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PET NEWS

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September 1980 95p

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Editor
Terry Hope

Publisher
Julian Allason

Editorial Consultant
Richard Pawson

Technical Editor
Tommy Turnbull

Art Editor
Dennis Appleby

Contributing Editors
Gavin Sanders Robin Bradbeer
Gregory Yob
Lindsay Doyle

Assistant to the Editor
Wendy Cheetham

General Manager
Jessica Allason

Advertisement Manager
Jonty Horne

Advertisement Office:
PRINTOUT, North Warnborough,
Basingstoke, Hants RG25 1PB,
Tel: Odiham 2724

Editorial Office:
P.O. Box 48, Newbury,
Berks RG16 OBD Tel: 0635-201131

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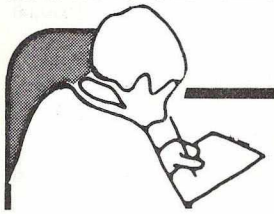

the Editor writes...

Our mixture and format in the last issue seems to have found favour with you all, if the size of our postbag is anything to go by.

Nearly all the change was governed by what you, the readers, had to say in our recent survey.

Thus you'll have noticed a much heavier emphasis on programming hints and tips, and you'll find this issue follows the same pattern.

The nice thing here in the editorial office is the way you supply many of these hints and tips.

Indeed, we often find ourselves wondering just how you manage to discover so many of them. And to be so inventive while you're at it!

But talking of issues let me tell you something of what we're planning for the months ahead.

Your next issue, cover-dated October, puts the emphasis fairly and squarely on software.

We have some frank reviews of new software on the market, intended as always to help you invest wisely. But, of course, there's more, much more.

We've commissioned an article on sorting algorithms (which even explains what an algorithm is) and on maze generation.

We've Lindsay Doyle in fine and irritable form peering beadily at Commodore's WordPro II (and if you use it, you can't afford to miss Lindsay's easy-to-use WordPro features chart).

We're summarising the pros and cons of disks in a major feature, if you aren't sure whether to invest or not.

And we've yet more reviews of some excellent books we've been examining.

For the issue cover-dated November, the mixture becomes even more heady.

The emphasis switches then to the ever-widening range of "bolt-on goodies" and other relatively low-cost peripherals.

Look, for instance, for high-resolution graphics revisited. Until you've seen "hi-res" in action on PET (or got a good impression of it by reading our feature!), you've no idea what a transformation it can bring to PET's performance.

And there've been some fairly dramatic high-resolution advances, since we last looked at this exciting PET add-on. Our feature will bring you bang up-to-date.

In fact, after reading it you might well find "hi-res" to be the Christmas present you'd like most!

In the same issue, we'll also be cataloguing music boards; synthesisers; ROM spacemakers; clever firmware chips; demagnetisers; a compendium of books; cassette and disk cases; clever interfaces to marry anything to anything; even magazine subscriptions.

In fact, everything your heart could desire for Christmas morning!

For your December PRINTOUT (which will still just be in time for Christmas!), we're going to move up-market slightly, and look at the more expensive peripherals, with a special emphasis on printers.

Right at this very minute, we have Robin Bradbeer and Ron Geere compiling what promises to be an exhaustive (and, for them, exhausting) examination of all possible PET Printers, very good, good, fair, bad, and dreadful.

We shan't forget disks though, so linking with our October feature on disks as a software medium, we'll summarise the two major disk units available for PET: Commodore and CompuThink.

And don't forget: running like a continuous thread through all these issues will be all the regular PET features which are making our name.

They're your own special recipe of programming hints and tips; shortcuts to do this and that; news, views and inside stories from our own staff and from you also; and your own letters pages, rapidly becoming a forum where we stand back and let you swap ideas.

Heavens, these are exciting times, aren't they? We only hope we'll manage to keep up with it all!

TERRY HOPE

KINGSTON

KINGSTON — KRK 1

A hardware repeat key for the PET number/cursor pad — a boon to the busy programmer and the ambitious games programme writer. Aided by the detailed instruction programme the average PET owner can upgrade his machine in a couple of minutes without fear of a fatal 'no-no'. **£17.50**

KINGSTON — KRK 2

Initially the KRK 2 was conceived as a definitive full keyboard repeat key. However, Kingston ingenuity has optimized on their patented board accessing techniques to allow two invaluable features to be added:

The first, a warm keyboard reset from otherwise fatal crashes. The second, a selectable keyboard tone which allows touch entry at otherwise impossible speeds. We can say with confidence that this unit is an absolute must for any PET user who wants to get the best from his machine. **£35.00**

KINGSTON — KC 1

A totally new concept in PET's communication with the outside world. At long last the programmer is free from the limitations of the IEEE bus. INPUT, PRINT, LOAD and SAVE to an external RS232 device are now possible without recourse to ingenious/tedious software. A comprehensive on-board firmware package allows all manner of hitherto impossible functions to be achieved including keyboard selectable configuration with full modem control. **£135.00**

KINGSTON — KC 2

Having achieved one level of impossibilities, we knew someone would need more so here it is —

Simultaneous access to two RS232 serial devices or networks with all the features of the KC 1 and more besides. With this device we give PET users serial RS232 I/O capabilities, which the owners of much more expensive machines would envy. **£150.00**

KINGSTON — KSB 1

A twenty-way RS232 multiplexing/switching box with 'mind-blowing' potential — Applications of the unit are legion and range from simple networking through multiple disc sharing to multidevice complexes based on a single processor. **£350.00**

CMC ADA 1200

A low budget IEEE 488/RS232 unidirectional interface, with a proven record of reliability (Field failure rate better than ·1 percent). Since the unit is not addressable it is not recommended for use with the Commodore Disc. **£65.00**

CMC ADA 1400

An addressable IEEE 488/RS232 unidirectional interface, which is proving even more reliable than the ADA 1200 from which it was developed. While it was designed to offer only standard RS232 output it is sufficiently 'beefy' to cope with a number of less demanding current loop applications without modification. **£90.00**

CMC SADI

SADI — The microprocessor based serial and parallel interface for the Commodore PET. SADI allows you to connect your PET to parallel and serial printers, CRT's, modems, acoustic couplers, hard copy terminals and other computers. The serial and parallel ports are independent allowing the PET to communicate with both peripheral devices simultaneously or one at a time. In addition, the RS232 device can communicate with the parallel device. Special features for the PET interface include:

- Conversion to true ASCII both in and out.
- Cursor controls and function characters specially printed.
- Selectable reversal of upper and lower case.
- PET IEEE connector for daisy chaining.
- Addressable — works with other devices.

Special features for the serial interface include:

- Baud rate selectable from 75 to 192000.
- Half a full duplex.
- 32 character buffer.
- X-ON, X-OFF automatically sent.
- Selectable carriage return delay.

Special features for the parallel interface include:

- Data Strobe — either polarity.
- Device ready — either polarity.

Complete with power supply, PET IEEE cable, RS232 connector, parallel port connector and case. **£175.00**

CMC AIM 161

A low budget IEEE 488 16-channel analogue to digital convertor for the competent programmer who wants to 'do his own thing', With a 5·12 volt reference voltage the unit is normally accurate to better than ·5%. **£90.00**

CMC PETSET

An AIM 161 specially configured for plug-in and switch-on use by the less technically graced user. The unit has a number of helpful extras including an input connector board allowing simple screw connection to the outside world. **£135.00**

CMC APPLESET

Similar to the PETSET, saving that the unit is configured for use with the APPLE. **£135.00**

CMC TANDYSET

Similar to the PETSET saving that the unit is configured for the TANDY TRS80. **£135.00**

CMC XPANDR 1

Analogue to digital conversion of up to 128 channels can be achieved by simply connecting as many 16-channel AIM 161 units as you need through this smart board. **£40.00**

TNW Corporation

TNW 2000

With over 2,000 units sold, this IEEE 488/RS232 interface can truly be said to be tried and tested. Features include the conversion of both PET and true ASCII, daisy chaining and full address selection.

Standard RS232. **£135.00**
Current Loop. **£150.00**

TNW 3000

A bi-ported, bi-directional IEEE 488/RS232 interface offering everything the discriminating programmer could ask for. Features include independent crystal controlled Baud rate on both ports and fully implemented RS232 with extensive control line options allowing responsive throttling. **£220.00**

SSM

SSM — A10

Two powerful APPLE interface boards in one:

The first an RS232 serial with three handshaking lines (RTS, CTS and DCD), rotary switch selection of nine standard baud rates from 110 to 19200, including 134·5 for selectrics and the modes of serial communication under software control.

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READ/WRITE ... the pages where you have YOUR say!

IN REVERSE!
Mr Bullard's right, in the August PRINTOUT, in supposing his reverse routine could be shortened. Try this, developed by my colleague, Brian O'Hare:

```
100 FORI=826TO851:READN:POKEI,N:NEXT
110 DATA164,4,169,160,132,97,162,128
120 DATA134,98,145,97,200,196,4,208
130 DATA249,230,98,162,132,228,98
140 DATA208,241,96
```

Running the program POKEs the second cassette buffer. Call it subsequently with SYS826. It's a bit shorter than Mr Bullard's, and the hex which goes into the buffer looks like this:

```
A4 04 A9 A0 84 61 A2 80
86 62 91 61 C8 C4 04 D0
F9 E6 62 A2 84 E4 62 D0
F1 60
```

Your readers may like to know that LDY and CPY (A4 and C4), which load and compare Y with the contents of zero page location 04, have been used instead of the more usual LDA 0 and CPY 0 for an odd but useful reason.

You see, this routine (or any similar one in machine-code) can be incorporated into a Basic program by using the monitor, without using POKE statements.

The second cassette buffer can be used, but more usually the Basic area is used. The (slight) snag is that any 00 byte within a Basic program is used to indicate the end of a program line. This produces fatal results to a program like the one above, if we don't pick up the needed zeroes from another location.

Try this. Type NEW and enter the line number 100, a REM, and 26 question marks.

Then go into the monitor (use SYS 1024, if you've a new-ROM PET), where you'll find the 26 question marks in locations 0406 to 041F. Replace them with the hex codes in the list above. When you've finished, you should see three groups of 0's, which signify the end of a Basic program, in locations 0420 to 0422.

Go back into Basic (type X if you've new ROMs), and enter, as Line 110, SYS 1030

You'll now have the same effect as Mr Bullard's original program gave. There's not much in it as far as speed is concerned, but you've used only 44 bytes as against nearly 200 in the previous program. This could be useful, space-wise, in many programs.

It's interesting to LIST, but let's make two points:

First, you can only input this program via the monitor; Line 100 is merely the system's version!

Second, you can't add to the program's beginning without carefully recalculating the new SYS. And in a more complicated program, all specific jumps would need working out too. So once the early part of your program is complete, leave it alone!

This sort of reverse-screen routine is indeed useful. For example, in file-handling, where specific lines have to be completed, the background seems better in reverse for input, whereas output looks better in unreversed. It's a matter of opinion, but it's an option that's really only viable in machine-code - Basic's too slow.

I hope this will interest your readers as much as their tricks and routines have interested me. You've got an excellent magazine; keep up the good work.

A S Goodenough
Northumberland Road
North Harrow

Thanks, Mr Goodenough, for the routines the information, and the compliment. You know, this "Read-Write" feature is the fastest growing section in PRINTOUT. The letters just keep on coming, and nearly all have some sort of program or hint. It's a terrific feeling, just sitting back and watching them roll in; the clearest evidence that what we're doing is OK by you.

PLEASE HELP!

Your letters are a real pleasure to get, to read, and to print, whether or not they're with program listings for other readers to try. And clearly this page is increasingly popular.

But if you send us a small program, and if you have access to a printer (but only if; don't stop writing just because there's not a printer handy!), then it would help us enormously if you'd enclose a listing.

Try to keep to 40 characters a line so that reproduction isn't too small; use a reasonably new ribbon if you can, plus fairly heavy-weight white paper; and try not to fold your listing in the envelope. We'd prefer a CBM or similar printer, simply because graphics and similar characters will be correct.

Thanks a lot!

AHEM!
I think I've got an answer to Tommy Turnbull's CompuThink lock-out in the last issue. Simply type R=0 and POKE 1034,65.

Hey presto! you've got control again! It's feasible, because CompuThink's DISKMON doesn't check for RUN, but only whether the first character's an "R". The POKE produces an "A" in the middle of your REM and asterisks.

But it's still possible to protect your program from running on another CompuThink drive, because every CompuThink system has its own 6-number "i.d", starting at decimal 36848 and ending at 36853. Each number can be anything between 0 and 255, and that's 2.81474 times 10 to the 14th possible combinations!

A simple test hidden in the program could produce a "self-destruct" if the numbers don't tally.

Mark Valentine
Valley Avenue
South Elmsall
West Yorkshire

Tommy has been smiling thinly since the last issue, Mark, and the letters his CompuThink security piece produced! Your idea's a good one, but see this month's Tommy's Tips for something even more simple. Though you're right, of course - CompuThink make a big point (and quite properly) about the unique identity each of their drives has. Thank you too for your other letter and very clever routine. Tommy will be commenting on it in his feature next month. One last thing: would you mind if we asked how old you were? We get a feeling (your handwriting, and the college-looking paper you use) that you might just be rather younger than your letters suggest? We'd like to hear more from you!

SHORTEST EVER!
You've asked for one-liners. Try WAIT 6502,100 (but new ROMs only).

P H H Verstage
Mekvale Limited
Orpheus Street
London SE5 8RR

For those who don't know it, we'll not give the result away. But you must be a new reader, Mr Verstage. Inside Trader blew this one in PRINTOUT Issue 2 (and the IPUG magazine carried it around the same time). Readers will get the best effect by strolling into a computer shop and surreptitiously entering it on any PET that's up and running!

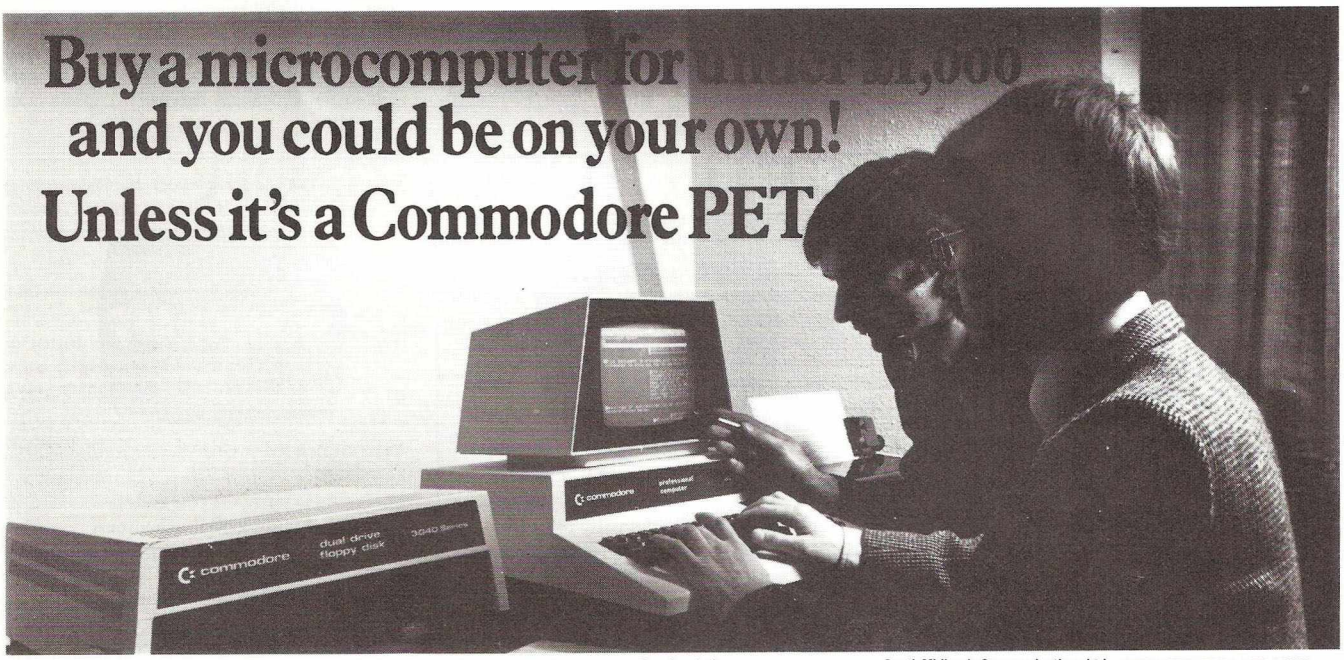
STANDARDS
Gavin Sanders' mention of "Spot The Errors" (PRINTOUT, June) in Commodore's printer listing, seen on most dealers' walls, doesn't go far enough. You can play this game with nearly any commercially sold software.

