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The Pet Users Magazine



April 1980

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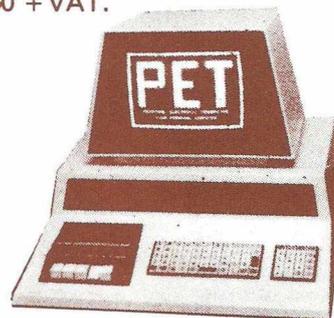
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# PRINTOUT

Vol. 1, No. 4, April 1980

**EDITOR:**

Richard Pawson

**Art Editor:**

Michael Lawson-Foster

**Staff Writer:**

Nigel West

**Advertising:**

Wendy Cheetham

**Correspondents:**

Thomas Turnbull (Technical)

Terry Laudereau (U.S.A. East Coast)

Gregory Yob (U.S.A. West Coast)

**Contributing Editors:**

Gavin Sanders

Robin Bradbeer

**Publisher**

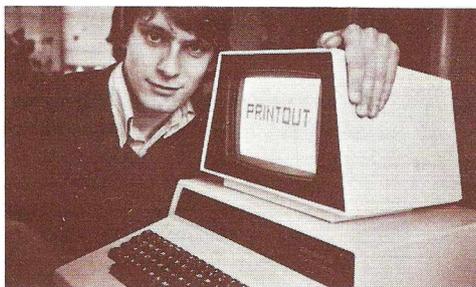
Jessica Allason

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## EDITORIAL



To quote my good friend Guy Kewnay – PET has now become a world of its own, and not merely a character in the greater play.

Microsystems '80, which marked the second anniversary of PET being on sale in the UK, had a fair sprinkling of PETs, with Commodore's stand clearly the largest in the show. The organisers also deemed PET to be the only microcomputer with a large enough following to justify its own Lecture and Buyer's Forum.

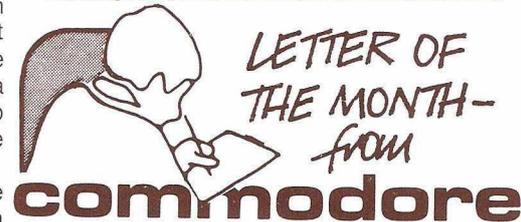
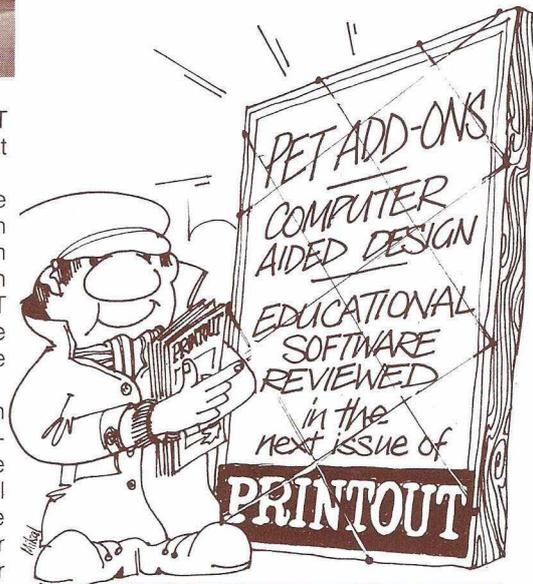
February 13th saw the start of an exhibition run by Commodore to demonstrate all of the Approved Products in the latest edition of their catalogue; there is a full report of the show in this issue. Now we understand that there is to be the first-ever PET exhibition this June. Reports that sheer size necessitate the National Exhibition Centre as the venue are exaggerations, but certainly there are enough PET-compatible products in the marketplace to make a thoroughly worthwhile show. We will keep you informed as more details become available.

Accordingly, we have started to increase the size of PRINTOUT, to include even more useful and interesting material – a process which we hope to continue. As you will see, we have made extensive use of photographs to portray the PET world of tomorrow, with a full report of Commodore's new technology from the Las Vegas Consumer Electronics Show.

Inside Trader, despite a recent take-over bid from a well-known Computer magazine, has remained faithful to PRINTOUT, but is demanding more space for his column. He reports that he may have to go underground soon, as 'the net is closing in'. We hope not.

Finally, next time you are walking through Waterloo Station and hear the familiar cry: 'Get your copy of PRINTOUT here', spare a thought for our faithful 'promotions manager' – Mikal. It gets awful cold out on the streets at this time of year. . . .

RICHARD PAWSON – Editor



The senior management at Commodore have read with great interest, your article 'Future Shock' predicting the future activities of Commodore over the next few years.

Will you please speed up your next issue so that our directors can have their 5 and 10 year plans to present to the next board meeting of Commodore.

We're lost without your next predictions.

Kit Spencer,  
General Manager/Director

## CONTENTS

Assembler Development System Reviewed	25
Kit Spencer Interviewed	17
Peeks and Pokes – Gossip	19
Pets and Pieces	21
Commodore Printer Evaluation	11
Commodore Future Technology	14
Hotline – News and Products	5
Read/Write – Questions and Answers	9

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# HOTLINE – News & Products

## PETs allowed in Hotels

A new software package, specifically for use in Hotels, has been announced by Landsler Software. Two programs comprise the system – Room Availability, and Guest Billing – which is available for £495 including VAT, to run on a 32K PET plus Commodore Floppy Disk and almost any printer.

Room Availability can handle bookings for up to 1188 rooms, and as far ahead as 400 days. This period advances dynamically as the system is used; the heart of the program being a perpetual calendar. Blocks of rooms can be defined as Double, Single with Bath or by other descriptions.

Guest Billing handles all the invoicing and charges for up to 130 rooms on one diskette. A screen menu (Sic) is used to specify the type of charge, along with the Room Number and amount. The final bill is produced on the Printer, with all charges and services itemised. Custom designed preprinted stationery can apparently be ordered from Landsler.

Room Availability is available separately, for £275 including VAT. For more details contact Landsler Software, 29A Tolworth Park Road, Surbiton, Surrey, or telephone 01-399 2476.

## Small keyboards rule OK!

Not three months after the announcement that 8K PETs would be sold with Large Keyboards, New ROMs, and Plastic Case for £495, Commodore have contacted PRINTOUT to say that the small keyboard machine lives again.

Thus, 8K PETs will shortly be available with Small Keyboard, New ROMs, Metal Case, and inbuilt cassette deck – all for £475 plus VAT.

Trying to uncover the reason behind this apparent about-face, PRINTOUT has come up with two possible answers. First, it could be that Commodore are trying to clear their old stock of housings, and are having to dangle New ROMs as the proverbial carrot. More likely, however, is a report from the Stateside 6502 magazine *Compute*, that there was quite an uproar over there when it was announced that the small keyboards were no longer available. Funny, when you think that some of us are old enough to remember the days when PET's small keyboard came in for a lot of criticism. It seems that some people are just never satisfied. . . .

Still at £475 this must surely be the best value microcomputer around.

## Anagrams lure OK!

Latest entrants in the competition to see who can supply the biggest (or most expensive) Stock Control program are Anagram Systems. A new company, formed by six members with "considerable experience in designing, programming and implementing complex business systems on mainframe computers", Anagram will be working in close association with Commodore dealers – Amplicon Micro Systems Ltd. of Brighton.

The specification of their new release certainly looks impressive, with printed

reports of slow moving Stock Lines, up to five different VAT codes, and recording of Purchase Order information, to name just a few features. But with a price tag of £750, to run on a 32K PET, Commodore floppy disk and 80 column printer, it needs to be.

What 'systems' is an anagram of, we're not quite sure . . . Anagram can be contacted on 0403 68601.

## PET for beginners

A new booklet entitled *PET for Beginners* – Book 2 has been produced by PETFOLIO, Inisbeag, Blackhill, Coleraine, N. Ireland, BT51 4EU. Aimed as a supplement to other PET documentation, rather than as a comprehensive introduction to BASIC, Book 2 (£1.50) follows Book 1 introduced last year at £1.00. Some of the more useful topics covered include: Programmed Cursor Functions, PEEK and POKE, and String Handling. Our opinion of the book was that it wasn't very advanced stuff, but a useful back-up if you are getting confused. Both prices include postage and packing.

## High quality printing

Rumour has it that the NEC 'Spinwriter' will soon become the printer officially recommended by Commodore, to provide Letter-Quality printing from their COMWORD Word Processing programs. The 'Spinwriter' requires interfacing to the PET, and the photograph below shows the configuration with a Complications C101 adapter available from FI Electronics, 968 Piner Road, Santa Rosa, California 95401. If the rumour comes true, however, then it is likely that several versions will be available in the UK, particularly as the bus is similar to the standard Centronics format.



An NEC Spinwriter interfaced to a PET

## All taped up

Up until now, the preparation of Control Paper Tapes, for Numerically Controlled (NC) Machine Tools has been time consuming or very expensive. Now Taylor Wilson Systems (05645 6192) have designed 'TAPEPREP' – a PET based system for editing and producing such tapes, away from the machine itself.

For under £4,000 the system includes a 32K PET, CompuThink disk, Anadex printer, paper tape punch and full software. The Editor will display blocks on the screen and allows insertion/deletion and load/save commands.

## Shoebox accounting

The long awaited Incomplete Records System, has finally been announced by Commodore. This system has been tested by several qualified accountants over the past few months, prior to release, and while several modifications have been made in that time, the system already has a good reputation.

Incomplete Records accounting describes the method of preparing official accounts from, typically, a shoebox full of Receipts and Checkstubs etc. – the chartered accountant's nightmare. The new Commodore system will replace hours of tedious work with a few entries into the computer screen. The software has been designed by Computer Services Midlands Ltd., and has full Commodore approval. For more information regarding prices and specification, contact the Commodore Information Centre on 01-388 5702.

## Versatile interface

To handle the problem of different printer bus requirements, Allen Computers have announced a versatile interface package for the PET. Attaching to the User Port, the package includes both hardware and Machine Code software.

ASCII characters can be sent either as Parallel or Serial bits, and as TTL, RS232 (20mA current loop) or V24. The unit will also receive characters on its Serial Port. Baud rates are selectable up to 240. The Machine Code is fully relocatable in RAM. For more details of the package, which costs £70 plus VAT, contact Allen Computers, 16 Hainton Avenue, Grimsby, South Humberside, or telephone 0472 40568.

## Plea answered

Following our comments regarding the documentation for the AIM161 Analogue to Digital Converter for PET (PRINTOUT, Vol. 1, No. 3), John Chew of Kingston Computers phoned us to say that he now has supplies of a proper manual. Anyone who has a PET and an AIM161 or PETSET – drop him a line, enclosing 50p to cover postage and packing and he will send out a manual, free of charge. They should also state where it had been bought, the age of the machine and which configuration. The address to write to is: Kingston Computers Ltd., Scarborough House, Scarborough Road, Bridlington.

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RENUMBER	Renumbers your BASIC program, including all GOTOs and GOSUBs
DELETE	Removes groups of BASIC program lines
FIND	Locates and displays the BASIC program lines that contain a specified string
APPEND	Adds a previously SAVEd program to the one currently in your PET
DUMP	Displays the names and values of all the variables used by your program (excluding arrays)
HELP	If your program stops due to an error, HELP displays the offending line and where the PET detected the error.
TRACE	As a program runs, the last six line numbers being executed are shown in the upper right corner of the PET's screen.
STEP	Executes one BASIC line and stops. Pressing SHIFT executes the next line. The line number is displayed in the upper right corner of the screen
OFF	Turns TRACE or STEP off

For the new 16K and 32K PETS, the tool kit consists of a single ROM chip which plugs into the left most empty socket inside the PET. Price £55 plus VAT.

For 8K and other 'old ROM' PETs a small printed circuit board is attached to the memory expansion and 2nd cassette ports of the PET. Price £75 plus VAT. Also available for 8K PETS with new ROMS. Please state configuration when ordering.

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*(Continued)***Mystery product**

We were recently sent this mysterious photograph by LOGIC BOX. After several unhelpful suggestions from PRINTOUT staff as to the identity of the device seen in use, we came to the conclusion that it was for large-fingered people who own small-keyboard PETs. The sticking down prong will automatically depress the keys with precision, and at the right pressure.

Contacting Logic Box, however, we were informed that it was an 'ingenious idea' which they had come up with for finding the correct program position on a tape. But they aren't going to sell it themselves and they don't guarantee it to work!!

