblers, which carry out static analysis). Use with IDIS.

MEDIA MANAGER SPECIAL EDITION
MEDIA MANAGER

These programs manage and control disks and cartridges, allowing sector access and correction/retrieval of corrupt data to cope with all sorts of possible calamities. These programs are NOT just for when something goes wrong, but serve for everyday use too.

The SPECIAL EDITION has been totally reworked to make it much more logical, concise and easy to use than the standard version, while actually providing more facilities (including a bi-directional communication facility with MS-DOS media). A must if you value what you store!

No more need you be terrified of "Bad or changed medium", "Read/write failed", "Not found" and others of that ilk!

PROFESSIONAL ASTROLOGER
PROFESSIONAL ASTRONOMER
SUPER ASTROLOGER

PROFESSIONAL ASTROLOGER and ASTRONOMER provide a system of unrivalled power - all the expected features from a top-notch system (natal charts, wheel-printing, transits, progressions, synastry) and lots of unexpected bonuses (full analysis in English - often stretching to half a dozen A4 single-spaced pages - of all types of calculation), calculation times <0.5 seconds, every orb of every aspect user-definable, user-selectable house system, auto-printing of a batch, customisable and re-writable interpretation files etc. A very comprehensive manual assumes no knowledge of astrology or astronomy and teaches you everything - ideal for beginners.

PROFESSIONAL ASTRONOMER incorporates planetarium as well as infinite-perspective tiltable views of the planets, telescope views of the faces of the inner planets plus moon (showing shadows exactly) and a choice of 5 co-ordinate systems.

SUPER ASTRO is much less ambitious but represents excellent value. It is not suited for beginners, though.

ADVENTURE CREATION TOOL

ADVENTURE CREATION TOOL does what its title says - but the system can be used for virtually any programming application, including the use of graphics, animation and simulation. If you want to use this to generate adventures, everything has been made very simple. An excellent TURBO accessory.

MICROBRIDGE

MICROBRIDGE not only gives you 3 opponents for a Contract Bridge session, but is a Contract Bridge bidding tutor too, with 16 graded lessons and a very helpful manual.

TRANSFER UTILITY

TRANSFER UTILITY moves programs from microdrive to disk, and performs whatever translates you wish while so doing.

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KEY>>		
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	Available only on disk	b
	Minimum 512K RAM:only available on disk	c
	Minimum 256K RAM:either cartridge or disk	d
	Minimum 256K RAM:only available on disk	e
	Available only on cartridge	f
	Compatible with all THOR machines	T
	Compatible with all THORs except the THOR XVI	t

TERMS AND CONDITIONS> E&OE

* All our programs are very comprehensively documented.

* UK purchasers - the above prices are all inclusive.

* For the rest of Europe, add 5% to the above to cover all extra charges. Rest of the world, add 10%.

* Acceptable forms of payment are sterling cheque drawn on a UK branch of a bank or building society, sterling cash, sterling postal order, Eurocheque made out in sterling, international money order in sterling, VISA / ACCESS / EUROCARD / MASTERCARD (specify expiry date), foreign currency cash or cheque (add 10% conversion charge), direct money transfer (write to us notifying us of the transfer, and ensure that all charges are paid your end, or add 5%) to A/C 50327808 DIGITAL PRECISION LTD at Barclays Bank PLC (Branch code 20-79-44), South Chingford Branch, 260-262 Chingford Mount Rd, London E4 8JN.

* To upgrade from one version of a program to a later/superior version of the same program, send us the cartridge/disk. Except in the case of upgrades to EDITOR SPECIAL EDITION (SE), MEDIA MANAGER SE, LIGHTNING SE & PC CONQUEROR EMULATOR, do NOT send the manual too. The cost of an upgrade is £10 plus the difference in current advertised price between the two programs (e.g. upgrade from DIGITAL C to SPECIAL EDITION DIGITAL C costs £30).

* Our programs are all freely transferable between cartridge and disk, are all free from copy protection, and all work with all drives, toolkits, RAM add-ons, disk interfaces (except for programs (1),(4),(9) & (26) which object to the MCS interface's non-standard device-handling) and the ST/QL Emulator. Users of the Microperipherals interface are recommended, in their own interest, to buy the QFLP ROM upgrade from Care Electronics.

* Digital Precision is the trading name of DIGITAL PRECISION LIMITED, Company Registration No. 1833989.

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The following attractive offer replaces and supersedes all earlier offers and deals:

* Buy ANY TWO programs, get a 25% discount on the less expensive one.
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And so on.... We'll compute the total for you if you wish.

PROGRAM COMBINATIONS WE WOULD ESPECIALLY SUGGEST INCLUDE:-

+ EVERYTHING BENEFITS FROM LIGHTNING SPECIAL EDITION. TO A LESSER DEGREE, EVERYTHING BENEFITS FROM LIGHTNING.
+ EDITOR AND SPECIAL EDITION EDITOR ARE BOTH TERRIFIC WITH ALL OF THE COMPILERS (ESPECIALLY TURBO AND DIGITAL C SPECIAL EDITION), THE EMULATORS (SUCCESS, SOLUTION AND PC CONQUEROR), MEDIA MANAGER, MEDIA MANAGER SPECIAL EDITION, IDIS, IDIS SPECIAL EDITION, AND PROFESSIONAL ASTROLOGER. IF YOU'VE THE RAM, GET THE SPECIAL EDITION.
+ A SUPER SET-UP INCLUDES ONE OF THE DESKTOP PUBLISHERS (PROFESSIONAL PUBLISHER IS THE BEST) TOGETHER WITH EITHER EYE-Q OR EDITOR SPECIAL EDITION OR, BEST OF ALL, ALL THREE (PRO PUBLISHER, SPECIAL EDITOR, EYE-Q).
+ PROFESSIONAL PUBLISHER LOVES GRAFIX.
+ EYE-Q LOVES ULTRAPRINT.
+ SPRITE GENERATOR LOVES EYE-Q.
+ TURBO AND DIGITAL C SPECIAL EDITION GO WELL TOGETHER.
+ BETTER BASIC AND ADVENTURE CREATION TOOL LOVE TURBO.
+ 3-D PRECISION GOES VERY WELL WITH EYE-Q AND PROFESSIONAL PUBLISHER.

****

* UPGRADES COUNT AS PROGRAMS WHILE COMPUTING SPECIAL DEALS! *

STOP PRESS!

£30 off TURBO SUPERBASIC COMPILER

Offer expires 15th October 1989

* Buy PC CONQUEROR *NOW* - prices may RISE!
* We have dramatically slashed SOLUTION's price!

We will be at THE THIRD ALTERNATIVE MICRO SHOW 10am-5pm Saturday 11th November 1989 at Bingley Hall, Staffordshire Show Centre.

- Cut here -

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Please send me: _____

Name: _____ Address: _____

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Delete as appropriate: (QL / THOR) (Mdv / 3.5"disk / 5.25"disk) (720 / 1440 sectors)

Enclosed: CHEQUE/PO/CASH/VISA/MASTERCARD/ACCESS/EUROCARD for £_____ Signature: _____

Card No: _____ Expiry: ___/___

DIGITAL PRECISION LTD

QL SCENE

Jan Jones book now back in print

Since references to *QL SuperBasic – The Definitive Handbook* by Jan Jones in *Troubleshooter last month, QL World* has received a number of letters and calls with helpful information.

The most helpful information came from Phil Borman of Quanta, who advised us that Quanta had already obtained permission from Jan Jones to re-publish this essential QL reference work, and would supply it for £8 plus £2 post and packing. The volume is also advertised by Sector Software at £8 inclusive of post and packing.

Some readers twitted us with not noticing that the book – apparently irretrievably out of print – was being advertised by Sector in the same issue. Touche. In mitigation, we plead that we were in discussion with an eminent member of Quanta on the subject only the previous month. He was apparently unaware at the time that contact had already been made and negotiations were proceeding.

Thanks to everybody who sent information or suggestions, particularly John Watson, Jan Jones' original editor at McGraw-Hill.

THOR STRIKES OUT WITH CHANGES

Thor International has found a new backer and has implemented a number of changes within the company.

Helmut Stuven of Thor International and Dansoft told *QL World* that Thor International I.S. – signifying a private partnership in Denmark – is now Thor International A.S., a business issuing shares. According to Stuven, a third party now holds the majority of shares in the company, but the right to design and manufacture all models of the Thor are retained by himself and David Oliver of CST.

Although, according to both Stuven and Penny Oliver, David Oliver continues to be involved in the development of the Thor, he is not at present employed by Thor International and has left Denmark to undertake contract work, probably in the United States. Said Penny Oliver in July: "We have run out of money and cannot afford to stay in Denmark at the moment. I have work to go back to in the States, and David may get a job there as well." David Oliver is apparently on call to Thor International when the company's trading plans with the U.S.S.R. are on a firmer footing.

Stuven told QL World: "We have succeeded in getting a written order from one of the five companies we are working with in Russia, involving 1000 computers and peripherals, and worth about £2,000,000." Political changes in the U.S.S.R. at the beginning of June, however, have left Thor International waiting while an export certificate is produced to allow their customers to export goods to the West to pay for the computers.

The export licences are a new development in the U.S.S.R. Issue has apparently stopped before it started while the ministry concerned awaits a new minister.

Restrictions on exporting and converting the rouble make a form of barter necessary in trading with the Russians, said Stuven.

Moves are going ahead to seek a licence from Unisoft in the U.K. to port an older version of Unix, in widespread use in the U.S.S.R., to the Thor 16/20, said Stuven. The necessary investment could be over £300,000, so this would be a long-term development.

Thor International will be available by telephone up to 4pm from September. The revised telephone numbers, following changes in the Danish exchange, are (from the U.K.) 010 4533 93 03 05, or 010 4533 93 75 44. Fax is 010 4533 93 82 92.

QL SCENE

Scanner from Germany

Juergen Falkenberg in Germany is marketing a colour scanner, the QL-Scanner, for high resolution digitisation of pictures. The QL-Scanner runs on a QL of minimum 256K expansion, or CST Thor, together with 'nearly any printer'.

The package contains an interface, the QL_A/D_1, a reflection sensor, the A/D_DS_1, the scanner software and an adapter suitable for many printers, which can be exchanged quickly for the printer's standard head to make full use of the scanner's capabilities.

The software, says Falkenberg, can be adjusted via two parameters to any printer, whether or not an adapter is available at present. There is a facility for ordering custom-made adapters, or building your own adapter following instructions supplied on request.

The scanner is designed so that all pixels are stored separately and can be redefined during scanning without having to repeat the scanning. Change of contrast and inversion can be implemented quickly, and proportional hard copy of the screen can be taken in three colours on a standard printer width, or black and white in multitasking mode.

The A/D_1 interface, says Falkenberg, can also be used as a computer-aided measurement interface for a variety of functions. Falkenberg also supplies add-on boards for such functions as temperature sensing, personal alarm, speedometer and others.

For prices and information in the UK, contact TK Computerware, Stone Street, North Stanford, Ashford, Kent TN25 6DF. Tel. 0303-81-2801.

For details in Europe contact Juergen Falkenberg, Hachelallee 84, D-7530 Pforzheim, W. Germany, local telephone 07231 35269.

S.U.B. NUMBERS

QL Super User Bureau is concerned that somebody is trying to discredit it after rumours have circulated that it has not been contactable.

While QL World has occasionally had complaints that QL S.U.B. has been slow to respond to a specific request or order, or that only an answering machine has not been available, we have normally been able to get hold of them by telephone or fax at their normal numbers during the hours advertised.

QL S.U.B. is available for general enquiries by telephone on 0388-450610 four line exchange only, Monday to Friday 9am to 5pm, and for S.U.B.

Helpline enquiries on the same number Mondays to Thursdays 1pm to 7pm. Their fax number is 0388 601516. Please mark all faxes FAO SUB. By Email, the Prestel number is MBX 219998590, or via Prestel QLeaps bulletin board on 0388 773737 at any time.

QL S.U.B.'s address is P.O. Box 3, Shildon, DL4 2LW. Visitors are welcome by appointment.

Eurofair line-up

The latest list of QL suppliers attending the European Microfair organised by Club Sinclair BruQsL includes the Van der Auweras showing *The Painter*, a vector drawing program and a new word processor; Thornado Systems, Jochen Merz showing a QL Emulator, Rebel Electronics with their hard disc and controller, D.J.M. Import with spares for all Sinclair computers, SPEM with various pieces of hardware including the Digitiser, T.F. Services, Miracle Systems with their hard disc, Tony Tebby from QJump, and Quanta. There will also be a roster of Spectrum dealers. Quanta is organising a minibus to the Microfair. Information about the trip is available from Phil Borman at Quanta.

The European Microfair takes place at the Eurovolleycentre, Beneluxlaan 22, 1800 Vilvoorde, Brussels (exit 6 on the Brussels ring road), Belgium on 21 October. Information, travel, and up to date details of the Fair itself are available from Jacques Tasset, Secretary, Club Sinclair BruQsL, Aarlenstraat 104, 1040 Brussels.

Disc wait

A QL World roving reporter saw the Rebel Electronics hard disc and controller at a recent Quanta event. He reports that Rebel are still ironing out the details of the expansion backplane and are not yet ready to issue a model for review. "The people who already have one seem to be perfectly happy with it," he reports, "but at the moment they are still the ones who know what to do with a soldering iron."

Miracle Systems is supplying its QL Hard Disc system but has a waiting list 'of about three weeks'. QL World expects to review the system when Miracle has cleared the backlog and has a spare unit available.

Miracle Systems has now ceased to market the Expanderam, preferring to concentrate on the Trump Card 768K Ram and disc interface.

Further information can be obtained directly from Rebel Electronics on 0757 86630 and Miracle Systems on 0904 423986.

OPEN CHANNEL

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1 1DG.

Boot

I was somewhat annoyed to see 128K boot programs still being advertised for sale in *QL World*. Enclosed is a 16-byte routine which will perform this most simple task. Under your normal rates for publication, I think this program comes to approximately 27 pence, in my opinion a fair reflection of the number of seconds it takes to write a program of this type.

This is scarcely worth a hex-loader, so why not use a decimal one?

```
10 DATA 20032, 124, 1792,
   10364, 4, 0, 20216, 388
20 A=RESPR (16)
30 FOR F=0 TO 14 STEP 2
40 READ N: POKE_W
   A+F, N: END FOR F
50 SBYTES
   MDV1_128K, A, 16
```

Add a BOOT program:

```
10 A=RESPR (16):
   LBYTES MDV1_128K,
   A: CALL A
```

Save this as MdV1_BOOT, and you have saved several pounds. To use this, put the cartridge in mdv1 before pressing F2/F1 on start-up; the machine will then appear to reset yet again, and you put the cartridge containing your offensive "This will run only on a 128K machine" program into mdv1 and press F1/F2 again.

Robert Goodwin
Guildford,
Surrey

Editor's notebook

The most interesting news this month is that Thor International is making definite headway in its drive to put the Thor into mass production through the medium of a major deal with the Soviet Union. The deal appears to be waiting at the terminus for take-off as I write, but the Soviet bureaucracy must one day creak into action again, and then: Go East, Young Machine.

Nearer home, the publication of QL Playwright may seem like a minor note in the QL symphony, but authors writing for screen and stage know that laying out a script with dramatis personae and directions is a major headache for wordprocessor users, and they will be greateful.

In the September issue we published the results of the 1988 Artist of the Year competition. Next month – all being well – we should have details of the next art competition. Start sharpening your keyboards.

Lastly, late last year, a Mr Parrott sent us a proposal for a series of articles. This proposal, we now know, was lost in the post with all documentation in early 1989. If he would like to risk contacting us again, we will try again.

```
Page 1  QL Macro assember version 1.10

  Loc    Object      STMT      Source statement

                       1  *Sets expanded machine to behave
                       2   as an unexpanded 128K machine
                       3
0000'  4E40            4    Trap    £0            Supervisor mode
0002'  007C 0700       5    ORI.W   £$0700,SR     Disable interrupts
                       6
0006'  287C 0004 0000  7    MOVEA.L £$40000,A4    Address for 'top of
                       8  *                          physical RAM'
000C'   4EF8 0184      9    JMP     $0184         Reset
                      10
                      11    END
```

Ark

Recently I wrote to Ark to enquire about the *Master Spy* editor. I wanted to know specifically whether the editor cold be invoked using the *Toolkit II* command EX and the names of the file to be edited, passed as an option string such as:

```
EX MS; flp2_file_txt
```

In little more than a week I received a copy with a letter stating that my enquiry had provoked much hacking and as a result a new version had been produced which could be invoked in the foregoing manner.

I would like to thank Ark for the superb service and would commend Master Spy to anyone programming on the QL. It is fast and flexible and an ideal editor for programming applications.

S. Bedford,
Bracknell,
Berkshire.

Loot

I have a problem with a program, *Home Finance*, which centres on its inability to run on the expanded QL, giving the erroneous "out of memory" report.

I have tried ways of overcoming this and then saw page 43 of the November 1986 *QL World*, in which Colin Opie gives a solution to the problem – see figure three in that article. Unfortunately I cannot make this solution work on my machine, getting an error message:

```
At line 200 bad name
```

What I am trying to achieve is a means by which I can run this program the SuperBasic environment of *Taskmaster* which means I have to avoid shrinking the memory as I do as present.

I am using a JM QL with two Sinclair disc drives and a Miracle Systemd 512K Expanderam. I have a very limited knowledge of programming. I like my QL, use it a good deal, and rely heavily on your magazine for gradual instruction in Computerese.

Noel Boland,
Cotswold Hills Gold Club,
Ullenwood,
Cheltenham,
Glos. GL53 9QT.

Buzz

I have a standard QL with Miracle Systems 512K Expanderam and the QL *Home Finance* program by Buzz Software. With the Expanderam fitted, all programs load correctly, except for Home Finance, which runs, displays the title page, runs a few more seconds, and then displays "At

line 200, out of memory." I understand that this program was designed for unexpanded QLs but I feel there must be a way round it.

H M White,
18 Grasmere Road,
Frodsham,
Cheshire WA6 7LW.

Editor's comment: Users with memory expansion units often experience problems with certain programs written for the unexpanded QL, especially the original Psion quartet. If anybody has experience of this combination, the readers concerned would doubtless be very grateful for any advice you can give.

Neither correspondent says whether he has tried contacting Buzz or Miracle Systems for advice. The publisher/manufacturer is the first and best recourse when problems arise with specific packages.

Fast

I was interested in the article Whither the QL? in the May 1989 issue. I believe the major problem is not with hardware – the QL is good but everyone would like more immediate/faster operations – but with the software which is, because of the operating system, specific to the QL in most cases.

We were faced with a similar problem in the Xchange Users' Association. This excellent integrated software is also available in enhanced form on other machines including Apricot, IBM and Amstrad PC-compatibles, either complete or in the more limited PC4 version.

Psion has informed us that it has no immediate plans to update the software. At our last annual meeting, however, we decided to continue the Association. Many of the users have large databases and have invested time and money in the software, which performs its tasks adequately.

We would all like to improve and update the programs but to change to a complete new language, with possibly incompatible data files, would be a step which is not, in the view of many users, worthwhile. It is important that manufacturers recognise that fact.

We at the Xchange Users' Group would be happy to welcome QL Xchange users into our organisation.

John Hanford,
Xchange Users' Association,
Freepost,
Beckenham,
Kent BR3 2BR.

TRA

I have read several times about a new command for the JS ROM, TRA, but I have never seen its syntax. As it translates characters to the printer it could be the solution for the 10 translatable characters allowed by Quill.

I am using Metacomco Lattic C, but I found the linker – GST Linker R101V030 – too slow. Does anyone know a faster one? Where can I get the Sinclair Relocatable Object File standard? I could write a new, faster linker. Does anybody have any clues?

Joao Cardoso,
Pr. Sousa Caldas 102-42
4400 VN GAIA,
Portugal.

Post

Normally my QL travels around in a briefcase with a disc drive and box of connectors. We go through severe baggage searches in hotels, and work on other people's printers. Mr Tony Firshman's lifeline services kept me going last year with a repair that took from a Fax enquiry on Wednesday to being back in Jordan from London and in use by Monday night. Salute the postal services between Jordan and the UK, and Mr. Firshman – and all in the teeth of secruity blocks on electrical packages by post.

Roy Myers,
Haddington,
East Lothian.

Help

After several attempts to recover an unclosed Archive file with the variety of recovery programs available, I hit on the simple expedient of creating a file for test purposes, duplicating it under another name, then deliberately omitting to close one of the files.

Then I examined the two files in the 'edit file' facility of QKick file was missing the 'v' from the file header, normally vrmldbf. It was easy to restore the 'v' via the edit facility and re-save the file. When tested in Archive, the file was readily opened and behaved normally.

This has saved many headaches with files I though were lost for ever because of mains glitches and also pure carelessness. I hope this will be of use to other Archive users who have suffered similarly.

G. M. Young,
Ravenshead,
Nottingham.

Editor's comment: As I am at this moment struggling with a major file loss caused by – we think – a minor procedural error, I can say with feeling that I hope that Archive users everywhere will bless your name many times in the future.

Dump

I am thinking of buying an Integrex 132 colourjet printer for my QL. It is claimed that this printer is supported by screen dump software for the QL. I need a printer for heavy duty colour graphics and text printing and consider dot-matrix ribbon printers unsuitable.

I would be grateful for any advice *QL World* readers could give me on this printer and on software which would enable it to be used with the QL, or any other suitable colour printer for the QL.

Kieron Salmon,
Robon Hill Cottage,
Water End,
Stokenchurch,
Bucks HP14 3XQ.

Loose

I mailed a letter and Microdrive cartridge to you on June 12. A few days later the Microdrive cartridge was returned to me by the Post Office stating that "This article has been found loose in the post." Luckily I had labelled the cartridge cover with my name and address.

You may like to quote this as a warning and suggestion to readers, this time I am using the envelope method.

E. Bamber
Milngavie
Glasgow

Editor's comment: Putting the owner's name and address on a label on all Microdrive cartridges sent to this or any other publisher is a useful safeguard against loss but the single most effective safety devices is to fasten the mdv case firmly to its covering letter, so that the cartridge can be slotted in and out of the case without separating it from the paperwork. Putting loose cartridges in envelopes, as many folk do, is asking for migrating Microdrives.

Speed

I have modified Giles Todd's DIY Assembler and obtained a 79 percent speed increase: 28 percent from the use of a temporary file as suggested by Giles Todd, and 72 percent from restructing several key modules.

