

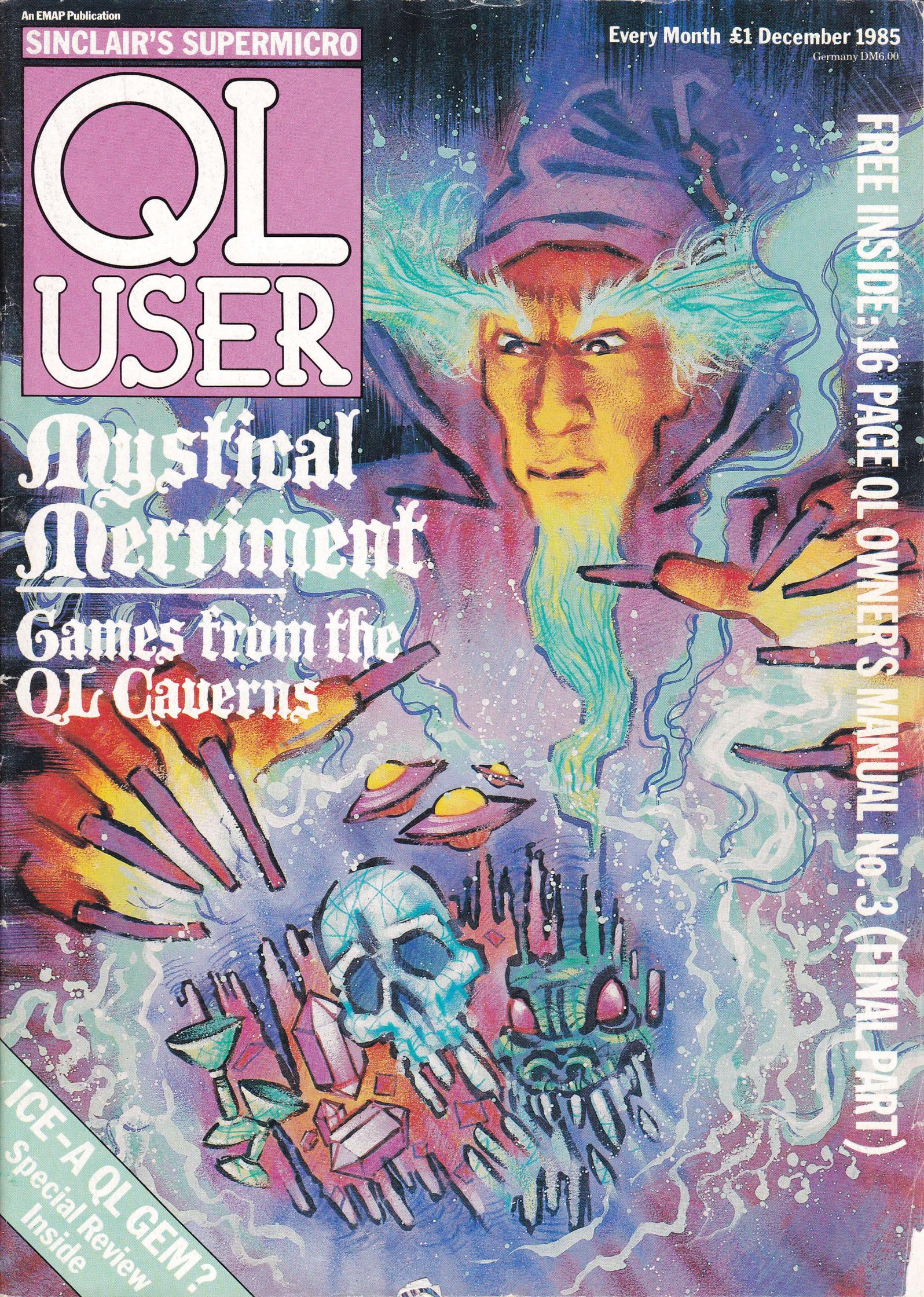
QL USER

Mystical Merriment

Games from the
QL Caverns

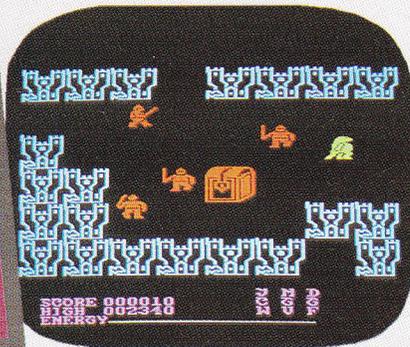
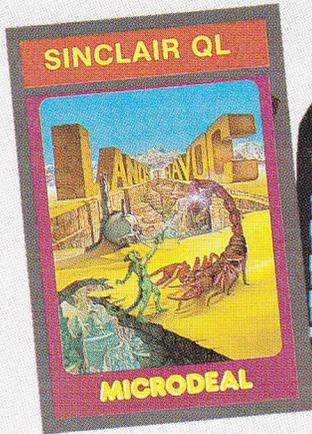
FREE INSIDE: 16 PAGE QL OWNER'S MANUAL No. 3 (FINAL PART)

ICE-A QL GEM?
Special Review
Inside



MICRODEAL QL

These Great games are available for your QL

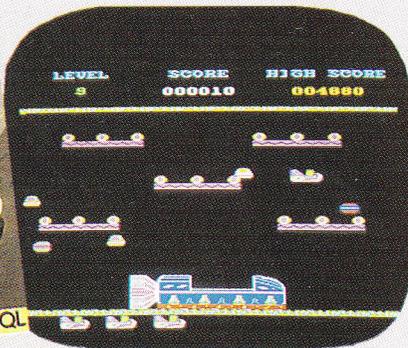
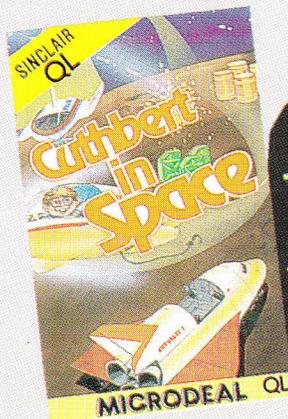
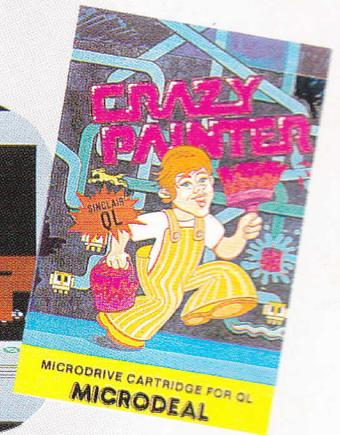


LANDS OF HAVOC A 2,000 plus screen Arcade Adventure described as the first MEGA GAME for the Q.L. Include 9 full colour maps... the book of change... excellent graphics and sound. The arcade style of this game makes it playable by young children and adults alike.

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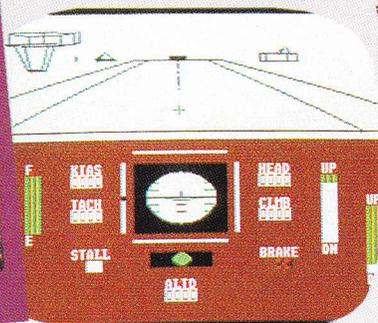
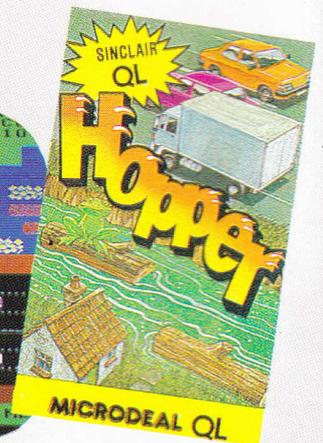
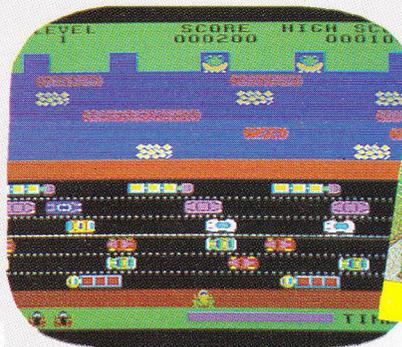


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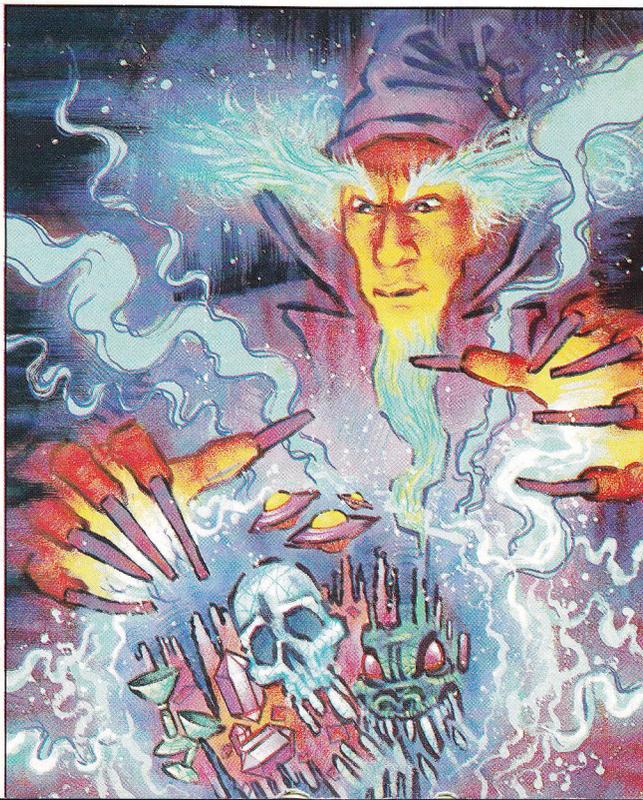
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FREE OWNER'S MANUAL — Vol 3 (between pages 32 & 33)
16 pages to supplement the official User Guide. The final volume covers: Archive,
Printer Settings, SuperBasic (3), Machine Code (2) & the Helpline.



OOPS!

PLEASE NOTE: October's article on program protection should be amended.

Listing 5:

```
435 IF rom_ver$(1 TO 2)
    ='JS' THEN LET
        rom_recog=1
520 LET mdv_one_
    number=PEEK_W
    (reserved_address
    +142)
560 LET mdv_two_
    number=PEEK_W
    (reserved_address
    +142)
```

Also three lines were omitted from the Spectrum-via RS232 listing. Just add:

```
10 CLEAR#:20
    FORMAT "b";9600:30
    OPEN#4,"b"
```

NEW

BJ THE RETURN

QL Caverns 2™

Solve the BJ mystery and win a Floppy Disk System + ICE full details within

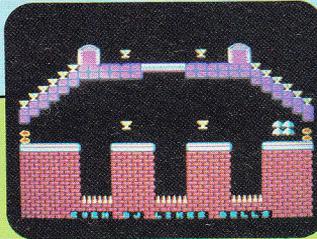
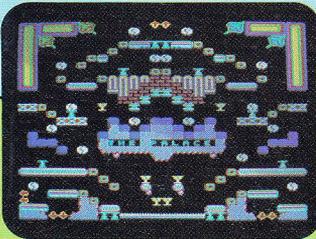
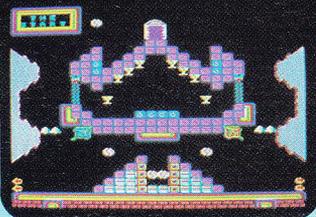
Drunx has died leaving BJ helpless in the caverns. Good Heavens Above!! Matilda the magic fairy has agreed to let BJ go providing he collects all the miracles from the caverns. A formidable task awaits you as you join BJ in this mega sequel to QL Caverns™

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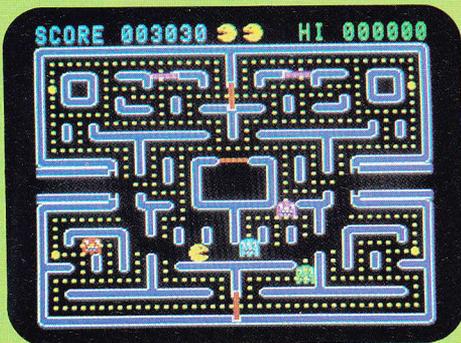


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NEW

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..... Postcode

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QL

SCENE

Glad Tidings

Christmas will doubtless be a time of rejoicing for the few games software houses that gambled on the QL. September's price cut has sent sales of machine through the ceiling and catches the big names in the industry on the hop.

Despite frantic efforts from the likes of Firebird and Ocean it looks as if none of the established (8-bit) software houses will make it into the market until the new year. Far too late to grab a slice of the action as games-starved users go to town on their annual Yuletide spree.

However, even if there won't be any newcomers Xmas still holds a few surprises. To begin

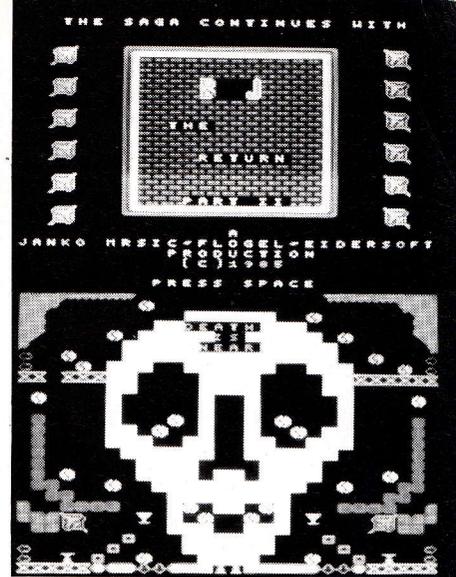
with Psion are set to release a new graphics package called QDRAW. This began life as an in-house programmer's aid and was used to design the sprites for their award winning 3D Chess game.

Then there's Eidersoft with two new entries to their credit - Ghost and BJ the Return. The former is a fairly standard Pacman type game. The latter is the sequel to QL Cavern and has its hero transmogrified into an aeroplane and on a suicide mission for the fairies. Eidersoft say the game uses very much more complex graphics and is twice as fast as its popular predecessor and has a spectacular ending. It is also very much harder to play. Indeed, they are offering £500 in computer equipment to the

first person to complete it.

From Sinclair we can look forward to Pawn, a humorous full-length text adventure with a little bit of AI thrown in. Also due for release are two more arcade games from the authors of Meteor Storm. JAB, short for Journey Around the Body casts you in the role of an antibiotic purging the body of deadly viruses and bacteria. Star Fight on the other hand is the QL's answer to Atari's Star Raiders.

Finally from Compugem, masters of the apocalyptic shoot-em-up extravaganza we can expect Destructor, a superfast and exceedingly difficult variation upon the arcade classic Defender and aimed at being a cut above Sinclair's *Meteor Storm*.



One Man Band

Are computer "whizz" kids merely a fabrication designed to sell home computers to aspiring mothers? If teenager Janko Mrcsic-Flogel is anything to go by, we think not. At 17 and studying for his 'A' levels, this young hungarian has authored more than half the best selling games on the QL. In under a year he has clocked up such titles as M-Cosmic, M-Treasure, M-Cruncher, M-Metropolis, QL Cavern and BJ the Return.

Janko, however, is not just a prodigious programmer but he is also a budding entrepreneur with his own company Paradox Software. Already contracted to write 68000 games for arcade machines, the company will be launching no less than six 'megagames' for the QL in the coming year.

When asked whether he would work on any other 68000 computers Janko expressed considerable interest in the Amiga but said of the Atari ST series "It's just old technology presented in a flash box. Not worth the effort." He should know!



"A MegaBasic extension to the QL from CST. All that's required now is the networking software". (See below.)

German Connection

It comes as something of a surprise to discover that a small German company is the first on the QL scene with a fully working mouse. Apparently ABC Elektronik of Bielefeld developed their mouse to complement their new Giga-Basic 'Toolkit'.

Giga-Basic adds over 70 new commands to SuperBasic in fields as diverse as Sprite Animation, Random Access, Multitasking, Icon Definition and creating your own mouse driven pull-down menus.

AB will also be releasing a zap-em-up game with the somewhat unassuming title of 'Fight' (see the review inside this issue).

Certainly, enough is happening on the QL scene to make any speculation about a QL mark II seem trivial. To begin with CST have now brought out a 40Mb Winchester disk system for the QL. The device includes two built-in floppy drives for backing-up and costs £3670. With a storage capacity equivalent to some 400 microdrives the system offers the ideal solution for those with six figure household accounts to contend with.

On a less esoteric level, the battle for the definitive expansion system continues unabated with prices plummeting all the while.

Interfaces have become ever more sophisticated. Sinclair's own badged product looks obsolete when compared with those offering RAM disk drives, parallel printer ports, integral toolkits and even GEM or UNIX like front ends for QDOS.

As for the floppy drives themselves, it seems that nothing less than 1 megabyte (unformatted) will do. This is just as well as lower capacities are no longer cost effective. Furthermore, it looks as though the new compact 3.5" drives have won out against their better established and reputedly more reliable 5.25" cousins. All we can look

forward to now are the latest Japanese third-height 'slimline' dual drives. With these it is the QL that dwarfs the drives and not the opposite.

If you are looking for a few stocking-fillers for Xmas the QL market has them in abundance. As a result of the overwhelming demand Transform Ltd are now producing ready made QL-to-Spectrum leads.

Spike Suppressors which prevent the QL from freezing up when there is a surge in the mains supply are available from Tony Firschman Services Ltd. Other goodies include flip-top dustcovers, numeric keypads, joysticks and mice.

ABSTRACTS

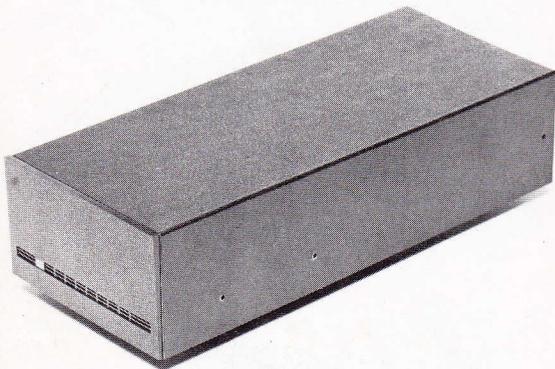
BY SILHOUETTE

Conceived by conjecture, designed by journalists and built by nobody, the new Sinclair 'Enigma' qualifies as the non-event of the month. Any QL peripherals' manufacturer can tell you that mice are fashionable, disk drives are reliable and extra memory is desirable. All three are available for the QL right now! So why fabricate a new machine?

MEDIC

- leaders in QL expansion
- introduce Winchester

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MEDIC – leaders in disk drives and expansion systems for the Sinclair QL – now introduce a Winchester hard disk which gives a full 5 MB of formatted text/data storage, enabling the QL to be used in major business applications.

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"Medic have set out to manufacture the definitive expansion system and have to a large extent succeeded." (QL User, August 1985).

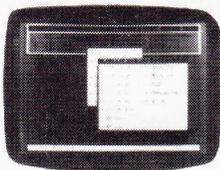
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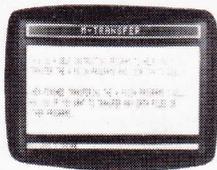
The system can be upgraded at any time to a maximum of 512K extra memory, modem, plus Winchester hard disk or up to four floppy disk drives.

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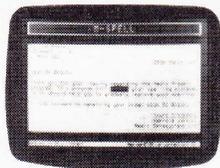
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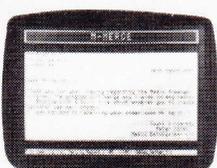
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M-DESK Macintosh-type single-key depression user interface, for instant program switching and utilities selection **M-BASE** turns Archive into a menu-driven database with single-key commands **M-ACCOUNTS** fully integrated sales, purchase, nominal ledgers, and stock control **M-KEY** single-key entry of user-defined text in any program **M-SPELL** spelling checker **M-MERGE** personalised mailshots **M-SQUEEZE** file compression **M-BOOT** sets up RAM disks in memory then automatically loads pre-defined files and programs **M-TRANSFER** microdrive – disk routine.

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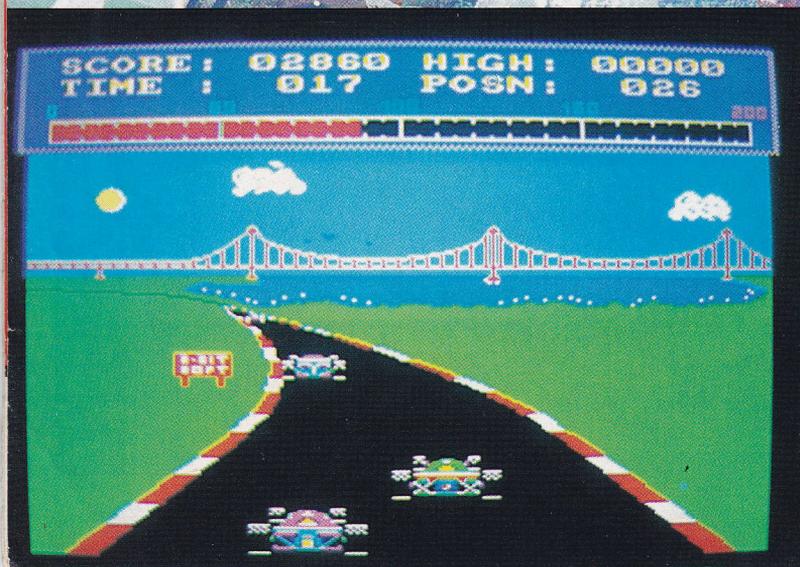
TELEPHONE (Area code) _____ (No.) _____
All sections must be completed, PLEASE USE BLOCK CAPITALS.



Mystical Merriment

The complete, unabridged and unexpurgated works of the QL games writing fraternity, dissected and discussed by our joystick journalist — Marcus Jeffery.

Split the QL market into hardware and software, filter out the business and utility programs and confine yourself to QL games and the word is you'll not be long at the joystick before despatching the very last alien into oblivion. The word, however, is *wrong!* Gathered here is a comprehensive selection of QL games, assessed for quality of graphics (G) and interest (I). This is the *QL User Christmas Games Survey*.





Hopper Microdeal

Hopper is a game lacking in the important squelch as mechanical drivers flatten yet another frog, hopping, skipping and jumping across the QL's impression of the M1 during the rush hour. I can't think why the frogs went across the road in the first place, maybe gathering hops or something. Even when you've navigated your way back through the destruction derby, there's still the river.

Though not perfectly rippleless, the graphics are fairly colourful. Hopper control is quite sensitive, and he certainly looks smug once he reaches his river bank lair.

On any other micro, this version of *Frogger* would probably flop, but as the QL games market goes, he might not sink too far below the surface. Fast though the traffic may get, I can't believe they're rushing to the shops to buy the game.

G: ●●●●●●
I: ●●●●●

Crazy Painter Microdeal

Decorating was never this much hassle (*Have you done any lately Marcus — Ed?!*) In crazy painter, you take the role of an animated paint brush beleaguered in your work of trying to paint the screen by an assortment of irritating individuals. Inmates from Battersea dogs home trek dirty paws, workmen take tea breaks, snakes slither trails, and even the computer space invader gets in on the act of mucking up your artistic efforts. You'll also need to be a dab hand with the scraper if you're going to keep the dripping paint on the canvas during the challenge stage.

This simple idea is curiously addictive. The graphics are by no means spectacular, but are nevertheless sufficient for the game and the action is fast and furious, ensuring that the game maintains its gloss for longer than you might expect.

G: ●●●●●●
I: ●●●●●●

Space Paranoids Shadow Games

"Press space to start blasting", and you're in another shoot 'em up scenario. Death, doom and destruction in space seem to be by far the most popular

form of computer entertainment, and this game gives you exactly that. The 40 different attack waves are merely variations on diagonal lines — aren't aliens stupid — but they certainly keep your lone space ship busy.

There are nine variations of alien, ranging through deadly berserkers, mutated frogs, and flying saucers to the deceiving live wires and spinning planks. The action is quite slow to begin with, but the aliens tend to get rather agitated as you wreak havoc amongst their ranks. With only one shot a time, even their simplistic attacks can be devastating, so you're unlikely to find time to criticise the mediocre sprite graphics — I'm sure those planks, which keep bashing me over the back of the interstellar drive, have it in for me.

G: ●●●●●
I: ●●●●●●

Star Guard & Galactic Invaders

Shadow Games

Ever since the original *Space Invaders* game, we humble earthlings have been decimating the descending alien hordes. Combining their strengths onto a single microdrive cartridge, they're now attacking in pairs. These aspiring bug-eyed monsters are unlikely to fare any better unless they intend to greatly improve their performance.

Galactic Invaders is the old original *Space Invader* game. I would go on to describe all the improvements which have been made to this game over the years, but I can't find any. With the possible exception that these are friendlier than the original bunch, and even rank amateur space pilots can expect to spend many seconds clearing the screens!

Star Guard on the other hand is completely different. It is far more difficult to control, shows the aliens getting larger as they approach, and is almost as boring.

G: ●●●●●
I: ●●

Cuthbert In Space Microdeal

Cuthbert doesn't sound the criminal type, but when in space, do as the aliens do. In this case, try to loot their planets. To do this, you initially have to collect fifteen fuel pods, enabling you to reach planetary escape

Mystical Merriment

velocity. This is no easy task with the Intergalactic Police not too happy about your kleptomaniac tendencies. Having collected sufficient fuel, you're permitted a single sortie to loot the planet, avoiding the usual custodians of law and peace.

Other features include Moronian bombs, variable controls on different planets and malfunctioning spacecraft for which you'll have to collect spares — sounds just like a QL!

The graphics are fast, colourful and smooth, and the game is quite playable, with that "I know I can do better next time" appeal.

Unfortunately, this interest only lasts so long, and is unlikely to keep even the most afflicted insomniacs awake into the early hours.

G: ●●●●●●●●

I: ●●●●●●

Quasimodo

Shadow Games

Esmeralda must have the hump again, 'cos Quasimodo's is missing in this classic arcade game. Speeding, leaping and swinging along the wall, with the speed of a ruptured snail, Quasimodo is trying to rescue his loved one yet again.

Graphics are colourful, but slow, and certainly not up to the standard of other games of this ilk. However, it's Hobson's choice, with this being the only hunchback game presently available for the QL.

The skill, and frustration as I was bowled over, beaten about the head with a truncheon, burnt to a cinder in fire pits and generally battered kept me amused for minutes.

G: ●●●●●●●●

I: ●●●●●●

QL Cavern

Sinclair Research

BJ's on a mission, to enter the cavern and collect an incredible 395 diamonds. So starts a quite varied 'levels and ladders' adventure into the underground.

On first sight, the cavern system appears to be very extensive, but after a while you're likely to start recognising the fifty or so different screens, even if you have entered from the opposite side of the screen.

Nevertheless, this game certainly doesn't lack variety, including jet packs, parachutes, trampolines, teleports, boats and lifts.

You'll have to fly, swim, run, leap and crawl, to reach the inaccessible diamonds, collecting your extra lives (in the form of hearts) as you go. Meanwhile, you are beset by a host of both animated and stationary obstacles.

If you're a good enough player, it won't take you too long to complete this reasonably extensive, though finite game. Once you've worked out how to reach the diamonds, the play tends to be just a little too easy, and this is the only major drawback.

G: ●●●●●●●●

I: ●●●●●●●●

Zapper

Eidersoft

Given Zapper's rather blatant title, it's unlikely that anybody is going to mistake it for anything other than a space shoot 'em up.

Unfortunately, ardent gamers may be deceived by the advertised "very addictive, super smooth high-speed action over eight screens, which is fun for all the family". It's not unreasonable to suppose that your great, great grandmother with chronic arthritis will find the action in this game too slow. The eight levels are very similar, even if the aliens do look slightly different, and the sound...

Well, I suppose there is some, though this doesn't alter the fact that this is rather expensive for a spare microdrive cartridge.

G: ●●●●●●●●

I: ●●●●●●

Meteor Storm

Sinclair Research

The blurb in this program tends to go on a bit about Solar Spice mining and the Universal Mining company, but you'll quickly recognise the classic *asteroids* format.

By pampering to the QL's graphical strongpoints, the authors have come up with a very fast, playable game. Using line drawing techniques, the *asteroids* tend to be a bit angular, but they certainly move pretty quickly — must be heavy gravitation.

As with most QL arcade games, graphics do have a tendency to slow the game down to some extent. In *Meteor Storm*, you're told that the slower speed is due to the automatic inhibitor circuits on your ship. I'm sure they don't really expect us to believe this, but having seen the speed of the meteors, I'm not

complaining.

This is by no means the greatest *Asteroids* game you'll come across, and the graphics are a little dull, but it is still one of the better games available for the QL.

G: ●●●●●●●●

I: ●●●●●●●●

Lands Of Havoc

Microdeal

Ex-Spectrum owners will immediately recognise this 2000 screen *Sabre Wulf* derivative from Microdeal. The graphics, though not quite as psychedelic as those from Ultimate, are probably the best you're likely to find on the QL at the moment, being chunky, reasonably colourful and extensive.

In the game, you control a lizard-like man, who must rush about a nine sector map collecting various items. These will finally lead to the skull, and the entrance to the next phase. The game arrives complete with nine picture postcards showing the sector details of the initial land, and these must be fitted together at the start of each game to form the map, giving a different layout every time.

The control and graphics are smooth and fast — the monsters were always too fast for me — and the game itself is quite playable, and frustratingly addictive. Not the last word in QL software, but this is certainly on the right track.

G: ●●●●●●●●

I: ●●●●●●●●

Master Blaster

CompuGem

Though very similar in style to the *Space Paranoids* game from Shadow Games, this shows how the other should have been written. The graphics are admittedly smaller, but the nasties are faster and more numerous. There is also a wider variety of aliens, and their attack strategies are far more volatile.

Again, this game uses the one bullet on the screen method, but the frustration of watching your lone missile make its way to the top, narrowly avoiding all those obstacles that it's supposed to be annihilating adds to the skill and excitement.

Not an incredible game, but the apocalyptic brigade will enjoy the holocaust.

G: ●●●●●●●●

I: ●●●●●●●●

Hyperdrive

English Software

It's time to get out the stopwatches and count the laps in the first car-racing game for the QL. The idea is to complete the four severe stages, each in under 40 seconds, finishing amongst the top five to qualify for the next stage.

As car racing games go, this one wouldn't even get close to the exhaust pipes of old favourites, such as the original — *Pole Position*. The car graphics are quite reasonable, however, and the standard oil hazards have also been included. Unfortunately, apart from this, the game is a non-starter. Unlike all the present day computer tracks, containing hairpin, chicanes, variable radius curves and intelligent drivers, *Hyperdrive* just has straights and a curve.

A few years ago, this standard of game would have fared quite well. Racing fans may enjoy it, but don't expect it to hold your attention all the way to the chequered flag.

G: ●●●●●●●●

I: ●●●●●●

Match Point

Psion

The Centre Court grass at Wimbledon has never looked greener than in this tennis simulation/game from Psion. Having chosen what stage of the competition finals you'd like to begin at — you can also choose between a one or two-player game — you'll have to use every ounce of your professional skill if you're going to match the championship level computer player, as the ball hurtles around the court.

The 3D-like graphics are colourful, fast and smooth, and the player control is excellent; though you're almost certainly going to need a joystick to use the game properly.

Psion still stands out as 'the name' in quality software for the QL. *Match Point* is no better than tennis games on many other micros, but it does prove that the QL can hold its own against the more dedicated games machines.

G: ●●●●●●●●

I: ●●●●●●●●

Programs-1

New Horizons

Programs-1 is a microdrive cartridge containing ten programs, for the all-inclusive price of just £10. Naturally,

being such a bargain, the programs are what might be described as appalling (to be charitable!)

With the current lack of software for the QL it's pleasing to see *anybody* marketing programs. However, the dismal quality of this package is far more likely to encourage QL owners to throw their micro in the dustbin, than write more software. In short, you'd be better off either writing your own, or typing the programs from 'The Progs' section, which are of a far better standard.

And, for the one born every minute, the ten programs are Lunar Lander, Clock, Reaction Lander, Interest Calculator, Biorythms Calculator, Laserblast, Temperature Converter, Puzzle, Hi-Lo and Utility Draw.

G: ●●
I: —

Breakout

New Horizons

Having just finished the ordeal of reviewing the inimitable *Programs-1* from New Horizons, it was with some trepidation that I loaded *Breakout*. After all, anybody can write this old chestnut. What a surprise. The program made good use of windowing, had smooth graphics, good control, one or two-player option, variable ball speed and angle, and three moving walls with reverse bounces once you get beyond the first.

The graphics are by no means perfect, with the program only using about half the screen for the playing area and the rest showing the scores for the two players and the highest score so far.

Okay, so I was pleased to see a decent game from a small company for a change. Having said this, *Breakout* isn't exactly the elite amongst games, and (on other micros) I've seen better published in magazines. At the price quoted, it isn't really worth buying. However, if the games on *Programs-1* had been anywhere near this quality, I would have happily paid the money.

G: ●●●●●●
I: ●●●●●●

Super Backgammon

Digital Precision

Well, Digital Precision may think that this version of Backgammon is 'super', but I certainly didn't. I'm not

exactly the world's greatest player, and computer programs for this game should be close, yet I could beat the program on a regular basis.

On the other hand, if you happen to be a fairly novice player, or just very unlucky with dice, then the program itself is quite good. The graphics, though not awe-inspiring are perfectly adequate, and the entire program is easy to use.

There are a couple of unusual features in this program. One of these is the inclusion of a copy of the rules of backgammon for use by the Quill wordprocessor. Another is the ability to obtain 'hints' for you next best move, though you can probably find a better move yourself. You can even roll your own dice, rather than accepting the computer's random numbers, so if you really got stuck, you could cheat a bit (or more appropriately, help the computer out by modifying its dice throws).

G: ●●●●●●
I: ●●●●●●

QL Chess

Psion

Psion Chess was one of the first game programs ever written for the QL, and still stands superior today. Not only is it a very strong player, able to give even club players a decent battle, but it also sports a remarkable 3-dimensional view of the board.

The program features twelve playing levels, ranging from Novice (immediate response) through to four minutes. There's also an 'Equal time' level and an 'Infinite' level, where the computer continues thinking until you tell it to stop — ideal for "ensuring that you've chosen the best move" in postal chess. In addition, the program will search for mate with a lookahead of between one and eight moves.

You can switch at will between the more common plan view and the 3D board. A host of other features, explained in the Help Pages, include Analysis, setting up board positions, Takeback, Replay, Hints, zero, one and two-players etc.

This can be highly recommended. Not only will you have the best chess program available on the QL, but probably one of the best on any home micro.

G: ●●●●●●●●
I: ●●●●●●●●

Gumshoe Logic

MegaCycal

Logic puzzles are quite popular, and often found in magazine form at the local newsagents. *Gumshoe Logic* is a fairly original idea, which brings this form of puzzle to the computer.

As an ace private eye (investigator, to all those who don't read or watch the TV), you have to use your powers of logic to solve cases; making money. You initially decide the difficulty of the case you wish to take on — the harder the case, the more money you can earn. You're then given the case details, which consist of the characters and other information involved with the puzzle. Then, instead of simply telling you all the facts, such as "Lolita's husband, who was seen at the Grand Hotel, is not Mugsy", you have to buy these facts from your snouts, some of which are more reliable than others.

The program is menu-driven and well produced, providing many hours of entertainment to logic freaks. The phraseology is a little confused at times, but this can be forgiven in recommending this game.

G: ●●●●●●
I: ●●●●●●●●

Fantasia Adventure

S & B Software

This is simply a typical text-only adventure. The story goes that you're a stranger, alone and unarmed in a hostile world, inhabited by a people with whom your country is locked in a bitter military struggle. The idea is to knock off the big boss, known as the enemy god emperor Hazaran, and pick up any treasure you can whilst you're at it.

The program's vocabulary is fairly basic, but it was able to handle such simple commands as 'Go west then get key'. The only other major complaint about the program was its speed, which was remarkably slow. On the whole, this program wasn't too bad. There were annoying features, such as telling you of objects which you can't then use. Other features were quite original — look out for the manic bagpipes!