Come on lads . . . it's not April Fools Day yet.



*The Logic Box Mystery Product*

Seriously though, Logic Box sell a non-Commodore cassette deck with a tape counter and loudspeaker for the same price as the Commodore one. And this they *do* guarantee to work.

# SHOW REPORT

COMMODORE  
Approved Products



Commodore started their Approved Products scheme several months ago in order to provide some indication as to the quality of a PET-compatible, non-Commodore product. A catalogue containing details of all the latest entrants in the scheme is sent out with every new PET and may be obtained from Commodore's Information Centre. Recently, however, they have decided that the scheme is large enough to warrant its own exhibition, and the first one was duly arranged for 13th February.

Visitors to the Skyway Hotel, Heathrow (where Commodore were also running the first of their Advanced Basic training courses, concurrently) must have been impressed by the range of products on show. Commodore occupied the whole of one Ante-Room with their own Business and Master Library programs. The latter have recently undergone a face-lift, with programs being re-packaged into PETPACKS.

On the games front, the Treasure Troves of Games (around 4 programs for a tenner) have been distinguished from the Super High Quality 'Arcade' games. Notable here, are Invaders – a good implementation of the addictive slot-machine game, and an incredible 3-D Startrek written in machine code. The speed at which the Galactic vista changes has to be seen to be believed!

For the businessman, Commodore's uprated Wordprocessor has arrived at £150, with features such as: Automatic Find and

Change, and page numbering/titling. After an abortive attempt to change the name from WORDPRO to COMWORD, the packages are now officially named COMWORDPRO II & III.

Turning to the non-Commodore exhibitors, these included 3D Design with their 16-Channel A/D Converters and Relay outputs, plus examples of their custom interfacing work. Small Systems had Ricoh and NEC Spinwriter printers linked to the PET – the latter has now been confirmed as the officially approved letter-quality printer for use with COMWORDPRO (see Hotline). The other main hardware exhibit was the MTU High-Density Graphics board from IJJ Design Ltd., being put through its paces with some impressive Pete Dowson demonstration software. Full report on this exciting new device next issue.

Dataview showed a program called Microclerk which will accept text files created by COMWORDPRO or WORDCRAFT. Aimed at replacing part of a manual filing system, this program can extract paragraphs containing selected keywords. A rather interesting new idea in Business Simulation is PETPLAN from Understanding Ltd.

Regrettably, there is not space to list all the many new products – but all are detailed in Commodore's new leaflet which is well worth a read. If this is anything to go by, the full PET Show in June will be an event not to be missed.

**DIY firmware**

Anyone who has written a piece of Machine Code for their PET, which needs to be used regularly as part of a program or operating system, will be pleased to know that it is now possible to burn your own EPROMs for use on a PET.

G.R. Electronics, who used to be a PET Dealer but aren't any more, have designed a low-cost EPROM programmer to handle the ubiquitous 2716 EPROMs. Cliff Allen of G.R. says – "I designed the unit simply for my own personal use in electronics consultancy; it was only afterwards that we realised that it could be marketed." Up to 2K of Machine Code can be programmed on to the chip, and then accessed by PET from one of the sockets built into the G.R. device.

This useful add-on to your PET can be bought for £80 including software, with optional extension sockets. For more details, contact G.R. on 0633 67426. Full report in a forthcoming issue.



*Some examples of interfacing from 3D Design*



*Ringmaster Andrew Goltz*



*High Density graphics with the MTU board*



# QUALITY PROGRAMS FOR PET



## FIVE CARD STUD POKER £8 inc.

This is the traditional Poker of the American West and still played particularly when the stakes are high. It usually, at first, seems an over simple game to the novice, but is, in fact, the toughest form of Poker played.

This version for the PET gives one the opportunity of actually playing the game against a quite strong opponent. PET actually plays the hand against you. It should not be confused with some Poker games currently on the market where you only bet against the odds of completing a hand.

## TARGET GOLF £8 inc.

Our latest cassette and entirely compatible with our policy of only publishing the very best programs. The graphics with this game have to be seen to be believed. The representation of your golf swing portrayed on the PET screen is remarkable.

The spacing and rhythm of striking three keys allows this clever machine code program to effect a variety of shots: Pulled, Faded, Sliced, Topped, Pushed, Drawn, Hooked etc.. The ball proceeding across the screen to the target hole. A variety of holes and wind conditions are presented to the player, to which he makes his choice of club and type of swing.

## TEN PIN BOWLING £5 inc.

A fascinating game for two players. PET keeps the score in the traditional manner allowing for Strikes and Spares. A continuing score is kept for a series. The graphics are good and the game is quite compulsive. Should be kept well away from the children or you'll never get at your PET.

## DOGS CHANCE £5 inc. (state which PET)

Reduces everyone to hysterics the first time they see it. You have to take off in your biplane, being careful not to try and leave the ground too soon and not leaving it too late, climb away avoiding the anti-aircraft guns. Having congratulated yourself on this achievement the 'flying bombs' suddenly appear. You must endeavour to shoot them down before they get you. And, well..... you haven't a Dogs Chance! Again, truly marvellous graphics in this machine code program.

## AIR TRAFFIC CONTROL £5 inc.

Can you keep your cool? After a few minutes with this simulation you'll see the problems Air Traffic Controllers have. Your screen is the radarscope and information is given of Flight Numbers and Heights. You have to give orders for your aircraft to lose or gain height or alter course to avoid collisions - after you've requested a SQUAWK of course (that is to identify an aircraft). Unfortunately, your depth of airspace is limited due to military activity above and below your lanes. The trouble is, it often gets very busy up there!

This has proved one of our most popular programs and we understand that it is in use by some Air Training Corp Squadrons as a form of concentration sharpener.

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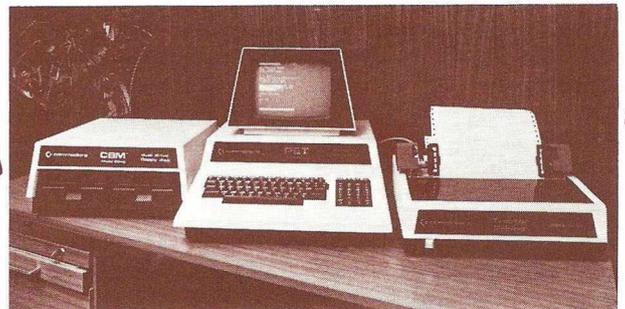


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# READ/WRITE

## Your Questions Answered

### Keep it simple

At last a dedicated Commodore Magazine of *practical* use rather than being concerned with mundane 'games' and the like. Please continue with Software reviews; articles on dedicated CBM Hardware and in particular, keep that 'Spy' on the USA West Coast well paid. It is financially beneficial to prospective purchasers that they be well informed of what is coming.

But keep it (relatively) simple. One tip as that by Gavin Sanders in the January 1980 issue on line formatting is worth the cover price. Remember if articles are written in your present understandable form, *all* (the thousands of beginners and advanced users alike) can understand. Make it complicated, and you write to only a select few. Congratulations again.

J. S. Minshull, M.Inst.M.

**Thanks for the nice comments. Your point about keeping it simple is well made – and we shall be endeavouring to write for the benefit of the beginner as well as the expert. We hope to start a series explaining some of the simpler programming concepts from scratch. What we need to know, is what PET Users are having difficulty with. String handling maybe, or screen formatting? Write and tell us.**

**Our 'Spy' in Santa Clara is now demanding overtime for all the material he is sending us – see the centre pages.**

\* \* \* \*

### Tape problems

I own an 8K PET (Old ROMs) with a 24K Expandem board. For the past six months I have been attempting to prepare and use data tapes – with very little success. Would New ROMs help? The technique I have used is based on the PET Workbooks.

Samual H. Jackson

**Yes – a set of New ROMs would help since these do not have the bug of starting the cassette motor too quickly. They are obtainable from your local dealer. However, in PRINTOUT's experience, most of the cassette problems are caused by dirty or magnetised heads and using three-a-penny cassettes. Have you tried using a good demagnetiser and cleaner? Our advice would be to get your dealer to look at the cassette deck before splashing out on New ROMs immediately.**

\* \* \* \*

### Matrix functions

I have been told that my PET would be a lot more powerful if the BASIC would handle the matrix or MAT functions. What use would these be (I mainly use my PET for business functions like cataloguing and other forms of information retrieval). Is it possible to buy a set of ROMs that will give me this capability or another more advanced form of BASIC.

P. D. Marks

**MAT functions enable you to perform arithmetic operations on matrices. A Matrix is a two-dimensional array of numbers, which is used to describe a particular situation – such as the structure of a steel bridge. Using Matrix operations, a large number of problems can be expressed in a standard format which can be easily solved by computer. But this is only really of use where you have a large number of simultaneous equations to solve, as is the case with Engineering and so-called 'Management Calculations' (Critical Path Analysis, mixing etc.). The chances are that if you don't know what use matrices are, then they aren't applicable to your field.**

Nevertheless, it is a pity that no-one has produced a Matrix-handling software package for PET, thus far. Rumour has it that a new faster form of BASIC will be available in ROM before the end of the year, but it is unlikely that this will contain MAT functions either.

\* \* \* \*

### User Port

I am looking for a low-cost microcomputer, primarily for home use, and the PET looks to be a particularly attractive buy. However, I shall probably want to link it in to some domestic equipment at a later stage, if I can master the programming, so I am after a machine that can be interfaced easily. PET's IEEE-488 seems rather too complicated for this type of thing, but I understand that PET has a 'User Port' as well. What exactly can this do, and would it be suitable for driving Relays etc?

Michael Collins

**The User Port is an 8-bit parallel port which is directly addressable from BASIC. This means that you can send any pattern of 1's and 0's onto the eight lines, each of which can be specified as an input or an output, all with simple POKE and PEEK commands. Machine Code may be used to handle very high speed applications.**

Because the User Port comes directly from PET's 6522 VIA chip, a number of other functions are available on it. These include two programmable 'Handshake' lines (one of which – CB2 – is frequently mentioned) which are used to acknowledge that the data is ready for reading. There is also a shift register, which can be used for converting between parallel and serial data bytes, and a timer, which is useful for interfacing to certain devices.

The lines operate at the standard 5V TTL levels, but are only capable of driving around 4mA, which means that you will have to 'buffer' the port with transistors or a standard 7400 buffer chip, if you want to drive something substantial such as Relays or LED's. The great thing about the User Port is that you can experiment in real time and see the effect of your BASIC commands.

### Monitor screen

I have heard it said that you can connect a commercial TV monitor to a PET so that you can 'run' two screens at once. Is a monitor significantly different from a domestic TV set, and how does one link it to the PET. It would be very useful to me to have a second, larger screen, for demonstrating the operation of various packages to my staff.

Andrew Philips

**A monitor is a TV screen, frequently used in closed circuit TV, which accepts the video signal from a line rather than an aerial. Small monitors are available for around £100 and can be interfaced to the Horizontal, Vertical, Synch and Video lines on the top side of PET's User Port, using a few Logic gates. Commodore or your local dealer should be able to supply the circuit.**

Alternatively, a domestic TV set may be linked to the port, with the addition of a UHF modulator (available from an electronics shop for a few pounds). However, several dealers can supply a complete interface which simply plugs into the User Port and your aerial socket, and as they are inexpensive, probably represent your best bet. Try STACK for a TV interface, or Small Systems Engineering Ltd. for a combined TV and monitor version.

\* \* \* \*

### Firmware problem

I have the 'Toolkit' ROM on my 16K PET; can the CBM Wordprocessor ROM be fitted into any of the other spare ROM sockets? I phoned Commodore but they said "Try it." At £75 this seems like an expensive try – do you know the answer?

Also, a great deal is written about Machine Code but how can a novice who only knows BASIC, start to see the advantages? With BASIC you can quickly try out a simple five-line program; can you give simple examples for Machine Code? Could PRINTOUT start a practical series leading into Machine Code in easy stages?

Alfred Rose

**As far as we can tell, there is no way for the Commodore protection ROM to be fitted to any of the other spare sockets. A point that we are trying to make to both Commodore and Petsoft, is that they should make available at least two locations for all firmware programs. We will let you know of any progress.**

In answer to your second point, regrettably, not easily! Probably the best way to learn the capabilities of Machine Code, without danger of crashing the system is to use Commodore's Snark program (£10). This is a simulation of an abstract 16-bit micro, written by the renowned Professor Andrew Collin, and contains full debugging and testing facilities. Although the machine is not the same as the 6502 Microprocessor, many of the principles apply. See also our two articles about aids to 6502 programming in this issue.