The only 'enhancement' I have added is the ability to use lower case input. Output has been checked using a dissassembler. I have also corrected the bug in the line 12800, which related to addressing errors subsequent to an ASR instruction.

Graham Worsnop,
Sutton,
Surrey.

List

Most users have the translate to print the correct £ symbol (£, esc, R, ETX, #, ESC, R, NUL) but where can one get the full list of translates to get the full keyboard to work correctly?

Norman Durrant,
185 Portland Road,
Edgbaston,
Birmingham B16 9TD.

Code

I am a dabbler in machine code and would like to pass on the following tip: with MOVEQ the limit of transferring data is 128-127, that is ##–$80 to ##7F. To transfer 128 the usual way is MOVEL ##80Dn. An alternative is:

MOVEQ ##–$80, Dn
NEG. L Dn

I have tested both over 20 million loops. The times are: empty loop: 64 seconds; usual method: 152 seconds, including empty loop; alternative: 131 seconds, including empty loop.

C. D. Seaden,
Foxhole,
St. Austell,

TROUBLE

A PROBLEM SHARED

Bryan Davies looks at the prospects for memory expansion on the QL

Some useful information has been provided in answer to my query about connecting buffered and unbuffered adapter units to the expansion port. **Graham Priestley**, who was responsible for hardware design at CST, states that the original QL design assumed little expansion would be required, a 512KB addition to memory which Sinclair never produced being thought sufficient. It was expected that Microdrives would be the only storage medium. The expansion port is unbuffered, which made it cheaper.

The strength of the signals available through this port is such that only a limited amount of external circuitry can be driven, unless buffer chips are provided. Buffering does not solve all the problems of connecting devices externally; there is also the matter of establishing reliable communication between devices and the CPU chip and handshaking is used to indicate completion of data transfers.

Those who follow the development of PCs will be aware that distance is becoming critical in their main board design, with the rapidly-increasing operating frequency of CPU chips — typically 20-33MHz and rising towards 50MHz — placing a premium on first-class PCB design; the U.S. restrictions on generated radio interference from the PC also constrain the designer, so that the time appears to have arrived when the really good designers are being sorted out.

Obviously, the considerations with the QL were on a lower level but nevertheless the expansion devices produced varied considerably in their design quality. The 68008 chip expects signals to be returned in less than half a cycle of the 7.5MHz clock and this is a tight schedule on all the wiring, PCB track, connectors and components of a typical expansion path.

Most QL peripherals are apparently designed to work without the use of wait states, deliberately-introduced delays to allow operation of slow devices to be synchronised with the fast CPU and, the further from the CPU they are, the more chance there is of devices returning inaccurately-timed signals to it.

EPROMs may not work reliably in an expansion chassis for this reason. The problem can be avoided by keeping the signal path short and this was done with the Trump Card and the earlier Medic interface. The alternative was to use a much more complex design, with the appropriate circuitry for ensuring correct timing; the CST +4 unit was such a device and no doubt many users like myself eagerly awaited further details of that, when it was first mentioned several years ago. Unfortunately, some existing devices would not have worked with that unit and the all – CST solution was too expensive for most tastes, although a few hundred were sold and CST designs set the standards for others.

One further thought concerns the way Sinclair used pins on the 64-way connector for decoding the addresses of expansion devices. The expansion slot appears to be in the lowest 16KB of the hardware expansion area and 16 devices can be connected but, if they follow the Sinclair numbering standard correctly, some combinations of cards will not work. A disc interface and memory card can work together but a disc interface and a second hardware expansion card cannot, unless one of them is modified to appear at a different slot number.

Priestley has offered technical assistance on QL or Thor constructional projects. In case there is a flood of requests, we are not publishing his address — letters should be sent care of QLW.

Not unbufferd

Returning to what prompted my original query, it would seem that an unbuffered multi-way expansion adapter card is not the proper way to go. It might work to some extent but only with certain expansion cards. It is a pity there do not appear to be any really "commercial" buffered adapters now available. You are still limited to one expansion card in the main expansion port.

We are always in the situation where the user cannot influence directly what is being produced. One has to wait for new products to appear and then buy them if they offer sufficient of the required facilities at a suitable price. That leaves gaps in the range of available hardware, some of which may be evident to designers, but the commercial potential may be thought too limited.

Taking users of the Trump Card as likely purchasers of further enhancements, what do such users think is missing from the market? For example, there are several useful programs available on plug-in ROM modules — *Ice* and *Lightning* for instance — but they cannot all be used together. You have a problem if you want to use more than one such ROM. Units have been sold which allowed several ROMs to be mounted on one PCB but I believe they all operated on the basis of switching in only one ROM at a time, not really satisfactory.

Copyright and space problems presumably prevent several programs being put on to one ROM unit; it would be difficult to decide on a configuration to suit a significant number of buyers anyway. Incidentally, my experience with the Ice ROM suggests that anything plugged into the ROM port needs to have an additional attachment, beyond the connector. A U-shaped wire bracket, going round the ROM unit and screwed to the QL casing at either side of the port, got rid of occasional strange behaviour; Samsung QLs have a spring to press on to anything inserted into the port. Once the Trump is in place you cannot fit any other expansion cards. Even if you could fit them there would be the problem of finding address space for them, since the Trump takes up the spare slots. If you want to connect both a serial and a parallel printer there is no parallel connector.

Being more ambitious, what are the chances of improving the QL operating speed and memory capacity and adding the capability to handle high-density floppy drives? Presumably, the original layout of the QL makes it virtually impossible to run the whole machine at the full 7.5 MHz and a faster CPU would gain us nothing. The full 16-bit or 32-bit CPU chips no doubt create major integration problems; could they be added separately from the 68008?

Priestley mentioned that the SCSI/2 interface specification, as used for hard disc interfacing, includes provision for the linking of slave processors; could the display and printer be driven by such a fast processor and permit much better resolution and speed for desk-top publishing and CAD?

The 68020/68030 CPUs have found favour in the PC world for driving laser printers, where there is a large overhead of conversion work to do to make the PC program output suitable for driving the basic laser engine. RAM of 1MB has all but become the basic amount on several types of micro and even the 16MB potential of 80286 and 80386 PCs has soon been overwhelmed by ways of more than doubling that amount.

There would not be too much point in increasing the available memory of the

SHOOTER

EMSOLVED

QL greatly until faster operation were possible but a fair number of users would be interested in raising the total to 1MB — what happened to the Sandy design? Once having used high-density 1.2 and 1.44MB floppy drives, the 720KB in the QL system seems restrictive and we are soon to be faced with 2 or 4MB drives as a new standard on PCs, if one accepts magazine comment on the subject.

text^{87} now has French and German versions. The latest version of Tony Tebby's *QTyp* spelling checker caters for the English version of this program; check before ordering but I think it likely the German version is also supported. Further enhancements to text^{87} should be available before the end of the year.

FlashBack Special Edition is receiving final touches and it is hoped copies will be available by the time this article is published. For those who are not aware of the main reason for the delay, the programmer who was writing the add-on modules withdrew because of other commitments and the original writer of FlashBack stepped in late in the day to get the project completed. The revised version of Lightning and Media Manager Special Edition have now been available for some weeks; for those who want to gain every bit of extra performance the latest Lightning is well worth investigating and the new Media Manager is a considerable improvement on its predecssor.

A surprising number of Tandata modem sets have seen sold recently; the total is estimated to be around 500-700, with more to follow. The obvious reason is the very low prices — £29-£39. Sector Software should by now have sold all its stock of the complete set of three units — but expect to have two-unit sets — without QCall, therefore lacking auto-dial and auto-answer — available for £29 inclusive of VAT. If any recent buyers have found that the supplied software does not work with an expanded QL they can try contacting Tandata, which has been supplying the later software at low cost; version 2.2 is suitable for expanded QLs. As Tandata has obviously cleared its stock of units it may not be prepared to deal with enquiries for much longer.

I hope that alert readers who read Trouble Shooter in the August issue, then looked at the end of the Sector Software advertisement in the same issue, will not think too badly of me. My comment about the possible cost of reintroducing Jan Jones' book *QL SuperBasic — the Definitive Handbook* were made some time before that advertisement was made up and it was not known to me that David Batty had been successful in obtaining permission to sell the book without having to find as much money as had been suggested previously. The price of the book is £8 from Sector Software. For anyone who does even a little SuperBasic programming, this is *the* reference book. The reprint is being published by Quanta — see *QL Scene*.

Checking through cartridges sent to *QL World* with programs on them it was no surprise that some of the programs did not run or gave errors. Roughly two-thirds of the cartridges checked showed a total sector-count — the figure on the right after a directory — of less than 218, with a few showing less than 210. To make matters worse, the difference between the "available" and "total" figures in several cases was more than the 2-3 sectors, which is about the limit for trustworthy cartridges. A reasonable Microdrive and cartridge combination will give 218/220 or more.

Clean drives

This is just another reminder to check your Microdrives; push the rubber roller down on the motor shaft and clean the debris from the roller with isopropyl alcohol or fit a new roller. If one drive is much better than the other, use it for saving important files.

Clive Turner reports receiving a working copy of **Talent** Cosmos + but it still arrived on cartridge instead of the requested disc and a session with an editor was necessary to make the program usable from disc. He finds the program much improved and a master key cartridge is no longer needed.

Stuart Robertson would appreciate advice on transferring data between the Commodore Amiga and the QL. He is trying to send register dumps from the Amiga via the RS232 port, a process which can be done only at 9;600 baud, with one stop bit. Unfortunately, the QL User Guide states specifically that more than one stop bit is required at that speed. Normal communication is satisfactory at lower rates. Any suggestions?

Miracle Systems has replaced the serial-parallel interface which was causing printing problems with *Front Page* for **M. C. Holland**. Printing from that program and Easel is now normal.

Humphrey Ziberlin of Eindhoven complained about not receiving an "anti-bounce" modification for his keyboard from **Schön** for a period of several months. Schön report that the goods have since been despatched. As it can find no record of previous letters concerning **Henri Hulet**, copies have been sent.

PDQL reports having sent a KBL casing and repaired QL to **Robert Carley**. The delay was occasioned partly by the QL not working properly after initial repair but mainly by slow delivery of the KBL from another supplier; the latter situation should not recur, as the source of such delay has been located.

There have again been two letters from overseas readers complaining about the higher prices charged to them, compared to those for U.K. residents. Be assured that this is not an attempt to make more money out of unfortunate overseas QL owners; it is a reflection of the fact that the cost in time and money of handling overseas orders is much higher. Where products are relatively expensive and have a good profit margin — i.e., hardware like disc drives, memory expansions — some or all of the extra cost can be absorbed by the supplier but it costs equally as much to send a £20 program with comprehensive instructions and there is not sufficient profit in that to cover the extra costs.

INFORMATION

Jan Jones' book
FlashBack Special Edition,
Tandata modem:
Sector Software,
39 Wray Crescent,
Ulnes Walton,
Leyland,
Lancs PR5 3NA.
Tel: 0772 454328 — bulletin board after 1800 hrs.

text^{87}:
Software^{87},
33 Savernake Road,
London NW3 2JU.

QTyp:
Care Electronics,
800 St. Albans Road,
Garston,
Watford,
Herts WD2 6NL.
Tel: 0923 672102.

Lightning,
Media Manager Special Edition,
Digital Precision,
222 The Avenue,
Chingford,
London E4 9SE.
Tel: 01-527 5493.

BASIC Improvements

In Part Three of our occasional series, Desmond Barry presents some programming tricks which will speed up your SuperBasic code with no expensive add-ons.

There has probably been the odd occasion when you have wished that there was more speed available in the QL — probably on more than the odd occasion. This article is about various things you can do to speed your code. It will not make it go like machine code or a Thor XVI but some tricks can gain you a good deal.

The two main areas of consideration are the screen and response times. They also overlap on occasions. So far as the screen is concerned, not much can be done to speed it directly unless you bypass it. If you do that, you will not produce anything which multi-tasks. The screen is linked to the multi-tasking routines and windows. That is why it is slow. Plenty is happening when you issue a screen command.

If you want to bypass the screen control there are sufficient pieces of code available to use as basic algorithms which are satisfactory on lesser computers. As a supporter of the QL, the Thor and Qdos/Argos, I am not going to help you spoil a great computer.

Few updates

The principle behind speeding the screen is to use it as little as possible; update things when they need it rather than all the time. It is also worth looking for other ways of doing things.

BLOCK is a very useful keyword. It can be used for simple colour manipulation and clearing windows. It is affected by the OVER command.

Not many people know that, because it does not say so in the manual. Type-in this program:

```
100 WINDOW#1,256,200,256,0:
  WINDOW#2,256,200,0,0
110 OVER#2,0
120 LIST
130 BLOCK#2,256,200,0,0,4
140 PRINT "That was BLOCK with
  OVER 0"/"Press a key".PAUSE
150 LIST
160 OVER#2,-1
170 BLOCK#2,256,200,0,0,4
180 PRINT "That was BLOCK with
  OVER -1"/"Press a key":PAUSE
190 BLOCK#2,256,200,0,0,4
200 PRINT "That was the same again.
  Interesting?"/"Press a key":PAUSE
210 RECOIL#2,7,6,5,4,3,2,1,0
220 PRINT"And that was RECOL" "All
  finished"
```

Note also that BLOCK can be set as any size from one pixel to the size of the window with which you are working. It can be very useful for cursors and highlighting.

If you want to update something, say row and column numbers, do it when nothing is happening or at the end of a timed period. For instance:

```
370 n=code(INKEY$#15,50)): IF NOT
  n THEN update:GOTO 370
```

In this case, INKEY$ waits for one second; then, if no key has been pressed, procedure 'update' is called. If a key has been hit, control passes to the next line, whatever it is. This little trick means that the screen is not updated unless nothing is happening. As an alternative, you may like to update something at regular intervals. Try this:

```
500 t=DATE
510 REPEAT loop
520   lots of
530   code to
540   do something
550   like the
560   main loop
570   in the program
580   IF DATE>t+10 then update:
      t=DATE
590 END REPEAT loop
```

This updates only if a minimum time, 10 seconds in this case, has passed. Line 580 checks if time t has increased by 10.

Slow down

Why do this kind of thing? It may be surprising but even an apparently small job such as writing two characters to the screen can slow everything. To keep a job moving, eliminate as much unnecessary work as possible.

The next 'speed-up' technique is another variation on doing as little as possible. This next piece of code is how one would normally do a menu loop:

```
700 REPEAT loop
710   n=CODE(INKEY$(#15,-1))
720   SELECT ON n
730     =49:option1
740     =50:option2
750     .....
760     =56:option8
770   END SELECT
780   update_screen
790 END REPEAT Loop
```

There is nothing basically wrong with this, except that every time a key is pressed the loop is executed and the screen updated. This occurs whether the key is valid or not. If it is not you are wasting time doing nothing useful. In a long loop that will result in response times becoming longer and that can be annoying for the user. Now look at this:

```
100 REPEAT loop1
110   REPEAT loop2
```

```
120     n=CODE(INKEY$(#15,-1))
130     IF range(n,49,56) then EXIT
          loop2
140   END REPEAT loop2
150   SELECT ON

(Rest as the above example)
```

In this routine, the main SELECT will be used only if a number between 1 and 8 is hit. Otherwise control remains in the much shorter and therefore faster loop2.

Do not use procedures and functions if they are not necessary. They involve a time overhead when being called. If the structure is called from only one place, or from not many places and it is fairly short, it can be worthwhile not using a structure. This is especially the case if the routine is likely to be called rapidly in succession, as in a cursor-moving routine.

Another thing which can help is not to make your code too flexible. That may sound odd and it tends to go against the principle of using parameter-passing to procedures and functions, but if you have a very flexible piece of code it probably spends a fair bit of time checking validity of parameters and so on. If you want the fastest code, cut it to the minimum. Of course, this may also mean you need several pieces of code doing broadly the same thing, in which case it can use memory. It is a compromise, like so many other things in programming.

Avoid screen-scrolling. It takes a long time. It is generally faster to clear it and refresh with a new batch of data if that is possible. It may be faster to use AT to control printing rather than just letting

"It may be surprising, but even a small job such as writing two characters to the screen can slow everything down."

Qdos take its course. It may take a little more code to control when a window is full but it is faster.

This may sound strange but if you are running only in SuperBasic, floating point numbers are faster than integers — my tests say about 10 percent faster. If you are compiling, integers should be quicker. Remember that FOR loops cannot normally use integers as the controlling counter. In some situations, the bitwise logical operators may be faster than any alternatives.

I found a rather odd thing once about QL maths. In a long equation the time to calculate it is roughly proportional to the length of the equation. In other words, a+b is done slightly faster than twice as fast as a+b+a+b. It also does not seem to matter which operators are used — +,-,*,/, ^.

If you have missed the significance, it means that the QL spends more time reading what you have programmed than doing it. So the shorter you can make the equation the faster it will run. Look at this:

```
100 FOR a=1 TO 50
110   PRINT a*(n*x-y)+a ^(n*x-y)
120 END FOR a
```

I do not know what it means either. Now look at this:

```
100 z=n*x-y
110 FOR a=1 to 50
120   PRINT a*z+a ^z
130 END FOR a
```

When I ran both, using 10,000 iterations, the loop in the second ran about 45 percent faster. That is worth having, is it not?

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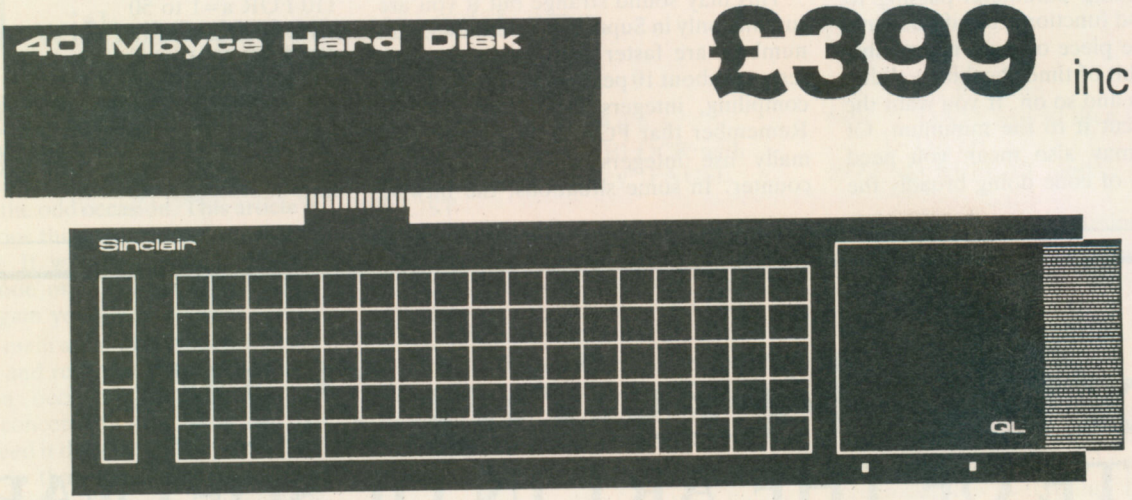

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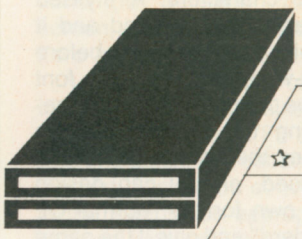

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INFORMATION
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Supplier: E. J. Wilce, 48 Liddington New Road, Guildford, Surrey GU3 3AH.

PLAYWRIGHT

Bryan Davies arranges his words with a program written for scriptwriters and other specialist scribes.

This is one program which certainly cannot be called run-of-the-mill. Few programmers risk offering a word processor program for sale and very few would offer one for a particular, small group of users, in this case, writers of scripts for TV, film and theatre. The apparently limited appeal of this program may be misleading; the buyer is not obliged to use it for writing epic TV series and a little imagination could find other uses for it. The author has been sensible enough to give the program a fair degree of flexibility; it is for the user to decide what to do with it.

The QL world has its share of people with interests which might seem rather unusual to the general public but an interest in theatre is not uncommon. There must be thousands of amateur theatre groups and hundreds of people writing scripts for one type of production or another. It is just that I had, until now, thought of this as being Amstrad PCW country, not QL territory at all.

Disc only

The first thing to note is that this program does not fall into the amateur category. It is well-presented and works smoothly and speedily. The code is compiled with Turbo and a run-time module of Turbo extensions is supplied. While it is said to be usable on an unexpanded QL it is clear that it is really intended for use only on a machine with memory expansion; it is apparently supplied only on 3.5in. disc, which is a further limitation to the number of potential customers. There can scarcely be any complaint about the price — even shareware or public domain programs are effectly little or no cheaper.

The program documentation is supplied on disc files and one cannot expect an elaborate printed manual for the price. The file is not a Quill one; you have to run *QL Playwright* to load the documentation files and the supplied single page of written instructions for making a back-up copy and using the program are not comprehensive, to say the least.

That said, most users should not be too annoyed by the way the back-up routine asks no questions and gives no messages but writes the names of the files to the screen as they are backed-up. If you boot from the master disc all you get is a copyright symbol, the word "Software", and a piercing tone from the QL speaker; most people must have forgotten it exists, so that may be a shock. Although the program is not copy-protected, the same symptoms are likely to occur if you change the name of the registered buyer.

No backup

A single-page introduction gives very brief advice on running Playwright but not on making a back-up copy; the separate SuperBasic program provided for making a copy is not mentioned. Use of the DATASPACE TASK program — if an "out of memory" message appears when the program is booted — is referred to but a little more detail, for less-experienced users, would be desirable.

The user is advised to load the file containing the user guide as a first step once the program is running. The guide contains 12 full pages of advice; it is well-written and comprehensive. Some characters appearing in the guide are there for print formatting and it would have been preferable to explain their use at the start of the document, rather than have the new user puzzling about their significance.

It might be assumed that available spell-checking programs cannot handle Playwright files, since there are several spelling mistakes, including the non-word "zeroise", in the two provided text files; this seems out of keeping with the nature of the program. In fact, *SpellBound* seems to work on-line with QL Playwright and also off-line in conjunction with *FileBound*. This should not be taken as an assurance of compatibility — the author makes no mention of spell-checking.

As the program is targeted at budding playwrights rather than existing ones who may not be using QLs, a further text file is supplied, giving guidance on how to write scripts. It gives guidelines on what to put into a script, how to arrange it, avoidance of "padding", together with a sample script and specification. This documentation will be very helpful to the beginner and is not too simple to help the more experienced writer.

