

S I N C L A I R

Every month £1.45 April 1989

QL

WORLD

**DIY TOOLKIT —
TASK FORCE**

Multi-task the
Psion Four
and other
bad-
tempered
software

**UPDATE —
TEXT '87**

What you see is
what you
really get

**EXPERIMENTAL
CIRCUIT**

On-screen hardware control

REVIEW

ABC Mega-RAM Board



**PROGRAM
OF THE
MONTH**

The Business Game



PERSONAL COMPUTER PRODUCTS

NORTHCOTE CRESCENT (04865)
WEST HORSLEY 3836
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WARNING — GUARANTEE

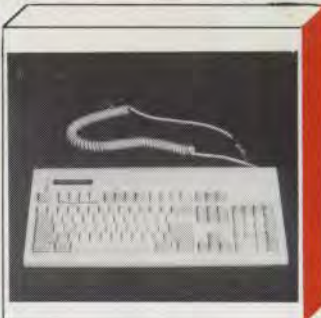
MAILING LIST OFFER. We sincerely hope that you are aware of the forthcoming withdrawal of QL World from the newstands. We therefore strongly advise you to contact us if you wish to be informed of any new developments (and there are many) as and when they arrive.

Please drop us a line as soon as 'snail mail' allows and we will add your details to our database. We have some superb new products arriving soon from the Continent, so be sure that you are contacted. We guarantee that all customers on record will be informed of new products that are selected to be in our range!!!



SCHÖN STANDARD KEYBOARD

The most popular add-on keyboard for the QL. Same key layout as original but incorporates full travel, two-shot moulded keys. Expansion, ROM ports and microdrives unaffected. Comes complete with anti-bounce device and QL top cover including LED's. Simple installation. No soldering, 5 mins. Please call for free spec sheet. Both keyboards have 1 yr+ guarantee. **Fantastic value at only £35.00 inc VAT.**



SCHÖN PS/2 STYLE KEYBOARD

The absolute ultimate add-on keyboard is now available for the QL. The Schön PS/2 style keyboard. It is the perfect tool for the discerning QL enthusiast and has many extra keys. In total the Schön PS/2 style keyboard has 102 keys and includes separate numeric and cursor pads, Home, End, Page Up & Dn, Del & ., SKIP & SOLN, EOLN, RECALL, Caps, Scroll & Num Lock (illuminated), SYS REQ, BREAK, Del Line, diagonal cursor keys AND yes ... **SINGLE KEY UNDERSCORE!!! R.R.P. £114.95 includes I/F and QL top cover with LED's. CALL NOW FOR FREE SPEC SHEET.**



SCHÖN KBL 128 QL CASING

This is a special product intended for the enthusiastic QL owner with electronic knowledge. The KBL 128 comprises of an inner metal chassis and a strong outer ABS casing. Complete with 64 way 'flip-back' connector to allow expansion devices to sit on top of the QL PCB. Casing is suitable for QL PCB, drives, PSU, and all expansion devices. A highly rewarding DIY challenge for the QL owner with the '4ft long' problem. Works superbly in conjunction with the new Schön PS/2 style keyboard. Call for spec sheet and chat about converting your QL. **R.R.P. £65.00 including VAT.**

SOFTWARE DISKTOOL By ULTRASOFT

A useful budget priced piece for the QL which uses the QJump Pointer Environment. Fully multi-tasking and accessed via HOTKEY, Disktool enables formatting disks to a capacity of 752k (1512 sectors). Other features include disk password protection and hyperfast single or double drive copying. Comes with Pointer Environment and CONFIG program. **R.R.P. £9.95. Call for details.**

NEW SOFTWARE NEW CARD By ULTRASOFT

Card is a small user-friendly database utility to handle simple database applications. Features include—
* Compatible with QJump Pointer Environment
* Dynamic memory allocation
* Fast SEARCH and SORT algorithms
* Fully multi-tasking
* 100% machine code
* HOTKEY accessible
* On-screen HELP facility
Card comes complete with Pointer Environment and **CONFIG** program and is available on 3.5" disk for **£14.95**. Please call for details.

SOFTWARE TOOLKIT III By ULTRASOFT

Toolkit III is the ultimate enhancement for SuperToolkit II. Features include—
* Fully operational sub-directory structures
* New file attributes: READ ONLY, USER AREAS, etc.
* Unique MEM device to access memory as a file
* Fast and flexible database commands
* Extensions to old Superbasic and TQ2 commands.
* Commands for advanced memory access
* 100% compatible to QJump Pointer Environment
Available on 3.5" for £19.95 or EPROM for £24.95

TRANSFORMER

The only alternative full blown IBM PC/MS DOS emulator for the QL. This previously unadvertised product is a complete, professionally written ROMable code program which gives your QL a PC environment. The transformer naturally supports both CGA and MDA fully and comes complete with PD software to show its full potential and speed. The transformer shows yet again the quality of continental programming and should be available from the beginning of April. It can be seen running at The Alternative Micro Show (Stands A6, A7, A8, A9).

To avoid public confusion we must stress that this product is a totally NEW product and is in no way related to so-called PC emulators advertised by other companies.

NEW SOFTWARE NEW

The latest piece of professional software from the Continent to become available in the U.K. The Painter is a totally new, totally complete user-friendly graphics/CAD package for the QL. All menus are full screen and icon controlled. The Painter allows up to 12 full screens to be designed at once in 4 or 8 colours. * User variable zoom command * Spectacular screen edit facility for close up full cover pixel work (displays min-

EXTRAS

EXTRAS FOR SCHÖN PRODUCTS

Anti-bounce Device (for Schön Standard Keyboard) £6.00
Black PVC Dustcover for PS/2 Style Keyboard £4.95
12 V Slimline cooling fan for use with Schön KBL 128 Casing £24.95
All 'extras' prices include VAT and P&P

ture full screen simultaneously) * Work screen/menu screen wrapping is instantaneous * Normal drawing commands (line, square, circle, etc.) as well as more unusual requirements) * Requires at least 256K and comes on 3.5" disk complete with manual. All drawings produced on The Painter can be incorporated in other graphics/DTP programs. The Painter retails at **£29.95** including VAT. Please call for more details.

PRODUCT & CARRIAGE COSTS

Schön Standard Keyboard £35.00 P&P @ £2.00
Schön PS/2 Keyboard £114.95 P&P @ £3.00
Schön KBL 128 Casing £65.00 P&P @ £3.00

All software advertised is priced as stated above. Postage is included on all software. Overseas customers please call for export prices. European customers contact **Ultrasoft, Vennhauser Allee 218, 4000 Dusseldorf 12, W. Germany**. All software is supplied on 3.5" unless otherwise stated.

MS DOS is a trademark of Microsoft Corp.
PS/2 is a trademark of IBM.

ORDER FORM/DATABASE FORM

Please send me the following product(s) to the address below.

Product(s)
Mr/Mrs
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..... P/Code
Tel Amount Enclosed £.....

Please tick box for database inclusion
PLEASE REMEMBER POSTAGE!! and don't forget to get on our product database.
Please allow up to 28 days for delivery.

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ISSN 026806X

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Back issues are available from the publisher price £2 U.K., £2.75 Europe. Overseas rates on request. Please telephone 089 283 4783 to check availability.

Published by Focus Magazine Ltd., London. S M Distribution, Streatham, London SW1.

Subscription information from: TIL, PO Box 74, Paddock Wood, Tonbridge, Kent TN12 6DW. £15 U.K., £30 Surface mail Europe and the rest of the world. Add £5 for air mail + £10 overseas. Typesetting by Adtec Typographics, Stanford-le-Hope, Essex. Tel: (0375) 360967.

Printing by Southernprint Ltd.
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WORLD — 1989.

CONTENTS

APRIL 1989

- 9 **QL SCENE** ● How many emulators?
- 10 **OPEN CHANNEL** ● Fast talking
- 12 **ABC MARK III** ● Outboard keyboard
- 16 **SOFTWARE FILE** ● Treat the Mega-Ram tenderly
- 18 **TEXT '87** ● What you see is what you get
- 24 **PSION SOLUTIONS** ● Looking for lost files
- 26 **DIY TOOLKIT** ● Taskmaster whips into shape
- 30 **SCREEN CONTROLLER** ● Screen to hardware stitchup
- 34 **SUPERBASIC** ● Part 2 of the calculator project
- 38 **PRINTER REPORT 3** ● The last of the present batch
- 41 **PROGRAM OF THE MONTH** ● The Business Game
- 46 **MICRODRIVE EXCHANGE** ● Multiple microcassettes



NEXT MONTH

LET US EMULATE

We present the first comparative review of two QL MS-DOS emulators.

IT MUST BE A FLASHBACK

Bryan Davies looks at the latest version of an increasingly popular program.

THE SOLUTION

— IBM PC EMULATOR

THE SOLUTION is Digital Precision's brand new PC Emulator System. By emulating an IBM PC as exactly as possible, **THE SOLUTION** enables its users to make their QL into a PC clone — no ifs, maybes or almos. **THE SOLUTION** is available now!

A full technical specification of **THE SOLUTION** appeared in the February issue of QL WORLD. We now answer your most common questions on the subject.

Q. Do I have to know anything about QDOS, MSDOS, PCs or programming to use THE SOLUTION?

A. No. Nothing at all.

Q. Do I need any hardware to run THE SOLUTION?

A. **THE SOLUTION** is purely software — there's no hardware to muck up your system. To run **THE SOLUTION** you must have at least one disk drive and at least 256K RAM expansion. If you have a 640K QL you have over 450K free for MSDOS and your programs — loads of room. And if you have a TRUMPCARD, you have more RAM available to MSDOS than on a big PC! If you don't have disks or expansion RAM, we can supply you with both at very competitive prices. And we don't stock anything but the best. Today's "bargain-price" hardware is all-too-often tomorrow's tragedy.

Q. How compatible is THE SOLUTION?

A. **THE SOLUTION** will run all properly written PC programs: that is, all programs that adhere to IBM's specifications. All the well-known and popular programs for the PC are properly written — if they weren't, their manufacturers would be swarmed with complaints from people who couldn't run the software on their particular brand of clone. It's a "chicken and egg" situation — it is because the sensible manufacturers don't break the rules and write software properly that they get to be famous in the first place!

Q. Can I have that again, in English this time?

A. Programs that break the rules, by making direct access to hardware and bypassing the BIOS, are the cause of problems. But these are programs that don't give just us headaches, they also won't work on many PC clones as well! It is impossible to guarantee compatibility with such naughty programs — but **THE SOLUTION** will have a good try to auto-guess what is expected of it, and will hence run the overwhelming majority of naughty programs too. Again, our emulator is no more fussy than many clones (including the unmentionable!) and less fussy than some of them.

Q. Naughty programs?

A. Software that breaks IBM specifications is invariably written either by people who didn't know better (this software is only found at the bottom of the public domain league-table — our advice is to steer clear of the super-cheapos!) or by people who wanted to maximise speed (direct pokes into screen RAM, etc.) whatever the consequences — invariably these are games. Our test suite comprises 100+ programs, even including a smattering of games. **THE SOLUTION** works with all of them, perfectly. Of course we've tested it on BASICs, other high level languages, compilers, assemblers, monitors, databases like dBASE and Framework, spreadsheets like Lotus 1-2-3, Symphony and Supercalc, word processors like Wordstar, Superwriter, Word Perfect and loads of applications programs. For heaven's sake don't think this is a complete list. There isn't a single PC program we've encountered — and our betatesters have had access to hundreds — that has given a problem that we haven't traced either to a proven and demonstrated bug in "their" program (that causes a problem with a clone) or a bug — fixed by us in minutes — in our test version. There is no third category. The bottom line? Run garbage and you just might get hassles, but no more than you would get with a clone. In many ways, we are more PC compatible than the famous brand PCs. Run half-decent software and you won't. **THE SOLUTION** is super-compatible.

Q. How fast is THE SOLUTION?

A. How long is a piece of string? As we are emulating an 80x80 CPU, different 80x86 instructions translate into a different set of M68000 instructions. **THE SOLUTION** is hand-written in optimal machine-code, so it goes as fast as is possible.

Q. Don't avoid the question.

A. **THE SOLUTION** runs with most programs, at about 10%-20% of the speed of an XT. Usually it will more than double this, and if you have an ST QL Emulator or fast THOR, you can increase our speed figures to 250%-300% of their values. But on a QL we have found the speed very acceptable for the vast majority of applications, and adequate for everything (except zap-em-up games). And if your PC software involves a significant "human input" component, you may find no significant difference at all between the speed of **THE SOLUTION** and that of a fast PC. If you want even more speed, we strongly recommend you buy LIGHTNING together with **THE SOLUTION** — we haven't reinvented the wheel in **THE SOLUTION**, which consequently benefits from LIGHTNING technology. Remember the 10% discount when you buy LIGHTNING.

Q. You mean I boot up THE SOLUTION, and then my QL is a PC. Can it really be that simple?

A. It is that simple. You will get your DOS prompt, A> or whatever, and after that you can forget you are on the QL. Disks you read from and write to will be in MSDOS format from here on — so you can directly read that data you wrote at the office, and after you have finished and saved your work to disk you can take the disk away and read it and manipulate it on your PC. As long as you are inside **THE SOLUTION**, the QL is a PC.

Q. Isn't the keyboard different? What about F6 . . . F10, PgDn, PgUp, DEL, INS etc, which are not QL keys?

A. Come on — it is Digital Precision you're talking to! We've remapped the keyboard — all IBM keystrokes are supported. You can reconfigure all the keys, too. So if you want (say) CTRL/DOWN to give PgDn, you can set it.

Q. What size drive?

A. Any. We can supply on 3.5" or 5.25", single or double sided, single or double density. Just tell us what you want. And if you have a QL with (say) 3.5" disks and want to use 5.25" IBM disks (IBM disks are available in both sizes, so this should not be a problem — but perhaps your office computer has only 5.25"), we can either sell you a 5.25" drive or a combined 3.5"/5.25" switchable drive, arranging a part-exchange with your existing hardware if you wish. Our prices are very competitive and we only supply NEC industrial quality goods. One thing — don't opt to format you IBM disks to quad-density (an option available on the latest PCs only) as QL drives can't read that density.

Q. What peripherals can I use?

A. Obviously, you can't plug in IBM hardware cards! But printers, modems, other communications hardware like terminal emulators (yes, we do maintain the baud rates!), mice (that mimic the keyboard) etc. all work. As our devices are reconfigurable, all sorts of possibilities arise, including the use of ramdisks, spoolers and other QL devices. You have total freedom.

Q. Miracle have announced a hard disk. Comments?

A. We love Miracle too. **THE SOLUTION** will support it via a module that we will market within a few weeks of the delivery to us of the hard disk, which is expected sometime in April. At present we are planning to allow disk partitioning, so rather than either QDOS or MSDOS grabbing all of the hard disk, you can allocate a % of it to each of them. 10% off **THE SOLUTION** if you buy it and the Miracle hard disk from us.

Q. Do I get colour too?

A. Of course. Full CGA-standard emulation (loads of smart software that took us ages to do!) is provided, with no need for accessories! Monochrome and block graphics are obviously also supported. **SOLUTION** works perfectly with CAD, graphics and DTP systems as a consequence — truly amazing!

Q. What versions of MSDOS will THE SOLUTION work with?

A. Virtually any version! We have tried even ancient, 5-6 year old versions and they work with **THE SOLUTION**. But you may get problems running some programs (not our emulator), which take advantage of recent DOS amendments, with old MSDOS versions — again, no more than you would get on a clone.

Q. Do I need to use Media Manager or Discover with THE SOLUTION?

A. No. **THE SOLUTION** provides full function disk formatting and file copying of files from QDOS to MSDOS format and back, via a separate stand-alone QDOS utility that is very fast. **THE SOLUTION** even copes with anomalies that arise with 40 track disks in 80 track drives. The beauty of all this is that you can use our superb EDITOR program — either standard or Special Edition — to manipulate IBM files very easily. EDITOR format is perfectly compatible with Wordstar/Superwriter etc format, so work is transportable to and from Editor with perfect ease. We give a £10 discount on Editor when bought with **THE SOLUTION**.

Q. Does this mean Digital Precision prefers MSDOS?

A. You must be kidding, that is why we have made **THE SOLUTION** fully and natively multitasking. If you wish, you can run more than one PC program together, or PC and QL programs simultaneously. It is exactly as you would expect, the only difference being that to multitask from **THE SOLUTION** CTRL/C is not used (because it has a meaning under MSDOS) but instead SHIFT/CTRL/C.

Q. I've heard of another emulator. . .

A. So have we. We wasted a day looking at the latest shipped version, and could get it working — after some considerable effort — with only two of our 100+ test programs, and with neither of these completely correctly. The rest all crashed or hanged! There was no support for CGA! Monochrome support was ridiculous — no sub-screen scrolling, no multiple display pages, no reading of characters back off the screen — we have a suspicion that only teletype mode (no cursor repositioning traps honoured!) was supported, which is why the 2 programs we were able to load spattered output higgledy-piggledy all over the screen. It wouldn't work with TRUMPCARD. It won't multitask — when we forced it to, it hanged the QL. It crashed on CLS, and an any access to drive B:. The keyboard — contrary to claim — isn't configurable, and many key combinations are inaccessible. Using RJOB on it soon hangs the QL, indicating the extent to which it has corrupted the entire machine. No facility is provided for moving data or files to or from QDOS. DATE seems to return random characters. Error trapping resulted in a hang. Even DEBUG wouldn't work, MODE COM1:96 returns "com1 is a bad parameter". There is no method to allow you to reduce/control the amount of RAM scavenged by the "emulator". Benchmarking this very problematic — you don't measure time to completion, only time to crash — but on the few things that worked it appeared to be a third of the speed of **THE SOLUTION** (MASM assembler time 96 seconds with our one, 253 seconds with their one — judging by their seven minutes plus for a 360K disc formatting a 720K disk would take over 12(!) minutes on their system if a bug that prevented the latter happening was fixed!

Our opinion is that it is a disgraceful program, one of the worst we have ever seen. Undoubtedly it will improve — it could hardly get worse, but it won't be usable. The ultimate insult is the manual (under 4 pages of Quill.doc file plus one twelve-line memo) from which we quote verbatim "It is not too difficult to crash the emulator!", it "still contains quite a few problems", "it is fine when using DOS and small packages," (untrue anyway, but revealing, as all PC packages are large!!). Not even could we get any BASIC (we tried five!) to work with their emulator — no input was possible, so you could not EDIT, LIST, RUN, etc. Even 10 FOR I=100 yielded a "type mismatch" error! Not a single program we tried — even one line-ones failed to crash. Phil Borman, the Secretary of QUANTA, the Independent QL User Group, stated to us on 1/3/89, "I could get no PC programs to work under that emulator." One of QL World's technical reviewers admitted that he had spent a whole day with it and had failed to manage to get any PC program to function at all (let alone function properly!). We know that QUANTA and QL World have both received many angry complaints from customers who got "caught" — we've received quite a few (unsolicited) stories already all saying the alternative didn't work at all. Finally, one of the independent sources mentioned earlier stated that what we have said about the so-called alternative is mild compared to what should have been said . . . 'nuff said.

Q. We have heard what you have to say. What do others think?

A. We understand that reviewers for QL WORLD, QUANTA and other magazines were very impressed with **THE SOLUTION**.

Q. What is the difference between the two flavours of THE SOLUTION?

A. The emulator is identical. The sole difference is that with the **CHOCOLATE SOLUTION** you are supplied with a complete MSDOS V4.0 — including all system documentation, loads of wonderful Microsoft paper, etc. **THE VANILLA SOLUTION** costs £79.95 — you've got to buy a DOS for yourself. **THE CHOCOLATE SOLUTION** costs £129.95, just £50 more — that compares with a dealer price for over £90 for MSDOS alone! And 10% off everything if you buy LIGHTNING at the same time.



THE EDITOR SPECIAL EDITOR

Text handling par excellence

These are the ultimate file-handling programs for your favourite computer. A new concept in hyperspeed information manipulation, Editor serves as a word processor, printer driver, database and programming environment. You name it, Editor does it. Its logic and consistency of approach put Editor in a class of its own. Special Editor only works on expanded machines - it takes the QL to its very limits, and is ideal for handling documents, manuscripts, books etc.

TURBO

The supreme SuperBASIC compiler

Turbo is compatible with the entire syntax of SuperBASIC. Its friendliness, features, tolerance, flexibility and fast operation are legendary. TURBOcharged programs run up to 100x faster than BASIC ones. TURBO is supplied with a general-purpose, two-hundred command toolkit.

LIGHTNING

The complete QL speed enhancement system

Lightning accelerates the QL's text, graphics, screen and mathematical operations by mind-blowing factors of up to 14x. No technical knowledge or programming is required. Simple to use, but with many bells and whistles - 78 fonts, new nul device, user-variable precision, character-drain, modechange suppression...

PRICES
SLASHED!

DESKTOP PUBLISHER DTP SPECIAL EDITION

These programs provide wysiwyg document design, with a huge number of RAM and device resident lo-res and hi-res fonts, continuously variable X & Y magnification, compatibility with Editor, Quill and Eye-Q, a preview function, comprehensive graphics facilities, flexible cut & paste, pixel justification etc. Both versions require expansion RAM, and Special Edition is disk only. The Special Edition is supplied with a free copy of grafiX, the well-known PDQL printer controller. Both versions work best with Eye-Q and Editor.

PRICE
SLASHED!

DIGITAL C

A C compiler for beginners

Truly portable, but carefully tailored and optimised to produce fast, concise code on the QL. No cash crop conversion this!

SUCCESS

The supreme CP/M Code Emulation System

Converts the QL into a fully compatible CP/M operating environment. No ifs, buts or almos. Run thousands of the world's favourite programs on your QL NOW! Emulates Z80 too!

IDIS

The first intelligent disassembler for the QL

The ideal disassembler for beginners - with IDIS you do not need to be an expert to crack other people's programs

For full program
specifications refer to
the July 1988 QL World

£10 off The Editor and/or ACT Special Edition if bought with anything else

3D PRECISION

A dream to use

Provides every facility for swiftly designing and manipulating three dimensional objects in real time. You have complete control over perspective, magnification and position, and you can create lines, surfaces, objects and worlds (groups of objects). Needs extra RAM..

MEDIA MANAGER SPECIAL EDITION

NEW

Media Manager is a very early DP release with oodles of functions. However, the design and user-friendliness of the system was not quite up to the standard of Digital Precision's other programs.

Consequently, we have spent a great deal of time rationalising and improving Media Manager, making it much easier to use, much faster, more powerful and more flexible. The result - Media Manager Special Edition. A classic release, a must for everyone who uses the QL to store things of value. Not that MMSE is just for when things go wrong - it is a manager too, with a host of medium control functions. And if you can program, we've supplied SuperBASIC extensions for every conceivable device control. Additional features include the facility to read from, write to (and even format) IBM MSDOS/PCDOS disks and Atari TOS disks - two-way access both at sector-level and at file-level.

MORE SUPER SPECIAL DEALS

We want to encourage more and more users to experience for themselves the stunning acceleration imparted to the operation of all Digital Precision programs (and everyone else's programs) by LIGHTNING. Programs that particularly benefit are editing/word processing programs, databases, graphics/CAD programs, desktop publishers, compilers, games and programs with a high computational overhead (like astrological systems). We will give a 10% discount, additional and supplementary to all other discounts, for any purchase of two or more programs, if one of them is LIGHTNING. This discount applies to the total price - it is not just 10% off LIGHTNING but 10% off the lot!