I HOPE it would be unrewarding with one of my programs, published commercially by Petsoft (I remember checking it for the umpteenth time, and still noticing a full-stop missing. I corrected it; resaved on a blank cassette;

Continued on page 9

Buy a microcomputer for under £1,000 and you could be on your own!

Unless it's a Commodore PET



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STOCK CONTROL Powerful and flexible stock system with full facilities for recording and control of stock information. An audit listing is automatically printed which itemises all transactions including the entry amendment and deletion of master stock information, issues receipts, allocations, purchase orders. Printed reports include Full Stock Control, Stock Valuation, Reordering Report, Audit Listing, The system is highly flexible.

£50 on CompuThink or Commodore Disk.

WORDCRAFT

WORDCRAFT A true Word Processor for the 32K PET. Wordcraft is a genuine word processing system, easy to understand and use, but containing all the facilities normally found only on more expensive dedicated Word Processors. Features include scrolling in both vertical and horizontal directions (to overcome small screen size), up to 117 characters wide and 98 lines deep for a full page of text. Written entirely in machine code for speed and compactness. Truly the Rolls-Royce of PET Word Processors.
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PAYROLL 200

PAYROLL 200 Comprehensive, easy-to-use package for small businesses with up to 200 employees. Facilities provided include Holiday Pay, Sick Pay, Bonus Payments and two rates of overtime, as well as allowing a 'Standard week' to be specified for each employee. Weekly and monthly summaries are provided and amendments necessary because of a Budget are made very easy. Prints wage slip and coin/note analysis. Tax & NI are computed automatically from knowledge of employees codes. Update service available. Full manual provided.
£50 on Commodore or CompuThink Disk. Cassette system also available at **£25**

PETPLAN BUSINESS SIMULATION

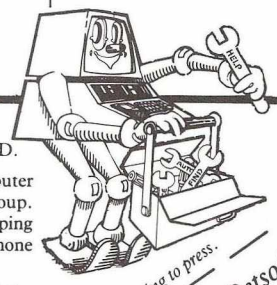
PETPLAN BUSINESS SIMULATION
Petplan is a general management business simulation game which is exciting to play. Already it is widely used by colleges and Industrial Trainers to teach the skills needed to run a business. The program creates the model of a manufacturing company; you take the decisions. You will need to hire workers, invest in plant and premises, set advertising budgets and prices. At each stage screen reports (which may be printed out) show the results of decisions as they take effect. 50 page manual and voice guide on cassette. For 32K PETs.
£60 on Cassette.

PET BASIC TUTORIAL

PET BASIC TUTORIAL 2 A revised version of our best selling course on programming the PET in Basic. Let PET take you through its commands and functions at your own speed. Over 50K of lessons including working examples of the programming techniques that are described. Suitable for novices and those with some programming experience, from literacy age 10 on.

£15 on cassette.

PROGRAMMERS TOOLKIT £44
Plug-in ROM Chip adds nine useful commands to PET BASIC including RENUMBER, TRACE, DUMP, FIND and APPEND.



You will find Petsoft programs on sale in more than 200 computer shops throughout the country, and in many more all over the world. We invite you to try them.

If you can't find the program you need, contact us directly. We offer over 200 titles and can supply you directly. We will even take credit card orders over the telephone. Since we normally carry all programs in stock, you won't have long to wait.

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Petsoft is backed by the resources of Applied Computer Techniques Ltd., Britain's leading computing group. With over fifteen years experience of developing business software, ACT has a reputation second to none in the industry. That is your guarantee.

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Prices exclude VAT and were correct at time of going to press.

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READ/WRITE (Continued)

verified it; rewrote both copies; verified again; all before sending it away).

What a pity therefore, and simply for instance, that such a clever machine-code program as Super Breakout should warn you that using the STOP key is hazzardous (sic)!

Is the main reason that computer programming is, on the whole, a "young man's game", and that therefore modern educational methods are being shown up more than in other vocations?

With PRINTOUT's help, let's try to raise the standard (though PRINTOUT's proof-reading isn't perfect; in an article from me last May, neither "subscribed" in paragraph 2, nor "number" instead of "numbers" near the top of the second column, were in my manuscript!).

But commercial software suppliers are far worse. Petsoft, for example, "translated" my program (so that it would run with new ROMs) simply by copying, and changing the then solidly lower-case letters to solidly upper-case. Thus there were 3 full screens of instructions in capitals (except for some odd lower-case letters they missed!). The lazy devils!

I'm naturally sending them a reworked version of this too, but I wonder if they'll bother to change over.

John Still
Rugby Avenue
Wembley, HAO 3DJ

Thanks for your letter, John. You've modestly not mentioned your program's name, so we will. It's "Life", but readers may now get it, only to see if they can find any errors! We'd like readers to tell us about especially dreadful software they might unwittingly buy. Laws of libel allowing, we'll pass the information on!

YET ANOTHER REVERSE!

Here's another Basic loader for a machine code routine. It also shows the effect of repeatedly calling the routine. After entering it, list it before running, so that something is on the screen.

```
 100 FORI=826TO897:READA:POKEI,A:NEXT
 110 DATA162,250,189,237,130,32,123,3
 120 DATA105,128,157,237,130,202,208
 130 DATA242,162,250,189,243,129,32,123
 140 DATA3,105,128,157,243,129,202,208
 150 DATA242,162,250,189,249,128,32,123
 160 DATA3,105,128,157,249,128,202,208
 170 DATA242,162,250,189,255,127,32,123
 180 DATA3,105,128,157,255,127,202,208
 190 DATA242,96,201,128,48,2,233,1,96
 200 SYS826
 210 FORI=1TO500:NEXT:GOTO200
READY.
```

Robert Ford
Longland Court
Avondale Square
London SE1 5HA

Thanks, Robert. But if we get one more routine to reverse the screen, we'll scream! And yours uses lots more bytes than Mr Goodenough's. Ho hum, back to the drawing board!

THAT LETTER

I read with interest the letter in a recent issue of PRINTOUT from a Commodore dealer.

Without debating the rights and wrongs of printing an anonymous letter, I would wish to add the following to this discussion.

As a fellow Commodore dealer I regret that the Correspondent dislikes the tactics of CBM. The points raised are, frankly, almost irrelevant to the business of selling. We deal with a great number of suppliers and very few of them are without fault in one form or another. Indeed, as hard as we try ourselves to give good customer service we too make the occasional mistake.

The purpose of this letter is to state publicly that we find that Commodore's overall performance is one of the best.

All within this organisation believe that our company's achievements have been realised through the splendid co-operation of CBM. I can also confirm that this view is shared by many of my peers. And just in case there are any cynics out there, Commodore have not asked me to write this letter.

Paul Handover,
Managing Director,
Dataview Limited
Colchester, Essex

We were standing by for an expected response to last issue's letter from a Commodore dealer, when this letter arrived. We were pleased, and so, when we told them, were Commodore. They felt it spoke for itself. We disagree on one important and vital point with Dataview - the letter was **not** *anonymous, as must surely have been obvious. We witheld the writer's names at their request. That is a light-year away from an anonymous letter. And, of course, there are many years of journalistic precedent for our action.*

GEERE AGAIN!

Tokens now seem to have been totally covered, and succinctly summarised, by Mr Ball of the Post Office. Clearly, the "Hunt The Token" award goes to Ken Hutchon; and happily Mr Higinbotham's problem is solved thereby!

Since I seem to have started all this token business, can I have the last word too?

Most Basic words represented by a token have an abbreviation, and the latter are useful for saving time in immediate mode, and saving space in long program lines.

The Basic input buffer limits lines to 80 characters, but by using ? for PRINT (which everyone knows about) and, for example, GOs for GOSUB or Da for DATA (which maybe many don't), you can have lines quite a bit longer than 80 characters.

I'm enclosing a full abbreviation table (which will appear fairly soon in a book we're producing called "The IPUG Compendium"). Maybe you could find room for the table?

203 is the token for SYNTAX ERROR in old ROMs; 204 or 205 repeat from 129 upwards; and 255 is pi (which is both character and keyword).

Keywords are listed in order from 128 to 202, plus 203 for new ROMs. That's from hex C092 (decimal 49298), in the format ENdOrNExt, and so on, where the lower-case denotes the ASCII for the character, with bit 8 (128) set.

The list is terminated with a zero byte. Oh yes, and you should note that INPUT positively does not have an abbreviation, despite what you may have read elsewhere!

Moving on, I see Gavin Sanders had a go at Invaders. Has he, or anyone, noticed that the CBM version has a habit of aborting the game prematurely? I've yet to discover whether it's due to the presence of DOS support or a program bug. I'm new to the game, having only scored a high of 4,190. How's Gavin's score?

Ron Geere
York Road,
Farnborough, Hants

Thanks a lot for the abbreviation list, Ron. We should run a contest to see who can get the longest single Basic program line (and THAT'S going to produce some mail, we imagine!). Gavin says he too has had the Invaders problem you describe, but as he loaded from cassette, and disks weren't a part of it, it sounds like a bug rather than DOS-activated. It may be a built-in device to stop you getting too cocky, Gavin feels. He also says, with the smallest of smirks, that he's scored 7,000+ on Invaders (and probably THAT will produce mail too!). Good luck with the book; we'd like to review it as soon as it's out.

See page 11 for Ron's abbreviation list.

OOPS!

We have some red-face errors to correct! Way back in the first "Tommy's Tips" to appear, the listing had errors in Lines 215 and 300. Line 215 should have read:
215 IFIR=0GOTO310
while Line 300 should have been:
300 GOTO190

Error number 2 was in last month's letters. We did Mr Sington a disservice by leaving a shifted graphic character in his listing. It should have been the upwards arrow instead. You'll spot it in Line 20.

No other errors found so far, but we'll always report them here on your letters page, either as we find them or you tell us!

THE PET™ REVEALED

CONTENTS

SECTION 1. The PET System Hardware

Basic elements — CPU — Memory — Input and Output — Video circuit — System memory map.

SECTION 2. The 6502 Microprocessor.

An overall view — The accumulator and arithmetic unit — Processor status register and flags — Branching and Jumps — Addressing modes — The Index register — The Stack register — Interrupts — Data modify instructions — Machine code on the PET — Hand assembling programs.

SECTION 3. The PET operating system.

Routines from PET Basic — Variable memory map — Basic tokens — Program storage format — Overlays — Data storage — Numeric and string variables — Arrays — Garbage collection — Adding commands to Basic — Trace.

SECTION 4. The User Port.

User port connections — Video output circuit — Parallel user port — The 6522 VIA — User port memory map — Programming the user port — Handshaking on the 6522 — Serial I/O — I/O port expansion — Communication between processors — KIM to PET data handshaking — Summary of 6522 registers.

SECTION 5. The IEEE port and the 6520.

The 6520 and its registers — The PET keyboard — Modifying keyboard functions — Cassette unit — Merge — IEEE port — IEEE connections — IEEE signals — IEEE commands — IEEE to RS232 conversion — IEEE bus handshaking — The video display — Double density plotting.

Available from COMPUTABITS Ltd.,
P.O. Box 13, Yeovil, Somerset
Price £10.00

A NICK HAMPSHIRE PUBLICATION

COLOUR FOR YOUR PET!

Terry Hope, Printout's new editor, went across to Brighton recently. The purpose ? To see a small black box which could be one of the years most exciting add-on devices for your PET. Here is his preliminary report. An in-depth review will appear very soon.

Salah Sadek is undoubtedly a modest and retiring man, not given to saying what he doesn't mean or offering what he can't deliver.

Which is a refreshing change, in this time of loud trumpet-blowing; a phenomena usually preceding non-existent products, bedecked with broken promises.

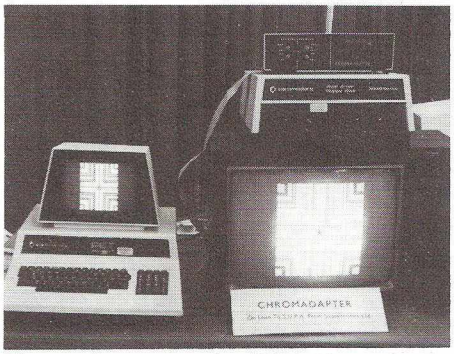
Sadek is one of the two architects of the 'Chromadaptor', a black box which instantly produces colour — and a large variety too — for your PET's screen output. Not on PET's screen of course. This remains immovably fixed on boring old black or green and white, depending on the model you have.

But add a colour TV set — not a monitor — and you get full colour displays with all colours totally under your control at all times.

We will be publishing a full review in an early issue, but here's a brief report to whet your appetite.

First, you get a choice of six basic on-screen colours. They are red, blue, magenta and cyan, plus black and white, a total of 8 in all.

Each of these comes in your choice of two intensities with the difference between them sufficiently marked really to justify a claim of 16 colours in all.



Chromadaptor at the PET Show. Black and white repro doesn't do it justice, of course.

COLOUR CONSCIOUS

This choice can be applied at will to either the background, which is the area where there aren't any characters, or the foreground, which is the area where there are. Even more flexibly, each and every background or foreground colour can be individually controlled, in every one of the 1000 possible screen positions. The final result is as flexible as any programmer could want, in our view.

The control is exerted by several POKE commands. placed at strategic points in the program. This means of course that existing programs can be simply modified for colour. New programs would naturally be written with colour in mind.

PLUG IN & SWITCH ON

The device itself plugs into the user port; runs from its own mains power supply; and provides a fully modulated UHF output which goes straight into the aerial socket of your colour TV set.

Any existing provision for sound in any program is automatically handled since the user port connection utilizes the normal CB2-sound approach. Sound, as might be expected comes out through the TV's speaker.

The Chromadaptor box is ten inches wide by seven inches deep and three inches high, with just four switches and two rotary thumb-wheel controls on the front. The switches and controls are part of the colour control system.

CONCLUSIONS

We have seen it, played with it, and written a quick program on it. And it works! The screen display is crisp, clear and considerably better than a number of black and white modulators we've seen in the past.

We're shortly going to put a unit through fairly exhaustive tests, and the results will form a full review article in the earliest PRINTOUT we can manage.

In the meantime the only other thing you will be wanting to know is the price. That is currently planned to be £295 plus VAT at launch, and will include special instruction programs and a demo.

All we can say is 'Watch this space!'

GEERE AGAIN!

TOKEN	ABBREVIATION	KEYWORD
128	End	END
129	Fo	FOR
130	Ne	NEXT
131	Da	DATA
132	In	INPUT#
133		INPUT
134	Di	DIM
135	Re	READ
136	Le	LET
137	Go	GOTO
138	Ru	RUN
139		IF
140	REs	RESTORE
141	GOs	GOSUB
142	REt	RETURN
143		REM
144	St	STOP
145		ON
146	Wa	WAIT
147	Lo	LOAD
148	Sa	SAVE
149	Ve	VERIFY
150	De	DEF
151	Po	POKE
152	Pr	PRINT#
153	?	PRINT
154	Co	CONT
155	Li	LIST
156	Cl	CLEAR
157	Cm	CMD
158	Sy	SYS
159	Op	OPEN
160	CLo	CLOSE
161	Ge	GET
162		NEW
163	Ta	TAB(
164		TO
165		FN
166	Sp	SPC(
167	Th	THEN
168	No	NOT
169	STe	STEP
170	+	+
171	-	-
172	*	*
173	/	/
174	↑	↑
175	An	AND
176		OR
177	>	>
178	=	=
179	<	<
180	Sg	SGN
181		INT
182	Ab	ABS
183	Us	USR
184	Fr	FRE
185		POS
186	Sq	SQR
187	Rn	RND
188		LOG
189	Ex	EXP
190		COS
191	Si	SIN
192	Ta	TAN
193	At	ATN
194	Pe	PEEK
195		LEN
196	STr	STR$
197	Va	VAL
198	As	ASC
199	Ch	CHR$
200	LEf	LEFT$
201	Ri	RIGHT$
202	Mi	MID$
203		GO(new ROM)

It's The Mu-pet Show!

Multi-User PET (Mu-pet) links 3-8 PET computers to one Commodore disc drive and a printer.

Mu-pet is very good news indeed for those PET users wanting a multi-user computer system and who, up until now, have run up against a budgetary brick wall.

Mu-pet delivers the goods at very low cost... which is one of the reasons it's become the world's biggest selling multi-PET system. Precisely engineered in the U.S. and Canada, Mu-pet makes the most of PET computers – *without the need for program changes.*

£595 is all it costs for a standard Mu-pet system that links three PET computers to a single Commodore disc drive and a printer. The cost of linking more PET computers, up to a maximum of eight, is £125 for each addition.