Memory of 512KB or more is recommended. The program is on 3.5in. disc but it can be configured to run from Microdrive, floppy or RAM disc. As an EXEC-able task, the program can be multi-tasked but the user may have to do a little work to get it to do so. Even with 240KB free memory it would not run initially with the usual program set-up in the 896kB review system; running the supplied Turbo sub-routine DATASPACE_TASK revealed that the program was set up for a data space of 417,792 bytes and reducing this to 200KB got the program running.

Set-up

For users already familiar with the Turbo compiler this might be a fairly obvious procedure but the instructions would not be sufficient to guide other users what to do. Most users could be expected to run Playwright on its own and the supplier will set it up for the required memory configuration, if advised beforehand by the prospective purchaser. The value quoted is suitable for a 512KB system.

Before commenting on how the program performs its intended function, it is worth pointing out some non-theatrical roles. You can Import files from Quill, *text87* and *The Editor,* without the typestyle enhancements — the program does not provide bold, underlined and so on as they are apparently not required in scripts; a fair amount of format data from the Quill file is left, as it is in other editor programs. SuperBasic programs can also be Imported but the word-wrap function places a constraint on line length which might be unacceptable to some programmers. The Import function operates decidedly slowly. Program lines can be renumbered. the program is stated to have been used to aid its own development and is said to have no GO SUBs or GO TOs in the source code. Files can be Export-ed in ASCII form.

Curtains

The initial program screen gives an impression similar to the opening of theatre curtains. The full screen width is not used, as the "curtains" remain at either side, but scripts are less likely than normal word processing documents to need 80-85 characters. A stylised character font is used and it permits 71 characters before word-wrap occurs. The font can be changed; deleting or renaming the default font file causes the normal QL font to be used, or you can design your own font to "normal QL standard" and give it the name of the default file.

At upper right of the curtain area is a date and time indicator. The text area is 19 lines deep. The status area is at the bottom, divided into three sections. At the very bottom is a line giving the necessary ALT and cursor key combinations to select menus and functions. Above that, a box at the left-hand side lists functions in menu groups of five and one at the right-hand side gives information on the requested function.

The menu group can be changed by using the left/right cursor keys with the ALT key, a

total of six menus giving 25 functions — one menu of five positions calls the other menus. A function is selected by moving the cursor bar to it using the up/down keys with ALT and then pressing ESC. Alternatively, some functions are available by keying CTRL with an appropriate letter — e.g., CTRL+D deletes the cursor line. Text indenting functions alternatively are available from the F1-F5 keys. Those menu items which can be selected by alternative keying have that keying listed after them. Standard text functions provided are Mark/Cut/Paste (block), Delete (line), Format (paragraph), Search, (go to) Top/Bottom, Save/Load, Import/Export, Directory (flp/mdv/ram). The date/time clock can be set quickly from a menu. Functions specific to the script-writing operation are (go to) Next/Last scene, (check/alter) Title, (check list of) Roles, (check/alter) Scene text, Indentation. The latter function allows text indentation for Scene, Action, Character, Dialogue and Bracket (for directions to characters).

Functions

Various functions obtained from keying CTRL plus one alpha character are not listed on menus: search Again, Go to (marked position), change case (upper/lower), Quit (program), (search and) Replace, Undelete (line), re-set indentations (to defaults), refresh screen, join (2 lines) together, Zero (re-set) indentation.

A useful variation of the block function is obtained by using SHIFT+F2/F4/F5 at the end of a block; this causes the marked block to be converted to the indentation appropriate to those function keys (Action/Dialogue/Bracket). This can be done with Import-ed text to put it into the current script format quickly. The Search (and Replace) functions are carried-out efficiently; the search starts from the current cursor position and goes to the end of the script but then returns to the top of the script and continues from there, avoiding the need to key-in a specific command to start from the top.

The Go To command can be used while marking a block, making it a quick job to mark a large section to the end of a document. Information specific to a script is kept in a Header; the title, list of characters, time, changes from the indentation defaults, printer-control data, all reside here. This information becomes evident at print time but can be accessed and altered from a menu at any time.

New keys

Although function keying is sensible in some ways, the fact that key combinations which are likely to be already familiar from other programs are sometimes used for similar functions, but sometimes for different ones, compels the user either to learn a complete new set of keying or accept rather slower operation by using the menus all the time, and possibly making a separate "crib sheet".

The Tab key moves the cursor one word to the right — SHIRT+right cursor in Quill or The Editor. One apparent omission from the list of functions is a way of "zapping" the current file without quitting the program. General housekeeping functions have to be accessed by returning to SuperBasic.

Manipulation of text is fast, with none of the disadvantages which plague Quill users. Even with several programs loaded, cursor movement is steady and fast enough. Cut and Paste operations are also fast, and simple — CTRL+M to mark the first block line, cursor to the last line, then CTRL+X to delete the block. Changing data discs reveals that provision has not been made for this action, the "new" disc making the drive an "invalid device".

The standard QL key combination of CTRL+C is used to switch between multi-tasking programs, of which the Playwright print program can be one. A 640KB QL permits about 5,000 lines — roughly 100 pages — in one script file, said to be enough for an average feature film. The number of lines in the current file is displayed if the (go to) Bottom function is used; the maximum number of lines available with the set memory allocation is displayed in the left-hand status window. If larger scripts are required they can be split into separate files and merged — up to 20 files — at print time.

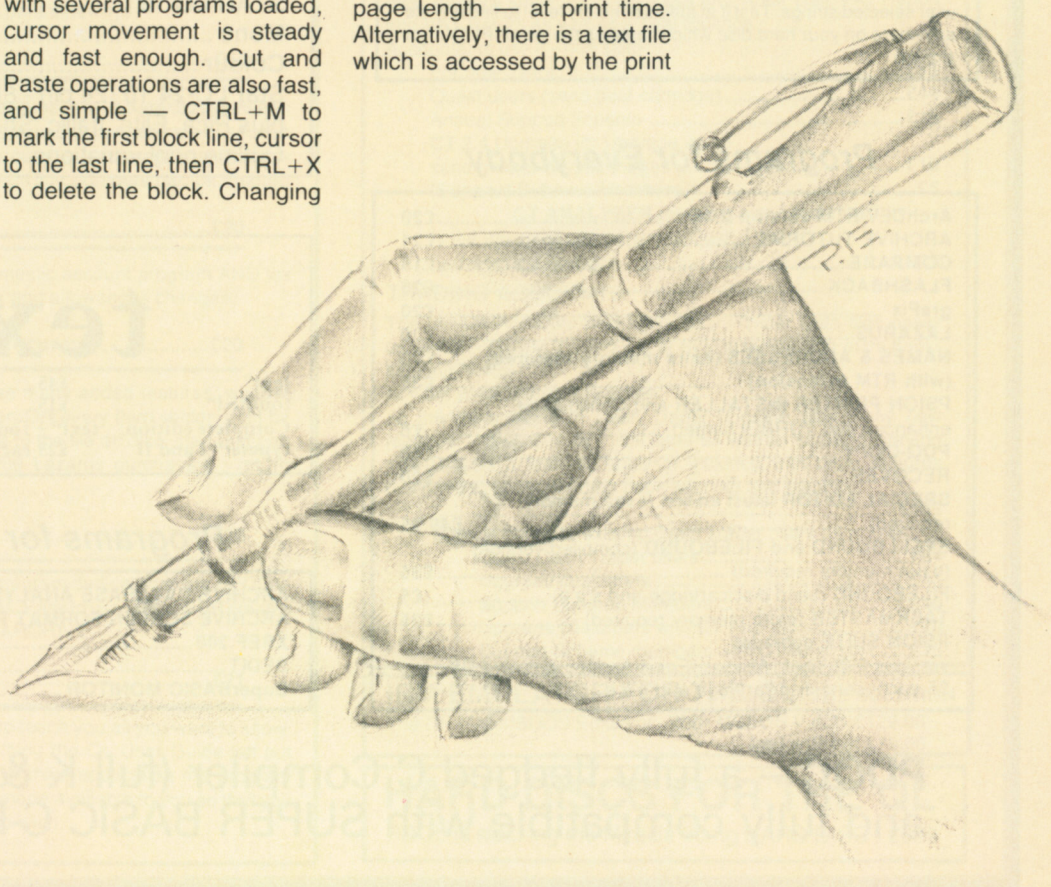
Fast driver

Scripts are apparently supplied with no typestyle enhancement and that allows the printer-driver routine to be fairly simple and fast. The current driver set-up is for Epson-compatible printers only. To use the print routine you quit the main program and EXEC the print program; parameters can be appended to the program name, to alter print configuration — e.g., port, page length — at print time. Alternatively, there is a text file which is accessed by the print program which can be Imported into QL Playwright and the parameters altered there.

Print output can be to screen, file or printer. Directing print to the screen first allows a "print preview", to check that it will look satisfactory beforehand. During text input there is no "page" as such but the print program splits the text into pages and ensures that there are no widow or orphan lines created in the process. Likewise, section numbering is added automatically by the print program, in response to codes put into the text.

Tailored

The program is well put together and runs well. It has plenty of facilities, both for its intended purpose and for general WP use. The flaws are minor and excusable at the low price. For the budding script writer, the saving in time formatting the text is great, compared to what would be necessary with other QL WP programs, and the way commands are tailored to the job in hand allows the writer to concentrate on the creative activity, rather than having to devote attention constantly to the demands of the program.



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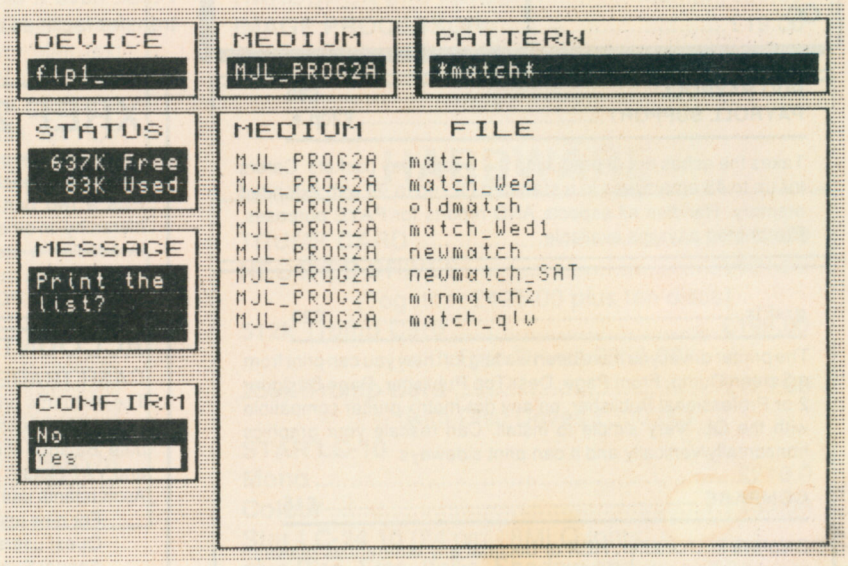
SUPER BASIC

Are you finding your disc library a little too large to cope with? Bring order to chaos with Mike Lloyd's file-searching utility.



Last month's string-matching utility has a role to play in a variety of applications. The most immediately obvious is to search for records in a database but word processors, spreadsheets and file managers all need searching facilities of one kind or another. Resisting the temptation to develop a fully-fledged database merely to demonstrate string-matching in action, instead I have written a relatively simple and useful file-searching program.

Scattered among my 150 or so discs and Microdrives are master copies of programs, partly-developed programs, half-forgotten data files, old word processing documents and back-ups for almost everything. What there is not, despite my best efforts, is a system which allows me to find a given file with unerring accuracy. I suspect that most readers, with the possible exception of the pathalogically neat, are in the same position. Accepting that it is too late to develop a program which enforces a logical file storage system, what is now needed is a program to search for a file whose name is only dimly remembered and whose location is completely forgotten.

The file-seeking program listed uses last month's string-matching routine to display selected filenames on the screen and allows users to view or print the file contents and even opt to delete them. Lists of filenames can also be sent to the printer as a permanent record of what currently exists on various media. As is usual in any pre-programming analysis, one of the first tasks was to impose some constraints, as follows:

* The screen displays had to suit television sets as well as monitors.
* No additional memory or toolkits were assumed to be available.
* The program had to be brief enough to type-in easily; it has fewer than 300 lines even when last month's routines are included.
* The program had to perform a worthwhile task.

The analysis revealed that the program dynamics would form three distinct levels. The first level could be described as being "pre-search" in which the display and variables are initialised, a search pattern is declared and a device chosen. The second level is concerned with searching a disc or Microdrive for filenames which match the declared search pattern. The third level concentrates on viewing, printing or deleting individual files. Only the first level is tackled this month – the remaining pair occupy about as many program lines although they are considerably more complex in their logic.

Hierarchy

The existence of such a hierarchy influenced the development of the menu structure used throughout the program but it was not an appropriate frame on which to hang the program design. Instead, I used the "building block" programming method, sometimes called the bottom-up strategy, in contrast to the more familiar top-down programming.

Top-down programming takes the fundamental aim of a program and splits it into its major constituents which are, in turn, divided and sub-divided to form a hierarchy. This process builds a kind of pyramid at the base of which are a large number of relatively simple routines. One difficulty with this design strategy is that largely identical requirements might exist at two parts of the pyramid which, if we are not careful, might result in two separate routines being written when one could have done.

The consequences of duplicating routines are that the program will be larger than necessary, the competing routines might confuse the user by being slightly inconsistent and the tasks of maintaining and improving the code are made more difficult.

The building-block approach can avoid those problems by identifying fundamental requirements and producing a set of general-purpose routines to meet them. The advantages are that less code is written and the program is likely to be more consistent and therefore easier to use and to maintain. The disadvantages are that general-purpose routines might not be ideal for every occasion and their

generality might increase their length or complexity.

The building-block approach produces not a pyramid of routines but something more akin to a diamond with the lower point formed from utility procedures called from a variety of middle-order routines which are linked by the controlling hierarchy which forms the top point of the diamond.

Compromise

There is no compunction to use one programming method to the total exclusion of another. Programmers need to reach their own compromise between the purity of top-down programming and the utilitarian efficiency of building-block programming. The building blocks needed by the file-searching program handle windows, menus, printing operations, file operations, and so on. Some of them rely on others; for instance, the menu display requires a window to be drawn. The most basic modules were therefore developed first and as the more complicated modules were added to the program it was necessary occasionally to adjust them slightly to cope with an unexpected situation.

Building blocks are not just procedure and function definitions but also include communication channels and major variables. Some of them are established in the opening lines of the program shown in listing four – listings one to three being the string matching routines published last month. As an *aide memoire* the channels used by the program are identified by a letter rather than a digit, as follows:

S = System, used for displays of system information such as the name of the current device.
M = Menu, the window devoted to the menu display.
P = Printer.
F = File, the channel opened to files saved on discs or Microdrives.
T = Temp file, the channel opened to the temporary file containing the directory of the current medium.

Six global variables are declared. Both *Pattern$*, the search string, and *Dev$*, the current device, can be defined by the user; the values shown are the defaults which you might wish to change to suit your circumstances. *TempFile$* is the file used to store the directory of the current medium. In the listing it is placed on a RAM disc but it could as easily be renamed *"mdv1_TempFile$"* or even *Dev$ & "TempFile$"*. The program works very quickly with a RAM disc, acceptably quickly with a floppy disc and more slowly with a Microdrive.

The values of the final three variables are determined by the medium placed in the current device. *Medium$* is the name given to it when it was formatted; the two numeric variables hold the amount of space on the medium used and the remaining measured in kilobytes rather than sectors. The remainder of the main segment calls up the individual displays and then activates the main menu.

Windows

Most QL software makes full use of the multiple display windows available via Qdos and this program is no exception, even though it could have been designed to use only one window. Much of the process of defining a window is repetitive and so can be placed in a single procedure

Listing 4

```
400 MODE 4: WINDOW 512, 256, 0, 0
404 PAPER 2, 4: CLS
408         S = 3: OPEN#S, con_
412         M = 4: OPEN#M, con_
416         P = 5: OPEN#P, ser1
420         F = 6
424         T = 7
428 Pattern$  = "*"
432 Dev$      = "flp1_"
436 TempFile$ = "ram1_TempFile"
440 Medium$   = " < None >"
444 Free      = 0: Used  = 0
448 Pattern:  Device:    Medium
452 Display:  Space:     Menu 1
456 REPeat Loop
460   key = Bar_Menu (max)
464   SELect ON key
468     = 1: New_Pattern
472     = 2: New_Device
476     = 3, 4
480       Examine = key -3
484       Search_Mode
488     = 5, 0: EXIT Loop
492   END SELect
496 END REPeat Loop
```

Listing 5

```
500 DEFine PROCedure  Draw_Wndo (ch, ac, dn,
    Xpos, Ypos, Col, Title$)
505 WINDOW#ch, ac*8+20, dn*10+24,  Xpos, Ypos
510 PAPER#ch,  2, 0:     INK#ch,     7: CLS#ch
515 BORDER#ch, 1, 0:     BORDER#ch,  4
520 CSIZE#ch,  2, 0:     PRINT#ch,   Title$
525 WINDOW#ch, ac*8+8,   dn*10+4,  Xpos+6, Ypos+16
530 PAPER#ch,  Col:      CLS#ch:     BORDER#ch, 2
535 CSIZE#ch,  1, 0:     INK#ch, 7 * (Col <4)
540 END DEFine Draw_Wndo
```

Listing 6

```
600 DEFine PROCedure  Display
605 Draw_Wndo 1,40,17, 140,56, 0,"MEDIUM     FILE"
610 DIM Media$ (56, 10), File$ (56, 48)
615 END DEFine Display
```

Listing 7

```
700 DEFine PROCedure  Pattern
705 Draw_Wndo S, 26, 1, 252, 16, 4, "PATTERN"
710 PRINT#S, Pattern$
715 END DEFine Pattern
```

Listing 8

```
800 DEFine PROCedure  Device
805 Draw_Wndo S, 10, 1, 30, 16, 4,"DEVICE"
810 PRINT#S, Dev$
815 END DEFine Device
```

Listing 9

```
900 DEFine PROCedure  Medium
905 Draw_Wndo S, 10, 1, 140, 16, 4, "MEDIUM"
910 PRINT#S, Medium$
915 END DEFine Medium
```

Listing 10

```
1000 DEFine PROCedure Space
1005 Draw_Wndo S, 10, 2, 30, 56, 4, "STATUS"
1010 PRINT#S, TO 4 - LEN(Free); Free; "K Free"
1015 PRINT#S, TO 4 - LEN(Used); Used; "K Used"
1020 END DEFine Space
```

Listing 11

```
1100 DEFine PROCedure Menu (Type)
1105 LOCal n, Title$, Col
1110   WINDOW#M, 120, 146, 20, 108
1115   PAPER#M,  2,4,0: CLS#M
1120   IF Type = 0: RETurn
1125   IF Type > 4: Message (Type -4) * 10
1130   RESTORE 1145 + INT (Type) * 5
1135   READ max, Col, Title$
1140   Draw_Wndo M, 10, max, 30, 176, Col, Title$
1145   FOR n = 1 TO max: READ a$: PRINT#M, a$
1150 DATA   5, 4, "MAIN", "Pattern", "Device",
           "List only", "Examine", "Quit"
1155 DATA   4, 4, "DEVICES", "flp1_", "flp2_",
           "mdv1_", "mdv2_"
1160 DATA   5, 4, "FILE", "Continue", "View",
           "Delete", "Print", "Quit"
1165 DATA   2, 7, "CONFIRM", "No", "Yes"
1170 END DEFine Menu
```

```
Listing 12

1200 DEFine FuNction  Bar_Menu (max)
1205 LOCal n, key, Loop
1210 n = 0
1215 REPeat Loop
1220   OVER#M, -1: BLOCK#M, 80, 10, 0, n*10, 7
1225   key = KEYROW(1): key = CODE (INKEY$ (-1))
1230   BLOCK#M, 80, 10, 0, n*10, 7: OVER#M, 0
1235   SELect ON key
1240     = 208:      n = (n-1) MOD max
1245     = 216:      n = (n+1) MOD max
1250     =  10, 32: RETurn n + 1
1255     =  27:     RETurn 0
1260   END SELect
1265 END REPeat Loop
1270 END DEFine Bar_Menu


Listing 13

1300 DEFine PROCedure Message (Type)
1305 Draw_Wndo S, 10, 3, 30, 108, 7, "MESSAGE"
1310 SELect ON Type
1312    = 1: PRINT#S, "Is "; Dev$
1314         PRINT#S, "ready for" \ "searching?"
1316    = 2: PRINT#S; "Print the" \ "list?"
1320    = 3: PRINT#S; "Delete"    \ File$(X);"?"
1324    = 4: PRINT#S; "Print"     \ File$(X)
1326    = 5: PRINT#S; "Continue"  \ "listing?"
1380 END SELect
1399 END DEFine Message

Listing 14

1400 DEFine PROCedure New_Pattern
1405 LOCal Loop, max, Temp$
1410 Draw_Wndo S, 26,1, 250,16, 0,"NEW PATTERN"
1415 Menu 0:      INPUT#S, Temp$:      Menu 4
1420 IF Bar_Menu (2) = 2:  Pattern$ = Temp$
1425 Pattern:   PRINT#S; Pattern$:   Menu 1
1430 END DEFine New_Pattern


Listing 15

1500 DEFine PROCedure New_Device
1505 LOCal key, a$
1510 Menu 2
1515 key = Bar_Menu (max)
1520 SELect ON key
1525    = 1: Dev$ = "flp1_"
1530    = 2: Dev$ = "flp2_"
1535    = 3: Dev$ = "mdv1_"
1540    = 4: Dev$ = "mdv2_"
1545 END SELect
1550 Device: Menu 1
1555 END DEFine New_Device
```

called with different parameters. Listing five takes seven parameters which describe the location, dimension, colour, title and channel for each window. As in other SuperBasic programs, the dimensions of the window are given in terms of character positions rather than in pixels. A common character size of 8x10 pixels – CSize 1,0 – is used throughout the program.

The window has a thin black border and a larger red/black background area, at the top of which is printed the title of the window. The print area is then superimposed on the background. The ink colour is chosen to give maximum contrast with the paper colour.

All that remains is to define procedures to produce the required displays. Listings six to 10 perform this task and any changes to the layout of the screen can be effected by altering the values in the various Draw_Wndo statements.

Odd

The next three listings are all that is necessary to activate the menu system. Menu items are highlighted by a bar cursor controlled by the up and down arrow keys. The highlighted option is selected by pressing either the space bar or the Enter key. This type of menu is particularly common due to the increased use of mice which can drag the cursor bar through a menu list.