DIGITAL C SPECIAL EDITION

NEW

Digital C Special Edition has all the features of the much-acclaimed Digital C System, plus:

- ★ Direct access to all QL traps and vectored utilities is provided.
- ★ Machine code has now been used for writing all the standard library functions - this maximises execution speed and minimizes code size.
- ★ Huge programs can be compiled - no 64K or other code size limit.
- ★ Many new fast library functions including SCANF are supplied.
- ★ User selectable size optimisation gives the choice of efficient 16 bit and flexible 32 bit addressing.
- ★ Long integers are now supported.
- ★ Long pointers are now supported.
- ★ Long constants in octal, decimal and hex are now available.
- ★ User friendliness is improved.

PROFESSIONAL PUBLISHER

NEW

Digital Precision is proud to announce an all-new, top-of-the-range desktop publishing system.

Professional Publisher has all the features and controls you require to produce output of the very highest quality.

Professional Publisher has ALL the features of Desktop Publisher Special Edition, plus the following:

- ★ **Linked windows...** Any number of windows can be 'invisibly' connected in a sequence determined by you so that text flows from one automatically into the next. Windows can be of any shape.
- ★ **Wraparound graphics...** Any graphic can be placed on a page and text can be made to automatically flow around the graphic. Pixel-proportional spacing and the integrity of columns will be maintained - the graphic can be of any shape and can wholly or partly overlap any number of windows. The user may define any polygon (up to 64 sides) to demarcate the desired border of the graphic, which need not coincide with its actual outline.
- ★ **Full mouse compatibility...** Smiling mouse owners can start smiling! The incredibly silky smooth feel of this system, when either used from keyboard or mouse, has to be experienced to be believed. It comes from our special scrolling and cursor-handling routines, handwritten in machine code. We suggest you use the system from the keyboard first, and then go in for a mouse if you feel the need to.
- ★ **Style and layout designer** allows you to create any number of layout templates, which contain details of columns, margins, gutters, breaks, guides etc. This permits the easy creation of multiple pages.
- ★ **No more fiddling** around with cursor keys for exact positioning - text can be snapped into guides.
- ★ **Full compatibility** (and now absolutely hassle free!) with ASCII files (say from Editor Special Edition), Quill .doc files and Quill .lis files - now with complete preservation of paragraphing, indentation, tabulation, superscripting, subscripting, italicising etc. Any size files can be handled - Pro Publisher has an on-screen skip/preview/chunk routine!
- ★ **Huge range of fonts** supplied (hundreds) - memory resident and disk resident - with sizes ranging from 8x8 to a gigantic 48x48! User-adjustable (pixel accuracy) descender position, character spacing, X and Y axis widths etc. In addition there are 26 graphic fonts!
- ★ **Page dimensions** specifiable either in pixels or millimetres - up to an enormous 960x1600 pixels and down to a tiny 48x48 pixels. Inch and mm rules provided.
- ★ **The whole of the ASCII set** is now supported - this is very useful if you want lots of special symbols or if you want to support non-English characters.
- ★ **Fingerprinting** is supported.
- ★ **A virtually infinite** selection of fill textures, with font patterns, graphics, or whatever you choose.
- ★ **There are 256 paint brushes**, with a unique programmable overlap (1/3/9 pixels) function.
- ★ **Automatic shading** and grey scale conversion of colour screens.
- ★ **Automatic interpolation** of graphics and fonts.
- ★ **Automatic bending/stretching/resizing** of graphics.
- ★ **All Boolean functions** supplied for brushes, fonts, graphics and freehand drawing - AND/OR/XOR
- ★ **Cut & paste** is supported both TO AND FROM the page itself, saved screens and compressed screens - this incredible support of all permutations gives unheard of flexibility!
- ★ **Full support** for kerning and pixel justification, including user-definable % line usage, user-definable maximum and minimum inter-character spacing and inter-word spacing (preventing the ugly spread of characters or words on a line when the first word on the next line is a very long one), preselectable/defaultable auto-hyphenation, auto-indent control, dropcaps, left/right/centre/off justification etc. etc.
- ★ **Walkdown menus** (selections either by a single keypress or by a moveable bar, you decide), context-sensitive help, very greatly enhanced user-friendliness.
- ★ **8/9/24 pin printers**, laser printer support, output any part of the page, individually vary X and Y axis magnification, user-selectable print density and number of passes.
- ★ **Professional Publisher** is supplied on disk for expanded QLs.

Digital Precision want to particularly acknowledge the skills of the ace programmer Andrew Astrand and his dedicated team.

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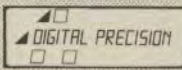
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Emulator war

Public confusion appears to be growing as several different companies offer MS-DOS emulators for the QL.

Digital Precision is concerned that buyers are confusing an emulator program advertised by Ant Software with the DP program *The Solution*, which is expected to be ready very shortly.

QL World has received a number of complaints that the Ant Software program is incomplete and unreliable as it stands. Contributor Mike Lloyd spoke to author Guy Turvey and established that he has not yet been able to make available essential parts of the program. This fact, and the collapse of a projected marketing agreement, makes the appearance of a V2 unlikely in the near future.

Schon PCP has now

announced a further MS-DOS emulator, scheduled to make its first appearance at the Alternative Micro Show on April 1. Titled *Transformer*, the program will be ROM-based, and plans are going ahead to implement a hardware-based CGA. "The program will be fully compatible with all versions of MS-DOS," said Schon's Chris Smith.

DP owner Freddy Vachha has stressed with great determination that the Ant emulator is not connected in any way with Digital Precision or *The Solution*. "I am unhappy that people have been contacting us with problems which have nothing to do with us," Vachha says. "Some people are under the impression that the other company is selling our software

but that is not the case. There is no connection."

Schon PCP has added two new products to its roster. A new discrete keyboard is based on the IBM PS/2 keyboard and has 102 keys, "most of which are QL-orientated," including a single key underscore.

A new program, *The Painter*, is a graphics package written in Europe and will retail for £29.95. Further details from Schon PCP, 15 Northcote Crescent, West Horsley, Surrey KT24 6LX.

MS-QLink

Portuguese software writer Tiago Freitas Leal is providing the first in a series of file utilities for the QL, *MS-QLink*. The program transfers files both way disc-to-disc between the QL and PC compatibles, avoiding the need for an RS-232 link.

MS-QLink uses "an MS-DOS-like shell with an optional menu." Files can be specified by standard wildcards. Code translation on transfer is an option; the MS-DOS CR,LF separator can be exchanged with the Qdos NL separator in both directions. The translation table can be customised to the user's need.

MS-QLink runs as an executable multi-tasking job on QLs with standard disc interface. It handles 5.25in./360K and 3.5in./720K discs but "high-density discs need a controller not available on QL disc interfaces." Commands available include Dir, View, Rename, Erase and Format; Read and Write to MS-DOS; Xlat for translate status and options for program configuration. Directories in MS-DOS are not yet supported.

MS-QLink costs £12 plus VAT and is available on disc only from T F Teal, Qfile, R. Guarda Joias, 16 R/C E, 1300 Lisbon, Portugal. Tel: (over-seas code) +01 637861.

A public domain version is available with MS-DOS Dir and View only. Send a 3.5in. or 5.25in. disc plus £1.

Club Paris

QLCF, the French QL user club, is happy to be able to tell *QL World* readers that it now has its own premises in Paris, at the Paris telephone numbers (1) 43 48 64 40 and (1) 43 48 64 41. An employee will be available to answer questions during the latter part of the afternoon on Tuesdays, Wednesdays and Saturdays. A Minitel server is planned. The group's address is 38-40 Rue Stehenson, 75018, Paris, France.

Take a number

Wayne Fletcher is looking for a publisher for his program *Turbo Numerology*. Fortune-telling and character analysis by numerology is "an alternative to astrology" according to Fletcher and the system used in his program is based on a book called *Hot Numbers* by Jean Simpson.

"The program is far easier to use than current astrology programs and can be used by anyone who can write his name in English and knows his date of birth," says Fletcher. Each reading produces two pages of text and users who wish to know more about numerology are referred to the book, which is not available with the program.

At present the program is

available from Wayne Fletcher at 8 Cooper Road, Kexborough, Darton, Barnsley, S. Yorkshire S75 5LQ for £12.99 (disc) or £10.99 to people who supply a disc or Microdrive. Fletcher is unable to obtain sufficient cartridges to offer a cartridge version.

Moving laser

Taylor Made Systems Ltd, which provides laser printing services for QL programs, has moved to 71 Wellington Close, Hepworth Way, Walton, Surrey KT12 1BB. Tel: 0932 241854.

Anti-sexist, please

London user Sandra Vogel has started an anti-sexism group, Organisation against Sexism in Software. Welcoming members of either sex, the group publishes a bi-monthly newsletter and charges an annual subscription of £3. For more

information send a SAE to Oasis, 3 Alden Court, Standley Road, Wimbledon, London SW19 8RD. This is an opportunity for users who object to sexist and pornographic stereotyping in computer software to express their views.

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 SW1P 1DG.

Kapow

Lightning, as confirmed by John Silk's review in the September, 1988 *QL World*, is a good deal faster than *Speedscreen*. Lightning is 50 percent faster at the things *Speedscreen* does 30 percent faster on its own benchmark, 187 percent faster on the benchmark listing published in the July, 1988 *QL World*, 100-150 percent at the rest. *Speedscreen* was superseded by the faster, hassle-free lightning. Even Mike Lloyd, the original *QL World* reviewer of *Speedscreen*, wrote that he had been 'knocked out by the improvement' Lightning gave.

Creative Codeworks sales director claims that an inappropriate version was chosen; in fact, the biggest and least uncomprehensive one was used. Anyway, it matters little which of the eight routines is used; Lightning is far zippier than any of them. He implies that using ROM *Speedscreen* could turn the tables; that is incorrect — Lightning is faster and, contrary to his assertion, Lightning is ROMable and is cheaper than ROM *Speedscreen*. He tries to deny that different versions of *Speedscreen* are required for Thors and QLS; wrong again. Most humorous is the claim that CST 'chose' *Speedscreen* over Lightning.

CST made the 'choice' a month before we started writing Lightning.

All *Speedscreen* accelerates is two varieties of MODE 4 text, solid colours only — no stipples. It has little effect unless the window is 'word-aligned', something scarcely any program allows you to control. Lightning has no such restrictions and you do not need different versions for different situations; one Lightning does everything.

In addition, Lightning accelerates graphics — four- and eight-colour — accelerates internal maths functions, provides null device handling, screen suppression, 78 fonts and so on. Compatibility? Seven serious bugs in *Speedscreen* are listed on page 8 of May, 1988 *QL World*, Lightning is bug-free.

Freddy Vachha
Technical director,
Digital Precision Ltd

Escape

I mailed a letter and Microdrive cartridge to you on June 12. A few days later the Microdrive cartridge was returned to my 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 device 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.

Exchange

I would like to exchange QRAM and/or CPMulator for a copy of the Medic Systems *M-Paint* and/or any back issues of *QL* magazines from 1984-1985 which may have dealt with the launch of the *QL*. Please write or telephone me on 0554 777867 after 5pm.

J.G. Williams,
33 Penllwynrhodn Road,
Llwynhendy,
Llanelli,
Dyfed.

Overheat

Having experienced overheating problems I decided to replace the voltage regulator as recommended by *QL World*. Taking the simplest route I set out to obtain a 78S05 as a replacement for the standard 7805. Looking through *QL World* advertisements, prices range between £4-£5. Visiting a local electronics shop. I found it could supply the same for £1.48. A more accessible source is the main supplier to hobbyists, Maplin Electronics. It will supply a 78S05 — order part number UJ54J — for 95 pence. Even adding 50 pence for post and packing and 50 pence surcharge for orders of less than £5, this adds to only £1.95, half the price of the cheapest *QL* supplier. Maplin Electronics Supplies is at PO Box 3, Rayleigh, Essex SS6 8LR.

Graeme Potter,
Taunton,
Somerset.

Editor's notebook

Simon Goodwin is hopping with enthusiasm over the latest DIY Toolkit opus, *Taskforce*, by Phil Spink. Taskmaster forces programs which are not natural multi-taskers, like Quill, to co-operate with other programs as if born to it, and all without tying up a large amount of memory. "Why did you not put it on the market yourself?" we asked. "Because it is too small and simple," said Goodwin, "and cheap. You publish it."

Freddie Vachha of Digital Precision is annoyed because members of the purchasing public have confused his MS-DOS emulator The Solution — not available at time of writing, although it should be out in force by the time you read this — with an MS-DOS emulator published by Ant Software. Meanwhile, there is no further news of a possible upgrade on the latter program.

Now, Schon PCP is advertising an entirely new PC/MS-DOS emulator, *Transformer*, for projected release in April. The first reviews of the Digital Precision and Ant programs will appear in *QL World* next month. Probably they will not be the last. Anyone for GEM?

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ABC MARK III

Now in its Mark III release, the latest adaptation for putting an IBM keyboard on the QL from the German firm of ABC Elektronik gives QL users yet another option from the unfortunate original choice of keyboard arrangements made by Sinclair Research.

Its first attempt to supply an alternative keyboard was demonstrated in 1986 at the October edition of the ZX Microfair. The demonstration at that time consisted of an IBM keyboard and an open-topped QL with the interface electronics completely replacing the QL 8049 chip, next to the left Microdrive.

If my recollection is correct, the Mark I interface included one of the Z-80 series of CPUs. So far as I know, the unit never worked and its functionality was limited to an installation display. I suspect that subsequent development of a working interface was concerned with integrating an interface with the complexity and peculiarities of 8049 programming.

The ABC Mark II — my designation, by the way — made its appearance in early spring, 1987; to all outward appearances the keyboard was the same. That version, included in an exclusive *QL World* review in March, 1987 along with the other three new QL keyboards of the time was, because of interface supply problems, non-functional.

No Z80

Within a month or so, a working version of the Mark II system was provided for evaluation. The re-designed interface did not include the Z-80 CPU and merely displaced the 8049 — you removed the 8049, plugged the interface card into the socket thus vacated and re-installed the 8049 on top of the interface PCB.

Once up and running the Mark II interface worked well and was free of keybounce. After some use, two design peculiarities came to light — `POKE_W` (163980,n) and `POKE_W` (163982,n), where n defaults to 30 and 2 respectively had been disabled by the interface.

The first of the `POKEs` is used to set the delay before a held-down key repeats itself and the second the rate at which a repeat takes place. If you set both to zero from SuperBasic the only way you will be able to type anything sensible into the QL is to re-set it.

Presumably this was the ABC way of preventing keybounce. The most unusual and undocumented aspect of the Mark II was that, if you pressed the "SYS REQ" — "SYStem REQUest" — key, the key used by the Schon PC keyboard as the

At last — Ron Massey gets his hands on one new keyboard interface

key assigned to switching between tasks — `<CTRL><C>` — the keyboard became locked out and the only way to regain control of the QL was a complete re-set.

The Mark III interface — so far as I know the keyboard has remained unchanged throughout successive versions of the interface — works very well. One of the oddities of its design, which never seems to bother QL users, is that the interface card consists of a bare 4in. x 4in. PCB which plugs into the QL ROM port and is mounted vertically, if somewhat precariously, behind the QL. Installation of the Mark III requires that you perform three operations:

Remove the top of the QL and extract both ROM chips — for as long as you are using the ABC keyboard adaptation they are not used again; solder a wire to either pin 30b — the upper row, towards the rear of the QL — of the expansion port or, if you are really adventurous, to pin 2 on the 8302 chip, the second pin from the back of the QL, on the left side — this chip has two resistors positioned on top of it — and run the other end of the wire from the ROM port hole in the QL lower case.

Plug in

The third stage is to re-install the upper part of the QL case, plug the ABC interface into the ROM port and connect the loose wire to the terminal pin on the PCB. The wire supplies the keyboard interrupt, a signal which is otherwise absent from the ROM port, and the keyboard will not function without it.

Most astute readers will immediately realise that, without its ROM chips, the QL is little better than an expensive and not very heavy doorstep. The Mark III, in addition to the usual collection of chips required for connecting the QL innards to the outside world, includes a 512K EPROM, an empty 28-pin IC socket and a pair of three-wire terminals.

The EPROM supplied with the Mark III includes the QL operating system but with some of the bugs fixed and, perhaps, other undocumented features. If you type "PRINT Ver\$" the QL new response is "GIGA".

I should imagine that the ABC-supplied operating system started life as a JS

version of the code but now lacks at least one of the JS peculiarities; if you type "PRINT ''&ver\$" on a JS machine you will always get a spectacular crash. The Mark III has corrected that.

The spare IC socket is used for plug-in add-ons which may otherwise occupy the ROM port, such as toolkits. Whether this would also work with *ICE* and, most particularly, *MICE*, I was unable to ascertain.

The pair of three-wire terminals is used for switching the user-installed EPROM between a range of addresses:

C000 to FFFF — 49152 to 65535.
8000 to BFFF — 32768 to 49151.
4000 to 7FFF — 16384 to 32767.
0000 to 3FFF — 0 to 16383.

You can either hardwire-bridge two pairs of terminals or, by installing your own rotary switch, have the option of switching between two to four EPROM areas; be sure to re-set your QL after switching. To take advantage of this option you will also need to have up to four of your own EPROMs — toolkits and such — blown on to a single 27512 EPROM.

Improved

In addition to considerably-improved reliability of better key switching, a much better tactile sense and the usual functions available from the standard QL keyboard, ABC has enhanced the keyboard operation of the QL.

In addition to having 10 function keys — the upper five available from the standard QL keyboard as `<SHIFT> F1 to F5` — and having LED indicators on the CAPS and NUMBER LOCK keys, there are several keys dedicated to functions accessed previously with the use of two or more QL keys on the standard keyboard.

ABC has incorporated two new SuperBasic commands into its keyboard interface `KEY_ROW` number, either 1 or 0, respectively activates the QL `<CTRL>` (joystick) ports or the keyboard. This command, which is added to program boots, has been included because, if you are using joysticks, the keyboard is disabled.

`HOT_KEY` char\$ defines which key in combination with `<ALT>` is assigned to the `PRTSC` key. If you are running Qram, adding a line to your boot like `HOT_KEY "/"` effectively will tell the QL you have pressed `<ALT></>`, the normal Qram call-up combination.

The `KEYROW` function has been enhanced with the addition of three new rows and a speed increase of 50 times is claimed by ABC.

Except for two reservations, I feel that the ABC keyboard system is a superb instrument. The first reservation is that the interface is a bare PCB and, as such, is vulnerable to having metallic objects accidentally connecting parts of its circuitry which would be much better left alone.

The second consideration is more serious. If you nudge the interface while the QL is powered up you run the risk of causing serious and permanent damage to the electronic components of the QL, the interface or both.

ABC suggests that "you may fix the interface with a screw to the QL case." I suggest that this should be considered a requirement for a finished installation.

Since KEYROW is used by many programs, especially graphics programs, one point which should be a major concern to all potential purchasers of the ABC keyboard is its compatibility with QL programs. The keyboard will not work with programs which disable the interrupts or clear interrupt lists. According to ABC, this technique is confined to a few games, such as *The Pawn* and *Knight Flight*.

Installation of the interface is simple but requires considerable care. I have misgiv-

New Key
 BREAK
 Scroll lock
 HOME
 END
 PAGE UP
 PAGE DOWN
 DEL
 INsert
 CTRL -
 CTR +
 SYS REQ
 PRTSC
 CTRL PRTSC
 ALT SHIFT SYSREQ
 ALT SHIFT PRTSC

Old key/function
 <CTRL> <SPACE> — Stops a SuperBasic program.
 <CTRL> <F5> — Toggles pause.
 Cursor to start of line, usable with editors only.
 Cursor to end of line, usable with editors only.
 Scroll up one page, usable with editors only.
 Scroll down one page, usable with editors only.
 <CTRL> <RIGHT> — delete character under cursor.
 <ALT> <ENTER> used with Toolkit II.
 Slows program
 Speeds program
 <CTRL> <C> switch between tasks.
 User-definable.
 Toggles between Mode 4 and Mode 8.
 Level 7 interrupt — the QL <CTRL><ALT><7>.
 Keyboard-based QL re-set.

ings about the wisdom of supplying hardware which requires users to dismantle their machinery to be able to install it.

There is one cardinal rule which applies to the majority of all computer hardware. Never install or remove peripherals while the equipment is powered up.

If you have doubts about your ability to install the interrupt line — removing the ROM chips, too, I recommend that you let someone more experienced handle.

In spite of the time taken to develop a viable keyboard, ABC has done a grand job with its implementation.

If you are using the ABC interface with other IBM or NCR keyboards variants, you may find that some of the more esoteric codes generated by different keyboards may be at some variance with what is required.

ROW COL	1	2	4	8	16	32	64	128
10	PAGE DOWN	INS	DEL					
9	NUM LOCK	SCROLL LOCK	HOME UP	PAGE	—	5	+	END
8	SYS REQ	LEFT	PRT SCR	F6	F7	F8	F9	F10
7	SHIFT	CTRL	ALT	X	V	/	N	,
6	8	2	6	Q	E	0	T	U
5	9	W	I	R	R	—	Y	O
4	L	3	H	A	A	P	D	J
3	[CAPS LOCK	K	F	F	=	G	;
2]	Z	.	B	B	£	M	'
1	ENTER	CURS LEFT	UP	ESC	CURS RIGHT	/	SPACE	CURS DOWN
0	F4	F1	5	F3	F3	F5	4	7

QUANTA

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Extras:

<- delete character left CTRL SHIFT <- delete whole line (in editors only)
 CTRL <- delete word left (in editors only) SHIFT <- cursor to start of line (in editors only)

There are five new function-keys:

F6	SHIFT F1	F10	SHIFT F5
F7	SHIFT F2	CTRL SPACE	BREAK
F8	SHIFT F3	SCROLL LOCK	CTRL F5
F9	SHIFT F4		

NUM LOCK toggles the state of the NUMLOCK LED.

This controls the function of the numerical pad. Is NUMLOCK on; then a keypress on it generates the numbers and characters shown at the keys, otherwise

ARROW KEYS

HOME Cursor to start of line (in editors only)
 END Cursor to end of line (in editors only)
 PAGE UP Scroll up one page (in editors only)
 PAGE DOWN Scroll down one page (in editors only)
 DEL Delete character under cursor
 INS ALT ENTER (with SuperToolkit II)
 CTRL - program slow down
 CTRL + program speed up
 SYSREQ Job-change (function of CTRL C)
 CTRL PRTSC toggles MODE 4 and MODE 8
 ALT SHIFT SYSREQ Level 7 interrupt (CTRL.ALT 7 at the QL.)
 PRTSC s.u.
 ALT SHIFT PRTSC RESET

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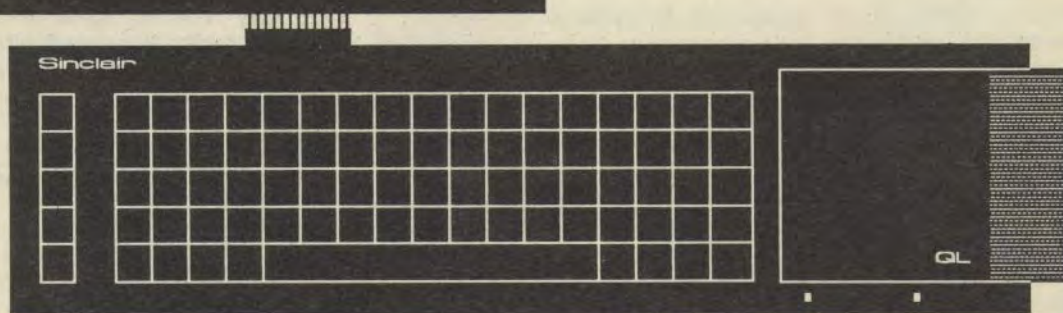


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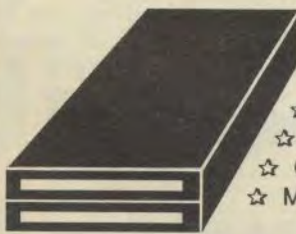
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SOFTWARE FILE

Information:

Product: ABC Elektronic Mega-Ram board
Price and ordering: see current advertising.