All machines have access to the disc drive and printer. The hardware which all runs via the IEEE bus has been so well designed that each PET thinks the disc is its own, and priority depends on who gets there first.

If you've three or more PETS, then you need a Mu-pet to make the most of them.

OFFICIALLY APPROVED BY COMMODORE

Yes, I want to see the Mu-pet show – please advise me on my nearest dealer.

Name_____

Address_____

_____

_____

PT

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KOBRA

HOTLINE News & Products

HAIL AND FAREWELL!

Possibly the most important news item this month (for us, anyway!) is that Julian Allason, previously Managing Director of Petsoft, is now publisher of PRINTOUT.

The previous publisher - Jessica Allason - wasn't entirely unknown to Julian Allason, of course; Jessica now, however, has her own full-time job, an accurate description for rearing any son of Julian's!

Julian therefore decided that he'd like to move on to the world of publishing, and PRINTOUT was the obvious choice.

Petsoft, the company founded by Julian only a few years ago, is now a very high-turnover business indeed, and in good hands within the ACT empire in Birmingham.

This left Julian free to relinquish his managing directorship while still remaining on the ACT board as a non-executive director.

Those who know him well somehow aren't surprised. Once a journalist, always a journalist, say the old hands sagely. Indeed, the picture tells all.

Centre is Julian; on the left, Matthew Wauchope of Petsoft; on the right, another journalist, one David Tebbutt, editor of a magazine not a million miles from Personal Computer World's offices.

One thing's for sure: readers may now expect very exciting things to begin happening in PRINTOUT's world.

LIKE TO JOIN A CLUB?

A club with a fairly unlikely name of Raygamco is going great guns in the USA. Members enjoy fairly hefty discounts on computer purchases, plus lots of other benefits.

Now something similar has begun here in the UK, under the somewhat more sensible title of COMPUTERCLUB.

"Begun" isn't probably the right word, since COMPUTERCLUB have just enrolled their 1,000th member (see the picture on this page).

He's John Ivinson, managing consultant of Altergo Consultancy, and a Council Member of the British Computer Society.

Wouldn't you just expect someone knowledgeable like John to join something like COMPUTERCLUB?

It sounds like a good deal to us, and you may already have seen COMPUTERCLUB's advertisements in the major computer magazines (like this one, for instance!), listing all the membership benefits.

If you'd like to know more, before signing up, contact Roger Frampton on 01-434 3914, or write to him at 42 Great Windmill Street, London W1V 7PA.

They'd even welcome offers of help in running it, because it's a spare-time occupation for Roger at the moment. It's growing fast enough, however, to keep him glancing frequently at his watch!

Three wise monkeys: Matthew Wauchope, Julian Allason & Desperate Dave Tebbutt

QUICKER DISK PROGRAMMING

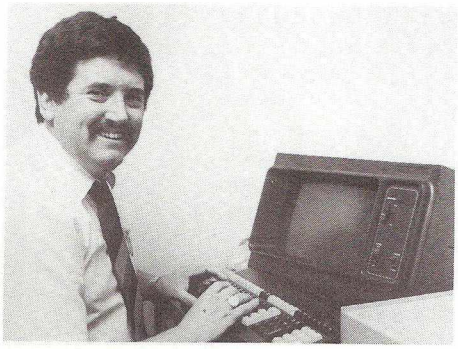
We have a news release/instruction booklet here that drips with exlamation marks. "News release!", it says. "Quicker programming on PET disks!!", it says. "Programming development can be halved!", it says. Cor!

We had to delve into the literature a bit (we were sent the instructions, but not the product) to find out exactly what it was, and we've concluded that it's a disk, containing some clever software.

It's called Linker, and it's now available for PET, primarily to merge your commonly used subroutines into Basic programs you're developing, but to do a lot of smart things besides.

Actually the specification looks pretty good, and suggests that Linker will do many of the things you've previously thought wistfully about, but never found a way of managing.

You can get more details from Dove Computer Systems at 17 Burlington Street, Blackburn BB2 6ES. Ring them on 0254-665867 if you want.



One thousandth Computerclub member, John Ivinson of Altergo Consultancy.

BE COMFORTABLE WHILE PETTING

Wego Computers have a sister company called Malcolm Owen Furniture. They didn't tell us how to contact them, so you'll have to contact Wego instead, if you're interested in what follows. Wego are at 22A High Street, Caterham, Surrey; phone 0883-49235.

Malcolm Owen make a neat-looking desk for PET and its peripherals.

So, if space and stowage are your problem, there's an answer for you.

BOTH ENDS OF THE RANGE

Taylor-Wilson Systems clearly believe in catering for everyone. They've introduced the Multi-PET System for one end of the spectrum and a Forms Receiving Basket for the other. Or maybe both for both.

The Multi-PET System lets up to 8 PETs be connected to each other, and to a common disk drive.

A machine code program living in the second cassette buffer (where else?) of each PET lets a PET use the disk drive if another isn't.

Otherwise, it polls the data bus until it's free. Clever, and neat too, as you can see from the picture.

The Forms Receiving Basket is a rather grand name for what practically none of us have got, a really efficient way of collecting up print-out on long runs.

The Multi-PET System will cost you up to £2,403.50, according to how many PETs you want on-line; the Forms Receiving Basket is slightly more economic at £19.55.

You can contact Taylor-Wilson at Oakfield House, Station Road, Dorridge, Solihull B93 8HQ; phone 05645-6192.

SEEING DOUBLE

Supersoft (watch for the review of their new SuperChip next issue) have another device available which nearly, but not quite, gives you high-resolution graphics.

It's called Double Vision and, in effect, gives you two screens, full of info, for the price of one.

Switching is done between the two 60 times a second, and the basic display unit is a square measuring two dots to a side - the same size as PET's full stop.

This provides over 15,700 addressable screen points, rather than the boring 1,000 to which you're normally limited.

The price you pay is a noticeable but not overpowering flicker, as the screen switches back and forth; and £65 plus VAT if you install it yourself, or £80 if you ask Supersoft to do it for you.

Contact Supersoft at 28 Burwood Avenue, Eastcote, Middlesex, or ring them on 01-866 3326.

DOCTORS ORDERS

We always thought 3D stood for the three Doctors who run this company specializing in PET interfaces. But no, the real title is *Digital Design & Development.* On show in their premises at 43 Grafton Way, London W.1. is an impressive new Fast Data Acquisition system for the PET. The price is pretty impressive too - £1,200 + VAT - but wait until you hear what it does. The system offers eight analog input chanels, four analog output chanels, eight bit resolution , crystal controlled conversion time and outputs for oscilloscope display; it converts your scope into a storage scope. The real trick is that it runs *simultaneously* with other Basic programs. Just what the Doctors ordered.

Continued on page 15

HOTLINE News & Products

EASY ALIGNMENT

"Computer diskettes and flexible disk drives can only work at optimum efficiency, with high integrity of data transfer, when correctly aligned and used with high-quality media."

Or that's what it says here. We believe it, we believe it.

Joking aside, good head alignment really IS important (which is a shorter way of putting the 27 words above), and Verbatim, the disk people, have produced write-protected disks, small and large, for alignment testing. They're prettily posed in our picture.

The nice thing is that a competent engineer can now use them, plus an oscilloscope, to cure most problems in situ.

If you'd like to know more, contact BFI Electronics Ltd., at 516 Walton Road, West Molesey, Surrey. You can ring them on 01-941 4066 if you're impatient.

Sorry we can't tell you how much the diskettes are. Dan Bogard & Associates, a PR firm who send a steady stream of stuff to us, never seem to include prices. Irritating people!

ANOTHER FIRMWARE GOODY!

Plug-in ROMs are coming so thick and fast these days that we'd advise buying shares in the firm that produce Spacemakers. Their stock is bound to go up.

Latest addition to the ever-lengthening range is called PicChip. With two Cs; a little one and a bit one.

Like most of them, it does an enormous amount, and we've no room to describe it fully here. We'll certainly review it later though.

In the meantime, to make your mouth water, it gives you FORTY new Basic commands - yes, forty! We've seen a list of them and we foresee a challenge in encompassing what they make possible.

They're all centred around the graphic abilities of PET, and extremely rapid handling/manipulation of the screen image.

It looks, as we say, very exciting, but only for 16K and 32K owners, unfortunately.

There's no UK distributor yet, but the price is £57.50. Information from Ing-Buro Roger Houghton, Arabellastrasse 58, 8000 Munich 81, W. Germany will make you first kid on the block to have one.

COURSES ON PETTING

Commodore are running a series of one day courses and seminars, and two- and three day residential courses on PET topics using CBM equipment and software.

Residential courses at the Skyway Hotel, London Airport - not our favourite inn but convenient if you need to effect a fast escape - include 'Beginners Basic' commencing November 4th and December 2nd, 'Advanced Programming in Basic' starting September 30th, November 11th and December 9th. Both cost £275 + VAT and last three days. There is a much needed two-day 'Disk Utilisation' course beginning October 9th, November 20th and December 18th; the cost is £175 + VAT.

One day seminars held at the Park Court Hotel, in London's Bayswater include 'Microcomputers and the Businessman' on October 14th and November 25th priced at £20 + VAT, and Word Processing (using WordPro) on October 16th and November 27th, at £35+VAT. Reservations through the Commodore Information Centre, Tel: 01-388 5702.

PRINTOUT will be reviewing some of these courses in a forthcoming issue.

For those who would like something tailored to their own needs, Beyts Logic (tel: 09327-86262) will provide one, two or three day seminars for small groups. They can be held at their HQ in Sunbury, Middlesex, in Central London or at the customers own premises. Typical cost - £60 per person per day.

WANNA MAKE A FORTUNE?

With the near-arrival of the new football pools season, promotion has started in earnest for John Minshull's Micro-Pools program, marketed by Petsoft at £20.

We've seen and played with it, and it's fun to use. Petsoft and John Minshull both carefully say, however, that there's no guarantee it'll win you a fortune!

Never mind; if it even reduces the odds a teeny bit, it's got to be worth it, and we think it should at the least do that from all we've seen so far.

Contact Petsoft at the address we all know so well: 66-68 Hagley Road, Birmingham; phone 021-455 8585.

COMMODORE'S ACOUSTIC MODEM

PRINTOUT has obtained details of Commodore's new acoustic modem which will allow PETs to communicate with other computers.

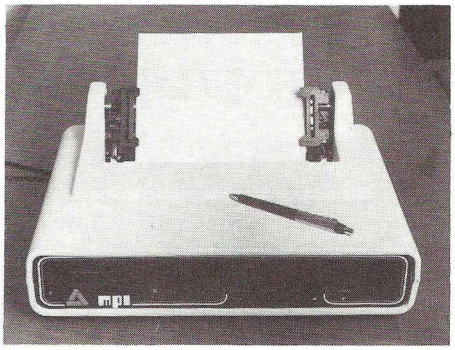
Designated the CBM 8010, it is an IEEE-488 device operating at 300 BAUD. Commodore are understood to have commissioned software to support terminal emulation and hard copy using CBM printers. A Disk File send and receive facility is also to be released.

Accurate processing of the input from received carrier is achieved through the use of a switchable four-section bandpass filter that rejects out-of-band signals.

The U.S. retail price is $395. However, GPO approval would be required before the device could be connected to British telephones. No U.K. launch date has been announced.

SHORT BITS

A company called ASI Celestial Computers are using the PET for astrological applications. Those interested can contact Henry Weingarten at 127 Madison Avenue, New York, NY 10016, USA. Telephone 212-679-5676.



A NEW PRINTER

Here's a new printer from Impectron Limited, and very neat it looks too, as the picture shows.

It's bi-directional (hooray for the time THAT will save at last); does 100 characters per second; has selectable character densities for 80, 96 or 132 character lines; gives you double-width characters, software-selectable, which you can mix on one line if you want; has a 96-character ASCII set; and a (are you listening, Commodore?) 7 by 7 dot matrix.

It's said to be "low-cost", but here's the snag. The infuriating Dan Bogard & Associates have struck again; they're the people acting for Impectron, so naturally no price indication was included with the information sent to us.

Sorry about that, folks. Blame a PR firm that doesn't include the one thing most people want to know.

If you're keen to know more, contact Impectron direct at Foundry Lane, Horsham, West Sussex; phone 0403-50111. And if you do, complain about their PR people.

Continued on page 17

"If you want what's best for your PET, choose Commodore software."

Kit Spencer
General Manager
of Commodore Systems
360 Euston Road
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The Commodore PET is Britain's best selling micro-computer, with over 10,000 already installed in a wide range of fields, including Education, Business, Science and Industry.

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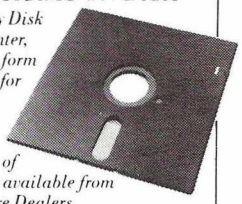

Business Information System – COMBIS £150 + VAT

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This is Commodore's official method of sharing new information and ideas between the many thousands of PET users. The newsletter is published regularly and for an annual subscription of £10 you can start receiving copies now.

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Look out for this sign. It tells you that compatible products of other manufacturers have met with our standards of approval.

(Tick the appropriate boxes)

To: Commodore Information Centre, 360 Euston Road, London NW13BL 01-388 5702

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Please send me details of: Commodore PET Software ☐

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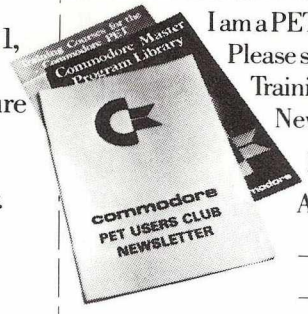

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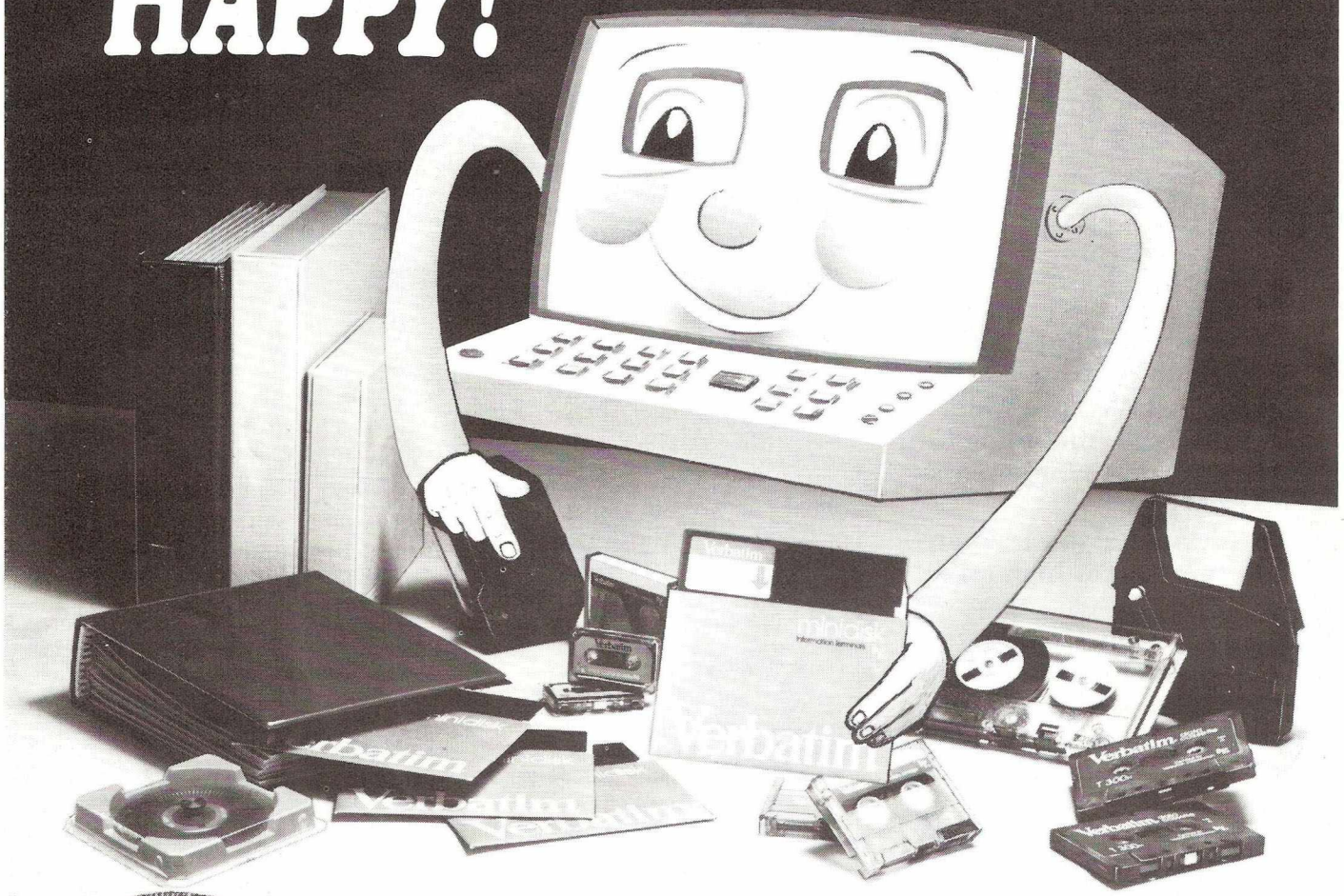

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Your computer or word-processor is only as good as its data storage media. If you feed your computer with suspect data from low quality discs or cassettes it will not only get indigestion but will also start giving you the wrong answers. Computers are only happy when they are functioning perfectly, in fact they are only happy when you are. So take steps to give your computer an error-free diet. Feed your computer **VERBATIM** products and watch him flourish.