We will try to introduce a series on simple Machine Code in the near future.

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**TRADE ENQUIRIES WELCOME**

# THE COMMODORE PRINTER

by Martin Jacobs



**The Commodore 3022 Printer is a remarkable beast – probably one of the most intelligent on the market. But it holds a few tricks up its sleeves – not least because of errors in the documentation. This article details the experiences of one user, and should be helpful to people considering the purchase of a 3022, as well as existing owners.**

With trembling hands I pressed the PET end of the PET-IEEE cable (extra cost) to the PET and the IEEE end to the printer. Flicking on the power switch, the printer jumped to life, hiccupped twice, and made a noise like 'Sthreep!' Peering into the paper drive area my wondering eyes beheld the message, "HELP! I AM A PRISONER IN A TAIWANESE IC CHIP FACTORY!"

## Cosmetic restyling

My Commodore 3022 Printer had finally been delivered. The 2020 model which I had ordered in July 1978 was scrapped in favour of two new models, the 2022 and 2023. I was told that the 3022 was to be a cosmetically restyled version of the 2022, the same innards, with a different cabinet: not so! The Itoh 820 mechanism of the 2022, which printed as the head travelled in both directions and had a specified print rate of 84 lines per minute has been replaced by the Epson 3110 mechanism which prints on the left-to-right stroke only and has a specified rate of 70 lines per minute. 'Cosmetic restyling' seems to be more than skin deep! The instruction book, of which we will have more to say later, shows a photo of the 2022 with two vertical side extensions of the case to cover the traction mechanism and a transparent plastic cover through which the emerging page is read. No such goodies are on my 3022. The 2023 is the pinch-roller version, but has the disadvantage that lines per inch are not adjustable, so that all text is separated and it is not possible to reproduce graphics with vertically continuous elements. The 3022, however, is programmable from vertically over-lapping lines through to 1¼ inches per line (255 steps at 144 steps per inch).

## Unpacking and setting up

The printer comes well-packed as usual, but the unpacking instructions don't apply to the 3022. You will not learn from perusal of the instruction book that there are two thumb-screws in the base which hold the mechanism fixed for shipping and which, when removed and stored in a waistcoat pocket, permit the mechanism to ride properly on its vibration mounts. Don't worry about the strange paint job on the front panel label and power switch, as my dealer did, just peel off the protective shipping film and throw it away. You will find a fine quality label underneath each!

## Characters

How can an 8×8 dot character space be reproduced by a 7×6 dot printer head? Answer: it can't, but try to get your friendly PET dealer to admit it! The result is a reasonable facsimile for alphanumeric characters, but not so good for fanciers of graphics. A few of the graphics, as will be described in detail, are not reproduced at all, while others are per force compressed so that they no longer form the same patterns when used in multiple.

In the good news department, it's only fair to mention that Epson America Inc., when I last checked, was the U.S. front for Shinsu Seiki Co. Ltd., of Japan, a member of the SEIKO watch manufacturing firm and a long-standing leader in the manufacture of printers including both dot matrix and high-speed rotary drum types.

## Transformer windings

This process allows you to check for bits of packing material and admire the construction generally. Note that the screw-on plate on the back gives access to test points and that the power transformer is supplied with 220 as well as 240 volt windings, which is useful if you live in Ireland and can get your dealer to change the wiring for you.

The next problem is to insert the perforated paper into the tractor feed mechanism. My recommendation: flip the tractor mechanism forward towards you to clear the paper entry. Fold the end of your paper over once to form a triangular point. You will find that this stiffens the wet noodle and allows

you to pass it down through and up between the ribbon and the hexagonal print platen bar easily. The plastic paper tractor guides flip outwards to allow the perforations to be laid over the drive belt with its Freudian lumps, and both the left and right guides may be unlocked and moved to the desired position by sliding along their cylindrical stay. The rest position of the print head is about ¼ inch to the right of the first print position.

## Transatlantic design

The power plug, not designed for British users, can be cut off and replaced with a 13A fused plug. How is it that these simple matters of international interchangeability cannot be resolved by one or two transatlantic or even transpacific telephone calls at the design specification level? Need I remind you of PET's inability to display the glorious pound sterling symbol? Hope springs eternal, and the printer has a programmable character feature, of which more anon.

## Ribbon life

Consider the supply refurbishment situation: printers require paper, ribbon, and, eventually, head replacement. Let us relate these to a standard double-spaced page with 33 lines of up to 88 characters each. Round it down to 2500 characters per page. This will be more than two, probably usually three VDU screens per page. The ribbon is specified to have a life expectancy of 2 to 3 million characters. That is 800 to 1200 pages, or two to three drafts of that great historical novel you have been planning to write. Paper is usually packaged 2000 sheets to the box, so you should use from two to three ribbons for every 5 boxes. The ribbon reverses automatically.

How soon these conditions come to pass depends on how intensely you use the printer. At two passes per minute, a lot of pages can be run off in a day, but I doubt that the average user has sufficient data to keep such a device busy more than an hour per day.

## Instruction book

I think I have by now made my point that the book supplied did not describe the machine it accompanied. A disclaimer inside the cover advises us that CBM assumes no responsibility for inaccuracies and that the material is for information purposes only.

I will not attempt to point out all the errors that I have found except to say that they fall into two categories. There are misleading statements such as: "It prints . . . all the graphic characters . . .", and there are some highly confusing paragraphs regarding one or two of the finer points of operation. None of the errors are really fatal, but all result in wasted time.

## Considerable intelligence

The 3022 is a 'smart' printer. (CBM prefer the word 'intelligent': sounds 'classier' I suppose.) When comparing its specifications with those of the competition, these special features are worth many added points. Using the IEEE secondary address options, the printer will accept and



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6. Accept and store definition of programmable character.
7. Set line spacing interval.

Any of these may of course be re-entered and changed during the course of a program. The formatting data controls include:

place a digit in a specific position in the field:

same but with leading zeroes:  
treat field as a dollar amount with fixed position of '\$':

(I guess we'll just have to knuckle under and change the name of the currency!)

floating '\$' right-justified before the most significant digit:

print '+' or '-' in fixed column:

print trailing '-':

fix decimal point position:

right-justify integers:

define alpha field, left justified:

print graphics characters to create a form while printing data:

and all valid non-conflicting combinations of these.

### Control characters

Within a single printer line of up to 80 characters it is possible to use certain dedicated control characters to generate the following:

upper case/graphics or lower case/  
upper case:

paging on or off:

reverse on or off:

return (carriage return with line feed):

carriage return without line feed for  
overprinting:

line feed alone:

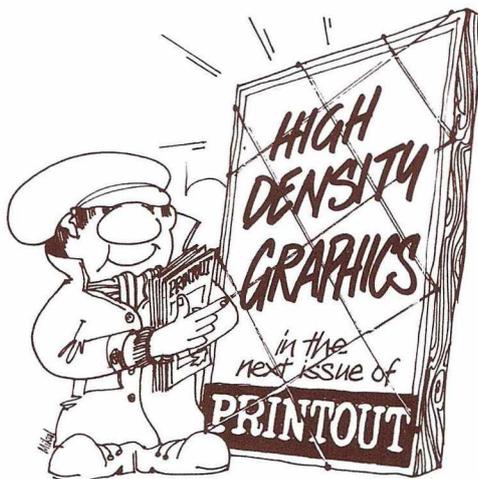
enhanced character on or off.

The enhanced character is doubled in width only, the height being constant. This is accomplished by printing each vertical column of dots twice. It is possible to re-enhance several times, but the effect is best with one or at most two applications.

RETURN is forced after the 80th character, with subsequent characters overflowing to the next line. Quotation marks operate as they do on the screen, making control characters visible, so that proper program listings can be printed.

### Speed

'Burst speed' in characters per second refers, not to the speed at which the machine will burst, as my eight-year-old suggested, but to the speed at which the print head lays down characters once it has accelerated from rest and reached its steady state. The head has to decelerate, stop, and retrace its path to the left border before it can be useful again. The time taken in these processes must be evaluated as well, leading to the only useful specification which is lines per minute (with length of line



specified). The corresponding number for the 3022 according to Epson is 70-80 character lines per minute. It puzzled me for some time to find that I was measuring only slightly more than 58 lines per minute until I realised that the manufacturer's specs are probably at 60HZ and that  $\frac{5}{6}$  of 70 = 58.33!

### Overheating

In general, graphics reproduce satisfactorily, but a small number of disadvantages exists. The instruction book states that REVERSE mode should not be used 'for more than five consecutive lines' since extended printing in this mode will damage the print head. The problem in this case is overheating due to high duty cycle on the dot needle point solenoids. There are seven of these, mounted in a restricted volume, and continuous re-excitation of them leads to various degrees of what the label so charmingly refers to as HEETING and eventually, no doubt, to death by fire. The Epson specs for the model 3110 mechanism state that print head life expectancy of  $10^8$  characters is based on an average of 14 dots per character out of the maximum of  $7 \times 6 = 42$ . Peak current is 16A, with a mean current of 2.5A into approximately 4 ohms. That certainly is a mean current! Clearly, however, REVERSE SHIFT '(' generates no more heat than REVERSE OFF SHIFT(';'; they both have the same number of dots, and examination will show many other graphics of which this is true. However, something like continuous printing of REVERSE SPACE, where all dots are activated, is no doubt what the writer was told to refer to, and if you have an application that requires such a printout, I would recommend building in delays between lines in the program to prevent any possibility of reaching damaging temperatures.

### Graphics

I have mentioned that certain graphics are not provided, but I have not identified them. Specifically they are the SHIFT 'T', which prints as SHIFT 'G', the SHIFT 'Y', which prints as SHIFT single quote, and the SHIFT '#', which prints as SHIFT 'E'. The 'T' and 'Y' are members of the set of 8 vertical lines, of which two had to be omitted in converting from  $8 \times 8$  to  $7 \times 6$ , and '#' is a member of the set of 8 horizontal lines, of which one had to be omitted. In a similar vein, it will be clear that one cannot draw a

diagonal line through from one corner to another of a  $7 \times 6$  matrix and therefore that no diagonals connect.

Most readers will be aware that there are four 'hidden' graphic symbols which are not marked on the keys and which only appear when lower case/upper case is selected (POKE 59468, 14). For the two arrow characters you must unshift to print the corresponding graphics and shift to print the arrows. This error does not extend to the other two, which correspond to the ')' and ':':

The paper feed generates 144 steps per inch. When the line spacing is set at 18 steps per line, there are therefore 8 lines per inch, which gives vertically continuous graphics. For the best reproduction it is well to put a slight tension on the paper feeding in from the supply box to ensure that it is held taut over the printing bar.

### Programmable character

The programmable character is defined by creating a string in your program which is a concatenation of six character strings corresponding to the six vertical columns of the desired character. I won't give the details, which are lucidly described in the instruction book. It is possible, though clumsy, to generate more than one programmable character per line, but the printer can only remember one at a time and we must realize that the action of the print head is a continuous sweep.

To overcome any difficulties presented by these limitations, there are two possibilities with which all kinds of exotic bells and whistles can be implemented. One can overprint a line any number of times, adding a character or a part of one each time. One can print out only one line of dots at a time, advancing the paper only one step for each line, thus building up special letters, for example, decorative alphabets, script writing, "Curse you, Red Baron!", and the lot. Proud progenitors of such decorative printouts may send sample program tapes to me c/o The Editor: I will put pressure on him to reproduce any that I find outstanding.

### Alphanumerics

As has been noted, the  $7 \times 6$  matrix causes characters to be diminished in width. They are not diminished in height however, as none of PET's alphanumerics used more than 7 vertical dots in the first place: it was only the graphics that did. Descenders are of the false variety, but so are so many other things these days: eyebrows, hair, and other portions of the female anatomy.

'Descenders', if any reader is wondering what I'm talking about, are those portions of lower case characters which reach below the base line of the upper case characters. When false descenders are applied, the whole character is pressed upwards so that the tail of the 'g', for example, is no lower than the base of the 'E'.