The standard QL has a healthy 128K of RAM but most QL owners have now added at least an extra 256K of RAM expansion to take full advantage of its multi-tasking abilities. Many who dipped their toes into the water with modest expansions are now looking for upgrades of half a megabyte and more. Even owners of 640K QLs would welcome the provision of even more cavernous quantities of memory.

For those who remain unconvinced about buying a RAM pack, the mouth-

ly by a factor of four or more.

★ Front-end management systems such as QRAM and Taskmaster can be used to ease the chores of managing a multi-tasking, multi-device computer system.

★ Part of the RAM can be formatted to act as one or more ultra-fast floppy discs.

★ More than one program can run at a time because of multi-tasking.

Leader

The current leader in this thriving market is Miracle Systems, which manufactures the tried and tested Expanderam and Trump Card. The choice appears to be widening with the appearance of the Mega Ram board from ABC Elektronic of Germany.

The board tested by *Sinclair QL World* arrived via a

"Apart perhaps from extra disc drives, extra RAM provides the most startling and cost-effective improvement to the QL."

watering range of advantages from having additional memory space should convince them that, apart perhaps from disc drives, extra RAM provides the most startling and cost-effective improvement to the QL.

★ Programs stored in external RAM run faster than those which use the slow QL internal memory.

★ More data space is available for memory-hungry programs such as Quill and Abacus, allowing larger documents, spreadsheets and databases to be constructed.

★ Toolkits can be installed to add extra commands, change the screen fonts and to accelerate text handling and graphics facilities typical-

circuitous route and without price details. It has a neat 'L'-shaped design with a new, square Motorola 68008 chip, an anonymous ROM containing the usual toolkit extensions, a bank of Siemens RAM chips and connections for chips which must be removed from the purchaser's QL.

The review model had 1MB of RAM but the accompanying documentation suggests that a gargantuan 3MB can be fitted — surely more than enough to please the most ardent multi-tasker. The prospect of sitting through an interminable memory check with every re-set has been circumvented by the incorporation of a clever RAM samp-

Mike Lloyd gets his hands on the new Mega-Ram board from ABC Elektronic and has a spot of trouble with the transplant.

ling check which is very fast. A more thorough check is included in the toolkit.

Unlike Expanderam and Trump Card, which can be installed in the QL expansion port by any careful person, the Mega Ram is designed to fit completely inside a standard QL casing. This choice of installation method seems to be at the heart of the problems experienced by everyone who has tried to use it.

Risky

Miracle Systems, to which the board was initially sent for evaluation, believes that the installation process is too complicated and too risky for the average home micro owner. The QL must be opened and the top separated gently from the base. Chips, including the CPU, must be removed carefully from the motherboard and installed on the Mega-Ram board, which then slots into

no further use. One possibility opened by this arrangement is that it may one day become possible to replace the M68008 with the much faster M68000 chip. The engineers at Miracle Systems found that the slightly raised mount for the M68008 made it difficult to obtain firm connections between the motherboard and board, which slots into the Mega-Ram and, as a result, could not get the expansion system to work. My efforts at fitting the board resulted in the complete failure of the QL.

A crystal which annoyingly pokes up more than half an inch from the motherboard surface had broken at the base.

I took the sick computer to Screen Scene of Cheltenham and its engineer made a third attempt to install the Mega-Ram.

He achieved success only by the expedient of removing the offending crystal and attaching it to the circuit board via a length of wire.

With the QL keyboard de-

"It needs to be marketed by a company willing and able to modify QLs sent by customers who do not wish to undertake this task themselves."

the positions left vacant in the QL insides.

At the end of the installation process you are left with the original rectangular M68008, for which there is

tached and with a vital part dangling precariously, the Mega-Ram began to perform exactly as the maker claimed it would. The Mega-Ram board deserves success but it cannot

SOFTWARE FILE

be endorsed by *Sinclair QL World* in its present form. It needs to be slightly re-engineered to fit more easily into the QL.

It needs to be marketed by a company willing and able to modify QLs sent by those customers who do not wish to undertake this delicate and demanding task themselves.

Slotted

Alternatively, and for my money preferably, it would be far better to re-design the board so that it can be slotted into the QL expansion slot in the same way as Expanderam and Trump Card. We shall report developments from ABC in future issues.

Information

Program: Psion Organiser II *Result*

Supplier: Nick Frank,
PO Box 4075,
Wellington,
New Zealand.

Price: £34.74 (NZ\$90)
plus £5 (NZ\$13) post
and packing.

The Psion Organiser has a long association with the QL because of the similarities between its native language, OPL, and the QL Archive database language, which was also written by Psion. Like the Cambridge Computer Z-88, the Organiser has a number of utilities which support its main database, one of which is a

programmable calculator. Not content with its facilities, New Zealander Nick Frank is marketing a ROM pack calculator called *Result*.

Result handles basic arithmetic in a friendly and sensible fashion, using the two lines of the Organiser display to show both the number being entered and the running total. Numbers can be inversed, negated, subtracted from, divided into, "raised as a power of", rounded up, down or to the nearest integer, and assigned to one of 10 memories, greatly exceeding the functionality of standard hand-held calculators.

Up to 12 significant digits are supported under the user's control. If a mistake is noticed the backtrack facility restores the previous running total. Values held in the calculator

are retained even if the power is turned off or other software is in use.

Parentheses

The usual suite of scientific and trigonometrical functions is available, mostly from a single keypress, and up to six levels of parentheses can be used. Users would have to write their own statistical procedures. As befits an integrated system like the Organiser, *Result* can be accessed from within OPL procedures and it can call OPL procedures — perhaps its greatest strength. Whether it is worth buying *Result* depends on what use you make of your Organiser. Quantity surveyors, agrotech farmers and al fresco mathematicians should look closely.

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Text '87

— a good read

text⁸⁷ has been with us for some time, gaining popularity steadily, but the new upgrade and utilities fountext⁸⁸ and founted⁸⁹ move it into a different league.

These three programs belong together and are discussed as a team, but text⁸⁷ can be used without either of the other two.

Having said that, it must also be said that the full value of the word processor is not enjoyed until fountext⁸⁸ is utilised with it to give genuine WYSIWYG performance. This expression has been so abused that many people will doubt if printer output from a word processor can look like what is displayed on the screen but these programs achieve what has seemed like "pie in the sky" until now.

text⁸⁷ has been around for more than a year and has been reviewed previously. It was felt that the recently-released version 2.00 marked a suitable stage for a further review. Existing users will welcome the additions/changes, which include definition of up to 10 typestyles for selection by Shift+F4 and Shift+F3 1-9; changing Feature or Option of current typestyle independently; on-screen display of current Ruler and Type using F2; on-screen justification — as well as in printout; four columns can be printed abreast; early versions allowed only three typical dot matrix printers but four on wider-carriage daisywheel printers.

The ability to set up 10 typestyles from within the program makes it unnecessary, for simple operations, to use a utility such as ALTKEY to do the job; it is not possible to save the definitions but this feature will be added later. To explain the second point by example, if you are using Printype 1 0 — i.e., Elite 10 Standard — and wish to embolden and underline the same typeface, it is necessary only to change the Option number. The command for this is F3 T O 3.

Likewise, when using the same typestyle, converting it to Italic Elite 10 Standard requires only the command F3 T F 8. In other words, enhancements to basic typefaces have been separated partially from those faces and can be added to other faces by using the same commands. This certainly reduces the complication and number of the ALTKEY macros which have to be set up.

Other planned additions are extra double-width and italic fonts, underlining

Information:

Products: text⁸⁷, fountext⁸⁸, founted⁸⁹

Prices: £45, £25, £15 (£80 for all 3)

Supplier: Software 87, 33 Savernake Road, London NW3 2JU.

for graphics printing, a new font to resemble business letter type, an internal memory indicating available memory reserved for the program. Possibly of most interest for those who use multiple fonts is a combined text and graphics printer driver which will allow the built-in printer fonts to be used for straight text and the fountext⁸⁸ driver for graphics founts.

The additions may mean little to someone contemplating buying the program, so here are some of the main features:

Similar command structure to Quill, with selections by F3 plus 1 or more letters; menu choices with hints displayed

"The expression WYSIWYG has been so abused that many people doubt that output can look like a screen display."

only when F3 pressed; permanent status line similar to that in Quill along bottom of screen; settings such as margins, tabs, justification, line spacing displayed on ruler; multiple fonts displayable on-screen (7 fonts supplied); screen line-length automatically adjusted to character pitch, multi-tasking (e.g. with TaskMaster, The Editor, and with itself); printout essentially the same as screen display (only limited by the differences between display and printer fonts); automatic reformatting during typing (Mode Reformat command needed after some changes to format); line-spacing adjustable in small increments (allows for different-sized fonts); support for 9- and 24-pin dot-matrix,

daisy-wheel and laser printers; faster operation overall than Quill.

The functions you would expect in major word processing programs are there — hard and soft space hyphen; export and import — in ASCII, text⁸⁷ and Quill formats; on-screen word count; Go To Top/Bottom/Page; alter size of program window; change default program and data devices; set right/left/decimal/centre tabs; set left/right margins and indent first or subsequent lines of paragraph; block copy/move/delete, set up to four columns; set headers and footers; page numbering; hard page break; page preview before printing; print, justified or not, by page — every or alternate — or line; print to SER/PAR printer/mdv/flp, zap/quit; re-format or freeze hold existing format until changes are completed; search/replace old or new string; change/insert Ruler; set line spacing to 1/6in., 1-72in., 1/48in., 1/180in. or 1/300in. for different printer types; documents loaded with cursor at same position as when saved. The cursor movement and delete commands are comprehensive and similar to those used in Quill and *The Editor*.

Functions you might not expect are setting the margin by length — 1mm., 1/6in. or 1/10in. — specifying the memory allocation; reducing displayed character width to get more large characters on to the screen; auto-loading of fonts and document parameters Ruler, columns, memory reservation; changing printer drivers from within the program; block change of Ruler/Type; re-mapping the keyboard, e.g., to another language set.

Type styles

The import function has features additional to those one would expect. Quill-document parameters; Ruler, columns, d_ doc files retain their type styles — i.e., bold, superscript, subscript, underlined. Corrupted Quill and Archive files can be imported using the ASCII option, as can export files from Quill, Abacus and Archive.

The program is not suitable for basic 128K QLs. To make use of the full

capability to have fonts and the fountex⁸⁸ printer driver loaded, expansion memory of at least 128K is needed. Expansion memory of 64K is sufficient for text⁸⁷ on its own. The program file is about 74K long; text printer drivers typically take 6K and the graphics drivers about 45K. text⁸⁷ files can be checked with *Spellbound* and compatibility is claimed with *QRam*, *QTyp* and *TaskMaster*. No difficulty is anticipated using the program with the hard disc drive announced by Miracle.

Generator

founted⁸⁹ is a font generator program with which you can either modify the supplied fonts or create your own. There is no sensible limit other than available memory to the number of fonts which can be displayed; if you want 255 fonts you can have them but it is for you to create them. fountex⁸⁸ extends the capabilities of text⁸⁷ into the area of graphics by providing graphics printer drivers.

There are currently 36 fonts supplied with this program, four being common with ones supplied with text⁸⁷; including the default font, this makes a total of 40 available. The graphics drivers are not specific to printer brands but are set up as one of two types — Epson-compatible or non-compatible — with either single-pass or double-pass printing to give a trade-off between speed and quality of print.

The specified driver can be loaded into text⁸⁷ when required, in the same way the standard text drivers are, and it carries with it any selected fonts. As a maximum of 32 fonts can be loaded at one time if sufficient memory is available, there should be little problem making fancy circulars and brochures. The feature which has to be seen to be believed is the similarity of screen display and printout. In a sense, you could consider the driver as doing a screen dump of the text area.

The supplied screen characters are from 8 to 72 pixels high — i.e., up to 1in. high including the spacing between lines. Characters from any of the supplied 40 fonts; any others you create can be mixed however you want on each line. The

printed characters are relatively free of the jagged outlines which are produced by some programs.

Using text⁸⁷ in its basic form is likely to be sufficient for most users. If you normally use printer features such as condensed, enlarged condensed and enlarged Pica, choose three of the seven provided fonts to represent them on the screen; if the widths of the characters do not give the same number of characters per line as the corresponding printer fonts, it is not difficult to use founted⁸⁹ to alter the character widths to match your printer fonts more closely; increasing/decreasing the space either side of each character may suffice.

The program adjusts line length to match the width of the printer characters, rather than that of the screen characters, so that it is not essential to have screen and printer fonts matching. Although the character shapes on the screen may then not be the same as those on the printer,

"I would suggest having fountex⁸⁸ for full WYSIWYG capability. founted⁸⁹ is perhaps a luxury for most users."

you know that the positioning will be the same and that is the biggest problem solved for most users.

There is no safe way of making a recommendation on buying any program but a verdict is presumably what many users want in a review. My feeling is that text⁸⁷ V. 2.00 is a good and comprehensive program, well worth having; I would further suggest having fountex⁸⁸ to get the full WYSIWYG capability. founted⁸⁹ is perhaps a luxury for most users but will be very desirable for those who have the time to spend creating their own fonts. Bear those points in mind when making a decision on buying:

Apart from the fact that it was free, there is now little point in sticking with Quill unless you do not find it lacking in any

respect. The Editor long ago provided a good alternative to Quill and is still first choice for the more manipulative type of work — program development, for example. text⁸⁷ gives comparable speed to The Editor, while having a similar screen presentation to Quill, some people dislike the non-WYSIWYG screen of The Editor. I find uses for both programs but never touch Quill any more other than for test purposes.

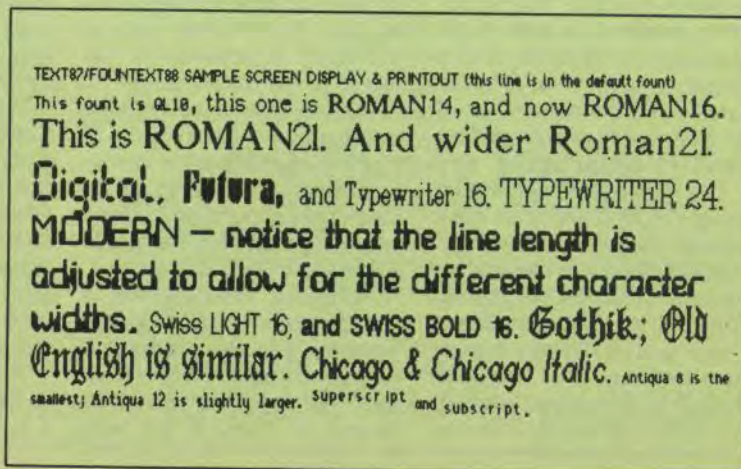
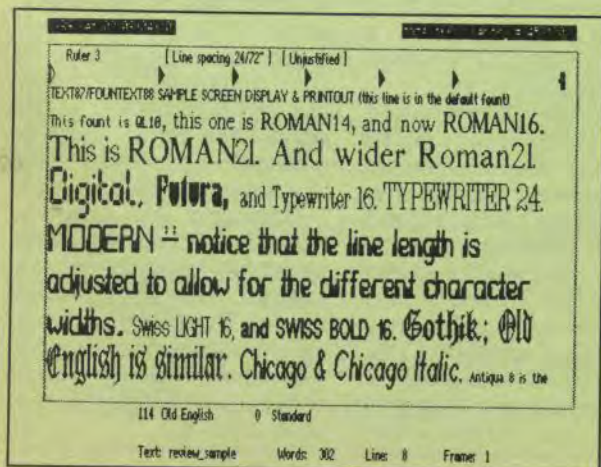
If different fonts mixed is your requirement and including pictures with text is not important, text⁸⁷ is very likely preferable to a desk-top publishing type of program. It may be easier to adjust to, for those coming direct from a word processor, has a good range of fonts especially with fountex⁸⁸ and can be relied on to show just how the printout will look.

It has some capability to introduce pictures into the text, as fountex⁸⁸ allows picture files from some graphics programs — or screens saved using the SBYTES command — to be split into blocks and defined as a series of characters, which can then be "typed into" the text.

Where the requirement is definitely in the realm of desk-top publishing you need to go to *Professional Publisher* from Digital Precision.

A planned enhancement to text⁸⁷ is the facility to have several documents open simultaneously, with just the one copy of program code — similar to what the Psion XChange and TaskMaster permit with the Psion quartet. This will avoid the considerable overhead of having to load the program code for each document; as the printer driver is already built-in there will be room for two large documents, plus a spelling checker and a database on a Trump Card system.

For those who already have an earlier version, or who contemplated buying one but were deterred by features which did not work or were too complicated to use, version 2.00 can be recommended without hesitation. It is still not what could be called an easy program to get used to — but it now works well and is straightforward to use once you have spent a few hours setting up and saving your regular document and driver configurations.



Product: The Prawn
Price: £15
Supplier: TK Computerware, Stone Street, North Stanford, Ashford, Kent TN25 6DF. (0303) 812801.

Whether board or computer-orientated, adventures of all types have always had an almost cult-like following. It is with some surprise that so few really good adventure games have appeared on the QL. In addition to the Talent *West* and *ZKul* from the early QL days, a small number of other particularly good adventures have appeared on the QL through the years.

The Gilsoft adventure programming system, *The Quill*, has had phenomenal success on the Spectrum. When it was released for the QL in late 1986 it looked as if QL users were to be treated to games which were as good as those available for any of the other machines.

The much-anticipated flood remained a trickle. Potential adventure authors lamented the Gilsoft failure also to provide a QL version of the graphics system long available on the Spectrum.

Entice

Even the release of the Digital Precision *ACT*, the most comprehensive games programming system available for any machine with the possible exception of the Atari *STOS*, and its complex accompanying adventure, *Imagine*, has so far failed to entice many potential authors to put their imaginations to work.

Even so, several very good QL adventures, with Talent dominating the market, have appeared. Talent Computer Systems has been the principal supporter of a wide range of adventures for the QL and its latest release, *The Prawn*, loosely makes gentle fun of another well-known adventure bearing a similar name.

The Prawn has been written using *The Quill* and is an inter-related, three-part adventure starring the most unlikely of heroes, a kind of super shrimp. Supplied on two cartridges, *The Prawn* is always started from cartridge one. The loading screen gives you the option of starting game play from any

SOFTWARE

Ron Massey looks at an adventure game which draws inspiration from a pun.

FILE

of its three parts. You will need to collect objects from previous parts of the game before you can begin to participate actively in the adventure. Not needing a password to enter parts two and three is a useful feature, since it allows you to become familiar with the general layout of the locations.

When each part of the game is loaded, you have the option of typing INTRO, giving a brief scenario of the part; BEGIN, to start a new game; or LOAD, to position you at your last saved location.

In part one, *The King's Keep*, you start with the Prawn awakening in a strange land to the harsh cries of a crow. As the hero, you last remember scuttling along a sandy thoroughfare when you were suddenly scooped up by a passing tawler.

Serious

The next part of the adventure takes place in the *Ancient City of Laros*, huddled on the western edge of King Kretin's domain. The cowardly king has allowed Korona the Magician to usurp the Palace, placing the city's inhabitants at the mercy of the Badlands.

While on your quest, you will visit the commercial district of Laros which includes jewelers, markets, clothing stores, pawn shops, pubs and offices of the city's officials. Beware of the maze in the catacombs.

Part three, *The Badlands*, is fraught with political unrest, collapse of law and order and unseen dangers; the only Dimpy's fast food bar has been closed. All these things have

brought the inhabitants close to revolt.

The Prawn is laced liberally with the kind of genuinely humorous puns which are guaranteed to sustain interest in continuing to the end of the game. There are a number of random elements placed at strategic points throughout the story. Some of the game play must be done during the day; some parts must occur at night.

Success in completing the game relies solely on collecting and re-locating objects found throughout. Player's dialogue with *The Prawn* can be in the usual n, s, e and w for north, south and so on. Equally acceptable are parts of words, so long as their abbreviated form is unambiguous and exceptional to its vocabulary.

A range of special commands has been included in the game to help players:

STATUS, indicates whether it is night or day; RAMSAVE, saves current position in memory; RAMLOAD, restores saved position, if you are killed; SAY is used with dialogue between characters; WEAR, to wear an object; REMOVE, to remove an object; I, the inventory of all objects held.

In common with most adventures, it is a good idea to spend some time browsing through the locations, mapping your routes as you navigate to successive locations. Like the majority of complex games there is little chance of completing the game without having a map of some kind.

Save your position frequently. *King's Keep* and the *Ancient City of Laros* include mazes

and traps for the unwary and unprepared.

If you are to save a position, save it when you first arrive at a location.

Parts one through three are played consecutively. After completing part three for the first time you will be returned to unvisited locations in all the parts to complete other stages which require distribution of objects acquired during the first visit.

Examine everything *The Prawn* includes very few red herrings and almost every object has a purpose.

Browse

The Talent release of Martin Hopkin's first adventure, *Horrorday*, and its sequel, *Fun-fear*, have both suffered the unfortunate fate of never receiving as much attention as they deserved. Hopkin's authorship displays a rare brilliance for attention to logical detail and providing a subtle and sometimes not so subtle — humour which eliminates the artificial awesome purpose so often seen in this type of game.

With more than 200 locations, 70 objects, 500 messages and a vocabulary of 600 words, *The Prawn* must be among the biggest adventures devised for the QL.

Continuing with what has become a tradition of the gentle mickey-taking theme featured in both of Hopkin's earlier games, *The Prawn* is sure to delight adventure enthusiasts everywhere. Although it has its humorous moments, it is a serious game.

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"My friend RECOVER is the Archive expert," explained LAZARUS. And RECOVER was duly fetched, performed and was rewarded with a special position in the King's library.

The Exchequer

The King was in his counting-house, counting out his money.

"What you need, Sire, is TRADING ACCOUNTS or CASH TRADER — with ANALYSER of course," said his Chancellor respectfully.

And so it came to pass that the King used TRADING ACCOUNTS to balance the Royal Exchequer and keep the VATman happy.

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"Then obtain the animal," exploded the King, "and put it to work."

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Flippy and Floppy

Flippy and Floppy, the Royal children, were in a flap. They were due to entertain a foreign visitor, King Ibm, the Prince of Darkness.

It was only that morning that they had been told that their guest spoke a different language. They desperately needed a translator. It was the Chancellor who again came to the rescue.

"To DiscOVER the message of Ibm, you require the services of DiscOVER. His brother, MULTI, will be on hand in case you want to read messages from the BBC or converse with the strangers of Cpm."