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HOTLINE News & Products

NEW DISKS FROM COMMODORE

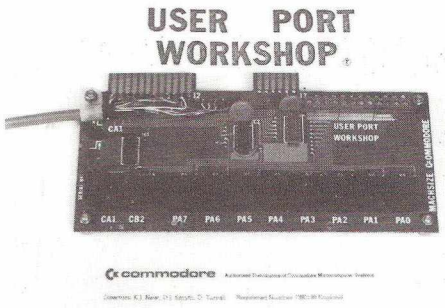
Commodore USA have finally announced the launch of the long awaited 2030 series of low cost, compact mini-floppies. Said to be the smallest, lightest and cheapest disks ever, the 2031 single 5¼" drive costs $595 for 130K bytes of store. Meanwhile Commodore's 8060 series full sized dual floppies have also been unveiled in the US. The 8061 has two single-sided 8" drives with 1.6M bytes of storeage, and is priced just below $2500. there is also a double sided model, the 8062 which yields 3.2M bytes for less than $3500. UK availability and prices have not been announced.

GET WISE ON INPUT-OUTPUT

Machsize (contact Duncan York, York House, Clarendon Avenue, Leamington Spa; 0926-312542) have just introduced a really interesting-sounding device (AND they told us how much too! It's £59.95, complete with disk/cassette software and an operating manual).

What is it? It's called User Port Workshop, and it's a board which plugs into the back of your PET's user and cassette port.

You don't lose use of the latter though; the edge connectors are duplicated on the board. Thoughtful, and you can see the board in the picture below.



It can be set up as an input, or an output, or an input-output device, which means loads of possible applications. It has 10 switches, one for each line, and lamps to indicate line status.

It's readily controlled by the ubiquitous PEEK/POKE twins, so if you're hovering on the edge of experimenting with external devices, this may be what you've been looking for.

GET AWAY FROM IT ALL!

Here's a new idea for a semi-winter break. The place is the Klymiarven Hotel in Looe, Cornwall (ring them at Looe 2333, if you can't wait to book), and the concept is a "computer week".

To be more precise, it's a 6-day course, during a 7-night stay at the hotel, in which "computers will be introduced in a relaxed and friendly atmosphere... explained by expert, amusing and talented people."

The latter are Charles Ross (British Computer Society, and experience as long as your arm) and Ron Middleton, who's similarly talented. They're backed up by the facilities of the Plymouth and District Amateur Computing Club.

It'll cost you £110 for the course, and around £110, according to room, for the hotel.

The accommodation includes the lot, and we mean the lot: early morning tea, breakfast, morning coffee, lunch, afternoon tea, and a rather superb dinner.

The nice thing is that wives are specially looked after if they're not on the course (though can YOU think of a better way of getting her interested than enrolling her along with you?).

Finally, the computers provided are, of course, PETs and they're apparently going to be available in the evening for everyone to play games on, whether they're on the course or not.

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All units boxed complete with power supply, leads, switch, fuse, indicators and illustrative BASIC software. IEEE-488 addresses selectable.

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CUSTOM DESIGN UNDERTAKEN

— BUTTERFIELD

Richard Pawson reports on Jim Butterfield's PET extravaganza, held recently by the North London Hobby Computer Club, and throws in a few ideas of his own for good measure.

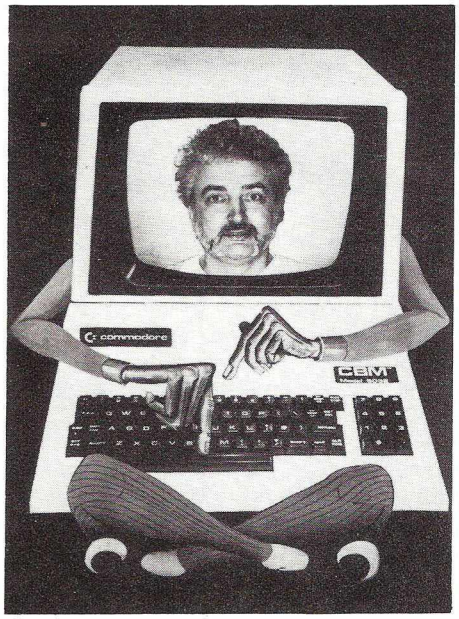
Celebraties deserve special treatment. Certainly the NLHCC spared no expense to ensure that everyone attending this event would have a clear view of Jim's fascinating programs and ingenious techniques. Notwithstanding the widely-expressed belief that Robin Bradbeer's complex array of video cameras, recorders and monitors would disappear in a puff of smoke before one could say 'Macro Relocating Assembler', there were no serious hitches. In between screenfuls of basic and machine code, we were treated to some excellent shots of Jim's right elbow!

The Butterfield policy is very much for the distribution of ideas and techniques - rather than actual pieces of code. "The main limitation on what a PET can be made to do," he says, "is the imagination of the user - not the equipment itself." He maintains that with both the famous Templeton merge routine and his own ingenious Un-Crasher (two significant milestones in PET's history), once the idea that such things were possible had got around, several programmers independently came up with appropriate solutions. Accordingly, no listings were given for several ideas which are passed on in this report. It is up to PRINTOUT readers to build on the suggestions given; we hope that you will write in with your solutions.

Watching the IEEE Bus

The first piece of software demonstrated was called 'IEEE WATCH' and was a short piece of machine code to monitor and display the status of each line of that Bus. This is achieved simply by peeking the locations corresponding to the 6520 chip which handles the Port. The screen format showed NRFD, NDAC and DAV plus the 8 data lines as being at 0 or 1, along with a trace for the last few characters sent over the Bus. Thus by borrowing a second PET and connecting it to the IEEE bus of your PET disk/printer system, it is possible to see how data and program files are transferred.

Two things were discovered by just such a method. Firstly, that it is possible to run two PETs from one CBM disk, provided that you make absolutely certain (by means of a verbal protocol, for example) that only one is active on the bus at any time. The other may remain connected, but must leave the IEEE lines well alone. Secondly, it can now be seen that whenever the screen is caused to scroll, the bus is interfered with - so beware!



Programs as Data Files

In contrast to cassette files, the Commodore disk allows a program file to be read or written as a data file, and vice versa. Apart from such esoteric concepts as programs which write programs, this makes possible a whole host of functions which are invaluable to program development and documentation. Specifically, it is now possible to record which variables are used where - which comes in very handy when you want to expand or alter a program at a later date.

First the mechanics:-

Any program saved as a normal program file, can be read back as a data file using an OPEN statement, but with P replacing the usual SEQ or USR type-specifier. GET statements can then be used to read in the program byte by byte. The first two bytes constitute the hi-lo start address for the program (usually $0400 for Basic). This will be followed by lines of Basic in the following format:

2-Byte forward chain
2-Byte Line number
Basic Code in ASCII, plus Tokens
Zero - to make End of Line

Jim has written a piece of software that reads in a program in this way and lists on the screen, for each line, the line number and all the variable names referenced in it. For example, a small program might appear like this:

```
100 A$ Y$ P%     Note: Open
110 LN NZ A$     brackets indicates
120 D( L(        a Dimensioned
130 Y$ P% D(     Variable
```

Once the run had terminated, a second routine was invoked to give a list of variables and their associated Line Numbers. The same program would thus appear:

Variable	Line Numbers	Comments (Author to complete)
A$	100,110,190 250,260	Answer
B$	1000,1100, 1150	Name of Supplier
	. . .	
D(	50,70,120 130,300	Product Code

This is an excellent form of technical documentation and encourages disciplined programming.

Pet Adventure

For anyone who has played the mainframe fantasy game - ADVENTURE, it will come as good news that this will shortly be available for the PET. Needless to say, J.B. already had a copy!

For those unfortunates who haven't, Adventure is probably the best-known, most-played, and definitely the most addictive of its genre - the object being to explore a massive underground labyrinth of caves, passageways, stairways and dungeons, and to bring back pieces of treasure to the surface.

In terms of style, the program is second to none - the following scenario being typical:

YOU HAVE ENTERED A LARGE CAVE WITH A HIGH CEILING. LYING ON THE FLOOR IS A SHINY BRASS LAMP. WHAT ACTION DO YOU WISH TO TAKE?

The novice invariable replies:

RUB LAMP

to which the computer, barely able to conceal its amusement, prints:

THERE IS LITTLE TO BE GAINED FROM RUBBING AN ELECTRIC LAMP

Since it is reckoned that to explore the entire cave takes upwards of *four months average playing time*, many mainframe establishments have banned the playing of this game before midnight. My last experience of this simulation was at 4 o'clock one morning. The spectacle of hardened addicts, confronting their VDU's with bloodshot eyes, hastily drawn maps and empty fag boxes, mumbling something about trying to find their way out of the Hall of Mists, is *almost* enough to deter you from ever starting.

Continued on page 19

IN LONDON —

The program itself involves pulling one of 300 messages from disk to screen. Although direct access would be one solution, Jim reckons that it is more efficient to develop a simple piece of machine code that will scan a sequential file for a specified group of characters.

Android Nim

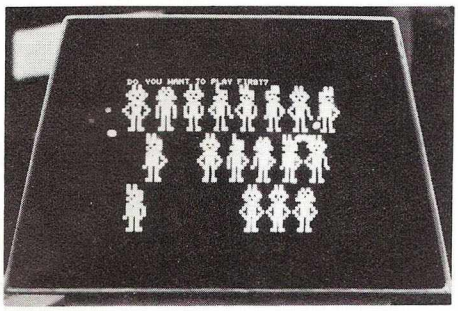
Once again we were treated to a demonstration of this delightful program - though this time PRINTOUT managed to obtain a picture of the fidgetting Robots that actually play better each time you win.

Shiftwork

This is the name adopted by Jim for an extraordinary discovery applicable to old and new ROMs alike. It concerns the shifted counterparts of several keys including Return and Space. Pressing Shift then Return has the effect of returning the cursor to the start of the next line - but without entering the line into Basic. Thus, typing:-

RUBBISH followed by SHIFT & RETURN

no syntax error message will appear. This is particularly useful when constructing graphics or drawing pictures on the screen. A quick way to get to the next line without having your drawing destroyed by rude messages.



Shift and Space has the same effect as a shifted graphic character for use in line indentations on structured programs. Revelation of this amazing effect was unfortunately pre-empted by the first item in Tommy's Tips in PRINTOUT No.7!

It can also be used for a simple, nearly bombproof, Input statement - which will reject a Return-only reply.

100 INPUT " Value — — — cl cl cl" ; X

(Three shifted spaces and three Cursor Lefts to reject a Return only reply)

Shifty Characters

Many of these 'Shifty Characters' can be put to good use in disk files. To achieve the shifted version of any character, simply add 64 to the argument of a CHR$ statement. For example:

CHR$(44) is a comma

CHR$(108) is a shifted comma

This will appear on the screen as a comma but will not act as an entry-terminator to an input.

Similarly,

CHR$(34) is a quotes mark (")

CHR$(98) is a shifted quotes mark

this again will be accepted by an Input (try it without the Shift). Using these and other shifted punctuation marks it would be possible, for example, to input the following piece of text from disk into one string variable:

"The reason," said Holmes, "is patently obvious."

From little acorns .....

Finally, a challenge. With all that programming talent out there, it should be possible to develop these techniques into something really spectacular. Next time Jim comes over, let's see if we can't prove that British programmers really are the best .....

~ ~ ~ A MATTER

"Pixel" is a useful word. Unfortunately there are two definitions abroad in the land. They can't both be right, so I'll tell you my definition and we'll know that the other one is wrong. A pixel (from "picture element") is the smallest element from which pictures can be built up. In the standard PET without other black boxes attached, this is the 8-dot by 8-dot character space. (There is a perfectly good word already for the other usage, namely, "dot"!)

The term 'high-resolution graphics' is misused when applied to resolution of four or perhaps six elements per character-space. It should be applied only to the case where the dot itself is the pixel, i.e. where each dot can be individually addressed and set or reset because it has a bit-storage space allocated to it in memory. It is often difficult to determine from advertisements or specifications what resolution is actually offered in a system. The preferred description includes the size of the character space, the size of the largest character, and the number of characters per line and lines per screen. From the first two we can determine what the horizontal and vertical spacing between characters is. PET uses a 7 by 7 dot character matrix on an 8 by 8 spacing, 40 characters per line, 25 lines. It is immediately clear from this specification why we must double-space lines of text to avoid eyestrain: the characters are separated by only one dot.

SCREEN LAYOUT

If you have never attempted to design a picture or the layout of a new game on PET's screen, you will find it a fascinating enterprise. The most valuable tool to have is a piece of paper with the 40 by 25 arrangement laid out on it as a grid. This will avoid a great deal of trial and error work on the screen and will act as a useful record as well as lending itself to finding centres, planning "windows", and determining the optimum position for legends. Windows are areas of the screen that are provided with independent erase and writing facilities.

Of course, if there is a student in the house or an embroidery fiend from whom the odd bit of graph paper can be requisitioned now and again, it will serve the purpose nearly as well. Howbe-it, do provide yourself with some form of screen layout paper before you begin to plan your Dragon-Maze or War Star Ecliptic. You will find that it well repays the slight effort required.

We define the origin, or the point from which to start counting on the screen, as the upper left corner because that's where the CLEAR and HOME buttons take the cursor. As there are several ways of calling out the position of any pixel on the screen, we will take them one by one, define them, and explain their strengths and weaknesses. You are not limited to using only one in a given program: there are times when a combination will be advantageous.

POSITIONING BY USING POKE

The POKE command allows us to place a coded number (one byte, 0 to 255) in any desired memory address. Now it happens in PET that a portion of the memory is given over to remembering what is to be written on the screen. The decimal memory addresses corresponding to the screen positions are 32768 (upper left) to 33768 (lower right). If we now include in a program or input directly the command POKE 32768, 42, we will find the asterisk character (code 42) written in the upper left corner of the screen. Note that this happens independently of where the cursor was beforehand and does not affect the cursor position. The character codes corresponding to POKE and PEEK have been reproduced in a number of publications. They are included on the layout sheets previously mentioned, along with the CHR$-ASC codes, which are not the same. The PEEK-POKE code set has the advantage that individual codes are included for the normal and reverse characters as well as for the shifted and unshifted characters. As always, we must be in either the upper-case-mit-graphics mode, which is the default mode reached when power is first applied, or in the upper-case-mit-lower-case mode which is reached by writing POKE 59468,14 and returned from with POKE 59468,12. There is no way of displaying a shifted graphics character at one point on the screen and its equivalent lower case character at another.

It is possible, of course, to define any of the 1000 pixels on the screen by its incremental position. That is, since the original in the upper left is 32768, the position next to the right of it is 32769, and so on. We can fill the screen, albeit slowly, with a given character by:

```
100 FORI=0TO999
110 POKE32768+I,42
120 NEXT
```

If we do that, we will experience one disadvantage of POKE: that it is not very fast. We will also see, on PETs with old ROMs, a degree of flickering "static" written momentarily on the screen. There are ways of suppressing this effect, which has been called by various names such as "snow", "crackle", and others which I will not edify you by repeating. This is accomplished by descending into machine language and turning the screen off at the opportune moments. In machines with new ROMs, the effect is automatically suppressed.