In the original design for the program the menu window was a constant size which looked slightly odd when it showed only two options in an area designed for five. The revised routine adjusts the window height according to the number of menu options. Line 1110 overprints the whole menu area with background colour to keep the display tidy when a small menu follows a larger one. The menu can be removed entirely by passing a zero to the procedure; it is bad practice to display a menu which is not available.

Some menus are self-explanatory, while others need to be placed in context. In this program only the "Confirm" menu falls into this category; what the user is asked to confirm depends on the circumstances. A neat way of coping with this requirement without adding an extra parameter to the procedure is to use non-integer values for Type.

For normal menus, Type is an integer but for the "Confirm" menu Type can be 4.0, 4.1, 4.2 and so on with the fractional value referring to the message to be displayed alongside the menu. This is controlled in line 1125, which calls the Message procedure at listing 13. The principle can be extended to reduce the number of parameters in a variety of procedures. A screen location could be described as *Spot 25.12* rather than as *Spot 25, 12.*

> *"Despite my efforts, I have no system to find a file with unerring accuracy. I suspect most readers, except the pathologically neat, are in the same position."*

The menu remains inert until listing 12 is called. In this function the cursor bar is drawn as a block using the "exclusive or" screen mode. Rather than obliterating a menu line it reverses the colours to highlight it. Different effects can be obtained by superimposing a "red" or "green" block, although red and green might not be the colours obtained.

After the block is drawn the program pauses to detect a keypress, following which the cursor bar is removed by overdrawing it, another useful characteristic of the "exclusive or" mode. The bar position is controlled by detecting the pressing of the up and down cursor keys. The use of the modulus operator causes the cursor bar to cycle round the options when the top or bottom item is reached. If the spacebar or Enter key is pressed the current location of the cursor is returned to the calling statement. The escape key returns a value of zero.

The loop at the end of listing four shows one way in which a menu is activated. This menu can be used repeatedly and so the options are contained in a loop. Not all menus work like this. In listing 14 the user is invited to enter a new search pattern. The new pattern is held in a temporary variable until the user confirms that it is correct. The "Confirm" menu is placed on the screen, in this instance with no accompanying message, and activated by calling the Bar_Menu function in an IF statement. If the function returns a 2, indicating a "Yes" response, the new search pattern replaces the old one. With any other value the old search pattern is restored.

Another menu style is demonstrated in listing 15. When users choose the "Device" option from the main menu this procedure displays a list of possible devices, which can be altered to reflect your computer system. As only one option can be chosen the menu is not contained in a loop.

The flexibility of this menu design can be increased further by allowing for more than one column of options to be displayed and permitting lateral movement of the cursor bar using the left and right arrow keys. The amendments required to listings 11 and 12 are relatively small.

● *Next month the project will be completed by adding the code necessary to read disc directories and control program output.*

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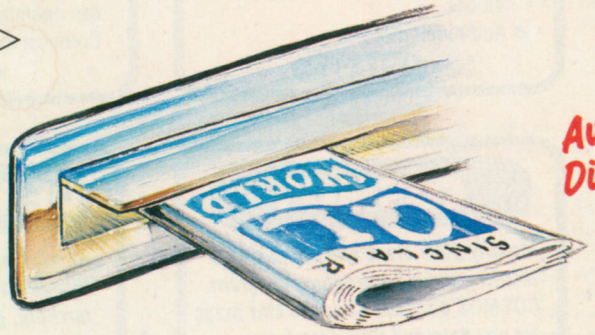

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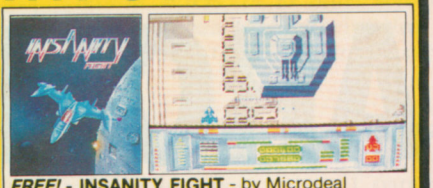

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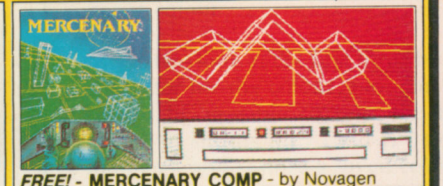

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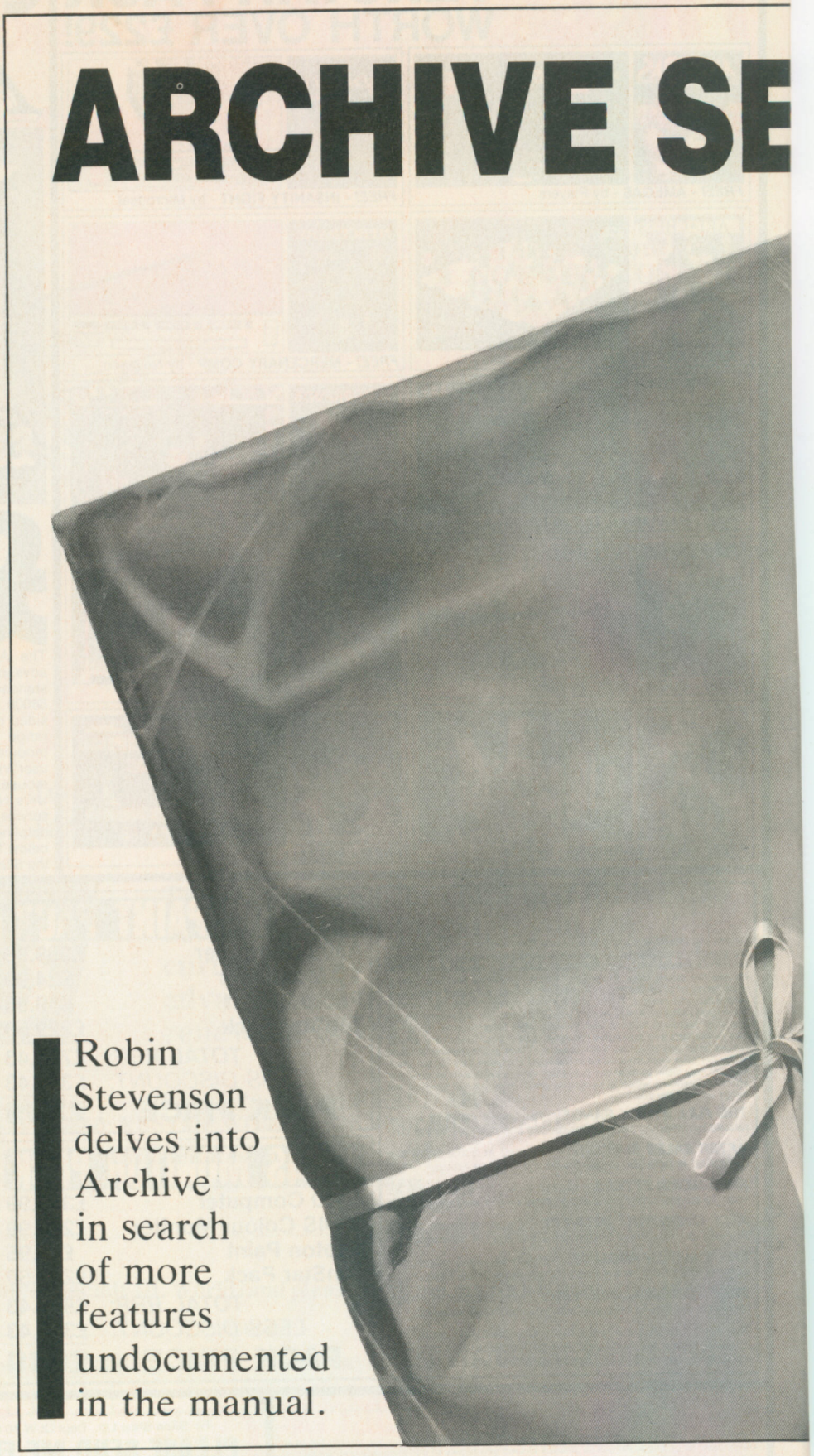


Robin Stevenson delves into Archive in search of more features undocumented in the manual.

You may have read from time to time of the slightly haphazard development of the four Psion programs, along with hints and allusions to a number of features which were implemented in the program but which never reached the manual. Quill, Abacus and Easel, all being menu-driven, will do only what they say they do, I assume. The programmable nature of Archive, however, leaves plenty of odd corners for undocumented features. This article reveals the details of some of these features and provides examples of how to use them in Archive programs.

Version 2.3 Archive includes a range of graphics characters in its character set which can be sent to the screen either from within a PRINT statement, or using SEDIT. Figure one shows the characters available and where to find them. If you wished to print a bottom left-hand corner you could say 'print chr (227)'. Or if in SEDIT, you could type the 'F5' key followed by 'd' and the corner would print to the screen. What the F5 key does is add 128 to the code value of the next key pressed.

An additional feature is included in SEDIT to make the drawing of boxes and borders easier. If you press the Shift plus any of the four cursor keys the last character typed will be repeated in the direction of the cursor key pressed. It is a pity Psion saw fit to include only a very bare minimum of graphics characters for drawing straightforward boxes. A little more trouble could have provided the full range of IBM graphics characters. Instead, most other keys produce either a vertical line or a cursor-type block.

Screen driver

A more significant omission from the manual, available on all version 2 programs and perhaps even on version 1 for all I know, is the 'screen driver'. Anyone who has used a printer will be familiar, at least in part, with the printer driver. A vaguely similar process has to take place for characters to be printed on the screen.

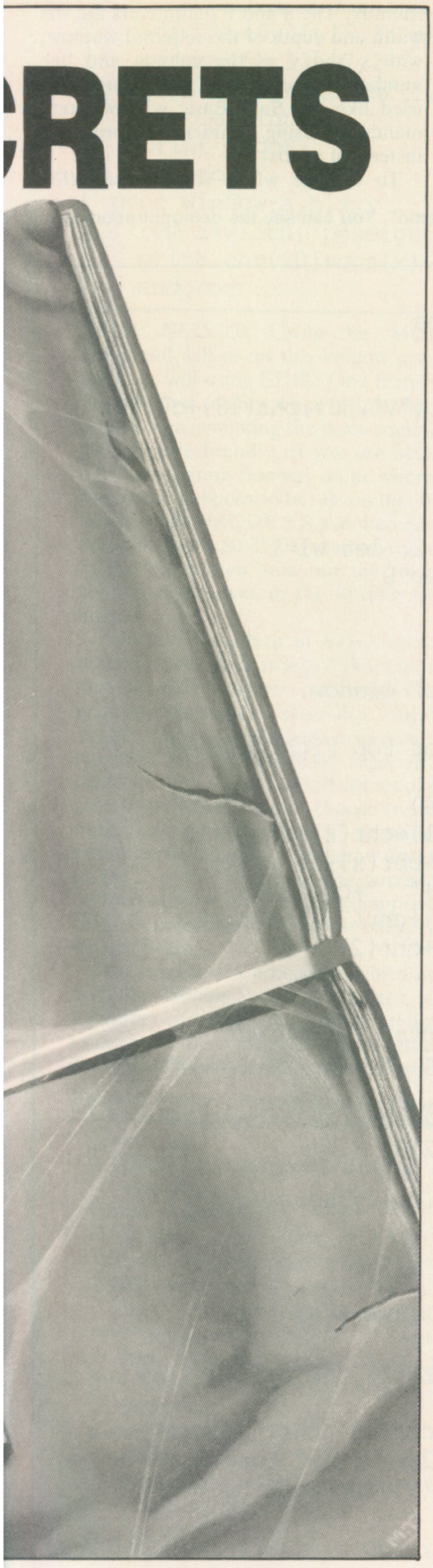
Just as there are special printer codes which do something other than print a letter, there are also special screen codes.

Figure 1 – Archive 2.3 Graphics characters.

QL Code	F5 followed by	Graphics Character	Epson equivelant
224	a	│	179
225	b	┤	180
226	c	┐	191
227	d	└	192
228	e	┴	193
229	f	┬	194
230	g	├	195
231	h	─	196
232	i	┼	197
233	j	┘	217
234	k	┌	218

They are all located in the ASCII code range 0 to 31, so cannot be typed directly from the keyboard. Instead, 'PRINT CHR(X)' must be used. Some characters act as a simple command, e.g., printing chr (12) will have the same effect as typing CLS – the CLS command causes archive to print chr(12) to the screen.

Other characters require one or more 'parameters'. They are other characters whose purpose is not to print a letter but to carry a value. For example, chr(9) provides a TAB function but to use it you must also send a further character, spe-



cifying the column to which you wish to tabulate. If this is, say, column 65 you would print chr(9)+chr(65). Chr(65) is the letter 'A' but in this context that is irrelevant; 'Archive is interested only in its ASCII value. Having read the required number of parameters the screen driver will interpret any other following characters as letters, or as other screen commands, depending on their value.

The full list of screen driver commands is:

chr(1) Set ink colour 1 parameter – in colour
chr(2) Set paper colour 1 parameter – paper colour

These two look at the first three bits of the character for the colour, i.e., chr(0-7). It should be possible to save the existing colour by setting bit 7 (add 127 to colour number), and restore a saved colour with chr(64) but this appears not to work. Instead chr (64) sets paper to 0, or in to 7, when used.

chr(4) Repeat characters 2 parameters – the character required and the number of repetitions.
chr(5) Toggle underline on/off no parameters
chr(6) Move cursor one column right no parameters
chr(8) Move cursor one column left – no parameters
chr(9) Tab cursor 1 parameter – the required column No.
chr(10) Move cursor down one line – no parameters
chr(11) Move cursor up one line – no parameters
chr(12) Clear screen window – no parameters
chr(13) Move cursor to left side – no parameters
chr(14) Switch cursor on – no parameters
chr(15) Switch cursor off – no parameters
chr(18) Select screen display type 1 parameter
Parameter chr(0) – Normal ink and paper characteristics.
Parameter chr(1) – Overprint – current ink, with 'transparent' paper.
Parameter chr(2) – Exclusive-or of the character and existing display.
chr(19) Delete one character to left – no parameters
chr(20) Define window area 4 parameters – line and column numbers, for top left inclusive, and bottom right exclusive
chr(21) Scroll screen window up 1 parameter – No. of lines to scroll
chr(22) Scroll screen window down 1 parameter – No. of lines to scroll
Unfortunately a bug prevents the window scrolling down more than 1 line.
chr(23) Pan screen window to right 1 parameter – No. of column to pan
chr(24) Pan screen window to left 1 parameter No. of columns to pan
chr(25) Boundary characteristics 1 parameter – see table in figure 2.

Figure 2. Boundary wrap characteristics.

Chr(25) determines how the window behaves when the text reaches the edges of the window. The parameter to follow chr(25) can be calculated from this table.

1	2	3	4	5
Bit	Boundary	Action if set	Action if clear	Value to set bit
0	Bottom	Scroll up	No scroll up	1
1	Top	Scroll down	No scroll down	2
2	Right	Wrap around	No wrap around	4
3	Left	Wrap around	No wrap around	8
4		No Action		16
5	Right	Toroidal	Progressive	32
6	Left	Toroidal	Progressive	64

Bits 5 and 6, as numbered in column 1, determine how text will wrap round at the end of a line, either continuing on the same line or progressing to the next. They apply only if you also set bits 2 and 3 respectively. To calculate the character value, add together the value from column 5 or any bit you wish to set., e.g., to set bits 0, 2 and 5, leaving the others clear would be 1+4+32 = chr(37). Using CLS will re-set the screen to its default values, which are bits 0, 1, 2 and 3 set, and the others clear.

chr(26) Swap ink and paper colours no parameters
chr(27)) Escape eode, followed by letter:
A: Clears window from cursor to end of line; B: Clears window from cursor to end of window; C: Saves the current cursor position; D: Restores cursor of previously-saved position; E: Scroll window up one from top to cursor line; F: Scroll window up one from bottom to cursor line; G: Scroll window down one from top to cursor line; H: Scroll window down one from bottom to cursor line;
chr(28) Combined CR and LF – no parameters
chr(29) Pass through 1 parameter – which is sent to screen, instead of being processed by the screen driver. This would be useful only if there were also graphics characters in the 0 to 31 range.

chr(30) Move cursor to top left – no parameters
chr(31) Position the cursor 2 parameters – the column and line co-ordinates required, the other way round from the 'AT' command.

The range of programming possibilities offered by the screen driver is enormous. It provides the building blocks for almost any screen control you may require.

though not very friendly ones it must be admitted. It is not completely finished code, either. Characters 3, 16 and 17 are not in this list and perform no discernable function, yet they generate an error if they do not have a parameter sent with them. More seriously, if you send the escape code, chr(27), with any letter other than the eight listed Archive will hang and you will have to re-set the QL, with possibly disastrous consequences for any files left open.

Examples of how to use some of the features in the screen driver are provided in figure three. Proc window is a way to make the windowing facility a little more friendly. The a and b parameters are the width and depth of the required window, with x and y as the column and line numbers of the top left-hand corner. It is used like the SuperBasic window command but using character co-ordinates instead of pixels.

To use the whole screen, use WIN-

Type in the program as shown (you can leave out any REM statements), and save it as "demo". You can see the demonstration by typing RUN "demo", or having loaded it, by typing START.

```
proc effects
  rem example title screen, using logo and window features
  local w1,w2: let w1=0: let w2=0: mode 1,8
  print at 12,5;rept("M",30); at 3,45;rept("M",30)
  print at 12,5;chr(18)+chr(2);rept("V",30); at 3,45;rept("V",30);chr(18)+chr(0)
  while w1<60
    window;15,5,w1+5,w2: print logo$
    let w1=w1+0.2+sqr(w1): let w2=w2+1
    endwhile :window;80,25,0,0
  input at 23,30;"Press ENTER to continue ";temp$: paper 2: let w1=1
  while w1<15: print chr(21)+chr(2);chr(23)+chr(2);: paper 0
    let w1=w1+1: endwhile
  endproc
proc logo
  rem String variable, logo$, prints itself in top left of window.
  rem Ink and paper and cursor position are then reset.
  local x,y: let x=3: let y=0:rem x,y are co-ordinates for top right corner
  let logo$=chr(15)+chr(27)+"C"+chr(31)+chr(x)+chr(y)
  let logo$=logo$+chr(2)+chr(128)+chr(1)+chr(132)+chr(234)
  let logo$=logo$+chr(4)+chr(231)+chr(10)+chr(226)+chr(31)+chr(x)+chr(y+1)
  let logo$=logo$+chr(224)+" YOUR OWN "+chr(224)+chr(31)+chr(x)+chr(y+2)
  let logo$=logo$+chr(224)+"  "+chr(26)+" LOGO "+chr(26)+"  "+chr(224)
  let logo$=logo$+chr(31)+chr(x)+chr(y+3)+chr(227)+chr(4)+chr(231)+chr(10)
  let logo$=logo$+chr(233)+chr(1)+chr(64)+chr(2)+chr(64)+chr(27)+"D"
  endproc
proc sampleprint;toprinter
  rem Use sampleprint;1 to send to printer, or sampleprint;0 for screen.
  local gr$,m:rem gr$ contains the graphics characters, m is the required margin
  if toprinter
    spooloff : let gr$=chr(179)+chr(180)+chr(191)+chr(192)+chr(193)+chr(194)
    let gr$=gr$+chr(195)+chr(196)+chr(197)+chr(217)+chr(218)
    let m=10: lprint rept(chr(10),8): else
    let gr$=chr(224)+chr(225)+chr(226)+chr(227)+chr(228)+chr(229)+chr(230)
    let gr$=gr$+chr(231)+chr(232)+chr(233)+chr(234)
    spoolon screen : let m=0: endif
  lprint tab m+40;gr$(11)+rept(gr$(8),13)+gr$(3)
  lprint tab m+30;" Our ref  ";gr$(1)+" X257 - 0"; tab m+54;gr$(1)
  lprint tab m+40;gr$(7)+rept(gr$(8),13)+gr$(2)
  lprint tab m;date(1); tab m+30;"Your ref  ";gr$(1)+" RS36"; tab m+54;gr$(1)
  lprint tab m+40;gr$(4)+rept(gr$(8),13)+gr$(10): lprint
  lprint tab m+20;chr(16)+chr(5)+chr(5);"DELIVERY NOTE";chr(16)+chr(5)+chr(5)
  lprint : lprint tab m;"Code ";gr$(1);" Item "; tab m+47;gr$(1);" Quantity"
  lprint tab m;rept(gr$(8),5);gr$(9);rept(gr$(8),41);gr$(9);rept(gr$(8),9)
  lprint tab m+5;gr$(1); tab m+47;gr$(1)
  lprint tab m;num(345,5);gr$(1);" Left handed Grommets"; tab m+47;gr$(1);num(6,8);
  if toprinter: lprint chr(12);: endif : spooloff
  endproc
proc start
  rem demo program to illustrate screen driver & graphics characters.
  logo:effects: mode 1,8
  paper 4: print chr(12);logo$;
```

```
  window;60,15,16,1: paper 2: cls
  window;58,13,17,2
  paper 0: print chr(12); at 12,0
  sampleprint;0
  print logo$;
  endproc
proc window;a,b,x,y
  rem a=width, b=height, x,y are co-ordinates of top right corner.
  print chr(20)+chr(x)+chr(y)+chr(a+x)+chr(b+y);
  endproc
```

DOW; 80,25,0,0. Using the 'MODE' command will re-set the window accordingly, as will using EDIT. One feature of the window facility when using the full screen area is making the trace command rather more friendly. If you use MODE 0,8 the program tracings occur wherever the cursor happens to be. If, on the other hand, you set MODE 1,8 and then re-size the window to 80,25,0,0 you have access to the full screen area but the tracings contain themselves in the bottom three lines.

Another procedure in figure three is proc logo. It puts a string of characters, a mix of screen driver instructions and printing characters into the variable 'logo$'. Having called logo once you can maintain your personalised logo, in its own little box, in the top left corner of the screen, or wherever you choose to position it, by printing 'logo$;' at suitable points in the program. It will draw the logo in the top left corner of the currently-defined window, whatever else happens to the screen, and leave the cursor back from where it came.

Proc effects is a procedure which uses both the Window and Logo features, plus a number of other screen driver controls to demonstrate a range of screen effects. The result might serve as a title screen, perhaps. Proc sampleprint provides an example of a report, using the graphics characters, which can be sent to the screen or to a dot matrix printer. Version 2.00 Archive users will get rather clumsy wide borders instead of neat lines and boxes intended. Provided your printer uses the Epson graphics character set it will still print on to the page correctly. This method of translating from within a procedure is necessary because the printer driver does not provide sufficient translates to convert them all from the printer driver.