Meanwhile Byte, the dog, growled in his sleep.

The Bridge of Psion

The TASK MASTER had so many things to do that day, but the most important was shepherding his charges from the Palace to the FILE DUMP. One of the prisoners of his DOMINATION was Alan "Red" Adair, the SpellBinding Poet.

"Shall I COMPARE thee to a Summer's Day?" he quoth.

Alan looked at two versions of his latest masterpiece "Ode to PDQL". The screen display paused as it found the first sector where a mismatch occurred. By using the magic sliding panel Alan was able to continue his search and identify the parts other seers could not reach.

The Princess

Princess Listeria was not at her best as she laid the spreadsheets on the tables. She called for the doc; but instead of Doc Ascii, a strange, garbled medic appeared.

"You need texTidying," commanded the Princess and, in a flashback or two, the curious figure became the handsome Doc Ascii quicker than the royals lips on a frog.

The Throne Room

The King was compiling the list for the Royal Birthday Honours.

Alternatively using a QUILL and his trusted EDITOR he resolved on a Dukedom for PDQL.

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Information

Product: QKick version

4.0

Price: £14.95

Product: Disktool

Price: £9.95

Supplier: Schon PCP,
Northcote Crescent, West
Horsley, Surrey KT24
6LX.

Tel: 04865 3836.

UTILITY FILE

Emerging from a period of relative quiet in a manner not unlike the mythical Phoenix, Ultrasoft has released two new products — one of which will be reviewed in the near future — and added a number of features to an established product.

Making its first appearance two years ago, QKick is now in its version 4.0 release and is fully *QRam*-compatible.

QKick, used in much the same way as *QRam*, is a kind of background front-end and, once activated, suspends temporarily all other currently-running programs. Although some of the QKick and *QRam* functions are similar, for the most part they complement each other.

Activated with the default <ALT> <SHIFT> hotkey, QKick offers five main options from its GEM-type menu. Each option has a main pulldown sub-menu and, from left to right, you can select Desk, Files, Notes, Tools and Exit. Options are selected with the left-right cursor keys and <SPACE>. The call-up key can be re-defined by selecting DESK, moving the menu bar to CUSTOM and pressing <SPACE>.

Hotkey

In addition to the hotkeys, options on this sub-menu allow you to define the spool device — ser1 or par — and the QKick database sort order. Other CUSTOM options include: Hotkey definer, defaulting to <ALT> <SHIFT>; other combinations include <ALT> <CTRL> or <CTRL> <SHIFT>, if the default hotkey is being used with a program such as *Keydefine*; screen off time, defaulting to a delay of 150 seconds; if no keyboard input is made for the set period of time, screen display is disabled. Pressing any key will re-activate the screen. Range is

in increments of 30 seconds from 30 seconds to 15 minutes; CQueue char which alters the QL default <CTRL> <C> job switcher.

If for any reason other key combinations are required, characters from chr\$(1) — <CTRL> & <A> — to chr\$(255) — <ALT> and any key except <CAPSLOCK> or cursor keys — can be used; Repeat Delay and Repeat Frequency defaulting to a value of 30 and 2 respectively; the former value determines the delay before a character will repeat itself and the latter value determines the repeat frequency rate.

The FILES sub-menu accesses a complete range of file management controls for either floppy or RAM disc; Directory; View — an option for copying a file to the screen; File Info provides a directory from which a particular file is selected. The selected file is shown with its statistics regarding type, length, dataspace and last update; Copy; Back-up named files to a named device; Change will convert every occurrence of one string with another and provide a report of the number of conversions at the completion of the option; Rename; Delete will delete selected files; Start a job; Format will format a selected floppy or RAM disc.

The NOTES menu; An 800-character, two-page Notepad; Diary Calendar, in conventional calendar format, preceding and successive months may be paged; Database; Altkey definer; Calculator; Hex and decimal converter.

The TOOLS sub-menu allows you directly to Edit Memory, a File or a Sector; the Job Control option produces a further menu giving access to Job information, Job pointers

and setting Job priorities. Other options from the TOOLS menu allow you directly to Load or Save Memory, to Save a screen or to spool a file.

Disktool

Until now, the ceiling for formatting double-sided QL discs has been limited to a maximum of 80 tracks of nine sectors each, totalling 1,440 sectors.

The Ultrasoft *Disktool* system requires version 1.14 or newer of the QJump Pointer Interface and version 1.08 or newer of the Window Manager, both of which are supplied; or the complete *QRam* system, version 1.14 or later.

Using <ALT> <D> as its hotkey, Disktool functions are displayed in the familiar *QRam* format. Icons and menu bars may be selected by moving the cursor over them and pressing <SPACE>. All functions are available with equivalent keypresses except for a FORMAT and COPY DO command.

The *Disktool* range of functions falls into one of five broad categories — Disc Protection/De-protection, drive selection, formatting parameters, copy select and format select.

Previously, protecting data from unauthorised personnel has usually meant encrypting it. While this form of protection is undoubtedly effective, its one shortcoming is that encrypted code repeats itself and, even with three eight-character code words, an experienced hacker can eventually work out the encryption sequence used.

The Ultrasoft protection routine works in a completely different manner. First selecting PASSWORD, you can enter a four-character code which can be any QL printable character from chr\$(33) to chr\$(191). Clicking on PRO-

TECT — or pressing P — you are offered a chance to accept or abort the routine. Once accepting your defined code-word, the disc is made unreadable. Asking for a directory of a protected disc will yield only: PROTECTED 0/0 sectors

Unprotecting a disc is done by entering the same password, which is also case-independent, and clicking on UNPROTECT — or pressing U. You are offered an ACCEPT/ABORT option as with protect. Failure to use the exact decoding password will render disc data permanently inaccessible.

The left-central group of icons is used to specify source and destination drives for copying. You can specify either copying to the same drive, from drive one to drive two or drive two to drive one.

Seven options are available for formatting discs — single or double-sided formatting, format the media in drive one or drive two, format at 80 or 84 tracks and the volume name.

In addition to being able to click on individual icons, you can also press <1> or <2>, to select the drive, <T>, to toggle between 80 and 84 tracks, <S> or <D> to format a disc, single or double-sided. The COPY and FORMAT menu bars must be selected.

Provided you have the appropriate *QRam* utilities available, Disktool can be put on EPROM and a version of the code for blowing on to an EPROM is included on the supplied disc.

Short and to the point, Disktool is one of those utilities which, when you have used it for a time, you begin to wonder how you fared without it. I have used successive versions of QKick regularly since its first release and find it indispensable.

text⁸⁷ VERSION 2.00

Just over a year since the release of text⁸⁷, we are proud to present the new version 2.00 of our advanced wordprocessor. Version 2.00 offers all the features of the earlier versions of text⁸⁷ plus the following:

- * On-screen pixel-accurate justification.
- * Optional display of the ruler for the cursor line.
- * Optional display of the name of the current typeface in addition to the WYSIWYG display of founts.
- * Up to 10 typefaces (selected by the user from those supported by the printer drivers) are available for quick insertion in the text. The Program remembers these selections for the next editing session.
- * 10 screen display founts are now supplied with the Program including 3 sans-serif, 4 Roman, superscript, subscript and italic founts.
- * New 80 page manual.

text⁸⁷ is extremely fast. Running on the Atari ST with the QL emulator, it outperforms most multifont wordprocessors running on the ST, AMIGA or the Macintosh Plus and matches the fastest ones. Even on the much slower QL it is more than a match for many of those wordprocessors. On QLs with 512k memory expansion text⁸⁷ can handle large documents of over 400k characters.

text⁸⁷ can print multiple-line headers and footers, print in up to 4 columns, and change line spacing in different parts of the text. Many dedicated and generic printer drivers are supplied for different families of printers. Once selected, the printer driver is automatically loaded and becomes an integral part of the Program. With any Diablo or Qume compatible daisywheel printer (including Epson, Brother, Juki, Panasonic, etc) text⁸⁷ can handle multiple daisywheels, proportional spacing, bold, underlined, superscript and subscript text even on models, which do not provide commands for these features. On Epson and compatible dot-matrix printers different character widths and styles can be mixed on each line with microjustification. Proportional spacing is also available with some dot-matrix printers. The number of different print styles supported by each driver varies between 48 and over 200. The whole range of QL accented characters is supported on all Epson and IBM Proprinter compatible dot-matrix printers.

founttext⁸⁸ is the graphic printer driver for text⁸⁷. Used with Epson compatible dot-matrix printers, it provides desk-top publishing facilities with thirty high-quality founts (not ordinary QL founts) in different styles and sizes up to 72 pixels high. With founttext⁸⁸ you can

use graphic founts without the limitations in text editing and document size imposed by page makeup programs. founttext⁸⁸ can load up to 32 founts and allows you to use them in any combination in the text. On QLs with 512k expansion, maximum text size can be up to 300k depending on the founts loaded. founttext⁸⁸ can be configured for two print densities and a choice of single pass or overlapping double pass print. A special 24-pin version is supplied at no extra cost.

founted⁸⁹ is the new graphics editor for founttext⁸⁸. It allows you to create new founts of up to 84x96 pixels per character or capture screen images saved from QL drawing programs for insertion in your documents. Using founttext⁸⁸ these captured images appear on the screen and on paper to pixel accuracy.

2488 is a set of state-of-the-art text-mode printer drivers for Epson and NEC 24-pin printers. When used with 2488, text⁸⁷ is the only QL program that can take advantage of the advanced features of 24-pin printers such as multiple character founts, proportional spacing, double width, double height, condensed, etc. For example, the driver for the NEC P2200 supports 12 typefaces each in 5 sizes and in a range of up to 12 further combinations of highlights, resulting in over 500 different print styles!

text ⁸⁷	£45	founttext ⁸⁷	£25
founted ⁸⁹	£15	2488	£15
Complete edition: text⁸⁷ + founttext⁸⁸ + founted⁸⁹ £80			
Other software:			
Taskmaster	£25	Qram	£29
Spellbound	£29	Qtyp	£29
		Qpac II	£19

Prices are inclusive of airmail worldwide. Payable by cheque, Postal Order, Eurocheque or credit card. Please specify cartridge or disk system.

text⁸⁷ is very compact and works perfectly with a minimum 64k of memory expansion. founttext⁸⁸ requires at least 128k expansion. text⁸⁷ is compatible with all QL memory expansions and disk interfaces and most multitasking software.

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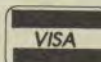
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The main listing is a tiny, powerful routine by *QL World* reader Phil Spink which lets you multi-task 'bad-tempered' software like the Psion packages or games which do not display a cursor.

Taskforce is so-called because it can force most programs normally loaded with EXEC_W to multi-task. *Taskforce* lets you switch input to Quill, Archive or other keyboard-hogging programs with Control C, as if they were well-behaved tasks. *Taskforce* works with compiled SuperBasic as well as Psion software; it gives multi-tasking control over machine code games like *Tower of Valagon*, Alan Pemberton's *Q-Liberated* adventure. There is no problem multi-tasking SuperBasic with Psion software, even on a 128K computer.

Now you can use SuperBasic commands like COPY, DELETE and DIR while running another task; you can even run a complete Basic program at the same time as Quill, or as many other tasks as you can fit into memory.

Taskforce is extremely frugal. Among other configurations we tested it on a minimal QL set-up — 128K, two Microdrives running Quill and SuperBasic at the same time. We had 7.5K memory free for SuperBasic and were able to type more than 1,200 words into Quill — about three A4 pages — before data started to spill to the DEF_TMP file on Microdrive 2.

You can run *Taskforce* several times on an expanded machine to get Quill, Abacus, Archive, Easel and SuperBasic all running at once. You can buy expensive programs to do this kind of thing. The most famous are *QRAM* and *TaskMaster* but there must be at least a dozen in all.

Usually they are bought to get the Psion software multi-tasking but they do all kinds of things besides. In particular, they gobble RAM with code and screen images, slow Qdos with extra checks and polling routines, and alter the behaviour of the system, making them incompatible with one another and some application programs.

When you see 'QRAM compatible' on a package, it normally indicates special effort on the part of the developer. Nowadays, compatibility with most QL front-ends is a design objective, not something to be taken for granted.

As you might expect from DIY Toolkit, *Taskforce* is classically simple. It makes all possible tasks work like well-behaved ones. Rather than introduce mouse control or ALT keys it sticks to the 'Control C' task-switching of a standard QL. *Taskforce* uses no RAM once tasks are loaded; it is just a few lines of Basic, needed only when you load new tasks. It is highly compatible and, best of all, it is free in this month's *QL World*.

The listing of *Taskforce* is being printed from SuperBasic as I type this line into

DIY TOOLKIT

This month Simon Goodwin discusses System Variables and shows how you can re-configure the QL system with well-chosen PEEKs and POKEs.

Quill 2.3. I still prefer my Video Genie but that is broken. It has half the CPU power of a ZX-81 but I have written more than 200 articles on it painlessly since 1980.

Back on the QL, there is another problem to be solved before we can get the Psion programs to multi-task properly. Quill and its siblings assume that they have a monopoly of the machine and grab almost all available memory as they start up. Normally Quill 2.3 leaves only 5.5K of free memory for SuperBasic and file-buffering Slave Blocks. This limits you to 4K of Basic on AH and JM versions of the QL, or 4.5 on the JS or MG. All systems prior to MG lock-up — stopping all tasks dead — if you exceed those limits while discs or Microdrives are running. Be careful when you multi-task programs in limited RAM; be aware of the context when you swap between tasks and keep SuperBasic in check with CLEAR or NEW.

Taskforce lets you conceal expansion memory from greedy tasks. You can divide memory into arbitrary partitions for many tasks, whether they have internal 'dataspace' or grab it from outside. Any slack is available to SuperBasic or used for Slave Blocks. You can work on big SuperBasic programs as you run Psion software.

When you run *Taskforce* it reads the system variables SV.FREE and SV.BASIC. One points to the start of filing system 'Slave Block' memory. The other points to the movable edge of Basic memory. Thus it can display the amount of free memory available, in K. You can get an extra 2K later by deleting *Taskforce*.

Memory reserve

You are asked to enter the amount of memory you want to reserve, in kilobytes. That much memory will be hidden when the task loads and starts up. If you press Enter no memory is hidden.

Before loading a greedy task, *Taskforce*

allocates space for a dummy array, DUMMY\$, made up of strings, each 1K long including the two-byte length. When the task has loaded *Taskforce* performs a CLEAR, Basic de-allocates the array and the space is returned to Qdos.

Who needs machine-code? At first we used commercial Toolkit commands to develop *Taskforce*. I expected the final routine to be written in machine code, like other DIY Toolkit utilities, but *Taskforce* uses nothing but standard SuperBasic.

Now the tricky part. We need code to give any task a cursor we can select with CONTROL C. We can determine this by experiment. Turn on the QL, press F1 or F2, then load Quill with EXEC, rather than the normal EXEC_W. SuperBasic continues to run after the task starts but that does not help you use Quill. As soon as the SuperBasic cursor appears the interpreter grabs all input and Quill is frozen, waiting for a keypress which never comes.

Quill re-connect

The same is true for Archive, Abacus, Easel and many other programs. Quill is there and running, but everything you type goes to SuperBasic, so you cannot use Quill. We need to find the Quill input channel and re-connect it to the real world.

Basic is still running, so let us try a few PEEKs and see if we can find the channel. Before loading the task, *Taskforce* reads the 'tag' which will be used to identify it. The value is held in a system variable SV.JBTAG. It is incremented for every new task, so every task has an exceptional tag, apart from the first, which has the same tag as the 'permanent' task, SuperBasic.

We fix this quirk by POKEing the tag value to 1 before the first task is loaded. This is a POKE in the nature of an initialisation bug-fix. Once the task has loaded with EXEC it shares processing

- TASKFORCE -

mit 7 ABACUS? wage ASD-W etc? →

QL World DIY TOOLKIT - March 1989 - Simon N Goodwin.

Taskforce LISTing:

```

100 REMark TASKFORCE utility program
110 REMark QL WORLD DIY Toolkit 3/89
120 REMark Copyright 1989 Phil Spink
130 :
140 CLS
150 REMark Free RAM = (SV.BASIC)-(SV.FREE)
160 free_k = INT((SYS_L(16) - SYS_L(12))/1024)
170 PRINT "TASKFORCE", free_k; "K bytes free."
180 INPUT "Enter task name & device"! task_name$
190 INPUT "Enter reserved space in K"! space$
200 :
210 REMark Reserve memory and load task
220 space = "0" & space$
230 IF space < free_k AND space >= 1
240 DIM dummy$(space-1,1022)
250 END IF
260 IF SYS_W(96) = 0 : POKE_W SYS_VARS+96,1
270 task_tag = SYS_W(96)
280 EXEC task_name$
290 PAUSE 200 : REMark Delay to allow memory allocation
300 :
310 REMark Enable cursor of task's first CON channel
320 ch_bas = SYS_L(120)
330 last_ch_num = SYS_W(114)
340 FOR ch_ptr = ch_bas TO ch_bas+last_ch_num*4 STEP 4
350 REMark Is the channel open?
360 IF PEEK(ch_ptr) <> 255
370 ch_def = PEEK_L(ch_ptr)
380 REMark Is its driver the same as for #0?
390 IF PEEK_L(ch_def+4) = PEEK_L(PEEK_L(ch_bas)+4)
400 REMark Is it owned by the correct task?
410 IF PEEK_W(ch_def+8) = task_tag
420 REMark Is it too big to be a SCR definition?
430 IF PEEK_L(ch_def) > 120
440 POKE ch_def + 67,1 : REMark Set SD.CURF
450 EXIT ch_ptr
460 END IF
470 END IF
480 END IF
490 END IF
500 NEXT ch_ptr
510 PRINT "WARNING! No CON channel in"! task_name$
520 END FOR ch_ptr
530 CLEAR
540 STOP
550 :
560 DEFINE FuNction SYS_L(addr)
570 RETURN PEEK_L(SYS_VARS+addr)
580 END DEFINE
590 :
600 DEFINE FuNction SYS_W(addr)
610 RETURN PEEK_W(SYS_VARS+addr)
620 END DEFINE
630 :
640 DEFINE FuNction SYS_VARS
650 RETURN 163840
660 END DEFINE

```

Handwritten notes in the left margin:

- 430: } ⇒ alchp?
- 430: } bei 300K - Abschneid!
- 270: → wählbar für Nr.
- 270: → 463936
- 270: → sv-jbtag
- 320: - sv-chbas
- 330: - sv-chmax ? → 41-CHAN ist besser
- 360: - ch-def = PEEK_L(ch_ptr)
- 360: - ch-def = PEEK_L(ch_ptr) = CH-BAS(Kanal)
- 360: - ch-def = PEEK_L(ch_ptr)
- 430: = 120 = 128
- 450: (CURFEN...)
- 450: (funktioniert nicht bei!)
- 450: (suspendieren task)

⇒ sv-ident

bytes for a CONSOLE channel, less for an SCR channel.

The second long word CH.DRIVER points to a table of addresses for the code which sends data through the channel. This value is identical in SCR and CON channels but different for all other types. The first channel in the system table should be the SuperBasic #0, which is always connected to the console; otherwise the QL is likely to crash. Taskforce knows the tag of the task for which it is looking and checks it against CH.OWNER, the next word in the channel details.

Spink tried a technique from Chas Dillon's classic *Filebound* program to put characters into the channel. It worked. Now he could use Basic as normal or run a short SuperBasic program to queue characters for Quill.

This is clever but it is not good enough. The Basic loop takes up memory while you word-process and makes Quill even slower. If you hold down keys, the Quill buffer overflows and the Basic stops with a 'not complete' error. If you disapprove of POKEs but have perhaps forgiven the one to SV.JBTAG you might like to compile such a program.

Spink decided to POKE the channel details to set SD.CURF, the cursor flag. A cursor appears, usually at the left edge of the task windows, and you can select that task with Control C. A warning is displayed if a task has no console channel. This may mean that the task has aborted, perhaps because you strangled it with tight memory limits.

I hope you enjoy this month's software project. Credit for the lateral ideas is owed to Spink at Creative CodeWorks, who conceived the prototype Taskforce routine.

Next month I shall offer a new batch of original and useful SuperBasic commands. Please write to let me know what new commands you would like to see featured.

User notes

Taskforce is very easy to use because it tames badly-behaved tasks so that they work like well-behaved ones. Each task has a cursor; in Quill it is at the extreme top left corner of the screen, out of sight on TVs and some monitors. Taskforce just turns on the cursor of the first console channel used by the task, so the position varies depending on the program.

The first console channel is picked because the default channel for INKEY\$ and PAUSE is #0 and that is the first one set up by any compiled task.

SuperBasic programs usually are written as the only task on the machine so there is no need to give them a cursor as a 'handle'. EXEC_W will run a compiled version but it will not multi-task. You will probably need Taskforce to add a cursor if you want to compile the code and run it, unchanged, with EXEC.

time with SuperBasic. To give it time to start and allocate memory, Taskforce pauses for four seconds before trying to find the task console channel.

Almost every task opens a console channel so that it can read characters from the keyboard. A few programs, mainly games, rely on KEYROW alone. Without a cursor they receive input only while they are the only task expecting data.

Tasks do not have to display a cursor. As soon as another task displays a flashing cursor it grabs the keyboard and there is no way you can get back to the first task

unless it has a cursor you can select with Control C.

The trick is to look through the system channel table. System variable SV.CHBAS points to a table of SV.CHMAX long words. Each long word contains \$FF????, for a closed channel, or the address of a particular table of channel details.

Every channel has its table of details; the size and content varies depending on the device. The first long word is the length of the table. This varies on different QL systems but should be more than 120

Psion programs and most other machine code tasks use several SCR windows but only one CON window for input. In its model of the computer there is only one keyboard channel, so our code works well by picking up the first.

There are some weird tasks around and it is easy to crash 'task management' programs. Taskforce is remarkably tolerant, so long as the computer is running Sinclair original Qdos, perhaps with toolkits and add-on devices. QRAM and the Thor window manager may interact badly with Taskforce but anyone using them does not need Taskforce.

The worst case is usually that Taskforce will leave a task dormant rather than turn it on. A message appears and you are still in control with SuperBasic. You can remove the task and try again with EXEC_W. In this case the task is probably using KEYROW, so it would be impracticable to multi-task it with any other program requiring input anyway.

Taskforce does not gobble memory with screen images, at 32K per display. Press SHIFT-F5 to re-draw the screen of Psion packages; most other programs have similar keys or use a scrolling display.

You may need to go by way of Basic if the screen mode has changed. Type MODE 8 or MODE 4 if necessary before swapping back to the old task or the re-drawn screen may not fit the window. MODE changes already force the system to re-draw the borders of windows.

Technical notes

The problem with low-level hacking, PEEKs and POKEs in particular, is that it tends to produce different results on different machines. Taskforce is stuffed with 'magic numbers' — addresses and offsets from the Qdos documentation, some of which might vary theoretically between QL versions.

The first rule is always to trace through from the System variables. System variables were introduced in the DIY Toolkit Index of Terms in August last year.

Tasks and channels do not move once they are set up, apart from usually PEEKing and POKEing them consistently.

Channel addresses vary widely between QL systems. They depend on RAM size, add-ons and even the order in which you use devices. Unfortunately system variable addresses are not guaranteed to stay the same on all systems. Taskforce recognises this as a fact of life; it has been designed to run on virtually any standard QL version without changes. The absolute base address is written as a function; to suit Thors, forget the last three lines.