The program-let above is not very useful: what we really want is the ability to select a position and poke it uniquely with the desired character. As we tend by training to think in X,Y coordinates of so much up or down and so much left or right, this tendency is pandered to in the present case by letting X be the position increasing from left to right from 1 to 40 and Y the position increasing from top to bottom from 1 to 25. Doing so, we can generate the function:

```
DEFFNI(Z)=32727+40*Y+X
```

which gives the memory address of any pixel in terms of X and Y. As you can see, the constant term has to be 41 less than the actual origin address to cater to my requirement that the lines and columns be numbered from 1 rather than from 0. Now, for a demonstration, we can fill the screen with repetitions of the character set, from code 0 to code 255 with:

```
100 DEFFNI(Z)=32727+40*Y+X
110    FORY=1TO24STEP2
120       FORX=1TO32
130       POKEFNA(Z),Q
140       Q=Q+1:IFQ=256THENQ=0
150       NEXTX
160    PRINT:NEXTY
170 WAIT59410,4,4:PRINT"clr"
```

Y is restricted to 24 lines, printing every other line, to get double-spaced characters so that they are separated from each other vertically and can be seen more readily. X runs to 32 instead of 40 in line 120 to cause identical characters to be aligned vertically. Line 170 prevents the pattern from being overprinted by the READY message at the end. Press the SPACE key to end the program.

POSITIONING BY USING CURSOR STRINGS

A faster technique, one which does not suffer from the snow effect in the case of old ROMs, and one which is better-adapted to relative rather than absolute positioning, makes use of cursor strings. By "relative positioning" I mean positioning with respect to where the cursor now is rather than with respect to the origin in the upper left. This is often the desired mode in board games, where a piece is to be moved to an adjacent position, or in arcade games where dynamic motion is to be simulated by rapidly rewriting a symbol in an incremental series of positions. A cursor string is simply a string consisting of a series of cursor literals:

```
100 R$="cr/cr/cr":REM 30 CURSOR RIGHTS
```

Note that for those who have to transcribe your programs from printed listings, it is a great help to incorporate in the remarks the number of characters in the string, especially if they happen to be blanks.

OF STYLE

Printout Contributing Editor, LINDSAY DOYLE continues his series aimed at helping you write better PET programs.

```
200 R$="sp/sp/sp":REM 39 SPACES
```

Blanks or SPACE symbols are used to erase previously-written characters, where the CURSOR RIGHT would just move over them without erasing. I limit such strings to 39 characters, except for special cases, to avoid being inadvertently thrown onto the next line by the automatic carriage return which PET interpolates after printing the 40th character on any line. To make use of cursor strings for positioning, we use the LEFT$ function.

```
300 PRINTLEFT$(R$,20),"*"
```

positions the asterisk horizontally at mid-screen. Note that the first semicolon or its equivalent, the plus sign, may be omitted, as may the final quotes. Neither are essential in PET's version of BASIC. After such a line is carried out, the cursor will be returned to the left border on the next line down. If this is not desired, we may keep the cursor to the right of the asterisk by adding a semicolon to the end of the expression. In this case, the close quote is mandatory.

To position the symbol in Y as well as X, a cursor string in Y must be defined:

```
310 D$="cd/cd/cd":REM 24 CURSOR DOWNS
```

Then, assuming that we want to position the asterisk with respect to the origin rather than to some previous position, we use the HOME facility, and write:

```
320 PRINT"ch"LEFT$(D$,12);LEFT$(R$,20);
    "*";
```

to place the character in the centre of the screen from a cold start. We can now if desired, make it appear to move diagonally to the right and down, using the following expression, which will take a bit of analysis:

```
330 FORI=1TO10
340     PRINT"cl/sp/cr/cd/*";
350 NEXTI
```

After printing the asterisk in line 320, the cursor moved one step to the right automatically in preparation for the next character in normal test. In order to erase the previous character we must move the cursor back with CURSOR LEFT and then must print a SPACE. This will automatically step the cursor to the right again, so we only have to command CURSOR DOWN to get it into the desired position on the diagonal.

Have 'you tried lines 310-350? Like it? Up-cursor strings and left-cursor strings can be added to the repertoire to allow you to proceed in any direction. I call these onestop strings "incremental cursor strings". A slightly more advanced approach is to put your cursor strings in an array, where you can call on them as a function of a variable.

```
400 REM: DEMO OF MOTION USING INCREMEN-
    TAL CURSOR STRINGS CALLED FROM AN
    ARRAY
410 :
420 REM: DIRECTIONS CORRESPOND TO NUM-
    ERICAL KEYPAD CENTRED AROUND 5
430 C$(2)="cl/sp/cl/cl/cd/*":REM DIR-
    ECTION 1
440 C$(9)="cl/sp/cl/cd/*":REM 2
450 C$(5)="cl/sp/cd/*":REM 3
460 C$(6)="cl/sp/cl/cl/*":REM 4
470 C$(8)="cl/sp/cl/cl/*":REM 4
480 C$(1)="cl/sp/*":REM 6
490 C$(3)="cl/sp/*":REM 6
500 C$(4)="cl/sp/cl/cl/cu/*":REM 7
510 C$(10)="cl/sp/cl/cu/*":REM 8
520 C$(7)="cl/sp/cu/*":REM 9
530 PRINT"ch*";
540 FORI=1TO16
550     PRINTC$(1);
560 NEXT
570 FORI=1TO1000
580     FORJ=1TO4
590         FORK=1TO8
600             PRINTC$(J)
610         NEXTK
620     NEXT J
630 NEXTI
```

Note that each version of C$ begins with a CURSOR LEFT and SPACE, to erase the previous character. They are numbered in this case in the desired order of use. Lines 540-560 move the display to top centre. The K loop steps eight steps in each direction called for by J. The J loop calls for the directions to trace the hourglass pattern and reverse, and the I loop runs it 100 times. The semicolons are essential. Try your own action pattern using lines 400-530 as a basis.

POSITIONING BY INSERT AND DELETE

It is possible, by using the INSERT and DELETE functions, to add or subtract blank spaces between a character and the left border. I mention this technique in passing in order to give the complete picture. I personally find little use for it, as the insertion or deletion carries with it anything else that may be printed on the line, so one must work in a sterile field or suffer the consequences. However, it is a good way to put something in the lower right corner of the screen without generating the hateful scroll-up which normally accompanies that action.

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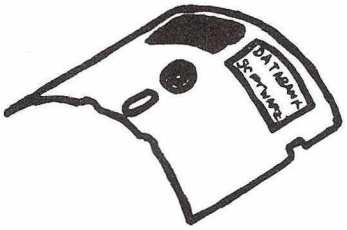

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PEEKS & POKES

by Inside Trader

It used to be just cameras that were imported unofficially. Now dealers reckon up to a quarter of all PETs sold are 'grey imports'

* * * * * * * * * * * *

Software piracy may be injurious to your health. One programmer who jokingly (I think) gave his occupation as 'pirate' on a life insurance proposal found himself classed in with Stunt Men and North Sea Divers.

* * * * * * * * * * * *

Department of interesting mathematics: "Commodore has more than 50% of the market for small micro systems." "The Sinclair ZX-80 outsells all the others put together." They can't both be right.

* * * * * * * * * * * *

The new ZX-80 Mark II could be compatible with the PET. It is to have an 8K Basic in ROM and my man at Microsoft tells me the company are negotiating secretly with Uncle Clive.

* * * * * * * * * * * *

Anyone like to buy 500 Toolkits cheap? One enterprising entrepreneur bought a job lot in the States to flog cheap to dealers here. Petsoft responded with a 40% price cut leaving him to sell at a loss.

* * * * * * * * * * * *

Jokes about an IBM personal computer have started to sound a lot less funny now that news of the 5105 has begun to leak. It has integral VDU, tape cartridge drive and 30 cps thermal printer, resident Basic and 32K RAM. Needless to say it is made in Japan, and features an S-100 bus interface of all things.

* * * * * * * * * * * *

Peter Laurie has taken pity on the teaching profession and is sending Nick Green and the Staff of Commodore's Educational Newsletter, a copy of his spelling corrector program.

* * * * * * * * * * * *

So successful has Robin Bradbeer's 'Personal Computer Book' proved that extra staff are being hired to count the money. Begging letters should be addressed to him care of North London Poly.

* * * * * * * * * * * *

After a consultation with Commodore's weight control program Tommy Turnbull found himself on a diet of Mathews Southern Comfort and All Bran. His weight is indeed under control but he now has cirrhosis of the liver instead.

Latest software fad is for interactive Fairy Tales. The user interrupts the narrative to select one of several alternative story lines eg. Snow White goes to the pictures, Snow White goes to a disco, or Snow White gets lucky. Sounds fun.

* * * * * * * * * * * *

I have enjoyed your reminiscences about what our regular cast did before they got in on the computer racket. Derek Moon of Currys was a millionaire religious leader in Korea, Alpha Microman, Leslie Button was big in interior decoration, Chris Carey was pirate disk jockey, Spangles Muldoon, whilst Colin 'Cheeky' Stanley enjoyed a (mercifully brief) political career.

* * * * * * * * * * * *

At a recent American Show, Guy Kewney claims to have been handed a press release which commenced: "IBM, through its wholly owned subsidiary, the United States, will shortly be releasing...."

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Prospective purchasers attending demonstrations of Tiddles Davies' new speech synthesiser should be on their guard. The disco dancing dealer owns a book entitled 'Teach Yourself Ventriloquism'.

* * * * * * * * * * * *

I can reveal the real reason why Commodore are moving their Corporate Headquarters from Santa Clara to Morristown, Pennsylvania, home of their 6502 making subsidiary, MOS Technology. Quite simply, there is no one left in the entire State of California who has not either already worked for Commodore and been fired or who is prepared to work for Commodore and be fired.

* * * * * * * * * * * *

Poachers turned Gamekeepers: I am amused to see the campaign against software ripoffs being led by two former cassette pirates. Couldn't have anything to do with the fact that they now make their living flogging word processing software for the PET?

* * * * * * * * * * * *

Does Jim Butterfield read Gregory Yob? Richard Pawson put this question to the Great Man. Well, yes, but only the machine code parts.

* * * * * * * * * * * *

Tiddles wants to know what has happened to Personal Software's "Toolkit", the release of which we forecast earlier in the year. Seems Canadian software sorcerer Brad Templeton finished it months ago but Personal Software have sat on it since.

Aero Hitch Hiking, a technique developed by North London PET Pundit, Robin Bradbeer, may not be quite the bargain it sounds. One such passenger on the PET jet ended up having $1,400 worth of aero fuel charged to his American Express card.

* * * * * * * * * * * *

The lovely Lesley, long-suffering wife to Knuckledusters, has put her foot down about moving to the States. "Kit wouldn't enjoy being fired at all" she says.

* * * * * * * * * * * *

I recall the time when Derek Rowe was employed as Commodore's software manager and started tinkering with PET's operating system. The result was that all the showroom models said "DEREK" instead of "READY". Knuckledusters was not amused.

* * * * * * * * * * * *

You will recall that the Clegg Commission contrived to make a £17m error when computing the teacher's pay award. It is not encouraging therefore to learn that Petsoft's Job Evaluation package uses the Clegg method.

* * * * * * * * * * * *

Talking of Apple, Inside Trader predicts that the company will take over direct distribution of its products in the U.K. soon. That will make the fourth change of distributor inside two years.

* * * * * * * * * * * *

Spare a thought for poor Kerr Borland, late Marketing Manager of the ill-fated Nascom. Mr. B's latest venture, Product Launch, took on MicroAce as a customer and swiftly found themselves in receipt of one of Uncle Clive Sinclair's famous writs. Now they have been reduced to promoting sales of a vibrating chair.

* * * * * * * * * * * *

Since most of the large micro manufacturers have taken to lying blatantly about their sales figures I talked to friends in San Francisco banking circles. They report: TRS80 sales flagging in the States, Apple booming, Commodore still in serious trouble over U.S. consumer sales whilst Texas Instruments TI994 sales are appalling. One to watch for, they say, is NEC.

* * * * * * * * * * * *

Now that Knuckledusters has been promoted to V.P. International Marketing, a new face is required to grace Commodore ads. Keith Hall has volunteered himself, but I am concerned for readers of a sensitive disposition. Suggestions on a postcard to Slough.

PETS & PIECES

by GAVIN SANDERS

YES, IT CAN BE DONE!

Some will know about this, but it'll be new to others. I'm encouraged, anyway, by the number of learned hackers to whom I've shown it, who've said "Well, I never! I didn't think there was a way."

Intrigued? Then enter these program lines:

```
10 POKE59468,14
20 PRINT"ANSWER "CHR$(34)"YES"
   CHR$(34)" OR "CHR$(34);
30 PRINTCHR$(34)"NO"CHR$(34)",
   PLEASE."
```

Now run them. Notice anything?

MIND-BOGGLING TIME

Thomas Schweine (PhD, no less), of Natal University, has dropped me a line, following my some-time-ago-mention on programs that reproduce themselves.

I naughtily joked about such a foolish possibility, but Tom has stomped on my foot!

"This is no light matter," he says. "John von Neuman demonstrated the point, in his Theory of Self-Reproducing Automata, 1966."

"And," he goes on, "Creative Computing published an article in June on a program which, when run with no input data, outputs itself. Maybe you can suggest a use for it?"

Well, so happens I can, Tom. In the very same post as your letter came news of a rather special software package, newly on the U.S. market.

Marketed by a company called Interlude (what else? read on!), it's called "the ultimate experience".

Seems it "evaluates a couple's sexual moods through a computer interview, then selects the appropriate activity." More than 100 are (gulp!) described.

So the answer to Tom's question is obvious, isn't it? Creative's program should be merged with Interlude's. Without delay. (Interlude's address is available from me under plain, sealed cover).

SACKCLOTH AND ASHES

I have this constantly recurring nightmare, you see, where I'm a small boy again (not THAT long ago, folks!).

I'm walking along this little narrow tree trunk, balancing beautifully, and squeaking "Mummy, mummy, look what I'm doing!".

And she does, just at the exact moment I fall off.

Familiar? Then you'll know how I feel now, just as I've got everyone worked up about Cursor, the PET program magazine on tape.

Petsoft (a murrain be upon them) are discontinuing its distribution! They say it's proved uneconomic, and I guess I have some sympathy with that. Heaven knows, Cursor was cheap enough.

But why the heck didn't Petsoft indulge in a little creative thinking, and consider a price increase? Or at least ask what the many, many hundreds of subscribers thought?

Maybe there IS something in the nasty rumours I hear: that the US-based producers may be about to cease! Aaargggghh! (As they say in the comic strips).

To think of life without Cursor! It's beyond endurance. The only thing I can suggest for addicts is to write to the fountainhead, as it were.

You'll get them at The Code Works, Box 550, Goleta, CA 93017.

They may confirm or deny they're carrying on. But here's an interesting snippet. The same people are responsible for Iridis.

That's the Atari equivalent of Cursor; the Atari micro has, of course, been available in the US for some time now, and will soon be available here too. Hmm!

HELP, I'M DROWNING!

If one more well-meaning soul writes to tell me how to produce a program that lists in reverse (see my page last month; and a murrain on Ron Geere too!), I'll smash something.

Ron, probably.

The laziest solution came from Tommy Turnbull. In that impenetrable Geordie accent he hides behind, I THINK he suggested using Toolkit's Append facility, and building the program up (or should it be down?) backwards.

The most inventive came from Bob Ford, who lives at the swish-sounding address of Longland Court, Avondale Square, London SE1. See what good company I'm in?

Bob suggested:

```
1 PRINT"IT'S GEERE AGAIN up crsr"
2 G=1-G
3 FORI=1TO50:NEXT
4 IFG=1THENPRINT"rev.on"
5 GOTO5
```

After you've whipped through that simple little bit, you do some POKEs in direct mode. The POKEs you need are POKE1027,5:POKE1052,4:POKE 1091,1.

And that's it; a program that lists in reverse, and flashes the self-aggrandising Geere commercial at you (put your own name in, if you try it!).

I knew how all the time, of course, I was just testing you out.

THE ART OF JUXTAPOSITION

The art, in fact, of artfully putting two things side by side for effect.

Because (oh joy!) I've stolen a software march on Tommy Turnbull. And as that can happen just once in a long lifetime, I'm gonna make the most of it!

I've got a Sanders Suggestion that I'd written down before this month's Tommys Tips arrived, with nearly the same thing included except (smirk) it was longer!

So - how'd you like to know what the title of your most recently loaded program was, in the event that its precise form had slipped your mind? (A not uncommon occurrence with me).

Yes? Terrific! You can find out like this. Enter the direct command POKE 158,32 after the program's in.

I'll go further (just in case anyone else does first!). Try titling a program with much more than the permitted 16 characters.

You'll only see 16 characters when you save it - but have a go at POKE 158,204 afterwards.

I'm expecting a bolt of Geordie lightning any minute!

FOR YOU TO THINK ABOUT (1)

There's a young man called Roland Hamp, who lives at Brock's Ghyll, Best Beech Hill, Wadhurst, Sussex.

With other schoolboys, he's working on a PET-based project which they all hope will eventually aid dyslexic children.

They've concluded that the use of sound will be helpful, and they're after as much information as they can possibly get on sound and the PET generally.

Naturally they were thinking about the recently released Talking Calculator program from Petsoft.