**This very full account of one users experience highlights a number of the 3022's unique features. The answer to many of his 'setting-up' problems would be to get your dealer to install the printer for you. PRINTOUT will be publishing routines for getting the most out of your printer as they are sent in.**

# COMMODORE'S NEW TECHNOLOGY



Twin SuperPETs



Memorex Mini-Winchester



The Executive PET

## Commodore's new technology

PRINTOUT was allowed to examine the technology which Commodore has under development at its Santa Clara, California, Headquarters and elsewhere.

As predicted on these pages three months ago, the showpiece is a new 'SuperPET', which closely resembles existing models but with an integral 12 in black and white CRT. The screen format is 25 lines times 80 columns, which clears the remaining obstacle to the company's drive to convert the PET into a CBM business computer.

The preproduction prototype which we used had BASIC 4.0. This was said to be fully compatible with that implemented on current (new ROM) models. An upgraded DOS with auto initialise was a welcome inclusion. However, the major enhancement was a string handling, as a result of revisions made to the garbage collection routines. Overall execution speed of BASIC has been improved, and programmers making extensive use of strings will appreciate the difference.

Commodore's Bill Seiler explained that the original Microsoft BASIC had been written for maximum space economy. In BASIC 4.0 strings now occupy a little more memory, but are more speed efficient.

An even more advanced BASIC 5.0 is under development, and this incorporates a number of Programmers Toolkit type features. Extended BASIC commands included FIND, TRACE and RENUMBER. This version was incomplete when we saw it and even Jim Butterfield had difficulty with the CHANGE command. When finished this will allow any character, word or combination of words within a program to be exchanged. Repeating keys will be another feature. It was not certain on which machine BASIC 5.0 will be implemented.

None of the prototypes we were shown has been officially announced, although a new 1 megabyte mini floppy made a fleeting appearance at the Consumer Electronics Show in Las Vegas.

This comprised twin Micropolis single sided 5 1/4 in drives giving 2 x 512K bytes of store. The new disk system had twice as many tracks as the present 2040 model. Diskettes written on one system could not be read directly on the other.

Commodore are working on several other disk systems including a stripped down single 5 1/4 in drive to sell at a low price. Capacity is approximately 150K bytes and some 2040 utilities will be missing. However, IEEE will be retained. It is now eighteen months since a single mini floppy was first mooted and there must be some doubt as to whether it will ever reach the market place.

Also available was a large housing containing twin 8 in floppy drives. Capacity is likely to be 2 megabytes. A utility was being worked on which would convert to IBM format.

However, PRINTOUT has learned that a separate development team in Phoenix, Arizona, are working on software for the Memorex 8 in hard disk on behalf of Commodore. This would have 5 to 10 megabytes of store. The company are also believed to have been in contact with IMI who supply an 8 in hard disk which is already on sale to Apple users.

The star turn was a prototype colour PET, known as T.O.I. This comprised a slim keyboard console generating colour video output to a monitor. The system appeared to be easy to use with eight colour set buttons used like 'shift' keys. Format was 40x25 and each two dots on the screen could be individually addressed as one of the eight colours. The possibilities of Teletext/Viewdata were said to be under investigation.

The last thing we were shown was a touch sensitive screen. Fitted to PETs with both large and small monitors, the system returned X, Y co-ordinates for the point touched. A lattice of infra-red beams parallel to the screen surface were used to sense the possibilities of the finger or stylus. In this way it is possible to draw directly onto the screen, or make a menu selection by touch alone.

It was stressed that not all of these projects will necessarily proceed to production. Commodore have yet to make any announcements, let alone quote delivery. Nevertheless, PRINTOUT expects to see some of them come to market this year, possibly as early as the summer. Kit Spencer has a good record of obtaining early U.K. supplies so we should not have to wait long after the American launch.

PETs are getting noisier. Commodore are working on software to generate synthetic speech on the PET via the well-known Votrax voice synthesiser. Meanwhile Petsoft are going ahead and publishing a talking calculator program which requires hardware costing less than £30. Hobbyists should be able to build the necessary tone generator for far less.

When loaded the £15 program displays a picture of a calculator on the screen. As keys on PETs' keypad are depressed, the sound generator 'speaks' each number or mathematical function, before pronouncing the solution to the problem entered. Petsoft say they are developing other sound programs and will also support Commodore's synthesiser when it is released.

The Votrax unit which CBM have interfaced to the PET is already available in the US for Ohio Scientific and other computers at \$399. It is also sold for \$799 with the Universal Telephone Interface to enable the computer to dial or answer telephone calls with synthesised English speech.

The software developed by Commodore appears superior to that available on other systems. Ordinary (i.e. non-phonetic) English typed on the PET keyboard can be rendered as clear comprehensible speech. Because the phoneme programmable technique employed allows inflection, the results sound more natural than on most of the systems currently on the market.

Frequently used words are held on disk in a dictionary which translates them into phonemes. Approximately 750 words may be stored online at one time. Commodore will probably supply one such dictionary, and users may program their own. Unlisted words are pronounced phonetically.

In direct mode the function of each alphanumeric key is stated out loud as it is depressed.

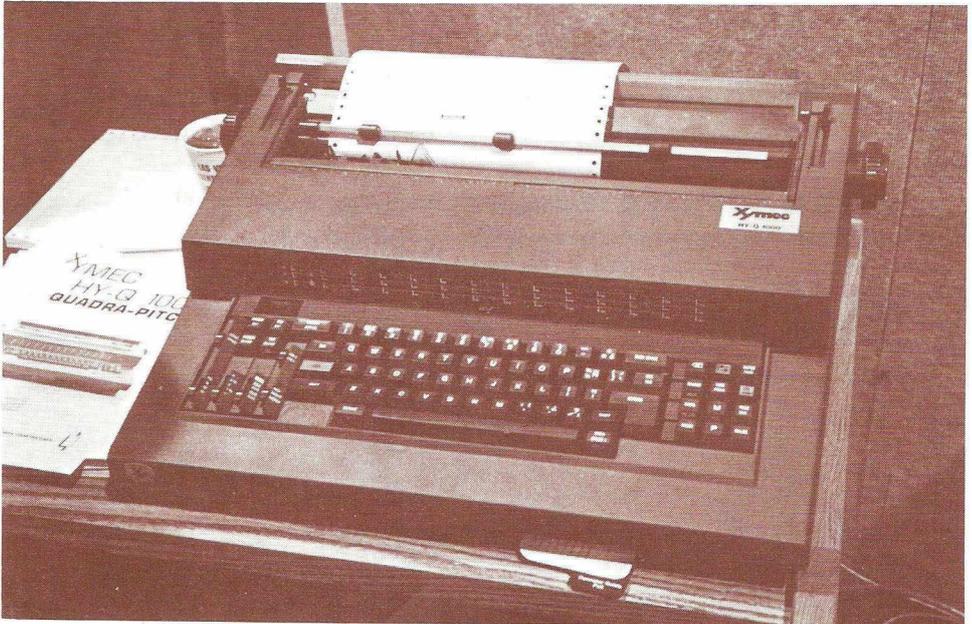
No release date has been announced by Commodore. Nothing can go wrong, go wrong, go wrong . . .



Talking hat: Commodore's speech synthesiser



Lori Wagner \_ Miss PET USA



Xymec printer



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TRADE ENQUIRIES WELCOME

# The PRINTOUT Interview ~ Kit Spencer

Kit Spencer, General Manager of Commodore Systems UK, is well known for his dissertations on the 'Commodore Philosophy'. PRINTOUT obtained an exclusive interview with Kit, to find out what this much-used phrase means, and what motivates the man himself.

**PRINTOUT:** *What exactly do you mean by the 'Commodore Philosophy'?*

**K.S.:** Essentially, our marketing philosophy is to introduce the right products at the right time, and for the right price! Everything revolves around that – our investment, research and staffing. We are a very flexible company; we don't believe in fixed annual budgets for each department. All costs have to be justified in the light of agreed objectives in agreed timescales which are not necessarily one year.

**PRINTOUT:** *How does this tie in with the PET concept, apart from the principle of good value for money?*

**K.S.:** The timing was critical here. Launching when we did gave us several months lead over the competition. PET now has a well established reputation, and more important – a massive software and user base. In the last analysis, that is what most potential buyers are looking for.

**PRINTOUT:** *Obviously the competition is hotting up for PET, but where do you see the fiercest attack coming from?*

**K.S.:** Probably from the Japanese. They have already started to dip their toes into the water, and of course they have the ability to produce high-specification products at good prices. But I can't help feeling that they will have problems in the long run because of a lack of good applications packages. That is something that we in Britain are very good at producing.

**PRINTOUT:** *But are you making good use of the enormous software talent over here, or is most of your software coming from the States?*

**K.S.:** All the new packages in our own 'Business Software' Library have been written in the UK, with the exception of COMWORDPRO. We also make use of the experienced people in evaluating and testing all new software. The newly released COMACCOUNTS package has only been put on the market after months of testing by accountants and programmers in the field.

**PRINTOUT:** *Is that the way you see PET applications going – towards Accountancy and other conventional Data Processing areas?*

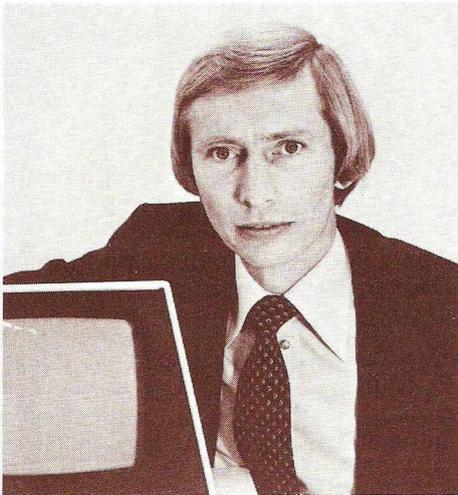
**K.S.:** I see a general trend towards Business Applications, yes. But more the small business, with packages that cater for one particular type of user's needs. If you like – the Butcher, Baker and Candlestick Maker packages! Another major area which is expanding is Automatic control and instrumentation. We recently held the first of our Applications Seminars on this subject, and it went down very well.

**PRINTOUT:** *What about Education – you advertise PET as being highly suitable for this, but there is very little software in your Library to back up this claim?*

**K.S.:** Don't forget that so far most educational users are using PETs to teach programming and therefore don't need much additional software. Computer Aided Learning still has a long way to go before it will be widely accepted. Of the simulation programs we do sell, some teachers say that they are excellent, while others disagree totally. We view our prime role as a co-ordinating one – in supporting and giving publicity to Educational User Groups, as they are formed. Educational software is probably six months to a year behind the business development and as you know, a lot can happen in the PET world in this time.

**PRINTOUT:** *What about your own PET Users Club? Are there plans to start meetings or other Club activities?*

**K.S.:** That very much depends on the members themselves. We will be inviting all members, free to a special Commodore PET exhibition in June. I think, however, that the primary function of PUC will remain the distribution of information by means of the newsletter.



**PRINTOUT:** *That being the case, what is your attitude to the various independent sources such as IPUG and ourselves?*

**K.S.:** I welcome any publication or group that is providing information to users and helping to establish PET as the number one computer! Obviously we can't expect everything that is written to be flowing praise, but time has shown that most of the genuine criticisms of our products are put right. In that sense, you are providing us with a very valuable feedback of information – keep up the good work.

**PRINTOUT:** *What about our gossip column – do you read that?*

**K.S.:** Yes, I find it amusing – I have had no end of questions about my two front teeth from the dealers. But you must keep it in its place; gossip is a trade luxury, not a feature of real interest to end users.

**PRINTOUT:** *What is your attitude to independent standards such as those laid down by the Computer Retailers Association?*

**K.S.:** I think such bodies are a good idea. We would take note of any decisions they make, but we do not envisage making membership of the CRA obligatory – we have our own set of standards.

**PRINTOUT:** *Most of the dealers are now producing Programs or Add-ons for the PET. Do you see a danger that the identity of PET will be lost in the wide range of products that go to make up a system?*

**K.S.:** To guide the user we have a three-level attitude to PET compatible products. First we have the Official Commodore range which we produce and market directly, under the Commodore name. On a secondary level, we have the Approved products which we have tested and endorsed as being of a high enough standard; these appear in our Approved Products Catalogue. Lastly, there are many other products which we don't endorse, but we may give publicity to, via the PET User's Club Newsletter and the Commodore Information Centre.