Having seen the standard of adventures (including graphics) which can be bought on such machines as the Commodore, BBC and Spectrum, I'm left wondering why it's so difficult to squeeze

similar programs into a machine with at least twice as much memory.

G: —
I: ●●●●●●

West

Talent

Again, this is a text-only adventure yarn, but at least Talent have tried to be different.

The story is set in the badlands, where you (the good guy) are on the trail of a band of dastardly bank robbers (the bad guys). You are beset in your quest around an old mining town by snakes, injuns and all manner of natural hazards, not to mention the bank robbers themselves. Your only aid is your trusty steed, who pops up from nowhere early on in the scenario, then has an annoying habit of wandering off if not tethered.

Complex and different, this has a lot to recommend it, but still falls far short of the quality on other micros.

G: —
I: ●●●●●●

QL Reversi

Sinclair Research

Whether you find Reversi fascinating or as interesting as watching concrete set, you're bound to agree that this is a very professional product. The software includes all the usual features associated with this type of program, such as replaying games, analysis (setting up a board), none, one and two player games, and so on. The computer has nine different levels of play, ranging from immediate replies up to two hours thinking time. It also plays a particularly good game, and I was only able to best it about two-thirds of the time on the default level (1.5 seconds thinking time).

The graphics, though rather slow, emphasize the professionalism of the programming. Moves are entered by positioning a cursor (using cursor keys or joystick) and your piece then moves smoothly from its stack to the board position and all the counters flip.

The success of this program will depend on the interest in the game, which is becoming a little long in the tooth these days, but the package is highly recommended.

G: ●●●●●●●●
I: ●●●●●●

Mystical Merriment

Bridge Player

CP Software

Bridge Player is "a simulation designed to provide practice in both the bidding and play of Contract Bridge". As you would expect, the program includes such features as rebidding and replaying of

hands. However, it is lacking in the equally important two or more player option, setting up particular hands and so on. Good players will be totally uninterested in this below standard software, whilst poorer players, wishing to improve, will certainly require all the missing extra

features. This makes me wonder who the software was aimed at.

G: ●●●●●●
I: ●●●●

Zkul

Talent

Zkul is in a similar vein as *West*, but set in the more traditional adventure surroundings of bearded dwarves and sorcerous wizards.

In *Zkul*, you take a fairly mercenary part, searching for lost treasures in the ancient dwelling place of the dwarves.

As with *West*, *Zkul* has a simple real-time feature, such that if you hang about, other events will continue around you. Both also include a save and restore feature with an unusual 'note pad' facility. This allows you to leave a small message on a stored game which will be available when the position is reloaded. So, you can remind yourself of where you are, and what to do.

Personally, I found this to be the better of the two Talent adventures. Possibly because I'm used to the more traditional style, though *West* tended to be by far the most humorous of the two. Both can be recommended, but only if you can afford them.

G: —
I: ●●●●●●

Area Radar Controller

Shadow Games

Ever fancied yourself as an Air Traffic Controller — I don't anymore. After a couple of episodes such as "This is your captain speaking. We are now travelling at a height of minus . . .", it all got just too much.

Area Radar Controller puts you in the controller's chair, flying between 10 and 69 planes (up to 26 on the screen at any one time) literally by the seat of your pants. There are two runways and nine exit lanes. You have to make sure that all the aircraft arrive at the right destination and the right height. It's no good trying to land a military jet by telling it to drop from 6000 to 1000 feet in a matter of yards. Well, you see it had to get over this other plane that was in the way, and . . .

Graphics are poor and the sound is evident and annoying (there doesn't seem to be any way to turn it off). This game left me with a feeling reminiscent of those old school reports, "could do better".

Nevertheless, I must admit that, despite its flaws, I found the game highly addictive. I guess it's a matter of taste, and in this case urge you to look before you leap.

G: ●●●●●●
I: ●●●●●●●●

Fight

Graphsoft

If you consider yourself an avid alien basher, then *Fight* is ideal. Alien annihilation is the name of the game, and you'll kill more per second in this than any other I've seen, being one of the quickest arcade games around.

The graphics are fast, furious and colourful. A descending star background becomes lost and confused in a rain of bullets, bombs and battered craft. Your first job is to dock the first stage, trying to get the three-shooter space ship and a handy bonus. You're then harried by hordes of homicidal nasties, in wave after wave of suicidal slaughter. Each wave is similar, until you reach the next docking sequence, and the whole game repeats. Only this time, the aliens are tougher and more ferocious.

Though much the same as other games of its ilk, *Fight* can be recommended to those who like life in the fast lane.

G: ●●●●●●●●
I: ●●●●●●●●

Knight Flight

Realtime Software

The age of chivalry is not yet dead, or so it would seem with *Knight Flight* from Realtime Software.

Ex-Spectrum owners will find that this one or two-player game bears a remarkable resemblance to *Winged Warlords*, previously released by CDS Microsystems. The idea is that you're a knight who flies around on some giant bird — hence the title.

Using left, right and 'flap' (via the space bar), you spur your mount amongst the perches, crossing lances with other knights in the fray. Having dismounted them, by clouting them over the head from above (not exactly sporting, eh chaps?), you must collect the egg which is dropped, before it hatches into a meaner knight. Invincible dragons, swamp serpents and tougher knights await the battlefield's victor.

G: ●●●●●●●●
I: ●●●●●●●●

SUPPLIERS

CompuGem — Master Blaster

13 Amblethorne, Birkenshaw, Bradford, W Yorks (01 731 7948)

CP Software — Bridge Player

10 Alexandra Road, Harrogate

Digital Precision — Super Backgammon, Arcadia, Reversi

91 Manor Road, London E17 5RY (01 527 5493)

Eidersoft — Zapper, BJ in Space (The Return)

Hall Farm, North Ockendon, Upminster, Essex RM14 3QH (0708 852647)

English Software — Hyperdrive

1 North Parade, Parsonage Gardens, Manchester M60 1BX (061 835 1358)

Graphsoft — Fight

ABC Elektronik, AM Brdshagen 100, 48 Bielefeld 1, W Germany (010 49 521 890381)

Megacycal Software — Gumshoe Logic

PO Box 6, Birkenhead, Merseyside

Microdeal — Lands of Havoc, Crazy Painter, Cuthbert in Space, Hopper, QL Flight

Micropost, 41 Truro Road, St Austell, Cornwall PL25 5JE (0726 68020)

New Horizons Software — Chomper, Zfred, Golf, Stranded, Collector, Football, Breakout, Programs 1, 2 & 3

Four Winds, Cwm Lane, Rogerstone, Newport, Gwent NP1 9AF

Newtech Publishing* — Tycoon

8 Ferge Court, Reading Road, Yateley, Camberley, Surrey

Psion — Chess, Matchpoint

22 Dorset Square, London W1 (01 723 9408/0553)

Realtime Software — Knight Flight

Prospect House, 32 Sovereign Street, Leeds LS1 4BJ

S & B Software — Fantasia Adventure

20 St Nicholas Street, Diss, Norfolk

Shadow Games — Area Radar Controller, Quazimodo, Night Nurse, Galactic Invaders & Star Guard, Space Paranoids

70 Gooseacre, Cheddington, Nr Leighton Buzzard, Beds (0296 668740)

Sinclair Research — Psion Chess, QL Cavern, QL Reversi, Meteor Storm

Sinclair Research Ltd, Camberley, Surrey GU15 3BR (0276 686100/685311)

Soft School* — QL Reversi

471 Hornsey Road, London N19

Talent Computer Systems — Zkul, West

Curran Building, 101 St James Road, Glasgow G4 0NS (041 552 2128)

Tropic Software Co* — Bongolia Escape

25 Rossway, Northwood, Middx HA6 3HU

We have attempted to be comprehensive in this survey and in most cases any companies not mentioned here or above within the context of QL games software have either ceased trading or are unknown to us.

We would strongly advise readers in the first instance to write into any companies whose phone number does not appear in the above listing.

Companies marked with an asterisk were not contacted pending evaluation of their software at a later date.

The following companies were sent written requests for software to be included in this roundup, but at the time of writing nothing had been received. Readers may draw their own conclusions as to the significance of this . . . Bedsoft, Equate, Intersoft, Rodent (QL) Software, Snowsoft, Summit Software, Swansoft.

Four companies — Brainstorm, Medic, Qcode and Quest — did get back to us and promised faithfully to send something, but again nothing was forthcoming and we cannot, therefore, comment on the current quality or availability of their software.



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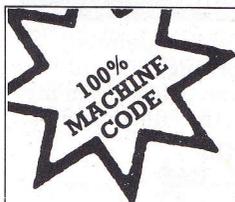
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QL12

OPEN CHA

This is the spot where we turn the magazine over to you, our readers. We welcome any comments, criticisms or anecdotes about either the QL or QL User. The address to send your letters is: Open Channel, QL User, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU

TV Monitor

I would like to purchase a monitor for my QL. Looking at what is available it seems that 14" colour TV's with RGB inputs offer better value for money. But do they perform as well?

Secondly, an article on the QL's system variables would be very useful. For example when designing children's games programs it is desirable to extend the "auto-repeat delay" (ie, the time after which, if a key is held down, the QL automatically generates further 'presses' of that key). This variable is stored at 2808C (in hex) and has the default value 30 (decimal). The delay may be

changed by

`POKE_W 163980,n`
where *n* can be a value from 0 to 32767.

What is needed is a list of all variables which can be safely altered, their default values and the usable range of values.
*Rob Wilson
Cirencester*

Most manufacturers specify a minimum bandwidth for signals a monitor is capable of receiving. This figure is a useful measure of the machine's worth.

Approximately 1MHz is required to display 60 pixels on a line. So for the QL with 512 pixels per line the minimum requirement would be 9MHz. In general the higher the figure the better the display. TV's typically operate at 4.5MHz whilst dedicated monitors average around 18MHz.

Another thing you should bear in mind when considering a TV with an RGB socket is that the QL emits a non-standard signal (ie the line flyback period differs from standard). So, you may find that the display overruns the edge of the screen. This can be a

real problem.

As regards your suggestion of publishing a list of system variables, our Secret Locations article (March 1985) covered fixed calls such as the one given here in detail. Furthermore, this month's Owner's Manual provides a comprehensive list of QDOS system calls.

Archive Angst

I have been using Archive for three months and have created a large database whose contents are quite important to me. This week I forgot to close the file. The file on my backup is also corrupted. So I am in trouble! Whenever I try and load either file I get the error message 'wrong file type'. Is there a trick to get the file back into the computer?

*Lex Hogenbosch
Netherlands*

Unfortunately, there's no quick solution to your problem. However, we will be publishing a set of programs which enable you to recover data lost in this fashion.

Split Screen

I have just purchased a Philips BM7502 green screen monitor. I must say that it is excellent. When you press F1 for Monitor Mode the display splits into two parts, the left pale and the right dark. The left shows input and the right anything from microdrive.

Now I want the screen to become one as in TV mode and allow me to use the full screen for programming. How do I do it?

*C Stories
Humberside*

Irrespective of the mode selected the QL automatically opens three channels to the screen. Channel #0 for typing in commands. Channel #1 for displaying any information using the PRINT statement

and channel #2 for listing programs. A window is linked to each of these channels and it is this that varies according to which mode you select. In TV mode the windows for channels #1 and #2 are placed one on top of the other. In monitor mode they are placed side by side.

To alter the windows from monitor mode to TV mode you need to use the WINDOW command as follows:

```
WINDOW #1,448,200,32,16  
WINDOW #2,448,200,32,16
```

If you want to use the whole of the screen for all your output try the following:

```
FOR n=0 TO 2:WINDOW  
#n,512,256,0,0:NEXT n
```

Bare Bones

Now that I am acquainted with the workings of Quill I find that I can delete, from my cloned copy, the following files:

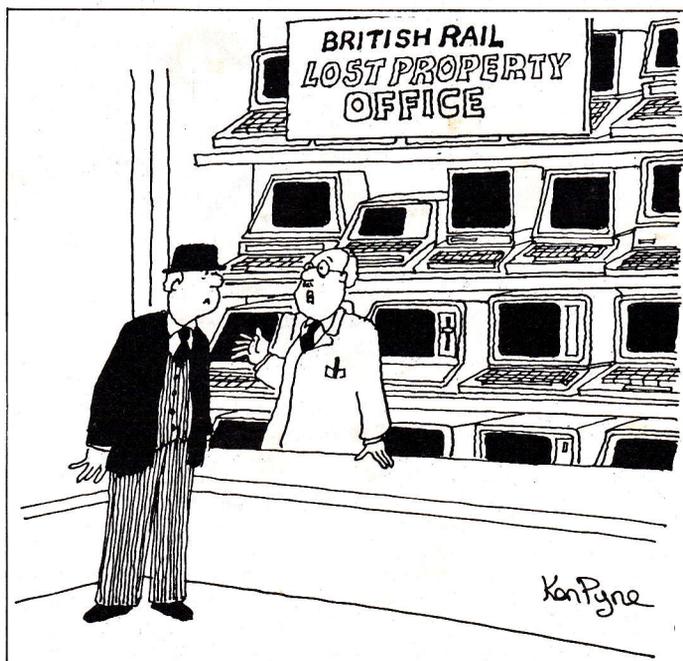
```
QUIL_HOB  
INSTALL_BAS  
INSTALL_DAT  
CONVERT_BAS
```

and still get everything I want. Before doing so I have, of course, installed my printer and if I want to do so again I can always go back to the original copy of Quill. Getting rid of the files liberates no less than 71 sectors, roughly a third of a microdrive cartridge.

I would now like to know how I can convert F1 and possibly F2 to perform another function? Also, can you tell me if there is any way to achieve text composition over two columns (ie., for indexes)?

*J W M Stone
Oxford*

The only way to reprogram the Function keys would be to amend the code in Psion's Quill program. As this is virtually impossible we suggest you use the translate facility on your Psion printer driver. Assuming that you do not use the characters ~ and | then these can be used to switch on and off italics



"Once it was briefcases - now all we get is personal computers!"

N N E L

respectively. The appropriate entry using EPSON control codes would be:

TRANSLATE2:

"~_ESC,52

TRANSLATE3:

"|_ESC,80

With regard to two column text composition there is no way of doing this on Quill other than simply tabbing across from one column to another. Unfortunately this means that you lose out on automatic justification etc.

Debriefing

I am a newcomer to the computer world and don't know much about computers. Often I have read of Assemblers, Disassemblers and Monitors. Would you please give me a brief idea of what each of these do and can you tell me which one would be used to write machine code programs.

A A Matauer
Saudi Arabia

Machine code programs contain coded instructions in the QL's native tongue. The programs can be typed in directly but the process is extremely difficult as each machine code instruction is a complex binary sequence

In Assembly language a meaningful mnemonic (ie, ADD, SUB, MULT) is used instead of a binary sequence. Writing in assembly language is very much easier than machine code and for this reason almost all machine code programs start life as assembly language programs. These are then converted into machine code using a program called an Assembler. So, if you want to write your own machine code programs you need to learn assembly language and buy an assembler.

A disassembler does the exact opposite of an Assembler. It takes machine code programs, which will run on the QL and converts them into

Assembly language programs.

A Monitor, on the other hand, allows one to interrogate a machine code program whilst it is running. It provides a variety of features. It allows one to step through the program instruction by instruction, examine the contents of memory and even amend it.

Both Disassembler and Monitor are debugging tools and are vital if you are new to machine code programming and prone to making errors.

Model Mania

Am I right in believing that the first three characters starting with "D" of the number imprinted on the base of the QL is the hardware revision number? Does the rest of the number indicate what version of the ROM is included. Do you have any suggestions on how I can shop for a QL and be confident that have acquired the latest model?

J Armstrong
Salisbury

There's no mystery about the QL's serial number. Quite simply, the two figures after the "D" represent the number of months after the launch and the rest, coming after the hyphen, is the number of QLs made at the time your particular machine left the production line.

As for getting hold of the latest model. All I can suggest is that you ring around and find out who's stocking which versions of the hardware and software. Versions 2.00 of Psion's packages and JM of QDOS are quite acceptable. Versions 2.30 and JS respectively are even better, though exceedingly hard to come by. To find out the version numbers examine the loading screens on Psion's programs and type PRINT VER\$ for QDOS.

N E X T M O N T H

BJ Bites Back!

An interview with the prolific Janko Mrcic-Floegel — programmer extraordinaire

Archive Recovery

Retrieve your corrupted Archive data, bit by bit

Beginner's Guide

One way to 'Get the most out of your QL', this Christmas

Astrological Aspirations

The QL as a fortune-teller — not quite, but it'll simplify the maths involved

Toolkit Tournament

A grand contest of all the different programmer's toolkits

On Disk

An introduction to disk drive operation and when to call in the doctor!

Languages To Learn

Boasting several unique languages, the QL leads the home micro scene

SuperBasic Extensions

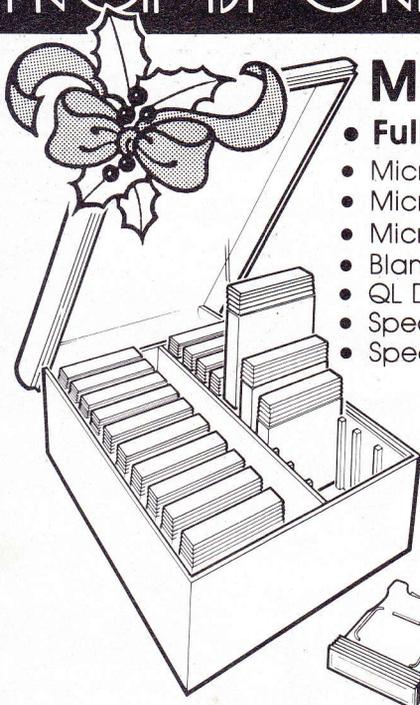
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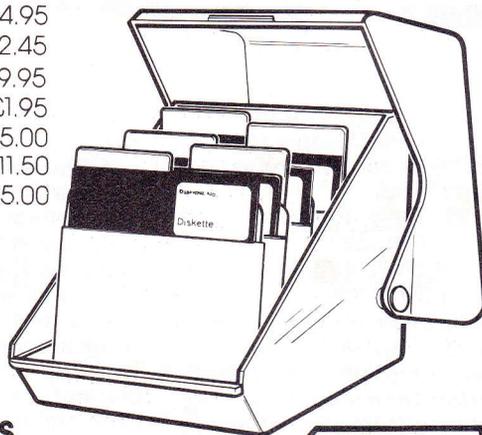
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A CHRISTMAS QL?

Will the ghosts of the past, present and future haunt the QL this Christmas? Mary Sargent finds out.

Dixon's promotion of the QL and the dramatic drop in price to £199.95 for the basic computer and four integrated software packages has been the starting point for yet another round of publicity for Sinclair Research. Once more, everyone has an opinion as to whether it will boost sales or bury the product for all time, and in that sense at least, it demonstrates the QL as Everyman's computer.

The Spectrum established itself as the micro for the masses by selling in phenomenal numbers, and it's still among the best-sellers. No-one could pretend that the 16-bit machine has been a success to follow that, but equally it should not be written off. Whichever way you look at it, you have to admit that an awful lot of people have heard of the QL, and since it now costs less than the average colour television set, it could just convert some of its massive publicity into hard cash.

Dixon's, which also means Curry's and Bridges, wanted the machine because it represents a way into the "sophisticated home user" market and have emphasised that the twin microdrives were a feature of the machine which the company particularly liked. Whilst one would have welcomed a rather more detailed appreciation, that statement does in fact mean two things. In the first place, it indicates that Dixons, which is busy turning its branches into the Mecca of the computer retail trade, recognises the need to cater for users who can exploit the capacity of a 16 bit micro to the full, and that it perceives the QL as fulfilling that market. It also means that the organisation has faith in the reliability of the machine as it now is. After all, it is the retailer who is responsible to the consumer for poor products, and no chain store is likely to deliberately take on a micro if it believes it will be opening its doors to a stream of dissatisfied customers. It is reasonable to assume that claims that the QL's problems have been ironed out are true.

The question remains whether the price-cut will encourage potential buyers to forget the past and investigate what the machine can offer them. Freddy Vaccha, Managing

Director of Digital Precision, a software house specialising in programs for the QL, has always believed that it is "a Rolls Royce of a machine," and that its operating speed in machine code is an inducement to all serious programmers to consider buying it. Apart from these aficionados, who are likely to have already sized up the QL, he identified three possible categories of micro-seekers.

"Those who have already decided that they need a home micro, and that the QL is not what they want, will have their prejudices confirmed by the price-cut. These are the 'I always knew the QL was no good' brigade. The second category are those who have decided that they

need a micro, but have remained open-minded or are actually attracted to the QL. For them, the drop in price is likely to be decisive, and they will buy. Those who have not yet fully convinced themselves that they want a micro might just be persuaded by the price, which represents excellent value. Compare £199.95 plus £75 for a mono monitor, with around £750 for, say, the Atari 520ST." Whilst he concedes that the QL will never be the World's number one micro, he's confident it will sell well this Christmas.

His wife Barbara runs Calpac, an

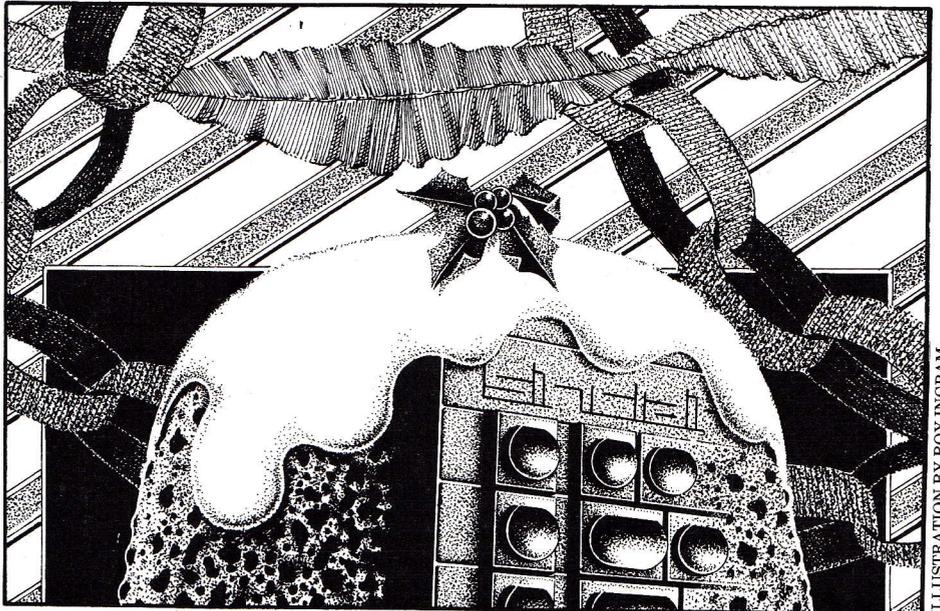


ILLUSTRATION BY ROY INGRAM

educational software house whose accounts Jeff has put onto the QL using Abacus, the spreadsheet program. He's pleased with its versatility and the fact that it can be re-designed by the user to take account of individual requirements, and he has underlined the point by using it to calculate his students' examination achievements. The college uses a complicated system requiring several different marks from different parts of the course to be taken into consideration, and given different emphasis. It's an operation which would involve a lot of time and possible error if done manually. Abacus copes in seconds.

Price And Prejudice

Archive is used for storing statistics gathered on field trips by students following the conservation and ecology courses with which Jeff is involved. Manipulation of the statistics is achieved by applying Abacus,

Jeff Warren agrees that it should. At £400 it was a better machine than the press ever admitted, at £200 it represents extraordinary value. Jeff is a senior lecturer at a College of Technology with more than a passing interest in the capabilities of a com-

puter. He lectures, amongst other things, on the use of computers in education and on the role they have to play in conservation and, on a day-to-day basis, he relies heavily on a word-processor. He considers Quill a useful package both as an excellent simulation of commercial word-processors which cost a great deal more than Quill, and as a well-documented program which adequately demonstrates the functions and virtues of word-processing to novices. He is particularly impressed by the simple help facility common to all four packages that gives detailed instructions on their use at the press of a button.

as for example when plant distribution for a particular area is required in percentage form, an exercise which uses the twin-microdrive feature emphasised by Dixon's spokesman. Compared to conventional cassettes, they are far superior.

The Ideal User

In some ways, Jeff Warren is Sinclair's perfect customer. His first home micro was a ZX81, he graduated to a Spectrum and put his name down for a QL as soon as it was announced. Delays and dongles notwithstanding, he took delivery of one of the earliest machines, nursed it through its teething troubles and accepted the new improved version from Sinclair when the add-on ROM was finally integrated into the main casing. He has never altered his opinion that the QL was well worth the wait, and has expanded his use of the machine as his knowledge of it increased. As an academic, he uses it for administration and writing, as an associate in a small business he uses it for book-keeping and in his spare time he programs in BASIC for fun. His sons would like to play games on it, but don't get much opportunity due to their father's enthusiasm for structured programming, QL style.

He maintains that, whereas it is perfectly possible to perpetuate poor programming habits, learned in past days on less sophisticated machines, the QL in fact offers the ideal opportunity to purists (and students!) to learn the real logic and precision of computer programming at its best. For this reason, he would like to see many more ventures along the lines of the Strathclyde experiment, where a scheme is underway to provide a majority of students at the University with their own QLs by the end of the decade. He feels that the continuing dominance of the BBC micro in schools and colleges is unacceptable, when the QL offers so much more in terms of memory, graphics capability and business software of the type with which students need to become familiar, prior to their emergence into the world of industry and commerce.

And in that world of commerce, the QL has found its way into some of the small businesses which were Sinclair's original target market. Initial and quite detailed market research had revealed the existence in Europe of some 18 million small businesses, many of them orientated around professions such as the law, finance and medicine, which were not computerised and whose principals were reluctant to pay more than £1,000 for a complete system. Many of them were, and still are, unconvinced about the desirability of computerisation, but even so there were sufficient potential buyers to make

the targetting of the QL a matter of form.

The launch delays and software problems may have blighted the initial campaign, but the small business market still exists, and the cost of a complete QL system is still a fraction of the competition's price. A small public relations agency, set up in London in March of this year, has benefitted enormously from both the low cost and the software which is sold with the machine.

The men involved in the partnership had spent some years working for large organisations, and the decision to set up on their own was not taken lightly. They needed a low-cost computer system which offered flexibility together with a range of business software, and they chose the QL. Archive, Quill and Abacus were all used in the planning stages of the business, for financial projection, database storage of advertising media and potential clients, correspondence and the like. The micro was found to be efficient, the software invaluable. The four Psion packages offer facilities which for any other business machine, would be sold on their own for more than the total cost of the QL hardware and software together.

There is perhaps a problem here. Despite the statistics on the number of businessmen unwilling to pay large sums for computers, there are still many who are victims of the "you get what you pay for" school of logical reasoning.

Big Business

This states quite clearly that IBM is the name for business machines, and therefore, if you run a business you must have either the thing itself, or a not noticeably cheaper look-alike, and no system costing less than £2,000 or £3,000 can possibly do what you want it to. There are a great many highly successful computer salesmen in expense-account suits driving around in company cars on the strength of this ideology, and some believe that had the price of the QL been much higher initially, many more businesses would have been prepared to consider it. That cannot now be proved one way or the other, and certainly the price-cut is not going to attract customers who suffer that particular prejudice. But for people either running or setting up a small business, who are less concerned with image than practical economic considerations, the QL is an excellent investment, according to those who already use it.

Another of the reasons much canvassed to account for the QL's lack of general appeal is the lack of software. This is yet one more factor which is perhaps more apparent than real. There are, in fact, over one hundred and sixty programs avail-

able for the QL, marketed by independent software houses and excluding packages written by Psion or put out under the Sinclair Research banner. They range from business packages and programmers' utilities through the less demanding offerings such as sprite generators and Astrology programs, to the frankly frivolous adventure and arcade games.

You can plan your household accounts, write your own games, design a garden, plot your family tree, study the principles of business planning, learn to touch type or even base major decisions on data examined by the QL in advance, before relaxing with a few aliens, or exploring a few adventurous problems. Just as with any other micro, you pay your money and you take your choice.

Compared with the BBC, Spectrum, and Amstrad micros, of course, the software support is not massive, but it is surely relevant to ask, just how much software is any one user likely to need? Much of the stuff around for the more popular home micros is rubbish, and the real choice of programs is reduced considerably by that fact. It's often difficult to identify a worthwhile program, simply because there are too many around for adequate reviews of all of them to be published and the games market has suffered badly as a result of home users copying tapes they don't consider worth buying.

By contrast, a large proportion of QL software has been reviewed and although some is not worth bothering with, much of it has shown up well. Several of the Sinclair programs were nominated for a British Micro Computing award, and the QL Entrepreneur program won. The four Psion packages which come with the QL are acclaimed by both those who write about micros and those who use them, which is an achievement in itself, and there is much interest in, and high hopes of, Digital Precision's SuperBasic Compiler, due for release very shortly.

All in all, the software scene as regards the QL is decidedly healthy, with sufficient programs available to satisfy all but the most avid of micro-enthusiasts, and a large enough range in most categories to afford a realistic choice.

The QL is no longer a prestige product. It is a good one, and it has attracted some good software. It is now capable of becoming the complete home-micro of the ad-men's dreams, provided the end-users are more interested in efficiency than fashion. First indications from the high-street are that quite a few people are. Several branches of Dixons report (albeit warily) that the QL is selling steadily — Happy Christmas, Sir Clive.

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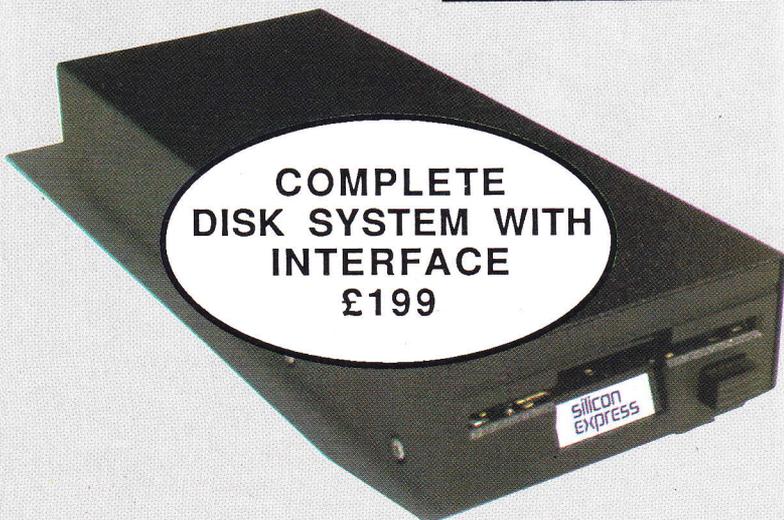
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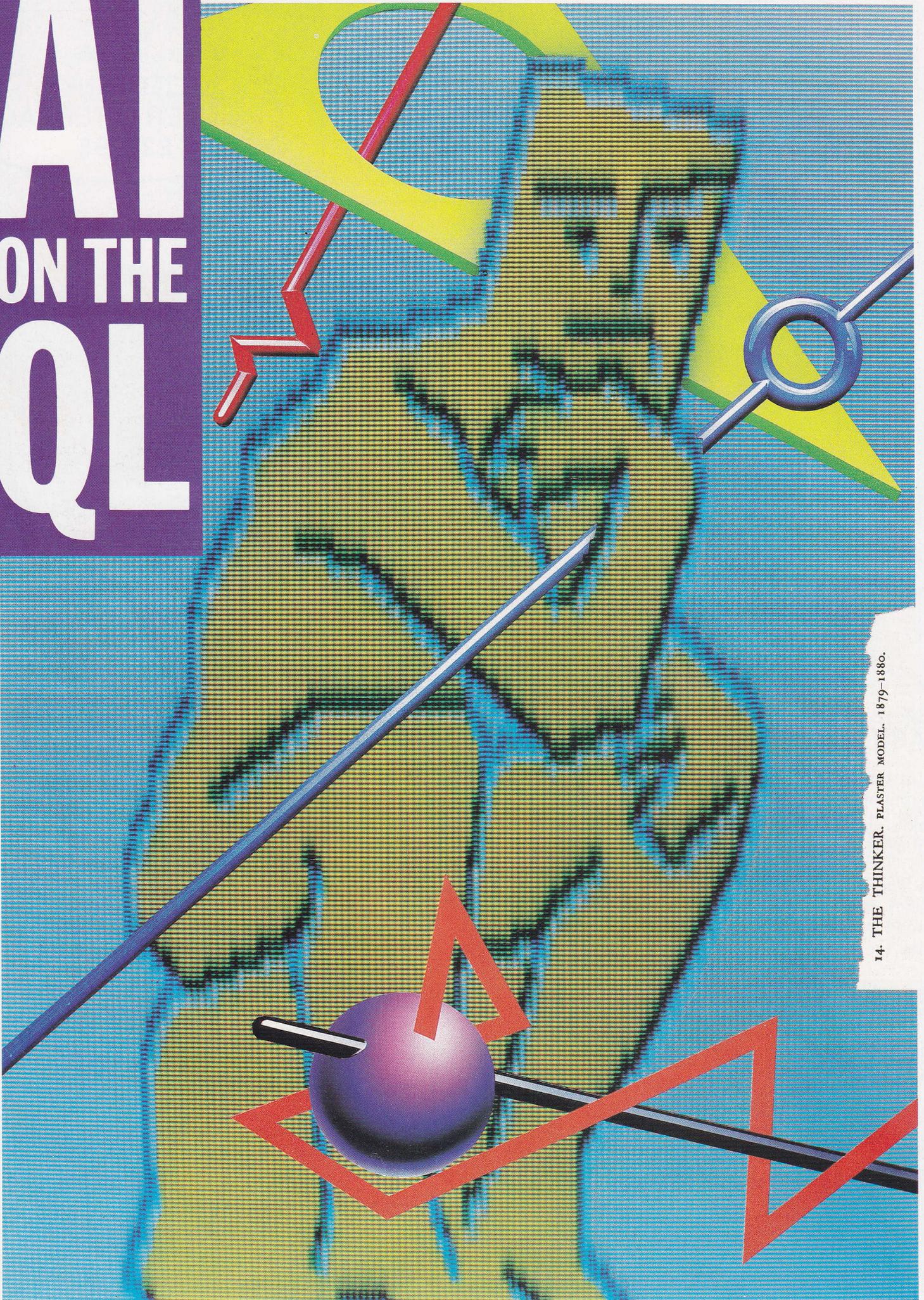
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AI ON THE QL



14. THE THINKER. PLASTER MODEL. 1879-1880.

In this, the final part of our series, Mike James and Kay Ewbank push AI to its limits in search of meaning and understanding.

Various programs, (*Eliza* for instance), have shown that it is possible to convince many users that a computer can understand what is typed on its keyboard even though it is quite clear from an examination of the program that there is no way that it can achieve anything as sophisticated as understanding the meaning of English.

The trouble is that it is difficult to establish exactly what *understanding* is. For example, it seems reasonable to say that understanding can be inferred by observing what happens after something has been said. If someone is asked to make a pot of tea and they do, it seems reasonable to conclude that he or she probably understood what was said. By the same logic it follows that the QL 'understands' a BASIC program whenever it obeys the instructions it contains. But the QL clearly doesn't understand a program in the same sense that the program's creator does!

The difference between the two types of understanding is difficult to pin down but it seems to have something to do with the existence of an adequate *model* of the external world and the ability to use it to respond to an instruction in a flexible way. For example, the traditional joke about a computer making a cup of tea is that it fails for some silly reason such as the kettle being empty which it is assumed a human would easily put to rights. The difference is that a human has a great deal of information, in the form of an internal model, that can be used to examine the feasibility, consequences and problems of complying with an apparently simple instruction. Indeed the existence of an internal model is even more important in that it plays an important role in deciphering the meaning in a

sentence. For example, the sentence "We went down to the bank" is ambiguous unless you have just been following a conversation about fishing. In this case your internal model of fishing should let you know that a river bank rather than a financial institution is likely to be involved!