Printer driver

On the subject of the printer driver, there are ways of using some of its features which do not occur in the manual. The translate features are easily understood. When you LPRINT a particular character, e.g., chr(96), the printer driver translates this into something your printer understands, such as a pound sign. What is not realised so widely is that all the other printer driver features behave in the same way, except that they use non-printing characters, just like the screen driver. Well, almost like the screen driver. Unfortunately, with two exceptions, the codes and their meanings are different.

Thus chr(10) will generate the End of Line code; chr(15) will toggle between Bold on the Bold off; chr(16) does the same for Underline; chr(17) for Subscript; chr(18) for Superscript; chr(26) generates the Postamble code, and chr(29) the Preamble code.

The two exceptions are chr(12) and chr(9). The first gives the nearest thing a printer can get to clearing the screen, which is a new sheet of paper. It sends sufficient end-of-line codes to fill the page length but if you are not using continuous paper gives a prompt for a new sheet of paper, on the screen as well. Chr(9) is the tab function and, as with the screen driver, needs a further character to indicate how far to tabulate. Archive then generates sufficient spaces to reach that column and sends them to the printer. One final point, which is documented by Psion, is the printer driver 'pass through' character which is chr(0). If you wish to send control codes directly to your printer, instead of via the printer driver, each character must be preceded by a chr(0).

The screen and printer driver features described give far greater control over any output from Archive and help the programmer enormously with the presentation of information, both on screen and on paper. What a pity Psion did not tell us all about it at the start.

Figure 4: A short program to make the sample outputs screen-visible.

```
proc aa
  REM Procedures using chr() to create a window and a logo.
  endproc
proc logo
  local x,y: let x=51: let y=Ø
  let logo$=chr(15)+chr(27)+"C"+chr(31)+chr(x)+chr(y)+chr(2)+chr(128)+chr(1)+chr
(132)+chr(234)+chr(4)+chr(231)+chr(1Ø)+chr(226)+chr(31)
  let logo$=logo$+chr(x)+chr(y+1)+chr(224)+" YOUR OWN "+chr(224)+chr(31)+chr(x)+
chr(y+2)+chr(224)+" "+chr(26)+"  LOGO  "+chr(26)+" "+chr(224)
  let logo$=logo$+chr(31)+chr(x)+chr(y+3)+chr(227)+chr(4)+chr(231)+chr(1Ø)+chr(2
33)+chr(1)+chr(64)+chr(2)+chr(64)+chr(27)+"D"
  endproc
proc start
  mode Ø,8
  paper 7: cls
  window;8Ø,14,Ø,6
  paper 2: ink 4
  cls
  logo
  print logo$
  endproc
proc window;a,b,x,y
  print chr(2Ø)+chr(x)+chr(y)+chr(a+x)+chr(b+y)
  paper 2: cls
  endproc
```

RE-INKING

Dennis Briggs says that you can re-ink ribbons yourself.

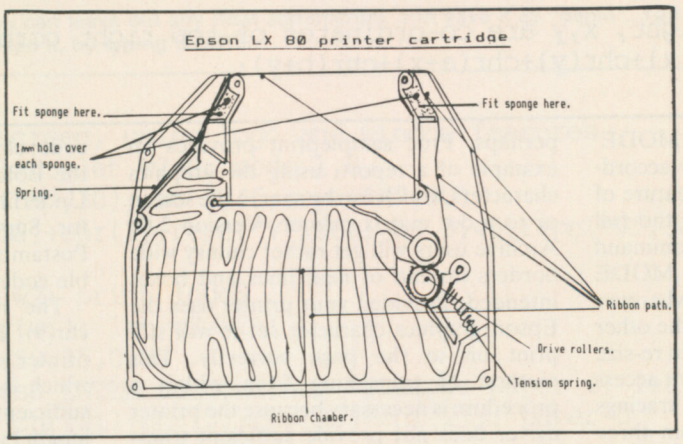
One of the main costs of using a computer printer is replacing the ribbon at frequent intervals to make sure that copy is dense and readable. This is more important when using DTP or similar programs which utilise graphics dumps to avoid a streaky appearance.

My experience has been that the ribbon will always fade halfway through an important printout and that the 'new' cartridge you have just bought is either of a different coloured ink or no better than the old, exhausted one. At best it lasts only for about four pages.

Horror stories

A re-inking service has been tried which gives good results provided you can remember to pad the envelope sufficiently to prevent heavy Post Office rollers smashing the contents.

If someone else can re-ink the ribbon why can it not be a DIY job? It can be done easily. In mentioning this to the 'experts', tales were told of printheads being damaged, special inks being needed and all kinds of horror stories but none of the 'experts' admitted to having tried it.



I tried it using ordinary stamp-pad ink at 75 pence per bottle with three cartridges used in rotation. In four years of heavy use, to the extent that one ribbon had a hole worn in it, perfect results are ensured at printout every time. To do the modification it is necessary to ease the top from the cartridge casing very gently so that the locating pins are not damaged. With the top off, as per diagram, fit two pieces of foam sponge in the spaces provided so that the ribbon makes good contact with them. One piece of sponge as the ink reservoir is a minimum with a further piece at the ribbon exit to wipe away any surplus.

Perfect results

A small hole over one of the sponges will permit the ink to be injected with a small syringe; 0.5mil of ink appears to be just about correct.

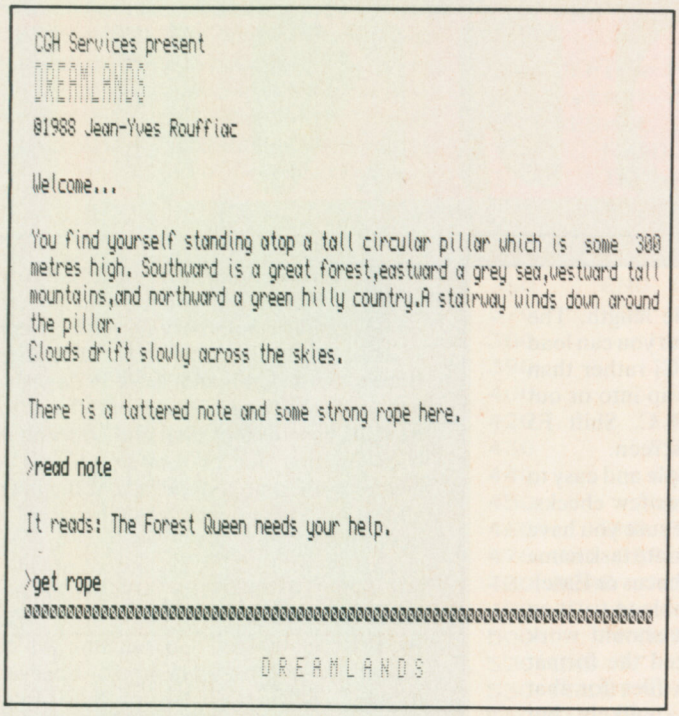
If you feed in too much ink it will run out and make a mess or it will make a mess of your printouts. If you feed in the ink, then run the ribbon through before leaving it overnight for the liquid to dry, perfect results are achieved. This is why I advocate the use of two or three cartridges.

For the colour-conscious, you can have green, brown, red or white printouts at the ready. What is the use of white ink? Have you never heard of black paper? It certainly gets you noticed.

I have not worked out the cost of re-inking this way accurately but is less than two pence. The cost is not the criterion really — it is the convenience together with the superb results.

SOFTWARE FILE

DREAMLANDS



INFORMATION:
Program: Dreamlands; needs min. 250K memory.
Price: £8, disc only.
Supplier: CGH Services, Cwm Gwen Hall, Pencader, Dyfed, Cymru SA39 9HA.

Dreamlands, written by Jean-Yves Rouffiac, is the latest and also the biggest in a line of new adventures to be released for the QL by CGH Services. Because of its size, a minimum of 256K memory is required, although the use of text compression techniques might have enabled the adventure to fit unexpanded QLs.

The adventure is set in a fantasy world entered by the medium of sleep, where you can live out your dreams and forget about those everyday problems. As the manual informs you, this time you seem to have got stuck and must complete several tasks to help people before you can return home.

When you first arrive in this world you are dressed only in a shirt and trousers – as with normal dreams, you forgot to put on shoes – at the top of a very tall pillar, with only a tattered note and some rope for company. The note tells you that you must help the Forest Queen but gives no suggestions as to the type of help she needs.

Finding the Queen is not easy, since she is hidden in the middle of a maze. Luckily, however, the mazes in the adventure do not seem too difficult, since they contain very few locations. This is a good point since it means that you do not waste a good deal of time having to map out a huge maze and find your way through it several times.

Get talking

Once you reach the Queen you need to talk to her and find what her problem is. Talking to characters in the adventure is no problem, since you use the command 'Talk to xxx' and they will respond and normally tell you something to help in your quest.

There are plenty of characters in this dream world, although some are more friendly than others. The range of characters includes the Queen, a vain dragon, a greedy troll and a lovable chick. Most of the characters will reveal to you a further subplot which you must solve before you can help the Forest Queen.

The place descriptions are adequate but are certainly not elaborate in their detail. You can examine most if not all objects you find on your travels but do not expect to get too many hints about their use in this way, since many of the descriptions seem rather pedantic, detailing merely their physical appearance; for example, examining the tall tower at the start gives the answer 'it is VERY tall'.

The range of problems is very wide, with a few which are relatively simple for seasoned adventurers, such as how to cross a river with only a rope and a tree on either bank.

Rich Mellor follows the fate of those who get caught in the land of sleep. He finds that it is easy to meet your death, but also easy to save yourself.

There are also several more difficult problems, such as how to get items from the top of a tower whose stairs will bear no weight other than your own. The problems seem to have been very well thought out, with a logical solution to them all, and will certainly keep your interest beyond a few hours at the computer keyboard.

The adventure seems very large. I have visited more than 100 locations and yet have managed to complete only 30 percent of the game. The size of the game does not slow progress since it is compiled with *QLiberator* and responds very quickly to typed-in commands. The parser seems to have a very good range of vocabulary, although it is a pity it cannot recognise upper-case.

Whole word

There are one or two minor complaints I have about the program. It is almost always necessary to type-in the whole word for objects, which can be a little annoying, although the ability to refer to previous objects by 'it' and 'them' is a help. Although the user interface for saving and loading is very good, presenting a pop-up screen and allowing for the use of Microdrives, discs and RAM drives by the press of a key, it is a pity the screen is not restored – in V9.8 – and that there is no over-write option.

Overall, the game seems to have been very well written, with no real bugs I could find and is certainly set to keep you entertained for many hours. Some graphics would have added to the addictiveness of the adventure, although that would only add to its already very large memory requirements. There are many ways in which you can meet your death in this fantasy world but the ease of saving, plus the ability to choose your own file name for saved games, means that it is easy to save different positions to which to return if anything happens. It is excellent value and I would recommend it to anyone who is even slightly interested in adventures.

Each month Simon Goodwin boosts QL SuperBasic with new commands and functions. This month he adds dynamic memory allocation.

DIY TOOLKIT

Extra Treat

We have an extra treat this month, in the shape of a small program from Austria which alters the Psion version 2 QL programs so that they display a cursor when loaded. The technique is not so versatile as *Taskforce* and it is for you to protect memory from Psion before loading, if need be, but it means you can multi-task Quill, Archive, Abacus and Easel with a standard EXEC command; there is no need for any control program, whether Basic or machine code, once the tasks have been 'patched'.

The 'patch' program in listing one was written by *QL World* reader Peter Postle of Vienna. It has been tested on versions 2.0 and 2.3 of the Psion programs. The program uses my SCROLL discovery, from the February *QL World,* to wind through the first part of the task code, depositing new and changed instructions which turn on a cursor in the main task window.

The new code becomes an integral part of the task and does not increase the file length. The only difference is that you can load the task with EXEC, rather than EXEC_W, and swap into or out of it with Control C. Shift F5 redraws the Psion screen.

Listing one is simple and easy to enter but it performs few checks. It is for you to make sure you have supplied an appropriate task name – Quill, Archive, Abacus or Easel. We have not been able to try it on version 2.35 but it should work unless Psion changed the format of the start of the files for that version, which is unlikely but possible. The patch works with Archive and Archder 2.38.

The patch will not work with other task files, compiled Basic applications or tasks which have been bloated by the QRAM 'grabber'. It links into the specific pattern of code at the start of the Psion packages. If in doubt, save any important information before EXECing a patched task. It is wise to patch a back-up copy of the file rather than your master. Ensure that the driver you are using is not write-protected or the program will not work.

```
100 REMark PSION PATCH (C) P.Postl, Vienna, 1989
110 RESTORE : CLS : PRINT "Patch for Psion v2 software."
120 INPUT "Enter drive & file name of Psion copy ?"!p$
130 OPEN #3,p$
140 REPeat mdv_wait : IF PEEK(164078)=0 : EXIT mdv_wait
150 SCROLL #3,42,42 : REMark Set file pointer to byte 42
160 byte5=CODE(INKEY$(#3,-1)) : byte6=CODE(INKEY$(#3,-1))
170 IF byte6<>216
180   SCROLL #3,0,42 : REMark Set file pointer to start
190   FOR n=0 TO 15 : READ byte : PRINT #3,CHR$(byte);
200   SCROLL #3,40,42 : REMark Patch call at byte 40
210   FOR n=40 TO 43 : READ byte : PRINT #3,CHR$(byte);
220 END IF : REMark Don't patch more than once!
230 CLOSE #3 : PRINT p$;" patched. Load with EXEC ";p$
240 :
250 DATA 96,12,43,72,byte5,byte6,118,255,112
260 DATA 14,78,67,78,117,48,60,78,186,255,216
```

This column introduces code to handle the 'common heap' – an area of memory shared between tasks and the QL operating system. Such commands have been included in toolkits previously but the DIY variants have exceptional and convenient tricks up their sleeves. You should still be aware of the potential pitfalls of the heap allocation scheme, which I shall discuss in detail later.

This month's DIY Toolkit commands are called RESERVE, DISCARD and LINKUP. RESERVE is a little like RESPR, in that is is a function which returns the address of an area or reserved memory. RESERVE has many advantages over RESPR. It works while tasks are running, when RESPR reports 'not complete'. If there is not sufficient memory available it returns a standard error code, without stopping the program, so programs can report the problem or side-stop it automatically.

You can specify the task which owns the memory allocated with RESERVE, so that the space is released when the task stops, or make it permanent if you want reserved memory to be shared between several tasks. Unlike the SuperToolkit ALCHP, the allocation persists even if you load a new SuperBasic program, so you can RESERVE memory for fonts in standard Basic windows or code or data which must remain resident.

If you allocate memory with RESPR there is no way to reclaim it without resetting the QL but the DIY commands are not that possessive. DISCARD can release any memory allocated with RESERVE. Thus you can un-RESPR memory when you no longer need it. Unlike the Turbo Toolkit DEALLOCATE, DISCARD checks that the memory was grabbed with RESERVE in the first place and resists the temptation to crash the machine if given the incorrect address or an address which has already been discarded.

DISCARD is a command which takes a single address parameter. The parameter must be a value which was returned by

RESERVE. Absent, odd, negative or extra parameters cause the standard 'bad parameter' report, while DISCARD complains 'not found' if the nominated address is superficially satisfactory but does not correspond to the start of a currently-reserved area.

RESERVE is a function which takes two numeric parameters. The first is the number of bytes to be reserved, anything from 1 upwards, and the second is the long word identifier of the task which will own the memory. The most common task identifiers are 0, to make space owned by the permanent task SuperBasic, and −1, so that the space is owned by the 'current task' and is released automatically when a compiled program terminates or is removed.

These are the commands a task would use to allocate a buffer of 12K bytes of memory and then release it:

```
buffer=RESERVE(1024*12, -1)
IF buffer >=0 : DISCARD buffer
```

If all is well, RESERVE returns the address of an area of memory. If there is insufficient free memory at the time of the call it returns the conventional 'out of memory' code −3. If your chosen owner task does not exist the code returned is −2. Nonsensical parameters cause the usual 'bad parameters' or 'error in expression' reports.

It is useful to be able to trap task and memory errors because there is no way to be sure of avoiding them on a multi-tasking system. A task can check the amount of free memory with PEEKs or a system call but the information is out of date as soon as it has been read. Other tasks may stop or grab memory at any time, so the only way you can be sure an operation is workable is by performing it. Test the value returned from RESERVE. Do not assume it is positive or your programs may sometimes fail mysteriously.

The LINKUP command is a logical extension of RESERVE which loads a code file into memory at any time, linking it permanently into the system. Normally extension code, such as Toolkit commands or new devices like MEM or RAM discs, must be loaded into RESPR memory before any tasks are running. This process involves several steps, including finding the code size, allocating memory, loading and calling the code.

SuperToolkit includes an unpronounceable but useful command LRESPR, which loads and calls the start of an extension code file in one fell swoop. Unfortunately it uses RESPR internally, so it will not work while tasks are running, which can be bad news if you are in the middle of using a task and realise you need a new command or device.

LINKUP works like LRESPR but uses permanent 'command heap' memory, so it can run at any time. The name LALCHP might seem more suitable to diehard QJump fans but I rejected it because the memory reserve is allocated permanently, unlike ALCHP space, and I find names like 'LRESPR' and 'LALCHP' needlessly cryptic. Change it if you like; that is the whole idea of DIY Toolit.

LINKUP takes one string parameter – either a string variable, string expression or a name in quotes. You must specify the full name of the file; for example:

```
LINKUP 'flp1_diy_heap_code'
```

Memory allocated with LINKUP is

```
100 REMark Sinclair QL World HEX LOADER
110 REMark by Marcus Jeffery & Simon N Goodwin
120 :
150 CLS: RESTORE : READ space: start=RESPR(space)
160 PRINT "Loading Hex..." : HEX_LOAD start
170 INPUT "Save to file...";f$
180 SBYTES f$,start,byte : STOP
190 :
200 DEFine FuNction DECIMAL(x)
210 RETurn CODE(h$(x))-48-7*(h$(x)>"9")
220 END DEFine DECIMAL
230 :
240 DEFine PROCedure HEX_LOAD(start)
290 byte = 0 : checksum = 0
300 REPeat load_hex_digits
310    READ h$
320    IF h$="*" : EXIT load_hex_digits
330    IF LEN(h$) MOD 2
340       PRINT"Odd number of hex digits in: ";h$
350       STOP
360    END IF
370    FOR b = 1 TO LEN(h$) STEP 2
380       hb = DECIMAL(b) : lb = DECIMAL(b+1)
390       IF hb<0 OR hb>15 OR lb<0 OR lb>15
400          PRINT"Illegal hex digit in: ";h$ : STOP
420       END IF
430       POKE start+byte,16*hb+lb
440       checksum = checksum + 16*hb + lb
450       byte = byte + 1
460    END FOR b
470 END REPeat load_hex_digits
480 READ check
490 IF check <> checksum
500    PRINT"Checksum incorrect. Recheck data.":STOP
520 END IF
530 PRINT"Checksum correct, data entered at: ";start
560 END DEFine HEX_LOAD
570 :
580 REMark Space requirements for the machine code
590 DATA 318
600 :
610 REMark Machine code data
620 DATA "43FA011634790000","01104ED234790000"
630 DATA "01164E92666C5343","6666204972FF7601"
640 DATA "4E4470014E424A80","66582256744076FF"
650 DATA "4E4470474E434A80","663C22562231E800"
660 DATA "70F108010000662E","2801284874007018"
670 DATA "4E414A8066202248","2404C14C76FF7048"
680 DATA "4E434A806B067002","4E424ED42E00204C"
690 DATA "70194E4160022E00","70024E4220074E75"
700 DATA "70F14E7534790000","01184E9266F45343"
710 DATA "66EE2231E8006BE8","0801000066E22041"
720 DATA "0CA0427566616704","70F94E7542987019"
730 DATA "4E414E7534790000","01184E9266C45543"
740 DATA "66BE2231E8006FB8","2431E80454892D49"
750 DATA "005870184E414A80","6B0A217C42756661"
760 DATA "FFFC200838002A00","671C383C081FD080"
770 DATA "691453442A007210","2005E3A069049841"
780 DATA "2A00E24166F2226E","00582385E8023384"
790 DATA "E800780270004E75","0002FEF2064C494E"
800 DATA "4B555000FF600744","4953434152440000"
810 DATA "0001FF8207524553","455256450000","*",25431
```

reserved permanently. This is because LINKUP is designed for use with extensions to the system which are accessible to any task. When you CALL a file of extension commands, the SuperBasic Name Table is updated with the addresses of code for each command or function. Compiled tasks look up the names of commands they need and copy the corresponding addresses so they can call the code.

If you discard memory used for extensions, the SuperBasic tables still hold addresses in the area but other tasks are free to use the memory. The machine is likely to crash if it tries to call those routines once their code has been overwritten.

Problems are even more likely if you discard the memory used for device drivers or interrupt serves. Unless you disconnect each link to the system explicitly inside the code it will continue to be called when the device is used, or the system tries to recognise the parameter of OPEN, or an interrupt occurs.

A few QL extensions can be unlinked, with commands like the Speedscreen_SPEED 0, or T_OFF which disconnects DIY Toolkit timer interrupts. They are exceptional and anyway they still leave command code linked, in case you want to turn them back on later. So LINKUP does not allow DISCARD. If you want to load, call and jettison code, use separate steps, including RESERVE, or accept the loss of memory.

In some cases you may not mind loading a small file with LINKUP. For instance, one very easy way to get a graphics printout of the majority of the QL screen is to put the Easel cartridge in Microdrive 1 and type:

```
LINKUP 'mdv1_gprint_prt'
```

This loads and calls the Easel screeen dump routine but it leaves you with about 500 fewer bytes to play with once printing is complete.

The code for the heap management commands is listed in two forms. Listing three gives you a quick way to enter the code without using an assembler. It loads the equivalent machine code from DATA statements and saves the code in a file. Once you have loaded that file, as follows, you can use RESERVE, DISCARD and LINKUp in your own programs:

```
base=RESPR(318) : LBYTES "file-
name", base : CALL base : NEW
```

The first part of listing three is Marcus Jeffrey's standard loader, used in every month's DIY Toolkit project. Only the DATA, from line 590 onwards, changes from month to month.

Listing two is the corresponding assembly code program, written and assembled using HiSoft DevPac. Type this text into your assembler if you want to customise the code or merge it with other routines.

This month's code is more straightforward than recent DIY Toolkit projects. As usual, the START routine calls BP. INIT, the ROM vector which adds new commands to SuperBasic. The table labelled DEFINE indicates the names and addresses of the commands.

This table is at the end of the file to make it easy to extend the command names if they clash with variables or SuperBasic names in your programs. I commend this format to all RAM toolkit writers. It means that a simple utility can be used to re-name commands in any toolkit file with the appropriate format.