**PRINTOUT:** *When you say that you market products – we have often heard the criticism that you don't actively do so. Rather you are relying purely on the reputation of those products to sell themselves.*

**K.S.:** That is the difference between a marketing and a sales organisation. It is obviously good news if a product has been made attractive enough to market itself. Please note that our sales force is the dealers and they are there to support our end users. We always try to act as our own competitors in making a better product and try to anticipate developments in the market place. We are trying to sell solutions and not just hardware. That is why we have chosen to market PET through a local dealer network rather than direct to the end user. This adds extra support to the product at realistic cost.

**PRINTOUT:** *Do you foresee a time when Commodore could literally be their own competitors, when for example the Consumer Product Division starts to diversify? They have recently announced their intention to produce a calculator which will run BASIC.*

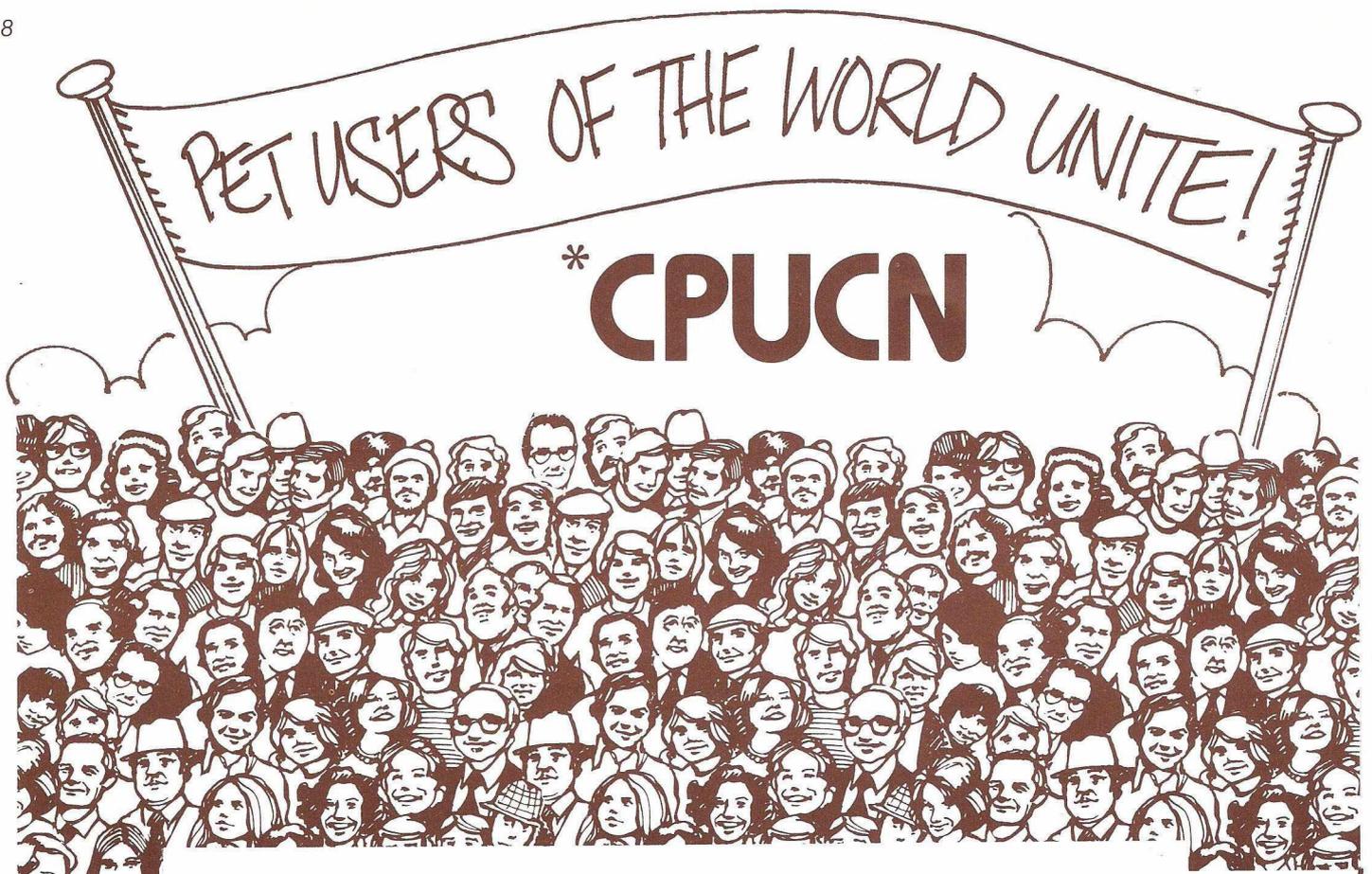
**K.S.:** A product such as that would not be in direct competition with the PET system. It would be sold mainly to scientists or people wanting to learn BASIC; it would not require a large software or service base. But, as I have said, Commodore is a flexible company – if another division is required to handle such products, then one will be created.

**PRINTOUT:** *What is the current financial split between Systems and Consumer Products?*

**K.S.:** I can't divulge the exact figures, I'm afraid, except to say that Systems is the larger. It varies considerably because calculators and watches have a very seasonal market.

**PRINTOUT:** *Do you use PETs yourselves, for administration or accounting?*

**K.S.:** Yes – there are quite a few machines being put to good use at the Slough offices. We have made use of the COMBIS package to put the PET Users Club mailing list on disk. We also prepare all new contracts and manuals with a COMWORDPRO 11 plus Spinwriter system.



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(Continued)

**PRINTOUT:** Why do you not use the COMWORDPRO system to write all your business letters?

**K.S.:** We believe in making economic decisions; we have a lot of expensive typewriters on the premises, purchased before the introduction of COMWORDPRO. We don't advertise that COMWORDPRO is a realistic replacement for all of these, but it really scores when you can make use of its special functions – such as in standard letters or document preparation. Being equally realistic we process our accounts on a HONEYWELL Computer (as well you know) because they simply won't fit on a PET.

**PRINTOUT:** What about you, as Kit Spencer, do you ever use a PET?

**K.S.:** I have one at home, yes. And when I can wrest it from the grip of my five-year-old Invaders-playing daughter, I like to try out several of the programs myself, to keep in

touch. I have taught myself the rudiments of programming with the Strathclyde BASIC course, and if I can find time, I will go on one of our own training department courses.

**PRINTOUT:** Do you try to keep in touch with the technical side of microcomputers as well?

**K.S.:** My job is first and foremost as 'General' manager – I employ a technical staff to keep informed for me. But I do try to take a practical approach to this problem. I am aware, for example, of the benefits and disadvantages of programming in Machine Code though I couldn't begin to write such a program myself. People are often surprised to learn that I am a renegade physicist, though I am afraid that my degree was a long time ago.

**PRINTOUT:** Where does that fit in with the rest of your background; how long have you been in the micro field?

**K.S.:** My background, as you put it, is primarily marketing. I first became involved in the micro field about seven years ago, as the electronic calculator started to be produced in bulk. After investigating their potential for a major electronics company, I was invited to become involved in the marketing of Bowmar Calculators in the UK. Five years ago I moved to Commodore in the same field. When the PET started production, I was asked to form a completely new division in the UK to handle computer products. The rest you know. We have had a few ups and downs over the past two years, but fortunately PET is now selling excellently. Two years ago, Commodore Systems Division was just starting – now it is a large and successful part of the company.

**PRINTOUT:** That must speak for itself. Thank you very much.

## PEEKs & POKES by Inside Trader

### Gossip, rumours and other distortions

Larry Perry recently established an all time US Commodore record by holding down his job as a software manager for a year . . . . . Latest piece of oneupmanship from Apple; they are sending one up in the Space Shuttle. To play Star Trek, no doubt . . . . . Peter Oldershaw's love of music put to the test in Las Vegas. Billited in the next suite to Petsoft's panjandram was a mariachi band who felt themselves in need of late night practice . . . . . North London Computer Club's hitchhiking chairman, Robin Bradbeer notched up a first in thumbing a lift on Jack Tramiel's PET Jet . . .



Robin Bradbeer

. . . Young ladies contemplating an evening with PET pundit Gregory Yob should proceed with caution. Greg keeps a laser under the bed . . . . . Now that PET has been officially rechristened the CBM computer, Apple want to change to 'something more business-like'. Unhelpful suggestions on a postcard to Mike Brewer . . . . . Insiders are agog about Chuck Peddle's supersecret new project. A PET that draws, talks and listens wouldn't be too far off the mark . . . . . According to ex-Commodore boffin Bob Skyles the Wordpro protection ROM merely duplicates existing routines at the new location . . . . .

. . . . . Bill Cannings, chief – until it went bust – of the Byte Shop chain, sports an appropriate number plate on his motor: WR1T. . . . . Inside Trader's undercover agent in Santa Clara reports a PET coming off Commodore's newly automated production line every 43 seconds . . . . . Everyone's into micronetworking these days, right? So what exactly is David Hebditch up to? . . . . . Allen Rosen is still looking for someone to buy his educational software. Couldn't be the £10,000 price tag is just a wee bit steep, Al? . . . . . Parts of Carl Moser's relocatable macro assembler keep surfacing in the oddest places. The new MacroTea plug-in ROM has it, and though we hesitate to mention it, CBM's own Assembler Development System bears a passing resemblance . . . . . Interfacing freak Michael Avery's computer dating run was less than successful. First pass produced an elderly (male) solicitor in Torquay. Second run terminated in a system crash . . . . . Commodore PR do's aren't quite the same these days. The computing press are lobbying for the return of the delectable Anne Hamilton . . . . . Harry Saal's writ servers are on the trail of one very well-known company who pirated the Toolkit in Germany . . . . . To the amazement of Stateside customers Commodore even answer the phones these days . . . . . Disco dancing dealer Timothy Davies asked us to write about his new maintenance scheme, but on no account to mention his nickname. Sorry Tiddles, no free plugs . . . . . More reports of non arriving American mail orders. Our advice: support your local dealer . . . . . Drama, suspense, romance; Computer Retailer Association meetings have them all. It is just a question of time before Paramount make Colin Stanley an offer he can't refuse . . . . . Ayatollah Osborne's software keeps popping up everywhere. Now the MicroMullah is rewriting PETs documentation. And about time too . . . . . Are you on the Source? Probably not but already several hundred American PET users are hooked up to the network. What price GPO approval of this daring scheme? . . . . . CBM brass not too impressed with sales record of certain

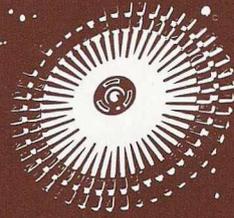
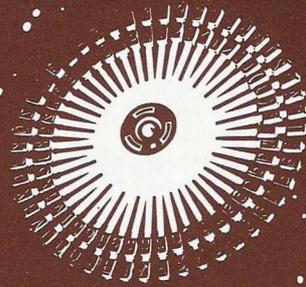
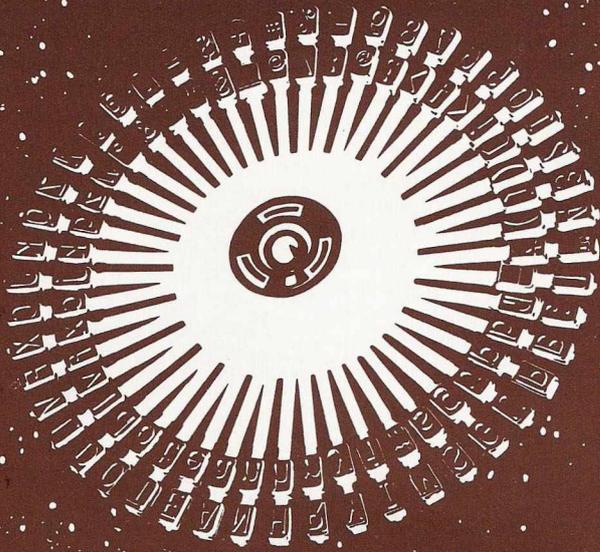
dealers. At least thirty have never even advertised. Standby for squalls . . . . .