But I KNOW there's a lot of very inventive people out there, in PRINTOUT-land. And I'd be more pleased than I can say if some of you would maybe drop young Roland a line.

He and his group would appreciate any suggestions and ideas you may have. Will you help? Please?

Continued from page 24

BOUQUET TIME

Had a nice letter from Brian Moore of Howes Gardens in Church Crookham, Aldershot. He was reacting to my piece an issue or two back on good and bad dealers.

It was a long letter, so I hope Brian won't mind if I don't print it all (especially as he took the trouble to write while on holiday).

Seems he too had good experiences at Petalect in Woking, the dealer I also singled out for mention.

Brian says: "I'm a relatively humble, low-prospect hobbyist, with an 8K PET and old ROMs - there's only two grades lower; 4K old ROMs, or no PET at all - and I've been a customer of Petalect for about 2 months. I can't speak too highly of the treatment I've had."

Brian then goes on to hand another bouquet to Mr Johnson, of T V Johnson, the Camberley dealers: "...I'm a totally satisfied customer", is Brian's comment.

And, would you believe, he finishes with a long anecdote on Petsoft in Birmingham.

Seems they too went miles out of their way to give Brian service, when he was getting into machine-code and ordering a machine-code handler.

Brian carefully avoids mentioning the personalities involved, referring to them only as Mr W and Mr T ("to avoid embarrassing them with too much praise", says Brian).

Well, I don't give a fig about their pink faces. Brian was undoubtedly talking about Petsoft's Matthew Wauchope, and Petsoft's North-East occasional technical consultant, none other than our own Tommy Turnbull. (Mentioned above, and also below; it must be Turnbull month).

Great exposer of moles, I am! Well done Petalect of Woking, T V Johnson of Camberley, and Matthew Wauchope of Petsoft. As for you, Tommy Turnbull - Brian describes you as "the total enthusiast".

Perceptive chap!

FOR YOU TO THINK ABOUT (2)

And finally, I'm afraid, a rather sombre note to finish with.

To some of you, the name Terry Laudereau, a very fine lady, won't mean a great deal. To others, it will produce waves of nostalgia.

It'll be a nostalgia borne of those early PET days; a time when we were all avid for every scrap of information we could get on the machine that had arrived in our lives.

Terry was then doing far more than anyone might have thought possible, to fill the needs we all had: she was the original editor of The PET Paper, a US-produced magazine, of an extraordinarily homely nature.

Each issue was crammed with all sort of things that helped push those early horizons back more and more. Which, I promise you, helped largely to bring us to the advanced state we're in today.

No one who was around them (and, Lord save us, it wasn't very long ago) can possibly forget the difference those home-brewed magazines made.

Magazines lovingly typed at home, and hand-duplicated, of which Terry's was a prime example; the mixture of hints, tips, short-cuts, and plain good sense with which they were filled.

Well, folks, Terry Laudereau no longer does much with The PET Paper. She's not able to, for Terry Laudereau is slowly and inexorably losing her sight.

Please - will those of you who remember those days and those publications, especially Terry's - please will you write a few newsy, chatty words to her?

She'd kill me if she knew I was saying any of this, for she's an independent soul. But, by Heaven, I know just how much she'd appreciate getting a letter or two.

You can reach her at this address: P.O. Box 1142, Columbia, Maryland 21044, USA.

And thanks.

Gavin

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LATEST NEWS ORACLE PAGE 451

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THE PET REVEALED

Author	:	**Nick Hampshire**
Publishers	:	**Computabits**
Suppliers	:	**Computabits, PO Box 13, Yeovil, Somerset**
Page size	:	**8.5" by 11"**
Price	:	**£10**

This is the second edition of 'The PET Revealed' published by Computabits, and covers both old and new ROM PETs (though not the new 8000 series Super PETs). As the title implies this a reference volume, providing a concise and accurate summary of everything you are ever likely to want to know about the way PET works.

'The PET Revealed' carries the seal of Commodore's approval, which is in itself worth a comment. The book contains all the information which Commodore were reluctant to divulge - including ROM listings and circuit diagrams. What the book is not is a 'How to use your PET' manual. Although a number of useful subroutines (including machine code TRACE and DOUBLE DENSITY PLOT) are listed, material of a tutorial nature is sparse. Typical is the chapter on the workings of the 6502 - an excellent technical description and summary, but you would still need to need one of the larger textbooks to become fluent in machine code.

The format of the second edition is without doubt an improvement on the first - A4 size, well typed (though not entirely free from error), with clear diagrams and reference tables. In a burst of over enthusiasm, the text has, however, been right-justified on a word processor, rendering it less legible than plain typescript.

After a good explanation of PET's internal system design, and the chapter on the 6502, the author proceeds to the operating system. Full listings are given for page zero usage, subroutines comprising the Basic interpreter, and tokens/character codes, followed by details on program and variable formats in memory.

The remainder of the book is devoted to input/output and interfacing. The user port is dealt with alongside the 6522 specification, and the mysteries of the IEEE bus explained with reference to PET's two 6520s.

For the home-electronics types there are circuits for monitor drivers, joysticks, and even an IEEE/RS232 convertor, construction of which looks surprisingly simple. On the subject of interfacing, Mr. Hampshire is clearly in his element as a glance at *Practical Computing* will show. After suggesting a useful technique for getting two PETs to exchange data, he then goes on to show how a PET can talk to a KIM. Who, one wonders, could possibly want to interface a PET to a KIM?

This book will be useful to anyone who wishes to gain a clear understanding of the internal workings of the PET, and hence many other microcomputers. It is also for PET programmers attempting "something difficult". If you regularly ask yourself questions like:

Where is the pointer for top of memory?
How do you arrange for a handshake on the user port?
What is the hex code for jump indirect?

then 'The PET Revealed' will save you an awful lot of time. At £10 direct from Computabits, I rate this book as good value for money.

R.P.

PET/CBM PERSONAL COMPUTER GUIDE

Authors	:	**Carroll Donahue and Janice Enger**
Publishers	:	**Adam Osborne/McGraw-Hill**
Suppliers	:	**Audiogenic, PO Box 88, Reading, Berkshire**
Pages	:	**426**
Page size	:	**6.5" by 9.0"**
Price	:	**£9.95**

Commodore have the benefit - in one sense, extremely dubious - of having become a legend in their own lifetime.

A legend because they were the first (or more or less, according to whether you believe their press releases, or those of the Tandy Corporation) - to produce and market a personal computer.

A dubious legend because there's not the slightest doubt that PET's documentation was the worst ever seen.

Incomprehensible, incomplete, illiterate, idiotic: these were some of the politer charges levelled against it.

Clearly Adam Osborne and McGraw-Hill between them thought that something better was possible, and in this book they've demonstrated that truth.

They've also shown, en passant, just how truly awful the original Commodore material was, and how bad it still is.

Which produces a delicious irony, for the Osborne/McGraw-Hill opus bears, on its front cover, the large legend "Commodore Approved".

Which naturally leads one to ask why the hell Commodore didn't do it themselves in the first place?

Indeed, we understand this book is actually packed in with each PET sold in the States, though the hapless purchaser has to pay extra for it!

So what's in it, and should you get one?

Well, to start with it has 426 pages, and though size doesn't necessarily mean a lot of ground covered, in this case it most certainly does.

The section headings are "Introducing The PET"; "Operating The PET"; "Programming The PET"; "PET Basic"; "Making The Most Of PET Features"; "System Information"; and an extraordinarily useful set of Appendices.

"Operating The PET" gives you 35 pages, starting with actually unpacking it (maybe a little silly in the USA, if the book's in the box!), and going right through to care and maintenance.

"Programming The PET" is 60 pages of *GENERAL* programming information, which is darn nearly more than CBM told anyone in the beginning about the whole machine.

"PET Basic" is over 50 pages of highly-detailed but very understandable explanations of *ALL* the Basic commands and keywords.

"Making The Most Of PET Features" is well over 200 pages (yes, 200!) of all the things pioneer PET customers spent years finding out the hard way, because Commodore couldn't or wouldn't tell them.

The balance of the book is material which will be very meaningful indeed to anyone who's acquired the knowledge in the pages which go before.

In short, very highly recommended indeed. Actually, we'll go further: if you're very honest with yourself, and have to admit there's anything - anything at all - you still don't quite understand about your PET, you can't afford not to have a copy on your bookshelf.

T.H.

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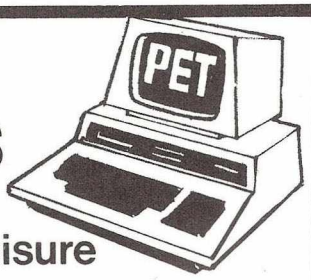

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TOMMY'S TIPS

The North of England PET guru with the amazing knack of finding things about and in PET that no one else seems to know. As always, the odds-on bet is that something on this page will be useful to you.

CODES AND THINGS

With the increased space I'm getting (thanks for your votes, folks!), you'll be seeing lots more little listings in my feature.

They'll mostly be direct from the CBM printer, so cursor codes will normally appear just as they should be entered.

From time to time though, there'll be a need to use what's started to be a standard coding for cursor manipulation.

In case you're not familiar with it, here it is.

cl=cursor left; cr=cursor right; cu=cursor up; cd=cursor down; ch=cursor home; cls=clear screen; sp=space; in=insert code; de=delete code (the last two can only occur between quotes in certain circumstances, but they can be very useful; see below!); sh, plus a normal, not graphic, character=the shifted version of that character.

To avoid confusion, different codes will be separated by a /. To save space, more than one of the same code will have a number before it to show how many.

DISK LOCK-OUTS (1)

My word, but my piece last month about protecting CompuThink disk files brought me a lot of correspondence.

The most interesting came from Stack Computers, who disagreed with my positive statement (Tommy-type, not computer-type) that there was no way back into a program protected as I described.

Not true, said Stack Computers, and privately "revealed" a way to me.

In fact (cross my heart), I already knew of Stack's method, but that doesn't diminish Stack's ingenuity in working it out. Congratulations to their software people.

Stack went further, and said that if anyone actually got locked out of a program he (or she) desperately needed to get back into, then Stack would do it for them, free of charge!

I reckon that's a handsome offer, but from all I hear, it's in line with the sort of service Stack usually provide, so it's not that surprising.

So, if you have a lock-out problem caused by using the method I described, send your disk to Stack Computers.

Include - and this is important - proof that it's your disk, and what's on it is yours too, and they'll pry your precious program loose for you.

Stack's address is Stack Computer Services Ltd., 290-298 Derby Road, Bootle, Merseyside L20 8LN.

Don't forget a tough, stamped, addressed envelope for return of your disk!

Please DON'T send your disk to me, and DON'T ask how to break the lock-out. If Stack or I told you how, there'd be no point in using it, would there?

DISK LOCKOUTS (2)

Stack Computers went further and also sent me an even better lock-out!

Right at the start of your program, put a new line. Let's assume it's going to be Line 10, in which case Line 10 should be REM AAAAA.

Later in the program, put two other lines. Space them well apart, and for Heaven's sake keep a note somewhere of the line numbers. With your Cash-point number might be a good idea!

Let's assume you number the first of the lines 2957, and the second one 3241.

In that case, Line 2957 should be:

```
2957 POKE1037,42:$S,1,"prog name":
END
```

The second special line, Line 3241, should be:

```
3241 POKE1037,65:END
```

Subsequently, the direct command RUN2957 will save the program in "locked" form, while RUN3241 will "unlock" it.

The huge advantage is that YOU choose the line numbers, so it doesn't matter if anyone knows the "unlocking" method.

The method is useless without the line number to use it with, and you can make that different for every program.

That's a choice of 63999 numbers.

And if that doesn't make you feel secure, you'll certainly be able to think up a minefield of GOTOs that'll lock the program up again, if someone starts working through it line by line!

So enough already on disk locking. Except I've yet to hear of a REALLY fool-proof method for Commodore's disks?

FIXING INPUT STRINGS

There are lots of ways of making sure people respond to input statements in the way you want.

You may like this one, which gives you the advantage of eliminating anything you don't want from an input string, should it have been put there by an idiot user!

I've supposed, in the example below, that someone had sprinkled dollar signs through an input string.

On the assumption you didn't really want a load of dollar signs littering up the string, here's the way to zap them out of existence:

```
100 INPUTA$
110 G=LEN(A$):FORI=1TOG
120 B$=MID$(A$,I,1)
130 IFB$="$"THENB$=""
140 F$=LEFT$(F$,I)+B$:NEXTI:PRINTF$
```

Change the routine (or lengthen it), of course, according to what you want to avoid.

FAST MATRIX CLEARANCE

If you've got a DIM statement in a program loop you pass through several times, and you want to avoid that annoying "REDIM'D ARRAY ERROR", here's a way.

There's only one thing: you have to agree to lose any other variables you have around.

Most programs that loop back on themselves do just that, however, so the tip will probably help.

Simply put a CLR statement immediately before the DIM statement (separate them with a colon, of course).

This will redimension the array, and avoid time-wasting FOR-NEXT loops the only other clearance method.

PROTECTING PASSWORDS

Programs sometimes use passwords near the start to stop unauthorised users running them.

There's a big problem with this: listing the program immediately reveals the password!

This is because the password is requested via an INPUT, and then a comparison is made. Match, you proceed; no match, finish!

Take these lines, for instance:

```
10 INPUT"Enter password";A$
20 IFA$<>"PASS"THENNEW
```

The password here is "PASS". If PASS isn't entered at Line 10, the program self-destructs. But anyone can see the password by listing the program.

Unless, of course, you use this tip.

Change line 20 by putting a colon after NEW, then a REM, then two double quotes with no space between them.

Move the cursor back over the second quote, press SHIFT, and use the insert key to put about 30 spaces between the quotes.

The cursor will then be over the first space after the first quote, so release the shift key, and press the delete key over and over.

This will put reverse Ts into the spaces between the quotes.

Stop when the cursor is over the second double quote, and press SPACE. This will remove the second quote. Then press RETURN to enter the line.

If you now list the line, you'll be delighted to find you can no longer see the password. The computer can, but you can't.

And neither, of course, can any other user!

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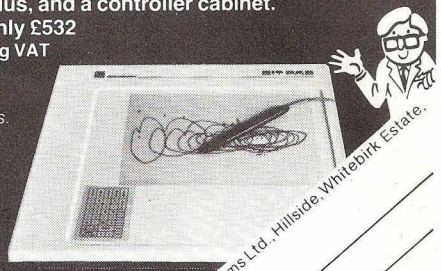

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Continued from page 29

TOMMY'S TIPS!

INPUT VERSUS GET

Lots of people prefer GET instead of INPUT, because the former avoids the need for RETURN.

That's a good thing if the program's to be run by someone not used to computers, because they never seem to know what to do!

Here's a simple way of using GET instead of INPUT, but it's only to start you thinking.

You can easily make improvements like, for instance, building a delete function in, if the user makes a mistake, or wants to change what he's typed in.

```
10 GETA$:IFA$=""THENPRINT"sh&/cl/";:
   GOTO30
20 B$=B$+A$:PRINTA$;:IFA$=CHR$(13)
   THEN40
30 FORX=1TO150:NEXT:PRINT"se/cl":GETA$:
   FORX=1TO150:NEXT:GOTO10
40 REM PROGRAM USING B$ FOLLOWS ON
```

That little routine should prove useful, and start you thinking too.

IF YOU MUST USE INPUT!

One major problem with INPUT is that pressing RETURN with INPUT operational drops you right out of the program, into the READY mode!

You can avoid this, if you want to use INPUT, by cashing in on the fact that even your keyboard has a device number.

Try this program out for size:

```
10 OPEN1,1,0
20 PRINT"?";:INPUT#1,A$
30 PRINT:IFA$=""THEN20
40 IFA$="END"THEN100
50 REM YOUR PROGRAM FOLLOWS HERE
 |
 |
100 CLOSE1
```

If you have a programming problem, an unexplainable PET phenomenon, or best of all, a tip that Tommy hasn't mentioned, write to him at PRINTOUT. He'll handle your enquiries, problems and tips on this page. Sorry, Tommy doesn't undertake to answer your letters other than through his regular PRINTOUT feature.

PLOTTING BY POKING

Most PET users know that the screen is 40 columns wide by 25 lines deep, and that every one of the 1000 positions can be reached with a POKE.

Here's a subroutine which does this quite neatly, and makes low-resolution plotting fairly simple.

32768 is the POKE location for the top left-hand screen position, while 42 is the ASC and POKE code for the asterisk.