Names can be made shorter or longer, assuming that the code offsets in the file are re-computed and do not exceed 32K.

The bulk of the listing consists of three parts, one for each command. LINKUP is the most complex command but only because it uses six or seven QL ROM routines and takes pains to ensure that it does not leave the system in a mess if given an inappropriate parameter.

First the code calls CA.GTSTR to fetch a string parameter on to the maths stack, addressed by 0(A1, A6.L). Names must be in quotes, or you will get an 'error in expression' report. CA.GTSTR does not pick up the identifier of parameters as it should when it finds a name with no value. I shall explain how to curcumvent that limitation another month.

The next block of code uses the name to open a file for input. The maths stack can move at any time, so the code uses TRAP #4 immediately before the OPEN to warn Qdos that it must add A6 to A0 when it needs to find the name.

If the file is opened successfully LINKUP reads the file header to check the file size – see *QL World*, February, 1988. The header is 64 bytes long and it is barely possible that two tasks may perform a LINKUP at the same time. Rather than risk collisions and tie up 64 bytes of RAM, LINKUP reads the header into the SuperBasic 'buffer' area, also used by EDIT, INPUT, EDLINE$ and COPY. Every SuperBasic task has its own 'buffer' of at least 128 bytes.

If the file length is odd or the header cannot be read, LINKUP closes the channel and returns an error code. This is the only check to prevent you trying to link code which is not executable. You can crash the machine easily if you try to LINKUP a Quill document or compiled task. LINKUP cannot check this for you, as extension code files may contain any mixture of code and data.

Otherwise common heap space is allocated with MT.ALCHP and FS.LOAD reads the code into memory. The file is closed and JMP (A4) is enough to call the code, using the return address from the call to LINKUP. The code takes pains to de-allocate memory and close the channel if an error occurs, so that resources are not tied up.

RESERVE is simpler than it looks. It fetches the two parameters, checks that the number of bytes is greater than zero and passes the buck for all further checking to MT.ALCHP, the system call to allocate common heap space.

Common heap memory is allocated in 16-byte positions. Each entry has a 16-byte 'header' used to keep track of allocations. The system uses the heap to hold details of channels, devices and individual drives; heap space is also used by FILL, RAM discs and toolkit commands like ALCHP, ALLOCATION and RESERVE.

Common heap areas cannot be moved once they are allocated, as other parts of the system may hold addresses inside them.

Memory is allocated from the bottom of the QL memory map, upwards towards the movable end of SuperBasic and task space. Intermediate space is used for file-buffering 'Slave Blocks'.

It is easy to 'fragment' the heap if you are careless. Reserved spaces must be a contiguous sequence of bytes, so one small block in the incorrect place can cause havoc.

Imagine you have 200K free and allocated 99K with RESERVE. Now you open a channel, start to use FILL, or access a drive you have not used previously. Qdos grabs another few hundred bytes. Later you DISCARD the 99K but you can no longer allocate more than 100K because the available common heap space is split in half by the small system allocation.

Qdos merges adjacent memory areas as they are released, so that problem disappears if you always DISCARD memory in the opposite order from that in which you RESERVE it, so long as Qdos does not clog things with its own allocations in the meantime. Once the heap is fragmented the only way to recover is to discard the areas which get in the way, which may be difficult or impossible, or press Reset.

Even LINKUP fragments the heap slightly, because IO.OPEN uses the heap to store channel details; next LINKUP loads code into the heap, then IO.CLOSE discards the channel details, often leaving a small 'hole' in common heap memory.

System entries use all 16 bytes of the common heap header but the last four bytes are unused if you allocate a block

```
* QL WORLD DIY TOOLKIT - heap memory routines
* Version 0.7, Copyright 1989 Simon N Goodwin.
*
initialise lea.l     define,a1          A1 -> extension details
           move.w    $110,a2            Fetch BP.INIT vector
           jmp       (a2)               Add these extensions
*
* LINKUP "file name string"    - adds extension code in the heap
*
linkup     move.w    $116,a2            Fetch CA.GTSTR vector
           jsr       (a2)               Put string at 0(A1,A6.L)
           bne.s     bad_return         Return if unsuccessful
           subq.w    #1,d3              Only one parameter?
           bne.s     bad_param          Return unless just one
*
           move.l    a1,a0              A0 is name offset
           moveq     #-1,d1             Channel owner = this task
           moveq     #1,d3              OPEN_IN (shared access)
           trap      #4                 Parameter is A6 relative
           moveq     #1,d0              IO.OPEN trap key
           trap      #2                 Try to open the file
           tst.l     d0                 Was OPEN OK?
           bne.s     bad_return         If not, exit & report error
*
           move.l    (a6),a1            A1 is BASIC buffer offset
           moveq     #64,d2             There's room for 64 bytes
           moveq     #-1,d3             Allow plenty of time
           trap      #4                 Buffer is A6 relative
           moveq     #71,d0             FS.HEADR
           trap      #3                 Read the file header
           tst.l     d0                 Was it OK?
           bne.s     bad_close          Abort otherwise
*
           move.l    (a6),a1            Retrieve buffer offset
           move.l    0(a1,a6.l),d1      Get file length from header
           moveq     #-15,d0            Presume 'bad parameter'
           btst      #0,d1              Check length is even
           bne.s     bad_close          Close & complain otherwise
           move.l    d1,d4              Save length of code
           move.l    a0,a4              Save channel ID
           moveq     #0,d2              Owner is permanent task
           moveq     #24,d0             MT.ALCHP trap key
           trap      #1                 Allocate memory
           tst.l     d0                 Did it work?
           bne.s     bad_close          If not, close file & report
*
           move.l    a0,a1              Set load address
           move.l    d4,d2              Retrieve file length
           exg.l     a4,a0              Retrieve channel ID
           moveq     #-1,d3             Allow infinite time
           moveq     #72,d0             FS.LOAD trap key
           trap      #3                 Load the entire file
           tst.l     d0                 Did it load OK?
           bmi.s     bad_load           If not, tidy up & report
*
           moveq     #2,d0              IO.CLOSE
           trap      #2                 Close the file
           jmp       (a4)               CALL the code
```

```
*
bad_load    move.l    d0,d7            Save cause of death
            move.l    a4,a0            Find the memory
            moveq     #25,d0           MT.RECHP trap key
            trap      #1               De-allocate RAM
            bra.s     close_out        Close file & report
*
bad_close   move.l    d0,d7            Save error code
close_out   moveq     #2,d0            IO.CLOSE trap key
            trap      #2               Close the file
            move.l    d7,d0            Restore error code
            rts
*
bad_param   moveq     #-15,d0          Set BAD PARAMETER report
bad_return  rts
*
* DISCARD buffer_address    - deallocate memory on the heap
*
discard     move.w    $118,a2          Fetch CA.GTLIN vector
            jsr       (a2)             Get long integers
            bne.s     bad_return       Return if fetch fails
            subq.w    #1,d3            Is there just 1 parameter?
            bne.s     bad_param        Reject otherwise
            move.l    0(a1,a6.l),d1    Get parameter from RI stack
            bmi.s     bad_param        Parameter must be >= 0
            btst      #0,d1            Parameter must be even
            bne.s     bad_param        Complain if it is odd
            move.l    d1,a0            Use parameter as a pointer
            cmpi.l    #'Bufa',-(a0)    Check header for watermark
            beq.s     seems_ok         Only continue if it matches
            moveq     #-7,d0           Otherwise report NOT FOUND
            rts
seems_ok    clr.l     (a0)+            Scrub watermark
            moveq     #25,d0           MT.RECHP trap key
            trap      #1               De-allocate RAM
            rts
*
* address/error code = RESERVE(bytes,owner)    - reserve heap
*
reserve     move.w    $118,a2          Fetch CA.GTLIN vector
            jsr       (a2)             Get long integers
            bne.s     bad_return       Give up if fetch fails
            subq.w    #2,d3            Two parameters?
            bne.s     bad_param        Give up unless two
            move.l    0(a1,a6.l),d1    Get number of bytes
            ble.s     bad_param        At least 1 byte needed?
            move.l    4(a1,a6.l),d2    Owner -1 = self, 0 = QDOS
            addq.l    #2,a1            Tweak stack by (8-6) = 2
            move.l    a1,$58(a6)       Set BV.RIP for result
            moveq     #24,d0           MT.ALCHP
            trap      #1               Allocate RAM
            tst.l     d0
            bmi.s     return_fp        Return error code
            move.l    #'Bufa',-4(a0)   Identify this block
            move.l    a0,d0            Return A0 via D0
```

```
* Make D0.L into a 6 byte decimal in the space on the RI stack
*
return_fp   move.w    d0,d4           D4 will be exponent
            move.l    d0,d5           D5 will be mantissa
            beq.s     normalised      Zero is a trivial case
            move.w    #2079,d4        First guess at exponent
            add.l     d0,d0           Already normalised?
            bvs.s     normalised
            subq.w    #1,d4           No, halve exponent weight
            move.l    d0,d5           Double mantissa to match
            moveq     #16,d1          Try a 16 bit shift
*
normalise   move.l    d5,d0           Take copy of mantissa
            asl.l     d1,d0           Shift mantissa d1 places
            bvs.s     too_far         Overflow; must shift less
            sub.w     d1,d4           Correct exponent for shift
            move.l    d0,d5           New mantissa is more normal
too_far     asr.w     #1,d1           Halve shift distance
            bne.s     normalise       Try shift of 8, 4, 2 and 1
normalised  move.l    $58(a6),a1      Get safe A1 value
            move.l    d5,2(a1,a6.l)   Stack mantissa
            move.w    d4,0(a1,a6.l)   Stack exponent
            moveq     #2,d4           Floating point result
job_done    moveq     #0,d0
            rts
*
define      dc.w      2               Two procedures
            dc.w      linkup-*
            dc.b      6,'LINKUP'
            dc.w      discard-*
            dc.b      7,'DISCARD'
            dc.w      0,1             One function
            dc.w      reserve-*
            dc.b      7,'RESERVE'
            dc.w      0               end
```

with MT.ALCHP. To help DISCARD identify RESERVEd memory, the DIY Toolkit code stores the text 'Bufa' at the end of the common heap header, as a kind of 'watermark'.

The last part of the code is the familiar normalisation routine which converts the reserved address into a Qdos floating point value. It is a pity you cannot return long integers by RTS with D4 set to 4.

DISCARD is very simple. It checks that the parameters even and positive, then looks for the watermark at the specified address. If successful, DISCARD assumes the space was allocated by RESERVE, as there are no words starting 'Bufa' in my dictionary. If clears the watermark, then calls MT.RECHP to deallocate the space. It might be considered more elegant to link spaces in a list, as MEM and ALCHP do, but I use a watermark as it is simpler and more efficient.

● *Please write to me, care of QL World, if you have found interesting tweaks or short applications for DIY Toolkit code. Send yur suggestions if you would like me to explore a specific area in this column, or to implement new and original commands.*

THE P·R·O·G·S

If you have a program worthy of consideration, send it to 'The Progs', Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG. We pay for everything published at the usual page rates.

Program of the month

3D SKETCHPAD by A. McGregor

3D Sketchpad, which runs on an unexpanded QL, enables the user to create simple wire-frame models in 3D by manipulating rectangular blocks of different sizes and orientations in imaginary 3D space. When the program is running, the following options are available:

Add Block

When "ADD BLOCK" is selected from the main menu, a new block is added to the file and default values for the parameters which control its size, position and orientation are displayed on the screen. Inputting new values for "X_DIMN", "Y_DIMN" and "Z_DIMN" will alter the size of the block in its x, y and z axes. "X_TRAN", "Y_TRAN" and "Z_TRAN" define the position of the block relative to the point of intersection of the three red cross hairs X=0, Y=0 and Z=0. The block may be rotated in any of the three axes by adjusting "X_ROTN", "Y_ROTN" or "Z_ROTN". The angle of rotation is expressed in degrees. Pressing the space bar will cause the new block to be displayed on the screen and return you to the main menu. All the block definitions are stored in a single two dimentional array and up to 100 of them may be stored numbered from 0 to 99.

"EDIT BLOCK" enables you to return to a block which has already been defined so that you may make alterations to its various attributes. The block being edited will be redrawn on top of its old version when the space bar is pressed.

A block may be removed from the file by selecting "DELETE BLOCK" and then following the on screen prompts. Once a block has been deleted it cannot be restored and other blocks may be renumbered as the file is compressed to fill the gap. Note also that the display will not be amended during this operation and, therefore, the deleted block will remain visible until a subsequent operation causes the entire scene to be redrawn.

Redraw

This option simply redraws the entire scene. It may be used to tidy the screen after a block has been edited or deleted.

At any time during the development of a model, the position and orientation of the "camera" may be adjusted to give a different view of the scene. Selecting the 'ADJUST VIEW' option from the main menu allows you to input new coordinates for both the position of the camera and the position of the "target point" towards which the camera always points. The orientations of the X, Y and Z axes as seen by the camera are shown diagramatically at the bottom right of the screen. The size of the "lens angle" can also be adjusted within the range 20 to 100 degrees. There are no restrictions on where you may position the camera within the scene since all lines which extend beyond the limits of the "viewing pyramid" are automatically 'clipped' before the perspective transformation is carried out.

Move Origin

It is sometimes easier to work out coordinates for a new block if the "origin" – the point where X=0, Y=0 and Z=0 – is relocated with respect to the existing blocks. The three red cross hairs which are normally visible on the screen are intended to show the position of the origin which is at the point where they intersect. A redraw will be carried out automatically after this operation.

All of the block definitions and the viewpoint data can be saved onto a microdrive cartridge by selecting "SAVE FILE" and then following the on screen prompts. If a microdrive error occurs the program may be restarted without loss of data by typing RUN 140.

Once saved, a file may be reloaded into memory via the "LOAD FILE" option.

ABANDON FILE simply destroys the current data and restores the viewpoint variables to their starting values.

```
100 REMark ************ 3D SKETCHPAD ************
110 REMark ************ A.D.McGREGOR ************
120 :
130 CLEAR:initialise
140 OPEN#4,con_512x256a0x0:MODE 4
150 OPEN#4,con_448x200a32x16
160 BORDER#4,2,2:SCALE#4,hght*2,-wdth,-hght
170 OPEN#5,con_378x40a32x216:CSIZE#5,0,0
180 IF n1>-1:draw_scene:ELSE draw_axes
190 REPeat menu
200 CLS#5:INK#5,4
210 AT#5,0,0 :PRINT#5,"1/ LOAD FILE"
220 AT#5,0,21:PRINT#5,"2/ SAVE FILE"
230 AT#5,0,42:PRINT#5,"3/ ABANDON FILE"
240 AT#5,1,0 :PRINT#5,"4/ ADD BLOCK"
250 AT#5,1,21:PRINT#5,"5/ EDIT BLOCK"
260 AT#5,1,42:PRINT#5,"6/ DELETE BLOCK"
270 AT#5,2,0 :PRINT#5,"7/ MOVE ORIGIN"
280 AT#5,2,21:PRINT#5,"8/ ADJUST VIEW"
290 AT#5,2,42:PRINT#5,"9/ REDRAW"
300 INK#5,7
310 AT#5,3,0 :PRINT#5,"1-9 TO SELECT"
320 REPeat chloop
330 wait_no_key:key=CODE(INKEY$(-1))-48
340 SELect ON key
```

```
350 =1:recall_file      :EXIT chloop
360 =2:store_file       :EXIT chloop
370 =3:abandon_file     :EXIT chloop
380 =4:add_object       :EXIT chloop
390 =5:edit_object      :EXIT chloop
400 =6:delete_object    :EXIT chloop
410 =7:move_origin      :EXIT chloop
420 =8:adjust_viewpoint:EXIT chloop
430 =9:draw_scene       :EXIT chloop
440 END SELect
450 END REPeat chloop
460 END REPeat menu
470 :
480 DEFine PROCedure initialise
490 wdth=166:hght=100:cd=.1
500 DIM blk(100,8),vw(6)
510 vw(0)=0:vw(1)=0:vw(2)=0
520 vw(3)=150:vw(4)=-400:vw(5)=300:vw(6)=60
530 n1=-1:set_up_view
540 END DEFine
550 :
560 DEFine PROCedure abandon_file
570 INK#5,4:CLS#5
580 IF n1=-1
590 PRINT#5,"FILE ALREADY EMPTY!"
600 PRINT#5,"PRESS ANY KEY"
610 wait_no_key:PAUSE
620 ELSE
630 PRINT#5,"CURRENT DATA WILL BE LOST IF NOT ALRE
ADY SAVED!"
640 PRINT#5,"DO YOU WANT TO CONTINUE? Y/N"
650 IF NOT yes:RETurn
660 END IF
670 initialise:CLS#4:draw_axes
680 END DEFine
690 :
700 DEFine PROCedure delete_object
710 LOCal n,m,ob%
720 INK#5,4:CLS#5:ob%=0
730 IF n1=-1
740 PRINT#5,"NO BLOCKS PRESENT!"
750 PRINT#5,"PRESS ANY KEY"
760 wait_no_key:PAUSE:RETurn
770 ELSE
780 IF n1>0
790 PRINT#5,"WHICH BLOCK DO YOU WANT TO DELETE? 0
TO"!n1
800 REPeat roloop
810 ob%=number(5,2,0,3,"TYPE BLOCK NUMBER >")
820 IF ob%<=n1 AND ob%>=0:EXIT roloop
830 END REPeat roloop
840 END IF
850 CLS#5
860 PRINT#5,"DELETE BLOCK NUMBER"!ob%!"Y/N"
870 IF yes
880 FOR n=ob% TO n1
890 FOR m=0 TO DIMN(blk,2)
900 blk(n,m)=blk(n+1,m)
910 END FOR m
920 END FOR n
930 n1=n1-1
940 CLS#5
950 PRINT#5,"BLOCK NUMBER"!ob%!"DELETED"
960 PRINT#5,"PRESS ANY KEY"
970 wait_no_key:PAUSE
980 END IF
990 END IF
1000 END DEFine
1010 :
1020 DEFine PROCedure add_object
1030 LOCal key%,objt
1040 IF n1<DIMN(blk)-1
1050 n1=n1+1
1060 blk(n1,0)=100:blk(n1,1)=100:blk(n1,2)=100
1070 edblock n1
1080 ELSE
1090 INK#5,4:CLS#5
1100 PRINT#5,"FILE FULL!"
1110 PRINT#5,"PRESS ANY KEY"
1120 wait_no_key:PAUSE
1130 END IF
1140 END DEFine
1150 :
1160 DEFine PROCedure edit_object
1170 LOCal ob%
1180 INK#5,4:CLS#5:ob%=0
1190 IF n1<0
1200 PRINT#5,"NO BLOCKS PRESENT!"
1210 PRINT#5,"PRESS ANY KEY"
1220 wait_no_key:PAUSE:RETurn
1230 END IF
1240 IF n1>0
1250 PRINT#5,"WHICH BLOCK DO YOU WANT TO EDIT? 0 T
0"!n1
1260 REPeat chloop2
1270 ob%=number(5,2,0,3,"TYPE BLOCK NUMBER >")
1280 IF ob%<=n1 AND ob%>=0:EXIT chloop2
1290 END REPeat chloop2
1300 END IF
1310 edblock ob%
1320 END DEFine
1330 :
1340 DEFine PROCedure edblock(nu%)
1350 LOCal key
1360 INK#5,4:CLS#5
1370 PRINT#5,"1/ X DIMN="&blk(nu%,0):AT#5,0,21
1380 PRINT#5,"2/ Y DIMN="&blk(nu%,1):AT#5,0,42
1390 PRINT#5,"3/ Z DIMN="&blk(nu%,2):AT#5,1,0
1400 PRINT#5,"4/ X TRAN="&blk(nu%,3):AT#5,1,21
1410 PRINT#5,"5/ Y TRAN="&blk(nu%,4):AT#5,1,42
1420 PRINT#5,"6/ Z TRAN="&blk(nu%,5):AT#5,2,0
1430 PRINT#5,"7/ X ROTN="&blk(nu%,6):AT#5,2,21
1440 PRINT#5,"8/ Y ROTN="&blk(nu%,7):AT#5,2,42
1450 PRINT#5,"9/ Z ROTN="&blk(nu%,8):AT#5,3,0
1460 INK#5,7
1470 PRINT#5,"1-9 TO EDIT OR SPACE TO EXIT"
1480 REPeat chloop3
1490 wait_no_key:key=CODE(INKEY$(-1))-48
1500 SELect ON key
1510 =1:blk(nu%,0)=number(5,0,10,8,0,"")
1520 =2:blk(nu%,1)=number(5,0,31,8,0,"")
1530 =3:blk(nu%,2)=number(5,0,52,8,0,"")
1540 =4:blk(nu%,3)=number(5,1,10,8,1,"")
1550 =5:blk(nu%,4)=number(5,1,31,8,1,"")
1560 =6:blk(nu%,5)=number(5,1,52,8,1,"")
1570 =7:blk(nu%,6)=number(5,2,10,8,1,"")
1580 =8:blk(nu%,7)=number(5,2,31,8,1,"")
1590 =9:blk(nu%,8)=number(5,2,52,8,1,"")
1600 =32-48
1610 flag%=0:objt=nu%:draw_object
1620 IF flag%=0
1630 INK#5,4:CLS#5
1640 PRINT#5,"BLOCK OUTSIDE VIEWING PYRAMID!"
1650 PRINT#5,"PRESS ANY KEY"
1660 wait_no_key:PAUSE
1670 END IF
1680 RETurn
1690 END SELect
1700 END REPeat chloop3
1710 END DEFine
1720 :
1730 DEFine FuNction yes
1740 LOCal key$
1750 wait_no_key
1760 REPeat ynloop
1770 key$=INKEY$(-1)
1780 IF key$=="y":RETurn 1
1790 IF key$=="n":RETurn 0
1800 END REPeat ynloop
1810 END DEFine
1820 :
1830 DEFine PROCedure wait_no_key
1840 LOCal key%,n
1850 REPeat wloop
1860 key%=0
1870 FOR n=0 TO 7:key%=key%+KEYROW(n):END FOR n
1880 IF key%=0:EXIT wloop
1890 END REPeat wloop
1900 END DEFine
1910 :
1920 DEFine PROCedure adjust_viewpoint
1930 LOCal key
1940 INK#5,4:CLS#5
1950 PRINT#5,"1/ TGET X="&vw(0):AT#5,0,21
1960 PRINT#5,"2/ TGET Y="&vw(1):AT#5,0,42
1970 PRINT#5,"3/ TGET Z="&vw(2):AT#5,1,0
1980 PRINT#5,"4/ CMRA X="&vw(3):AT#5,1,21
1990 PRINT#5,"5/ CMRA Y="&vw(4):AT#5,1,42
2000 PRINT#5,"6/ CMRA Z="&vw(5):AT#5,2,0
2010 PRINT#5,"7/ LENS A="&vw(6):AT#5,3,0
2020 INK#5,7
2030 PRINT#5,"1-7 TO EDIT OR SPACE TO EXIT"
2040 REPeat svloop
2050 wait_no_key:key=CODE(INKEY$(-1))-48
2060 SELect ON key
2070 =1:vw(0)=number(5,0,10,8,1,"")
```

```
2080 =2:vw(1)=number(5,0,31,8,1,"")
2090 =3:vw(2)=number(5,0,52,8,1,"")
2100 =4:vw(3)=number(5,1,10,8,1,"")
2110 =5:vw(4)=number(5,1,31,8,1,"")
2120 =6:vw(5)=number(5,1,52,8,1,"")
2130 =7:vw(6)=number(5,2,10,3,0,"")
2140 INK#5,4:AT#5,2,10
2150 IF vw(6)<20
2160 vw(6)=20 :PRINT#5,"20   "
2170 END IF
2180 IF vw(6)>100
2190 vw(6)=100:PRINT#5,"100  "
2200 END IF
2210 =32-48
2220 IF n1>=0:draw_scene:ELSE draw_axes
2230 RETurn
2240 END SELect
2250 END REPeat svloop
2260 END DEFine
2270 :
2280 DEFine PROCedure move_origin
2290 LOCal x,y,z,n
2300 INK#5,4:CLS#5
2310 IF n1=-1
2320 PRINT#5,"FILE EMPTY!"
2330 PRINT#5,"PRESS ANY KEY"
2340 wait_no_key:PAUSE:RETurn
2350 END IF
2360 REPeat orloop
2370 CLS#5
2380 x=number(5,0,0,8,1,"X DISPLACEMENT.....>"
)
2390 y=number(5,1,0,8,1,"Y DISPLACEMENT.....>"
)
2400 z=number(5,2,0,8,1,"Z DISPLACEMENT.....>"
)
2410 AT#5,0,36
2420 PRINT#5,"ALL CORRECT? Y/N"
2430 IF yes:EXIT orloop
2440 END REPeat orloop
2450 vw(0)=vw(0)-x
2460 vw(1)=vw(1)-y
2470 vw(2)=vw(2)-z
2480 vw(3)=vw(3)-x
2490 vw(4)=vw(4)-y
2500 vw(5)=vw(5)-z
2510 FOR n=0 TO n1
2520 blk(n,3)=blk(n,3)-x
2530 blk(n,4)=blk(n,4)-y
2540 blk(n,5)=blk(n,5)-z
2550 END FOR n
2560 draw_scene
2570 END DEFine
2580 :
2590 DEFine PROCedure set_up_view
2600 LOCal exr,eyr,ezr,d1,d2
2610 exr=vw(3)-vw(0)
2620 eyr=vw(4)-vw(1)
2630 ezr=vw(5)-vw(2)
2640 d1=SQRT(ABS(exr^2)+ABS(eyr^2))
2650 d2=SQRT(ABS( d1^2)+ABS(ezr^2))
2660 IF exr=0 AND eyr=0 AND ezr=0
2670 a1=1:a2=0:a3=1:a4=0
2680 ELSE
2690 IF exr=0 AND eyr=0
2700 a1=1:a2=0:a3=0:a4=ezr/d2
2710 ELSE
2720 a1=eyr/-d1:a2=exr/d1:a3=d1/d2:a4=ezr/d2
2730 END IF
2740 END IF
2750 va=a1:vb=a2:vg=a3:vk=-a4:v1=d2
2760 ve=a4*-a2:vf=a4*a1:vi=a3*-a2:vj=a3*a1
2770 sd=wdth/TAN(RAD(vw(6)/2))
2780 END DEFine
2790 :
2800 DEFine PROCedure draw_scene
2810 LOCal objt
2820 INK#5,4:CLS#5:draw_axes
2830 IF n1<0
2840 PRINT#5,"NOTHING TO DRAW!"
2850 PRINT#5,"PRESS ANY KEY"
2860 wait_no_key:PAUSE:RETurn
2870 END IF
2880 FOR objt=0 TO n1
2890 draw_object
2900 END FOR objt
2910 IF flag%=0
2920 CLS#5
2930 PRINT#5,"VIEWING PYRAMID EMPTY!"
2940 PRINT#5,"PRESS ANY KEY"
2950 wait_no_key:PAUSE
2960 END IF
2970 END DEFine
2980 :
2990 DEFine PROCedure draw_object
3000 INK#4,7:INK#5,4:CLS#5:AT#5,0,0
3010 PRINT#5,"DRAWING BLOCK NUMBER"!objt
3020 syz=SIN(RAD(blk(objt,6)))
3030 cyz=COS(RAD(blk(objt,6)))
3040 sxz=SIN(RAD(blk(objt,7)))
3050 cxz=COS(RAD(blk(objt,7)))
3060 sxy=SIN(RAD(blk(objt,8)))
3070 cxy=COS(RAD(blk(objt,8)))
3080 tdx=blk(objt,3)-vw(0)
3090 tdy=blk(objt,4)-vw(1)
3100 tdz=blk(objt,5)-vw(2)
3110 x=blk(objt,0)/2:y=blk(objt,1)/2:z=blk(objt,2)
/2
3120 RESTORE 4640
3130 DIM xe(8),ye(8),ze(8)
3140 FOR vtx=1 TO 8
3150 READ      xw,yw,zw
3160 rotate_x     yw,zw
3170 rotate_y  xw,   zw
3180 rotate_z  xw,yw
3190 translate xw,yw,zw
3200 viewpoint xw,yw,zw
3210 END FOR vtx
3220 FOR cnct=1 TO 12
3230 READ      vertex1,vertex2
3240 draw_line vertex1,vertex2
3250 END FOR cnct
3260 END DEFine
3270 :
3280 DEFine PROCedure rotate_x(y,z)
3290 LOCal yt,zt
3300 yt=cyz*y-syz*z
3310 zt=syz*y+cyz*z
3320 yw=yt:zw=zt
3330 END DEFine
3340 :
3350 DEFine PROCedure rotate_y(x,z)
3360 LOCal xt,zt
3370 xt=sxz*z+cxz*x
3380 zt=cxz*z-sxz*x
3390 xw=xt:zw=zt
3400 END DEFine
3410 :
3420 DEFine PROCedure rotate_z(x,y)
3430 LOCal xt,yt
3440 xt=cxy*x-sxy*y
3450 yt=sxy*x+cxy*y
3460 xw=xt:yw=yt
3470 END DEFine
3480 :
3490 DEFine PROCedure translate(x,y,z)
3500 xw=x+tdx:yw=y+tdy:zw=z+tdz
3510 END DEFine
3520 :
3530 DEFine PROCedure viewpoint(x,y,z)
3540 xe(vtx)=va*x+vb*y
3550 ye(vtx)=ve*x+vf*y+vg*z
3560 ze(vtx)=vi*x+vj*y+vk*z+vl
3570 END DEFine
3580 :
3590 DEFine PROCedure draw_axes
3600 LOCal wx,wy,v1,v2,px,py,p$,dis
3610 CLS#4:CLS#5:INK#4,2:set_up_view
3620 DIM xe(6),ye(6),ze(6)
3630 wx=70:wy=40
3640 OPEN#3,scr
3650 WINDOW#3,wx,wy,480-wx,216:CLS#3
3660 SCALE#3,wy,-wx/1.35/2,-wy/2
3670 PAPER#3,0:INK#3,2
3680 OVER#3,1:CSIZE#3,0,0
3690 CLS#3:dis=wy/2-5
3700 RESTORE 4570
3710 FOR vtx=1 TO 6
3720 READ      xw,yw,zw
3730 viewpoint xw.yw,zw
3740 END FOR vtx
3750 FOR cnct=1 TO 3
3760 READ v1,v2
3770 LINE#3,xe(v1),ye(v1)TO xe(v2),ye(v2)
3780 END FOR cnct
3790 FOR p=2 TO 6 STEP 2
```