Mental Models

Clearly internal models of the world are essential to any sort of intelligent understanding of the world. The only problem is that currently we have very little idea of how to represent anything remotely complicated in a computer memory. The sophistication of a memory depends not so much on raw storage capacity but on the variety of relationships that it can maintain. The simplest sort of computer memory forms links between pairs of items – one item is regarded as an *address* and the other item the *data*. The most sophisticated memory that we know of, the human memory, is characterised by the wide variety of links that are made between items of information stored within it. Indeed the links can be made with such wild abandon that the rigid notions of what constitutes 'address' and 'data' have to be modified. Items of information may be used to recall others, which may then be used to recall yet more items, and so on. Here, an item of information can be considered to be an *address* when it is known and is being used to recall other items of information associated with it.

This suggests that if we want to construct more sophisticated models it is worth investigating methods for increasing the ways of linking items of information together. The first and most obvious improvement is to allow *any* number of links in *any* direction to exist between *any* pair of items. This type of memory is usually called a *relational store*. For example, in *Fig 1* separate items of information are linked together so that, for example, 'name' can be found from 'address' or even 'telephone number'.

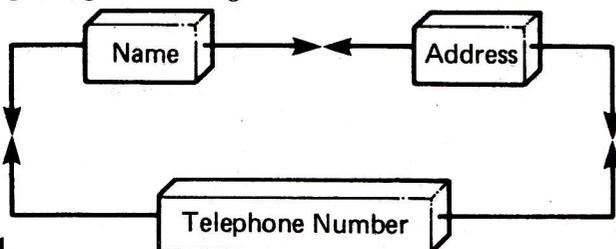


Fig 1

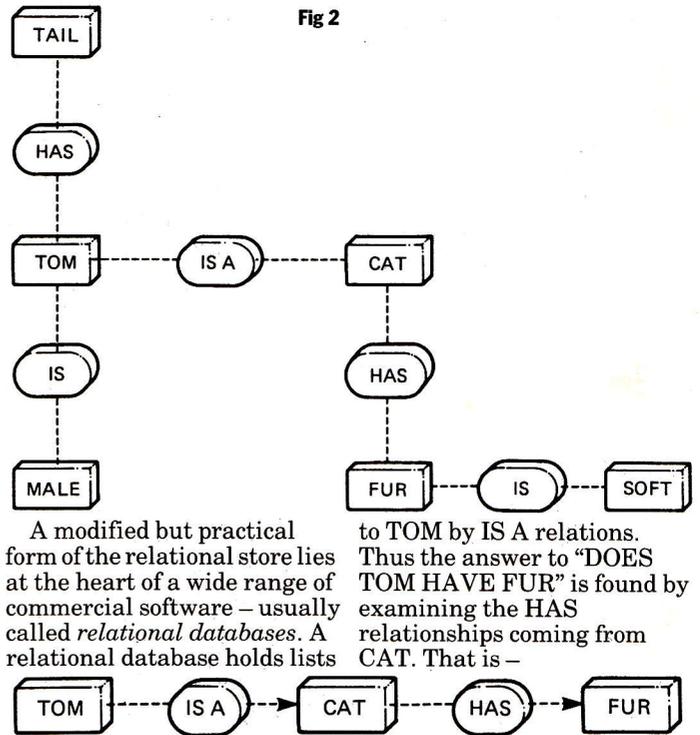


Fig 2

A modified but practical form of the relational store lies at the heart of a wide range of commercial software – usually called *relational databases*. A relational database holds lists

to TOM by IS A relations. Thus the answer to "DOES TOM HAVE FUR" is found by examining the HAS relationships coming from CAT. That is –

Fig 3

of information and uses *pointers* to enable information to be stored economically and recalled using a variety of addresses.

The relational database has the potential to become an important part of AI research in the next few years. However, it is by no means the final word in increased sophistication!

Semantic Nets

The links that we have been using to associate one item of data with another have so far all been of the same type. They are anonymous arrows or pointers that simply bind items of information together without indicating what it is that causes them to be joined. This is obviously not sufficient to represent complex models of the world. A human memory is very different because it links items together with named relationships. For example, in *Fig 2* the relationships between the items of information TOM, CAT, TAIL, FUR, SOFT and MALE are shown.

You can see that the relationship between TOM and CAT is different to that between TOM and TAIL. That is TOM *IS A* CAT but TOM *HAS* FUR. The fact that the relationships IS A and HAS are different only really becomes apparent when the memory is being searched.

For example, if you want the question "DOES TOM HAVE FUR" answered then as well as looking at the item TOM for HAS relations you have to also examine the items connected

means that TOM does have FUR.

This type of memory, using named relationships, is called a *semantic network*. A *general semantic network* can be very complicated but it is possible to produce a small example in Super Basic to show how things work and to provide the starting point for experiments.

To produce a program that will store this sort of system of items and named relations it is first necessary to solve the problem of representing the named links. Each item of information can be stored in an element of a string array, *W\$* say. When an item is encountered it is simply stored in the next free element of the array. The item that it is linked to is of course also stored in the array and we could indicate which one it was by storing its index in another array, *P%*. For example, if the array *W\$* contained:

- W\$(1) = TOM
- W\$(2) = TAIL
- W\$(3) = CAT
- W\$(4) = FUR

Then the link between TOM and TAIL and CAT and FUR would be stored in *P%* as:

- P%(1) = 2
- P%(2) = 0
- P%(3) = 4
- P%(4) = 0

In other words, the item that *W\$(I)* is linked to is stored in *P%(I)*. A value of zero in *P%(I)* indicates that the item is not linked to anything. This combined use of the arrays *W\$* and *P%* gives us a simple relational database because, although the links are all

represented, they are anonymous. The simplest way of storing the names of the links is as items of information in the array $W\%$. To associate the name of the link with its use we also have to use another array $R\%$ to store the index of the name.

$W\%(I)$	is an item
$P\%(I)$	is the index of the item it is linked to, ie. it is linked to $W\%(P\%(I))$
$R\%(I)$	is the index of the name of the relationship, ie. $W\%(R\%(I))$ is the name of the relationship

Fig 4

For example, adding the names of the relationships to the previous contents of $W\%$ gives -

INDEX	$W\%$	$P\%$	$R\%$
(1)	TOM	2	5
(2)	TAIL	0	0
(3)	CAT	4	6
(4)	FUR	0	0
(5)	HAS	0	0
(6)	IS A	0	0

Fig 5

Thus $W\%(1)$, TOM, is related to $W\%(P\%(1))$, TAIL, and the relationship is $W\%(R\%(1))$, HAS. Notice that the value of $R\%(1)$ is set to zero when there is no relationship to label.

The only remaining problem is what happens when there is more than one link from an item. This could be dealt with by making both P and R two-dimensional arrays and using them to store all the links and the names of the relationships for each item - $P\%(1,1)$ would store the first link for the first item and $P\%(1,2)$ would store the second link for the first item and so on. The solution adopted by the program given in Listing 1 is simpler but can be slower. Each time an item appears it is stored in the array $W\%$, even if it is already present in the array. So to add TOM IS MALE to the memory, the three items TOM, IS and MALE are stored in $W\%$, and $P\%$ and $R\%$ are set to point to the correct items. That is -

INDEX	$W\%$	$P\%$	$R\%$
(7)	TOM	8	9
(8)	MALE	0	0
(9)	IS	0	0

Fig 6

In practice this duplication of items allows us to store information in memory without checking to see if it is already there and doesn't cause any practical problems.

Now that the problem of representing the structure of a semantic net has been solved, all that is left is to work out

how information gets into it and how information can be retrieved. The simplest way of allowing the user to store information is via the English sentence construction, x relation y where x and y are items to be stored and connected by the link

named *relation*.

**TOM IS A CAT
TOM IS MALE
TOM HAS TAIL
CAT HAS FUR
FUR IS SOFT**

describe the information shown in Fig 2. Using this limited form of English ensures that it is possible for the program to separate x and y from the relation. The rule used is that the first word is item x , the last word is item y and any words in between form a description of the relationship.

Once information has been entered the memory is only useful if it can be used to answer questions about its contents. Using the form of representation that has been described it is possible to implement many different types of question-answering routines but, to keep things simple, the program (Listing 1) attempts to handle the following three types of question -

**TELL ME ABOUT x
DOES x HAVE y
IS x A y**

Once again because of the restricted format of these questions it is easy for the program to detect the type of the question and the items mentioned within it. The first question is detected by the first word being TELL and the last word is taken to be x , similarly the second and third questions are detected by the first word being DOES or IS respectively and the second word is taken to be x and the last word is taken to be y .

What happens when one of the three questions is detected varies according to the question. To answer the TELL ME ABOUT x question the program has to search for all occurrences of x in $W\%$ and then print out the relationship $W\%(R(I))$ and the item it is related to, $W\%(P(I))$. However, if this is all it did the question TELL ME ABOUT TOM would have the answer TOM IS A CAT - HAS TAIL - IS MALE. By following the IS A

relationship to CAT you can also discover that TOM HAS FUR - IS SOFT.

To answer the question completely the program should follow all of the relationships with TOM through all of the net. So the programs response to TELL ME ABOUT x is to print every connection that x has with everything else in the memory! To answer the DOES x HAVE y question it is necessary not only to examine the direct HAS relationships but also the HAS relationships of items connected to x by IS A relationships. So DOES TOM HAVE FUR would be answered by the following chain of relationships TOM is a CAT has FUR. Similarly the IS x A y question has to be answered by following IS A relationships. So if we add CAT IS A ANIMAL to the memory the answer to the question IS TOM A ANIMAL would be answered by the following chain of relationships



Fig 7

The need to examine not only direct relationships but follow chain of relationships, TOM is a specific kind is in general difficult to implement without using advanced techniques; specifically *recursion*. While recursion is possible in Super Basic the simplest way of following such chains is to use a stack to store all the intermediate findings.

A stack is simply a temporary store that is used via two operations PUSH and PULL. PUSH will store an item of information and PULL will retrieve it. The order that information is retrieved is opposite to the order that it was stored. That is, the last item to be PUSHed in is the first item to be PULLED out.

For this application the order in which items are retrieved is not important, the stack is simply used as a temporary store for relevant links that have still to be explored. The way that this works is best illustrated by an example of how the DOES x HAVE y question is handled.

The question DOES TOM HAVE FUR is answered by first scanning $W\%$ for the word

TOM. When the word is found the type of the relationship is checked. If it is HAS y then the item y has to be checked to see if it is FUR. If it is, the question is answered. If it isn't then the array is searched for another occurrence of TOM. However, if an IS A y relationship is found then the index of the item y is PUSHed on the stack. Once the whole of $W\%$ has been searched for all occurrences of TOM then the search has to be repeated with any items that are stored on the stack.

In the case of the information in Fig 2, the first occurrence of TOM is a HAS relationship but this doesn't answer the question. The TOM IS entry cannot provide any information regarding the question and so it is ignored but the TOM IS A entry results in the pointer to CAT being PUSHed onto the stack. At the end of the first scan through the array the question isn't answered but there is something on the stack that

still has to be explored. The information on the stack is retrieved and then the array $W\%$ is searched for occurrence of CAT HAS and CAT IS A relationships. Fortunately in this case the first CAT HAS entry answers the question and no further searching is required. However, in principle any IS A relationships detected on the second search would be PUSHed onto the stack, so causing $W\%$ to be searched yet again. You should be able to see that all that's happening is that the stack is being used as a temporary store for further items that have to be searched for HAS relationships that might answer the question of IS A relationships that extend the search.

Putting all this together results in the Program given in Listing 1. To help you understand the program the procedures are as follows

Fig 8

Line No or Procedure	Description
10 -299	Main program. Input data and decide if it is a question or new data
init	Initialisation
get_word	Remove the next word in $T\%$ and store it in $K\%$
tell	TELL all information on x
dont_know	No information on x
does	DOES x HAVE y procedure
no_inf	Answer procedure
is	IS x A y procedure
add_inf	Add information to $W\%$
on_stack	Push number in D on stack
off_stack	Pull number from stack and store in D
comp_with_y	Compare $W\%(P(I))$ with $Y\%$ and set A to 1 if they are equal
check_len	Remove lefthand character from $T\%$

LISTING 1

In The Net

The program (*Listing 1*) implements only a few of the ideas of a semantic net and yet it still behaves in an interesting way, as the output given below indicates. For clarity, all the input data and questions are shown in upper case and the computer's responses are in lower case.

```
TOM HAS A TAIL
TOM IS A MALE
TOM IS A CAT
CAT HAS FUR
FUR IS SOFT
IS TOM A CAT
yes
DOES TOM HAVE A TAIL
yes
TAIL HAS STRIPES
CAT IS A ANIMAL
IS TOM A ANIMAL
yes
DOES TOM HAVE
```

STRIPES

yes
DOES CAT HAVE STRIPES
not as far as I know

There is a great deal more that can be done to improve this program. At the simple level of implementation the method that it uses to store the names of relationships is very inefficient. The program should occasionally scan through the array *W\$* and remove multiple occurrences of the name of any relationship and adjust any relationship pointers in *R%(I)* to point at the single occurrence of each relationship. At a more sophisticated level it should be possible to recognise different categories or classes of objects in the store. For example, TOM is a unique object but CAT is a class to which other

objects can belong. Such classes can be detected by following IS A relationships. In fact the program already includes the array *T%*, which records the type of each item as accurately as it is known when it is entered, although this type of information isn't used.

T%(I) = 1 means the item is an object
T%(I) = 2 means the item is a relationship
T%(I) = 3 means the item is a class
T%(I) = 4 means the item is either a class or an object.

You can also introduce new relationships and include them in question processing. For example, TOM IS A CAT implies that TOM has all the items that CAT has but the reverse isn't true. In fact the

new relationship that is necessary is

CAT EXAMPLE IS TOM
Given this relationship, any items that TOM HAS might also be items that CAT HAS. In this way you could arrange for the answer to DOES CAT HAVE STRIPES to be AT LEAST SOMETIMES. If other examples of CAT also turned out to have stripes then you might feel justified to conclude that CAT HAS STRIPES.

By experimenting with the above program you will discover many ways of examining and reorganising the relationships between the items. There is one danger to be aware of while using the program - circular relationships. A relationship of the form TOM IS A CAT and CAT IS A TOM will send the program into an infinite loop!

Listing 1

```
10 REMark SEMANTIC NET
20 WINDOW 452,236,60,20
30 MODE 8
40 init
50 REPEAT main
60 INPUT A$
70 IF A$="QUIT" THEN EXIT main
80 T$=A$
90 get_word
100 IF K$="TELL" THEN
110 tell
120 ELSE
130 IF K$="DOES" THEN
140 does
150 ELSE
160 IF K$="IS" THEN
170 is
180 ELSE
190 X$=K$
200 add_inf
210 change_point
220 END IF
230 END IF
240 END IF
250 END REPEAT main
299 STOP
1000 DEFINE PROCEDURE init
1010 NX=50
1020 DIM W$(NX,30)
1030 DIM TX(NX)
1040 DIM RX(NX)
1050 DIM PX(NX)
1060 DIM MX(NX)
1070 RI%=0
1080 TI%=1
1090 SX=0
1099 END DEFINE init
2000 DEFINE PROCEDURE get_word
2010 K$=""
2020 REPEAT space_rem
2030 IF LEN(T$)=0 OR T$(1 TO 1)<>" "
THEN EXIT space_rem
2040 check_len
2050 END REPEAT space_rem
2060 IF LEN(T$)>0 THEN
2070 REPEAT get_char
2080 K$=K$ & T$(1 TO 1)
2090 check_len
2100 IF LEN(T$)=0 THEN EXIT get_char
2105 IF T$(1 TO 1)=" " THEN EXIT get_char
2110 END REPEAT get_char
2120 REPEAT strip_space
2130 IF LEN(T$)=0 THEN EXIT strip_sp
```

```
ace
2140 check_len
2150 IF T$(1 TO 1)<>" " THEN EXIT at_rip_space
2160 END REPEAT strip_space
2170 END IF
2999 END DEFINE get_word
3000 DEFINE PROCEDURE tell
3010 X$=""
3020 REPEAT add_word
3030 get_word
3040 IF LEN(T$)=0 THEN EXIT add_word
3050 END REPEAT add_word
3060 X$=K$
3070 FX=0
3080 REPEAT print_sect
3090 FOR I=1 TO SX
3100 IF W$(I)=X$ THEN
3110 IF PX(I)<>0 THEN
3120 FX=FX+1
3130 IF FX=1 THEN PRINT X$; " ";
3140 PRINT W$(RX(I)); " ";
3150 PRINT W$(PX(I))
3160 DX=PX(I)
3170 on_stack
3180 END IF
3190 END IF
3200 END FOR I
3210 IF FX=0 OR TI%=1 THEN EXIT print_sect
3220 off_stack
3230 X$=W$(DX)
3240 END REPEAT print_sect
3250 IF FX=0 THEN dont_know
3299 END DEFINE tell
3500 DEFINE PROCEDURE dont_know
3510 PRINT "I DON'T KNOW ANYTHING ABOUT ";X$
3520 PRINT "PERHAPS YOU WOULD LIKE TO TELL ME ABOUT ";X$
3599 END DEFINE dont_know
4000 DEFINE PROCEDURE does
4010 get_word
4015 X$=K$
4020 REPEAT add_word
4030 IF LEN(T$)=0 THEN EXIT add_word
4040 get_word
4050 END REPEAT add_word
4060 Y$=K$
4070 K$=X$
4080 FX=0:AX=0
4090 REPEAT text_int
4100 FOR I=1 TO SX
4110 IF W$(I)=X$ THEN
4120 FX=1
4130 IF W$(RX(I))=" IS A" THEN
```

```
4140 DX=PX(I)
4150 on_stack
4160 END IF
4170 IF W$(RX(I))=" HAS A" THEN
4180 DX=PX(I)
4190 on_stack
4200 comp_with_y$
4210 END IF
4220 IF W$(RX(I))=" HAS" THEN
4230 DX=PX(I)
4240 on_stack
4250 comp_with_y$
4260 END IF
4270 END IF
4280 END FOR I
4290 REPEAT pull
4300 IF TI%=1 THEN DX=0:EXIT pull
4310 off_stack
4320 IF DX<>0 THEN EXIT pull
4330 END REPEAT pull
4340 IF DX=0 THEN EXIT text_int
4350 X$=W$(DX)
4360 END REPEAT text_int
4370 no_inf
4399 END DEFINE does
4400 DEFINE PROCEDURE no_inf
4410 IF FX=0 THEN
4420 PRINT "NO INFORMATION ON ";K$
4430 END IF
4440 IF FX=1 THEN
4450 IF AX=0 THEN
4460 PRINT "NOT AS FAR AS I KNOW"
4470 ELSE
4480 PRINT "YES"
4490 END IF
4500 END IF
4599 END DEFINE no_inf
5000 DEFINE PROCEDURE is
5010 get_word
5020 X$=K$
5030 REPEAT more
5040 get_word
5050 IF LEN(T$)=0 THEN EXIT more
5060 END REPEAT more
5070 Y$=K$
5080 K$=X$
5090 FX=0:AX=0
5100 REPEAT is_a
5110 FOR I=1 TO SX
5120 IF W$(I)=X$ THEN
5130 FX=1
5140 IF W$(RX(I))=" IS A" THEN
5150 DX=PX(I)
5160 on_stack
5170 comp_with_y$
5180 END IF
```

```
5190 END IF
5200 END FOR I
5210 REPEAT pull
5220 IF TI%=1 THEN DX=0:EXIT pull
5230 off_stack
5240 IF DX<>0 THEN
5250 X$=W$(DX)
5260 EXIT pull
5270 END IF
5280 END REPEAT pull
5290 IF DX=0 THEN EXIT is_a
5300 END REPEAT is_a
5310 no_inf
5399 END DEFINE is
6000 DEFINE PROCEDURE add_inf
6010 R$=""
6020 REPEAT add
6030 get_word
6040 IF LEN(T$)=0 THEN EXIT add
6050 R$=R$ & " " & K$
6060 END REPEAT add
6070 Y$=K$
6099 END DEFINE add_inf
7000 DEFINE PROCEDURE change_point
7010 SX=SX+1
7020 W$(SX)=X$
7030 TX(SX)=4
7040 W$(SX+1)=R$
7050 TX(SX+1)=2
7060 W$(SX+2)=Y$
7070 RX(SX)=SX+1
7080 PX(SX)=SX+2
7090 SX=SX+2
7099 END DEFINE change_point
8000 DEFINE PROCEDURE on_stack
8010 IF TI%<NX THEN
8020 MX(TI%)=DX
8030 TI%=TI%+1
8040 END IF
8099 END DEFINE on_stack
8100 DEFINE PROCEDURE off_stack
8110 IF TI%>1 THEN
8120 TI%=TI%-1
8130 DX=MX(TI%)
8140 END IF
8199 END DEFINE off_stack
8200 DEFINE PROCEDURE comp_with_y$
8210 IF W$(PX(I))=Y$ THEN AX=1
8299 END DEFINE comp_with_y$
9000 DEFINE PROCEDURE check_len
9010 IF LEN(T$)<2 THEN
9020 T$=""
9030 ELSE
9040 T$=T$(2 TO LEN(T$))
9050 END IF
9099 END DEFINE check_len
```

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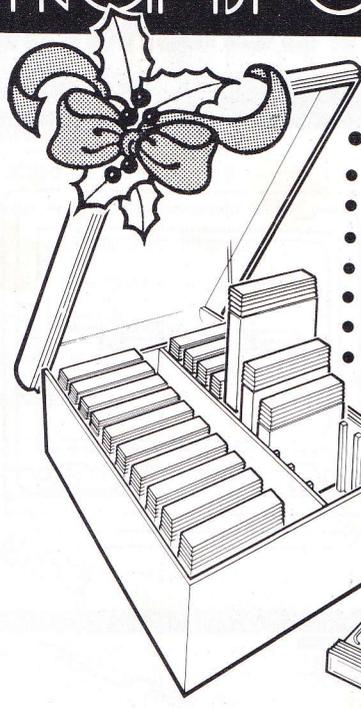
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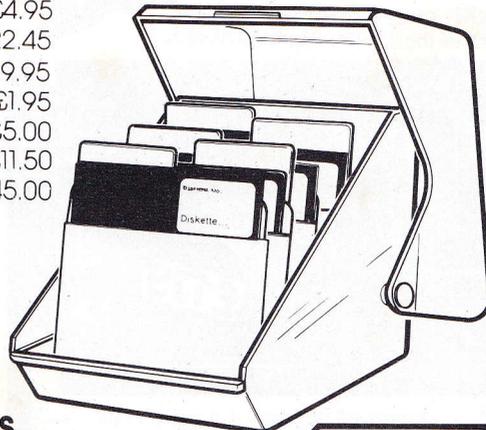
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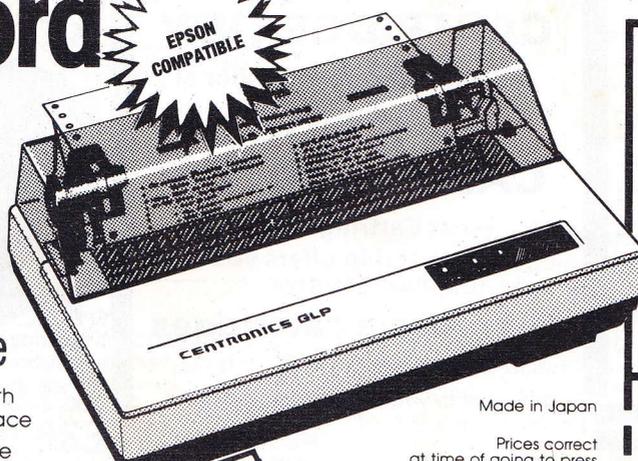
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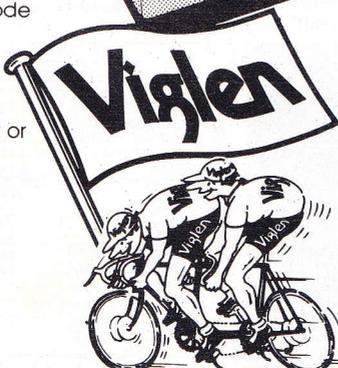
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BASIC DIFFERENCES

Backing up last month's feature on transferring Spectrum programs onto the QL's microdrives, Marcus Jeffery examines some of the differences between Spectrum BASIC and QL SuperBasic.

With the dramatic price drop of the QL recently, the machine is now a far more attractive proposition. To many people, looking for a new micro this Christmas, it will be viewed as a logical upgrade from the Spectrum, much as the Spectrum was the 'next step' from the ZX81. However, the present lack of software available for the QL is likely to entice many people into converting software from their old machine — not an easy task when you consider the vast differences between Spectrum BASIC and QL SuperBasic.

Fortunately, with SuperBasic being far more versatile than its predecessor, we can convert large chunks of code with remarkable ease. For instance, *Table 1* shows the mathematical functions available on the Spectrum,

MATHEMATICAL FUNCTIONS		
SPECTRUM FORMAT	QL FORMAT	USE
ABS x	ABS(x)	Returns Absolute Value
ACS x	ACOS(x)	Returns Arccosine
ASN x	ASIN(x)	Returns Arcsine
ATNx	ATAN(x)	Returns Arctangent
COS x	COS(x)	Returns Cosine
EXP x	EXP(x)	Returns Exponent
INT x	INT(x)	Returns Integer
LN x	LN(x)	Returns Common Logarithm
PI	PI	Gives value of Pi
SGN x	-----	Returns Sign as -1,0 or 1
SIN x	SIN(x)	Returns Sine
SQR x	SQRT(x)	Returns Square-root
TAN x	TAN(x)	Returns Tangent

Table 1. Trigonometric and other maths functions.

and their SuperBasic equivalents. As you can see, the only function lacking on the QL is SGN, which returns -1 for negative arguments, +1 for positive arguments, or zero for zero arguments. Here again, due to the flexibility of the QL, all you need to do is add the following lines to your program:

STRING FUNCTIONS		
SPECTRUM FORMAT	QL FORMAT	USE
CHR\$ x	CHR\$(x)	Returns ASCII character
CODE x\$	CODE(x\$)	Returns ASCII integer
LEN x\$	LEN(x\$)	Returns length of x\$
STR\$ x	x\$ = x	Converts x to string
VAL x\$	x = x\$	Converts x\$ to numeric
VAL\$ x\$	-----	Strips a level of string quotes

Table 2. Functions to permit string handling.

```
DEFine FuNction SGN(x)
IF x > 0 THEN
RETURN +1
IF x < 0 THEN
RETURN -1
RETURN 0
END DEFine SGN
```

From now on, the function SGN can be used on the QL in the same way as all the other functions, with the syntax SGN(x). One thing to be careful of when converting mathematical functions to the QL is where to put the brackets which are used in SuperBasic. If we take the following line in Spectrum BASIC:

```
PRINT ABS 5-9
```

You would probably expect the value four, because five minus nine equals four, and the absolute value of this is four. However, due to operator priority, the 'ABS 5' is executed before the subtraction, giving the final result minus four.

Having considered the numeric functions, let's look at strings (*Table 2*). On the whole, the Spectrum and the QL are very similar, both using string slicing, the same type of dimensioning and so on. Nevertheless, there are a few important differences in string use. For instance, try the following on the Spectrum:

```
DIM a$(10,20)
PRINT "***;a$(4)
(6 TO 9);***"
PRINT "***;a$(5);***"
```

When initially dimensioned, the Spectrum fills string arrays with spaces, so you'll get the output:

```
*{4 spaces}*
*{20 spaces}*
Now, if you try the same thing
```

on the QL, you'll get the output:

```
*{4 x CHR$(255)}*
**
```

These differences occur because the QL doesn't define the strings to contain spaces. The easy method of avoiding this is to fill all QL strings with spaces when they are first needed. You can do this using FILL\$, choosing a large repetition number, such as:

```
DIM a$(20)
a$ = FILL$(" ",100)
```

The QL has no need for the

sure they can also write a QL function to emulate it. This is simply a matter of removing one level of inverted commas from a string, then returning a string.

Both the Spectrum and the QL use the non-zero values for true and zero for false, so there shouldn't be too much trouble converting these (*Table 3*). Things should work even with the more complex use of the logical relations, such as:

```
LET a=b+(c>d)+e*
(f<=g)
```

The only problem you may come across is if you have a program containing something like:

```
PRINT 13 AND 7
```

If you perform a logical AND

LOGICAL OPERATORS		
SPECTRUM FORMAT	QL FORMAT	USE
x AND y	x AND y	Return TRUE if x AND y is true
NOT x	NOT x	Return opposite of x
x OR y	x OR y	Return TRUE if x OR y is true

Table 3. The logical operators AND, NOT and OR.

functions STR\$ and VAL, due to its use of coercion. If you want to perform the following Spectrum command:

```
LET a$ = STR$(1.234)
```

then simply assign the number to a string variable:

```
a$ = 1.234
```

The QL's coercion will take care of the rest. The VAL function is similarly handled by assigning a string number to a numeric variable. One other difference is that the QL

of the bits you'll get the answer five, the Spectrum will print thirteen, and the QL will print one.

When using the Pascal-like SuperBasic language, the advanced control structures make such commands as GO TO and GO SUB redundant. Fortunately, however, Sinclair have seen fit to leave these commands in the syntax for compatibility with other BASICs. As shown in *Table 4*,

CONTROL STRUCTURES		
SPECTRUM FORMAT	QL FORMAT	USE
DEF FN x () = expression	DEFine FuNction x () RETurn expression END DEFine x	Single-line function definition
FOR..TO..STEP statements NEXT	FOR..TO..STEP statements FOR..TO..STEP statements END FOR	Loop repetition control
FN x ()	x ()	Call function
GO SUB line	GOSUB line	Call subroutine
GO TO line	GOTO line	Go to line number
IF..THEN..ELSE	IF..THEN..ELSE or IF..THEN statements ELSE statements ENDIF	Condition control
RETURN	RETurn	Return from GOSUB call
STOP	STOP	Stop program execution

Table 4. Looping and other program flow commands.

uses & to concatenate strings, whereas the Spectrum uses +. The reason for using & is to avoid confusion when coercing results. For instance, on a Spectrum:

```
LET a = VAL "1.234" + 5
```

would give the result 6.234, because the VAL converts its immediate argument, then adds the five. On the QL:

```
a = "1.234" + 5
```

would give the correct result, but:

```
a = "1.234" & 5
```

would give '1.2345'. The & induces the QL to coerce the five to a string and concatenate the two strings before coercing back to a numeric value!

many of the control structures have a slightly different layout, but conversion from the Spectrum is still relatively simple. In all cases, the QL contains the more advanced structures, which can easily accommodate the elementary Spectrum features.

Moving on, *Table 5* shows the data and file handling commands. Again, conversion is relatively straightforward. Bear in mind that the Spectrum could have such lines as LOAD "" CODE to load some byte data or machine code. Using QL microdrives you'll have to change this to LBYTES and specify the file name. Another little anomaly is the RESTORE statement. On the Spectrum, the data

DATA AND FILE HANDLING		
SPECTRUM FORMAT	QL FORMAT	USE
DATA data list	DATA data list	List data for use by READ
DIM array list	DIM array list	Dimension vectors and arrays
LOAD filename	LOAD dev-filename	Load a BASIC program
LOAD filename CODE start, length	LBYTES dev-filename start	Load a data file
MERGE filename	MERGE dev-filename	Combine/Load program
READ variable(s)	READ variable(s)	Read a DATA item
RESTORE line	RESTORE line	Restore DATA pointer
SAVE filename	SAVE dev-filename	Save a BASIC program
SAVE filename CODE start, length	SBYTES dev-filename start, length	Save a data file

Table 5. SAVEing, LOADING and other file commands.

pointer is automatically restored to the beginning of a program as it is run. So, with the following program:

```
10 READ a
20 PRINT a
30 STOP
40 DATA 1,2,3,4
```

the digit '1' will be printed, however many times you may run it. If you try the same program on the QL, you'll get the answers '1', then '2', and so on. To be safe, when using READ and DATA, always include a RESTORE statement at the beginning of the program.

something like:

```
OPEN#4,serl
PRINT#4,"Printer
output"
```

Finally in this section, the QL has no equivalent to the Spectrum's INVERSE command. The way around this is to remember the current PAPER colour and INK colour, and swap them for the duration of the inverse printing.

Table 7 shows the few remaining miscellaneous commands. Both micros have a BEEP command, but the QL's is far more sophisticated

SIMPLE INPUT/OUTPUT		
SPECTRUM FORMAT	QL FORMAT	USE
*AT line, column	AT line, column	Set print position
CLS	CLS [channel]	Clear screen to current paper
COPY		Copy screen to printer
*FLASH 0 or 1	FLASH [channel] 0 or 1	Turn flashing off or on
*INK colour	INK [channel] colour	Print in specified colour
INKEY%	INKEY%	Check keyboard for key press
INPUT string, var(s)	INPUT string, var(s)	Input data from keyboard
*INVERSE 0 or 1	Swap INK/PAPER	Print in inverse colours
LPRINT expression	Use PRINT channel	Print the information to the printer
*OVER 0 or 1	OVER 0 or 1	Turn overwriting off/on
*PAPER colour	PAPER [channel] colour	Print on specified colour
PRINT expression	PRINT [channel] expression	Print the information to the screen
TAB column	TO column	Tabulate output (This is embedded in PRINT/INPUT statements on Spectrum and the QL)

* On the Spectrum, these commands will be found embedded in statements, such as PRINT, LPRINT, INPUT, PLOT, DRAW, and CIRCLE. On the QL, they should be separate statements prior to these commands.

Table 6. Basic I/O and screen commands.

Input and output of information are obviously very important in any program. Some of this will be based on screen graphic layout, and as such is bound to be very different from one machine to another. Before considering these, table 6 shows some of the simpler Input/Output commands. The Spectrum has eight colours (as has the QL in MODE 8/256) and, whilst printing, these can be changed in much the same way as on the QL. The Spectrum COPY command sends the appropriate bit patterns of each screen byte to a ZX printer, thus allowing you to copy any screen. On the QL, with its possible range of printers, this would be very difficult to write. However, if all you want is text, then it's easy enough to set up a printer channel and reprint the screen. If you write procedures to perform the printing within the program, you could then call it using different channel parameters. Setting up a printer channel is also the way to simulate LPRINT, using

(though it's dubious whether it sounds any better!). TheUSR command is for the Spectrum's User-Defined Graphic characters. These can be any of the graphics letters 'a' to 'u'. It's not too difficult to obtain user-defined graphics on the QL, just by reserving an area of memory (using RESPR), then POKING the appropriate bytes to use, say, codes 128 onwards.

Unfortunately, the QL's character sizes are not the same as those on the Spectrum, being narrower and taller, requiring nine bytes each. This makes any simulation of character graphics extremely difficult, and best avoided. The other commands in this table deal mainly with byte memory. If you've chosen a Spectrum program which uses

OTHER COMMANDS		
SPECTRUM FORMAT	QL FORMAT	USE
BEEP dur,pitch	BEEP dur,pitch,...	Activates speaker sound
BIN string of eight bits	Binary number	Binary number
CLEAR location	(RESPR)	Lowest RAMTOP, leaving free space above it
LET var = expression	LET var = expression	Assignment (Optional on QL, just use: var = expression)
PAUSE 1/50 sec.	PAUSE 1/50 sec.	Halt execution for delay
PEEK loc,value	PEEK loc,value	Retrieves value from memory
POKE loc,value	POKE loc,value	Place value in memory
RANDOMIZE seed	RANDOMIZE seed	Set random number generator
REM comment	REMARK comment	Comment statement
RND	RND	Produce random number
USR character	USR	Returns address of User Defined Graphic

Table 7. Miscellaneous Spectrum/QL commands.

PEEKs and POKEs, probably for machine code or directly accessing the display and attribute files, then you deserve all you get. Try to pick a program making more normal use of Spectrum BASIC.