I suggest you either clear the screen before you do any plotting, or use data statements for the x and y functions.

```
10 INPUT"X & Y CO-ORDINATES";X,Y
20 REM LINE 30 CHECKS FOR VALID INPUT
30 IFX>39ORX<00RY>23ORY<0THEN10
40 GOSUB100
50 REM YOUR PROGRAM FOLLOWS HERE
 |
 |
100 POKE(24-Y)*40+32768)+X,42:RETURN
```

END NOTE

I was going to tell you that if you entered the line below as a direct command (not a program line).....

```
FORI=639TO660:PRINTCHR$(PEEK(I));:NEXT.
```

....you'd get the name of the last program you'd loaded, just in case you'd forgotten the exact form it took.

I see, however, that Gavin Sanders has beaten me to it, on his page in this issue, with an even shorter method!

Just goes to show - you can't win 'em all!

See you next issue.

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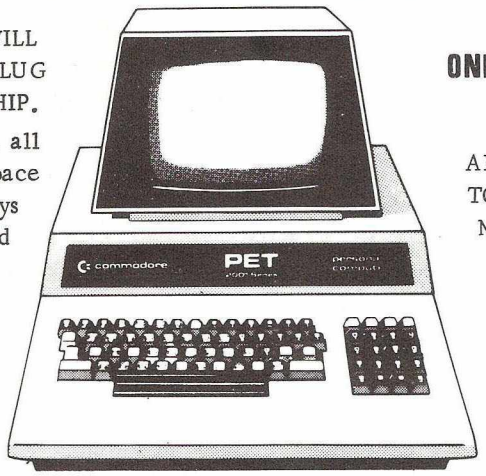

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CREATE KC$="CREATE O:MAILFILE,120,15,1: SYS 24576 This example tells KRAM to create an indexed file called MAILFILE on the disk in drive zero, with a record length of 120 characters and a key length of 20 characters which starts at position 1 of the record. KRAM looks at the RESERVED variable KC$ to identify the function and its parameters; the SYS call tells KRAM to execute the function. The record length can be any value up to 254 characters and the key up to 48 characters, a total of 302. KRAM packs as many records into the 255 character disk block as necessary.

OPEN KC$="OPEN O:MAILFILE": SYS 24579 This tells KRAM that we will want to make accesses to the file called MAILFILE on the disk in drive zero. KRAM returns in location zero (peek (0)) the file number by which this file can be accessed during the rest of the program.

ADD KC$="ADD 1,NA$,AD$": SYS 24591 This tells KRAM to add to file number one the data in variable AD$ whose key is NA$. For example in a mailing list, the key NA$ might be the name 'SMITH A.J.' and AD$ might be the address '120, HIGH STREET, ANYTOWN'. Any normal double character string variable can be used to denote the key and the record.

GET KC$="GET 1,NA$,AD$": SYS 24582 This tells KRAM to get from file number one the data belonging to the key NA$ and put it into variable AD$. In our example, if NA$ was 'SMITH A. J.', KRAM would read the address '120, HIGH STREET, ANYTOWN' from file and put it into variable AD$. If we weren't sure of the exact surname, we could give KRAM the key 'SM' and it would get for us the next alphabetically higher name beginning 'SM', together with its address! Or if we gave KRAM a blank key, it would find the first name and address on file.

READ KC$="READ 1,NA$,AD$": SYS 24585 This tells KRAM to read the data belonging to the next highest key following the name in NA$, and put it into variable AD$. In our example, a complete file of names and addresses could be read in alphabetical order, starting at any name in the file, simply by executing successive READ commands! For instance, having got Mr A. J. Smith from file, executing the READ command as above would get us say 'SMITH M.' in NA$ together with his address in AD$.

READ – KC$="READ-1,NA$,AD$": SYS 24585 This works like READ except BACKWARDS! It tells KRAM to read the data belonging to the next lowest key preceding the name in NA$, and put it into AD$. For instance, having read 'SMITH M.' with the forward read, executing the backward read as above would get us 'SMITH A.J.' in NA$ together with his address in AD$.

PUT KC$="PUT 1,NA$,AD$": SYS 24588 This tells KRAM to rewrite to file number one the data in variable AD$ which belongs to key NA$. For instance, if we wanted to change Mr A.J. Smith's address, we would simply set NA$ equal to 'SMITH A.J.', AD$ equal to his new address, and execute the PUT function.

DELETE KC$="DELETE 1,NA$,AD$": SYS 24594 This tells KRAM to delete from file number one the key contained in NA$ and its associated data contained in AD$. In our example, to delete Mr A. J. Smith from the file, we would simply set NA$ equal to 'SMITH A.J.', AD$ equal to his address, and execute the DELETE function. KRAM will release for further use the disk space made available by the deletion.

CLOSE KC$="CLOSE 1": SYS 24597 This tells KRAM that file one is finished with for now. KRAM updates the BAM on disk, but the file can still be used without another OPEN command.

INITIALIZE SYS 24600 This function is used at the beginning of each program to clear KRAM's work areas and buffers.

The examples above illustrate the use of KRAM in a mailing list application, with disk access times from less than one second. KRAM can of course be used in any application program with the Commodore disk where programmer time, user time and disk space are at a premium.

Each KRAM package includes a ROM which plugs into the middle ROM socket of the 16K/32K Pet, a demonstration disk with a mailing list program and a 40-page User Reference Manual. KRAM is available by post (cash with order) price £115 including VAT, or by credit card phone the KRAM 24 Hour Order Desk on 01-546 7256; or see your nearest dealer. (Quantity discounts available).

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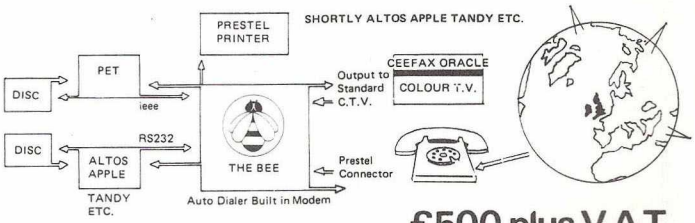

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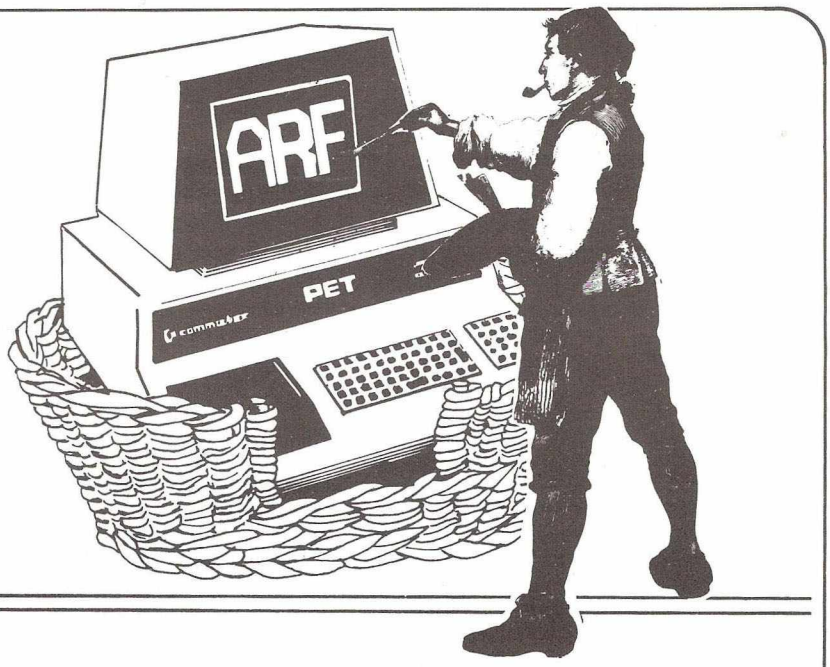
Personal Electronic Transactions

by Gregory Yob



Quickies Revisited

I mentioned some hex-to-decimal and vice versa routines as examples of "Quickie" programs which did a lot in 10 lines or less. You were invited to send me examples of other neat "Quickies" — the result? I now have **lots** of two and three line hex/decimal/gumbo conversion routines! What I **meant** was to see other **ideas,** not better versions of hex and decimal!!!

Is the PET Logical?

Turn on the PET, and enter:

```
PRINT 12 AND 7
 4
```

Now try:

```
PRINT 12 OR 7
 15

PRINT NOT 12 AND 7
 3

PRINT NOT 12 OR 7
-9
```

Odd, isn't it? Let's start by looking at the Boolean truths first.

Enter this small program to see how the PET determines if a number is TRUE or FALSE:

```
10 INPUT N
20 IF N THEN PRINT "TRUE": GOTO 40
30 PRINT "FALSE"
40 PRINT
50 GOTO 10

RUN
? 1
TRUE

? Ø
FALSE

? -1
TRUE
```

As you play with this, you will discover that:

```
ZERO IS FALSE
EVERYTHING ELSE IS TRUE
```

When the PET is deciding if an IF is to be executed or not, the expression following the IF is evaluated, and then checked for TRUE vs FALSE. TRUE (of course) executes the following statement or jump, and FALSE doesn't.

If you are sharp, this brings a deduction: Relational operators produce numbers! Let's see if this is so:

```
NEW

10 INPUT "X,Y"; X,Y
20 PRINT X">"Y"spVALUE:"X  Y
30 PRINT X"= "Y"spVALUE:"X= Y
40 PRINT X"<"Y"spVALUE:"X  Y
50 PRINT
60 GOTO 10
```

Here, two numbers, X and Y, are entered. In Line 20, their values and the relation being examined, >, are displayed, and then the value of the expression X>Y is shown. Lines 30 and 40 act in a similar manner. Here's a RUN:

```
RUN
X,Y? 1,2
 1 >2  VALUE: Ø
 1 =2  VALUE: Ø
 1 <2  VALUE:-1

X,Y? 2,1
 2 >1  VALUE:-1
 2 =1  VALUE: Ø
 2 <1  VALUE: Ø

X,Y? 2,2
 2 >2  VALUE: Ø
 2 =2  VALUE:-1
 2 <2  VALUE: Ø
```

Ah, so — When a relational expression is TRUE, the PET uses the number -1, and when a relational expression is FALSE, 0 (zero) is used.

This leaves you with two interesting flexibilities with the PET. First, you may use an expression without a relational operator in an IF test. For example, IF X is the same as IF X <>0. This saves space and runs faster. Second, relational expressions can be used in assignment statements, ie, Y=X>3. Here are a few legal PET statements:

```
IF X+5/Y THEN PRINT "HELLO"

IF 2+A$<B$ THEN PRINT "WHACKO"

Z=A=B=C

M=(A$>B$)+2=(A$<B$)
```

When brewing these concoctions, the PET might get confused — and you will see a ?TYPE MISMATCH ERROR. Use parenthesis to separate numbers from string comparisons.

On rare occasions, these may be used to save some effort. For example, suppose you have:

```
100 IF X<10 THEN Y=2: GOTO 140
110 IF X>20 THEN Y=5  GOTO 140
120 Y=0
140 REM ......
```

This can be replaced by:

```
100 Y=-((X<10)*2+(X>20)*5)
```

Take care to use parenthesis as needed. The relational operations are performed after the arithmetic ones. For example, 1+2=3 will result in -1 rather than zero. 1+2 is evaluated, giving 3, and then 3=3 is checked, giving TRUE, or -1.

To understand how AND, OR and NOT work, we need to take a short detour into:

Two's Complement Tutorial

Most of you probably already know how to count in binary. As a refresher, here are a few numbers:

```
    0   is 0000 0000 0000 0000
    1   is 0000 0000 0000 0001
    2   is 0000 0000 0000 0010
    3   is 0000 0000 0000 0011
    4   is 0000 0000 0000 0100
    7   is 0000 0000 0000 0111
    8   is 0000 0000 0000 1000
  255   is 0000 0000 1111 1111
  256   is 0000 0001 0000 0000
32767   is 0111 1111 1111 1111
```

(broken into groups of 4 for clarity.)

There is a reason for looking at these as 16 bit numbers — the PET does its logical operations on 16 bit integers. If you wanted to use all 16

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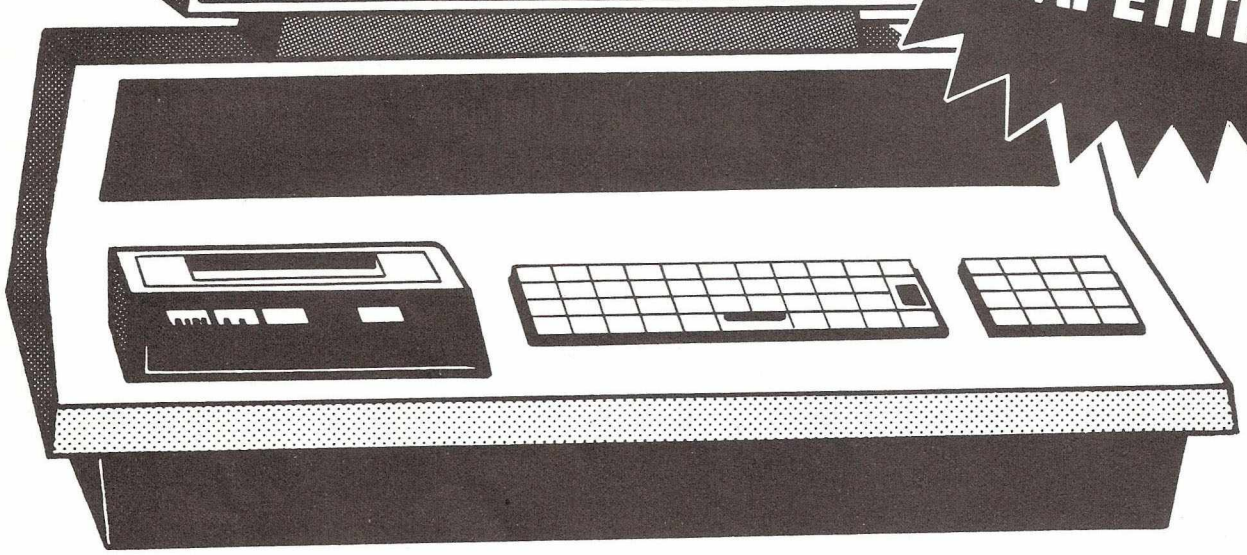

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PERSONAL ELECTRONIC TRANSACTIONS Continued.

bits, the largest number would become 65535. However, if you did so, the smallest number would become zero, and there wouldn't be any negative numbers.

In the 6502 (and almost every other computer too), the convention of a sign bit is used. In the case of the PET's integers, the highest bit (the one on the left) is chosen for the sign. A positive number has a sign of 0, and a negative number uses 1. If a short table of numbers were now created, it would look like this:

```
+256    is    0000 0001 0000 0000
+ 63    is    0000 0000 0011 1111
+  2    is    0000 0000 0000 0010
+  1    is    0000 0000 0000 0001
+  0    is    0000 0000 0000 0000
-  0    is    1000 0000 0000 0000
-  1    is    1000 0000 0000 0001
-  2    is    1000 0000 0000 0010
- 63    is    1000 0000 0011 1111
-256    is    1000 0001 0000 0000
```

This method of making negative numbers has the odd property of **two** values for zero, Plus Zero, and Minus Zero. If you try a few additions and subtractions, this gets to be very clumsy, very fast.

To simplify addition and subtraction with negative numbers, the operation of subtraction is changed to addition with negative numbers. For example, 15-7 is converted into 15+(-7). The new form of a negative number consists of 1) Make the Sign Bit a 1, and 2) Flip all of the bits — make 1 into 0 and vice versa. The Table above would now become:

(+1 and up the same as before)

```
+  0    is    0000 0000 0000 0000
-  0    is    1111 1111 1111 1111
-  1    is    1111 1111 1111 1110
-  2    is    1111 1111 1111 1101
- 63    is    1111 1111 1100 0000
-256    is    1111 1110 1111 1111
```

This system is called One's Complement, and it still suffers from two values of zero. Here is a sample subtraction:

```
 15     0000 0000 0000 1111
-7      1111 1111 1111 1000
 7      0000 0000 0000 0111
```

(Remember we add these!)
(The carry goes into limbo to the left.)

Oops! We are one short — the true answer is 8. The solution is to always add one after doing subtraction. Another solution is to make the number negative, and then to add one. Our table now looks like:

```
+256    is    0000 0001 0000 0000
+ 63    is    0000 0000 0011 1111
+  2    is    0000 0000 0000 0010
+  1    is    0000 0000 0000 0001
   0    is    0000 0000 0000 0000
-  1    is    1111 1111 1111 1111
-  2    is    1111 1111 1111 1110
- 63    is    1111 1111 1100 0001
-256    is    1111 1111 0000 0000
```

This is known as Two's Complement, and is the PET's method for doing integer arithmetic. Note that the Zeros problem has vanished. One way to visualize Two's Complement is shown below: (Just for 4 bits this time)

```
+ 15    is    0 1111
+ 14    is    0 1110
+ 13    is    0 1101
+ 12    is    0 1100
....    ....  .....
- 12    is    1 0100
- 13    is    1 0011
- 14    is    1 0010
- 15    is    1 0001
- 16    is    1 0000
```

First, the smallest number in Two's Complement is one larger in magnitude than the largest number — in the 4 bits shown above, the largest number is +15 and the smallest is -16. Second, if you start at the bottom (-16) and count up, the numbers are the same as the positive numbers starting at zero with the sign bit changed.