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SINCLAIR QL WORLD

```
3800 px=wx/2-3+xe(p)*1.35
3810 py=wy/2-5-ye(p)
3820 CURSOR#3,px,py
3830 READ p$
3840 INK#3,4:OVER#3,-1
3850 PRINT#3,p$
3860 END FOR p
3870 dis=1E6
3880 RESTORE 4570
3890 FOR vtx=1 TO 6
3900 READ xw,yw,zw
3910 xw=xw-vw(0):yw=yw-vw(1):zw=zw-vw(2)
3920 viewpoint xw,yw,zw
3930 END FOR vtx
3940 FOR cnct=1 TO 3
3950 READ      v1,v2
3960 draw_line v1,v2
3970 END FOR cnct
3980 flag%=0
3990 END DEFine
4000 :
4010 DEFine PROCedure draw_line(vtx1,vtx2)
4020 LOCal cx1,cy1,cx2,cy2,vc1,vc2,vc3
4030 LOCal cf1%,cf2%,xs1,ys1,xs2,ys2
4040 x1=xe(vtx1):x2=xe(vtx2)
4050 y1=ye(vtx1):y2=ye(vtx2)
4060 z1=ze(vtx1):z2=ze(vtx2)
4070 IF z1<cd AND z2<cd:RETurn
4080 IF z1<cd:clip_z:x1=xc:y1=yc:z1=cd
4090 IF z2<cd:clip_z:x2=xc:y2=yc:z2=cd
4100 cx1=sd/wdth*x1:cx2=sd/wdth*x2
4110 cf1%=(cx1<-z1)+(cx1>z1)*2
4120 cf2%=(cx2<-z2)+(cx2>z2)*2
4130 IF cf1%>0 AND cf1%=cf2%:RETurn
4140 IF cf1%>0
4150 clip_xy cf1%,x1,y1,z1,x2,y2,z2,sd,wdth
4160 x1=vc1:y1=vc2:z1=vc3
4170 END IF
4180 IF cf2%>0
4190 clip_xy cf2%,x1,y1,z1,x2,y2,z2,sd,wdth
4200 x2=vc1:y2=vc2:z2=vc3
4210 END IF
4220 cy1=sd/hght*y1:cy2=sd/hght*y2
4230 cf1%=(cy1<-z1)+(cy1>z1)*2
4240 cf2%=(cy2<-z2)+(cy2>z2)*2
4250 IF cf1%>0 AND cf1%=cf2%:RETurn
4260 IF cf1%>0
4270 clip_xy cf1%,y1,x1,z1,y2,x2,z2,sd,hght
4280 y1=vc1:x1=vc2:z1=vc3
4290 END IF
4300 IF cf2%>0
4310 clip_xy cf2%,y1,x1,z1,y2,x2,z2,sd,hght
4320 y2=vc1:x2=vc2:z2=vc3
4330 END IF
4340 xs1=sd*x1/z1:ys1=sd*y1/z1
4350 xs2=sd*x2/z2:ys2=sd*y2/z2
4360 LINE#4,xs1,ys1 TO xs2,ys2:flag%=1
4370 END DEFine
4380 :
4390 DEFine PROCedure clip_xy(cf%,v1,v2,v3,v4,v5,v
6,v7,v8)
4400 LOCal mu,dc1,dc2,d1,d2,d3,d4
4410 d1=v4*v7:d2=v1-v4:d3=v2-v5:d4=v3-v6
4420 IF cf%=1:mu=(d1+v6*v8)/(d2*-v7-d4*v8)
4430 IF cf%=2:mu=(d1-v6*v8)/(d2*-v7+d4*v8)
4440 vc1=mu*v1+(1-mu)*v4
4450 vc3=mu*v3+(1-mu)*v6
4460 dc1=SQRT(d2^2+d4^2)
4470 dc2=SQRT((vc1-v4)^2+(vc3-v6)^2)
4480 vc2=dc2*d3/dc1+v5
4490 END DEFine
4500 :
4510 DEFine PROCedure clip_z
4520 xc=(cd-z1)*(x2-x1)/(z2-z1)+x1
4530 yc=(cd-z1)*(y2-y1)/(z2-z1)+y1
4540 END DEFine
4550 :
4560 REMark AXES
4570 DATA -dis,0,0,dis,0,0
4580 DATA 0,-dis,0,0,dis,0
4590 DATA 0,0,-dis,0,0,dis
4600 DATA 1,2,3,4,5,6
4610 DATA "X","Y","Z"
4620 :
4630 REMark BOX
4640 DATA -x,-y,-z,-x,y,-z,x,y,-z,x,-y,-z
4650 DATA -x,-y,z,-x,y,z,x,y,z,x,-y,z
4660 DATA 1,2,4,3,8,7,5,6
4670 DATA 1,5,2,6,3,7,4,8
4680 DATA 1,4,2,3,6,7,5,8
4690 :
4700 DEFine PROCedure store_file
4710 LOCal file$,i,j
4720 INK#5,4:CLS#5
4730 IF n1=-1
4740 PRINT#5,"FILE EMPTY!"
4750 PRINT#5,"PRESS ANY KEY"
4760 wait_no_key:PAUSE:RETurn
4770 END IF
4780 CLS#5
4790 PRINT#5,"TYPE DEVICE (e.g: MDV1_) & FILE NAME
"
4800 file$=file_name$(5,2,0)
4810 CLS#5
4820 PRINT#5,"SAVE "&file$&"? Y/N"
4830 IF NOT yes:RETurn
4840 OPEN_NEW#10,file$
4850 PRINT#10,"THIS IS A 3D SKETCHPAD FILE"
4860 FOR i=0 TO DIMN(vw)
4870 PRINT#10,vw(i)
4880 END FOR i
4890 FOR i=0 TO n1
4900 FOR j=0 TO DIMN(blk,2)
4910 PRINT#10,blk(i,j)
4920 END FOR j
4930 END FOR i
4940 CLOSE#10
4950 END DEFine
4960 :
4970 DEFine PROCedure recall_file
4980 LOCal file$,id$,i
4990 INK#5,4:CLS#5
5000 IF n1>-1
5010 PRINT#5,"CURRENT DATA WILL BE LOST IF NOT ALR
EADY SAVED!"
5020 PRINT#5,"DO YOU WANT TO CONTINUE? Y/N"
5030 IF NOT yes:RETurn
5040 END IF
5050 CLS#5
5060 PRINT#5,"TYPE DEVICE (e.g: MDV1_) & FILE NAME
"
5070 file$=file_name$(5,2,0)
5080 CLS#5
5090 PRINT#5,"LOAD "&file$&"? Y/N"
5100 IF NOT yes:RETurn
5110 OPEN_IN#10,file$
5120 INPUT#10,id$
5130 IF id$="THIS IS A 3D SKETCHPAD FILE"
5140 initialise:n1=-1
5150 FOR i=0 TO DIMN(vw)
5160 INPUT#10,vw(i)
5170 END FOR i
5180 REPeat ldloop
5190 IF EOF(#10):EXIT ldloop
5200 n1=n1+1
5210 FOR i=0 TO DIMN(blk,2)
5220 INPUT#10,blk(n1,i)
5230 END FOR i
5240 END REPeat ldloop
5250 draw_scene
5260 ELSE
5270 CLS#5
5280 PRINT#5,"WRONG FILE TYPE!"
5290 PRINT#5,"PRESS ANY KEY"
5300 wait_no_key:PAUSE
5310 draw_scene
5320 END IF
5330 CLOSE#10
5340 END DEFine
5350 :
5360 DEFine FuNction file_name$(ch%,yp%,xp%)
5370 LOCal k,b$,xpc%
5380 b$="_3D":xpc%=0:wait_no_key
5390 REPeat floop
5400 AT#ch%,yp%,xp%
5410 PRINT#ch%,b$&FILL$(" ",42-LEN(b$))
5420 INK#ch%,7:PAPER#ch%,2:OVER#ch%,0
5430 AT#ch%,yp%,xp%+xpc%:PRINT#ch%," "
5440 IF LEN(b$)>xpc%
5450 OVER#ch%,1:AT#ch%,yp%,xp%+xpc%
5460 PRINT#ch%,b$(xpc%+1)
5470 END IF
5480 INK#ch%,4:PAPER#ch%,0:OVER#ch%,0
5490 k=CODE(INKEY$(-1))
5500 SELect ON k
5510 =192:IF xpc%>0:xpc%=xpc%-1
```

```
5520 =200:IF LEN(b$)-3>xpc%:xpc%=xpc%+1
5530 =65TO 90,97 TO 122,48 TO 57,95
5540 IF LEN(b$)<41
5550 IF LEN(b$)=xpc%
5560 b$=b$&CHR$(k)
5570 ELSE
5580 b$=b$(1 TO xpc%)&CHR$(k)&b$(xpc%+1 TO)
5590 END IF :xpc%=xpc%+1
5600 END IF
5610 =194
5620 IF xpc%>0
5630 IF LEN(b$)=xpc%
5640 b$=b$(1 TO xpc%-1)
5650 ELSE
5660 b$=b$(1 TO xpc%-1)&b$(xpc%+1 TO)
5670 END IF :xpc%=xpc%-1
5680 END IF
5690 =10,208,216:IF b$<>"_3D":RETurn b$
5700 END SELect
5710 END REPeat floop
5720 END DEFine
5730 :
5740 DEFine FuNction number(ch%,yp%,xp%,lm%,ng%,la
b$)
5750 LOCal key,n$,n,s%,xpc%,lmc%
5760 s%=LEN(lab$):n$="":xpc%=0:AT#ch%,yp%,xp%
5770 lmc%=lm%+3
5780 PRINT#ch%,lab$:wait_no_key
5790 REPeat nloop
5800 AT#ch%,yp%,xp%+s%
5810 PRINT#ch%,n$&FILL$(" ",lmc%-LEN(n$))
5820 INK#ch%,7:PAPER#ch%,2:OVER#ch%,0
5830 AT#ch%,yp%,xp%+xpc%+s%:PRINT#ch%," "
5840 IF LEN(n$)>xpc%
5850 OVER#ch%,1:AT#ch%,yp%,xp%+xpc%+s%
5860 PRINT#ch%,n$(xpc%+1)
5870 END IF
5880 INK#ch%,4:PAPER#ch%,0:OVER#ch%,0
5890 key=CODE(INKEY$(-1))
5900 SELect ON key
5910 =192:IF xpc%>0:xpc%=xpc%-1
5920 =200:IF LEN(n$)>xpc%:xpc%=xpc%+1
5930 =48TO 57
5940 IF LEN(n$)<lm%
5950 IF LEN(n$)=xpc%
5960 n$=n$&CHR$(key)
5970 ELSE
5980 n$=n$(1 TO xpc%)&CHR$(key)&n$(xpc%+1 TO)
5990 END IF :xpc%=xpc%+1
6000 END IF
6010 =10,208,216
6020 IF n$<>"" AND n$<>"-" AND n$<>"." AND n$<>"-."
6030 n=n$:AT#ch%,yp%,xp%+s%
6040 PRINT#ch%,FILL$(" ",lm%+1)
6050 AT#ch%,yp%,xp%+s%:PRINT#ch%,n:RETurn n
6060 END IF
6070 =194
6080 IF xpc%>0
6090 IF n$(xpc%)="." OR n$(xpc%)="-":lm%=lm%-1
6100 IF LEN(n$)=xpc%
6110 n$=n$(1TO xpc%-1)
6120 ELSE
6130 n$=n$(1 TO xpc%-1)&n$(xpc%+1 TO)
6140 END IF
6150 xpc%=xpc%-1
6160 END IF
6170 =46
6180 IF "-"INSTR(n$)=1 AND xpc%=0
6190 ELSE
6200 IF "."INSTR(n$)=0
6210 IF LEN(n$)=xpc%
6220 n$=n$&"."
6230 ELSE
6240 n$=n$(1 TO xpc%)&"."&n$(xpc%+1 TO)
6250 END IF
6260 xpc%=xpc%+1:lm%=lm%+1
6270 END IF
6280 END IF
6290 =45
6300 IF ng%=1
6310 IF xpc%=0 AND "-"INSTR(n$)=0
6320 IF LEN(n$)=xpc%
6330 n$="-"
6340 ELSE
6350 n$="-"&n$(xpc%+1 TO)
6360 END IF
6370 xpc%=xpc%+1:lm%=lm%+1
6380 END IF
6390 END IF
6400 END SELect
6410 END REPeat nloop
6420 END DEFine
```

MICRODRIVE

KEY

B = SuperBasic; A + O = assembler and object code; M + B = machine code and Basic loader; A+B+O = assembler and Basic loader and object code; S = supercharged; L = QLiberated; f1 = monitor mode; f2 = TV mode

1. DIY ASSEMBLER by Giles Todd (B) £5
A complete two-pass assembler which assembles all 68008 code and supports the directives DRG, END, EQU, DC and DS.

2. MINI MONITOR by Richard Cross (A + O) £3
Multi-tasks on the QL using only 3K of RAM, Dump registers, memory and ASCII m/c trace, register store, memory move and store, and jumps. *QL User,* October 1985.

4. GOLF by Shergold and Tose (Bf12) £2
Up to 50 courses varying difficulty with lakes, rivers, bunkers and trees. *QL User,* May, 1985.

5. PALADIN by Williams and Holliday (A + O) £5
All-machine code space-invaders game used as the basis of the games programming series beginning in April 1985.

7. PACMAN by Steve Deary (B) £1
Almost 20 screens of varying difficulty including an invisible maze. *QL User,* March 1985.

8. FAMILY TREE by Andy Carmichael (B) £3
Archive database for assembling and displaying large family trees. *Theory of Relativity, QL User,* July/August 1985.

9. COMPOSER by James Lucy (L) £3
Completed in *QL User,* October 1985, this QLiberated program allows you to compose, play and edit music, including tempo, staccato, legato and sharps.

17. CAD QL by Tony Quinn (S) £4
The QL is particularly suited to CAD. Includes rubber banding and user-definable symbols. *QL World,* September 1988.

19. STARPORT 2001 by Karl Jeffrey (M + B) £3
Galaxian-style arcade game with fast m/c entry. *QL World,* November 1986.

24. DESIGN 3D by J.F. Tydeman (S) £4
3D screen designs with the minimum of fuss. *QL World,* March/April 1987.

25. STELLARIS by D. Carmona (Bf1) £4
Real-time space adventure against the computer, including economic simulations, lunar landing and superb graphics. *QL World,* June 1987.