. . . . . New York dealers say the Mafia bought a PET; not to play Tic-Tac-Toe we surmise . . . . . Wondering why the CompuThink Minimax computer has been dubbed the ACT800 here? Turns out the name is already registered to a well-known fire extinguisher . . . . . Looking at the first plastic PET that arrived in the shop, I noticed that space had been left inside for an integral disk drive. Trouble is Commodore just switched disk brands and the new ones won't fit . . . . . Peter Laurie, PC Editor and naughty nuclear author extraordinaire says his telephone is tapped. He should have read more of PC's articles about 'debugging' . . . . . Another nuclear enthusiast is software impressario, Julian Allason. Some people have fairies at the bottom of their garden; Julian has a fallout shelter . . . . . Latest concept from Luton based PET Vet, Robin Woods: Executive Relief Software



A reluctant Snow White?

. . . . . Provisional cast list for Commodore's panto: Prince Charming – Kit Spencer, Buttons – Robin Bradbeer, Snow White – Jessica Allason, The Good Fairy – Keith Hall, Widow Twankey – Andrew Goltz, The Seven Dwarfs – Jack Tramiel, Rumpelstiltskin – Nick Green . . . . . Most appropriate street address: Silicon Gulch Electronics who reside at 2 Disk Drive . . . . . Fun loving Colin Stanley is in the doghouse again. Rave reviews of the latest HB publication were accompanied by snaps of Cheeky Colin, grinning hideously. Trouble is partner Mike Hambly wrote the book .



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# PETS AND PIECES

by GAVIN SANDERS

## Lateral thinkers forward, please

New PET peripherals and add-ons now seem to appear almost weekly, the latest to have come past me being Innovision's new direct input writing block. That's reviewed briefly elsewhere on this page, but the constant stream of goodies started me thinking.

Is there a limit to what can be hung on PET? Not in terms of numbers, you understand, but as far as really inventive devices are concerned?

The obvious first arrivals on the scene were printers and disk drives (though using the words 'first arrivals' and 'disk drives' in the same typographical breath may raise the blood pressure in some!). And, of course, the first PETs came with their own integral tape units, with all PETs being able to take a tape unit, main or secondary.

Sound for the PET was another early arrival, though how two approaches with wildly dissimilar results could have evolved puzzles me. One plugs into the user port and is very good indeed, while the other plugs into the second cassette port and isn't. More of that later.

Add-on memory, in-board or out-board, was an obvious expectation, though those who rushed in early may still be examining their bank statements with some sorrow.

Plug-in chips for the newer PETs have arrived, each conferring special advantages. Particularly worthy of mention is the Programmers' Toolkit, which I *did* mention last issue, you'll remember. Coming along are others, with extra programming and machine language routines. It's an area where the lateral thinkers are busy.

Speech synthesis is already a reality: watch out for an extraordinary 'Talking Calculator' program that Petsoft are just about to release. It employs a sound-box via the user port (at last!) and is really mind-blowing in the extra possibilities it gives for fertile imaginations.

Direct input I've covered already; telephone modems are in development; external device control has been around for a while; a colour PET is in the offing (OK, I know it isn't an add-on, but it *is* an extension of PET-power); and so on and so on.

In fact, the challenge is now changing. Slowly it's not so much *how* to make a new add-on idea work, but to think of a new idea in the first place.

Which brings me to the Sanders Super-simple Peripheral Prize.

The *what?* Allow me to explain. One thing which has become blindingly obvious since PRINTOUT began is that you, the readers, are an inventive lot. Thus your mission this issue, should you choose to accept it, is to think up an idea for a PET peripheral, input or output, directly or indirectly controlled, which so far as you know hasn't been thought of so far.

Don't blench: circuits, electronics, interconnections, all that technical stuff – those are *not* needed. All that's required is a simple concept, an idea, a description of *what* the thing is supposed to do, not *how* it could do it.

So, do you have a need? Have you ever thought "wouldn't it be great if there was

something which would do so-and-so?" Have you wondered whether such-and-such a device existed, and concluded regretfully that it didn't?

Now's your chance to tell the PET-orientated world about it. And to spur you on, £50 worth of software of your choice for the most intriguing, interesting, inventive and potentially saleable idea that comes in. Address your concepts to me at PRINTOUT, marking your envelope 'PET Peripheral Notion'.

## Little brickbats and pretty bouquets

Terrific! We're being read out there and, as the last issue of PRINTOUT said, the letters are pouring in to prove it.

Ron Geere, IPUG magazine editor, wryly conjectured that I'd put my PRINTOUT Issue 2 mention of tokens up as an 'Aunt Sally', going on to explain what was happening (but not quite as well as Nigel West, whose piece on the subject was in Issue 3). Ron felt it was an 'Aunt Sally' because he seemed certain that everyone must already have known all about tokens.

What Ron missed (or maybe sort of accidentally overlooked) was not my simple non-knowledge of the token mysteries – he was on to that like a dose of salts – but my mini-challenge to come up with an inventive way of using them. On that, Ron was darkly silent.

Perhaps he's thinking about it, in between issues of what *is* a very good magazine (if in places a little advanced for many of the PET people I know). IPUG, incidentally, is an acronym for Independent PET Users' Group, and if you're not yet a member, then your PRINTOUT subscription, plus one for IPUG also, are almost all you need to cover the PET scene. IPUG's address was in the last PRINTOUT.

But Ron's stance is, to many, rather familiar. It could almost be grammatically labelled 'advanced subjective'. Like being on a mountain, looking down on a forest, and knowing that if one hadn't actually planted every tree there, one certainly had watched them all grow, and knew every branch, twig and leaf intimately.

Not all PET users are up on that mountain. Lots of us are still groping round in the forest, maybe mainframe men meddling with micros, or amiable amateurs asking for assistance.

Like, for instance (and I'm sure he won't mind my quoting him), another correspondent, John Minshall, M.Inst.M., who wrote from Bury in Lancashire to say: "Gavin Sanders' tip in the January issue on line formatting was worth the cover price. Remember if articles are written in your present understandable form, *all* (the thousands of beginners and advanced alike) can understand. Make it complicated, and you write to only a select few. Congratulations again. I enclose my subscription with pleasure."

Thanks, John. We'll carry right on trying to inform, entertain and be simple too – even if we do sometimes look a little ingenuous by accident or design.

## A quick one

You've almost certainly noticed PET's habit (but only from time to time – that's what this quick piece is all about) of providing you with a long string of decimal places in response to a calculation.

Trouble is, if you're a 'pretty-print' person (which simply means you like your screen layouts to be reasonably neat and tidy), a sudden and unpredictable decimal string, much longer than the two places you wanted, and were mostly getting, plays havoc with your layout.

Fret no more: here's a way of avoiding it for ever. It's not original (*down, Ron!*), but you may not have come across it before, in which case you'll like it.

Simply insert a program line which reads:

```
X=INT(X*10 raised to the power N+.5)/
10 raised to the power N
```

X is the number you want to round to a precise number of decimal places; N is the number of decimal places you want to round it to. I've used the phrase 'raised to the power', but you should use PET's single upwards arrow instead, of course.

## Presdigitators of the world, unite!

It's here at last – welcome to the Presto-Digitizer Tablet! And for the second time in this column, I can hear you saying "the *what?*"

Dear readers, I swear upon my honour and all else I hold dear, that truly is its name. But to stifle the muffled screams of impatience, let me now say quickly (and I quote) "the PrestoDigitizer Tablet (patent pending) is a low-cost peripheral device which allows hand printed characters to be received and recognised by small computers".

Now various types of pad which detect the movements of a stylus, and transmit to a computer signals corresponding to those movements, have been around quite a while.

They're usually very sophisticated, cost several hundreds of pounds for starters, and run with graphics packages of up to 48 kilobytes. Which sort of lets them out for most average PET users, pro or hobbyist, even assuming an interface could be set up.

But now here's the PrestoDigitizer which, though relatively unsophisticated, *does* plug straight into PET's user port; comes with two ready-written programs, and a further program listing; will recognise letters, numbers and graphic characters; has quite a bit of further software promised for it; and costs just £42 plus VAT.

The PrestoDigitizer (I *really* wish it wasn't called that!) checks stylus stroke direction and sequence, rather than stylus position on the surface, which obviously restricts it as a fully-fledged graphics input device. However, your PET has a character-based, rather than bit-map, display. And that means that a graphics input device can do quite a bit by simply looking at stroke direction and sequence.

Which is why the P-D (stands for Presto-Digitizer; and that's the last time I use the whole word) gets more interesting the longer you think about it.

(Cont. on Page 23)



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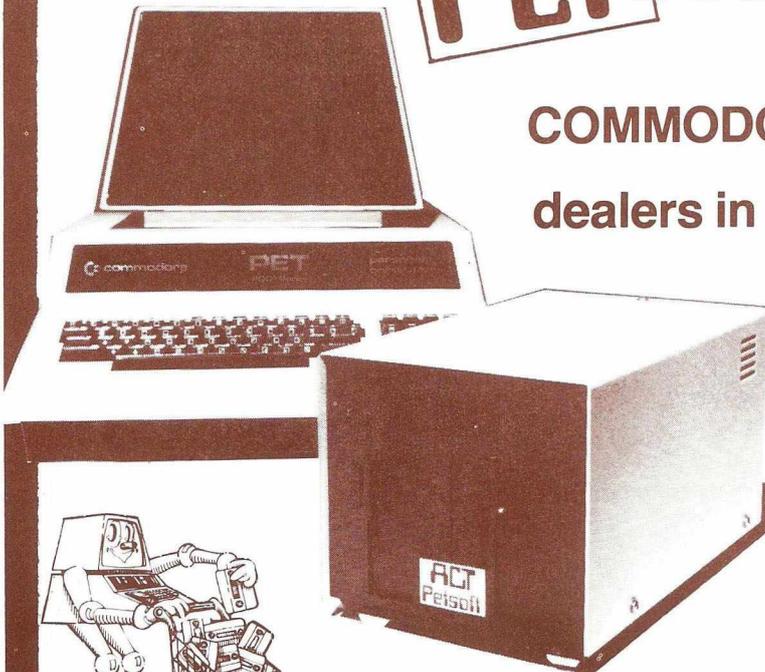
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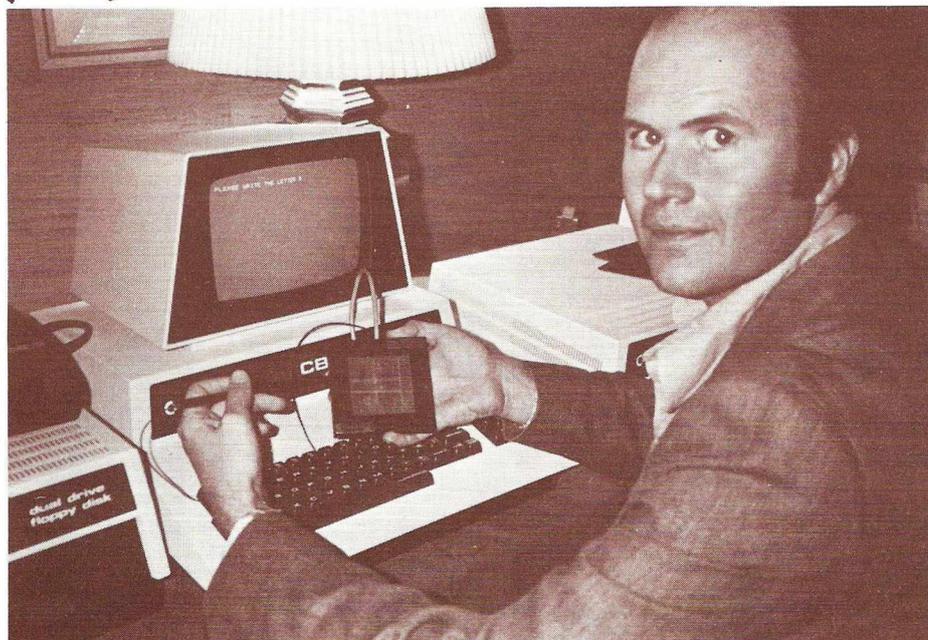


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Dr. David Thornburg with his PrestoDigitizer

The two programs with it are 'Handwriting' and 'Quizzer'. The former gets you to write the alphabet on the P-D, and trains your PET to recognise your own particular style. The latter does the same with numbers. The program listing (enter it yourself) is a graphics program, which lets the P-D be used for direct entry of graphics, and subsequent saving of whatever you've created as a program in its own right.

But after the initial fun of writing an 'A' on the P-D, and seeing an 'A' pop up on the screen, wears off, reality sets in. "Now what the heck can I *really* use it for?" is the sort of question that comes to mind.