Normally people use PEEK with an absolute address to read the system variables. All QLs and some Thors keep system variables from address 163840, so this usually works. Some systems move the variables elsewhere. The Qdos specifi-



cation documents only their offsets from the start so we have packaged the normal base address into a function at the end of the program.

Peek and poke

Thors have a resident function to tell you where the system variables are to be found — SYS_VARS returns the address of SV.IDENT. In Qdos you can get this by reading A6 in Supervisor mode, or calling MT.INF (TRAP #1, DO=0) for an address in A0.

You can do other interesting things by PEEKing and POKEing the system variables. POKE SYS_VARS + 146,9 sets the TAB key to swap between tasks, instead of CONTROL C. The code of TAB is 9. POKE SYS_VARS + 146,3 to restore CONTROL C, or try another code.

PEEK (SYS_VARS+55) tells you your QL network station number. Use PEEK (SYS_VARS+238) to find the number of the currently-running Microdrive, or zero if they are asleep.

Tasks can PEEK or POKE SYS_VARS+51, SV.SCRST to adjust or simulate the effect of CTRL-F5 which pauses the display.

Line 160 of the program reads the system variables to find the amount of free memory. That is the amount free for Slave Block buffers; you should always leave at least 1K when drives are in use. On a QL



this gives the total RAM capacity of the machine and the amount of RESPR space allocated:

```
PRINT SYS_L(32)—131072.
SYS_L(32)—SYS_L(28)
```

You can find the real amount of memory used by a SuperBasic program when it runs. On the QL, tokenised code usually takes much more memory than the listing text in a SAVE file; the size also depends on the number of Toolkits you have loaded, whether you use them or not:

```
PRINT SYS_L(20)—SYS_L(16)
```

You will find more ideas in Andy Pennell's *Qdos Companion*, formerly published by Sunshine Books.

By now good programmers must be wondering why we do things like turn on a cursor with a POKE rather than a Qdos system call. The answer may be obvious to some; the POKE works and, in this case, the system call does not.

The red blob on a Psion display is a block rather than a real cursor, because it does not flash and you cannot switch control to it.

There is no legal way to turn on the cursor of a Psion program while it runs. The problem is that only one call can be issued on a particular channel at any time and when the Psion software is not busy it waits for the next input character, tying up its console channel.

You cannot use CURSOR_ON or CURSEN, even if you determine the appropriate channel identifier, because the channel is already in use and cannot accept other instructions until it gets some input, which is the reason you want to turn on its cursor.

You cannot use Qdos so you have to sneak past it with a POKE, which is definitely hacking and arguably bad practice. In this case, it happens to work extremely well — better than expensive front-end programs, all of which have compatibility problems.

Taskforce is very tolerant. We tested it on ROMs from JM to MG, on British and Korean-made QLs, 128K and expanded, disc and Microdrive.

Even so, it can be fooled by other programs which change the behaviour of Qdos, Qram and the Thor windowing environments and alter the addressing of channel details so that a pure Basic program has no hope of finding the correct place to POKE. The length of the channel block can vary between Qdos versions but the cursor flag is always at offset 67 when using Sinclair display drivers or true compatibles.

Windowing programs mess this up. In general, they duplicate the function of Taskforce so it is unlikely you will use both at once. It is not too difficult to write a window manager in compiled SuperBasic with these PEEKs and the Turbo MOVE_MEMORY.

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THROUGH THE GLASS DARKLY

A truly on-screen control circuit. Andrew Armstrong's experimental circuit is connected to the QL only by a piece of Blu-tack and is suitable for simple devices.

The QL is not often used to control such items as electric motors, lamps and so on but it is capable of doing so. The problem is that to do so one has always needed a special interface adapter, which plugs in where you may wish to plug something else. There is also the problem that unless the interface is opto-isolated, there is always the chance that a serious malfunction further down the line will damage the QL.

Here is a DIY project to construct an opto-isolated interface using the monitor or television set to provide isolation. The principle is simple — small squares are lit on an otherwise blank screen by the control software. Photodetectors stuck to the screen, using a small piece of magic tape or Blu-tack, detect whether or not a particular position is illuminated and the control electronics detects the response of the photodetector and switches the circuit to be controlled accordingly.

This method has its limitations, of course. It may not be practical if very many circuits are to be controlled and it does not permit feedback to the control

program. This method would not be very suitable for positional control, as for example with a robot arm. The program would have no means of checking the position of the arm before moving it, nor could it detect when the required point had been reached. Still, this control method is simple and avoids all risk of damage to the QL, even in the event of catastrophic failure of the interface unit.

Optical detection

Though the control squares on the screen may look as if they are continuously-illuminated, they are lit only while the raster scans past that area and for a small additional period while the phosphor continues to glow after it has been energised. The detection system must take account of this effect and not try to switch on and off each time the spot scans past the detector. The circuit diagram shown in figure one illustrates this. When the RPY58A LDR (light dependent resistor) is illuminated it discharges C1. The time constant of R1 and C1 is

such that it does not recharge again before the next time the LDR is illuminated. This is helped by the slow response of the LDR.

This particular LDR was chosen in preference to any other means of detection, such as a phototransistor, because it is a 5mm. square plate which is convenient to fix on to the face of a cathode ray tube. Certainly other detectors would work in this circuit but probably none so conveniently. If, however, you want to experiment with a different type of detector it may be a good idea to replace R1 with a lower value, say 10K, and insert a 100K potentiometer in series. C1 should be increased to a 1 μ F electrolytic capacitor, with its negative end to ground. The potentiometer should be adjusted until the circuit switches correctly with whatever photodetector is chosen.

The circuit shown in figure one is of just one channel, adequate for a first experiment. Its functioning is straightforward. IC1 is a quad comparator IC, of which one quarter is used per control channel. The inverting input of the comparator measures the voltage at the junction of R1 and the LDR. The dark-resistance of the LDR is specified as 200K or greater, so the voltage on the non-inverting input when the LDR is dark is likely to be almost 10 volts.

The bright resistance of the cell is specified as 600 Ω at an illumination of 50 lux. The brightness achieved by a monitor is unlikely to reach this level but the resistance of the cell when reasonably illuminated should be only a few kilohms at most. Under these conditions the voltage on the inverting input of the comparator will be less than 2V.

The non-inverting input is biased to half the power supply voltage, i.e., 6V, by R2

Screen Hardware Controller

```
100 start_screen
110 DIM byte(163,2)
120 j=1
130 RESTORE 230
140 READ x,y:IF (x+y)=0 THEN GO TO 180
150 byte(j,1)=x:byte(j,2)=y
160 j=j+1
170 GO TO 140
180 IF INKEY$="" THEN
190     j=RND(1 TO 162):IF j=0 THEN j=1
200     onn byte(j,1),byte(j,2):GO TO 180
210 END IF
220 STOP
230 DATA 4,0,3,1,5,1,2,2,6,2,2,3,6,3,2,4,4,4,
    6,4,2,5,4,5,6,5,1,6,7,6,1,7,7,1,8,7,8
240 DATA 28,0,28,1,28,2,28,3,28,4,28,5,28,6,
    28,7,28,8
250 DATA 10,0,12,0,14,0,10,1,12,1,14,1,16,1,
    10,2,16,2,10,3,16,3,10,4,12,4,14,4,16,4,
    10,5,12,5,14,5,10,6,10,7,10,8
260 DATA 28,10,28,11,28,12,28,13,28,14,28,15,
    28,16,28,17,30,17,32,17,34,17,28,18,30,
    18,32,18,34,18
270 DATA 38,10,38,11,38,12,38,13,38,14,38,15,
    38,17,38,18
280 DATA 1,10,3,10,5,10,5,10,7,10,1,11,3,11,5,
    11,7,11,1,12,1,13,1,14,3,14,5,14,1,15,3,
    15,5,15,1,16,1,17,1,18
290 DATA 13,10,12,11,14,11,11,12,15,12,10,13,
    16,13,10,14,16,14,10,15,16,15,11,16,15,
    16,12,17,14,17,13,18
300 DATA 19,0,21,0,23,0,19,1,21,1,23,1,25,1,
    19,2,25,2,19,3,25,3,19,4,21,4,23,4,19,5,
    21,5,23,5,19,6,23,6,19,7,24,7,19,8,25,8
310 DATA 31,0,31,1,31,2,31,3,31,4,31,5,31,6,
    31,7,33,7,35,7,37,7,31,8,33,8,35,8,37,8
320 DATA 22,10,21,11,23,11,20,12,24,12,19,13,
    25,13,19,14,25,14,19,15,25,15,20,16,24,
    16,21,17,23,17,22,18,0,0
330 DEFine PROCedure start_screen
340 PAPER 0:INK 7:CLS
350 END DEFine start_screen
360 DEFine PROCedure onn(x,y)
370 x1=1+(x*10):x2=1+((x+1)*10)
380 y1=1+(y*10)
390 BLOCK 10,10,x1,y1,7
400 BLOCK 10,10,x2,y1,7
410 END DEFine
```

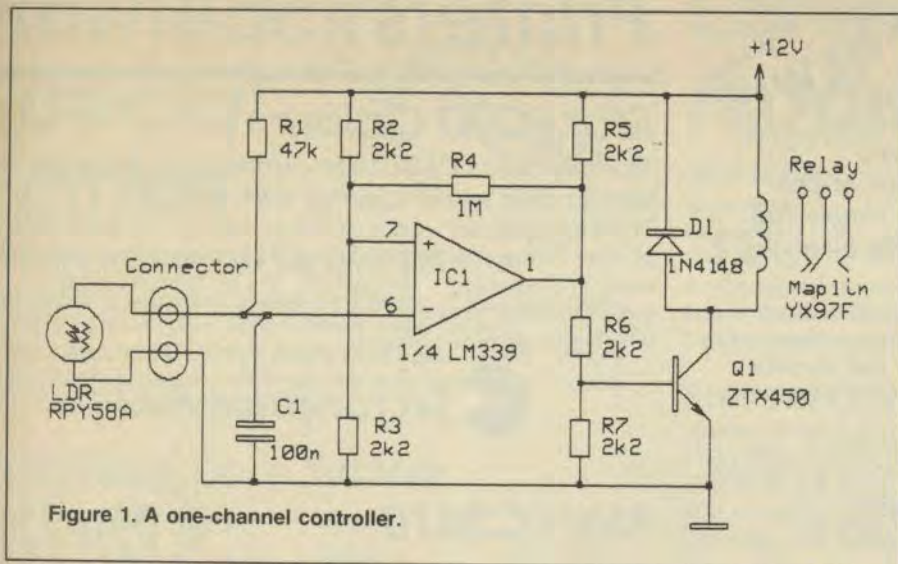


Figure 1. A one-channel controller.

and R3, with R4 providing a small amount of positive feedback to make it switch cleanly. When the LDR is illuminated, the voltage on the inverting input is below that on the non-inverting input, so the output of the comparator is high. This switches on Q1, which switches on the relay, and hence switches on whatever circuit the interface is controlling.

A relay was chosen as the output device because it has the most universal application. If the recommended relay is used it can control mains or low voltage, AC or DC, an ideal choice for an initial experiment. If the unit is intended only to switch AC mains circuits, an alternative would be to use an opto-isolated triac to trigger a triac rated at the required current and use this to switch the load.

Both a relay and an opto-isolated triac isolate the mains voltage from the rest of the circuitry but, to make this isolation effective, connections must be made correctly, with adequate insulation to avoid short circuits. If the unit is built on Veroboard, at least two adjacent tracks either side of all mains connections should be totally removed to provide a reasonable isolation gap. Remember that mains voltages can be lethal and all precautions must be taken to make sure that live wires are properly insulated and that mains cannot reach any part of the circuit which is not supposed to carry it, including the user.

If fairly low-powered 12V DC circuits are to be switched, the BC182 output transistor could be replaced with a TIP126 Darlington transistor, which provides more gain and can switch a higher current. This could then switch the load directly without using the relay.

Both of these alternative output suggestions are best pursued after the basic unit has been made to function.

Only one control channel is shown here and it is probably best to build only one for the initial experiment. Once this is working, the other three parts of the IC may conveniently be connected in three more control circuits. Because the chosen IC is a quad comparator, if many circuits are to

be controlled it will be convenient to build them in groups of four. A list of the pin numbers is given in figure two.

Power supply

A source of 12V DC is required to run this unit. Because the whole virtue of it is that it has no direct connection to the

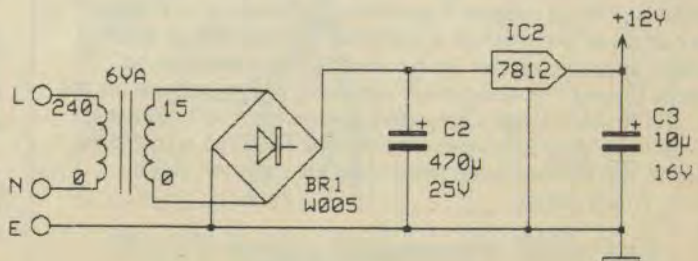
Figure 2. The pin-outs of the LM339

Figure 2.

Pin	Function
1	Output 2
2	Output 1
3	Positive supply
4	Inverting input 1
5	Non-inverting input 1
6	Inverting input 2
7	Non-inverting input 2
8	Inverting input 3
9	Non-inverting input 3
10	Inverting input 4
11	Non-inverting input 4
12	0V
13	Output 4
14	Output 3

QL, it needs a separate power supply. It is very tolerant of different supply voltages, so long as the relay coil is properly energised, and would prob-

Figure 3. Power supply circuit.



ably work from a 9V battery. If it is intended to be used for more than brief experiment, it is better to use a mains power supply and a suitable circuit is shown in figure three.

All the components used in this project are available from Maplin Electronics, whose catalogues are available in newsagents.

Software

This project is intended to demonstrate what can be done and what people's appetites for hardware control. Accordingly, I have included a listing of a simple program to light up a few squares on the TV or monitor to check that the system works. When the system is shown to work you can write your own program, perhaps incorporating the square drawing procedure from my listing.

It would be a good idea to enter and run the program exactly as it appears in the listing, to make sure that the extreme contrast levels which it generates do not upset the functioning of your TV or monitor. This is very unlikely but it could happen with some sync-separator circuits and it would be a pity to spend money on components only to find that the control program upsets the vertical or horizontal hold on your display. The program as written lights a sequence of squares which should upset the monitor if anything is to do so.

Assuming that there are no problems with the monitor when the circuit is first tested, you should adjust the brightness level to approximately the middle of the range, which makes the unit switch cleanly.

No printed circuit board layout has been provided with this project. It is assumed that constructors will build it on Veroboard and as such it should not be attempted by readers who have not built electronic projects before. Readers who are interested in the software might find someone with electronic experience to help them build the circuit. If sufficient readers write requesting it, a PCB layout may be published at some point in the future.

While we make every effort to ensure that projects function correctly, QL World accepts no responsibility for loss or damage arising from electronic construction.

Ferret




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 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.


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


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~~RRP £300~~

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- for the expanded QL and CST Thor

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 FlashBack, 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.

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- New 'quit program' facility provided
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- Compatible with Qram

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By Peter Jefferies

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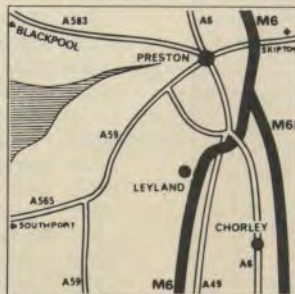
THE NORTHERN SINCLAIR SHOW

The first Northern Sinclair show will be held at Stokes Hall, Leyland, Lancashire, on April 8th 1989. Organised by Sector Software, the show will have a similar format to London's ZX Microfair and will be totally Sinclair orientated. Most companies who have anything to do with the QL will be at the show.

Sector Software will of course be there with FlashBack Special Edition, Miracle will be showing its Hard Disk and Digital Precision will be there with the MSDOS emulator. With any luck Clive Sinclair's new satellite TV system will also be on the Sector stand.

As well as the QL related stalls there will be exhibitors from the Spectrum, Disk, Book and accessory markets. The Z88 will be represented with new software releases from Harvester Information Systems.

This show is the first of what we hope will become a regular event. Much depends on the success of this first effort. A good attendance will give us the green light for another show in three months time.



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SUPER BASIC

Mike Lloyd continues with the second part of his calculator/base conversion project.

The combined calculator and base conversion utility outlined in last month's SuperBasic feature consists of 363 lines of SuperBasic code divided into some 30 procedure and function definitions. Although the program will not be completely usable until the last menu option definition has been typed-in, readers will be able to make some limited use of the program at the end of each section.

As many as possible of the functions and procedures have been designed for use in other programs with little or no amendment. The listings printed with this month's article perform the essential but thankless task of initialising the program variables and display area.

Fight for space

Programmers' utilities such as *QL-Calculator* must fight for space in a very limited and over-worked area — the computer screen. Its display must therefore be compact without being cramped — and informative without being cluttered. In SuperBasic form it must also be able to share a variables area with a program being developed. All variables must therefore be local to the procedure definitions of the utility and it cannot use DATA lines, so as not to clash with the programs to which it might be appended. The utility is activated by entering the keyword "calc", which is the name of its main procedure.

To keep track of all the listings a modified numbering convention has been used. The listings in this article are numbered 1.0, 1.1, 1.2 and so on. Those in the next issue will be numbered 2.0, 2.1 and so on until the program is complete. The line numbers for listing 1.0 are between 1000 and 1099; those of listing 1.1 are between 1100 and 1199.

The program begins at listing 1.0 with the procedure which bears the name used to invoke the whole program. It has the maximum number of LOCAL statements

Listing 1.0

```
1000 DEFine PROCEDURE Calc
1005 LOCAL Num$(10),      B$(10)
1010 LOCAL Valid$(36),   BaseVal$(4), BaseTag$(6)
1015 LOCAL Base$(4,3),   Store$(5,10), Const$(5,20)
1020 LOCAL Prt$(2,3),    Mode$(2,4), Menu$(5,10)
1025 LOCAL X_Org,        Y_Org,          TV_Mode
1030 LOCAL PrtOn,        In_Val,         Out_Val
1035 LOCAL In_Base,     Out_Base,        IntOnly
1040 Init_Vars
1045 Init_Arrays
1050 Init_Screen
1055 Main_Loop
1060 Quit_Calc
1065 END DEFine Calc
```

Listing 1.1

```
1100 DEFine PROCEDURE Init_Vars
1105 B$ = FILL$(" ", 10): Num$ = B$
1110 BaseVal$ = CHR$(10)&CHR$(16) &CHR$(2)&CHR$(8)
1115 In_Val = 1: In_Base = 10
1120 Out_Val = 1: Out_Base = 10
1125 BaseTag$ = " hbo"
1130 Valid$ = "0123456789?????"
1135 Valid$ = Valid$ & ". ?-+*/"
1140 FOR x = 187, 61, 10, 194, 27, 232 TO 248 STEP 4
1145 Valid$ = Valid$ & CHR$(x)
1150 END FOR x
1155 op = 18: Ans = 0
1160 PrtOn = 0: IntOnly = 0
1165 END DEFine Init_Vars
```

Listing 1.2

```
1200 DEFine PROCEDURE Init_Arrays
1205 LOCAL x
1210 FOR x = 1 TO 5: Store$(x) = B$(1 TO 9) & "0"
1215 Base$(1) = "DEC": Base$(2) = "HEX"
1220 Base$(3) = "BIN": Base$(4) = "OCT"
1225 Prt$(1) = "OFF": Prt$(2) = "ON"
1230 Mode$(1) = "REAL": Mode$(2) = "INT"
1235 Const$(1) = "3.141593 PI"
1240 Const$(2) = "131072 SCRN START"
1245 Const$(3) = "65536 64k"
1250 Const$(4) = "1.61 km > miles"
1255 Const$(5) = "0.45 lb > kg"
1260 Menu$(1) = "Store": Menu$(2) = "Fetch"
1265 Menu$(3) = "Constants": Menu$(4) = "Settings"
1270 Menu$(5) = "Clear"
1275 END DEFine Init_Arrays
```

allowed by Qdos; any more would corrupt the Qdos name table. The variables are described when they are initialised in the following procedures.

It is worth noting that all strings have been declared as single-dimensioned arrays. This is mainly to take advantage of the different way in which SuperBasic concatenates fixed-length strings. Additionally, the tasks performed by some of the routines are eased greatly if the strings on which they work are of a consistent length. Finally, it is the preferred way of declaring strings in programs destined to be compiled using the Digital Precision Turbo compiler.

The executable lines of the *calc* procedure are a classic example of a high-level part of a hierarchy of program segments. They show the entire sequence of the program by listing the names of the major segments.

Major variable

Listing 1.1 initialises the major simple variable used throughout the program. The first, *B\$*, is a string of 10 blank characters used to initialise other strings with a command such as:

```
100 Num$ = B$
```

rather than the lengthier and clumsier equivalent:

```
100 Num$ = FILL$( " ", 10)
```

The *Num\$* variable is used to hold numeric input. It is a string so that the hexadecimal digits *A* to *F* can be used in addition to conventional decimal digits.

The *BaseVal\$* string holds characters representing the four bases — decimal, hexadecimal, binary and octal — used by the program. It allows the bases to be referred to as 1, 2, 3 and 4 rather than as the less helpful 10, 16, 2 and 8.

Input and output can be in different bases, which allows values to be translated between bases as calculations are made. *In_Val* and *Out_Val* are used to indicate the bases currently in use. In a multi-base utility it is essential to tell whether a value such as 1000 represents a decimal value of 1,000, 4,096, 8 or 512. Accordingly, *BaseTag\$* contains appropriate suffixes, a blank for decimal and "h", "b", and "o" for hex, binary and octal.

One of the most crucial aspects of any program is the error-proofing of input. Next month's issue will detail how QL-Calculator copes with this perennial problem but it is helpful to mention now that all valid input characters are stored in a string called *Valid\$*.

The first characters in the string are the familiar decimal digits. There follow six question-marks to occupy positions which are reserved for the additional hex digits. Question-marks are used here to represent "null" characters because they have no arithmetic significance and they are easier to use than the null byte, *CHR\$(0)*.