We now start coming across the main problems when converting software. The layout of the Spectrum screen (Fig 1) is organised in two files. The first is a simple bit mapped on/off display file. The

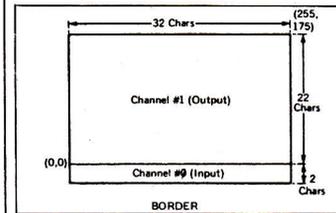


Figure 1. Spectrum screen layout.

horizontal axis has 32 bytes (256 pixels) and the vertical axis has 24 character lines (192 pixels), using 6144 bytes. In addition to this there is a separate 'Attribute' screen which has just one byte per character square. Each byte

This also gives a small BORDER which can be changed in response to the Spectrum's BORDER command. One feature of this command is that it also changes the PAPER colour of channel zero (input area). Therefore, you could easily redefine channel zero on the QL to fit over the border of channel one, without spoiling the screen effect.

The next problem is to alter the QL's graphics scale, to emulate the Spectrum's horizontal (256) and vertical (176) axis. The QL vertical scale begins at 100, and the first parameter of the scale command can change this to 176 — measured from the top left-hand corner of Window Zero (if you've defined this). Unfortunately, this does not give the correct horizontal distance, and the SCALE command will not allow us to define values for both axes. You could mess about for hours trying to improve these coordinate values, and never

GRAPHICS		
SPECTRUM FORMAT	QL FORMAT	USE
ATTR line,column		Returns attribute value of character square
BORDER colour	BORDER [channel] width, colour	Set colour of screen border
BRIGHT 0,1 or 8		Set character brightness
CIRCLE x,y,radius	CIRCLE x,y,radius	Draws a circle at x,y
DRAW dx,dy	LINE-R TO dx,dy	Draw line dx,dy (relative to present cursor)
PLOT x,y	POINT x,y	Plot point x,y
POINT x,y		Return 0/1 for paper/ink

Table 8. Commands for graphics manipulation.

contains the information for the PAPER colour (0 to 7), the INK colour (0 to 7), the BRIGHTness (on/off) and FLASHing (on/off). Then, just to make things a little more complicated still, the screen is split into two areas (like windows on the QL). Window one (Output) covers the topmost 22 lines, and is used for listing and printing, whilst the bottom two lines (window zero) are used for input, error messages, and so on. What's more, the graphics coordinates start from the bottom-left of the output window only, giving a range of (0,0) to (255,175).

Now the QL is flexible enough to emulate (to a degree) the Spectrum screen layout. Use MODE 8 to give the eight required colours, and try the following values to give the 32 column display:

```
WINDOW#1,416,256,48,0
CSIZE#1,2,0 {Default}
```

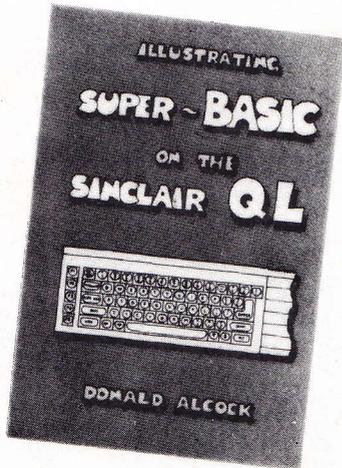
get particularly close to the Spectrum. By far the best method of handling this is to choose the position for a 32 column, 24 line display which suits your television or monitor, set the vertical scale for 176 coordinates, then divide the distance along the horizontal axis by 256. Now, when converting the program, multiply all the X-axis values by this amount.

We're not suggesting that this is all the information you'll need to go away and convert all your Spectrum programs. To do that properly, you really need to be familiar with both machines. For instance, it is unlikely that you'll be able to find any interesting Spectrum software which doesn't use user-defined graphics, Z80 machine code, direct screen addressing, system variables and the like. Just as QL software takes advantage of the QL's features, such as easily changed character sizes, windows, and so on. However, if you pick some of the simpler software, this information should at least guide you past the majority of pitfalls, and avoid some of those dreary error-searching hours.

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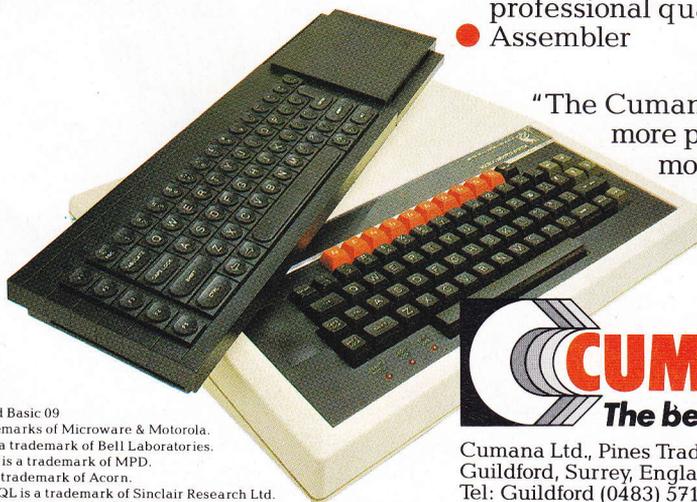
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Archive is probably the most difficult of the four Psion packages to really come to grips with, or at least it appears so, especially if you try to understand everything in the User Guide all at once. On the other hand it is a powerful package and probably more than any of the others, realises the potential of using a micro to replace a manual procedure. The purpose of this article is to give you some additional help and ideas, firstly on how to get started, and then on how to translate your particular application into an Archive database - whether its for high-powered scientific research or just keeping track of your record and tape collection. If you've already made a start with Archive the next section will just be revision before getting down to applications.

Archive is a tool for organising information - storing it, retrieving it, sorting it, searching through it and generally managing it. The analogy to a card-index system is a good one since information is stored on *records* (like the cards in a manual system) and the records are collected together in a *file* (like the card-index box). On each record there are a number of *fields* (like the spaces on each card) which are used to contain the information relevant to the particular item (or person) referred to by that record. Fields have a *type* which indicates whether the field is for textual or numeric information. The great advantage of using Archive instead of a manual card-index is that the laborious sorting and searching jobs are carried out automatically. When you add a new record to the file, or delete or amend an existing one, the file is automatically re-sorted.

Searching for particular items or groups of items, accumulating totals from individual fields on all or some of the records and (if you

have a printer) printing out sorted lists, reports or labels, can all be readily achieved with the Archive database system. Archive also allows you to have several database files open at once, so for more complicated applications it is ideal for linking together related information.

FIRST STEPS

Naturally; before you can use a tool effectively you need to know what it does and the basics of how to use it. This doesn't imply that you need to pore over every detail of the manual - in fact this is probably counter-productive. It's far better to experiment with a few simple examples first.

An obvious contender is the telephone/address list since it is quite straight-forward and probably all of us have one, even if it's only scribbled in the back of our diaries (maybe it is in a card-index box!). Load Archive and try typing the following:

```

Create "Phone" <ENTER>
Surname$ <ENTER>
Firstname$ <ENTER>
Address$ <ENTER>
Telephone$ <ENTER>
endcreate <ENTER>

```

You have just created your first database file - it really is as simple as that! The effect of the above command is to create a file named "Phone_dbf" (the "_dbf" part of the filename is the default file extension for database files) and each record in the file will have 4 text fields for storing the name, address and 'phone number of the people on the list. To insert some names and addresses in the file just type: **insert** which should cause a blank record to be displayed for you to type in the details. When you have entered a number of records press <F4> to leave insert mode. You could now try a number of the commands like **order** which sorts the file into

ascending or descending alphabetical order on any field (eg, Surname\$), **cls** which clears the screen, **display** which displays the current record, **search**, **find** and **locate** which are different ways of looking for a particular record, or **alter** which is used to change the record on display. There are many more commands on which you will find full details in the User Guide or, if you press <F1>, on Archive's own help pages. It's worth trying as many of the commands out as possible so that you get the feel of what you can do, and if you do this before you type in too much data, you won't feel too bad if you make an error and delete some data accidentally! (Do it after 2 hours typing and it's much more painful - so always remember to back up all your data at least once on another cartridge.) When you have finished using a file, to make sure it is all present and correct on the microdrive cartridge, you must type **close**, or **quit** (which also returns you to SuperBASIC) or **new** (which also clears any procedures or special screen formats from the computer's memory). To examine the file again use the command **look** or, if you want to change the file at all, **open**.

When you are reasonably confident about using commands the next step is to try to incorporate some in a few simple procedures. Procedures are ways of storing often repeated sets of commands, or of carrying out some processing on the data in the database.

For example, if you type all your address list into the machine it's not very convenient to have to nip up to the computer, load Archive and the database and then locate the required name, every time you want to ring someone up. It's much easier if you have a paper list too.

The advantage the database gives you for storing the address list is that it is easy to change and keep in alphabetical order, and it may be useful for things like typing address labels automatically. So to get the best of both worlds we need to write a procedure to print out the address list whenever an up-to-date copy is required. To do this first enter the command **edit**, to use Archive's screen editor, and type in the following procedure. The language used is actually a dialect of BASIC specifically developed for the database package and incorporating all the commands which can be used directly from the keyboard. Here's the procedure:

proc AdList

```
rem *** Prints the address list on the
rem *** screen or to a printer
input "Send output to printer (y/n)? ";Ans$
spooloff
if Ans$ < > "y" and Ans$ < > "Y"
  cls :rem *** Output sent to screen
  spoolon screen
  endif
first :rem *** Start at the beginning of the file
while not eof ( )
  lprint "Name: +Firstname$+" "+Surname$
  lprint "Address: "+Address$
  lprint "Telephone: "+Telephone$
  lprint
  next :rem *** Go to the next record
endwhile
spooloff
endproc
```

The procedure prints out a list of all the addresses in the database in the order in which they are held in the file. If you used the **order** command this will be alphabetical order, otherwise it's likely to be in an order related to how you typed it in. Having typed in the procedure, press <ESC> twice to exit the editor and use **save** to store the procedure on microdrive, as the procedure will be lost from memory when you **quit** or type **new**. To try it out type **Adlist**.

The procedure demonstrates a few features of Archive's language like the conditional statement (**if**) and the loop statement (**while**) which use a strictly *structured* form – no GOTO's allowed! It may take a little getting used to if you've only used BASIC before, but while it's sometimes a little inconvenient it should result in clearer programs

to read. Remember, anything you can write with a GOTO you can write in a structured form using **if / then / else / endif** or **while / endwhile**. If you need to jump forwards in the program an **if** statement could replace the jump, if you need to jump backwards a **while** could be used. Other additional features of the language include the **trace** command which shows you the statements as they are being executed – very useful for debugging.

Having noted some of the differences with BASIC, writing procedures for Archive is nevertheless in most respects very similar to writing in SuperBasic, and it's not the intention of this article to spend

too much time on this aspect. As practice in writing procedures try writing one to help inputting the data. For example after asking for each field it could change the surname to upper-case, firstname to initial upper-case followed by lower-case, and check the phone number contains only numbers. Use the **append** command to enter each record into the database.

APPLIED SCIENCE

What about other more complicated applications? The really good thing about Archive is that you can tailor it to your own interest and use it to store and organise data how you want it. There is no limit to what you could apply it to: stock control, mailing lists and lending libraries are some obvious suggestions, but what about butterfly collecting, gardening, school

reports and form lists (for teachers), facts for exam revision (for pupils), quiz games (and other trivial pursuits), catalogues of products, photograph collections, analysis of experimental results or even storing information about your wine cellar!

The first part of the job is to really examine what you want to do and how you think Archive is going to help. It's all too easy to jump in with both feet, spend a few hours bashing the keyboard to set up a database, and probably quite a few more hours typing in the data, only to find that it doesn't do the job you want it to do. Even with thought you may not get it right first time, but you can always add enhancements if you've got the basic structure right. A little time spent examining the problem at the beginning really pays dividends.

Archive allows you to use multiple data files simultaneously, which is a feature you may want to use as it is very useful for referring to a different set of information from a data record. For example, a school form list might well contain the addresses of the pupils, but it would be inconvenient to also store the reports in the same file, and time-consuming to type addresses into the report file. Two files with a simple cross-reference between them is therefore required.

If you do reference other files it is important that you pick up the right record. Surnames are rarely unique, and even with initials or first names can often be duplicated, so it is better to have another field for a reference number. Such a field is known as the primary key to the file, and one value of the primary should key give us only one record.

As well as considering what data you want to store and whether it can conveniently be stored as one or more files, you must consider how the database is going to be used – how information gets in and how it gets out. Ideally data going in should be checked to make sure it is consistent with what is already in the database, and data being output may well be required in the form of a report (for which a procedure will probably be needed) or a special

screen format (which can be designed using the **sedif** command). How much time you spend writing input procedures and so on will really depend on how important it is that mistakes are found during input, and possibly on who inputs the data.

PHILASOPHY

Consider another example – collecting stamps. Depending on the size of your collection you might want to store data on each of your stamps, or just those in a particular album, or maybe one data record per page or per album. Depending on how you want to use the data and what sort of reports you want the computer to give you when all the data has been entered, you might want to store the purchase price of stamps, their estimated value, catalogue cost, condition, date of issue, and so. You might even want to store details of stamps that you'd like to own one day! You will need to take into account the total number of records you want to create, as if you have an unexpanded QL and sort your files on one field, the maximum would be about 1000 records. If you collect stamps and wish to use Archive to catalogue your collection you may choose to store slightly different data from that which I that chosen, but in any case here is an attempt at setting up data files for this application.

Looking at the data to be stored you will see that it falls into two categories: data about particular stamps in the collection, and data about particular types of stamps (of which there may be a number of examples in the collection). This suggests that two data files will be needed. The following two procedures define suitable database files:

proc NewTypes;Filename\$

```
proc NewTypes;Filename$
rem *** Creates a new file for storing
rem *** data about types of stamps
create Filename$ logical "1"
  Type_Ref_No
  Stamp_Name$
  Country$
  Issue_Date$
  Mint_Value
  Used_Value
  Comments$
endcreate
order Type_Ref_No$
endproc
```

proc NewCollection; Filename\$

```

proc NewCollection;Filename$
ren *** Creates a new file for stamp collection
create Filename$ logical "S"
Stamp_Ref_No
Stamp_Type
Page_No
Position_No
Mint
Purchase_Bt$
Cost
Sale_Value
Comments$
endcreate

```

Having run these procedures with suitable file names as parameters we can start entering data about stamps. However a data entry procedure might be useful which could search for the appropriate stamp type name and if the type had not yet been entered allow both files to be updated together.

Other useful procedures would be one to print the catalogue of the whole collection and one to print a summary report of the total value of the collection. Here are my suggestions for these procedures, firstly to output the value of the collection:

proc FindValue

```

proc FindValue
ren *** To show total value of album
spoolon screen
cls :CenPrint;"Total Cost and Value",80
CenPrint;"-----",80; lprint
let Total_Val=0; let Total_Cost=0
all "S"
let Total_Val=Total_Val+S.Sale_Value
let Total_Cost=Total_Cost+S.Cost
endall
CenPrint;"Cost of collection = "+dec(Total_Cost,2,8),80
CenPrint;"Estimated sale value of collection = "+dec(Total_Val,2,8),80
spooloff : print : print :YesNo;"Okay?"
endproc

```

proc Catalogue

```

proc Catalogue
ren *** Prints catalogue of collection to screen or printer
print :YesNo;"Do you want the catalogue sent to printer?"
spooloff : if not yes: spoolon screen : endif
let yes=0
while not yes
YesNo;"Print catalogue in Country/Date order?"
if yes
use "T": order Country$a,Issue_Date$a; first
use "S": order Stamp_Type$a;Heading;1
while not eof("T")
use "S": locate T.Type_Ref_No
while S.Stamp_Type=T.Type_Ref_No and not eof("S")
PrinStamp; next "S": endwhile
next "T": endwhile
lprint rept("-",79)
else
YesNo;"Print catalogue in Page/Position order of album?"
if yes
use "S": order Page_No$a,Position_No$a
use "T": order Type_Ref_No$a
Heading;2; first "S"
while not eof("S")

```

```

use "T": locate S.Stamp_Type
PrinStamp; next "S": endwhile
lprint rept("-",79)
endif
endif
print :YesNo;"Okay?"
endwhile
Reorder: spooloff
endproc

```

proc Heading;N

```

proc Heading;N
ren *** Output heading for catalogue
let Ord$="Country/Issue-date"
if N=2: let Ord$="Page/Position": endif
cls :CenPrint;"STAMP CATALOGUE for album: "+Album_Name$,79
lprint :CenPrint;"printed in "+Ord$+" order",79; lprint
lprint : lprint rept("-",79):BlankLine
lprint "iPage Pos. | STAMP NAME | Country | Issue Date |
Cost | Value|Cat.Val!"
lprint "i-----|-----|-----|-----|
-----|-----|-----|-----|
BlankLine:BlankLine
endproc

```

proc PrinStamp

```

proc PrinStamp
ren *** Outputs details of one stamp (current record)
lprint "i";dec(S.Page_No,0,4);dec(S.Position_No,0,4);"
i";:CenPrint;T.Stamp_Name$,17
lprint "i";:CenPrint;T.Country$,13; lprint "i";
CenPrint;T.Issue_Date$,12; lprint "i";
CenPrint;dec(S.Cost,2,6)+" i"+dec(S.Sale_Value,2,6),14
lprint "i";
if S.Mint:CenPrint;dec(T.Mint_Value,2,6),7
else :CenPrint;dec(T.Used_Value,2,6),7; endif
if S.Comments$(">)" or T.Comments$(">)"
lprint "i"; lprint "i" | | "i";
CenPrint;S.Comments$+" / "+T.Comments$,49; endif
lprint "i";BlankLine
endproc

```

Notice that the "Catalogue" line in the table, and the details of procedure calls other procedures individual stamps. to output the heading, a blank

proc AltStamp

```

proc AltStamp
ren *** Alter existing stamp record
Which
YesNo;"Do you wish to change the stamp type?"
if yes: cls :GetType: let S.Stamp_Type=T.Type_Ref_No; endif
use "S": alter : return
endproc
proc BlankLine
ren *** Blank line in catalogue
lprint "i" | | | | |
| | |
endproc
proc Bye
ren *** Closes all files that may be open
while 1: close : endwhile
endproc

```

proc GetType

```

rea *** Finds appropriate stamp type (or enters it)
print : print "What is the type of stamp to be entered?"
use "T": let yes=0
while not yes
  print "Reply with stamp Type_Ref_No (if known)"
  print "      or part of Stamp_Name (not numerical)"
  print "      or press <ENTER> to enter new stamp type."
  print : input "Stamp type: ";Ans$
  if Ans$="":InpType: else
    let Ref_No=val(Ans$)
    if Ref_No(>0): locate Ref_No: display : else
      find Ans$: display
      while not yes
        if found(): sprint : print tab 12; " :YesNo;"OK (y/n)? "
          if not yes: continue : endif
          else : print "NOT FOUND *** "; let yes=1: endif
      endwhile
    endif
  endif
  sprint :YesNo;"Is this stamp type the correct one?": cls
endwhile
endproc

```

proc InpStamp

```

rea *** Input new stamp record
cls : print "INPUT"
use "S": last :rea *** Set up Ref. No.
let S.Stamp_Ref_No=S.Stamp_ref_No+1
GetType: let S.Stamp_Type=T.Type_Ref_No
let S.Mint=0: let S.Page_No=0: let S.Purchase_Dt$=""
let S.Cost=0: let S.Sale_Value=0: let S.Comments$=""
let S.Position_No=0
use "S": append : alter : return
endproc

```

proc InpType

```

rea *** Input a new stamp type
YesNo;"Are you sure a new stamp type is needed?"
if not yes: return : endif
let OK=1: use "T": last
let T.Type_Ref_No=T.Type_Ref_No+1
let Stamp_Name$="": let Country$="Great Britain"
let Issue_Date$="YYYY/MM/DD": let Mint_Value=0
let Used_Value=0: let Comments$=""
append : alter : return
endproc

```

proc Menu

```

rea *** Display and execute options
Reorder
while 1
  cls : print : print "Choose options:"
  print : print tab 10;"(I)  Insert new stamp"
  print tab 10;"(A)  Alter stamp"
  print tab 10;"(C)  Output catalogue"
  print tab 10;"(V)  Estimate value of collection"
  print : print tab 10;"(X)  Exit (and close files)"
  let A$=inkey(): let A$=getkey()
  if upper(A$)="I":InpStamp: endif
  if upper(A$)="A":AltStamp: endif
  if upper(A$)="C":Catalogue: endif
  if upper(A$)="V":FindValue: endif
  if upper(A$)="X": error bye: stop : endif
endwhile
endproc

```

proc Start

```

rea *** Start-up procedure
mode 1,8: cls
YesNo;"Does the Stamp Catalogue file exist (stamp types)?"
input "Name for Stamp Catalogue file: ";N$
if yes:YesNo;"Need to modify?"
  if yes: open N$ logical "T": else look N$ logical "T": endif
  else :NewTypes;N$: endif
YesNo;"Does the Stamp Album file exist?"
input "Name for Stamp Album file: ";Album_Name$
if yes:YesNo;"Need to modify?"
  if yes: open Album_Name$ logical "S"
  else : look Album_Name$ logical "S": endif
  else :NewCollection;Album_Name$: endif
Menu
endproc
proc Which
rea *** Identifies the stamp for change
let yes=0: use "S": display
while not yes
  input "Stamp reference number? ";Ref_No
  locate Ref_No: sprint
  print "
  YesNo;"Correct stamp? "
endwhile
endproc

```

proc YesNo;P\$

```

proc YesNo;P$
rea *** Gets Y or N from keyboard and sets 'yes'
while 1
  print P$: let Q$=lower(getkey())
  let yes=(Q$="y")
  if instr("ny",Q$): print " "+Q$
  return : endif
print : endwhile
endproc

```

All the procedures also make use of the following more general purpose procedures for outputting a centred line of text, reordering the files, and obtaining a yes or no reply to a prompt.

proc CenPrint;S\$,Ln

```

proc CenPrint;S$,Ln
rea *** Centres or truncates string in given length
if len(S$)=Ln: lprint S$( to Ln): return : endif
let T=int((Ln-len(S$))/2)
lprint rept(" ",T);S$;rept(" ",Ln-T-len(S$));
endproc

```

proc Reorder

```

proc Reorder
rea *** Puts the files back in Ref. No. order
use "S": order Stamp_Ref_No;a
use "T": order Type_Ref_No;a
endproc

```

The procedures make use of the logical names of the files "S" and "T" given when the files were created. Whenever the files are opened the same logical names should be specified in the open or look command.

3 IN 1

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					Total		

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Name _____

Address _____

Postcode _____

DIPPING IN

Assorted printer driver and DIP switch settings for the QL

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Shinwa CP80 (type1)

None
9600
CR,LF
FF
ESC,"@,0
none
ESC,"E
ESC,"F
ESC,"-,1
ESC,"-,0
ESC,"S,1
ESC,"T,ESC,"H
ESC,"S,0
ESC,"T,ESC,"H
"£,129

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Qume LP20

none
9600
CR,LF
FF
ESC,CR,"P
none
ESC,"Q
ESC,"R
ESC,"I
ESC,"J
ESC,"U
ESC,"D
ESC,"U
ESC,"D
"£,35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Brother KP22

none
300
CR,LF
FF
none
"£,156

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Smith Corona L-1000

none
1200
CR,LF
FF
ESC,"C,ESC,"9
none
DEF
DEF
ESC,"C
ESC,"R
none
none
none
none
none
"£,35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1
Translate 2

Brother KP44

none
1200
CR,LF
FF
none
none
none
none
ESC,"E
ESC,"R
ESC,"U
ESC,"D
ESC,"D
ESC,"U
"£,35
"!,"",8,".

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1
Translate 2
[Red On]
[Red Off]

Brother HR15/25/35

None
9600
CR,LF
FF
ESC,CR,"P
none
ESC,"W
ESC,"&
ESC,"E
ESC,"R
ESC,"U
ESC,"D
ESC,"D
ESC,"U
"£,35
35,92,8,61
ESC,"A
ESC,"B

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Brother HR-5

Space
300
CR,LF
FF
ESC,CR,"P
none
ESC,"E
ESC,"F
ESC,"-,1
ESC,"-,0
ESC,"S,0
ESC,"S,1
ESC,"S,1
ESC,"S,0
"£,35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Translate 1

SPG 8010

none
9600
CR,LF
FF
ESC,"R,4
none
ESC,"d
ESC,"e
ESC,"f,1
ESC,"f,0
ESC,"h,0
ESC,"h,1
"£,"\$

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Riteman II

EVEN
9600
CR
FF
ESC, "@"
none
ESC, "E
ESC, "F
ESC, "-", 1
ESC, "-", 0
ESC, "4
ESC, "5
ESC, "W, 1
ESC, "W, 0
"£, ESC, "I, "33, 6, ESC, "I, 48

Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

ESC, "E
ESC, "R
ESC, 30, 6, "U, ESC, 30, 8
ESC, 30, 6, "D, ESC, 30, 8
ESC, 30, 6, "D, ESC, 30, 8
ESC, 30, 6, "U, ESC, 30, 8
"£, 35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1
[NLQ On]

Kaga Taxan & Canon PW1080A

EVEN
9600
CR, LF
FF
ESC, "R, 3
none
ESC, "E
ESC, "F
ESC, "-", 1
ESC, "-", 0
ESC, "S, 1
ESC, "T
ESC, "S, 0
ESC, "T
"£, 35
ESC, "("

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

OK Writer

none
1200
CR, LF
FF
24, ESC, 0
none
ESC, "H
ESC, "I
ESC, "C
ESC, "D
ESC, 28
ESC, 0
ESC, 31
ESC, 0
"£, 35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Quen Data DWP 1120

SPACE
300
CR, LF
FF
ESC, 26, "I
none
ESC, "W
ESC, "&
ESC, "_
ESC, "R
ESC, "D
ESC, "U
ESC, "U
ESC, "D
"£, 35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Diablo

none
9600
CR, LF
FF
none
none
ESC, 33
ESC, 34
ESC, "X
ESC, "Y
ESC, "G, 1
ESC, "Z
ESC, "G, 0
ESC, "Z
"£, 35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1
[NLQ On]
[NLQ Off]

Epson LX-80

none
9600
CR, LF
FF
ESC, "@"
ESC, "R, 0
ESC, "E
ESC, "F
ESC, "-", 1
ESC, "-", 0
ESC, "S, 1
ESC, "T
ESC, "S, 0
ESC, "T
"£, 35
ESC, "x, 1
ESC, "x, 0

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Brother M1009

SPACE
9600
CR, LF
FF
ESC, "R, 3
none
ESC, "E
ESC, "F
ESC, "-", 1
ESC, "-", 0
ESC, "S, 0
ESC, "T
ESC, "S, 1
ESC, T
"£, 35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off
Underline On
Underline Off
Subscript On
Subscript Off
Superscript On
Superscript Off
Translate 1

Daisystep 2000

none
1200
CR, LF
FF
none
none
ESC, "Q
ESC, "&
ESC, "_
ESC, "R
ESC, "U
ESC, "D
ESC, "D
ESC, "U
"£, 35

PRINTER

Parity
Baud Rate
End of Line Code
End of Page Code
Preamble Code
Postamble Code
Bold On
Bold Off

Juki 6100

EVEN
300
CR, LF
FF
CR, ESC, 9, 0, ESC, "9
none
ESC, "W
ESC, "&

Dip Switch Settings

Daisystep 2000 Printer

Manufacturer's Interface

A1	On	B1	-	SW1	Left
A2	On	B2	On	SW2	Left
A3	On	B3	On	SW3	Right
A4	On	B4	On		
A5	On	B5	On		
A6	On	B6	On		
A7	On	B7	On		
A8	On	B8	On		

Juki 6100 Printer

Manufacturer's Interface

A1	Off	SW1	On	A7	Off
A2	Off	SW2	On	A8	On
A3	On	SW3	Off	A9	Off
A4	Off	SW4	Off	A10	Off
A5	On	SW5	Off		
A6	On	SW6	On		

Riteman II Printer

Left Right Upper Right

L-1	On	R-1	On	UR-1	On
L-2	On	R-2	On	UR-2	On
L-3	On	R-3	Off	UR-3	On
L-4	On	R-4	Off	UR-4	Off
L-5	Off	R-5	On	UR-5	Off
L-6	Off	R-6	On	UR-6	Off
L-7	Off	R-7	Off	UR-7	Off
L-8	Off	R-8	Off	UR-8	Off
				UR-9	Off
				UR-10	On

Epson LX-80 Printer

1-8	Off	2-4	Off
1-7	Off	2-3	Off

1-6	On	2-2	On
1-5	Off	2-1	Off
1-4	Off		
1-3	Off		
1-2	Off		
1-1	Off		

Brother HR-5 Printer

1-1	Off	2-1	On
1-2	On	2-2	On
1-3	Off	2-3	Off
1-4	On	2-4	Off
1-5	Off	2-5	Off
1-6	On	2-6	Off
1-7	Off		
1-8	Off		

Brother M1009 Printer

Version K	Later Versions	Version K	Later Versions
1-1	Off	1-1	On
1-2	On	1-2	On
1-3	On	1-3	On
1-4	On	1-4	On
1-5	On	1-5	On
1-6	On	1-6	Off
1-7	Off	1-7	Off
1-8	Off	1-8	Off
		2-1	On
		2-2	On
		2-3	Off
		2-4	Off
		2-5	On
		2-6	Off
		2-7	On
		2-8	On

Kaga Taxan & Canon PW1080 Printer

Manufacturer's Interface

1-1	On	2-1	Off	3-1	Off
1-2	On	2-2	Off	3-2	Off
1-3	Off	2-3	On	3-3	Off
1-4	Off	2-4	Off	3-4	Off
1-5	Off	2-5	Off		
1-6	On	2-6	Off		
1-7	On	2-7	Off		
1-8	Off	2-8	Off		

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40Mb system only . . .	£2700
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CST are pleased to announce yet another first for the Sinclair QL.

A range of 10, 20 and 40Mb Winchester systems with optionally one or two 3.5 inch 720K Floppy disc drives and high speed tape streaming output, in one enclosure.

These systems are designed for the professional office environment and care has been taken to avoid unsightly cable connections.

With the exception of the 10Mb unit without floppy, the QL power supply is built in and there are 3 mains outlets at the back for monitor, printer, graph plotter etc...

Winchesters can store huge amounts of valuable information; for example a 10Mb unit can store as much as approximately 100 microdrives. Good back up is essential when relying on one storage facility. Hence CST has developed a simple yet sophisticated system to provide easy backup of data on floppy disc, high speed streaming tape or microdrive.

The CST Winchester systems were developed with close co-operation from Sinclair Research Ltd and are fully compatible with the QL, QDOS, Psion application programs and all planned Sinclair peripherals and software.

For applications requiring more than one interface, the CST Q+4 Expansion system can be used (as illustrated above), to connect up to four interfaces to the QL.

If you have any questions as to which system would be most suitable for your application, please do not hesitate to contact us.

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Cambridge Systems Technology

PART 3 The Commands

Last month we developed a number of general library routines for use within our programs. In so doing we looked at how to enter information on the computer (*gen_in*), how to display it (*prompt*) and how to store and retrieve it using DATA statements or files on microdrive cartridges. Here using similar techniques we examine how the QL understands things, makes decisions about them and manipulates them.

NUMBER CRUNCHER

Everything on a computer is dealt with numerically. Where we are dealing with numbers as opposed to characters this poses few problems. Simply regard the QL as a glorified calculator with virtually unlimited memory. Arithmetic operations need not be entered step by step but may appear all together on a single line:

PRINT 3+2*5+7

When entering complex formulae on the QL there are two points to note. First, the order of evaluation is determined by the priority of the arithmetic operator (see Table 1).

PRIORITY	SYMBOL	DESCRIPTION
1.	^	Raise to the power
2.	*	Multiplication
	/	Division
	DIV	Integer Division
	MOD	Integer Remainder (ie modulus)

3. + Addition
- Subtraction

Table 1: Arithmetic Operators

Second, whilst the QL is capable of handling numbers over a range from -10⁶16 to +10⁶16 it is accurate to only SEVEN SIGNIFICANT FIGURES. Anything in excess will be rounded up and expressed as a seven figure number followed by its exponent. For example:

PRINT 1234567
gives 1.234567E6

CHARACTER CODE

When it comes to how the QL treats characters, things are a little harder to understand. What may appear to us as a letter, punctuation mark and even mathematical symbol is to the QL a uniquely coded number with a value between 32 and 127. This value is set according to a standard international code known as ASCII (see *Concepts Section* in User Guide). To ascertain that this is the case enter:

PRINT CODE("A")
this will display the value 65.
PRINT CHR\$(65)
this will display "A".

CHR\$ converts the code back into the character.

One interesting feature of the ASCII code is that a difference of 32 separates each upper case letter from its lower case equivalent. This means that if you want to convert any character from upper to lower or vice-versa you need only apply the following

formulae respectively:
lower\$ = CHR\$(CODE (any_capital\$)+32)
upper\$ = CHR\$(CODE (any_lower\$)-32)

often this is written as:
lower\$ = CHR\$(CODE (any_capital\$)+CODE ("A")-CODE("a"))
upper\$ = CHR\$(CODE (any_lower\$)+CODE ("A")-CODE("a"))

Using this formula we can add a further procedure to our library (*Listing 1*) which when passed a string will change the case of each character within it, so that, a lower case character becomes an upper case one and vice versa. As usual the amended string will be returned in the variable *temp\$*.

STRING STORAGE

To recap briefly then, when we assign a collection of characters to a string variable, each is coded and then stored in sequence. The amount of memory that a string occupies depends on its size and is not fixed as it is with a numeric or integer variable. In fact, the only limitation upon a string's length is the amount of free memory available (where each character occupies one byte of memory).

Once characters have been grouped together in a string they may be manipulated in all sorts of ways. For example, where:

a\$="blackredgreenwhite"
b\$="bluemagentacyan yellow"

we can join strings together (concatenate) using the & operator.

all_colour\$=a\$ & b\$

(ie all_colour\$= "blackredgreen whitebluemagentacyanyellow") or else we can extract a portion of a string. If a group of characters are required we must specify the positions of the first and last characters within the string.

col1\$=a\$(1 TO 5)
(col1\$="black")
col2\$=a\$(6 TO 9)
(col2\$="red")

col3\$=a\$(1 TO 5)&" and "&b\$(1 TO 4)

(col3\$="black and blue")
If we wish to extract a single character we need only give its position in the string.

char1\$=a\$(17)
(char1\$="t")
char2\$=b\$(20)
(char2\$="w")

Just as we can extract portions from a string we can also replace portions within it

a\$(9 TO 13)="ochre"
(will replace "green" with "ochre" a\$="blackredochre white")

However, when altering an existing string using this method it is important to bear in mind that you cannot increase the amount of memory allocated to it. In other words you cannot change its size. For example an attempt to replace "white" in string a\$ with "tangerine" (ie, a\$(14 to 23)="tangerine") would result in only the first five letters "tange" being moved in. The reason for this is that a string's size is set only when characters are assigned to the WHOLE of it. Replacement of some of its parts will not increase the memory allocation. So, if we want to add "tangerine" we would use the following method:

a\$=a\$(1 TO 13)&"tangerine"

The length of a string can be found using the function LEN(string).

PRINT LEN("Sinclair QL")

will display a value of 10

str_len% = LEN(b\$)

will restore length of the string b\$ in str_len%

For most complex string manipulations LEN plays a vital role. For example, SuperBasic unlike many other dialects does not have a RIGHT\$ function. This permits you to slice strings up from right to left. However, using LEN such a function may be constructed with:

slice\$=a\$(LEN(a\$)+1- characters_to_slice TO LEN(a\$))

The command INSTR, short for "IN STRing", allows us to search through a string to see whether another string is contained within it. It returns a value of zero if no match is found otherwise the position of the first character in the match will be returned.

LISTING 1

```
30000 REMark *** Case convertor ***
30010 DEFine PROCedure case_conv(str$)
30020 LOCal f
30030 temp$=str$
30040 FOR test = 1 TO LEN (str$)
30050 f = CODE(str$(test))
30060 IF f>64 AND f<91 THEN temp$(test)=CHR$(f+32)
30070 IF f>96 AND f<123 THEN temp$(test)=CHR$(f-32)
30080 END FOR test
30090 END DEFine
```

M1 = "cyan" INSTR b\$. . .