I've no doubt at all that question is going to be answered in a lot of very inventive and interesting ways in the year ahead. You may well want to get a P-D yourself, to see what you can come up with.

### Highly recommended

The Gavin Sanders' Gold Seal goes this month to two really lovely (and wildly compulsive) programs that came our way while we were luckily laid up with 'flu.

*Luckily* laid up with 'flu? Why, yes, or else a whole lot of other things we should have been doing wouldn't have got done, so hypnotic were these programs we'll now describe.

The first comes from a nice outfit called Supersoft. You can reach them at 28 Burwood Avenue in Eastcote, Middlesex, and they have a catalogue (albeit simply duplicated, but never mind the quality; try the programs) that currently lists 38 offerings.

If even a quarter of them are as good as 'Air Attack', you may find a lot of hours drifting dreamily by. 'Air Attack' has a similar approach to Atari's 'Canyon Bomber', for those who've tried it, but heavy overtones of 'Alien Invaders', the present arcade big-money-maker.

In it, an aircraft flies steadily across the screen from left to right, over and over. Below it is a skyscraper silhouette. You drop bombs on the skyscrapers, which causes bits of them to vanish. Sometimes they're big bits, sometimes not. Your task is to clear

the skyscrapers completely so that the aircraft can land.

There's just this one little problem: the aircraft gets lower and lower with each pass across the screen, which means that any tall skyscrapers still standing get in its way, sooner or later. The aircraft not surprisingly crashes into them, and you then have another try.

Playing 'Air Attack' was, for me, like eating peanuts. I found it hard to stop. In fact I must have played nearly 100 times, and I still haven't beaten the darn thing, curse it. For £5 it's very good value. And look out for a clever mini-machine language routine that makes the screen flash from time to time.

The other totally compulsive program cropped up in the February *Cursor*. That's the tape cassette magazine for PET, with each issue containing up to 6 programs — and a black mark if you haven't subscribed yet.

Again it's a game, this time called 'Ferry'. You're the controller of 5 robot-controlled spaceships, each of which ferries supplies across an asteroid belt to starving prospectors on the far side. They go one at a time, and have to avoid the asteroids. High scores come with fast time and no asteroid collisions. Five asteroid collisions and you get a mournful sound rendition of the 'Last Post' (yes, this one has sound *too!*).

Once more that elusive 'compulsion quality' is somehow built-in. In fact, I found it hard to get near my PET once the family had latched on to what was happening. High scores are kept and sneeringly displayed against your own puny effort. It's good, and since it comes with 4 other programs too (one of which measures month on month just how much your car or cars is/are costing you), you might like to get the February *Cursor* as your try-out for a subscription. Petsoft are, or were, offering singles at £4 (a year's subscription for 10 costs £36).

Sure, there's a lot of debate on whether the power of a computer should be devoted to games. When they're as good and original as these two, then in my view it would be a shame if a piece of my PET wasn't put to that purpose.

**PET** as a secret agent!

### Nigel West reports on how you too can vet telegrams and telexes . . .

Last week I sent my auntie in Philadelphia a telegram of congratulations on her 70th birthday.

En route that cable was intercepted and scanned by one of the National Security Agency's secret IBM 370 computers.

In evidence to a Senate committee investigating excesses by the intelligence community, a National Security Agency spokesman stated that all cables passing to or from the United States were scanned in this way.

Each telex or cable is transmitted to an offline storage device where it is allocated a serial number and stored until one of the multi processors is free to scan it. The messages themselves are not delayed.

The scan itself takes the form of a string search for certain key words and names, and is carried out at very high speed. The NSA witness stated that the words sought included variations on the theme of 'explosives' and 'killing'. The number of sensitive messages thrown up by this procedure is believed to be very large indeed. Each 'suspect' communication is printed out on a terminal where a duty officer decides whether it requires further investigation or not. In some cases the message will be passed to the FBI or other appropriate agency for action.

The existence of a similar British system was revealed in February 1967 by Chapman Pincher writing in the *Daily Express*. The ensuing row was heightened when the then Prime Minister, Mr Wilson, sacked Colonel Lohan, Secretary of the D Notice Committee. The scandal became known as the Cable Vetting Affair.

Fleet Street rumour has it that both British and American schemes have now been widened to cover potential drug smuggling communications. A number of recent drugs hauls are attributed to information intercepted in this way.

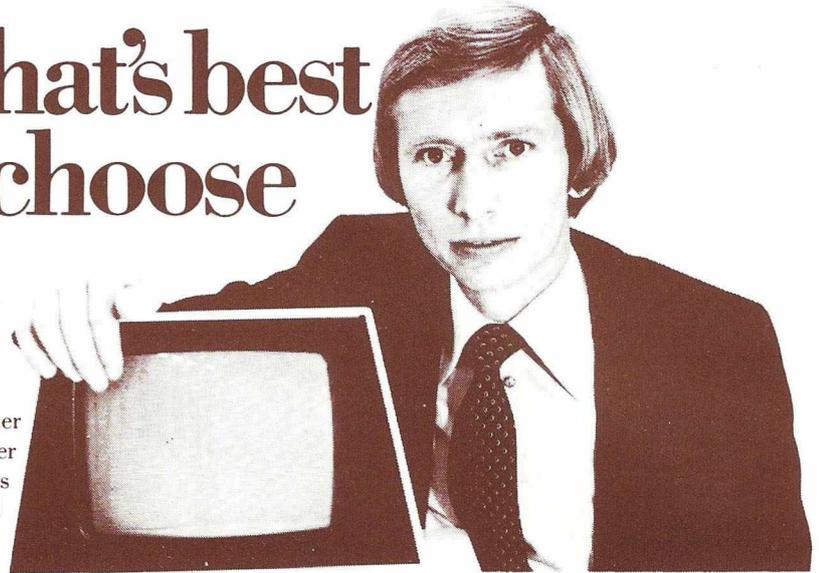
An attempt to reconstruct the algorithm used produced the following simple program written in PET BASIC:

```

100 INPUT "ENTER NEXT CABLE";
    CB$
110 READ KW$
120 IF KW$="DATAEND" GOTO 170
130 FOR I=1 TO LEN(CB$)
140 IF MID$(CB$,I,(LEN(KW$)))=
    KW$ GOTO 200
150 NEXT I
160 GOTO 110
170 PRINT "NO KEY WORD FOUND
    IN THIS CABLE"
180 RESTORE
190 GOTO 100
200 PRINT "KEY WORD DETECTED
    IN THIS CABLE:" -
210 PRINT CB$
500 DATA "DESTROY", "KILL",
    "HIT", "SMACK", "COKE",
    "POT", "DATAEND"

```

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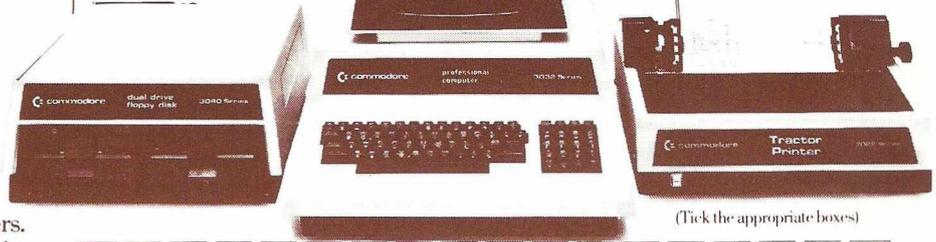
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## Two aids to assembly language programming

One of the major sales points in PETs favour and one of the main reasons why so many people buy a PET on which to learn to program, is that it is so easy to learn to use. This is partly because PET runs BASIC—the language which is acknowledged as being the simplest to pick up. But it is also due to PET's powerful operating system which provides extensive screen editing and comprehensive error messages. Many users manage to implement their applications quite quickly, and are content to stay there.

However, for the competent programmer who has mastered the intricacies of PET BASIC, there comes a time when he wants to venture into the field of machine code. This may be for the sake of interest or education, or it may be that he has a particular programming task which cannot be executed sufficiently fast in BASIC. Machine code will often run at up to 100 times the speed of BASIC, and is thus suitable for high speed software interfacing or text editing, for example. Complex mathematical calculations, however, are extremely difficult to perform in machine code, unless you have access to a good range of well written sub-routines.

It is at this stage, though that some of the glitter begins to fall from PETs shiny image. It is as difficult to learn machine code on the PET as it is easy to learn BASIC. This, despite the fact that PET is centred on the ubiquitous 6502 microprocessor; the 6502 is now the most common micro in personal computers — and there is plenty of software available for it.

There have been two main difficulties. First, there has been little documentation available on 6500 language — all machine languages are difficult to master, so a good explanation in writing is essential. Secondly, good machine code handling routines have not been available. On the PET one cannot simply enter a m/c code program, run it to observe the effects, and then correct any errors. This is partly because PETs Editor won't accept m/c code directly, partly because m/c code runs too fast to observe, and partly because if you make an error in programming, the system will probably crash.

Now the situation is changing on both fronts; documentation and software tools are being widely sold, by Commodore and others. In line with the growing interest in

such products, PRINTOUT has reviewed two of the most recent introductions — an assembly language development system, and book on 6502 programming. Together, they provide a good indication of the current State of the Art.

Before reviewing an Assembler Development System such as Commodore's, it is first necessary to establish the use of such a system, for the benefit of those readers who are not familiar with Machine Language terminology. Programming done at machine level, that is using instructions which are understood by the microprocessor and not by the BASIC Interpreter, must be built up byte-by-byte. The microprocessor has an Instruction Set which defines the operations which can be executed. Although the machine understands only binary, these 1-byte instructions are often written in Hex (base 16) for convenience. Thus, the two numbers:

A9 and 1B

would tell the microprocessor to load the decimal number 27 into its arithmetic accumulator. This highlights the difficulty of machine code — it is almost impossible to understand! So to help the programmer, a series of mnemonics have been written to represent the various instructions. This is called Assembly Language and the directive above would be written:

LDA #27; LOAD ACCUMULATOR WITH 27  
The piece of software required to convert from Assembly Language to Machine Code is called an Assembler, the reverse is called a Disassembler.

The functions of an Assembler do not stop here. Instead of operating on specific bytes of memory, an Assembler allows you to address these bytes by names — much like the variables in BASIC. This allows you to use much better programming techniques and makes the program much easier to read. Another major problem is that of relocation — if a piece of machine code is written for a particular location in RAM, then it requires a considerable amount of rewriting before it can be moved to another location. Using an Assembler, however, means that parts of a program can be given labels (such as START, LOOP etc) which are converted to actual addresses during the final assembly. This feature is vaguely comparable to the concept of renumbering in BASIC.

If an Assembler is combined with some sort of editing facility (both screen editing and some method of calling up standard subroutines from a library) it is usually given the title of an Assembler Development System, such as Commodore's A.D.S. (Order No. GD001) which at £50+VAT is a good example of what such a system should be.

## THE COMMODORE A.D.S.

### The Commodore Assembler Development System

This package is part of Commodore's new range of professionally written and well presented utilities. Packaged in a multi-ring binder with the documentation, the programs come on disk for use with a 16K or 32K PET plus Commodore disk unit. Perhaps the most confusing point at the start is that the directory for the disk displays no less than 27 programs. In fact, most of these are variations on a theme (for 16 or 32K PETs, or in different RAM locations, for example); in normal use only three programs will be referenced regularly: Editor, Assembler and Loader.

The documentation gives a general introduction to Assembly language programming — explaining, for example, the conventions used by this program for specifying the addressing mode for an instruction. It does not, however, purport to teach Assembly Language, for which a separate text is needed — such as the book reviewed overleaf. Following this, there is a detailed explanation of the functions of each of the main programs in the suite. Two criticisms here: first, there is a complete absence of worked examples. This means that if you haven't used an Assembler before, you can be left wondering how to begin to enter a program. Secondly, there is no one-page summary of commands, so looking up a particular function takes time. However, once you have started, learning the use of each function is quite easy. Our advice: try to get a 10-minute demonstration of the system in use, before buying.

The first program to be used is the Editor, which provides facilities for preparing an Assembly Language program. Because a routine cannot immediately be run and tested, programming should be much more careful and structured; one cannot resort to the trial-and-error method used by many inexperienced BASIC programmers. The Editor allows normal screen editing and sports a number of helpful functions including: automatic line numbering and deleting, repeat cursor controls and full FIND and CHANGE functions which display all occurrences of a particular 'phrase'. At this stage a completely formatted listing of the program can be produced; Figure 1 shows a typical routine with comments on the right hand side.