The PET is Logical

At last we can attack AND, OR and NOT. The PET takes the values being used, converts them into 16 bit Two's Complement Numbers, and then does the operation on a bit-by-bit basis. Here are some examples:

```
AND: 1100 If the bits match, they are the
     0101 same.  If they don't, the result
     0100 is zero.

OR:  1100 If either bit is one, the result
     0101 is one.  Both zero gives a zero.
     1101

NOT: 0011 Flip them - one to zero, zero to
     1100 one.
```

With these in mind, to go back to the first examples:

```
12 AND 7:

     0000 0000 0000 1100      (12)
     0000 0000 0000 0111      ( 7)
     0000 0000 0000 0100      ( 4)

12  OR 7:

     0000 0000 0000 1100      (12)
     0000 0000 0000 0111      ( 7)
     0000 0000 0000 1111      (15)

NOT 12 AND 7:

     0000 0000 0000 1100      (12)
     1111 1111 1111 0011      (-13)
                          - This is NOT 12
     0000 0000 0000 0111      ( 7)
     0000 0000 0000 0011      ( 3)


NOT 12 OR  7:
     1111 1111 1111 0011      (-13)
                        (NOT 12 from above)
     0000 0000 0000 0111      ( 7)
     1111 1111 1111 0111      (-9)
```

The PET performs NOT first, then AND, and finally OR. This can lead to trouble if you aren't careful:

```
PRINT 1 AND 2 OR 3
 3
PRINT 1 AND (2 OR 3)
 1
```

Use parenthesis liberally as needed.

One common operation is to set or clear bits in 8 bit bytes. You can use AND to clear a bit by ANDing with a zero in the bit's position. This can also be used to remove unwanted bits (known as masking). OR can set bits by placing a 1 in the appropriate position with OR.

I hope this is of some help. It is hard to compress into two pages the material which often takes 30 pages in most beginning computer science texts.

PET Has a Light Pen

A light pen is a photosensor (usually at the tip of a pen-like wand) which is placed next to a CRT screen. The pen tells the computer where the pen is placed on the screen. If several options are put on the display, the pen may be used to select between them.

3G Company (Rt 3, Box 28A, Gaston, OR 97119) offers a light pen for the PET at a cost of about $30.00. My pen consists of a wand which looks like a felt pen, a cable about 40 inches long, and a small PC card which attaches to the PET's User Port. The enclosed instructions explain which way to attach the pen to the User Port (It's very easy to put it on upside down. This is harmless, but the pen won't work.) Also included are a listing of a Basic program to demonstrate the use of the pen, the bits used in the User Port, and some insert sheets from two software vendors, Quill Software and Distinctive Interiors (an unusual company name!). The Quill offerings were more interesting, so I obtained the programs to see how the light pen might be used.

The light pen works by creating a cursor on the PET screen, flashing it, and checking if the pen's output is matching the cursor's flashing. Most of the programs would draw several squares on the screen and then flash the cursor sequentially through the squares. If the pen's presence was suspected, the cursor's scan will stop and a few more flashes made to verify the pen's presence. This was fast enough for two or three choices, and went more slowly for more squares. (One of Quill's programs simulates the PET keyboard. The scan takes a few seconds to do for the 75-odd keys.)

In many cases the light pen wouldn't "catch" the cursor as it went by. The pen has to be held perpendicular to the screen, and I found that turning up the screen's brightness helped a lot.

Quill's software is seven programs — most of which are simply standard games modified to take the light pen's input instead of the keyboard's entry.

Continued on page 37

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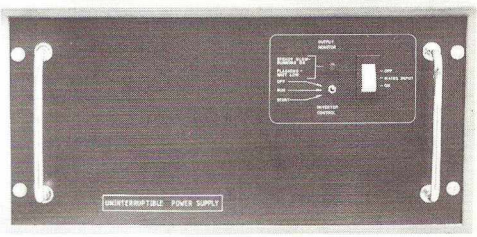

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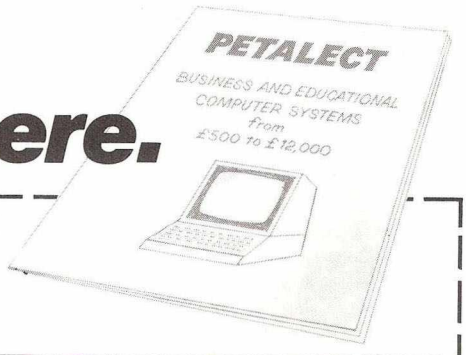

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One program, the Light Pen Keyboard, shows some promise. It coulid be developed further, say to at least give input to a Basic program, or (even better, but hard to do) to actually serve as a substitute for the keyboard.

The light pen interests me in two ways. First, the personal computer can be used to assist handicapped persons in several ways. If any of my readers are doing this, let me know. The light pen may be simpler to use than a keyboard for those with motor handicaps, for example. The second interest is in relating to young children who aren't very handy with language and symbols. Pictures may be drawn on the screen for the child to make selections via the light pen. Most present personal computer applications stress the information/symbol processing aspect of the machines — and they **can** be used for entirely non-verbal and non-symbolic activities (like Pong).

As an exercise for the light pen, and to help launch new concepts (perhaps), here is a program which lets you draw simple pictures on the screen via the light pen.

The first task was to see how the light pen functioned. The low three bits in the User Port serve the pen. Bit 2 provides the pen's power (CMOS doesn't use much current, and the 1 or 2 mA of the PET's User Port is sufficient.) Bit 1 is used to "cock" the light Pen. By turning Bit 1 off and on, the pen is enabled to detect light. Once light is detected, the pen will remain insensitive until Bit 1 is toggled again. Bit 0 provides the pen's output, with 1 for no light and 0 for light.

My test program ended up like this:

```
10 PRINT"clr rvs sp sp sp sp sp sp sp sp
20 GOSUB 5000
30 PRINT"hm dn dn dn dn   "PEEK(LP)" sp sp"
50 POKE LP,4:POKE LP,6
60 FOR J=1 TO 25:NEXT: GOTO 30

5000 REM INIT PEN
5010 POKE 59459,254
5020 LP=59471
5030 POKE LP,4:POKE LP,6
5040 RETURN
```

This drew a band of light at the top of the screen, and the number 6 or 7 appears three lines below. When the pen doesn't see any light, the value is 7, and when it is on the band of light, 6 appears. In fiddling around with this I learned that: 1) Lines 50 and 5030 are absolutely required — once the pen senses light, Bit 1 **must** be toggled. 2) The delay in line 60 is needed (probably due to a RC circuit in the PEN — remember that the PET screen flickers at 60 Hz and needs to be filtered out.) The minimum delay was FOR J=1 TO 6 with my pen, and I advise using FOR J=1 TO 10 as your pen might be a little different than mine.

In routine 5000, LP is used to speed up the looking at the User Port — remember that Basic can fetch a variable about 10 times faster than converting 59471. Line 5010 simply sets up the User Port's data direction register.

As space is limited, here's the final program and then a few comments.

```
10 GOSUB 5000: GOSUB 6000
20 KB=515:K1=26:KØ=10:KZ=255
30 REM SETUP SCREEN
40 PRINT "clr"
50 GOSUB 5300
60 REM NOW TRACK IT
70 GOSUB 5400
80 CQ=CP
90 IF PEEK(KB)=K1 THEN POKE CP,DT
100 IF PEEK(KB)=KØ THEN POKE CP,DS
110 GOTO 70

5000 REM INIT PEN
5010 POKE 59459,254
5020 LP=59471
5030 LA=4:LB=6:LC=7
5040 CP=33268:CH=0:DT=81:DS=32:DD=160
5050 CX=40:CY=41:CZ=39

5100 POKE LP,LA:POKE LP,LB
5110 FORJ=1TO30:NEXT:RETURN

5200 REM CURSOR PRIMITIVE
5210 CH=PEEK(CP):F=Ø
5220 POKE CP,DS:GOSUB 5100
5230 IF PEEK(LP)=LB THEN F=1
5240 POKE CP,DD
5245 FOR J=1TO30:NEXT
5250 IF PEEK(LP)=LC THEN F=1
5260 POKE CP,CH
5270 RETURN

5300 REM WAIT FOR PEN
5310 F1=Ø
5320 GOSUB 5200:IF F=Ø THEN F1=F1+1
5330 IF F1<2 THEN 5320
5340 CQ=CP:RETURN

5400 REM CURSOR TRACKING
5410 CP=CQ-CY:GOSUB5200:IFF=ØTHENRETURN
5420 CP=CQ-CZ:GOSUB5200:IFF=ØTHENRETURN
5430 CP=CQ-CZ:GOSUB5200:IFF=ØTHENRETURN
5440 CP=CQ-1 :GOSUB5200:IFF=ØTHENRETURN
5450 CP=CQ   :GOSUB5200:IFF=ØTHENRETURN
5460 CP=CQ+1 :GOSUB5200:IFF=ØTHENRETURN
5470 CP=CQ+CZ:GOSUB5200:IFF=ØTHENRETURN
5480 CP=CQ+CY:GOSUB5200:IFF=ØTHENRETURN
5490 GOTO 5410

6000 PRINT"clr LIGHTPEN DRAWER
6010 PRINT"dn dn sp sp USE THE LIGHTPEN TO
     MAKE A
6020 PRINT"SIMPLE PICTURE.
6030 PRINT"dn sp sp WHEN YOU START, A CURSOR
     WILL
6040 PRINT"APPEAR IN THE MIDDLE OF THE SCREEN.
6050 PRINT"PUT THE LIGHTPEN ON THE CURSOR,
6060 PRINT"AND AS YOU MOVE THE PEN THE CURSOR
6070 PRINT"WILL FOLLOW THE PEN.
6080 PRINT"dn sp sp IF YOU MOVE THE PEN TOO
     FAST,
6090 PRINT"THE CURSOR WILL STOP FOLLOWING AND
6100 PRINT"YOU WILL HAVE TO PUT THE PEN BACK
     ON
6110 PRINT"THE CURSOR.
6120 PRINT"dn sp sp PRESS '1' TO DRAW DOTS
     AND 'Ø' TO
6130 PRINT"ERASE DOTS.
6200 PRINT"dn dn PRESS ANY KEY TO START
6210 GETA$:IFA$=""THEN6210
6220 RETURN
```

See the instructions in lines 6000 — for how to use the program. The cursor is easily "lost" and you must move the pen carefully. Sometimes two positions will activate the lightpen, giving two dots if you press the '1' key.

Line 20 sets up these values: KB is the PEEK location for the keyboard scan (New ROMS will use the value 151 here.), K1 is the code for the '1' key, and K0 for the '0' key. Line 50 calls the "wait for the pen" routine 5300. Once the pen is found, the tracking begins in line 70. When the pen is tracked, Routine 5400 returns and the keyboard is checked for '0' or '1'. If a key is detected, CP indicates where the cursor is, and a dot or a space is POKEd into place.

Routine 5000 mostly sets things up. The POKE in 5010 is done only once, so there's no transformation of numbers into variables. LP is the pen address; LA, LB and LC are the values used with the pen. CP points to the middle of the screen initially. CH is to hold the screen's character while the cursor is in the same place. DT is the code for SHIFT-Q, DS for SPACE and DD for RVS-SPACE. The PET screen is 40 characters wide. CX, CY and CZ can be added or subtracted to CP to get the adjacent and diagonal locations. (i.e., CP+CX is the next position down.)

Routine 5100 actually initializes the lightpen. Note how 5000 "drops through" to use this code the first time. At 5200 the essential details of detecting the cursor are performed. First, in Line 5210, the character already on the screen is grabbed for safekeeping and a detection flag, F, is set to zero. Lines 5220 through 5250 turn the cursor off, check the pen, turn it on, check the pen. If the pen is following the cursor, the conditions in 5230 and 5240 will not be true and F is zero. F=1 implies the cursor wasn't seen. (I intended this to work the other way, but it was late at night and I'm lazy.)

Routine 5300 checks for the pen by calling 5200. If the pen was found, the counter F1 is incremented. Three successful checks indicates that the pen was found.

The tracking routine 5400 uses CQ as the "permanent" pen position and CP for the cursor position. A 3 × 3 square is scanned for the lightpen, and if the pen is found (F=0), the routine exits. (Note: Line 80 then updates CQ to the new pen's position.) The tracking scan repeats until the pen is found. (And you put it there!) □

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PEDDLE AT PCW

Here's a date for your diary: September 4th; that's when the Personal Computer World Show opens at London's Cunard Hotel, in tranquil surroundings bounded by the Hammersmith Flyover and the Metropolitan Police Car Pound.

The PCW Show has a reputation for being the most enjoyable show of the year. The World Microcomputer Chess Championship should prove fascinating; International Master, David Levy will be supervising the thirty entrants. There will also be a chance to hear from the PET's designer, Chuck Peddle and a number of other distinguished speakers, including our own Julian Allason, at the Micro U.K. Conference running alongside. Details from 0895-30594.

The Show opens at 10 a.m., continuing until 7 p.m. on the Thursday and Friday, 6 p.m. on Saturday. Tickets £2 at the door or £1.50 in advance from Montbuild Ltd., 11 Manchester Square, London W.1.

BUSINESS SOFTWARE NEWS

Anagram Systems of Horsham (tel: 0403-68601) have released a Sales Ledger and Invoice Printing package with an impressive spec. Written almost entirely in machine code, the package consists of a 30K monitor program containing a sample database, foot controls, all record retrieval and storage. Small applications are dynamically loaded from diskette. The system costs £320 + VAT and runs on Commodore disk. We will be reviewing it shortly.

Landsler Software are offering a new Plain Paper Payroll package for £150 + VAT. It is said to cater for up to 500 employees current on disk, covering all normal codes, BR, BRI, D, F, and Weekly Basis. There is also an update service costing £20 p.a. Full details from 01-399 2476.

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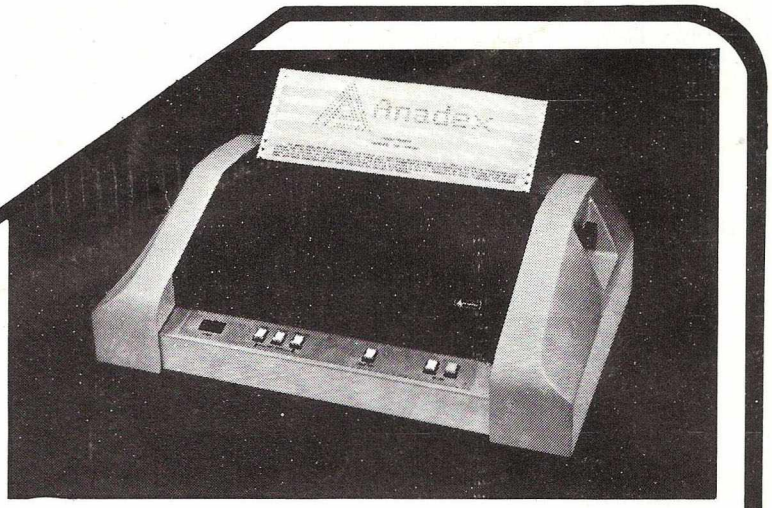

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maximum	200 lpm for 10 ch lines	

Features

- ✻132, 175 or 220 columns, 120, 150 or 200 characters per second
- ✻50-200 lines per minute, bi-directional printing with line scanning logic
- ✻150 M characters print head life
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- ✻Tractor feed, multiple copy plain paper
- ✻7 x 9, 9 x 9 or 11 x 9 matrix with optional graphics capability
- ✻Special character sets available as options
- ✻6 or 8 lines per inch, selectable
- ✻10, 13.3 or 16.7 cpi, selectable
- ✻Communications control selectable

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Baud Rates
50, 75, 110, 135, 150, 300, 600, 1200, 1800, 2200, 2400, 3600, 4800, 9600*
*RS-232C only
Switch selectable.

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Physical
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Plug-in option enables printing of continuous graphics under control of data source, with resolution of 72 dots per inch vertically and 60 (DP-9500) or 75 (DP-9501) dots per inch horizontally.

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Please ring Graham Knott or Jeff Orr for other interfacing requirements. Prices exclude VAT.

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