The remaining characters in *Valid\$*

Listing 1.3

```
1300 DEFINE PROCEDURE Init_Screen
1305 TV_Mode = 1 + (PEEK(163892) > 0)
1310 X_Org = 500 - 200 * TV_Mode: Y_Org = 20
1315 CLS_wndo 32, 10, X_Org, Y_Org, 2
1320 CSIZE 0,0: PAPER 2, 0: CLS: UNDER 0
1325 FOR x = 1 TO 5
1330 CLS_wndo 14, 1, X_Org + 12 + 88 * TV_Mode,
      Y_Org + x * 20 - 16, 2
1335 Hue 0: PRINT "F": x; " ";
1340 BLOCK 2, 10, 16 * TV_Mode, 0, 7
1345 Hue 2: PRINT B$
1350 END FOR x
1355 CLS_wndo 13, 9, X_Org + 6, Y_Org + 4, 4
1360 Main_Menu
1365 PrtOut "* CALCULATOR"
1370 END DEFINE Init_Screen
```

Listing 1.4

```
1400 DEFINE PROCEDURE Set_Wndo (wide, high, xpos,
      ypos, col)
1405 wide = wide * 6 * TV_Mode + 8
1410 high = high * 10 + 4
1415 WINDOW wide, high, xpos, ypos: Hue col
1420 BORDER 2
1425 END DEFINE shadow
```

Listing 1.5

```
1500 DEFINE PROCEDURE CLS_wndo (wide, high, xpos,
      ypos, col)
1505 Set_Wndo wide, high, xpos, ypos, col
1510 CLS: BORDER 2, 0: BORDER 1, 7: BORDER 2
1515 END DEFINE CLS_wndo
```

Listing 1.6

```
1600 DEFINE PROCEDURE Hue (x)
1605 PAPER x: INK 7 * (x < 4)
1610 END DEFINE
```

Listing 1.7

```
1700 DEFINE PROCEDURE Main_Menu
1705 FOR x = 1 TO 5: Show_Menu x, Menu$(x)
1710 Calc_Wndo
1715 END DEFINE
```

Listing 1.8

```
1800 DEFINE PROCEDURE Show_Menu (x, Text$)
1805 Set_Wndo 10, 1, X_Org + 12 + (90 + 18)
      * TV_Mode, Y_Org + x * 20 - 16, 2
1810 PRINT \Text$;
1815 END DEFINE Show_Menu
```

Listing 1.9

```
1900 DEFINE PROCEDURE Calc_Wndo
1905 Set_Wndo 13, 9, X_Org + 6, Y_Org + 4, 4
1910 END DEFINE Calc_Wndo
```

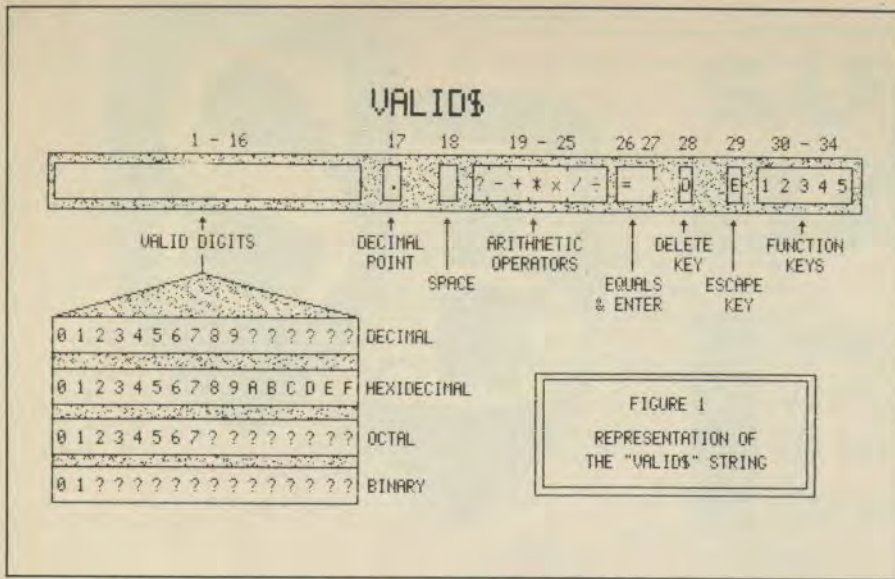


FIGURE 1
REPRESENTATION OF
THE "VALID\$" STRING

arithmetic symbols are codes for the delete, escape and function keys. There are two symbols each representing multiplication and division. The question-mark among the operators reserves a place for an additional operator such as the exponent.

The final procedure task is to set variables to indicate that the current operator is a space — the eighteenth character in the *Valid\$* string — the "answer" to the current sum is zero and that the printer and integer-only options are turned off. Those defaults can be changed using menu options described later in the series.

Listing 1.2 establishes the initial contents of the multi-dimensioned arrays in the program. *Store\$* is the equivalent of five memory functions on a traditional calculator. The next strings provide English translations for various options. The *Const\$* array is used to hold the value and description of five constants available to the calculator.

The way in which the SuperBasic coercion facility is used to differentiate between the value and its description is described later in the series. The final array to be filled holds the main options which are displayed by default.

Not fussy

The three screen display procedures were designed for use by a suite of programming utilities, some of which will be included on the version of QL-Calculator sold in Microdrive Exchange. The QL-Calculator is not fussy about character size, display mode, window settings and display device, provided some simple minimum criteria are met. The display area needs to be at least 13 characters wide and eight lines deep.

Output could go to a screen window or to a printer, or both simultaneously. The program uses only the SuperBasic default window but its location is changed frequently to give the appearance of many windows being open.

Before the screen area can be produced the display mode must be discovered so that a valid character size can be set and the proper window width ascertained. This is done by using a system variable to set the value of *TV_Mode* to determine their true width. The co-ordinates of the top left point of the display window are held in the *X_Org* and *Y_Org* variables. The window will always appear towards the top right of the screen.

Using the principle that the computer should do as much of the calculating as possible, two procedures have been written to ease the task of defining window sizes. For textual applications it is much easier to define how many character positions the window should display rather than its total width in pixels, which is complicated by character sizes, display mode and borders.

Listing 1.4 establishes the window area without clearing it, allowing the default window to be moved elsewhere on the

screen and returned without affecting the display. Windows are first created using listing 1.5, which additionally draws borders and clears the usable window area.

Although the QL colours offer wide variety, the most effective PAPER and INK combinations always include black or white, according to whichever offers the strongest contrast. For QL-Calculator it was decided that the INK colour would be limited to black or white. Listing 1.6 takes a single parameter which is assumed to be a solid PAPER colour. If it is a dark colour, INK is set to white; if PAPER is light, INK is set to black. Thus one procedure replaces two SuperBasic keywords.

Windows

Throughout a calculating session the main display area is used except when the menu is updated. Listing 1.7 displays the five main menu options by calling the *Show_Menu* routine with the menu position and contents as parameters. When this has been done the *Calc_Wndo* routine restores the Qdos window parameters to point to the main display area.

Both the *Show_Menu* and *Calc_Wndo* routines call the *Set_Wndo* option to re-set the default window without clearing the display area.

Once these routines have been entered and a copy of the program saved they can be tested by entering the keyword *CALC*. The program should draw the QL-Calculator window before coming to a halt at line 1055 with a "Not Found" error message. Try running the program in high- and low-resolution modes to see the different displays. Next month's article will deal with the problem of reading, analysing and displaying input.

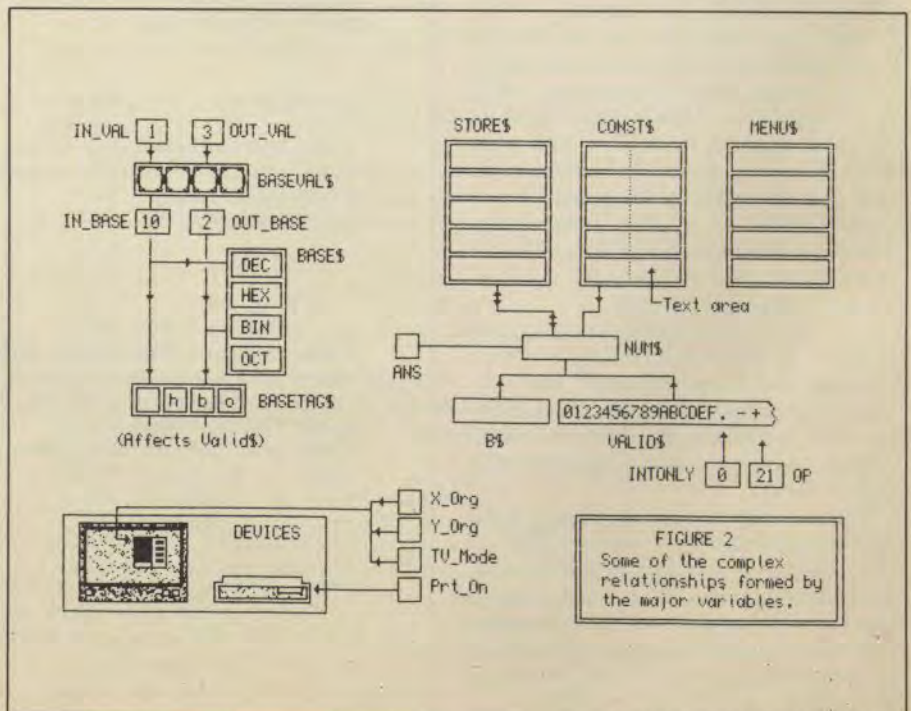


FIGURE 2
Some of the complex
relationships formed by
the major variables.

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THE PRINTER REPORT III

In the third and — for now final part — of QL readers' printer experiences, we look at the Silver Reed EX30E and the popular HR-5 again.

HR-5

Of all the printer problems about which people have written to *QL World* one printer appears to stand out — the Brother HR5, although I have several other names for it.

My Brother HR5 printer was part of a bundled package when Boots, along with all the other high street retailers, were putting a printer on a QL to shift them from the shops. My package consisted of a 128K QL, Brother HR5 printer, Centronics printer interface by Connexions and *Cash Trader* software.

I bought the entire package for £200, which was incredible when you realise that at the time the printer was retailing in computer magazines at between £100 and £150. Add the cost of the software and interface and I got a standard JS QL for almost nothing.

The HR5 is in two versions, RS232 or Centronics interface, although I have never seen a serial version. Otherwise it is a dot matrix type, with standard 80-column printing. Print speed is around 30cps and the printer buffer is 1K.

Portable

The HR5 has two other features which can be very useful. One is that it can be powered by four HP-11 batteries or by its own power supply, so it is portable. Second, it can use ribbon or it can use thermal transfer paper if no ribbon is available. If no ribbon is fitted the printer goes automatically into thermal mode and vice versa. Print quality is best-described as draft quality, although there are tricks which improve the appearance of the printing. The printer is not very large. Its footprint is just less than that of A4 paper.

Some HR5s also have a paper roll holder which clips into the back of the printer. While at best described as a piece of plastic, I have seen this add-on sold in

shops for £7 or more. If you are the kind of person who uses roll paper you will need this device.

The cost of thermal paper and ribbons is high. Thermal paper for 100 sheets is £5.50 while thermal paper on the roll — 30 metres — is £5.95. It must be said that Brother thermal paper is the best available. I have used Silver-Reed EXD 10/EXD 15, which is satisfactory for general printing purposes but it is not in the same league when compared to the dark print of Brother paper.

Ribbons

HR5 ribbons are another matter. In the last few years these things have caused more problems than anything else. For some reason they have a habit of fouling when they spool back into the case. This problem has worsened in the last six months. After repairing three separate ribbons in one afternoon I mentioned the problem to another HR5 user.

He, too, has had problems and only when we swapped ideas did we discover that the ribbon in some cartridges did not pass through a combination of spring levers. We also discovered that some ribbon cartridges had springs which appear to be assembled incorrectly. I contacted Brother about it and received a note saying it had passed on my comments.

Brother also seems a little confused over the price of printer ribbons at the moment. In its current price list they are listed at £2.45, while on mail order forms they are listed at £4.40. While some people may think that this is not a bad price it is worth pointing out that HR5 printer ribbons print only a maximum of 50,000 characters, while other Brother printers print between 80,000 and five million characters at a cost between £4.60 to £18.95. Worse still, HR5 ribbons can not be re-inked — unless somebody knows different.

Hooking up the printer is simple. Plug in the Centronics interface into SER1, put the other end in the printer. Re-set the computer, load the install program from Quill, follow the simple instructions in the

manual — which is fairly clear and straightforward — and then save the new printer.dat file. Re-set and boot Quill.

Now type a letter with a footer and place a sheet of paper in the printer. When ready, send it to the printer. This works well until you get towards the bottom of the paper and then the printer suddenly beeps telling you that you are out of paper. Yet when you take it out you find there is three inches of paper left. For some reason when Brother designed the printer it decided to fit a small microswitch which detects empty paper just inside the lip of where you feed in the paper. So then you are left with a three-inch gap at the bottom of the page and no footer.

There is a way round this. One is to use roll paper so it does not happen or get a small sticky label and stick down the switch. I have a small card flap fitted over the switch, which means I can have the best of both worlds. It is worth remembering that when using the install program for the printer drivers that the option for single sheet must be taken if you use this method.

Graphics screen dumps have in the past been the bane of my life. Try as I might I could not get a respectable screen dump. Every screen dump package worked well for two seconds, then all at once the printer would start printing a load of rubbish which usually meant a printer/computer re-set, depending on the program. In the end I wrote my own screen dump program and had it compiled. It did the job and I was pleased with the result.

Graphics

At the time I could never determine what was causing the problem. I could never use a commercial software package which used graphics modes and so felt for a long time that I was losing. I followed every guideline to setting up graphics printer drivers for programs and invented a few. I had problems with them all.

I am not the usual type of person who misses the obvious, so after a year I had all but given up. Then I got a Sandy Superdisk interface which has a Centronics interface on it. I gave it careful consideration and after cutting down one end of a 36-way Centronics lead to fit the 26-way interface, I plugged it in.

I booted Oram and then Quill and popped up the window dump in Oram. Straightaway I got a reasonable printout by sending the data straight to PAR instead of SER using the Epson FX80 option. After 10 minutes I had set up Oram to use the Brother HR4 option on scale 3. For the first time since I have had my printer I had a full, page-sized, shaded screen dump on my printer.

So where did the problem lay? The obvious answer suggests the Centronics interface. I had no complaints with it so long as it was printing text; only when graphics mode was in effect did the printer

fail. Now I am using a true Centronics interface I have no problems. I have tested this theory on a friend's system; his HR5 uses a Miracle Systems Centronics interface and he has no problems doing screen dumps. So it looks as if my interface has no graphics capabilities, which was not mentioned on the piece of card which served as a manual, not that it matters much now anyway, thanks to Sandy.

The print quality can leave a little to be desired when using programs like Quill but as with almost everything else hard or soft in the computer industry, there is a way round it. My solution is to alter the Quill printer driver in a slightly different way than the usual option of using the translate option.

Automatic

The HR5 does not need pre-amble or post-amble codes, so I found that those options could be used to send code to the computer automatically during printing without having any messy extra characters

turns Elite mode on at the start of every page.

POSTAMBLE CODE DC2: This turns it off and sets the print back to normal.

There are two problems with this method and two worthwhile gains. The problems are that bold cannot be used as it prints in normal print and makes the document look unbalanced, due to the two different styles. So watch those headers and footers. Second, using Quill with the margins set wider than the screen can make it difficult to use. So I use the default margins and when I have finished I re-justify the right margin to 8.5in. This takes only a moment or so and is easier than trying to remember what is off-screen.

The advantages are better print quality than the normal print mode. If you use a very good, shiny-type paper, the print quality on first examination could be (V) NLQ, the 'V' meaning 'Very'. The second advantage is that you get more text on one line. This means what text which might

'GOTO'. This can save miles of ribbon when printing labels.

So far I have found just one problem with using the HR5 with the Sandy Centronics interface and that is probably software-related. When printing, the information is passed into a RAM buffer so that the computer can continue with its job(s); this speeds printing but you can find yourself with the problem of the printer waiting for data from a half-filled buffer. It is not really the fault of the printer: it is the buffers as it is waiting to be 'topped up'. The way round this is to send a few carriage returns to help it if you get this problem.

Price at the moment is difficult. The machine is now discontinued, although Brother still supplies ribbons and thermal paper if you cannot get them in high street shops or the office suppliers.

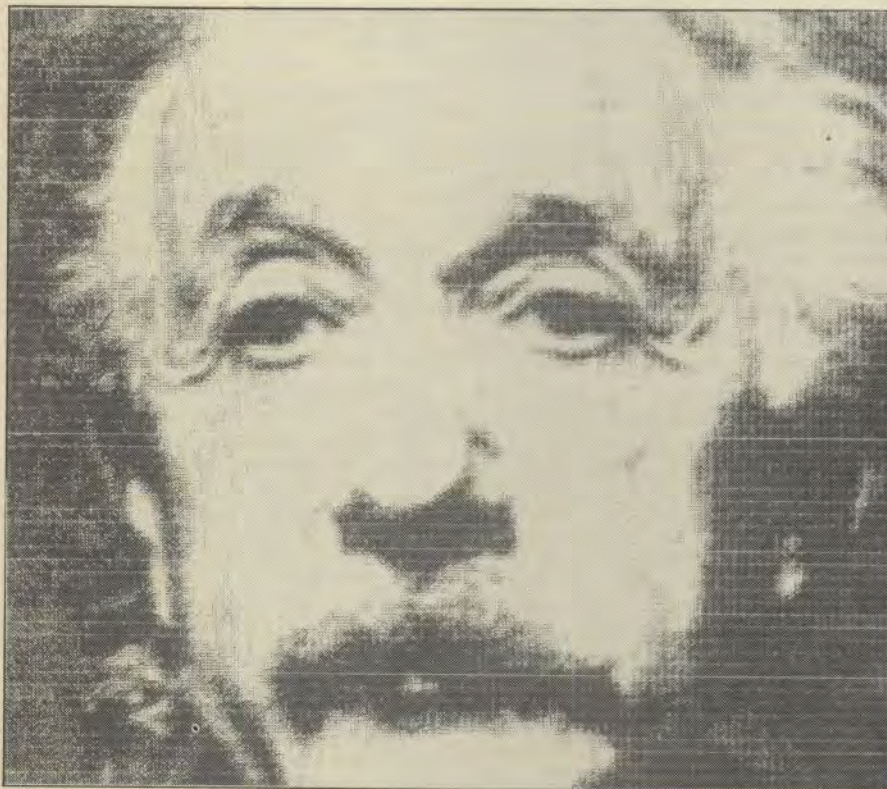
The power supply is extra, at between £2.50 and £9.95 each. No doubt you could use a multi-voltage transformer if you have one spare. If you do not have a Centronics port in your disc interface you will also have the extra expense of a Centronics interface. I would recommend the Miracle Systems one which is less than £20 and can handle graphics modes.

Buy new

If you want one of these printers second-hand, be prepared for a shock. You will often see these printers for sale in the classified advertisements, yet the owner will often want more for it than it would now cost to buy new. It is cheaper to buy a new one than argue on the telephone about nearest offers.

After two years of a love/hate relationship, I think I have it beaten. It is not perfect by any means. I think everybody would like a full-blown NLQ printer with the speed of a laser. It now prints everything I have thrown at it with no complaints. It is versatile, as it can handle two types of paper. It is portable, as it has two forms of power supply. It is not very big or heavy. It is very handy for anybody who wants a printer for basic file/listing/screen dumping. So long as Brother supplies ribbons and the excellent thermal paper I doubt if there is a better all-round printer at the price.

Wayne Fletcher



on-screen as some people seem to do. The best output on the HR5 is the Elite typeface which gives 96 columns on paper, so the margins on Quill have to be altered before printing to say one-inch (left) and 8.5in. (right), with indent wherever you want. I suggest that you also feed the paper slightly more to the left than you would normally do.

When altering the printer driver in Install, find the option which says pre-able and enter:

PREAMBLE CODE ESC,'M': This

take 1.25 pages when re-justified might well fit on a single sheet. This can reduce the cost of both ribbon and thermal paper.

One other tip to remember might well apply to other printers. The first time the HR5 is used and you have ribbon installed the machine does a complete one-line spool of the ribbon. This is wasteful when you are using the printer a great deal, so do not turn it off during the session unless you have to do so. If you are working in Basic and you are using the printer, avoid the 'RUN' command, as this causes a line spool of ribbon as well. Instead, use

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Tel: 0753 888866.

SILVER REED EX30E

The printer I use is a Silver Reed EX30E. It is an electronic typewriter/printer with a cassette daisywheel print element and a 12in. wide carriage, with the option of connecting to a computer, but can be used on its own as a portable machine if required. That is one of the reasons I bought it, the other reason being the price and the fact that I could get letter quality printout. I have used it almost daily in the last two years and have been very pleased with the all-round performance.

I obtained the machine from an Argos branch in Chester. The original price was something in the region of £320 but it was on offer at £185. The day I bought it it had been reduced by a further £5, so I paid £180.

Silver Reed no longer manufactures the EX30E. It has been replaced by the Silver Reed EZ30. I know, however, that Silver Reed is making a special offer on the last of the EX30E models it has in stock which will include in the price the IF30 parallel interface. I paid £98 for the interface on its own, as well as £20 for the Centronics printer interface, dual port version.

That made a total price to me of £298 and I admit that the £98 for the IF30 interface was something of a surprise at the time, as I had been informed by another source that the machine would work only with the Centronics interface which, as it transpires, it would not.

Interfaces

Connecting to the QL, once I had obtained the required interfaces, was a piece of cake. With everything switched off, I first plugged the output pins of the Centronics interface into the input end of the IP30 parallel interface; then, removing the small cover on the connector port of the typewriter, which is situated on the lower right-hand side of the typewriter lower cover I plugged in the flying output lead of the IF30 parallel interface. Finally, I put the input lead from the Centronics interface into SER1 on the QL. Less than 20 minutes after receiving the machine I had my first hard copy.

Silver Reed supplies a very good operating manual with the machine; you also get a very comprehensive operating manual with the IF30 parallel interface containing a full list of installation codes, ASCII codes and so on. If you wish to use the ASCII codes you will need an ASCII wheel for the machine. I have been using the wheel supplied with the typewriter/printer, typestyle (standard) Courier, printing pitch 10P — 10 characters per inch.

The machine has three settings of pitch, 10, 12, 15; the wheel I have is 10-pitch. To use the other settings of 12 and 15 you need the other pitch of wheel supplied by the manufacturer or agent. The wheel I have at the moment does all I seem to need and I have had no adverse effects from any of my other equipment.

Installation of the printer drivers was simple. As I use Quill a great deal, I used the Lrun MDV1__Install__bas to set up the system. Once I had installed the name Silver Reed I then put in the preamble code — ESC, " @, ESC, " R, " 3 followed by Translate 1 code: " £, ESC, " R, ETX, " #, ESC, " R, NUL.

With regard to after-sales support, Silver Reed could not have been more helpful. Its nearest agent to me is at Llandudno, where I obtain my ribbons and spares like the different styles of wheel, if required. I am still using the 10-pitch wheel supplied with the machine and have up to now had no problems with it. There are two types of ribbon I can use; both are of the cassette type, one type being carbon which is used only once through the printer. It costs £3 per cassette, so if you do a good deal of printing you can easily get through one in no time. This, of course, can become expensive. The Silver Reed agent told me about the fabric ribbon which costs more but lasts much longer; it costs £8.40. The one I am using at present has been in the printer for about two months and is still performing well. I hope that when it finally runs out that I will be able to get it re-inked for about £2.

Paper for the printer is obtained from various sources, one being the printer which prints the local weekly paper. It usually has waste edges about 10 or 11in. wide, plus other bits and bobs. I have been able to get a large amount for £2.

Coloured

I also bought three lots of different-coloured A4-size paper; each pack had 500 sheets, total cost £15. The printer can also use the computer-style perforated edge paper; even though it has no carrier for this type of paper, it still works satisfactorily. At least, I have experienced no problems with it.

I must say that I am very pleased with the Silver Reed typewriter/printer and for the work I require it to do, to write letters and documents, I could not ask for a better machine.

There are some snags to having a daisy-wheel printer. It is good for letters but you can only do just that. You cannot, for instance, print graphs or get a screen-

dump. You can change the print style only by changing the printwheel, so you are limited to what you can do. If, as in my case, you need letter quality printing, in my opinion you can get nothing better than a daisywheel. To get the same quality of print from a dot matrix printer you will have to pay a good deal more.