(returns 12 ie . . .
"bluemagentacyanyellow")

M2 = col2\$ INSTR all_colour\$
(returns 19)

M3 = "blue" INSTR a\$
(no match - returns 0)

Often it is necessary to set up strings containing a large number of identical characters. Assigning each character in turn is both repetitive and prone to error, particularly where spaces are concerned. However, provided no more than two characters are to be repeated the function **FILL\$** may be used. You simply specify the character(s) to fill with and the length of the string to be filled.

blank\$ = FILL\$(" ",50)

(creates a string with 50 spaces)

asterisk\$ = FILL\$("*",5)

(asterisk\$ = "*****")

mix\$ = FILL\$(" - ")

(mix\$ = " - - ")

A possible application using **FILL\$** would be to centre a string on paper. Assuming you are using an 80 column printer this would be:

temp\$ = FILL\$(" ",(80/2-LEN(a\$)/2))&a\$:PRINT temp\$

of course, a more efficient alternative would be to use **AT**

AT (80/2-LEN(a\$)/2):PRINT a\$

Coercion (mentioned briefly in Part 1) provides a bridge between different data types. It permits numbers to be converted into strings and strings to be converted into numeric values provided, in the latter case, that there is no type mismatch.

Additionally, you can convert floating point numbers into integers and vice versa. The following examples illustrate what may be achieved.

1. Integer to floating point

10 **x% = 237: y% = 5**

20 **result = x% / y%**

2. Floating point to integer

10 **fl_point = 678.54**

20 **integer% = fl_point**

It is worth noting that numbers are rounded and not truncated as with the **INT** function.

3. Numeric to string

10 **number = -113.675**

20 **string\$ = number**

30 **PRINT string\$(5 TO 8)**

4. String to floating point or integer

10 **sale\$ = "23.50":**

cost\$ = "12.45"

20 **profit = sale\$ - cost\$**

30 **NP% = (100*profit)/sale\$**

If a string holds non-numeric characters then conversion will not be possible. For instance **value = "£123.45"** will generate an error as the pound sign is non-numeric and consequently unacceptable.

Aside from **INPUT** routines, this type of coercion is most commonly encountered where time or calendar date are incorporated into programs.

CLOCK AND CALENDAR

The QL's internal clock (and calendar) works only when the machine is on. As a consequence the date and time must be set at the beginning of every session. This is done using the function **SDATE**. It takes the form:

SDATE year,month,day,hour,minute,second

All values are numeric. However for reasons mentioned in the last section, if these values are to be **INPUT** they need to be entered as strings, checked and then coerced into their numeric equivalents. The library routine given in *Listing 2* shows how this may be done (note that it makes use of the procedures given in Part 2 of this manual).

Once the current date and time have been entered, the QL will keep track of them until it is switched off. To get time and date to display we use the function **DATES\$**. This returns a string laid out as follows
"yyyymmdd hh:mm:ss"
In this case coercion would be required to process each bit of information. For example:

10 **birthyear% = 1957**

20 **now\$ = DATES\$**

30 **years_old% = now\$(1 TO 4) - birthyear%**

An alternative to using coercion is to use the function **DATE**. This measures time in seconds and provides an economical way of storing information on file. **DATE** may be converted into a readable format using **DATES\$**. The following program illustrates how this works:

10 **SDATE 1986,1,1,0,0,0**

20 **PRINT "The date and Time is"!DATES: now = DATE**

30 **PRINT DATE!"seconds have elapsed since"!DATES\$(0)!**

As shown above **DATE** is measured in the number of seconds that have elapsed since "1961 Jan 1 00:00:00".

Incidentally, the furthest into the future you can go is 2/2/2097.

The command **ADATE** allows the QL's clock to be fine tuned. Adjustments are entered in seconds.

ADATE 60

(forwards 60 secs)

ADATE -43200

(back 12 hours)

Another useful clock function is **DAY\$**. This will return the day

from the internal clock (Mon,Tue,etc).

PRINT DAYS

(will display current day)

PRINT DAYS\$(0)

(displays 'Sun' being 1/1/1961)

This ties up our examination of SuperBasic. In the three installments of this manual we have tried to cover the areas which have hardly been touched upon by Sinclair's User Guide. The object has been to shine some light on the unknown rather than restate the obvious. We end with a word of encouragement to those new to programming. Remember over 90% of all programs ever written have bugs in them!

LISTING 2

```

30000 REMark **** Date Entry *****
30010 DEFine PROCedure date_entry(ch,x,y)
30020 LOCal loop,dte,yy$,mm$,dd$
30030 mm$="":yy$="":dd$=""
30040 REPEat d_inner
30050   dte=0
30060   prompt "Enter Day",1,5,40
30070   gen_in dd$,2,ch,x,y:dd$=temp$
30080   prompt "Month",1,5,40
30090   gen_in mm$,2,ch,x+3,y:mm$=temp$
30100   prompt "Enter year in full",1,5,40
30110   gen_in yy$,4,ch,x+6,y:yy$=temp$
30120   temp$=yy$&mm$&dd$
30130   FOR loop=1 TO LEN(temp$)
30140     dte = temp$(loop) INSTR "1234567890"
30150     IF NOT dte THEN EXIT loop
30160   END FOR loop
30170   IF dte
30180     IF dd$>0 AND dd$<32
30190       IF mm$>0 AND mm$<13
30200         IF yy$>1984 AND yy$<1999
30210           EXIT d_inner
30220         END IF
30230       END IF
30240     END IF
30250   END IF
30260 END REPEat d_inner
30270 SDATE yy$,mm$,dd$,0,0,0
30280 AT #ch,y,x:CLS #ch,4:temp$=DATE$
30290 prompt temp$(1 TO 12)&DAY$,1,5,40
30300 END DEFine date_entry

```

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MACHINE CODING

PART 2

The QL holds many secrets, which can only be unlocked in response to commands presented at the very lowest levels near the QDOS retreat . . .

The machine code programmer talks to QDOS generally in one of two ways. The first is by executing a particular 68000 TRAP instruction. The traps used by QDOS are #0, #1, #2, #3, and #4.

Trap #0 is very basic and simply causes the processor to enter supervisor mode. This is often useful when we are inside jobs, which normally run in user mode, as it allows us to alter the interrupt state and move the system stack.

Trap #1 provides a group of functions known as the 'manager' routines. These look after the major parts of the system such as jobs, memory allocation and system lists. Each trap #1 routine is entered with the function number in register D0, and possible parameters in registers D1 to D3 and A0 to A3. If the routine returns and results, these will be found in the same group of registers, and errors are reported generally by setting register D0 to a negative error code value.

JOBS AND TREES

If we take a look at the routine which scans a job tree, *MT.JINF*, for example, we find that it is entered by putting 2 in to D0 before the TRAP #1 instruction is executed. Other values it requires are the 'job IDs' of the job being scanned (in register D1) and the job at the top of the tree (in D2). When this routine returns, D1 holds the job ID of the next job in the tree, and registers D2, D3 and A0 have been set to hold values relevant to the job which was scanned.

The register usage, parameters required, results returned and possible error conditions are given in the QL Technical Guide, along with a very brief description of each routine's purpose. Trap #2 and trap #3 follow much the same lines as trap #1, except that each has a slightly different purpose.

Trap #2 is used for I/O Allocation, which means the opening and closing of channels. This trap also incorporates file deletion and medium formatting. The trap #2 routine to open a channel, *IO.OPEN*, is called by putting 1 in to D0 before executing the TRAP #2 instruction. It needs a fair amount of information before it can open the channel. D1 is used to hold the job ID of the job which will 'own' this channel, D3 holds a 'key' which determines how a channel should be opened (ie, read only, update and so on) and register A0 points to the name of the file or device to be opened. If the open is successful, then D0 holds 0 and register A0 holds the 'channel ID' of the newly-created channel.

Trap #3 deals with all the general-purpose I/O routines, allowing us to read and write single bytes or strings. Console I/O also has a special 'edit a line' routine which allows a previously-typed line to be edited by the user at the keyboard. Apart from these routines, trap #3 provides access to the enormous number of screen driver routines such as window panning and scrolling, ink, paper and strip colour changes, border alterations, circle and line drawing and recoloring. The final few trap #3 routines provide access to specialist file-handling operations which allow things like reading and setting the header on a file, moving the read/write pointer to any given position in a file (and, therefore, providing random access) and saving or loading complete files. Trap #3 is probably the most used QDOS routine.

Trap #4 is like trap #0 in that

it has one purpose only in life: to tell the next trap #2 or trap #3 routine that the addresses being passed to it will be relative to register A6 rather than absolute. It does this by setting a byte in the job's header.

VARIED VECTORS

The other way of accessing various QDOS routines is via a 'vector'. A vector is a pointer to somewhere else, which may seem a bit strange, but its advantages are obvious. If the system is being updated often then it is very likely that the address of each routine in the system will alter from time to time. As information needs to be published about where these routines are, and as other routines need to call them, the fact that they alter often is rather inconvenient. But, if the addresses of each routine are placed in special pre-defined locations in memory which never change from version to version, it is extremely easy to access each routine. These special locations are the vectors, and the addresses inside the vectors are entirely irrelevant to us. We call the vectored routine by grabbing the address from the vector and then calling it as a sub-routine or jumping to it. The easiest way of doing this is as follows:

```
MOVE.W _the_vector,A2
JSR     (A2)
```

There is no reason why A2 in particular should be used, but it is generally speaking the most obvious choice. We move only a word in to the address register from the vector because each vectored routine is in ROM, which always starts at address \$00000000 on a QL. Things are specially arranged to ensure that each of the routines starts at an address less than \$00008000, which allows word-long addresses to be used via the 'absolute short' addressing mode.

The vectored routines which exist provide many facilities. Some of them almost duplicate trap-invoked routines but have simpler parameters or can be

used in certain situations only; other provide entirely new facilities which are useful to have around. Many of the vectored routines are used mainly by the SuperBasic interpreter, as they refer to the SuperBasic variables such as the name table and name list. Other routines are useful in all sorts of applications: the routines which convert numbers into dates and days of the week, for example, or those which convert numbers into strings and vice versa. There are routines even to create and maintain linked lists, perform floating point arithmetic operations and compare two strings. It seems that a good deal of applications software could be written entirely using QDOS vectored utility routines!

CHANNELS AND IDs

In order to be able to refer to a given channel or job uniquely, the operating system needs to have a number for that channel or job. As both jobs and channels may be created and destroyed asynchronously, a number which increases on a per-job or per-channel basis is insufficient by itself. QDOS uses the same system for both jobs and channels, and the numbers used are referred to as the job or channel IDs. Each ID is held in a long word, which means four consecutive bytes (thirty-two bits), and comprises two parts. The lowest two bytes (sixteen bits) form an incremental number between zero and a given upper limit which refers to the channel or job's position in its requisite table. The channels opened in a row, for example, may have positions two, three and four in the channel table. If channel two is then closed and a further channel opened, the new channel will be given position two in the table as it is the first empty slot. This position is often referred to as the job or channel number, but has nothing to do with the '#' channel numbers used by the SuperBasic interpreter.

As this intimates, it is very easy for a channel to be closed

and another to be opened in its place before a job talking to that channel knows about the closure. If the job is reading from or writing to the channel it obviously will get very confused. To avoid such things, the high word (sixteen bits) of the channel or job ID holds a cyclic 'tag' which is allocated by the operating system. So, to take our case of three channels being opened in quick succession, they may still be given numbers two, three and four, and the tags might be four, five and six.

Now, when channel two (with tag 4) is closed and the new one opened, the new channel two will have a tag of seven. The operating system can see straightaway that the new channel is different from the first, so when a job attempts to com-

municate with the old channel two it will be told that this channel is not open. As these principles apply to jobs as much as to channels, the job ID mechanism is the same as the channel ID mechanism.

LABELS AND TABLES

To find the position in memory of a job, given its job ID, we need to know only a few things. If we assume that register A6 points to the base of the system variables, the code below will return in A0 the base address of the jobs whose ID is held in register D1. This base address is the address of the start of the code immediately after the job header.

```

JB_TAG EQU $10
SV_JBBAS EQU $68
JB_END EQU $68
SV_JBTOP EQU $6C
    
```

```

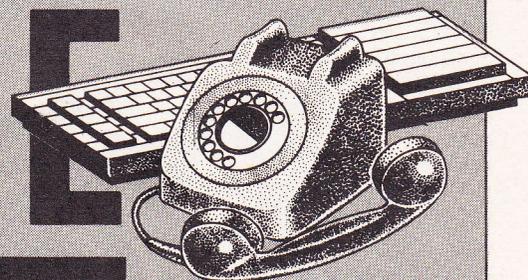
MOVE.W D1,D4
EXT.L D4
LSL.L #2,D4
ADD.L SV_JBBAS(A6),D4
CMP.L SV_JBTOP(A6),D4
BCC.S BAD_JOB
MOVEA.L D4,A0
MOVE.L (A0),D4
BMI.S BAD_JOB
MOVEA.L D4,A0
SWAP D1
CMP.W JB_TAG(A0),D1
BNE.S BAD_JOB
LEA.L JB_END(A0),A0
    
```

*A0 holds job's base address
The label *BAD_JOB* is jumped to if the job ID passed in register D1 is invalid in any way. Apart from finding a job in memory, this routine also provides a convenient way of telling if a given job exists or not. As much the same techniques apply to channels, similar code may be used to discover if

given channels are open, or where their channel definition blocks are. Obviously, the system variables used will need to be changed.

Immediately before the *LEA.L JB_END(A0),A0* instruction, register A0 holds the address of the job's job header. This header contains a great deal of useful information which may be extracted and in certain cases directly altered. The information held here includes such things as the job's length, its owner, its priority and its suspension status, a pointer to its trap re-direction vectors and a copy of all the 68000 registers except the supervisor stack pointer. These register entries are particularly useful as they allow us to put things on a job's stack before it is activated, or to set up the registers.

HELPLINE



With the recent price drop the QL has now become a hacker's machine *par excellence*. Its uses are no longer limited to running so-called 'serious' applications such as Psion's four packages but extend to cover games playing, advanced programming, enhancing QDOS, dabbling in AI and linking up to a host of peripherals.

Not surprisingly, a host of new applications have generated new problems for QL owners. What scant technical documentation exists for the machine deals almost exclusively with QDOS and is geared for the expert. Furthermore outside information services from Psion (01 723 9408) and Sinclair (QLUB), often loathe to admit to faults in their respective products, have singularly failed to keep pace with an ever more demanding user base.

All this adds up to the fact that unless you have an enlightened philanthropic dealer as your

constant companion, you have nobody to turn to when the going gets rough on your QL! Well, for those who have subscribed or who registered with *QL User* magazine before May this simply is not true! There is the Technical Helpline.

The service is available after working hours and promises a 7 day turnaround on individual queries. However, before you pick up the phone and pour out your troubles to our resident expert bear in mind that the service is intended as the last recourse when all else has failed.

So, before you ring in ensure that you have taken the following steps:

Re-read the *Beginner's* section of the User Guide and check that you haven't committed something glaringly wrong like trying to *FORMAT* a microdrive with its 'write/protect' tab broken off. Many problems derive from the obvious overlooked.

Look-up the problem area in the *Concepts* section of the guide and, if necessary, make sure that you understand precisely what is meant by say, a 'file', and what the difference is between a 'function' and 'procedure' before you try solving a problem at a lower and more involved level.

Finally, if possible, see if you can reproduce your error upon a friend's or local dealer's machine! It may well be that the version of the QDOS or the peripherals attached to your machine interfere with its correct running. If possible try and compile a check-off list showing at what stage software works and at what stage it ceases to do so.

If these steps fail to solve your problems, you will at least be in a position to articulate your query clearly and with that half the battle will be won. After all we can only provide answers if we understand the question.

The procedure after dialling the Helpline (01 250 0350) is:

Give your name and address. State whether you are a subscriber or registered reader and in the former case quote your subscription number. After this state your problem as succinctly as possible and give information as to the circumstances in which the error occurs as well as details of your system — for example, the version of the ROM and what peripherals are attached.

One final point, because the helpline is run by an outside agency and not *QL User* staff, it is not the best way to get messages through to this magazine. The telephone number on page three of every issue is far better.

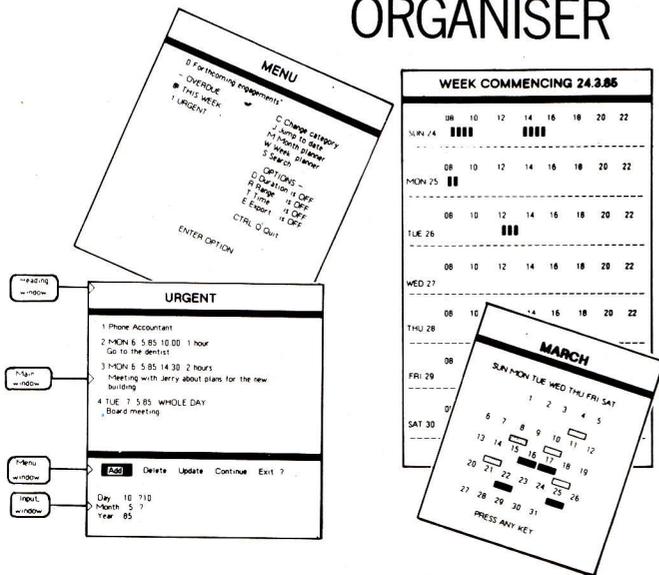
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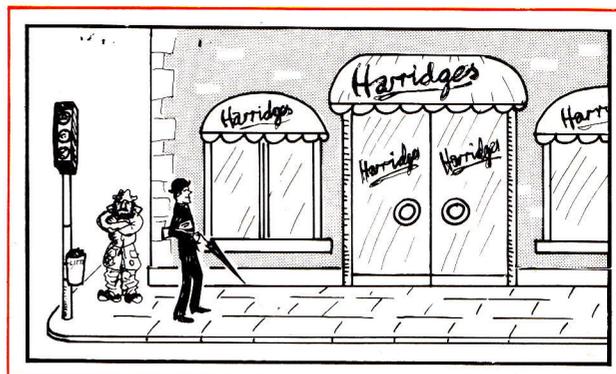
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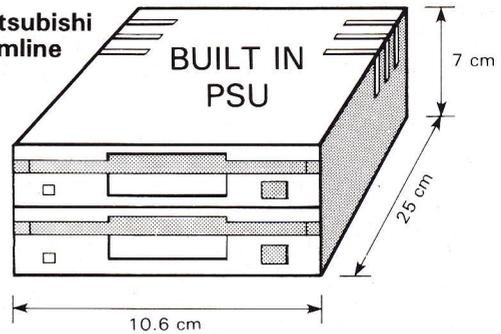


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HARDWARE

In the year after the QL's launch, the two most welcome add-ons for the machine have been disk interfaces and RAM cards. In the absence of any cheap and reliable motherboards for the QL, peripheral manufacturers have concentrated upon producing 'all-in-one' expansion units. PCML's compact Q+ system falls into this category.

With the capacity to house both RAM and disk interfaces the unit allows the user to reap the benefits of increased processing speeds and more reliable storage. Furthermore, greatly enhancing the unit's versatility, the user can choose between a variety of configurations and may upgrade from one to another as and when circumstances dictate.

Configurations include: RAM cards with 64K, 128K, 256K and 512K expansion memory; A card with 256K RAM and 16K utilities ROM driver; A floppy disk interface able to support up to 4 double-sided double-density 5.25" and 3.5" (mixed) disk drives, plus 256K RAM and QL Toolkit utilities.

PCML also supply a compatible 3.5" boxed disk drive with power supply and interface cables.

As the Q+ Disk Interface contains most of the features of the other two configurations we concentrate upon that here.

The interface plugs into QL's 64 way DIN connector at the left hand edge of the QL. When installed it adds 5cms to the line length and has at its extremity a standard shugart-type connector used to link up to the disk doctor.

The unit's PCB comprises a mere 22 chips. The most interesting of these is a full scale 16K by 8-bit EPROM which houses the PCML's firmware. This is still something of rarity amongst

QL interfaces with many manufacturers opting for the small 8K variety. The chip not only houses the RAM disk drivers which link the device to QDOS but also support a substantial number of Toolkit commands and even then comes up with 3.5K spare capacity. PCML hint that this may be used to permit the elite machine-code programming set to hook-in their own customised routines.

It should take nobody by surprise to learn that PCML's firmware has been written by the ubiquitous Tony Tebby, creator of QDOS. This means the floppy and RAM disk driver are guaranteed to be fully compatible with the QL and that both are extremely efficient. Comparative timings with CST's interface (also written by Tony Tebby and generally held to be one of the fastest available) are given below (bottom left hand corner of this page).

As this is the most recent of Tebby's creations the Toolkit commands that have gone into it are the very latest. Aside from standard file and memory management procedures which allow for file spooling, random access, job control and microdrive emulation both on disk and in RAM, two new SuperBasic extensions put in an appearance. The first, is WCOPY (wild-card copy) which enables files with a similar prefix to be copied across from one device to another in a single operation. Previously this only applied to making deletions or extracting directories.

The other command is FLP_OPT. Not entirely new, this combines the separate procedures FLP_START, FLP_TRACK and FLP_SEC into one. These allow the user to alter the disk defaults which set the start-up time, number of tracks to be



PCML's interface and a drive

formatted and degree of verification undertaken during access. This should prove useful for those wishing to use the interface with older, slower and less reliable drives.

Returning to the PCB's design it should be noted that PCML have opted for Western Digital's 1770 floppy disk controller. This checks the disk's type upon the first access which means that the interface can take full advantage of the faster half-height disk drives that are beginning to appear on the QL scene.

Other points of note are that the PCB incorporates 256 by 1 bit DRAMs and uses a PAL chip as a memory controller. This has made it possible not only to reduce the number of chips on the board but also raise the amount of memory that may be supported (without an external power supply) from 256K to 512K on the basic configuration and from 128K to 256K upon the

disk interface.

PCML have also included amongst the 11 TTL devices on their PCB a 74LS85 as recommended by David Karlin in the QL Technical Guide. This ensures a degree hardware compatibility which quite a few other interface manufacturers have failed to achieve.

In all then, PCML's Q+ interface is a product with a definite future. Elegant in its design, manufactured to the highest standards and with a performance that puts it at the front of the pack it is the 'Rolls Royce' in the QL field and puts Sinclair's own floppy interface to shame.

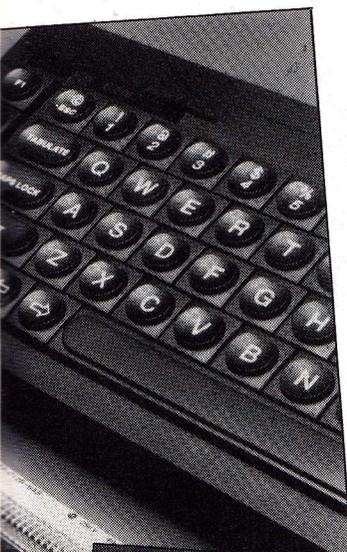
FAST BLOWER

Until recently the only way of getting software from the QL's RAM onto an EPROM ('Erasable Programmable Read-Only Memory') chip has been to transfer the data down the serial line to a special machine. This process is slow

Timings(secs)	CST (with 256K)	Q+ Floppy	Q+ Ramdisk
LOADING			
Quill V2.00	10	9	8
64 bytes	5	5	2
15K SuperBasic	41	38	33
SAVING			
64Bytes	13	12.5	1
15K SuperBasic	9	8	4

ORIZONS

6



on-board EPROM and takes some 15 seconds to load. It is written for the most part in SuperBasic and uses the QL's mode 8 screen display. Whilst this is of no immediate disadvantage it does give the product a rather amateurish appearance. Certainly rewriting the routines in machine code would not only speed matters up but also allow the user to define his own procedures to create, load, verify and blow EPROM software in one go.

The facilities offered by the programmer are fairly standard to such a tool, including 'fast blow' techniques and content verification. Indeed hardwarewise there is little to

derived has started to look old. Particular shortcomings include the awkward location of the DIP switches, which need to be reset if you want to change the typeface outside software control, and the lack of a near letter quality (NLQ) print mode, to satisfy the increasingly finicky expectations of personal computer users.

Epson's answer to these criticisms is the LX-80, an all-new printer which offers considerably more than the RX/FX range without bumping the price up too much.

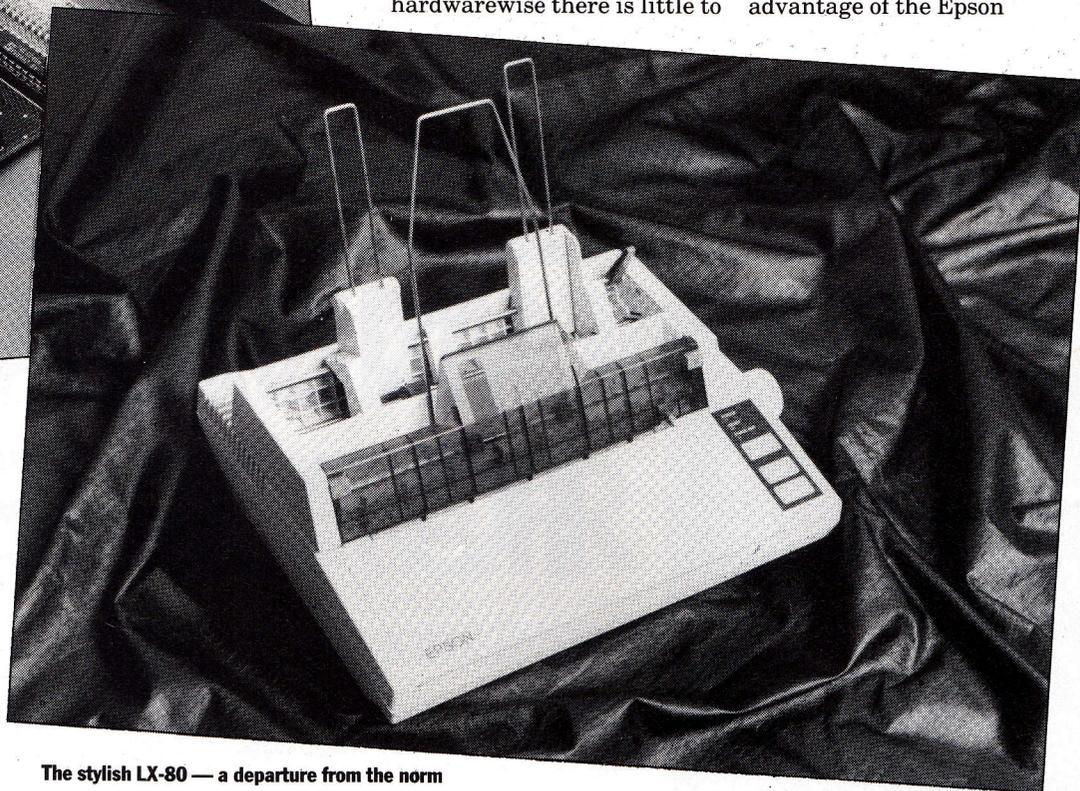
The LX-80 maintains full software compatibility with the earlier models, to take advantage of the Epson

though only one size of type (10 cpi) is available in this mode. The LX-80 does not offer print quality as good as that of the bigger, more expensive LQ1500 printer, but it performs a reasonable imitation of an electric typewriter as long as you don't look too closely. Speed in this mode is better than you might expect - about the same as the ordinary Epson two-pass double-strike printing.

Internally the new printer bears little resemblance to its forbears. The most obvious change is the ribbon. Instead of the hefty, long-lasting Epson ribbon available virtually everywhere, the LX-80 uses a much smaller cartridge. The life expectancy of this type remains to be seen, but it would be surprising if it has as much endurance as the older type.

A major ergonomic improvement is that any typeface can now be selected from the front panel of the printer, as well as by the more conventional means of sending control codes from the host computer or fiddling with internal DIP switches. The On Line, Line Feed and Form Feed buttons can be pressed in various sequences to set up the printer configuration. Epson could have made things easier still by incorporating something like a slider switch with the different styles marked along it, but presumably it would cost more. We would certainly recommend LX-80 buyers to copy the table of switch sequences for different typefaces and stick it to the side of the printer - you don't want to spend the rest of your life grubbing about in the manual. Speaking of the manual, it comes up to Epson's usual high standard of content and presentation, but we would still like to see an index.

The LX-80 is a worthy supplement to the Epson range, and at £250 (tractor unit extra) offers particularly strong value for money.



The stylish LX-80 — a departure from the norm

and tedious. However, with the release of Cambridge Microelectronics' dedicated EPROM Programmer card things look set to change.

The card plugs directly into the QL's expansion port, so that information is transferred at very much higher speeds. It will support 2764 (8K) and 27128 (16K) EPROM's and their 'A' variants. The chip to be programmed is cradled in a zero insertion force socket on the card itself.

The software to control the Programmer is held on an

the Programmer, just an EPROM, 6821 PIA, a couple of TTL chips and a power supply converter. Bearing this in mind the unit's eighty pound tag seems difficult to justify. But then this is the only QL EPROM Programmer *so far!*

EPSON LX-80

For many years Epson dot-matrix printers have been a mainstay for micro users, but despite regular upgrades (from MX-80 to RX-80 and FX-80), the basic design from which the variations are

printer drivers which are built into virtually every serious applications program. Graphics routines such as screen dump utilities also work fine with the new printer. The standard pica, elite, condensed, expanded and italic typefaces are available using the same codes as previously, along with special effects such as underscore, bold, double-strike, backspace and superscript or subscript.

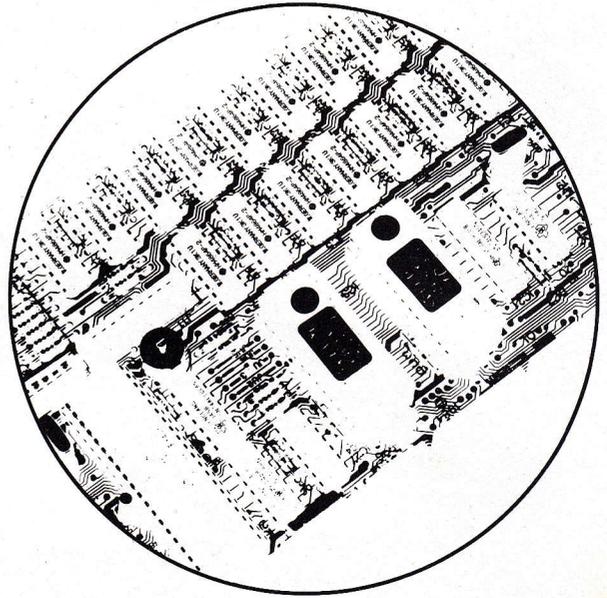
The special effects are also available in NLQ mode,

SYSTEM VARIABLES

Paolo Baccanello spotlights a useful subset of QDOS system variables and isolates some of their applications on the almost infinitely expandable QL.

In every computer there is an area of memory used by the operating system to keep track of the many different things it gets up to. The QL stores this information directly above its 32K memory mapped screen. QDOS system variables start from address 163840 (decimal) or 28000 (hex). This start location is commonly referred to as SV_BASE (ie, Base of System Variables).

The list below describes each variable in turn. Its decimal address is given (in column 2) for the benefit of those without assemblers who may access a particular variable using the commands *PEEK* and *POKE*. If the variable is word (2 bytes) or long word (4 bytes) size the command should be postfixed with *_W* and *_L* respectively. For example:
POKE 163891,1 . . . will freeze the screen
POKE_W 163976,255 . . . will turn Caps Lock on
PRINT PEEK(163890) . . . will display 0 in monitor mode



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Q-MOD

Manual dial V23 modem operating at 1200/75 baud and 1200/1200 baud half duplex.

Q-CALL

Provides traditional pulse/loop disconnect auto-dial and auto-answer.

For those with assemblers the Hex offset from SV_BASE is given for each variable (column 3).

Name	Addr Dec	Hex Offset	Len	Description
SV_IDENT	163840	00	word	System Identification
SV_CHEAP	163844	04	long	Base of common heap area
SV_CHPFRR	163848	08	long	1st free space in common heap area
SV_FREE	163852	0C	long	Base of free area
SV_BASIC	163856	10	long	Base of Basic area
SV_TRNSP	163860	14	long	Base of Transient Program Area (TPA)
SV_TRNFR	163864	18	long	1st free space in TPA
SV_RESPR	163868	1C	long	Base of resident procedure area
SV_RAMT	163872	20	long	Top of RAM +1
SV_RAND	163886	2E	word	Random Number
SV_POLLM	163888	30	word	Count of poll interrupts missed
SV_TVMOD	163890	32	byte	Returns 0 in monitor (not TV) mode
SV_SCRST	163891	33	byte	Screen Status (0=active)
SV_MCSTA	163892	34	byte	Current value of MC status register
SV_PCINT	163893	35	byte	Current Value of PC interrupt register
SV_NETNR	163895	37	byte	The machine's network number
SV_I2LST	163896	38	long	... list of interrupt 2 driver
SV_PLIST	163900	3C	long	... list of polled tasks
SV_SHLST	163904	40	long	... list of scheduler tasks
SV_DRLST	163908	44	long	... list of device drivers
SV_DDLST	163912	48	long	... list of directory device drivers
SV_KEYQ	163916	4C	long	... keyboard queue
SV_TRAPV	163920	50	long	... trap redirection table
SV_BTPNT	163924	54	long	... most recent slave block entry
SV_BTBAS	163928	58	long	... base of slave block table
CV_DTTOP	163932	5C	long	... top of slave block table
SV_JBTAG	163936	60	word	Current value of job tag
SV_JBMAX	163938	62	word	Highest current job number
SV_JBPNT	163940	64	long	... current job table entry
SV_JBDAS	163944	68	long	... base of job table
SV_JBYOP	163948	6C	long	... top of job table
SV_CHTAG	163952	70	word	Current value of channel tag
SV_CHMAX	163954	72	word	Highest current channel number
SV_CHPNT	163956	74	long	... last channel checked
SV_CHBAS	163960	78	long	... base of channel table

COMMUNICATIONS SINCLAIR QL

system full advantage can be taken of the integrated features of the Q-CONNECT's software.

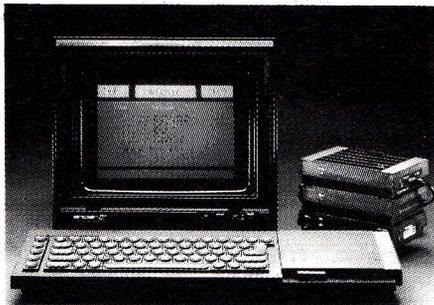
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The three smart modules have been designed to match the QL in style and for added convenience they stack together using vertical bus connectors without the need for interconnecting cables.

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SPECTRUM



John Lambert constructs a bridge to link Masterfile on the Spectrum with Archive on the QL.

Where processors differ and computers run entirely different software, you'd expect the task of transferring vital information from one computer to another to be fraught with problems and take days, if not months, to complete. However, where Masterfile, the definitive database for the Spectrum and Psion's very much more powerful Archive for the QL are concerned problems are easily surmounted and the transfer of large amounts of data is reduced to a matter of minutes.

The process of transfer from Spectrum to QL can be broken down into three distinct parts. First, we need to find out how to physically link the two machines together. Next, we need to sort out what we want to send across and the form in which it is to be sent. Finally, once information is on the QL we need to know how Archive can use it.

The first part is the easiest. October's *Spectrum Connections* article provides a clear indication as to how to go about matters. However, for the benefit of those without the 'official' Sinclair RS232 lead with its

colour coded wires *Figures 1 and 2* provide pin connections for wiring up to *ser1* and *ser2* respectively. Our 'standard' RS232 lead connects up to a 25 way DIN plug. At the QL end pin 1 is the one farthest from the QL's plastic foot.