29. BRIDGE by Peter Etheridge (B) £4
Excellent version including accurate bidding, automatic or manual card play, replay hands, save and load more.

32. ADVENT2 by Phillip Sproston (B) £4
Arcade adventure with humour: rooms, robots and problems to keep you on your toes.

34. QL CONVERSION/CALCULATOR (f2) £2
Weights and measures, conventions and reverse Polish, converts anything to anything. Menu-driven, easy to use.

35. QWHIST by John Wakefield (B) £3
You play south and the computer plays north against automatic east/west opponents. *QL World,* August 1987.

36. MAIL MERGE by Stanley Sykes (Bf2) £1
Handy utilities providing mail merge and labeller for Quill files, plus a demo.

37. THE DOUBLE by P.G. Ives (Bf2) £4
A large football strategy game. You manage a team through four divisions, buying and selling, boosting morale through the league and F.A. Cup season.

40. ROULETTE by Santiago Rubio (B) £3
Spanish/English version of the gambling game, including Leigh Pattern system to break the bank. *QL World,* September 1987.

45. SUPERBREAKOUT by R. Davidson (M + B) £2
Fast m/c version of the classic bat, ball and wall game. Optional double bats and/or balls.

52. SPACE PODS by Simon Quinn (M + B) £3
Your lone ship must protect six energy pods against the aliens. Machine code. *QL World,* December 1987.

53. GRAPHIC WRITER by S.M. Walker (B) £2
A graphic design program which can save your pictures as SuperBasic commands for use in other programs. *QL World,* December 1987.

54. ZAPMAN by L. Miles (M + B) £3
Fast-action m/c version of the Pacman genre. Variable skill levels and maze formats.

55. ADVENTURE PLAYTIME by A. Pemberton (B) £3
An extensive adventure where you must complete tasks for the inhabitants of a strange land. Coded messages and hints included.

56. SPACE INVADERS by Paul McKinnon (M) £3
Very fast, challenging version of the classic, with ugly aliens and protective shields.

57. SPELLED by Timo Salmi (T) £3
A complete spelling checker for Quill — list files. 7,500 words automatically expandable. Required two cartridges and 512K expansion.

58. RADAR by Nigel Ford (B) £2
You are control, monitoring the skies, checking aircraft, scrambling jets to intercept UFOs and shooting down enemy aircraft.

59. DUNGEONS by Geoffrey Evelyn (B) £4
As wizard, superhero, megahero or elf you must explore the dungeons, fighting monsters and collecting treasure in this one- to four-player game. Needs two cartridges and an expanded QL.

60. SPEEDMIND by William Henderson (B) £3
A mastermind-style game played with coloured pages. You have 12 attempts at breaking the code against the clock. *QL World,* January 1988.

61. COMPANDER by A. Quigley (M9) £1
Compresses screen designs into the smallest files we have seen from a similar routine. *QL World,* April 1988.

62. DOMINOES by Adrian Steen (Bf2)
1 version of the classic English dominoes to play against the computer. *QL World,* May 1988.

63. VICIOUS VIPER by Ian Humphreys (B) £3
A version of the snake game in Basic. "Simple, frustrating, addictive, playable." *QL World,* July 1988.

64. TAKTIX by Nigel Ford (B) £3
Six or more can play the computer in a fierce game of European conquest. Put aside at least an hour. *QL World,* July 1988.

65. DUAL DOMINOES by Heimo Geske (B) £4
Two addictive versions of European dominoes with splendid graphics, to be played in mode 4 against the computer.

66. FTIDY by Howard Clase (B) £4
"A very pleasant file handling front-end type program, very clear and simple to use" — *QL World* software editorial. Machine code data file handlers *Data—maker* and *Data—loader* are included in the package.

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67. LEAGUE SECRETARY by C.B. Storey (B) £3
You enter the match results and this program updates the league tables. Suitable for any sporting league organised on the lines of the Barclays Football League.

68. TAB—EDITOR by Richard Williams (B,complied) £3
A flexible text editor for easy entry and manipulation of listings. Includes simple movement through columns, full block copying, special SORT for tabular listings, and very flexible tabbing. "The author has taken a lot of trouble to get it right." Code available from author.

69. WORDSEARCH by David Watson (B) £3
Generates 20-word wordsearch puzzles with large-letter screen dumps using the Easel print—prt routine (which must be added by the user). "A nice program and different to the usual run of wordsearches." *QL World,* November 1988.

70. QTRON by Axel Berle (M + B) £3
"Although arcade games are not my personal favourite, I liked this one — smooth graphics, excellent visually, and plenty of variety to maintain interest." MDX only.

71. CRITICAL MASS by Patrick Carter (B) £4
As numbers accumulate in close proximity to each other, they reach their critical mass and explode, blowing their neighbours off the board. Can you hold your position? "An original game which I enjoyed playing." *QL World,* December 1988.

72. BOXES/FOX AND HOUNDS (B) £4
Two SuperBasic games for the festive season. Keep your family amused for hours, get hooked yourself. *QL World,* January 1989.

73. MULTIPLICATION TABLES by Ron Allpress (B) £3
An educational program with plenty of features. Ideal for teaching the next generation to memorise the multiplication tables, or revising your own. *QL World,* February 1989.

74. GRAPH PLOTTER by John Banks (B) £3
Useful for visualising mathematical functions in two dimensional polar or cartesian coordinates. *QL World,* March 1980.

75. BUSINESS GAME by David Smith (B) £4
A business simulator for any number of players, human or computer. The winner is the one who makes the most money! Networking capability available from author. See *QL World,* April 1989.

76. BACKGROUND MUSIC
By J Russell/CARPET by G.V. Reynes £4
The former generates music which will play behind another program; the latter generates patterns based on one-dimensional cellular automata. Lie back and relax. *QL World,* May 1989.

77. FOOTBALL MANAGER by Chic James (B) £3
Guide your teams through the league competing against one another.

78. CUBE by Dirk de Mal (B) £3
A 2D strategy game in the colour cube tradition — unscramble the cube into the correct colour sequence. "Entertaining and addictive" with graphics and music. *QL World,* July 1989.

79. LINK 4 by Graham Creasy/BOING by Richard Green (B) £4
Line up four counters against an opponent or against the computer. Not as easy as it sounds. In Boing, a ball bounces to the force of user-definable gravity.

80. MOLECULAR GRAPHICS by Mark Knight (M & B) £4Molecuar structures of any compound can be saved, reloaded, drawn and rotated on screen. Examples provided. "Excellent, one of the best educational programs on the QL." Disc transfer available. 2 cartridges and 512K needed.

81. CONQUEST by Andrew Pritchard (T) £4
"Superb graphics with lots of original ideas. The best strategy game I've reviewed for *QL World.*"

82. WORDBLOK by Phillip Sproston £3 Simple to play, hard to win: do you know more words than the computer? Infuriating and addictive. *QL World September 1989.*

83. 3D SKETCH PAD by A.D. McGregor £3
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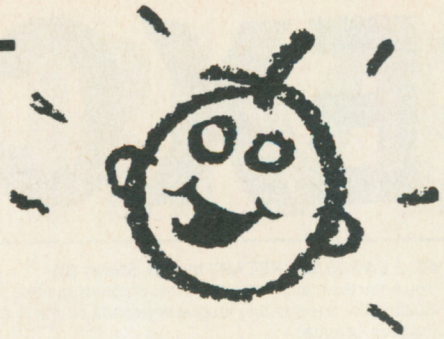

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After months of blood, sweat and tears, a massive effort by ace machine code programmer Peter Jefferies, technical system support by Dilwyn Jones and Chas Dillon, we are delighted to announce an entirely new version of Flash-Back, FlashBack Special Edition.

FlashBack Core System

By Peter Jefferies

Peter has re-written FlashBack introducing a host of improvements and extra features, only a few of which can be listed here due to constraints of space.

Now written entirely in re-entrant hand coded assembler. This means that you can now use multiple copies of Flashback SE at any one time and transfer details between files.

- Much slicker screen handling, faster scrolling etc.
- Separate Group and Order (Index) commands provided
- Successive record selection (Grouping) now supported
- Six options of file indexing now available: these include number handling (leading zeros optional)
- New powerful string match update from View screen
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- Two types of search and replace supported. One lightning fast, the other allowing on screen step-by-step consent
- New 'quit program' facility provided
- Edit line (Search, Group, Read etc.) greatly improved
- Ad-hoc record selection/rejection on subsequent Groupings
- Many quick-key presses for next, back, repeat search etc.
- Entirely compatible with existing Falshback files
- Compatible with Qram

New extended config program

By Peter Jefferies

Greater choice of turn on key and variations of record separator to printer.

- New extended import program
- extensively modified by Chas Dillon.
- More flexible when reading in Archive files, allows sub record definition at import and mistakes, restart option etc.

Report Generator

Planned by Chas Dillon Written by Dilwyn Jones

This is the feature that hordes of existing users have been screaming for.

The report generator provides flexible printer output from a FlashBack file. Allows columnar printing of details, labels, mailmerge, document and invoice production etc. Includes printer driver and installation utility which allows for additional fonts and 10 translates.

Sector price Only £40

FlashBack Special Edition will be available in April. Standard FlashBack will continue to be available at only £25 inclusive.

Upgrades for existing FlashBack users

Send your FlashBack master and £15, mark your envelope 'FlashBack Upgrade'. You may upgrade from Microdrive to disk. Make this clear or you will receive the upgrade on the same media as you send. Demand will be high and orders will be dealt with in date sequence.

Phillips CM8833 Stereo Monitor

A dark screen monitor with composite video, RGB linear and RGB TTL inputs.

Plainly speaking it is a very good monitor that is well suited to the QL or any other computer. The monitor has a green screen button to convert from colour to green screen and back again at the press of a button. It can handle all 4096 colours available on the Amiga and has full stereo sound output through its two built in speakers. Not much use on the QL, but if you change computers this monitor will work just as well with your new one. The Phillips CM8833 is the same price as the Discontinued Microvitec QL monitor, but is much, much better.

~~RRP £300~~

Sector price £260

Ferret

NEW!

Ferret is a new utility that hides in the background until needed. When you can't remember the filename of the doc or program that you were working on. You simply call up ferret and send it looking for the file by giving it a clue about the content.

If you wrote to Quanta then simply type 'Quanta' and tell Ferret where to look. It will fly through your disk or Mdv and read all the files, looking for a match. Any file that contains the search text is named and the the file contents around the match are shown to you if required.

The program searches only specified files, e.g. _doc or _bas and will either search the whole file for a match or will just the first 1-5K of it. This can be used by leaving notes in the header of a Basic program which can subsequently be searched for.

Ferret is designed to be quick and easy to use and will work on all QL's and memory sizes. It comes on 3.5" disk or Microdrive and is a must for anyone with an extensive disk or Mdv collection. During searching the filename is displayed together with the file size - you can see the program working. The next time you can't find a file don't waste time looking for it, just send your ferret after it.

Sector price £12

Star LC10 Colour

The new Star LC10 colour printer is an 8 column printer that works superbly with the QL.

The 8 colour ribbon only costs £6 to replace - less than the cost of black ribbons for some printers. The colour commands are easily implemented - simply type "((C))" followed by the colour number required. The LC10 colour has 6 NLQ fonts all of which give excellent output.

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£399 INCLUDING VAT

With SM124 mono monitor: £498 INC VAT — With SC1224 colour monitor: £698 INC VAT

1040ST-FM PROFESSIONAL PACK

NOW WITH TV MODULATOR

For the serious home user and the small business, we are pleased to announce a new package based around the 1040ST-FM. The 1040ST-FM has 1Mbyte RAM and a 1Mbyte built-in disk drive. In addition, the 1040ST-FM now comes with a TV modulator built-in. (The previously available 1040ST-F was designed for use with a monitor only and did not come with a modulator.) This modulator allows the 1040ST-F to be plugged directly into any domestic TV set, and comes complete with a lead to allow you to do so. The new 'Professional Pack' from Silica includes the new 1040ST-FM with modulator plus four high quality software packages including a spreadsheet, database, word processor and programming language. This 'Professional Pack' software will enable you to get straight down to business with your new computer. In addition to this software (worth £384.84), if you buy the Professional Pack from Silica Shop, you will also receive the Silica ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for further information.

£499 INCLUDING VAT

With SM124 mono monitor: £598 INC VAT
With SC1224 colour monitor: £798 INC VAT

ATARI 1040ST-FM	(Computer)	£499.99
VIP PROFESSIONAL	(Spreadsheet)	£149.95
MICROSOFT WRITE	(Word Processor)	£149.95
SUPERBASE PERSONAL	(Database)	£59.95
BASIC DISK & MANUAL	(Language)	£24.98

NORMAL RRP: £884.82
LESS DISCOUNT: -£385.82
PROFESSIONAL PACK PRICE: £499.00

2Mb & 4Mb MEGA ST

The MEGA ST computers are styled as as lightweight keyboard with a separate CPU, connected by a coiled telephone style cable. There are two versions of the MEGA ST, one with 2Mbytes of RAM and the other with 4Mbytes. Each version has a 1Mbyte double sided disk drive built-in to the CPU unit. The MEGA ST's do not come with modulator built-in and must therefore be used with a monitor. With every MEGA ST purchased, we will add the 'Professional Pack' software (worth £384.83) detailed above, plus the Silica ST Starter Kit (worth over £200) both Free Of Charge. Return the coupon for further details.

2Mb MEGA ST
£899 INC VAT
+ mono monitor = £998
+ colour monitor = £1198

4Mb MEGA ST
£1199 INC VAT
+ mono monitor = £1298
+ colour monitor = £1498

DTP PageStream £149 +VAT =£171.35

Desktop Publishing (DTP) is one of the fastest growing applications for personal computers. We are pleased to announce a powerful low cost package for the Atari ST called PageStream. PageStream costs only £149 (+VAT=£171.35) and, because it works with an Atari 1040ST and a Seikosha SP-180AI printer, you can be up and running with a complete system for less than £1000. Some of the features of PageStream are listed to the right. If you would like further information on this program, complete and return the coupon below, ticking the 'DTP' box in the corner.

* TEXT-FLOW AROUND GRAPHICS
* ROTATION OF TEXT & GRAPHICS
* SLANT OR TWIST ANY OBJECT
* POSTSCRIPT COMPATIBLE
* TAG FUNCTION
* AUTO/MANUAL KERNING & HYPHENATION
* GROUPING OF OBJECTS

ATARI ST

ST COMPUTERS

The range of Atari ST computers offers something for everyone. From the games enthusiast who wants the challenge of the very best in arcade action, to the businessman who wants to make financial forecasts or faultless presentations. The ST offers high quality graphics, sound and speed for the gamer, whilst providing a fast, user friendly and affordable solution to business. The ST is now firmly established in the home environment and boasts a wealth of users in education, local government, television, and a variety of different businesses. Software for the range stretches to cover applications as diverse as ENTERTAINMENT, ACCOUNTS, ART, COMMUNICATIONS, COMPUTER AIDED DESIGN, DATABASES, DESKTOP PUBLISHING, EDUCATION, MUSIC, PROGRAMMING, SPREADSHEETS, WORD PROCESSING and more. For a full list of the software available, as well as details of the ST range, complete and return the coupon below.

All prices correct at the time of going to press. E&OE.

520ST-FM EXPLORER PACK

WITH BUILT-IN 1Mb DISK DRIVE

The value for money offered by the Atari ST range is reflected in the Explorer Pack featuring the 520ST-FM computer with 512K RAM. The 520ST-FM computer now comes with a built-in 1 Mb double sided disk drive as well as a free mouse controller and a built-in TV modulator. The new 520ST-FM Explorer Pack includes the 520ST-FM computer, the arcade game Ranarama, a tutorial program and some useful desktop accessories. In addition, if you buy the Explorer Pack from Silica, we will give you the Silica ST Starter Kit worth over £200, FREE OF CHARGE. Return the coupon for details of our Starter Kit and of the full ST range.

£260

ONLY £2.51 PER WEEK
RETURN COUPON FOR DETAILS

+VAT= £299

+ SM124 mono monitor: £398 INC VAT — + SC1224 colour monitor: £598 INC VAT

WHY SILICA SHOP?

Before you decide when to buy your new Atari ST computer, we suggest you consider very carefully WHERE you buy it. There are MANY companies who can offer you a computer, a few peripherals and the top ten selling titles. There are FEWER companies who can offer a wide range of products for your computer and expert advice and help when you need it. There is ONLY ONE company who can provide the largest range of Atari ST related products in the UK, a full time Atari ST specialist technical helpline and in-depth after sales support, including free newsletters and brochures delivered to your door for as long as you require after you purchase your computer. That one company is Silica Shop. We have been established in the home computer field for ten years with an annual turnover in excess of £8 million and can now claim to meet our customers requirements with an accuracy and understanding which is second to none. But don't just take our word for it. Complete and return the coupon below for our latest literature and begin to experience the Silica Shop specialist Atari service.

SILICA STARTER KIT: Worth over £200, FREE with every Atari ST computer bought from Silica.
PROFESSIONAL PACK: Free business software with 1040ST-FM and MEGA ST's bought from Silica.
DEDICATED SERVICING: 7 full-time Atari trained staff with years of experience on Atari servicing.
THE FULL STOCK RANGE: All of your Atari requirements from one place.
AFTER SALES SUPPORT: The staff at Silica are dedicated to help you get the best from your ST.
FREE CATALOGUES: Mailed direct to your home as soon as we print them, featuring offers as well as all of the new releases.
FREE OVERNIGHT DELIVERY: On all hardware orders shipped within the UK mainland.
PRICE MATCH PROMISE: We will match competitors on a 'same product same price' basis.
FREE TECHNICAL HELPLINE: Full time team of Atari technical experts always at your service.

FREE SILICA STARTER KIT WORTH OVER £200

WITH EVERY ST - RETURN COUPON FOR DETAILS

ALL PRICES QUOTED INCLUDE FREE UK DELIVERY

DO YOU OWN AN ATARI ST?

If you already own an Atari ST computer and would like to be registered on our mailing list as an ST user, let us know. We will be pleased to send you copies of our price lists and newsletters FREE OF CHARGE as they become available. Complete the coupon and return it to our Sidcup branch and begin experiencing a specialist ST service that is second to none.

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OPEN: *MON-SAT 9am - 5.30pm* ***LATE NIGHT:*** *FRIDAY 9am - 7pm*

LONDON **01-580 4000**
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OPEN: *MON-SAT 9.30am - 6.00pm* ***LATE NIGHT:*** *NONE*

LONDON ..... **01-629 1234 ext 3914**
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To: Silica Shop Ltd., Dept QLW 10 89, 1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX.

PLEASE SEND FREE LITERATURE ON THE ATARI ST

Mr/Mrs/Ms: ..... Initials: ..... Surname: .....

Address: .....

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Postcode: .....

Do you already own a computer
If so, which one do you own? ..... DTP ☐

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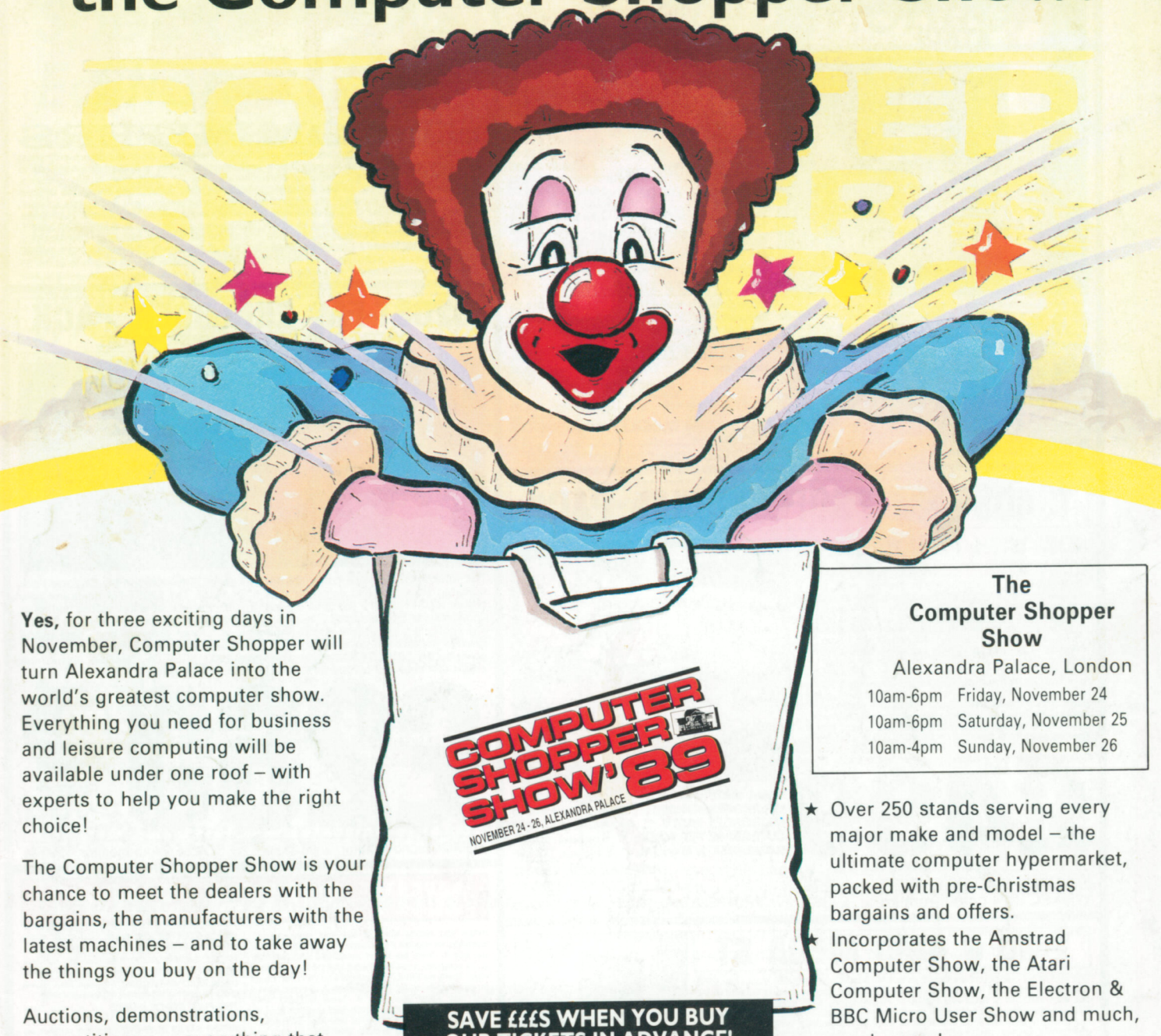

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