No hash

In my case, although I have the hash sign on the printwheel and on the typewriter key, I cannot get the hash sign to print-out. I have tried various Translate codes to no avail. If I try to print-out the Dir from the screen, it will print satisfactorily but the problem is that it prints on the diagonal:

```
145/213 sectors
Jerzy__add
Sidney__add
Don__add
Mike__add.
```

and so on. I have seen this in *QL World* but I have seen no reply to the person who asked about it.

Recently I have bought a Star LC10 eight-colour dot matrix printer but, having had it for only a short time, I feel that I cannot make any comment on it. I use the Star LC10 in SER1 and the daisywheel in SER2. I have had to make program changes to the printer drivers. I have made two copies of Quill, one to output to SER1, one to output to SER2. It seems to work satisfactorily.

In a word processor, I started using the standard Quill 2.0, I then progressed to the 2.3 and now have a 2.35 version. Both the 2.3 and the 2.35 are Turbo versions. I think with Turbo and Qtype added, you cannot go far wrong. I found Quill fairly easy to use from the start and think it is the ideal word processor for a new user of the QL. It is also easy to add the printer codes.

A short time ago I upgraded most of my hardware. I now have 'Trump Card' plus twin NEC drives and the new Star LC10. With the added memory and disc drives, I really expect something good from the LC10 printer. Time will tell.

At the moment, if I have any spare time. I am trying to get to grips with *Desktop Publisher Extra*, which I am sure will be the program to use on the LC10. As I run the Club QL and we are hoping to issue our own newsletter in the near future, I think DTPE will be of great value.

W. G. Johns

THE

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Program of the month

THE BUSINESS GAME by DAVID SMITH

The Business Program is a business simulator for any number of players, human or computer. When playing, each player has control of a small company in direct competition with everyone else, as everyone makes the same goods. To win you must find the most profitable combination of quantity of manufacture, selling price and advertising. The winner is obviously the one who makes most money by the end of the game.

At the start you will be asked how many are to play — do not forget to include any computer players; how many turns the game will last — start with a six-month game to get the feel of it; the computer skill level — start at two and work up slowly; and, finally, the names of all the players. To signify a computer player, start its name with the letters "QL".

Now the game starts. Each player in turn will be presented with two sets of information. The first screen is general information, which everyone receives. It tells you the state of the entire market and from that such things as average advertising and average prices can be calculated. Also future market trends will be given.

Note that the information you receive is for the previous month, so the short-term forecast concerns the turn you are about to play and the long-term forecast is about the one after.

At any time in your attempt you can call up relevant help by pressing "h", even when inputting numbers.

After pressing any key, make sure that no-one else can see the information displayed. That is the information about how your company fared in the previous month and therefore contains sensitive information. Do not worry too much about stock remaining — you can always sell it later.

There are certain rules governing what you can input. The amount made can vary by only up to five units either way over the previous month. That is why forecasts are so important; it is very easy to find yourself struggling as you are either under- or over-producing. When thinking about what you will make, concentrate on potential sales rather than total sales, as that is what tells you your market share.

Your selling price cannot increase by more than £70; it can fall by any amount. Advertising expenditure can be increased only by up to £30; again it can be reduced by any amount but you would be foolish to do so. When calculating your selling price, each unit costs £60 to make and your overheads equal £300, plus your advertising expenditure — under non-production costs.

One final piece of advice; it can be more profitable to accept fewer sales at a higher selling price than to try con-

stantly to undercut your competitors but this depends heavily on market conditions.

Program notes

The heart of the game is the procedure called CALC which is what works out how each company fares each month. I chose the current system of calculating two different market shares and then adding them in different proportions to determine the final potential sales.

The computer decides before the game starts how many people will be prepared to buy — array PPTB — the goods each month and then works from these. First, it divides the market in proportion to advertising expenditure.

It then allocates each player an equal share and adds to or subtracts from that an answer from an inverse x cubed graph with the average price at the origin, with the player's price providing the input.

These two calculations are then added in a ratio dependent on the variable 'tuning'. This variable can be altered while the game is running by pressing CTRL-SHIFT-A on the general data screen; the higher the decimal, the greater the significance of advertising.

When I was writing the program I was also experimenting with QLAN and the possibili-

ties of multi-player, multi-computer games. Therefore the program will detect automatically any QLs or ZX Spectrums with Interface Ones running the correct software on the net and tie into the main game any players on those machines.

That has the advantage of making confidential company information much more secure and also it is great fun.

When running the slave program(s) — one QL has the Master program, i.e., the one listed, and all other computers have Slave programs — make sure that they are displaying the 'Logging on' message before the last person on the Master has input his name.

Slave

The QL Slave is a modification of the Master; alterations necessary are listed. Do not panic — it is not so much work as it looks. For the Spectrum Slave send me a cartridge or tape — you need an Interface One or compatible — and I will give you a copy. I have read reports that early QLs could not network properly, hence there is no charge for the Spectrum Slave except for postage costs. I use a JS machine and have had no problems. All I can say is try it and see; if it works you will discover a new aspect of you QL.

```

100 tuning=3/8
110 REMARK
120 REMARK
130 REMARK
140 REMARK THE BUSINESS PROG
RAM
150 REMARK FOR THE SINCLAIR
QL
160 REMARK AND SINCLAIR ZX SPE
CTRUM
170 REMARK OVER THE EX NE
T
180 REMARK AND QLAN
190 REMARK DAVID SMITH 1
987
200 REMARK
210 REMARK
220 PAPER 0:WINDOW 512,256,0,0
:CLS
230 BEEP 2000,20,1,1,1,1,1,1
240 WINDOW £2,224,200,32,16
250 WINDOW £1,224,200,258,16
260 WINDOW £0,450,36,32,216
270 OPEN £15,con_224x108a32x10
8_128
280 PAPER £15,7:INK £15,0:PAPE
R £2,7:INK £2,0
290 MODE 4
300 FOR N=0 TO 2:BORDER £N,2,7
,0
310 Repeat GAME_LOOP
320 INSTRUCT
330 INITIATE
340 CLS£2
350 PLAY_GAME
360 DEFINE PROCEDURE INITIATE
370 CLS:CLS£2
380 PRINT £2,"Please tell me
how many players there wi
ll be. (2 or more.):":inp 2,3,0
,nopl
390 IF nop1<2 THEN GO TO 370
400 AT £2,4,0:PRINT £2,"Each
turn represents one month. Ho
w many turns shall we play?":
AT £2,6,0:PRINT FILL$(' ',36)
:inp 2,6,0,months

flp1_BUSINESS 1961 Jul 14 22:5
9:56 Fri

410 IF months < 1 THEN GO TO
400
420 AT £2,7,0:PRINT £2,"Plea
se tell me how hard you want
me to play.(set my skill level
1-20)":AT £2,9,0:PRINT £2,FILL
$( ' ',36):inp 2,9,0,DIFF_LEVEL
:ASDF=0
430 IF DIFF_LEVEL < 1 THEN G
O TO 420
440 DIM PNUMS(nopl,27):PRIN
T £2,"Please tell me your name
s. Enter 'QL' as the name
first characters of the name
if you want me to play."
450 FOR N=1 TO nop1
460 INPUT £2,PNUMS(N)
470 END FOR N
480 GET
490 COL_NAMES:DIM ACCOUNT(no
p1,10),MONTH_DATA(5),PPTB(mon
th),ADVERT(months*6)
500 FOR ADPOINT=0 TO 5:ADVER
T(ADPOINT)=RND(50 TO 100)*nop1
510 ADPOINT=6
520 ADVERT(6)=50*nopl
530 FOR N=1 TO nop1
540 RESTORE 580:FOR M=1 TO
10
550 READ ACCOUNT(N,M)
560 END FOR M
570 END FOR N
580 DATA 20,20,0,120,20,2400
,1200,350,850,850
590 RESTORE 630
600 FOR N=1 TO 5
610 READ MONTH_DATA(N)
620 END FOR N
630 DATA 20*nopl,20*nopl,0,n
opl*2400,50*nopl
640 PPTB(0)=20*nopl
650 FOR N=1 TO months
660 PPTB(N)=PPTB(N-1)+RND(
-(nop1*4) TO (nop1*4))+RND(nop
1*2)
670 END FOR N
680 SEND_THE_DATA

flp1_BUSINESS 1961 Jul 14 23:0
1:12 Fri

690 END DEFINE INITIATE
700 DEFINE PROCEDURE PLAY_GAME
710 FOR MONTH_NO=1 TO months
720 FOR N=1 TO nop1:IF PNUM
S(N,1 TO 4)=="EXT." THEN BRODC
ST:END IF :END FOR N
730 FOR PNUM=1 TO nop1
740 IF PNUMS(PNUM,1 TO 2)
=="QL" THEN CLS: AT 0,0:PRINT P
NUMS(PNUM)!"IS":"THINKING..."
:QL_PLAY:GO TO 790
750 IF PNUMS(PNUM,1 TO 4)
=="EXT." THEN CLS:PRINT 'ACCES
SING'!PNUMS(PNUM):OTHER_PLAY:
GO TO 790
760 DISPLAY
770 INPUT_DATA
780 PRINT £0:"PRESS ANY
KEY":A=KEYROW(1):PAUSE:CLS£0:C
LS
790 END FOR PNUM
800 CALC
810 END FOR MONTH_NO
820 MONTH_NO=MONTH_NO+1
830 FOR PNUM=1 TO nop1
840 IF NOT (PNUMS(PNUM,1 TO
2)=="q1" OR PNUMS(PNUM,1 TO
4)=="EXT.") THEN DISPLAY:PRINT
£0:"Press any key":A=KEYROW(0
):PAUSE:CLS£0
850 NEXT PNUM
860 THE_END
870 END DEFINE
880 DEFINE PROCEDURE CALC
890 CLS
900 ADPOINT=ADPOINT+1
910 AT 9,9
920 PRINT "PLEASE WAIT"
930 TOTAD=0
940 FOR N=1 TO nop1
950 TOTAD=TOTAD+ACCOUNT(N,
8)-300
960 END FOR N:AVAD=TOTAD/nop
1
970 TOTPR=0
980 FOR N=1 TO nop1
1340 MONTH_DATA(4)=MONTH_D
ATA(4)+ACCOUNT(N,2)*ACCOUNT(N,
4)
1350 MONTH_DATA(5)=MONTH_D
ATA(5)+ACCOUNT(N,8)-300
1360 END FOR N
1370 ADVERT(ADPOINT)=MONTH_D
ATA(5)
1380 MONTH_DATA(2)=PPTB(MONTH
_NO)
1390 FOR N=1 TO nop1
1400 ACCOUNT(N,6)=ACCOUNT(
N,2)*ACCOUNT(N,4)
1410 ACCOUNT(N,7)=60*ACCOU
NT(N,5)
1420 COSTS=ACCOUNT(N,8)+AC
COUNT(N,7)
1430 SALES=ACCOUNT(N,6)
1440 ACCOUNT(N,9)=SALES-CO
STS
1450 ACCOUNT(N,10)=ACCOUNT
(N,10)-SALES-COSTS
1460 END FOR N
1470 CLS
1480 END DEFINE CALC
1490 DEFINE PROCEDURE DISPLAY
1500 CLS
1510 AT 0,14:PRINT "MONTH:";
MONTH_NO-1
1520 Z=LEN (PNUMS(PNUM))
1530 Z=Z/2:AT 1,14-Z:PRINT "
PLAYER:";PNUMS(PNUM):RESTORE
1540 AT 3,0:PRINT '
PREVIOUS MONTH'
1550 FOR N=1 TO 5
1560 READ A$:AT N*2+2,20-L
EN (A$)

flp1_BUSINESS 1961 Jul 14 23:0
4:59 Fri

1570 PRINT A$
1580 AT N*2+2,30-LEN(MONTH
_DATA(N))
1590 PRINT MONTH_DATA(N)
1600 END FOR N
1610 DATA 'TOTAL SALES','POT
ENTIAL SALES','STOCK LEFT','PR
ICE OF SALES ','ADVERTISEMEN
T S '
1620 AT 13,0
1630 IF MONTH_NO>months THEN
GO TO 1680
1640 PRINT "SHORT TERM:";mon
per$( PPTB(MONTH_NO-1),PPTB(MO
NTH_NO))
1650 IF MONTH_NO<months THEN
PRINT "LONG TERM:";monper$( P
PTB(MONTH_NO),PPTB(MONTH_NO+1
))
1660 IF MONTH_NO=months THEN
PRINT "LONG TERM:NO FORECAST
AVAILABLE"
1670 PRINT under_cut$(PNUM)
1680 CLS £0:PRINT£0,MID$( "PR
ESS ANY KEY TO CONTINUE OR 'H'
FOR HELP."):A=KEYROW(0):A$=IN
KEY$( -1 ):CLS £0
1690 IF A$=="!" THEN INPUT £0
:TUNING FOR ADS ? (DECIMAL,NO
T FRACTION)":tuning:CLS£0
1700 IF A$=="H" THEN help1
1710 FOR X=2 TO 18:AT X,0:PR
INT FILL$( " ',36):BEEP 10,X:EN
D FOR X
1720 AT 0,20:PRINT MONTH_NO
1730 RESTORE 1780
1740 FOR N=1 TO 10
1750 READ A$
1760 AT N+5,23-LEN (A$):PR
INT A$:AT N+5,30-LEN(ACCOUNT(P
NUM,N)):PRINT ACCOUNT(PNUM,N)
1770 END FOR N
1780 DATA 'POTENTIAL SALES',
'TOTAL SALES','STOCK LEFT','PR
ODUCT PRICE ','AMOUNT PRODUCE
D','INCOME ','PRODUCTION COST
S ','NON-PRODUCTION COSTS ','
PROFIT ','AMOUNT IN THE ACCO
UNT '
1790 CLS £0:PRINT £0,MID$( "Pr
ess any key,or 'H' for help."
):A$=INKEY$( -1 ):CLS £0:CSIZE £
0,0,0:IF A$=="H" THEN help2
1800 END DEFINE DISPLAY
1810 DEFINE PROCEDURE THE_END
1820 CLS
1830 AT 1,11:PRINT "THE END"
1840 PRINT
1850 DIM POS$(nop1,40)
1860 HIPL=1:HI=- (10*600)
1870 FOR N=1 TO nop1
1880 PRINT N:'.':
1890 FOR M=1 TO nop1
1900 IF ACCOUNT(M,10)>HI
THEN HI=ACCOUNT(M,10):HIPL=M
1910 END FOR M
1920 POS$(N)=PNUMS(HIPL)&
" WITH "&ACCOUNT(HIPL,10)
1930 PRINT !PNUMS(HIPL)!"
WITH"! "&ACCOUNT(HIPL,10):ACC
OUNT(HIPL,10)=- (10*600):HI=- (1
0*600)
1940 END FOR N
1950 EXPORT
1960 INPUT £0,"ANOTHER GAME
? (Y/N)":!AN$
1970 IF AN$=="N" THEN STOP:EL
SE RUN
1980 END DEFINE THE_END
1990 DEFINE PROCEDURE BRODCAST
2000 STN=PNUMS(N,5 TO)
2010 OPEN £4,'NETO_'&STN
2020 FOR X=1 TO 5:SEND MONTH
_DATA(X),STN
2030 SEND PPTB(MONTH_NO),STN
:SEND nop1,STN
2040 X=PLPERST(STN,3)
2050 POS='\ 'INSTR PNUMS(N)+
1:X=X+(PNUMS(N,POS TO)-1)
2060 FOR Z=1 TO 10:SEND ACCO
UNT(X,Z),STN
2070 SEND monper$(PPTB(MONTH
_NO-1),PPTB(MONTH_NO)),STN
2080 IF MONTH_NO=months THEN
SEND "NO FORECAST".STN:ELSE S
END monper$(PPTB(MONTH_NO),PPT
B(MONTH_NO+1)),STN

flp1_BUSINESS 1961 Jul 14 23:0
7:42 Fri

2090 CLOSE £4
2100 END DEFINE BRODCAST
2110 DEFINE PROCEDURE SEND (XY
Z$,ABC)
2120 IF PLPERST(ABC,2)=2 THE
N PRINT £4:XYZ$:CHR$(13):ELSE
PRINT £4:XYZ$
2130 END DEFINE SEND
2140 DEFINE PROCEDURE OTHER_PL
AY
2150 STN=PNUMS(PNUM,5 TO)
2160 OPEN £4,'NETI_'&STN
2170 POS='\ 'INSTR PNUMS(PNU
M)+1:POS=PNUMS(PNUM,POS TO)
2180 AC=PLPERST(STN,3)+POS-1
2190 INPUT £4,ACCOUNT(AC,5)
2200 INPUT £4,ACCOUNT(AC,4)
2210 INPUT £4,ACCOUNT(AC,8)
2220 CLOSE £4
2230 END DEFINE OTHER_PLAY
2240 DEFINE FuNction monper$(
MON1,MON2)
2250 LOCAL A,B
2260 A=MON1/MON2*100
2270 B=100-A=B-INT(B+.5)
2280 A$="SALES WILL"
2290 IF B>0 THEN A$=A$&" IN
CREASE ":ELSE A$=A$&" DECREASE
"
2300 A$=A$&"BY UP TO "&ABS(B
)&"%"
2310 RETURN A$:END DEFINE monp
er
2320 DEFINE FuNction XPOFY(X,Y
)
2330 A=Y*X/100
2340 B=INT (A+.5):RETURN B
2350 END DEFINE XPOFY
2360 DEFINE FuNction FXOFY (X,
Y)
2370 A=X/Y*100
2380 B=INT(A+.5)
2390 RETURN B
2400 END DEFINE FXOFY
2410 DEFINE PROCEDURE QL_PLAY
2420 DIM PHO(nopl,3)
2430 HIGHPROF=- (10*50)

flp1_BUSINESS 1961 Jul 14 23:0
8:56 Fri

2440 FOR N=1 TO nop1
2450 IF RND <.5 THEN PHO(N
,1)=TREND:ELSE PHO(N,1)=NON_TR
END
2460 PHO(N,2)=(MONTH_DATA(
4)/MONTH_DATA(1))-RND(-10 TO 1
0)
2470 END FOR N
2480 FOR Nmbb=1 TO DIFF_LEVE
L
2490 PRICE=(MONTH_DATA(4)-
(ACCOUNT(PNUM,2)*ACCOUNT(PNUM,
4)))/(MONTH_DATA(1)-ACCOUNT(PN
UM,2))
2500 PRICE=PRICE+RND(-10 T
O 10)

```

```

2510 IF RND<.5 THEN ADS=TR
END:ELSE ADS=NON_TREND
2520 IF ADS=(ACCOUNT(PNUM,
8)-300)>30 THEN ADS=ACCOUNT(PN
UM,8)+30-300
2530 PHO(nopl,1)=ADS
2540 PHO(nopl,2)=PRICE
2550 PHOCALC
2560 CHANGE=PHO(nopl,3)-AC
COUNT(PNUM,3)-ACCOUNT(PNUM,5)
2570 IF CHANGE<-5 THEN CHA
NGE=-5
2580 IF CHANGE>5 THEN CHAN
GE=5
2590 COSTS=(ACCOUNT(PNUM,5
)-CHANGE)*60+ADS+300
2600 INCOME=(ACCOUNT(PNUM,
5)+CHANGE)*PRICE
2610 PROFIT=INCOME-COSTS
2620 IF PROFIT>HIGHPROF TH
EN
2630 DIM STO(3)
2640 STO(1)=ADS:STO(2)=P
RICE
2650 STO(3)=ACCOUNT(PNUM
,5)+CHANGE
2660 END IF
2670 END FOR Nmbb
2680 ACCOUNT(PNUM,5)=INT(STO
(3)+.5)
2690 ACCOUNT(PNUM,8)=INT(STO
(1)+300+.5)

f1p1_BUSINESS 1961 Jul 14 23:1
0:12 Fri

2700 ACCOUNT(PNUM,4)=INT(STO
(2)+.5)
2710 END DEFINE QL_PLAY
2720 DEFINE FUNCTION NON_TREND
2730 HI=0:LO=10^100
2740 FOR I=1 TO nopl
2750 IF I=PNUM THEN NEXT I
2760 IF ACCOUNT(I,8)-300 <
LO THEN LO=ACCOUNT(I,8)-300
2770 IF ACCOUNT(I,8)-300 >
HI THEN HI=ACCOUNT(I,8)-300
2780 END FOR I
2790 AS=(HI+LO)/2:bc=HI-AS:A
S=HI-(bc/DIFF_LEVEL)
2800 RETURN RND(AS TO HI)+RN
D(50)
2810 END DEFINE NON_TREND
2820 :
2830 DEFINE FUNCTION TREND
2840 TOT=0
2850 FOR I=1 TO ADPOINT
2860 TOT=TOT+ADVERT(I)
2870 END FOR I
2880 I=TOT/ADPOINT/nopl+RND(
50)
2890 IF I<0 THEN I=RND(50 TO
150)
2900 RETURN I
2910 END DEFINE TREND
2920 :
2930 DEFINE PROCEDURE PHOCALC
2940 LOCAL N:TOTAD=0:TOTPR=0
2950 FOR N=1 TO nopl
2960 TOTAD=TOTAD+PHO(N,1):
TOTPR=TOTPR+PHO(N,2)
2970 END FOR N
2980 FOR N=1 TO nopl
2990 p1=(PPTB(MONTH_NO)/no
p1)*PHO(N,1)/TOTAD*nopl
3000 p2=(PPTB(MONTH_NO)/no
p1)+(PPTB(MONTH_NO)/nopl*((-
PHO(N,2)-(TOTPR/nopl))^3)/5400
0))
3010 PHO(N,3)=(p1*tuning)+
(p2*(1-tuning))

```

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f1p1_BUSINESS 1961 Jul 14 23:1
1:25 Fri

3020 END FOR N
3030 END DEFINE PHOCALC
3040 DEFINE PROCEDURE GET
3050 DIM PLPERST(63,3):REMARK
NOPL,TYPE,BASE
3060 STN=2
3070 OPEN #4,NETI_1
3080 REPEAT LOOP
3090 IF EOF(#4) THEN EXIT
LOOP
3100 NS=INKEY$(#4)
3110 IF NS=' ' THEN EXIT LO
OP
3120 DUM=#$ INSTR 'QS':D
UM=DUM-1
3130 IF DUM=0 THEN EXIT LO
OP
3140 OPEN #5,NETO_1
3150 IF DUM=2 THEN PRINT #
5,STN:CHR$(13):months:CHR$(13)
:ELSE PRINT #5,STN:PRINT #5,m
onths

```

```

3160 CLOSE #5
3170 OPEN #5,'NETI_'&STN
3180 INPUT #5,PLPERST(STN,
1):PLPERST(STN,2)=DUM
3190 CLOSE #5
3200 STN=STN-1
3210 IF STN=64 THEN EXIT L
OOP
3220 END REPEAT LOOP
3230 CLOSE #4
3240 END DEFINE GET
3250 DEFINE PROCEDURE COL_NAME
S
3260 DIM DUM$(nopl,36)
3270 FOR NHY=1 TO nopl:DUM$(
NHY)=PNAMES(NHY)
3280 COUNT=0:FOR N=2 TO 63:C
OUNT=COUNT+PLPERST(N,1)
3290 DIM PNAMES(nopl-COUNT,3
6)
3300 FOR N=1 TO nopl:PNAMES
(N)=DUM$(N)
3310 N=N-1
3320 FOR Q=2 TO 63
3330 IF PLPERST(Q,1)=0 THE
N EXIT Q

```