For those who would rather not resort to a soldering iron a ready-made lead is available from Classified Products and Services. If you buy a bespoke lead, note that the listings given here use *ser2* so that a printer may be connected up to the QL during transfer. To adapt them for *ser1* simply change all occurrences of *ser2* to *ser1*.

Once we have physically linked up the two machines we can tackle the second and most difficult part of the transfer process - that is how to get our data across to the QL in a form palatable to Archive.

Fortunately, Archive is blessed with the ability to Import and Export files between it and the other Psion programs. As the other Psion programs do not need most of the garbage in a standard *Archive* file, an export file is simply laid out. *Fig 3* shows what this file would look like. (This, incidentally, looks very much like a *dBase II* file which raises some interesting possibilities.)

FIGURE 3

```
"name$", "address$", "phone$", "contact$
", "note$"
"QL User", "Priory Court|30-32, Farrin
gdon Lane|London|EC1R 3AU", "01-251-62
22", "Paul Coster", "Buyer of articles"
"Transform Ltd.", "24, West Oak|Becken
ham|Kent|BR3 2EZ", "01-658-6350", "", "S
upplier of this program"
"Classified Products & Services Ltd."
, "St. Cuthberts House|Aycliffe Indust
rial Estate|Newton Aycliffe|County Du
rham|DL5 6UT", "0325-313131", "", "Cable
suppliers £4.68"
```

As an *Archive* export file can be Imported straight back into it, so the Spectrum side of the program is designed to generate exactly such a file. This again is quite easy using the User Basic facility of *Masterfile*, although you will need a version 09 *Masterfile* or later to do it using this remarkably easy method.

Listing 1 needs to be added to a

copy of *Masterfile*. The simplest way to do this is to load *Masterfile* in the normal way and then to execute User Basic, by pressing [U] then [Y]. So long as you do not already have any User Basic in the program this will do absolutely nothing. (If however you have a lot of records selected, it will take a long time doing it!) Simply press Break when it beeps at

LISTING 1

```
4500 REM Masterfile to Archive
4510 REM Transfer Program - Spectrum
4520 REM (c) 1985 John Lambert
4900 FORMAT "b";9600: OPEN #3;"b"
4910 LET t$="": RESTORE 4990: READ f
4920 FOR c=1 TO f: READ i$: LET t$=t$+i$(1)
4930 LPRINT CHR$ 34;i$(2 TO );CHR$ 34;
4940 IF c<>f THEN LPRINT ",";
4950 NEXT c: LPRINT CHR$ 10;
4960 GO TO USR r
4990 DATA 5,"Nname$", "Aaddress$", "Pphone$", "Cconta
ct$", "Nnote$"
5000 DIM r$(f,128)
5010 GO TO USR r
6000 FOR c=1 TO f
6010 IF c$(1)=t$(c) THEN LET r$(c, TO )=c$(2 TO )
6020 NEXT c
6030 GO TO USR r
7000 FOR c=1 TO f
7010 LET i$=r$(c, TO )
7020 GO SUB 9500
7030 LPRINT CHR$ 34;i$;CHR$ 34;: IF c<>f THEN LPRIN
T ",";
7040 NEXT c
7050 LPRINT CHR$ 10;
7060 GO TO USR r
9000 LPRINT CHR$ 26;: CLOSE #3
9010 BEEP 1,0: GO TO USR R
9500 FOR s=LEN i$ TO 1 STEP -1
9510 IF i$(s)<>" " THEN GO TO 9530
9520 NEXT s
9530 LET i$=i$(TO s)
9540 RETURN
```

you and type in the listing. When you have finished enter as a direct command **GO TO USR r** to get back to *Masterfile*. Now is a good time to save *Masterfile* as the program can get confused if you made a mistake when entering the listing. Press [V] for save and then [P] for program.

Variable Format

As everyone has different uses for *Masterfile* it is not possible to give a definitive method of transferring records. Every *Masterfile* file will contain different fields which mean different things. The same, of course, is true for *Archive* and any other database for that matter.

For an example we have used a simple file that contains five fields stored in *Masterfile* as **N**, for names, **A** addresses, **P** telephone numbers, **C** contacts and **X** for general notes. These appear in a **DATA** statement at line 4990.

The number at the start of the line

FIGURES 1 AND 2

INTERFACE 1		25 WAY CONNECTOR		SER2	
Signal	Pin	Pin	Pin	Signal	
Tx	2	2	2	Tx	
Rx	3	3	3	Rx	
DTR	4	20	4	DTR	
CTS	5	5	5	CTS	
GND	7	7	1	GND	

All other pins no connection

INTERFACE 1		SER1	
Signal	Pin	Pin	Signal
Tx	2	3	Rx
Rx	3	2	Tx
DTR	4	5	CTS
CTS	5	4	DTR
GND	6	1	GND

All other pins no connection

CONNECTIONS 3

is the number of fields to be transferred, and each field name is stored as a string. The first character in the string is the Data reference used by Masterfile, which must be a capital, and the rest of the string is the field name to be used by Archive. All fields are transferred as strings so all the Archive field names must end in a dollar sign. If you have any numeric fields these will be dealt with later.

You do not have to transfer the whole file in one go. In this example you could have a data statement like:
4990 DATA 2, "Nname\$",
"Pphone\$"

So long as the number of fields you want to transfer is not more than the number of fields in the file you will not have any problems. The fields will be transferred, and so appear in Archive, in the order that they appear in the data statement. Only selected records will be transferred.

Custom Code

As you may well want to customise the listing for your own uses a brief explanation is in order. When User Basic is executed control passes initially to line 4900. This opens the RS232 channel, sends the field names and creates *t\$* which holds the Masterfile Data references. Control passes to line 5000 once for every record and the array *r\$* is created, this has the added bonus of effectively clearing it every time the line is called. Line 6000 is called once for every field in a record. Fields, and records, are stored in Masterfile in date order, that is, in the order that you typed them in or made any alterations. Each field is put into *r\$* in its correct place. At line 7000, at the end of each record, the fields are stripped of trailing spaces and sent. Finally at line 9000 the channel is closed.

As listed the program takes up roughly 650 bytes. Each field takes up a further 128 bytes and so for this example you would need about 1300 bytes free. If you do not have this much spare then you could either compact the program by using multistatement lines and changing each number to the VAL "number" or by transferring the file in two halves and then merging them.

Before going any further it is a good idea to test the program. Enter on the QL, COPY SER2z to SCR_, select half a dozen records on Masterfile and execute User Basic. With any luck you will see the file appearing on the QL screen. If not take a coffee break, or whatever you think suitable, and check that you have entered Listing 1 correctly.

Assuming everything works enter Listing 2 into the QL and save it.

LISTING 2

```
100 REMark Masterfile to Archive
110 REMark Transfer Program - QL
120 REMark (c) 1985 John Lambert
130 OPEN_IN #4,ser2z
140 OPEN_NEW #5,mdv2_temp_exp
150 REPEAT loop
160 IF EOF(#4) THEN EXIT loop
170 a$=INKEY$(#4)
180 a=CODE(a$)
190 SELECT ON a
200 =10,32 TO 127
210 PRINT #5,a$;
220 END SELECT
230 END REPEAT loop
240 CLOSE#4
250 CLOSE #5
```

Before you actually transfer your file there is one final problem to consider. Masterfile uses the ' | ' character to force a new line when displaying a field. This is meaningless to Archive but it must be transferred along with the rest of the file regardless. There are two things you can do, the first is to add the following lines to Listing 2 which simply replaces all ' | ' characters with a space:-

```
200 =10,32 TO 123,125 TO 127
212 =124
214 PRINT #5," ";
```

The second is to write an Archive procedure that splits a field over a number of separate fields so that they can be displayed over a number of lines. Listing 3 is an example of this and splits address\$ over four fields. If you use this remember that there may be ' | ' characters in other fields that have to be dealt with.

Now you can transfer the file. Run the QL program and then just exe-

cute User Basic on the Spectrum. Depending on the length of file this will take a long time, up to an hour for a long file, but at least you only have to do it once.

Internal Disk

If you have a RAM disk facility on your QL you can save a lot of wear and tear on the microdrive, just add the following lines to Listing 2

```
135 FORMAT RAM1_100
140 OPEN_NEW #5,
    RAM1_temp
260 COPY RAM1_temp to
    mdv2_temp_exp
```

Once the file is safely tucked away on cartridge and backed-up at least once transforming it to an Archive file takes no time at all. Load up Archive, put the cartridge in MDV2 and enter

```
IMPORT 'mdv2_temp_exp' as
'file'
```

CLOSE

and Archive does all the hard work. If you now directory mdv2_ you will find two files, temp_exp and file_dbf. Easy wasn't it.

If you have fields that are numeric adapt the copy procedure and use a line such as

```
let f2.number=VAL(f.number$)
to make a backup copy of the file.
```

Finally, if all of the above seems a bit much or you want to transfer a file and do not have the necessary hardware Transform Ltd., 24, West Oak, Beckenham, Kent BR3 2EZ (01 658 6350) can do it for you.

QL to Interface 1 leads can be obtained from Classified Products & Services Ltd., St. Cuthberts House, Aycliffe Industrial Estate, Newton Aycliffe, County Durham DL5 6UT (0325 313131).

LISTING 3

```
proc copy
rem Copies File f to f2
create "file2" logical "f2"
name$
ad1$
ad2$
ad3$
ad4$
phone$
contact$
note$
endcreate'

open "file" logical "f"
use "f"
first
while not eof()
let f2.name$=f.name$
let f2.ad1$=""
let f2.ad2$=""
let f2.ad3$=""
let f2.ad4$=""
expand
let f2.phone$=f.phone$

let f2.contact$=f.contact$
let f2.note$=f.note$
use "f2"
append
use "f"
next
endwhile
close "f"
close "f2"
endproc

proc expand
if not len(f.address$)
return
else
let a$=f.address$
fill
let f2.ad1$=f$
fill
let f2.ad2$=f$
fill
let f2.ad3$=f$
let f2.ad4$=a$
endif
endif
endproc

proc fill
if not len(a$)
return
else
let p=instr(a$,"")
if not p
let f$=a$
let a$=""
return
else
let f$=a$(to p-1)
if p=len(a$)
let a$=""
return
else
let a$=a$(p+1 to )
endif
endif
endif
endproc
```

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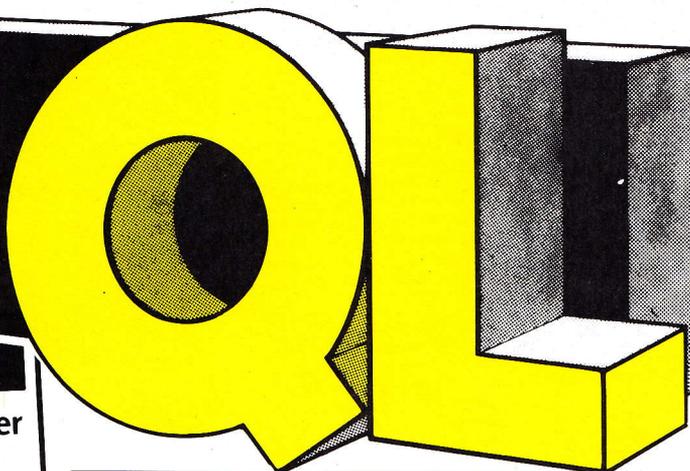
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*The code generated by SUPERCHARGE runs incredibly fast - here are the standard PCV Benchmarks (PCV June 1984) for QL BASIC compared with the timings for the same programs when SUPERCHARGED:

BENCHMARK NUMBER:	1	2	3	4	5	6	7	8
SUPERBASIC	2.1	6.4	10.7	10.3	13.2	26.1	61.8	25.8
SUPERCHARGE (Integer)	0.06	0.1	0.3	0.3	0.3	0.7	1.0	N/A
Speedup Factor (Integer)	35x	64x	36x	34x	44x	37x	62x	N/A
SUPERCHARGE (Floating Pt)	0.2	0.3	1.2	0.9	1.0	2.5	4.1	8.6
Speedup Factor (Floating Pt)	11x	21x	9x	11x	13x	10x	15x	3x

Timings performed on SUPERCHARGE at 17.8.85. SUPERCHARGE is subject to continuous revisions, refinements and improvements: actual benchmark timings are hence likely to be substantially better than the ones stated above. Even for this early version of SUPERCHARGE, on standard benchmarks a speed increase of over sixty times is possible. Further, SUPERBASIC grows slower as program size increases while SUPERCHARGE speed is unaffected. Speed improvements of SEVERAL HUNDRED TIMES are in no way uncommon when using SUPERCHARGE on programs of average size!

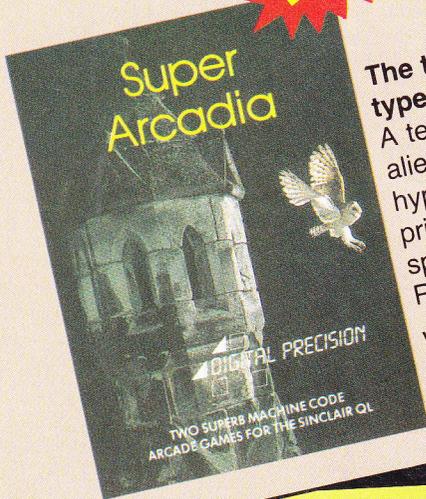
- *SUPERCHARGED programs are independent tasks (so you don't need to have SUPERCHARGE loaded or present to run them).
- *SUPERCHARGED programs are relocatable and are inherently multitasking (so you can run any number of them at once).
- *SUPERCHARGE optimises as it compiles - and the advanced user may switch the optimisation from time-optimal to space-optimal on a statement to statement basis. This is a unique feature. The beginner may ignore it - SUPERCHARGE will then intelligently guess how to optimise.
- *SUPERCHARGED programs load far more quickly (5-10 times, usually) hence, reliably than normal SuperBASIC - there is no pause between blocks.
- *SUPERCHARGE is very easy to integrate machine code programs with SUPERCHARGED ones.
- *SUPERCHARGE can compile programs of virtually any size, provided you have enough RAM on-board (for the unexpanded QL, the limiting source code size is still massive).
- *SUPERCHARGE provides a complete set of compile-time and run-time error messages (clear, unambiguous and in plain English) showing exact error locations (line, statement and symbol position within statement).
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- *SUPERCHARGE is compatible with all disk and memory-expansion systems. The system we recommend (on grounds of quality, speed and reliability) is the one we use in developing SUPERCHARGE - the CST disk system, available from Computamate (Scotia Road, Burslem, Stoke-on-Trent - Tel: 0782 811711) or from us - write in for details.
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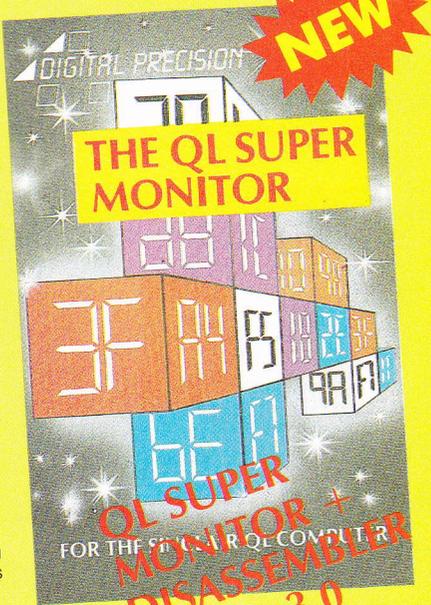
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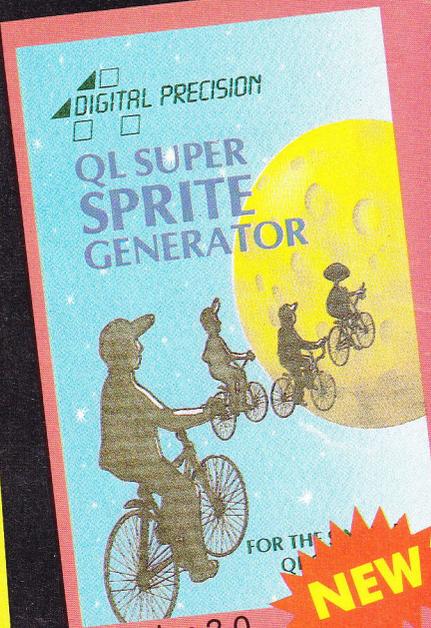
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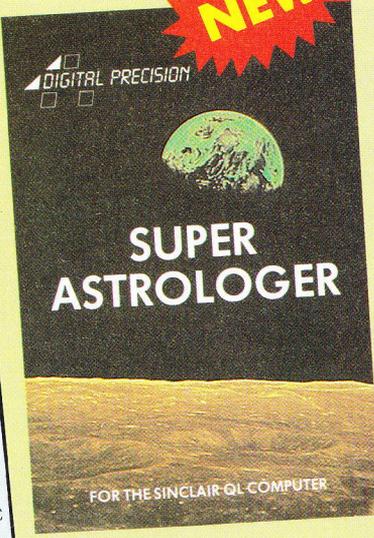
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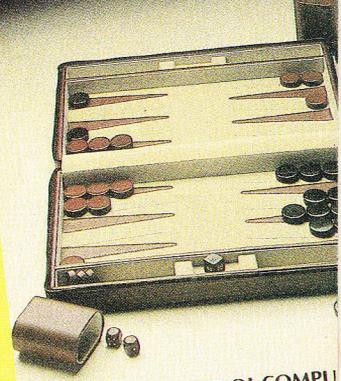
QL SUPER BACKGAMMON

£12.95 VERSION 2.0 COMPLETE WITH RULES AND HISTORY OF BACKGAMMON
 "The computer will almost certainly beat you" (QL User, June 1985)

Version 2.0

An excellent program both for beginners and experts at the game. Variable playing strength (6 playing levels - a real ego-crusher at the top one!), full on-screen instructions, obeys all the rules of Backgammon. Randomising features ensure a different game each time - trillions of possibilities! Fast response speed - plays an aggressive, challenging and entertaining game. Dual clocks. 3 Playing Modes: Auto-play (Computer vs Computer); Normal (Human vs Computer); Supervisor (Human vs Human). Rules of Backgammon both in print and on-screen, (as a Quill document). Computerised dice thrower coupled with override option to allow you to throw real dice. Very easy to operate. Help facilities present: the computer suggests a move for you. Improved display: works on Colour or B&W TVs/Monitors. You can choose to have displayed, while the computer is thinking, both the current move considered and the best move found so far, with Evaluation scores for both. The most enjoyable version of Backgammon produced!

DIGITAL PRECISION QL SUPER BACKGAMMON



FOR THE SINCLAIR QL COMPU

"Simply excellent" (QL User, June 1985) is what they wrote about Version 1.0! Superspeed Sprite Compiler, Sprite Management Procedures, the Machine Code Sprite Creation Editor, a Library of SuperBASIC Extensions, lots of Demonstration Sprites - 29 files supplied! This superb system allows you to create all the high speed, high tension, high drama special effects of top arcade and adventure games... You can use QL Super Sprite Generator v3.0 with absolutely no machine code knowledge at all - it does all the hard work automatically for you!

This is what Version 2.0 offered:
 *Easy drawing and amending of multicoloured sprites. *Up to 16 different sprites on screen simultaneously. *Each sprite can have up to 16 different shapes "frames" for animation. *Up to 256 different planes to control depth of movement. *Automatic real-time collision detection; both Sprite-Sprite (with identity) and Sprite-Object. *Sprite Reversal. *Sprite Inversion. *Comprehensive diagnostics with run-time error trapping and exception-processing systems. *Ultra high speed action - at top speed the motion is faster than the eye can see. *100% Variable speed. *Easy control from within your program, using SuperBASIC Keywords. *Library of preprogrammed sprites. *Easy to use. *Full instructions included. *All processes fully described + flowcharted for clarity. *Ultra large sprites possible. *Full over/under/hit/miss logic. *Freeze Control. *Automatic Screen Border Detection. *Backup copy. *Full Setup/Connect/Extend/Test/Reply facilities. *Solid + "Ghostly" sprites and much, much more. *All you need to know about accessing the system both from SuperBASIC and 68000 machine code supplied with the system.

Now Version 3.0 has ALL the features of Version 2.0 as well as:
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£24.95 COMPLETE WITH EXTENSIVE INSTRUCTIONS
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ENFIN!



du soft en français pour le QL!

MS_Morpions

Le jeu de réflexion bien connu (appelé aussi jeu de GO) est maintenant disponible pour votre QL ! Arrivez-vous à aligner cinq de vos pions avant votre QL ? Les paris sont ouverts ! Taille du damier variable de 9x9 à 19x19 et deux niveaux de difficulté. Vous verrez comme il est coriace !

MS_Othello

Le célèbre jeu qui a inspiré les organisateurs du tournoi annuel de l'Ordinateur Individuel tourne aussi sur le QL, et de plus en trois dimensions ! Un jeu simple à apprendre, mais très dur à gagner.

Romana_Paint

Notre programme de DAO (dessin assisté par ordinateur). Il vous permettra de créer des images à l'aide de figures primitives, parmi lesquelles on trouve les cercles, les ellipses, les triangles, les rectangles, les arcs de cercle, etc... Tout est géré à l'aide d'un joystick (ou avec les curseurs) : le positionnement de la figure, sa taille, sa couleur, etc... En plus, vous avez une option qui permettra de créer un programme SuperBasic qui régénérera votre dessin. Avec ce procédé, vous gagnerez près de 30Kbytes lors du sauvetage de votre dessin sur microdrive.

MS_GFMD

Qu'est ce que cela signifie ? Gestionnaire de Fichiers MicroDrives. L'outil indispensable de chaque possesseur de QL. Il vous permet pour chacun des fichiers affichés de faire soit : COPY, RENAME, BACKUP, DELETE, LRUN, LIST et avec une seule touche ! Exemple : Vous désirez faire en un coup : copier quelques fichiers, en DELETIER deux autres et en RENAMER un autre. Mettez le curseur tour à tour devant chaque fichier, taper la lettre de votre choix pour indiquer l'opération que vous désirez effectuer. Lorsque c'est fini, pressez ENTER et tout sera fait selon vos désirs ...

MS_3D

MS_3D vous souhaite la bienvenue dans la 3ème dimension ! Envolez-vous, voyez les choses sous un angle différent ! Cette phrase reflète assez bien les possibilités du programme, du moins au sens figuré. Ce dernier vous permettra de vous familiariser avec le graphisme en trois dimensions sur ordinateurs. Vous pourrez le faire évoluer, en y rajoutant soit vos propres routines, soit nos futurs modules complémentaires (volumes avec arcs de courbe, calcul des surfaces cachées, etc.).

MS_Agenda

Ensemble de procédures tournant sous ARCHIVE V2.00 (anglais) qui vous permettront de planifier des rendez-vous, des horaires de voyage, des dates d'anniversaire, etc... Avec diverses options (jour dans la semaine d'une date, calendrier pour un mois ou une année donnée, etc...), et interrogation du fichier AGENDA pour un jour ou un mois donné. Epuraton automatique, et toutes les facilités de gestion du fichier (insertions, effacements, recherches, modifications, etc.).

MS_PLUS

Des utilitaires et des commandes supplémentaires (plus de vingt) ! Une Supertrace (vitesse réglable), VARS qui affiche toutes les variables, TDF qui permet de définir 13 touches de fonction, IDENT qui arrange votre programme de façon lisible, une montre mobile, etc. et des PLUS pour : les conversions de base, la gestion du multitasking, l'accès direct, ...

Attention : Nos prix comprennent frais de port, microdrive(s), explications et sont mentionnés en francs suisses !

Découper ici

Remplissez ce bulletin et envoyez-le accompagné d'un chèque en francs suisses à l'adresse ci-dessous :

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CH - 1018 LAUSANNE

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Nom :

Adresse :

QL12

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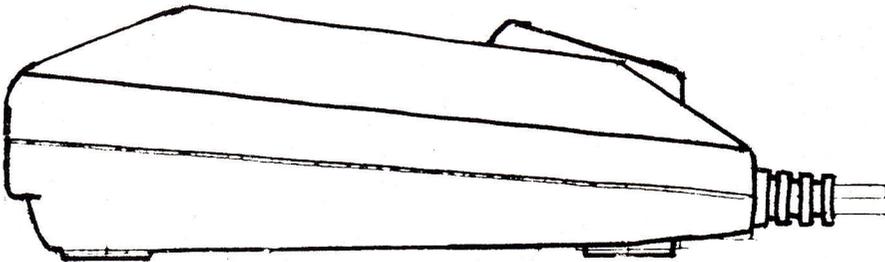
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Je vous ai joint un chèque de francs suisses. Veuillez m'envoyer par retour de courrier les programmes ci-dessus sur microdrive(s) et dans les 5 jours. Date : Signature :

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The Giga Soft Mouse for the Sinclair QL is now available!



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How to order: 1) send a check to ABC / 2) transfer money to Postcheckamt Dortmund to Mr. Budde Account No. 902 83 469 / 3) Send an order to the address above, we will send the package with post cash on delivery.

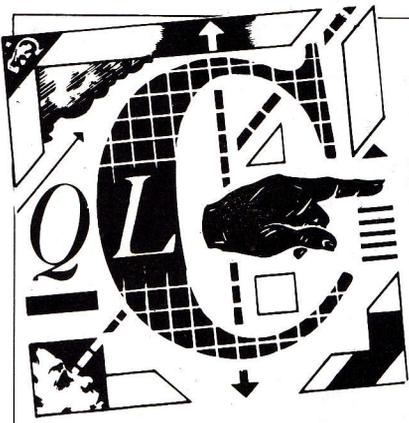
The hardware:

The mouse+ special interface to use with the joystick port of the QL computer. The mouse resolution is 0.26mm.

The software:

GIGA Basic: This extension adds more than 70 new commands to SuperBasic. This includes a full screen editor, animated sprites, mouse control commands, GEM style pull-down menus and many more.

E.A.S.E: A totally new user interface for the QL. It supports a desktop environment, similar to GEM. It includes pull-down menus, icons, really scrollable windows, a calculator and a game. This program enables the user to have access to all system functions in an easy manner.



C SERIES

We take a rest from the complexities of C and examine the latest compiler from Metacomco.

October's episode in our series looked at Structures, powerful data types which, more than anything else, set C apart from BCPL. The complex nature of structures requires some time to digest, so this month we have decided on a lighter note, to turn our attention to Metacomco's recently released *Lattice C* compiler, comparing it to GST's QL Compiler. The 'Lattice' incidentally refers to the American company which designed and wrote the compiler; Metacomco simply wrote the 'runtimes' for the QL and distribute the software.

Lattice C is renowned in the IBM PC world as one of the fastest and most complete compilers available, and for producing some of the fastest executing and shortest object code. The IBM PC product costs considerably more than the QL computer, so QL users should consider themselves extremely lucky to be blessed with such an excellent compiler for £99.95. As to whether this compiler should be bought in preference to the GST QC compiler, it's a question of what facilities you want.

Small and Neat

GST's C is what is known as a *small C*. This means that it does not implement many of the more advanced parts of the language; in particular, the complex data types such as floats, doubles, structures and unions. *Small C* compilers are relatively easy to write and generally are smaller and faster than their full C counterparts. Disadvantages are that the syntax accepted by such compilers is not necessarily true Kernighan & Ritchie C, or that important constructs such as the *for* loop may be left out. None of these are, of course, insurmountable, but it does tend to mean that the ostensibly simpler product is less suited to the novice C programmer than a more complete version. Although the GST compiler costs some

£40 less than Metacomco's, it is better suited to the experienced C programmer not familiar with the QL who wants to get something done quickly. This is the case when you compare the number of QDOS-specific functions provided in the two libraries. Metacomco supplies the barest minimum while GST have taken the time and trouble to write a huge number of extremely useful library functions which allow the programmer to clear windows, set colours, make sounds and so on without having to delve into QDOS.

Looking at *Lattice C* the first thing to note is that it has all of the data types, all of the operators and all of the keywords which constitute the C language. It has structures, doubles, shorts, typedef, type casts, the conditional expression, structure pointers and bit fields. Not all of these things are used very often, but it's nice to know they are there!

Almost as important is that the standard library of input and output (I/O) functions supplied with the compiler complies with the *de facto* standards set by the latest versions of the Unix operating system. This makes it extremely easy to find out how the functions work as they are in common usage. Files are opened by the *fopen* function, for example, and it returns a pointer to type FILE which is defined in the standard header file *stdio.h*.

As with most Unix systems, there are two classes, or levels, of input and output supported. The one most likely to be used revolves around the FILE data type and uses functions *fopen*, *fclose*, *fseek* and so on. At a lower level, functions such as *creat*, *open* and *close* are used and are based around the 'file descriptor', a machine-specific number which the operating system uses in its own I/O mechanism. For example, a QDOS runtime system which implements this level of I/O may choose to use the internal QDOS channel ID as the 'file descriptor'. It is generally possible to discover a normal file's descriptor (one which has been opened with *fopen*, etc.) by using a supplied function to interrogate the structure pointed to by FILE. This level of I/O is often used when random access filing is required, as it can be more efficient than buffered *FILE channels.

The compiler is supplied on three microdrive cartridges and an EPROM which plugs in to the back

of the QL during compilation. This EPROM is not required by the runtime system, so any programs developed with the system will run on ordinary QLs without the EPROM. Also, Metacomco does not charge for the runtime licence, which means that any programs so developed may be sold without the need to pay a royalty to either Metacomco or Lattice.

Which To Choose

A weighty A5 manual is also supplied, and although it is not a tutorial it will allow any reasonably experienced C programmer to start working right away. Each of the functions supplied in the runtime system is described in detail, as is the compiler itself. Metacomco's screen editor is provided to allow you to create and edit source files, and the object code modules produced by the compiler may be linked with the runtimes, and therefore made into executable programs, by using the supplied linker (just to confuse people, the linker is written by GST!). These programs may be passed command line arguments, accessible via *argc* and *argv* in the usual manner, if you have the EPROM plugged in while you run them, or if you have the EX and EW SuperBasic extensions provided by the QJump Toolkit.

The advantages of the *Lattice C* compiler have already been discussed, and although I am not going to recommend one compiler over another here, I am of the opinion that this product, although rather more expensive than GST's QC, is more useful to the general C programmer as all aspects of the language are covered in a standard way. It produces code of much the same size and speed as the GST one (perhaps a little larger and slower - it's hard to measure as the systems are so different). GST's C is great if you want to write a program for the QL, have knowledge of C but are a bit dodgy on machine code. However, almost every QL software developer is working on other 68000-based machines as well, in particular the Atari ST, and if you intend to develop programs which may subsequently need to be moved to these machines it seems more apposite to adopt a compiler whose facilities more closely follow the Kernighan & Ritchie/Unix standards.

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P + R = O = G < S

This is the page we hand over to you. So, if you've a program that is worthy of consideration, send it to 'The Progs', QL User, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU. We pay for everything published at the usual rates.

Masterminder

Peter Derlien

Its surprising how much you can cram into a few lines. Based on the highly popular board game, the object here is to deduce the order in which a set of four coloured pegs are arranged in as few turns as possible. Each peg may be either black, white, red, yellow, green or magenta. You take your turn by entering the first letter of the colour of each of the four pegs in the order in which you believe they will appear — ie. {bgry} , {ggrw}.

After each turn the QL will indicate how close you are to the true combination. This is done by displaying a set of four circles on the screen. A black circle means that one of your pegs is of the correct colour and in the correct position. A white circle means that it is of the correct colour but in the wrong position. Any empty circle means that one coloured peg doesn't appear at all.

```

100 REMark MASTERMINDER by P. J. Derlien
110 REPEAT main
120 CLS:CLS #0:col$="bwrygm":ht=94:max=4
130 AT 0,15:PRINT max;" from (";col$;)"
140 RANDOMISE DATE:goal$=""
150 FOR j=1 TO max
160 goal$=goal$&col$(RND(1 TO 6))
170 NEXT j
180 REMark PRINT "target ";goal$
190 ng=0:solved=0
200 REPEAT loop
210 REPEAT ask
220 INPUT #0,"guess? ";guess$
230 IF LEN(guess$)=max THEN EXIT ask
240 PRINT #0,max;" pegs, please"
250 END REPEAT ask
260 CLS #0:ng=ng+1:ht=ht-10
270 IF ht<4 THEN ht=4:SCROLL -10
280 CURSOR 3,ht,-6,-5
290 PRINT ng;TO 3;guess$
300 assess
310 IF black=max THEN solved=1
320 x=40:INK 7:FILL 0
330 FOR j=1 TO max
340 IF black THEN
350 INK 0:FILL 1:black=black-1
360 ELSE
370 IF white THEN FILL 1:white=white-1
380 END IF
390 CIRCLE x,ht,2:x+15:INK 7:FILL 0
400 NEXT j
410 IF solved THEN EXIT loop
420 END REPEAT loop
430 PRINT "Remarkable, Mr. Holmes!"
    
```

```

440 PRINT #0,"Press SPACE for another game"
450 k$=INKEY$(-1)
460 END REPEAT main
470 DEFine PROCEDURE assess
480 black=0:white=0:goalcopy$=goal$
490 FOR j=1 TO max
500 IF guess$(j)=goal$(j) THEN black=black+1:goalcopy$(j)=" "
510 NEXT j
520 FOR j=1 TO max
530 v=(guess$(j) INSTR goalcopy$)
540 IF v THEN white=white+1:goalcopy$(v)=" "
550 NEXT j
560 END DEFine assess
    
```

Billy Bounder

Norman Paton

Even in its abridged form, this platform game should provide quite a few hours entertainment. Billy Bounder, our bouncing Texan, has to negotiate three screens of varying difficulty to reach his journey's end.

Each screen is filled with a unique assortment of ladders, levels and walls. Mines and invisible holes crop up in the most unexpected of places making Billy's journey all the more hazardous. To make things even harder there's a time limit to each screen. If it is exceeded Billy will lose one of four lives. Billy's movements may be controlled by joystick or cursor keys — (Fire/Space Bar to jump).