Routines can be saved on disk in this 'OBJECT CODE' form, ready to be Assembled into a 'SOURCE CODE' file, later. Additionally, subroutines which have been written previously, may be called up and inserted into the program from any line number. This is distinct from the LIBRARY function where a routine is called, but is only actually inserted at the assembly stage — a LIBRARY routine is not seen by the user.

Having completed the program, and saved it on disk, the Assembler program can be loaded into memory. This simply asks for the name of the program to be assembled, and produces a machine code (or source code) file from it. Library routines are found from disk and incorporated. Unfortunately, only one level is allowed, so

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that a library routine may not reference another library routine as part of its code. This is only likely to be a hindrance, however, to the most articulate and practised programmers. A nice feature, though, is a modular programming facility, where each module contains as its last instruction the name of the next one. At this stage all Assembler directives are interpreted; these include label and variable definitions, as well as format instructions to the printer (if you have one!). The end result is a printout of the assembled program – either on the screen or a printer. Any errors which are found in the program are indicated after the listing as error codes. Having direct messages would have been more convenient than having to look up the message or a code, but there may have been a space restriction.

Finally, the Loader is used whenever you want to load and run a particular machine code program. Not until this stage can you tell if the program is working – or if the system will crash!

Using the three main programs in turn sounds rather fiddly, but the speed of the disk access makes the whole process quite fast. For applications requiring only a small amount of RAM, however, it would have been nicer to have a program which covered all three aspects.

Another program included in the suite is EXTRAMON 7.5 – a 7.5K Supermonitor as

described by Jim Butterfield (PRINTOUT Vol. 1, No. 1). This is an extension to the TIM 1K monitor resident in New ROM PETs, and as such is useful for debugging machine code, rather than creating it. A TRACE and STEP facility is included, along with powerful Disassembler and Spot Assembler (which interprets mnemonics but not labels). EXTRAMON has obviously been added as an afterthought and the documentation is on a separate program – not written in the main manual, which devotes only one paragraph to it. While EXTRAMON undoubtedly adds extra value to the Commodore A.D.S., PRINTOUT's view is that Commodore would do better to sell it as a separate product – fully documented and on cassette for a few pounds.

All in all, this package represents very good value for money for anyone who wants to start writing serious machine code programs. But don't expect it to teach you machine programming – read a book or attend a training course first. PRINTOUT has several reservations regarding the documentation, and at this stage would advise a purchaser to get a 10-minute demonstration of the system in use, if possible. Undoubtedly, the Commodore Assembler Development System is the most powerful aid to machine language programming on the PET so far. This is what PRINTOUT will be using to develop and test all the machine code we come across.

## 6502 Assembly Language Programming – by Lance A. Leventhal

This book is probably the most definitive guide to programming the 6502 ever written. Occupying a modest ¾in of book-shelf space, the innocuous-looking cover conceals more than 600 pages of useful material. Lance Leventhal is known for his previous books on the 8080 and other micros. *6502 Assembly Language Programming* is published by Osborne/McGraw Hill and can be obtained in the UK from: Mine of Information Ltd., 1 Francis Avenue, St. Albans AL3 6BL (Tel: 0727-52801) and computer shops.

Leventhal's style is thorough – almost to the point of overkill – but the text is littered with worked examples, and the wording is easy to comprehend. The first two chapters provide an overview of programming languages and an introduction to the concept of Assemblers. Most of the Assembler conventions used in this book, incidentally, are compatible with the Commodore Assembler. If you can afford the time to read through the general sections thoroughly, you will be well rewarded with a good background knowledge of the subject.

By chapter three the author has remembered that it is the 6502 about which he is writing, and proceeds to give a detailed explanation of this micro. Addressing Modes are given a high priority, which is fitting in view of the difficult nature of this subject. Subsequently, each of the 6502's 56 instructions is explained in detail (one per page) with the aid of diagrams and tables. The summary tables are, regrettably, not repeated at the end of the book, making them rather difficult to find in a hurry.

The next seven chapters cover the subject of programming and include loops,

subroutines, tables and lists, arithmetic and code-conversions. The examples are numerous and are not only useful as illustrations, but as standard subroutines once you have started programming. PRINTOUT was particularly impressed with Leventhal's concern for good programming. Documentation and methods for problem solving are covered in detail.

Thereafter, the book becomes more hardware oriented, with detailed explanations of various 6502 support chips. This includes PIAs, VIAs such as the 6522, timers and even UARTs. Software interfacing is illustrated with projects such as a keyboard, rotary switch, seven segment display and teletype.

Finally, Leventhal spends three whole chapters on the subjects of Program Design, Debugging/Testing and documentation. There follow two worked projects involving hardware and software – a digital stopwatch and a digital thermometer.

The great thing about this book is its scope – after teaching the beginner, it remains a valuable reference volume for the experienced programmer. The emphasis in the teaching is not merely on efficient coding, but on good programming as well. The chapters on hardware/interfaces will be of less use to the PET user, but the many worked examples can form the basis of a subroutine library. One criticism is that the sheer size and structure of the book make sections difficult to find quickly, though there is a full index and a useful set of 'key boxes' summarising each page on the right hand side. Overall, the best book we have seen on the subject and well worth the cover price of £6.90.

# TOMMY'S TIPS!

PET programs. No. 1:

a routine to sort character strings into Alphabetic order using Heapsort.

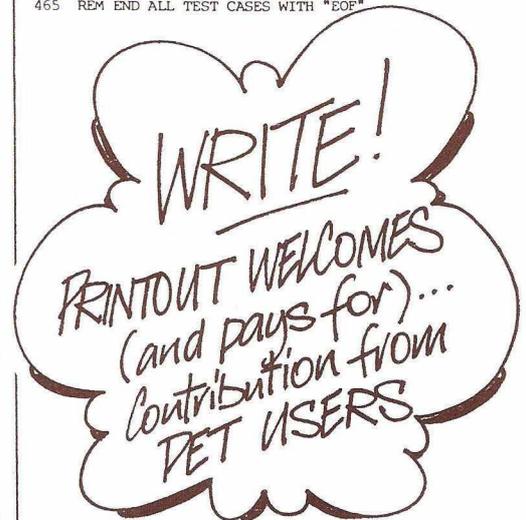
From PET Workbook No. 2, reprinted with permission of Petsoft.

Note: Testdata is shown in lines 400 to 465 which may be discarded.

```

10 DIM R$(100)
100 PRINT "PLEASE INPUT THE NAMES YOU WANT SORTED"
110 PRINT "WHEN YOU ARE FINISHED INPUT EOF."
120 N=0
130 N=N+1
140 INPUT R$(N)
150 IF R$(N)<>"EOF" GO TO 130
160 N=N-1
170 L=INT(N/2)+1
180 IR=N
190 IF L=1 GO TO 212
200 L=L-1
210 S$=R$(L)
211 GO TO 220
212 S$=R$(IR)
213 R$(IR)=R$(L)
214 IR=IR-1
215 IF IR<=1 GO TO 310
220 J=L
230 I=J
240 J=2*J
250 IF J=IR GO TO 265
260 IF J>IR GO TO 290
261 IF R$(J)>=R$(J+1) GO TO 265
262 J=J+1
265 IF S$>R$(J) GO TO 290
270 R$(1)=R$(J)
280 GO TO 230
290 R$(I)=S$
300 GO TO 230
310 R$(I)=S$
320 FOR I=1 TO N
330 PRINT R$(I)
340 NEXT I
350 END
400 REM TEST DATA
410 REM INPUT A SINGLE CHARACTER
420 REM TRY 123
430 REM TRY ""
440 REM TRY "RETURN"
450 REM TRY 2 LONG STRINGS
460 REM TRY A STRING WITH A COMMA (,) IN THE MIDDLE
465 REM END ALL TEST CASES WITH "EOF"

```



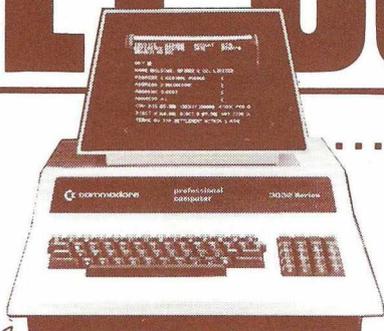
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APR 79		B/F	836.45	
MAY 79		B/F	1941.64	
				366.09
				1017.50
		INV		1096.23
	1014	INV		
	1096	CH		
	44	INV		

**STATEMENT**

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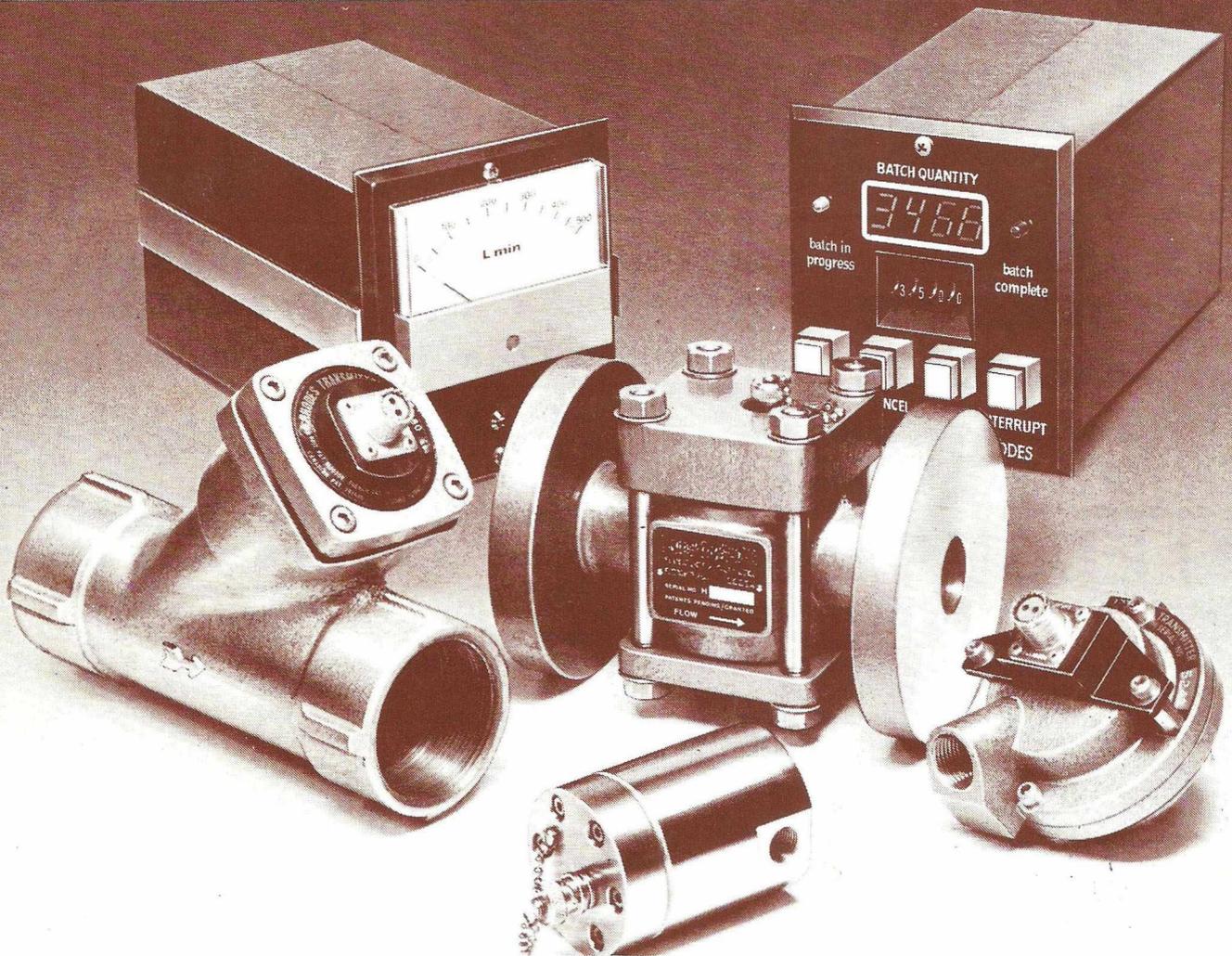
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