```

f1p1_BUSINESS 1961 Jul 14 23:1
2:41 Fri

3340 OPEN #5,'NETI_'&Q
3350 FOR W=1 TO PLPERST(Q,
1)
3360 INPUT #5,NAM$
3370 FOR QAZ=LEN(NAM$) T
O 2 STEP -1:IF NAM$(QAZ)=' ' T
HEN NAM$=NAM$(1 TO QAZ):ELSE E
XIT QAZ:END IF :END FOR QAZ
3380 PNAMES(N)='EXT.'&Q$
'\&W$' '&NAM$
3390 N=N-1
3400 END FOR W
3410 END FOR Q
3420 PLPERST(2,3)=nopl-1
3430 FOR Q=3 TO 63
3440 IF PLPERST(Q,1)>0 THE
N PLPERST(Q,3)=PLPERST(Q-1,1)+
PLPERST(Q-1,3)
3450 END FOR Q
3460 nopl=nopl-COUNT
3470 END DEFINE
3480 DEFINE PROCEDURE EXPORT
3490 LOCAL N
3500 FOR N=2 TO 63
3510 IF PLPERST(N,1)=0 THE
N EXIT N
3520 OPEN #4,'NETO_'&N
3530 FOR Q=1 TO nopl:SEND
POSS(Q),N
3540 CLOSE #4
3550 END FOR N
3560 END DEFINE
3570 DEFINE PROCEDURE inp (cha
n,X,Y,variable)
3580 LOCAL A$,B$
3590 B$='':AT #chan,X,Y:PRIN
T #chan,'_'
3600 REPEAT LOOP
3610 A$=INKEY$(-1)
3620 mkl=CODE(A$)
3630 SELECT ON mkl
3640 =10:IF B$<>' ' THEN
EXIT LOOP
3650 =194:IF B$<' ' THEN
B$=B$(1 TO LEN(B$)-1)
3660 =48 TO 57:IF LEN(B
$)<10 THEN B$=B$&A$
3670 =72,104:IF X MOD #=
0 THEN help2

```

```

f1p1_BUSINESS 1961 Jul 14 23:1
3:58 Fri

3680 END SELECT
3690 AT #chan,X,Y
3700 PRINT #chan,B$:'_'
3710 END REPEAT LOOP
3720 variable=B$
3730 AT #chan,X,Y:PRINT #cha
n,B$:' '
3740 END DEFINE
3750 DEFINE PROCEDURE INP$(cha
n,X,Y,LENGTH,VAR$)
3760 LOCAL A$,B$
3770 B$='':AT #chan,X,Y:PRIN
T #chan,'_'
3780 REPEAT LOOP
3790 A$=INKEY$(-1)
3800 mkl=CODE(A$)
3810 SELECT ON mkl
3820 =10:IF B$<>' ' THEN
EXIT LOOP
3830 =194:IF B$<' ' THEN
B$=B$(1 TO LEN(B$)-1)
3840 =REMAINDER :IF LEN(
B$)<LENGTH THEN B$=B$&A$

```

```

3850 END SELECT
3860 AT #chan,X,Y
3870 PRINT #chan,B$:'_'
3880 END REPEAT LOOP
3890 VAR=B$
3900 AT#chan,X,Y:PRINT #chan
,B$:' '
3910 END DEFINE
3920 DEFINE PROCEDURE SEND_THE
_DATA
3930 POINTER=2
3940 REPEAT LOOP
3950 IF PLPERST(POINTER,1)
=0 OR POINTER>63 THEN EXIT LOO
P
3960 OPEN #4,"NETO_"&POINT
ER
3970 FOR N=0 TO months:SEN
D PPTB(N),POINTER
3980 FOR N=0 TO months-6:S
END ADVERT(N),POINTER
3990 POINTER=POINTER+1
4000 CLOSE #4
4010 END REPEAT LOOP
4020 END DEFINE

```

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f1p1_BUSINESS 1961 Jul 14 23:1
5:14 Fri

4030 DEFINE PROCEDURE INSTRUCT
4040 INPUT #0,'Instructions
?(Y/N) >':ANS:ANS=ANS&'N':CLS
#0:IF AN$(1)='n' THEN RETURN
4050 DATA ' The Busi
ness Game
4060 DATA ''
4070 DATA ''
4080 DATA 'This game puts yo
u in charge of a,'young compa
ny in direct combat with','man
y other companies vying for the
e','same customers.As in real
business,','the secret of succ
ess is to make ','your product
more attractive to the','cust
omer than every
one else's.This ','is achieved
by controlling your ','pricin
g and advertisement ','expendi
ture successfully.',''
4090 DATA ' Unfortunately yo
u cannot rely on ','ads alone,b
ut you need to price your ','pr
oduct aggressively.','',' You
will first be given data about
','the previous month.From thi
s such','things as average pri
ce can be ','deduced.Then you
will be given v
our ','own personal data.Follow
the prompts','',' Monthly pro
duction of units can ','only b
e varied by up to 5; price ','i
ncreases have a limit of '70;
','increases in advertisement'
','expenditure have a limit of
'30.','',' As regards to the c
omputer's skill
','level,the higher it is,the
longer it','will think,so if y
ou want a quick','game or are
playing a lot of','computer pl
ayers,keep it under 5.'
4100 DATA '999'
4110 RESTORE 4030:REPEAT LOC
P

```

```

f1p1_BUSINESS 1961 Jul 14 23:1
6:36 Fri

4120 AT 18,0:READ A$:IF A$
='999' THEN EXIT LOOP:ELSE PRI
NT A$
4130 FOR N=1 TO 10:SCROLL
-1:PAUSE 2
4140 END REPEAT LOOP
4150 AT #0,1,29:PRINT #0,"Pres
s any key.":PAUSE:CSIZE #0,0,0
:CLS #0
4160 FOR N=1 TO 55:SCROLL -4
4170 END DEFINE
4180 DEFINE PROCEDURE help1
4190 CLS #2
4200 PRINT #2,
" This screen shows data
about ALL the players. From
this screen,many facts can be
deduced. For example:- 1:The
average price per unit is the
PRICE OF SALES divided by th
e
TOTAL SALES.
2:T
he average advertisement expen
di-
ture is the ADVERTISEMENT
S divided by the number of p
layers.
The shor
t term forecast tells you how
the possible sales will vary

```

this month, and the long te
rm fore-cast in
dicates how the sales will be
the following month.
It is important to reme
mber that all the informatio
n that you see now is about ALL
the players and not just y
ou."
4210 CLS #0:PRINT #0:MID\$(P
ress any key.."):A=KEYROW(0):P
AUSE:CLS #0
4220 CLS #2:END DEFINE
4230 DEFINE PROCEDURE help2
4240 LOCAL A\$,B\$
4250 BORDER #15,2,255:CLS #1
5
4260 DATA
" This screen supplies th
e data pers-onal to your compa
ny and no-one else should see i
t.
You w
ill be asked to input how many
units you will make. This figu
re has got to be no more than 5
different to

f1p1_BUSINESS 1961 Jul 14 23:1
8:06 Fri

the figure labelled AMOUNT
PRODUCED.
Next you will be ask
ed for how much you are going t
o sell each unit for.You can d
rop your price by any amount
but you have a maximum increas
e limit of '70 over the PRODU
CT PRICE. Final
ly you will be asked for the
advertising expenditure. This
can be more than '30 over the
e previous month.How much you
spent last month on ads can b
e found by taking '300 away f
rom NON-PRODUCTION COSTS.

Never fo
rget that each unit costs '60
to make and you have other v
er-heads which total '300 plus
your spending on adverts."
4270 RESTORE 4260
4280 CLS #0:
4290 READ A\$
4300 REPEAT hlop
4310 #0:IF LEN(A\$)<360 T
HEN B\$=A\$:#1:ELSE B\$=A\$(1 TO
360)
4320 PRINT #15:B\$
4330 PRINT #0,MID\$("Press
any key.."):PAUSE:CLS #0:CLS #
15
4340 IF #1=1 THEN EXIT hlop
4350 A\$=A\$(361 TO LEN(A\$))
4360 END REPEAT hlop
4370 BORDER #15,0,0:CLS #15:
BORDER #2,2,255
4380 CSIZE #0,0,0
4390 CLS #0:PRINT #0,MID\$(P
ress 'H' if you want help..")
4400 END DEFINE
4410 DEFINE FUNCTION under_cut
\$(qwert)
4420 LOCAL low
4430 low=ACCOUNT(qwert,4)

f1p1_BUSINESS 1961 Jul 14 23:1
9:20 Fri

4440 FOR QAZ=1 TO nopl
4450 IF ACCOUNT(QAZ,4)<low
THEN low=ACCOUNT(QAZ,4)
4460 END FOR QAZ
4470 IF low=ACCOUNT(qwert,
4) THEN RETURN ''
4480 low=ACCOUNT(qwert,4)-1
ow
4490 RETURN "You are under-c
ut at the shops by"&CHR\$(10)&"
"&low
4500 END DEFINE
4510 DEFINE FuNction MID\$(A\$)
4520 LOCAL A
4530 A=36-(LEN(A\$)/2)
4540 AT #0,1,A
4550 RETURN A\$
4560 END DEFINE
4570 DEFINE PROCEDURE CHK
4580 CLS:FOR N=1 TO nopl
4590 PRINT PNAMES(N)
4600 PRINT ACCOUNT(N,5),ACCOU
NT(N,4),ACCOUNT(N,8)-300
4610 NEXT N
4620 END DEFINE
4630 DEFINE PROCEDURE CHKALL
4640 FOR N=1 TO nopl
4650 CLS
4660 PRINT PNAMES(N)
4670 FOR M=1 TO 10

```

4680 PRINT ACCOUNT (N,M)
4690 NEXT M
4700 PAUSE
4710 NEXT N
4720 END DEFINE
4730 DEFINE PROCEDURE INPUT_DA
TA
4740 PRINT £0,MID$( "Press 'H
' if you want help..")
4750 CLS £2
4760 PRINT £2, "Amount Produc
ed":inp 2,0,16,AM
4770 IF ABS(AM-ACCOUNT(PNUM,
5))>5 THEN do_err "Please keep
your production figures withi
n 5 of last month.Press any ke
y.":GO TO 4750

```

```

flp1_BUSINESS 1961 Jul 14 23:2
0:34 Fr1

```

```

4780 IF AM<1 THEN zero:GO TO
4750
4790 AT £2,4,0:PRINT £2,"Pri
ce Of The Product ";FILL$( ' '
,13):inp 2,4,22,PR
4800 IF PR-ACCOUNT(PNUM,4)>7
0 THEN do_err "Please keep you
r price to within 70 of last
month. Press any key.":GO TO 4
790
4810 IF PR<1 THEN zero:GO TO
4790
4820 AT £2,8,0:PRINT £2,"Adv
ertisements ";FILL$( ' ',19):i
np 2,8,16,AD
4830 IF AD-ACCOUNT(PNUM,8)+3
00>30 THEN do_err "Please incr
ease your ads spending by no m
ore than 30. Press any key.":
GO TO 4820
4840 IF AD<0 THEN zero:GO TO
4820
4850 CLS £0:INPUT £0;"ARE THES
E FIGURES CORRECT (Y/N) >";ANS
:ANS=ANS&"Y":IF ANS(1)='N' TH
EN CLS £0:GO TO 4740
4860 ACCOUNT(PNUM,5)=AM
4870 ACCOUNT(PNUM,4)=PR
4880 ACCOUNT(PNUM,8)=AD-300
4890 CLS £2
4900 END DEFINE INPUT_DATA
4910 DEFINE PROCEDURE do_err (
qw$)
4920 CLS£0:PRINT £0,MID$(qw$
):PAUSE:CLS £0:PRINT£0, MID$( "
Press 'H' if you want help..")
4930 END DEFINE
4940 DEFINE PROCEDURE zero
4950 do_err "Please keep all
numbers above zero.Press any
key"
4960 END DEFINE

```

Modifications

The majority of the game is the same for both versions; the changes necessary are to remove the CALC procedure, as this is done by the Master, and to change the network output routines to input routines and vice versa. A new procedure has to be added so that the Slave can let the Master be aware of its presence.

How this works is that at the start all the Slaves are trying to send data to the Master. Obviously the Master can read from only one computer at a time, therefore one Slave at a

time is freed from sending data. The Master then sends a station number to the 'free' Slave and then sends preliminary details about the game. The Master then goes back to check for any more Slaves.

X HEAD.

One idea I have is to dispense with the Slave and write a new Master which can decide whether it should be the one Master on the net or run in a

Slave mode. The problem is getting the computer to decide whether it should be the Master, Slave or stand-alone system, depending on what it hears on the net.

Also in the pipeline is a much more powerful game with more intelligent computer players, the Laws Of Diminishing Returns, workforce control, selection of a specific market each with different characteristics, full menu/joystick control and graphs of anything you want.

My address if you want the Slaves or have suggestions is 144 Lache Lane, Chester CH4 7LX.

DELETE FOLLOWING FUNCTIONS AND PROCEDURES AND ANY CALLS TO THEM:-

CALC, EXPORT, THE_END, GET, COL NAMES, SEND THE DATA, BROADCAST, OTHER_PLAY, SEND, MONPER\$, XPOFY, FXOFY DELETE LINES 480 TO 680, 720, 750, 1690, 1640, 1650, 1660, 1670 400, 410 In QL_PLAY and PHOCALC replace the variable nopl by TNOPL.

Add these lines:-

```

355 END REPEAT GAME_LOOP
335 LOG_ON:SEND_NAMES:GET_DATA
715 GET_PREV_MONTH
800 TRANSMIT_DATA
860 THE_END
1640 PRINT "SHORT TERM:";ST$
1650 PRINT "LONG TERM:";LT$

```

RENUM THE PROGRAM

ADD THESE PROCEDURES :-

```

5000 DEFINE PROCEDURE log_on
5010 NET 1: OPEN #4,NETO_1
5020 PRINT #0;"LOGGING ON":
PRINT #4;"Q";
5030 CLOSE #4
5040 OPEN #4,NETI_1

```

```

5050 INPUT #4,STN:INPUT #4,
MONTHS:CLOSE #4
5060 NET STN:OPEN #4,NETO_1:
PRINT #4; NOPL: CLOSE #4
: CLS #0

```

```

5070 END DEFINE LOG_ON
5080 DEFINE PROC SEND_NAMES
5090 OPEN #4,NETO_1
5100 FOR N=1 TO NOPL
5110 PRINT #4,PNAME$(N)
5120 END FOR N
5130 CLOSE #4
5140 END DEFINE SEND_NAMES
5150 DEFINE PROCEDURE GET_DATA
5160 OPEN #4,NETI_1
5170 DIM ACCOUNT(NOPL,10),
MONTH_DATA(5),
PPTB(MONTHS),
ADVERT(MONTHS+6)

```

```

5180 FOR N=0 TO MONTHS:INPUT
#4,PPTB(N)
5190 FOR N=0 TO MONTHS+6:
INPUT #4,ADVERT(N)
5200 CLOSE #4
5210 END DEFINE GET_DATA
5220 DEF PROC TRANSMIT_DATA
5230 FOR N=1 TO NOPL
5240 OPEN #4,NETO_1
5250 PRINT #4,ACCOUNT(N,5)
5260 PRINT #4,ACCOUNT(N,4)
5270 PRINT #4,ACCOUNT(N,8)
5280 CLOSE #4
5290 END FOR N
5300 END DEFINE TRANSMIT_DATA

```

```

5310 DEF PROC GET_PREV_MONTH
5320 LOCAL N
5330 FOR N=1 TO NOPL
5340 OPEN #4,NETI_1
5350 FOR Q=1 TO 5:INPUT #4,
MONTH_DATA(Q)
5360 INPUT #4,PPTB:INPUT
#4,TNOPL
5370 FOR W=1 TO 10:INPUT
#4, ACCOUNT(N,W)
5380 INPUT #4,ST$:INPUT
#4,LT$
5390 CLOSE#4
5400 END FOR N
5410 END DEFINE GET_PREV_MONTH
5420 DEFINE PROCEDURE THE_END
5430 CLS
5440 AT 0, 13 :UNDER 1:PRINT
"THE RESULTS" : UNDER 0
5450 OPEN #4,NETI_1
5460 DIM POS$(TNOPL,36)
5470 FOR N=1 TO TNOPL
5480 INPUT #4,POS$(N)
5490 END FOR N
5500 CLOSE #4:PRINT \
5510 FOR N=1 TO TNOPL
5520 IF N<10 THEN PRINT
";";
PRINT N:" "; POS$(N)
5540 END FOR N
5550 INPUT #0;"ANOTHER GAME ?
(Y/N) >";ANS:IF ANS(1)='N'
THEN STOP
5560 RUN
5570 END DEFINE

```

QUANTA REPORT

Simon Goodwin
reports from
Birmingham

Miracle Systems QL hard disc had its first public showing at a crowded Quanta meeting in Birmingham. Scores of QL enthusiasts saw Tony Tebby demonstrate the prototype running his new drive-control software.

The drive is expected to sell for £399 when the software has been finished and optimised. At the time of the demonstration Tebby had the only working unit but production circuit boards were expected soon after.

The system is based round tried and tested hardware — a Western Digital filecard, often fitted in IBM PC systems. It uses an ST-506 interface, making it cheaper than CSTs SCSI drives, although slower.

The Miracles box contains an adapter to allow the PC card to interface with a QL system.

The hardware plugs into the QL cartridge port, the only suitable socket remaining once the machine is fully-expanded with the other large Miracle expansion product, the 768K Trump Card.

You do not have to use that expansion unit with the drive but the hard disc is really suitable only for an expanded QL, as it keeps a 30K file allocation table in memory at all times. A duplicate cartridge socket is mounted on the drive box, so you can still plug in ROMs like the CP/Mulator, Speedscreen or compiler dongles.

The formatted capacity is

15,997 sectors — almost 32 MB, as each sector is 2K long, rather than 512 bytes as on removable media. You need 45 720K floppy discs and a fair amount of time to back-up the contents of a full hard disc.

At the time of the demonstration the disc access code was incomplete but showed promise. The system could boot from hard disc but it could be disabled by putting a disc in floppy drive 1. Hard disc files could be loaded but not deleted and saving was not demonstrated.

A screen loaded from hard disc at roughly twice the speed of a floppy file but Tebby predicted that the maximum speed might be as much as five times that of a removable

disc once his code has been tweaked. Access time for small files should be better still.

Miracle hardware wizard Stuart Honeyball answered questions about the electronics. Other names among the throng included Dennis Briggs, Adman Services, Simon Goodwin, Creative Code-Works, John Wilk, PDQL and National Quanta secretary Phil Borman. Freddy Vachha of Digital Precision was expected to show his PC Emulator but did not appear.

The West Midlands QL group meets twice a month at the Holloway, a pub in the centre of Birmingham. It is one of many sub-groups of Quanta, The International QL User Group.



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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

- | | |
|--|--|
| <p>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.</p> <p>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. <i>QL User</i>, October 1985.</p> <p>4. GOLF by Shergold and Tose (B f2) £2
Up to 50 courses of varying difficulty with lakes, rivers, bunkers and trees. <i>QL User</i>, May, 1985.</p> <p>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.</p> <p>7. PACMAN by Steve Deary (B) £1
Almost 20 screens of varying difficulty including an invisible maze. <i>QL User</i>, March 1985.</p> <p>8. FAMILY TREE by Andy Carmichael (B) £3
Archive database for assembling and displaying large family trees. <i>Theory of Relativity</i>, <i>QL User</i>, July/August 1985.</p> <p>9. COMPOSER by James Lucy (L) £3
Completed in <i>QL User</i>, October 1985, this QLiberated program allows you to compose, play and edit music, including tempo, staccato, legato and sharps.</p> <p>17. CAD QL by Tony Quinn (S) £4
The QL is particularly suited to CAD. Includes rubber banding and user-definable symbols. <i>QL World</i>, September 1988.</p> <p>19. STARPORT 2001 by Karl Jeffrey (M + B) £3
Galaxian-style arcade game with fast m/c entry. <i>QL World</i>, November 1986.</p> <p>24. DESIGN 3D by J. F. Tydeman (S) £4
3D screen designs with the minimum of fuss. <i>QL World</i>, March/April 1987.</p> <p>25. STELLARIS by D. Carmona (B f1) £4
Real-time space adventure against the computer, including economic simulations, lunar landing and superb graphics. <i>QL World</i>, June 1987.</p> <p>29. BRIDGE by Peter Etheridge (B) £4
Excellent version including accurate bidding, automatic or manual card play, replay hands, save and load and more.</p> <p>32. ADVENT2 by Phillip Sproston (B) £4
Arcade adventure with humour: rooms, robots and problems to keep you on your toes.</p> <p>33. CLOCK by Leslie Fahidy (B f2) £3
On-screen clock to set or read the time. Education, <i>QL World</i>, June and July 1987; complete program.</p> <p>34. QL CONVERSION/CALCULATOR (f2) £2
Weights and measures, conventions and reverse Polish, converts anything to anything. Menu-driven, easy to use.</p> <p>35. QWHIST by John Wakefield (B) £3
You play south and the computer plays north against automatic east/west opponents. <i>QL World</i>, August 1987.</p> | <p>36. MAIL MERGE by Stanley Sykes (B f2) £1
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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.</p> <p>40. ROULETTE by Santiago Rubio (B) £3
Spanish/English version of the gambling game, including Leigh Pattern system to break the bank. <i>QL World</i>, September 1987.</p> <p>44. COMPRESS by David Marsh (B) £2
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A mastermind-style game played with coloured pages. You have 12 attempts at breaking the code against the clock. <i>QL World</i>, January 1988.</p> |
|--|--|

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62. DOMINOES by Adrian Steen (B f2) £2 A version of the classic English dominoes to play against the computer. <i>QL World</i> , May 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.
63. VICIOUS VIPER by Ian Humphreys (B) £3 A version of the snake game in Basic. "Simple, frustrating, addictive, playable." <i>QL World</i> , July 1988.	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." <i>QL World</i> , December 1988.
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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.	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 <i>QL World</i> April 1989.
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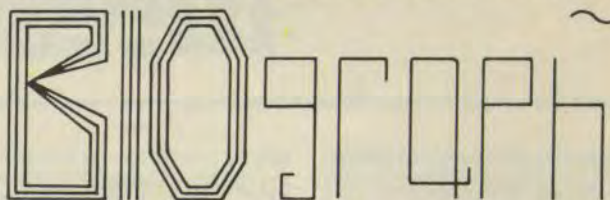
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Care Electronics	17
De Bondt Electronics	29
Digital Precision	4,5,6,7
EEC Ltd	50
Eidersoft	OBC
Emsoft Ltd	37
ImaQLate Software	50
Miracle Systems	14,15
PDQL	21,22,23
Quanta	13
Schön Products	IFC
Sector Software	32,33
Silica Shop	IBC
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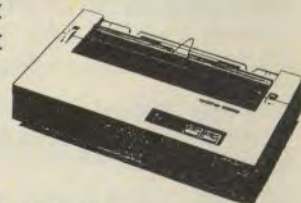


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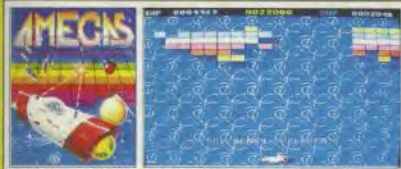
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