The program, which runs in TV mode is an interesting mix of machine code (including checksums) and SuperBasic. Each screen is separately defined and adding your own screens is a doddle using the simple procedures *set_up*, *ground*, *wall*, *ladder* and *mine_lay*. Once you have created your own screen, say *screen4*, simply amend the program so that play continues when *screen_num* is incremented by one:

```

200 IF screen_num=5 THEN
EXIT play_g
901 =4:screen4
    
```

If you like the program but cannot add to it yourself a full length version with many more screens and obstacles is available from the Micro-drive Exchange.

```

100 REMark BILLY BOUNDER
110 REMark (C) Norman Paton 1985
120 initialise
130 REPEAT whole_game
140 game_init
150 REPEAT play_game
    
```

```

160 local_init
170 IF life_num=5 OR screen_num=4 THEN EXIT play_game
180 game_proc
190 END REPEAT play_game
200 IF screen_num=4 THEN winner
210 REPEAT another_game
220 CLS #0: CSIZE 1,0: AT #0,1,7: PRINT #0,"Another Game? [Y/N
]":p1$=INKEY$(#0,-1)
230 IF (p1$ INSTR "YyNn") THEN EXIT another_game
240 END REPEAT another_game
250 IF (p1$ INSTR "Nn") THEN EXIT whole_game
260 END REPEAT whole_game
270 STOP
280 :
290 DEFine PROCEDURE initialise
300 LOCAL param
310 set_up INK 6: CSIZE 1,1: AT 2,8: PRINT "Billy Bounder"
320 CSIZE 1,0: AT 10,6: PRINT "By Norman Paton"
330 AT 13,8: PRINT "Please Wait": CSIZE 0,0
340 sprite_setup
350 prog=RESPR(2048): return_data=RESPR(10): data_table=RESPR(
1024)
360 param=prog
370 prog_read 2750,param,82
380 END DEFine
390 :
400 DEFine PROCEDURE game_init
410 LOCAL base
420 screen_num=1: life_num=1
430 game_time=DATE
440 base=prog+1245
450 prog_read 3580,base,6
460 END DEFine
470 :
480 DEFine PROCEDURE prog_read (start_line,address,length)
490 LOCAL c.ct,line_num,csua,checksum
500 line_num=start_line: fault=0
510 RESTORE start_line
520 FOR c=0 TO length
530 csua=0
540 FOR ct=1 TO 15
550 IF NOT EOF THEN
560 READ t: csua=csua+t
570 POKe address,t
580 address=address+1
590 END IF
600 END FOR ct
610 IF NOT EOF THEN
620 READ checksum
630 IF csua<>checksum THEN
640 PRINT "Error in ";line_num
650 fault=1
660 END IF
670 line_num=line_num+10
680 END IF
690 END FOR c
700 IF fault THEN STOP
710 END DEFine
720 :
730 DEFine PROCEDURE local_init
740 LOCAL n,z,offset
750 offset=0: RESTORE 2410
760 FOR n=1 TO 3
770 FOR z=1 TO 13
780 READ temp
790 POKe L (data_table+offset),temp
800 offset=offset+4
810 END FOR z
820 END FOR n
830 END DEFine
840 :
850 DEFine PROCEDURE game_proc
860 LOCAL end_screen
870 SELECT ON screen_num
880 =1: screen1
890 =2: screen2
900 =3: screen3
910 END SELECT
920 REPEAT sc_loop
930 cur=0: pfall=0: end_screen=0
940 time=0: st_time=DATE
    
```

THE PROGS

```

950 CSIZE 1,0: AT #0,1,8: PRINT #0,(5-life_num);
960 REPEAT loop
970 cur=KEYRDM(1)
980 CALL prog_data_table,sprite_data,cur,return_data
990 scn_add=PEEK_L(data_table+4)
1000 IF ABS(scn_add-135128)<2 THEN end_screen=1: EXIT loop
1010 cfall=PEEK_W(return_data)
1020 IF (cfall-pfall)<-100 OR (time>60) THEN EXIT loop
1030 IF PEEK_W(return_data+2)=255 THEN EXIT loop
1040 pfall=cfall: time=DATE-st_time
1050 AT #0,1,26: PRINT #0,time; " ";
1060 END REPEAT loop
1070 IF end_screen OR life_num=5 THEN EXIT sc_loop
1080 life_num=life_num+1
1090 BEEP 3000,150,0,0,0,0
1100 END REPEAT sc_loop
1110 IF end_screen: screen_num=screen_num+1
1120 END DEFINE
1130 :
1140 DEFINE PROCEDURE sprite_setup
1150 LOCAL address, temp, loop
1160 sprite_data=RESPR(1024): address=sprite_data: RESTORE 245
0
1170 REPEAT loop
1180 IF EOF THEN EXIT loop
1190 READ temp
1200 POKE_W (address),temp
1210 address=address+2
1220 END REPEAT loop
1230 END DEFINE
1240 :
1250 DEFINE PROCEDURE winner
1260 CLS
1270 INK 4: CSIZE 1,1: PRINT " Well done, you have compl
eted: "
1280 PRINT: INK 6: PRINT " Billy Bounder"
1290 PRINT
1300 INK 4: PRINT " Score:";(6-life_num)*(2000+game_time
-DATE)
1310 PAUSE 5000
1320 END DEFINE
1330 :
1340 DEFINE PROCEDURE ladder (xb,yb,ght)
1350 LOCAL c
1360 INK 4
1370 FOR c=yb+5 TO yb+ght-5 STEP 5: hline xb,c,6
1380 END DEFINE
1390 :
1400 DEFINE PROCEDURE ground (xb,yb,ght)
1410 LOCAL c
1420 INK 5
1430 FOR c=xb TO xb+ght-5 STEP 3: LINE c,yb TO c+3,yb+3 TO c+3
,yb
1440 INK 4
1450 hline xb,yb,ght: hline xb,yb+3,ght
1460 INK 2
1470 vline xb,yb+1,2: vline xb+ght-2,yb+1,2
1480 END DEFINE
1490 :
1500 DEFINE PROCEDURE wall (xb,yb,wht)
1510 LOCAL c
1520 INK 5
1530 FOR c=yb TO yb+wht-3 STEP 3: LINE xb,c TO xb+3,c+3 TO xb,
c+3
1540 INK 2
1550 vline xb,yb,wht: vline xb+3,yb,wht
1560 INK 4
1570 hline xb,yb+wht,4,5
1580 END DEFINE
1590 :
1600 DEFINE PROCEDURE set up
1610 MODE 8: PAPER 0: CLS
1620 BORDER 4,4: BORDER #0,4,6
1630 AT #0,1,0: PRINT #0,"Lives : Time : "
1640 INK 2
1650 LINE 0,0 TO 0,100: LINE 166,0 TO 166,100
1660 vline 0,0,100: vline 165,0,100
1670 END DEFINE
1680 :
1690 DEFINE PROCEDURE mine_lay(xb,yb)
1700 FILL 1: INK 3: CIRCLE xb,yb,1: FILL 0
1710 FOR c=0 TO 2*PI STEP .78: LINE xb,yb TO xb+3*SIN(c),yb+3*
COS(c)
1720 END DEFINE
1730 :
1740 DEFINE PROCEDURE hline(xb,yb,1)
1750 LOCAL c
1760 xr=xb+1
1770 FOR c=0 TO .8 STEP .4: LINE xb,yb+c TO xr,yb+c
1780 END DEFINE
1790 :
1800 DEFINE PROCEDURE vline(xb,yb,1)
1810 LOCAL c
1820 yt=yb+1
1830 LINE xb,yb TO xb,yt
1840 LINE xb+.4,yb TO xb+.4,yt
1850 LINE xb+.8,yb TO xb+.8,yt

```

```

1860 END DEFINE
1870 :
1880 DEFINE PROCEDURE screen1
1890 set up
1900 ground 2,4,20 : ladder 4,7,20
1910 ground 2,27,20 : ground 30,20,10
1920 ground 50,20,12 : ground 38,50,12
1930 ground 65,15,12 : ground 68,35,12
1940 ground 50,40,12 : ground 85,15,80
1950 ladder 87,15,20 : ladder 120,15,40
1960 ground 120,55,45 : ground 80,55,32
1970 ground 70,60,10 : ground 10,70,58
1980 ladder 38,50,20 : ground 78,78,70
1990 ladder 159,50,30 : mine_lay 130,60
2000 INK 6:CSIZE 0,1: AT 0,1:PRINT "Billy Bounder"
2010 PAPER 6: INK 0: CSIZE 0,0: AT 0,25: PRINT "EXIT"
2020 END DEFINE
2030 :
2040 DEFINE PROCEDURE screen2
2050 set up
2060 wall 82,0,60 : ground 26,77,53
2070 ground 89,14,15 : ground 111,22,16
2080 ground 135,31,40: ground 111,40,17
2090 ground 89,50,15 : ground 70,50,10
2100 ground 90,78,50 : ground 50,50,10
2110 ground 45,30,15 : ground 70,20,12
2120 ground 95,5,15 : ladder 8,-1,88
2130 ground 17,64,8 : ground 25,30,15
2140 mine_lay 50,82 : ground 45,2,15
2150 INK 6: CSIZE 0,0: AT 5,5: PRINT "Billy Bounder"
2160 PAPER 6: INK 0: AT 0,25: PRINT "EXIT"
2170 END DEFINE
2180 :
2190 DEFINE PROCEDURE screen3
2200 LOCAL n
2210 set up
2220 ground 10,5,140 : ladder 10,4,40
2230 wall 134,9,5 : wall 120,9,5
2240 mine_lay 126,9 : mine_lay 131,9
2250 mine_lay 100,8 : mine_lay 80,9
2260 mine_lay 60,10 : mine_lay 40,11
2270 ground 10,38,30 : ground 50,38,30
2280 ground 85,47,12 : ground 60,55,18
2290 ground 40,64,20 : ground 66,74,20
2300 ground 92,64,10 : ground 108,54,10
2310 ground 118,50,10 : ground 130,57,10
2320 mine_lay 120,55 : ground 142,65,7
2330 ground 151,70,7 : ground 110,78,31
2340 mine_lay 135,83 : mine_lay 34,42
2350 mine_lay 116,9
2360 PAPER 6: INK 0: CSIZE 0,0:AT 0,25: PRINT "FINI"
2370 PAPER 0: INK 5: CSIZE 1,1: AT 0,1:PRINT "Billy Bounder"
2380 END DEFINE
2390 :
2400 REMARK Basic Data
2410 DATA 1,155118,0,23,0,0,8,0,0,0,0,0,0
2420 DATA 2,0,0,23,0,0,0,96,192,0,0,0,0
2430 DATA 2,0,0,23,0,0,0,288,384,0,0,0,0
2440 REMARK Stand
2450 DATA 512,32768,512,32768,2560,40960,3,192,3,192,3
2460 DATA 192,3,192,2565,41040,10773,43092,41553,34884,41553,3
4884
2470 DATA 10773,34884,2565,34884,513,34884,512,32780,512,32768
,512
2480 DATA 32768,2560,40960,2048,8192,2048,8192,2048,8192,2048,
8192
2490 DATA 10256,10244,10260,10260
2500 REMARK Left 1
2510 DATA 512,32768,512,32768,2560,40960,514,32896,3,32896,3
2520 DATA 32896,3,192,513,41040,2565,43092,2565,43092,10773,34
884
2530 DATA 8721,34884,8721,34884,561,34884,512,32780,512,32768,
2560
2540 DATA 32768,2048,32768,2048,32768,2048,32768,2048,32768,20
48,32768
2550 DATA 10769,32768,10773,32832
2560 REMARK Left 2
2570 DATA 512,32768,512,32768,2560,40960,514,32896,3,32896,3
2580 DATA 32896,3,192,513,41040,2565,43092,2565,43605,10773,35
397
2590 DATA 8721,32835,8721,32832,561,32832,512,32768,512,32768,
2560
2600 DATA 32768,2048,32768,2048,32768,2048,43012,2048,43012,20
48,2052
2610 DATA 10256,2052,10260,2052
2620 REMARK Right 1
2630 DATA 512,32768,512,32768,2560,40960,514,32896,514,192,514
2640 DATA 192,3,192,513,41040,2565,43092,10773,43092,10773,348
84
2650 DATA 8721,34884,8721,34884,561,32844,512,32768,512,32768,
512
2660 DATA 32768,512,40960,512,8192,512,8192,512,8192,512,8192
2670 DATA 512,43076,513,43092
2680 REMARK Right 2
2690 DATA 512,32768,512,32768,2560,40960,514,32896,514,192,514
2700 DATA 192,3,192,513,41040,2565,43092,10773,43092,10773,348
84
2710 DATA 41553,34884,33345,34884,705,32844,512,32768,512,3276
8,512
2720 DATA 32768,512,40960,512,8192,10768,8192,10768,8192,8208,
8192

```

```

2730 DATA 8208,10244,0,10260
2740 REMARK Program Code
2750 DATA 67,250,4,206,34,129,67,250,4,204,34,130,32,65,36,151
2
2760 DATA 122,4,192,71,250,4,196,38,132,8,3,0,6,103,0,1129
2770 DATA 0,6,78,186,0,160,8,3,0,4,103,0,0,8,118,674
2780 DATA 2,78,250,0,18,8,3,0,1,103,0,0,8,118,1,590
2790 DATA 78,250,0,4,118,0,40,58,4,160,75,250,4,166,74,1281
2800 DATA 85,103,0,0,6,78,186,0,32,78,186,0,134,73,250,1211
2810 DATA 4,138,40,131,78,186,2,40,78,186,1,98,32,122,4,1140
2820 DATA 112,48,186,4,124,112,0,78,117,38,58,4,112,73,250,131
6
2830 DATA 4,118,66,128,48,20,229,64,40,64,32,122,4,76,32,1047
2840 DATA 3,192,250,4,68,209,192,32,40,4,71,250,4,92,1411
2850 DATA 34,52,176,0,208,129,33,64,0,4,71,250,4,72,38,1135
2860 DATA 129,32,12,228,64,82,64,12,64,0,8,102,0,0,4,801
2870 DATA 112,0,73,250,4,54,56,128,38,58,4,38,78,117,73,1083
2880 DATA 250,4,36,74,84,102,0,0,16,73,250,4,32,74,84,1083
2890 DATA 102,0,0,6,56,188,0,1,78,117,47,0,47,1,47,690
2900 DATA 2,47,4,47,6,47,7,47,8,47,11,47,12,47,13,392
2910 DATA 73,250,3,246,74,84,103,0,0,6,38,58,3,232,32,1202
2920 DATA 122,3,208,32,3,192,250,3,200,209,192,34,40,0,12,1500
2930 DATA 6,129,0,0,0,1,194,252,0,128,210,168,0,4,42,1134
2940 DATA 65,40,40,0,24,78,186,0,28,78,186,0,70,42,95,932
2950 DATA 40,95,38,95,32,95,46,31,44,31,40,31,36,31,34,719
2960 DATA 31,32,31,78,117,32,60,0,0,0,6,78,186,1,20,672
2970 DATA 74,71,102,0,0,12,2,70,127,252,74,70,102,0,0,956
2980 DATA 12,219,252,0,0,0,128,81,200,255,228,36,60,0,0,1471
2990 DATA 0,6,148,64,78,117,71,250,3,126,74,83,103,0,0,1123
3000 DATA 6,78,250,0,34,71,250,3,104,213,83,12,66,0,7,1179
3010 DATA 103,0,0,8,66,83,78,250,0,4,213,83,196,252,0,1336
3020 DATA 128,213,168,0,4,78,117,66,128,48,19,71,250,3,70,1363
3030 DATA 6,83,0,4,12,64,0,4,108,0,0,22,196,252,0,751
3040 DATA 128,32,58,3,52,180,128,109,0,0,8,144,130,209,168,134
9
3050 DATA 0,4,78,117,32,122,3,8,198,250,3,2,209,195,40,1261
3060 DATA 122,3,6,57,124,0,0,0,2,42,104,0,4,40,40,544
3070 DATA 0,24,4,132,0,0,0,8,32,60,0,0,0,11,78,349
3080 DATA 186,0,138,2,6,0,128,102,0,0,14,2,7,0,196,781
3090 DATA 12,7,0,196,103,0,0,16,219,252,0,0,0,255,81,1141
3100 DATA 200,255,224,78,250,0,10,57,124,0,255,0,78,117,1650
3110 DATA 42,104,0,4,219,252,0,0,0,4,32,60,0,0,0,717
3120 DATA 11,78,186,0,76,2,134,0,0,0,128,102,0,0,16,733
3130 DATA 2,135,0,0,0,196,12,7,0,196,103,0,0,14,219,884
3140 DATA 252,0,0,0,255,81,200,255,220,78,117,57,124,0,255,189
4
3150 DATA 0,2,78,117,218,252,0,5,30,21,28,37,224,159,224,1395
3160 DATA 158,30,37,28,37,224,159,224,158,30,37,28,37,233,191,
1611
3170 DATA 233,190,78,117,66,134,66,135,28,29,30,21,233,190,233
,1783
3180 DATA 191,78,117,74,67,102,0,0,8,78,186,0,24,78,117,1120
3190 DATA 12,67,0,1,102,0,0,8,78,186,0,30,78,117,78,757
3200 DATA 186,0,146,78,117,34,122,2,42,182,68,103,0,0,6,1086
3210 DATA 78,186,1,6,78,186,1,40,78,117,32,122,2,18,34,979
3220 DATA 122,2,18,182,68,103,0,0,6,78,186,0,238,32,122,1157
3230 DATA 2,0,32,3,192,250,1,248,209,192,42,104,0,4,47,1326
3240 DATA 4,40,40,0,24,4,132,0,0,0,8,32,60,0,0,0,344
3250 DATA 0,11,78,186,255,136,2,6,0,128,102,0,0,14,2,920
3260 DATA 7,0,196,12,7,0,128,103,0,0,40,219,252,0,0,964
3270 DATA 0,255,81,200,255,224,32,40,0,24,89,64,12,0,0,1276
3280 DATA 8,108,0,0,12,112,16,4,168,0,0,0,2,0,4,434
3290 DATA 33,64,0,24,40,31,78,186,0,174,78,117,32,122,1,980
3300 DATA 152,34,122,1,152,182,68,103,0,0,6,78,186,0,116,1200
3310 DATA 32,122,1,134,32,3,192,250,1,126,209,192,42,104,0,144
0
3320 DATA 4,219,252,0,0,0,4,47,4,40,40,0,24,4,132,770
3330 DATA 0,0,0,0,0,0,0,0,0,11,78,186,255,8,2,640
3340 DATA 134,0,0,0,128,102,0,0,16,2,135,0,0,0,196,713
3350 DATA 12,7,0,128,103,0,0,40,219,252,0,0,0,255,81,1097
3360 DATA 200,255,220,32,40,0,24,88,64,12,0,0,16,111,0,1062
3370 DATA 0,12,112,8,6,168,0,0,0,2,0,4,33,64,0,409
3380 DATA 24,40,31,78,186,0,42,78,117,32,122,1,20,32,4,807
3390 DATA 192,250,1,12,209,192,71,250,1,20,38,168,0,4,71,1479
3400 DATA 250,1,16,38,168,0,24,66,168,0,4,78,186,0,40,1039
3410 DATA 78,117,32,122,0,238,32,3,192,250,0,230,209,192,184,1
879
3420 DATA 67,103,0,0,14,33,122,0,232,0,4,33,122,0,230,960
3430 DATA 0,24,78,186,0,4,78,117,47,0,47,1,47,2,47,678
3440 DATA 4,47,6,47,7,47,10,47,12,47,13,32,40,0,8,367
3450 DATA 103,0,0,50,42,40,0,12,46,40,0,16,229,135,36,749
3460 DATA 71,40,112,160,28,217,201,42,64,40,40,0,20,78,186,129
9
3470 DATA 0,90,34,40,0,16,36,16,82,65,180,65,102,0,0,726
3480 DATA 4,114,0,33,65,0,16,33,104,0,4,0,8,33,104,518
3490 DATA 0,24,0,20,32,40,0,4,103,0,0,30,42,40,0,335
3500 DATA 12,42,64,40,40,0,24,46,40,0,16,229,135,36,71,795
3510 DATA 40,112,160,28,217,201,78,186,0,22,42,95,40,95,36,135
2
3520 DATA 95,46,31,44,31,40,31,36,31,34,31,32,31,78,117,708
3530 DATA 47,13,44,60,0,0,0,46,60,0,0,0,13,283
3540 DATA 12,0,0,15,12,0,1,232,190,232,191,189,29,191,29,1323
3550 DATA 225,158,225,159,189,29,191,29,225,158,225,159,189,29
,191,2381
3560 DATA 21,88,76,218,252,0,123,81,205,255,204,42,95,78,117,1
855
3570 DATA 0,52,0,0,0,0,0,0,0,0,0,0,0,0,0,52
3580 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
3590 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
3600 DATA 0,255,255,255,0,0,0,0,0,0,0,0,0,0,0,766
3610 DATA 2,0,0,0,3,0,0,0,0,0,0,1

```

Pentathelete II

A Didcock

Apologies to all those who typed in last month's Pentathelete program only to discover that the program crashed at lines 4 and 5 with the error message "not found".

To solve this problem you will have to type in the following short program which generates the user defined graphics in Pentathelete. Once entered this program should be saved as follows:

SAVE mdv1_UDG_data

Having done this load last month's Pentathelete program, delete line 4 and then save the corrected version of the game on the same microdrive as this program. Now, provided you have not made any typing errors in entering either listing you will find that Pentathelete runs (and jumps!)

```
32005 start=RESPR(100)
32010 a0=65537
32020 a2=start+6
32030 RESTORE 32100
32040 FOR i=0 TO 70: READ byte: POKE start+i,byte
32050 CALL start,0,0,255,37,0,0,0,a0,0,a2
32060 GO TO 7
32099 :
32100 DATA 32,4,78,67,78,117
32110 DATA 128,7
32120 DATA 96,112,24,92,124,12,20,36,76
32130 DATA 100,104,112,112,96,96,80,72,108
32140 DATA 24,24,48,52,60,48,56,40,76
32150 DATA 24,24,48,48,48,48,16,16,48
32160 DATA 88,88,112,52,60,48,56,40,76
32170 DATA 88,88,112,48,48,48,16,16,48
32180 DATA 0,48,48,96,120,96,124,0,0
```

Sliding Puzzle I

C Debski

We have received a number of sliding puzzle programs but none as good as this. The first program, published this month, is the puzzle itself. It takes a pre-defined picture and jumbles it up into 5 x 5 blocks. The blocks must then be moved using the cursor keys so that the original picture is recreated. This is far from easy as a block may only be moved if a previous move has vacated a space adjacent to it on the 5 x 5 grid.

A count is kept by the computer of the number of moves required to reconstruct the original picture.

The second program will appear in our January issue.

```
100 REMark ** Picture Create for Sliding Puzzle **
110 REMark ** Copyright (C) D.Debski 1985 **
120 REMark ** For QL User **
130 set_scr:get_col
140 :
150 DEFINE PROCEDURE set_scr
160 MODE 8:PAPER 7:CLS:INK 0
170 OPEN#3,con_208x200a272x16
180 DIM color(19,19):x=0:y=0:
190 CSIZE#0,3,1:FLASH#0,1:CLS#0:PRINT#0,FILL$(CHR$(32),7);"INITIALISING":FLASH#0,0:CSIZE#0,0,0
200 FOR a=0 TO 19
210 BLOCK 448,10,0,10*a,a
220 FOR b=0 TO 19:color(a,b)=7
230 END FOR a
```

```
240 CLS#0:INK 0
250 CLS:PAPER#3,3:INK#3,0:CLS#3:PRINT#3;" Keys :-"
260 PRINT#3:PRINT#3,CHR$(190)\CHR$(188);CHR$(189)\CHR$(191):PRINT#3:PRINT#3," ENTER to finish"
270 curr_col=color(x,y):SElect curr_col=0 TO 3:INK 7
280 PAPER color(x,y):AT y,x:PRINT "+"
290 END DEFINE
300 :
310 DEFINE PROCEDURE get_col
320 REPEAT loop
330 REPEAT key_loop
340 out=0:col_out=10:key%=INKEY$(-1)
350 k=CODE(key%):IF k=208:out=1
360 IF k=216:out=2
370 IF k=192:out=3
380 IF k=200:out=4
390 IF k=10:EXIT loop
400 SElect k=48 TO 55:col_out=k-48
410 IF out OR col_out<10 THEN EXIT key_loop
420 END REPEAT key_loop
430 IF out
440 ok=0:ey=y:ex=x
450 SElect ON out
460 =1:IF y>0:y=y-1:ok=1
470 =2:IF y<19:y=y+1:ok=1
480 =3:IF x>0:x=x-1:ok=1
490 =4:IF x<19:ok=1:x=x+1
500 END SElect
510 IF NOT ok THEN NEXT loop
520 BLOCK#ref,6,6,across#6,up#6,color(pos(ref),up,across)
530 END FOR across
540 END FOR up
550 mov=mov+1:passed=1
560 FOR check=3 TO 18:IF pos(check)=check-3:NEXT check:ELSE passed=0:EXIT check
570 IF passed THEN RETURN
580 END REPEAT forever
590 END DEFINE game
600 :
610 DEFINE PROCEDURE set_scr
620 x=185:y=55:ex=x:PAPER 7:CLS:RESTORE 1500
630 FOR i=3 TO 18
640 op$="con_30x30a"&ex&"x"&y
650 OPEN#i,op$:PAPER#i,7:CLS#i:ex=ex+30
660 SElect i=6,10,14:ex=x:y=y+30
670 END FOR i
680 END DEFINE set_scr
690 :
700 DEFINE PROCEDURE keys
710 BORDER 20:INK 0:PRINT CHR$(190)\CHR$(188);CHR$(189)\CHR$(191)\:BORDER 0
720 AT 7,0:PRINT " ESC" to quit"
730 END DEFINE keys
740 :
750 DEFINE PROCEDURE init
760 CSIZE#0,3,1:CLS#0:FLASH#0,1:PRINT#0:PRINT#0,FILL$(CHR$(32),7);"INITIALISING":CSIZE#0,0,0:FLASH#0,0
770 RESTORE :DIM color(15,4,4),pos(18)
780 FOR al=3 TO 18:pos(al)=al-3
790 FOR part=0 TO 15
800 BLOCK 448,12,0,12.5*part,part
810 FOR up=0 TO 4
820 READ col$
830 FOR across=0 TO 4
840 color(part,up,across)=col$(across+1)
850 END FOR across
860 END FOR up
870 END FOR part
880 CLS#0:PAPER 7:CLS
890 END DEFINE init
900 :
910 DEFINE PROCEDURE demo(fac)
920 x=320:ey=60:ex=x
930 add=0:IF NOT fac THEN add=3
940 FOR part=0+add TO 15+add
```

```
950 FOR up=0 TO 4
960 FOR across=0 TO 4
970 IF fac:BLOCK 4,4,across#4+ex,up#4+ey,color(part,up,across):ELSE BLOCK#part,6,6,across#6,up#6,color(pos(part),up,across)
980 END FOR across
990 END FOR up
1000 ex=ex+20
1010 SElect part=3,7,11:ex=x:ey=ey+20
1020 END FOR part
1030 END DEFINE demo
1040 :
1050 DEFINE PROCEDURE jumble
1060 FOR as=3 TO 18
1070 pos(as)=15-(as-3)
1080 END FOR as
1090 END DEFINE jumble
1100 :
1110 DEFINE PROCEDURE end_of_game
1120 PAPER#0,7:INK#0,0:CLS#0
1130 PRINT#0,"You completed the puzzle in ";mov;" moves"
1140 PRINT#0:INPUT#0,"Another game (Y/N) ? ";an$
1150 PAPER#0,0:INK#0,7:CLS#0
1160 IF an$=="n" THEN STOP
1170 END DEFINE end_of_game
1180 :
1190 DEFINE PROCEDURE quit
1200 PAPER#0,7:INK#0,0:CLS#0
1210 PRINT#0,"It took you ";mov;" moves to get this far"
1220 PRINT#0:INPUT#0;"Save game status (Y/N) ? ";sv$
1230 IF sv$=="y"
1240 CLS#0:INPUT#0,"File name (including mdv1/mdv2_) ? ";file$
1250 PAPER#0,0:CLS#0:INK#0,7:CSIZE#0,3,1:FLASH#0,1:PRINT#0,FILL$(CHR$(32),9);"SAVING":CSIZE#0,0,0:FLASH#0,0
1260 DELETE file$:OPEN_NEW#19,file$
1270 FOR out=3 TO 18
1280 BLOCK 448,12,0,12.5*(out-3),out-3
1290 PRINT#19,pos(out)
1300 END FOR out
1310 PRINT#19,mov
1320 CLOSE#19:PAPER 7:CLS
1330 END IF
1340 PAPER#0,0:INK#0,7:CLS#0
1350 STOP
1360 END DEFINE quit
1370 :
1380 DEFINE PROCEDURE load_game
1390 CLS#0:INPUT#0,"File name (including mdv1/mdv2_) ? ";file$
1400 CLS#0:CSIZE#0,3,1:FLASH#0,1:PRINT#0,FILL$(CHR$(32),8);"LOADING":CSIZE#0,0,0:FLASH#0,0
1410 PAPER 7:CLS:OPEN_IN#19,file$
1420 FOR in=3 TO 18
1430 BLOCK 448,12,0,12.5*(in-3),in-3
1440 INPUT#19,pos(in)
1450 END FOR in
1460 INPUT#19,mov
1470 CLOSE#19:PAPER 7:CLS
1480 END DEFINE load_game
1490 :
1500 DATA 5555,55554,55544,45445,44454
1510 DATA 55555,44455,55445,55455,44455
1520 DATA 55555,55566,55666,55666,55666
1530 DATA 55555,65555,66555,66555,66555
1540 DATA "00544","00445","00455","00114","00444"
1550 DATA 55445,55545,44455,41441,11141
1560 DATA 55566,55555,55555,11111,11111
1570 DATA 65555,55555,55555,11111,11111
1580 DATA "00411","00111","00111","01111","01111"
1590 DATA 11111,11111,11111,11111,11111
1600 DATA 11111,11111,11111,11166,16666
1610 DATA 11111,11166,66666,66666,66666
1620 DATA "01111","06666","06666","06666","06666"
1630 DATA 11166,66666,66666,66666,66666
1640 DATA 66666,66666,66666,66666,66666
1650 DATA 77777,77777,77777,77777,77777
```

Froggy - Part 1

Tony Day

When a reader's program is this excellent you begin to wonder why so little commercial software fails to make the grade. Smooth scrolling graphics, fast action, varied play — all are to be found in this Frogger look alike. The only thing that's missing is a realistic "squelch" your Frog makes with the tarmac!

So as to fit all 12.5K into the magazine and allow readers without assemblers to play the game, the program comes as two hex loaders, the first appearing this month. At the end of each line is a checksum which verifies the code in that line prior to poking it into memory. If the code is incorrect the loader will list the offending line. Using this device you should be able to quickly eliminate most if not all typing errors.

Acknowledgement: Hex loader produced using a program generator written by R K Lowry.

```

100 REMARK **** Part2 DL Froggy ****
110 REMARK **** For DL User's Day ****
120 DIM array(5):address=RESPIR(7000)
130 START=address:CLS:CLS:RESTORE :lin=1000
140 READ words:PRINT lin
150 IF words=<0 THEN PRINT "Load complete":SBYTES advl :froggy2
, start,7000:STOP
160 csun=0:FOR i=0 TO nwords-1:READ array(i):csun=csun+array(i)
:NEXT i
170 READ csun2:IF csun<csun2 THEN PRINT "Checksum error at line
":lin:PRINT "Correct checksum":csun:PRINT "Line of data":FOR i
=0 TO nwords-1:PRINT array(i):",":NEXT i:STOP
180 FOR i=0 TO nwords-1:PKDE W address,array(i):address=address
+2:NEXT i
190 lin=lin+10:GO TO 140
1000 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1010 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1020 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1030 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1040 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1050 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1060 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1070 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1080 DATA 6,-21846,-21846,-21846,-21846,-21846,-21846,-131076
1090 DATA 6,-21846,-21846,0,42,0,42,-43608
1100 DATA 6,42,42,42,42,42,0,210
1110 DATA 6,42,0,42,42,42,42,210
1120 DATA 6,0,42,0,42,42,42,168
1130 DATA 6,42,42,42,0,42,0,168
1140 DATA 6,42,42,42,42,0,42,210
1150 DATA 6,0,42,42,42,42,42,210
1160 DATA 6,42,0,42,0,42,42,168
1170 DATA 6,42,42,0,42,0,42,168
1180 DATA 6,42,42,42,42,42,0,210
1190 DATA 6,42,0,42,42,42,42,210
1200 DATA 6,8316,2,16392,31757,17402,-266,73603
1210 DATA 6,31247,30721,8337,22601,22600,20940,136446
1220 DATA 6,-8,-11780,0,120,20941,-20,9253
1230 DATA 6,-28164,0,2040,20942,-36,8316,3098
1240 DATA 6,2,26632,31757,17402,-184,31247,106856
1250 DATA 6,30721,8337,22601,22600,20940,-8,105191
1260 DATA 6,-11780,0,120,20941,-20,-28164,-18903
1270 DATA 6,0,2040,20942,-36,28672,20085,71703
1280 DATA 6,6716,104,24614,6716,0,24608,62758
1290 DATA 6,6316,2,6152,-14084,2048,-11836,-9402
1300 DATA 6,6658,-17860,55,28384,-17860,5,-618
1310 DATA 6,28128,22853,-13572,2,-11835,-19396,6180
1320 DATA 6,0,28512,-19396,60,27738,31235,68149
1330 DATA 6,18426,228,-15620,128,-10303,15379,8238
1340 DATA 6,-19396,3,28172,6658,21317,20555,57309
1350 DATA 6,-15108,2,-26686,-19396,57,27916,-33215
1360 DATA 6,-27588,56,-26110,-15108,2,-11838,-80586
1370 DATA 6,30735,-18884,0,26148,12435,-11780,38654
1380 DATA 6,0,128,20619,20940,-18,-28164,13505
1390 DATA 6,0,2046,-28628,0,126,20994,-3462
1400 DATA 6,20941,-38,28672,20085,12422,24794,106876
1410 DATA 6,3088,0,26406,9288,9800,22667,71249
1420 DATA 6,23178,21128,7186,5136,3091,1,59720
1430 DATA 6,26390,-27642,4226,21128,6160,21128,51390
1440 DATA 6,4624,30208,24832,-186,28672,20085,108235

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1450 DATA 6,-11258,24808,16890,1872,31847,3088,67247
1460 DATA 6,0,26372,31232,29184,18663,640,106091
1470 DATA 6,25014,19679,320,31232,29184,23688,129117
1480 DATA 6,20942,-28,18426,1836,23691,22155,87022
1490 DATA 6,3091,11,26134,6716,12,7228,43192
1500 DATA 6,11,5765,5958,12,5957,24,17727
1510 DATA 6,28672,20085,6716,11,7228,12,62724
1520 DATA 6,24808,0,0,0,0,24808
1530 DATA 6,0,0,0,0,0,10,10
1540 DATA 6,160,0,0,10,160,0,330
1550 DATA 6,2,160,8,0,170,170,510
1560 DATA 6,168,42,168,42,170,42,632
1570 DATA 6,160,42,170,42,160,42,616
1580 DATA 6,170,42,168,42,170,0,592
1590 DATA 6,170,170,168,0,2,160,670
1600 DATA 6,8,0,0,10,160,0,178
1610 DATA 6,0,10,160,0,0,0,170
1620 DATA 6,0,0,0,0,0,0,0
1630 DATA 6,0,0,0,0,0,0,0
1640 DATA 6,0,0,0,170,42,128,0,340
1650 DATA 6,170,42,128,42,0,128,510
1660 DATA 6,40,42,170,170,168,42,632
1670 DATA 6,170,170,170,170,170,170,1020
1680 DATA 6,170,170,170,170,170,170,892
1690 DATA 6,170,170,170,42,170,170,892
1700 DATA 6,168,42,0,128,40,0,378
1710 DATA 6,170,42,128,0,170,42,552
1720 DATA 6,128,0,0,0,0,0,128
1730 DATA 6,0,0,0,0,0,0,0
1740 DATA 6,0,0,0,0,0,2570,2570
1750 DATA 6,-24416,0,0,2570,-24416,0,-46262
1760 DATA 6,0,8224,2570,-32640,0,10794,-11052
1770 DATA 6,-21846,-21846,0,-21846,-22360,10794,-77104
1780 DATA 6,-22360,-21846,-22360,2570,-22360,-21846,-108202
1790 DATA 6,-22360,2570,-22360,-21846,-22360,10794,-75562
1800 DATA 6,-22360,10794,-21846,-21846,0,8224,-47034
1810 DATA 6,2570,-32640,0,2570,-24416,0,-51916
1820 DATA 6,0,2570,-24416,0,0,0,-21846
1830 DATA 6,0,0,0,0,0,0,0
1840 DATA 6,0,0,0,0,0,0,0
1850 DATA 6,0,0,0,514,-22360,-21846,-43692
1860 DATA 6,0,514,-22360,-21846,0,10280,-33412
1870 DATA 6,514,0,-22360,10794,-21846,-21846,-54744
1880 DATA 6,-22360,-21846,-21846,-21846,-22360,-21846,-132104
1890 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
1900 DATA 6,-21846,-21846,-21846,-21846,-22360,10794,-89590
1910 DATA 6,-21846,-21846,-21846,-22360,10280,514,0,-55258
1920 DATA 6,-22360,514,-22360,-21846,0,514,-65538
1930 DATA 6,-22360,-21846,0,0,0,0,-44206
1940 DATA 6,0,0,0,0,0,0,0
1950 DATA 6,0,0,0,0,0,0,0
1960 DATA 6,0,0,0,0,0,0,0
1970 DATA 6,0,2565,-24496,0,-21931
1980 DATA 6,0,2565,-24496,10773,-32704,-24496,-68358
1990 DATA 6,2052,10773,-32191,-21931,-22444,0,-63741
2000 DATA 6,2565,2565,-21931,-21931,-22444,2565,-58811
2010 DATA 6,-22444,-21931,-22444,2565,-22444,0,-86698
2020 DATA 6,2565,2565,-21931,10773,-32191,-21931,-60150
2030 DATA 6,-22444,10773,-32704,-24496,2052,0,-66819
2040 DATA 6,0,2565,-24496,0,0,2565,-19366
2050 DATA 6,-24496,0,0,0,0,0,-24496
2060 DATA 6,0,0,0,0,0,0,0
2070 DATA 6,240,0,0,15,240,0,495
2080 DATA 6,0,48,15,3,252,63,381
2090 DATA 6,255,195,252,255,240,240,1437
2100 DATA 6,0,63,240,63,255,63,684
2110 DATA 6,240,63,255,255,240,1293
2120 DATA 6,0,63,255,195,252,48,813
2130 DATA 6,15,3,252,15,240,0,525
2140 DATA 6,0,15,240,0,0,0,255
2150 DATA 6,0,0,0,0,0,0,0
2160 DATA 6,0,0,0,0,0,0,0
2170 DATA 6,0,0,0,0,0,0,1
2180 DATA 6,84,0,0,1,84,21,190
2190 DATA 6,84,84,1,21,65,85,320
2200 DATA 6,85,0,5,5,17,85,197
2210 DATA 6,84,5,17,85,84,5,280
2220 DATA 6,17,0,5,5,17,21,65
2230 DATA 6,85,85,85,21,84,84,404
2240 DATA 6,1,0,1,84,0,86
2250 DATA 6,0,1,84,0,0,85
2260 DATA 6,0,0,0,0,0,0,0
2270 DATA 6,0,0,0,0,0,0,0
2280 DATA 6,0,10815,-32576,0,0,10815,-10946
2290 DATA 6,-32576,0,0,-32576,10815,515,-53822
2300 DATA 6,-22276,-21761,-21761,-32061,-22276,-30516,-150651
2310 DATA 6,-24336,-24336,0,-30516,-24336,10815,-92709
2320 DATA 6,-21761,-30516,-24336,10815,-21761,-30516,-118075
2330 DATA 6,-24336,-24336,0,-21761,-21761,-32061,-124255
2340 DATA 6,-22276,-32576,10815,515,-22276,10815,-54983
2350 DATA 6,-32576,0,0,10815,-32576,0,-54337
2360 DATA 6,0,0,0,0,0,0,0
2370 DATA 6,0,0,0,0,0,0,0
2380 DATA 6,0,0,0,0,0,0,0
2390 DATA 6,0,0,0,0,0,0,0
2400 DATA 6,0,0,0,0,0,0,0
2410 DATA 6,0,0,0,0,0,0,0
2420 DATA 6,0,0,0,0,0,0,0
2430 DATA 6,0,0,0,0,0,0,0
2440 DATA 6,0,0,0,0,0,0,0
2450 DATA 6,0,0,0,0,0,0,0

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2460 DATA 6,0,0,0,0,0,0,0
2470 DATA 6,0,0,0,0,0,0,0
2480 DATA 6,0,0,0,0,0,0,0
2490 DATA 6,0,0,0,2,168,0,170
2500 DATA 6,0,2,168,0,0,40,210
2510 DATA 6,2,0,0,42,170,0,214
2520 DATA 6,0,42,170,0,0,170,382
2530 DATA 6,170,0,0,170,170,0,510
2540 DATA 6,0,42,170,0,0,42,254
2550 DATA 6,170,0,0,40,2,0,212
2560 DATA 6,0,2,168,0,0,2,172
2570 DATA 6,168,0,0,0,0,0,168
2580 DATA 6,0,0,0,0,0,0,0
2590 DATA 6,0,0,0,0,0,0,0
2600 DATA 6,0,0,0,10794,-32640,0,-21846
2610 DATA 6,0,10794,-32640,0,0,-32640,-54486
2620 DATA 6,10280,0,0,-21846,-22360,0,-33926
2630 DATA 6,0,-21846,-22360,0,0,-21846,-66052
2640 DATA 6,-21846,0,0,-21846,-21846,0,-65538
2650 DATA 6,0,-21846,-22360,0,0,-21846,-66052
2660 DATA 6,-22360,0,0,-32640,10280,0,-44720
2670 DATA 6,0,10794,-32640,0,0,10794,-11052
2680 DATA 6,-32640,0,0,0,0,-32640
2690 DATA 6,0,0,0,-21846,-21846,-21846,-65538
2700 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2710 DATA 6,-24416,-21846,-21846,-21846,-30070,10794,-109230
2720 DATA 6,-21846,-21846,10794,-30070,-21846,-21846,-106660
2730 DATA 6,10794,-30070,-21846,2056,-21846,-30070,-90982
2740 DATA 6,-23902,514,-21846,10794,-22360,-21846,-78646
2750 DATA 6,-21846,10794,-22360,-21846,-21846,10794,-66310
2760 DATA 6,-22360,-21846,-21846,-30070,-22360,-21846,-140328
2770 DATA 6,-21846,-30070,-23902,-21846,-23902,-143412
2780 DATA 6,-30070,-21846,-21846,-22360,10794,-21846,-107174
2790 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2800 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2810 DATA 6,-21846,-22360,10794,-21846,-21846,-23902,-101006
2820 DATA 6,-30070,-21846,-21846,-30070,-23902,-21846,-149580
2830 DATA 6,-21846,-30070,-22360,-21846,-21846,10794,-107174
2840 DATA 6,-22360,2570,-21846,10794,-22360,514,-52688
2850 DATA 6,-21846,10794,-22360,-22360,-21846,-30070,-107688
2860 DATA 6,-23902,-21846,10794,-30070,-21846,-21846,-108716
2870 DATA 6,10794,-30070,-21846,-21846,-30070,10794,-82244
2880 DATA 6,-21846,-21846,-24416,-21846,-21846,-133646
2890 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2900 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2910 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2920 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2930 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2940 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2950 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
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2970 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
2980 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
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3000 DATA 6,-21846,-21846,-21846,-21846,-21846,-131076
3010 DATA 6,-21846,-21846,-21846,300,1293,2,-63943
3020 DATA 6,298,1291,2,374,1293,2,3260
3030 DATA 6,372,1292,2,458,1293,2,3419
3040 DATA 6,456,1291,2,504,1538,258,4049
3050 DATA 6,500,1539,258,456,1546,258,4597
3060 DATA 6,424,1538,258,420,1539,258,4437
3070 DATA 6,416,1546,258,452,1538,258,4468
3080 DATA 6,448,1546,258,397,1538,258,4445
3090 DATA 6,466,1544,258,468,1543,258,4537
3100 DATA 6,428,1544,258,430,1543,258,4461
3110 DATA 6,458,1544,258,460,1543,258,4521
3120 DATA 6,393,1539,258,398,1546,258,4383
3130 DATA 6,275,1538,258,271,1539,258,4139
3140 DATA 6,267,1539,258,263,1546,258,4131
3150 DATA 6,358,1538,258,354,1546,258,4312
3160 DATA 6,328,1538,258,324,1539,258,4245
3170 DATA 6,320,1546,258,311,1544,258,4237
3180 DATA 6,313,1541,258,475,1544,258,4389
3190 DATA 6,477,1543,258,288,1544,258,4368
3200 DATA 6,290,1543,258,304,1544,258,4197
3210 DATA 6,306,1541,258,373,1544,258,4280
3220 DATA 6,375,1541,258,265,1797,260,4496
3230 DATA 6,261,1800,260,273,1799,260,4653
3240 DATA 6,269,1800,260,357,1797,260,4743
3250 DATA 6,353,1800,260,401,1799,260,4873
3260 DATA 6,397,1800,260,457,1799,260,4973
3270 DATA 6,453,1800,260,287,1797,260,4857
3280 DATA 6,283,1800,260,301,1797,260,4701
3290 DATA 6,297,1800,260,312,1799,260,4728
3300 DATA 6,308,1800,260,273,2054,4,4699
3310 DATA 6,277,2056,4,321,2052,4,4714
3320 DATA 6,325,2056,4,389,2052,4,4830
3330 DATA 6,393,2056,4,437,2052,4,4946
3340 DATA 6,441,2056,4,456,2054,4,4915
3350 DATA 6,360,2056,4,368,2052,4,4844
3360 DATA 6,372,2056,4,424,2052,4,4912
3370 DATA 6,428,2056,4,481,2052,4,5025
3380 DATA 6,485,2056,4,294,2054,4,4897
3390 DATA 6,298,2056,4,275,2304,2,4939
3400 DATA 6,279,2305,2,283,2313,2,5184
3410 DATA 6,309,2312,2,307,2308,2,5240
3420 DATA 6,446,2304,2,450,2313,2,5517
3430 DATA 6,257,2304,2,261,2313,2,5139
3440 DATA 6,379,2312,2,377,2308,2,5380
3450 DATA 6,411,2312,2,409,2313,2,5446
3460 DATA 6,503,2312,2,501,2310,2,5630

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3470 DATA 6,292,2312,2,290,2310,2,5208
 3480 DATA 6,345,2312,2,343,2308,2,5312
 3490 DATA 6,460,2304,2,464,2305,2,5537
 3500 DATA 6,468,2313,2,354,2304,2,5443
 3510 DATA 6,358,2305,2,362,2313,2,5342
 3520 DATA 6,326,2304,2,330,2305,2,5269
 3530 DATA 6,334,2313,2,85,85,85,2904
 3540 DATA 6,85,85,85,85,85,510
 3550 DATA 6,86,170,170,85,90,160,761
 3560 DATA 6,2,85,106,170,170,85,618
 3570 DATA 6,104,2,138,85,170,170,669
 3580 DATA 6,168,85,162,128,170,85,798
 3590 DATA 6,170,170,168,85,170,170,933
 3600 DATA 6,170,85,104,10,8,85,462
 3610 DATA 6,106,170,170,85,90,160,781
 3620 DATA 6,10,85,86,170,170,85,606
 3630 DATA 6,85,85,85,85,85,510
 3640 DATA 6,85,85,85,85,85,510
 3650 DATA 6,85,85,85,170,170,170,765
 3660 DATA 6,170,0,40,10,138,170,528
 3670 DATA 6,170,170,170,138,170,170,956
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 3690 DATA 6,170,170,170,170,130,130,940
 3700 DATA 6,170,170,170,170,2,852
 3710 DATA 6,10,0,170,170,170,690
 3720 DATA 6,170,160,42,160,10,170,712
 3730 DATA 6,170,170,170,85,85,85,765
 3740 DATA 6,85,85,85,85,85,510
 3750 DATA 6,85,85,85,85,85,510
 3760 DATA 6,85,170,170,170,130,895
 3770 DATA 6,42,128,168,170,168,170,846
 3780 DATA 6,160,128,170,128,160,170,916
 3790 DATA 6,138,170,128,160,168,2,766
 3800 DATA 6,128,170,170,128,170,936
 3810 DATA 6,170,168,128,162,136,10,774
 3820 DATA 6,160,170,170,160,160,990
 3830 DATA 6,10,138,168,170,170,826
 3840 DATA 6,170,85,85,85,85,510
 3850 DATA 6,85,85,85,85,85,510
 3860 DATA 6,85,85,-24571,85,2640,85,-21591
 3870 DATA 6,-24570,170,2704,85,90,170,-21351
 3880 DATA 6,165,85,106,170,169,10305,11000
 3890 DATA 6,170,170,170,-22016,42,170,-21294
 3900 DATA 6,170,-22016,42,170,-22016,-43480
 3910 DATA 6,42,170,170,-22016,42,170,-21422
 3920 DATA 6,170,10305,170,170,85,11070
 3930 DATA 6,106,170,169,85,90,170,790
 3940 DATA 6,165,85,-24570,170,2704,85,-21361
 3950 DATA 6,-24571,85,2640,85,85,85,-21591
 3960 DATA 6,85,85,85,85,85,510
 3970 DATA 6,85,85,85,85,85,510
 3980 DATA 6,85,85,85,85,85,510
 3990 DATA 6,85,85,85,85,85,510
 4000 DATA 6,85,85,85,85,85,510
 4010 DATA 6,85,85,85,85,85,510
 4020 DATA 6,85,85,85,85,85,510
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 4050 DATA 6,85,85,85,85,85,510
 4060 DATA 6,85,85,85,85,85,8192,8617
 4070 DATA 6,8192,8192,8192,8192,6170,7198,46136
 4080 DATA 6,8224,8224,8224,8224,6170,7198,46264
 4090 DATA 6,6170,7198,8224,8224,8224,46264
 4100 DATA 6,8224,6170,7198,6170,7198,41130
 4110 DATA 6,7198,8224,8224,8224,8224,48318
 4120 DATA 6,8224,6170,7198,8224,8224,46264
 4130 DATA 6,8224,8224,8216,6684,7712,8224,47276
 4140 DATA 6,6684,7712,8224,8224,8224,47292
 4150 DATA 6,8224,8224,8224,8224,8224,49334
 4160 DATA 6,5138,4110,3082,2062,3082,2054,19528
 4170 DATA 6,1026,32,8224,8224,8224,33954
 4180 DATA 6,8224,8224,8224,8224,8224,49344
 4190 DATA 6,8224,8224,8214,5138,4110,3078,36988
 4200 DATA 6,1026,32,8224,8224,8224,33954
 4210 DATA 6,5652,4624,3596,2568,1540,512,18492
 4220 DATA 6,8224,8224,8224,8224,8224,49344
 4230 DATA 6,8224,8224,8224,8224,8224,49344
 4240 DATA 6,8224,8224,8214,5138,4110,3082,36992
 4250 DATA 6,2062,3082,2062,3082,2054,1026,13368
 4260 DATA 6,32,8224,8224,8224,8224,41152
 4270 DATA 6,8224,8224,8192,8224,8224,49312
 4280 DATA 6,8224,8224,8216,6684,7704,6684,45736
 4290 DATA 6,7712,8224,8224,8224,8224,48832
 4300 DATA 6,8224,8224,8224,8224,8216,6684,47796
 4310 DATA 6,7704,6684,7704,6684,7712,8224,44712
 4320 DATA 6,8224,8224,8224,8224,8224,49344
 4330 DATA 6,8224,8224,8224,8224,8224,49344
 4340 DATA 6,8224,8224,8224,8224,8224,49344
 4350 DATA 6,8224,6170,7198,6170,7198,423184
 4360 DATA 6,8224,8224,8224,8224,8224,49344
 4370 DATA 6,8224,8224,8224,8224,6170,47290
 4380 DATA 6,7198,6170,7198,8224,8224,45238
 4390 DATA 6,8224,8224,8224,8224,8224,49344
 4400 DATA 6,8224,8224,8224,8224,8224,49344
 4410 DATA 6,8224,8224,8224,8224,8224,49344
 4420 DATA 6,8216,6684,7712,8224,8216,6684,45736
 4430 DATA 6,7712,8224,8224,8224,8224,48832
 4440 DATA 6,8224,8224,8224,6170,7198,8224,46264
 4450 DATA 6,8224,8224,8224,8224,8224,49344
 4460 DATA 6,8224,8224,8224,8224,8224,49344
 4470 DATA 6,8224,8224,8224,6170,7198,8224,46264

4480 DATA 6,8224,6170,7198,8224,8224,46264
 4490 DATA 6,8224,8224,8192,8224,8224,49312
 4500 DATA 6,8224,5652,4624,3596,2568,28260
 4510 DATA 6,2568,1540,512,8224,8224,29292
 4520 DATA 6,8224,8224,8224,8224,8224,49344
 4530 DATA 6,8224,8224,8224,8224,8224,49344
 4540 DATA 6,8224,8224,8224,8224,8224,49344
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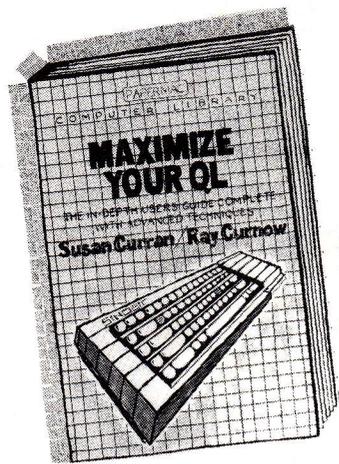
BOOKMARKS

A slightly different format for this month's book collection, reviewed by Nicky Trevett.

Helping you to make use of your QL to better effect is the laudable aim of *Maximize Your QL* by Susan Curran and Ray Curnow. Published by Papermac at £8.95, it reckons it starts where the QL User Guide ends, looking in detail at points not fully covered in the official manual and "taking a more critical look at the QL's shortcomings".

True to its word, it does not spend a lot of time explaining the basics. It prefers that the reader has a user manual to hand, and assumes a basic understanding of computers and BASIC programming.

Topics covered include using a printer with the QL, working with the Psion applications, SuperBasic, graphics, and using files and microdrives. There are also chapters on the more technical areas of QL computing, including the internal workings of the machine, memory management, QDOS, plus a look at the QLAN local area network.



The book is well-written and well put together, and does a great deal to spell out quite clearly who it is for — the relatively inexperienced user who has picked up the essentials of SuperBasic and has perhaps run through the Psion software, and now wants to do more with the computer and investigate the way it works. There are plenty of program listings, mostly in SuperBasic but including a couple of machine code utilities, and there are also some suggestions for actual, business-orientated applications using Abacus, Archive, Easel and Quill.



The authors have done a good job filling in some of the gaps in the QL's own user documentation, but if and when you decide to concentrate on specific topics — perhaps on setting up an elaborate database, or learning to write sophisticated assembly language programs — you'll need more detailed coverage than this book provides.

Lots of books have appeared dealing with the Psion programs that come bundled with the QL; now, not to be outdone, Longman has brought out a series under the general heading *Working with the Sinclair QL*.

True, two books in the series deal respectively with SuperBasic, and graphics and sound, but Abacus wins two whole books to itself, and another book deals exclusively with Archive.

Word Processing with QL Quill by David Dempster is aimed at everyone from computer novices to experienced typists and word processor operators. This is a common approach that does not always succeed, but this particular book is so well organized that anyone interested in Quill who does not already know it inside out should find something.

The beginner, for example, should read through the book from start to finish and attempt all the exercises. Experienced computer users are first directed to chapters 2, 3 and 4, which deal with loading Quill and basic editing, then on to the chapters looking at advanced editing, formatting and printing techniques. Experienced word processor users are advised to consult

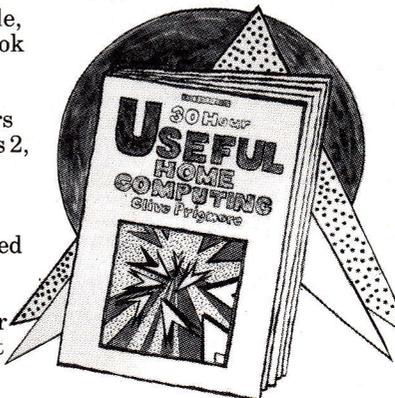
Appendix 4, which acts as a quick reference guide and — a nice touch, this — directs the reader after a brief description of each command to the page where he or she can find more information.

There are several books available on QL Quill, but there is room for a book like this — encouraging, unalarming, and worth keeping on the shelf as a handy reference guide.

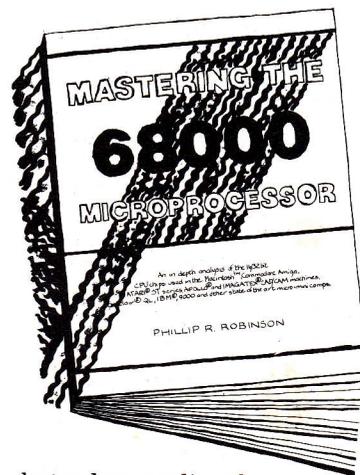
It seems safe to assume that if you bought a QL, you are keen to put your computer to some use other than games. Clive Prigmore's *30 Hour Useful Home Computing*, published by Century at £8.95, has its heart in the right place. It aims to show people running small businesses, clubs, shops and societies how to use their computer to process documents, build spreadsheets, create databases, carry out stock control, do the accounts and so on.

Unfortunately, it is not devoted to any one computer. The book is aimed at the "home micro user", which seems to include such machines as the Spectrum, Commodore 64, Tandy, BBC and Amstrad as well as the QL, and some users might well bristle to find their computer included in such company.

Although many computing and software concepts are broadly the same whatever the machine, it was not wise to include the QL user among the potential readership. The QL is supplied with a sophisticated suite of business packages which can between them more than handle the kind of tasks named above, and an extensive library of books devoted to business applications specifically on the QL already exists.



Finally, another bible for the 68000 enthusiast. *Mastering the 68000 Microprocessor* by Phillip Robinson, published by American company Tab Books is, according to the blurb, an "exceptionally complete resource". It's aimed at serious devotees of the 68000 chip — those interested in hardware design or assembly language programming on the various mini and microcomputers based on the 68000 family, and it includes a look at the 68008;



but only to outline the functional differences between it and the parent chip.

The book is sweeping in scope, putting "The Microprocessor" in perspective generally, and examining its history and "design philosophy". There is a brief chapter on the architecture of the processor, but the greater part of the work is given over to software matters — the registers, addressing, instruction groups, the instruction set, interrupts and exceptions and assembly language.

There's also a handy chapter on the various members of the family, including the 68008, plus a look at the systems which make use of it — the Sinclair QL, IBM System 9000, Apple Lisa and Macintosh, to name a few.

It's written in a straightforward, even lively, manner, and there are plenty of diagrams, charts and tables throughout to illuminate the text. It could be a useful addition to anyone's 68000 reference library, but particularly so to those still relatively new to the subject.

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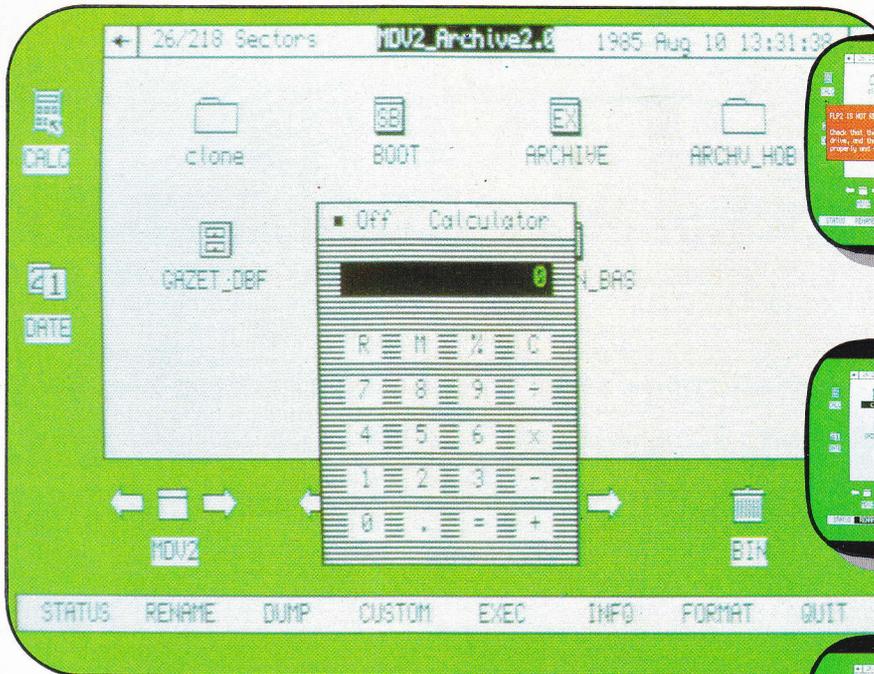
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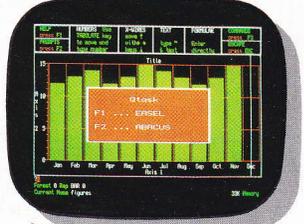
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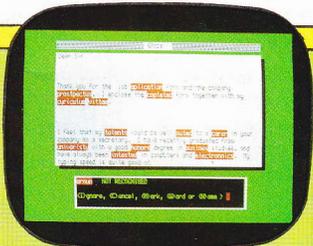
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Of late the 'in' word amongst computer hacks has been "WIMPS", meaning Windows, Icons, Mice and PointerS. It seems that no new personal computer will sell without the kind of push button computing that systems such as Microsoft's GEM, Atari's TOS and Apple's MAC(DOS) afford. Judging by the size of the lawsuits currently running in the States this view would seem to be shared in the highest of silicon circles. But what of QL user's?

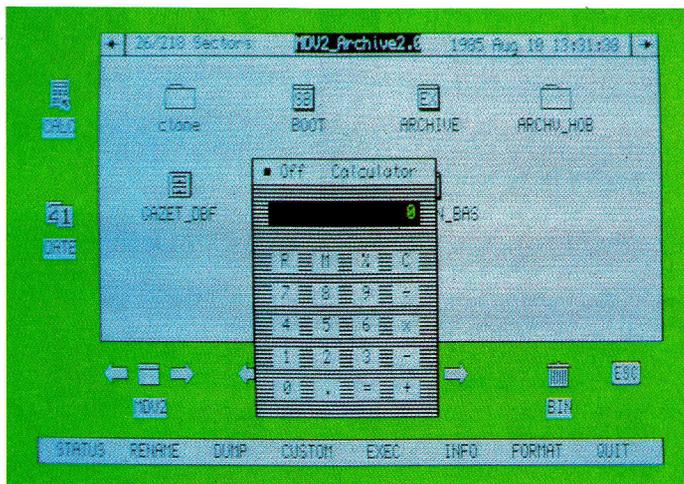
Well, those familiar with the QL's elaborate, unwieldy and often convoluted command syntax should welcome any system which circumvents it entirely and allows one to carry out essential housekeeping operations at the press of a button (or two). Eidersoft's Icon Control Environment or ICE for short, does exactly this.

Designed as a user-friendly "front end" for QDOS, ICE has much in common with WIMPS systems found on fully-fledged PCs. It cocoons the user from the vagaries of the operating system within a protective graphics shell. This takes as its theme the idea that a parallel can be drawn between operating a computer and running a busy office. Switch on your QL with the 16K ICE EPROM plugged into the ROM socket at the back and the screen depicts a small workdesk dotted with little figures or 'icons' which represent the various devices that may be linked to the QL, various files in storage and such odds and ends as a calendar, calculator and a wastebin.

To use ICE all the user need do is guide a little arrow or 'pointer' across the screen using the cursor keys, joystick or a mouse (which will be available shortly). When the pointer is in the immediate vicinity of a particular icon or control option (displayed on a panel at the foot of the screen), you simply click the space bar once or twice depending on whether you wish to select the item or initiate any implied operation. The process, which requires no typed input is child's play.

Basic housekeeping operations such as extracting directories, copying files and running programs are carried out implicitly by ICE. The user need only 'point-and-press' and ICE takes care of the rest. Where, for example, multiple files need to be copied or deleted you point at each file in turn and then point at the destination device or the bin respectively. Where operations are irreversible ICE will require the user to confirm his intentions. Where errors occur messages display written in plain English.

ICE GEM IN A ROM?



Is Eidersoft's new icon-based software a jewel in the QL's crown?

Files on disk (floppy or RAM) and microdrive are paged to the screen in groups of twelve. ICE automatically distinguishes between different file types and uses different icons to display them. The types that it recognises are general machine code files, EXECutable code, SuperBasic programs, Quill documents, Abacus spreadsheets, Easel graphs and Archive databases plus export, boot and tasking files. The obvious benefit here is that the user can at a glance see what a file contains. Less obvious, is that users when running a program need not distinguish between files that are EXECed and those which LRUN so, for example, boot programs for Psion's packages (version 2.00) are not necessary.

General housekeeping and system operations appear explicitly as options on a control panel at the foot of the screen. These allow for files to be RENAMED, their contents VIEWed and INFORMATION as to their full name, length, type and date last amended, displayed. Additionally disks (RAM or floppy) or cartridges may be FORMATTed or BACKED UP and SYSTEM information relating to available memory,

jobs running, QDOS and ICE version number may be extracted. A further option allows the user to CUSTOMise ICE. Here defaults relating to date, time, device names, printer installation, pointer speeds and key sensitivity may all be varied. Last, there is an option to leave ICE and return to SuperBasic.

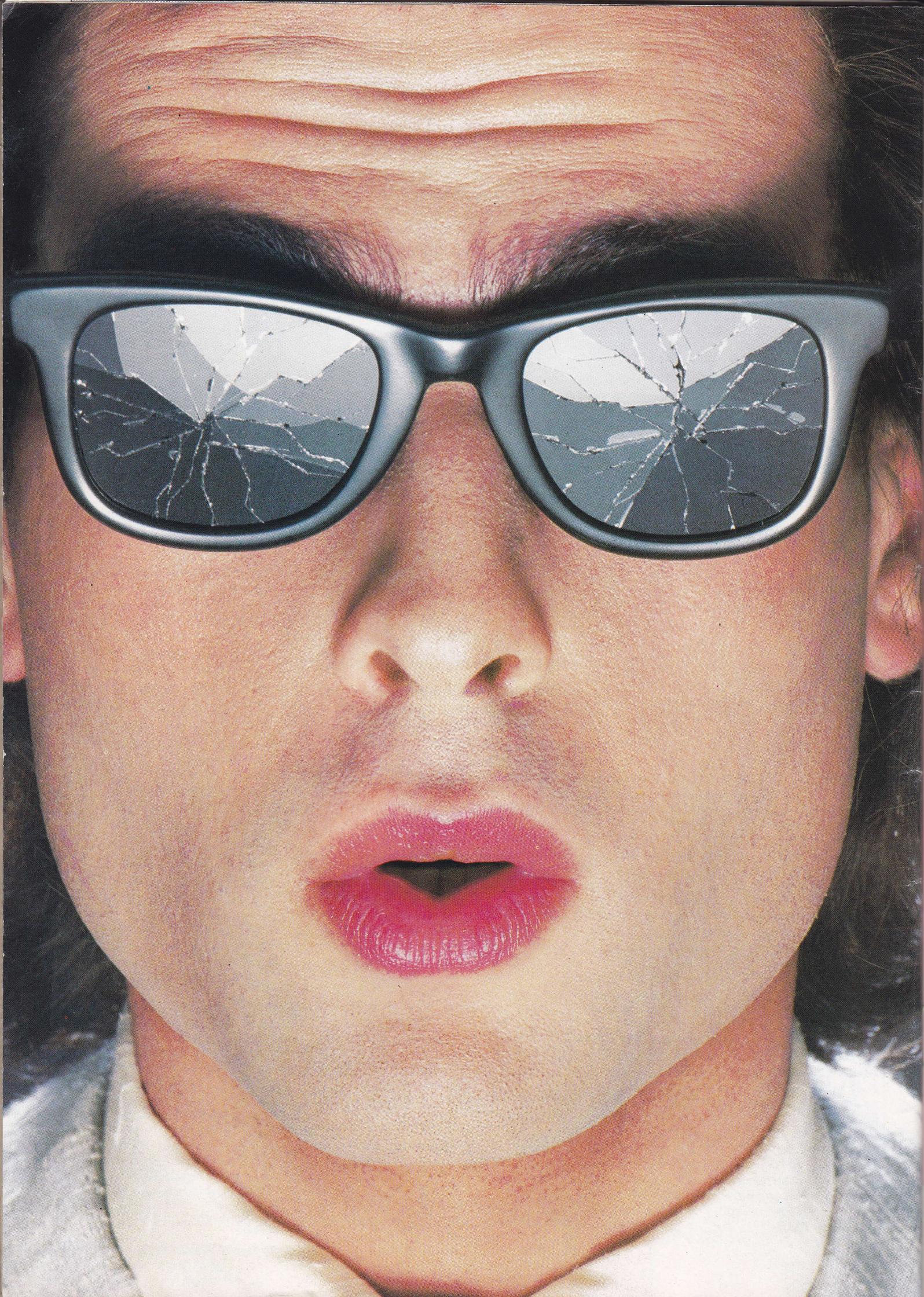
ICE also supplies two special functions, a calendar and a calculator. The former, which displays an entire calendar month at a time with the current date highlighted in red and allows you to quickly scroll back and forth through the months, is quite useful. The latter, however, which mimicks the typical desk top calculator right down to an imitation LED display would seem to be geared to reinforcing the illusion of the 'tidy little workdesk' and is of little practical value.

Along with the ICE EPROM Eidersoft also supply a microdrive cartridge containing their CHOice software. This consists of an ingenious set of programs (including a RAM disk driver) which, provided you have sufficient additional memory, allows you to multitask up to four EXECutable programs of your own choosing alongside ICE.

CHOice was tested using PCML's Q+ interface with its extra 256K memory and built-in RAM disk driver. Having reserved 128K for Archive, Abacus and Quill we were able to run them simultaneously and switch back and forth between the packages (as well as ICE) simply by pressing CTRL+F3. We were impressed not only by the speed at which you could move between the packages but also the fact that when you returned to one of them, you did so at exactly the same point from which you had left earlier, whether in the middle of a document, database or spreadsheet.

Without an elaborate system of pull-down windows ICE is very much less sophisticated than its upmarket counterparts and as such would certainly justify the title of a poor man's GEM. However, far from being a criticism this is a compliment. The program is after all only 16K long, as opposed to GEM's 90K, exacts virtually no toll upon the limited memory available within an unexpanded QL and yet is fun, easy to use and virtually idiot proof. Furthermore, combined with CHOice it opens up an entirely new dimension in practical computing on the QL hitherto denied most users. Little wonder then that ICE unlike many new products has found an instant application on the various QLs used to run *QL User*.

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Each month, for a trial period, this column will contain details of readers' programs that we are able to offer on microdrive.

In return for a small administration charge (per program - including a royalty for the author), we will copy onto blank microdrives any or all of the featured programs.

Each program will be a direct copy of the published listing, or an extended version of that listing where the program in question was too long to print in full (programs for which an abridged version has been published are marked with an asterisk).

It must be stressed that we are not selling the software itself, nor providing any guarantee that it performs any particular function (though we do check every program that is to appear in *QL User*), we are merely offering a service to readers who wish to obtain *QL User* programs on drive rather than by typing them in straight from the page.

HOW TO ORDER

Listed below are programs which have appeared as listings inside *QL User*.

To the right of each program entry is a small box, which you should mark with a bold cross if you want to order that program.

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<i>Converts Assembler source into m/c object code</i>					
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<i>Pocket sized monitor with comprehensive facilities</i>					
A Didcock	(B)	Connect4	£1.00	Sept	15 <input type="checkbox"/>
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Shergold & Tose	(B)	* Golf	£2.00	May	35 <input type="checkbox"/>
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Williams & Holliday	(AO)	Paladin	£5.00	Apr	70 <input type="checkbox"/>
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B = SuperBasic, AO = Assembler + Object Code (ready to run), MB = Machine Code + Basic loader

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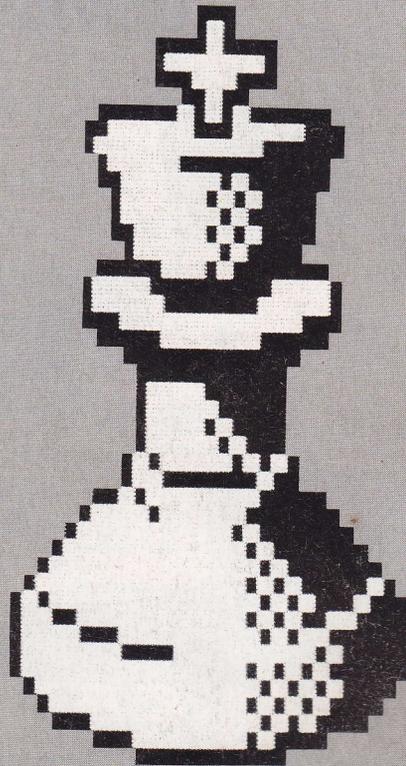
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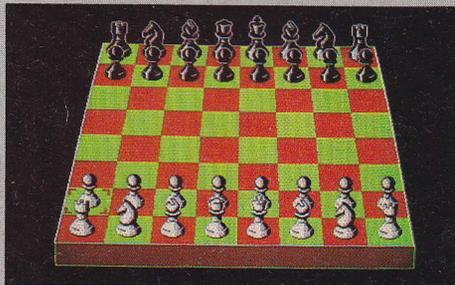
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