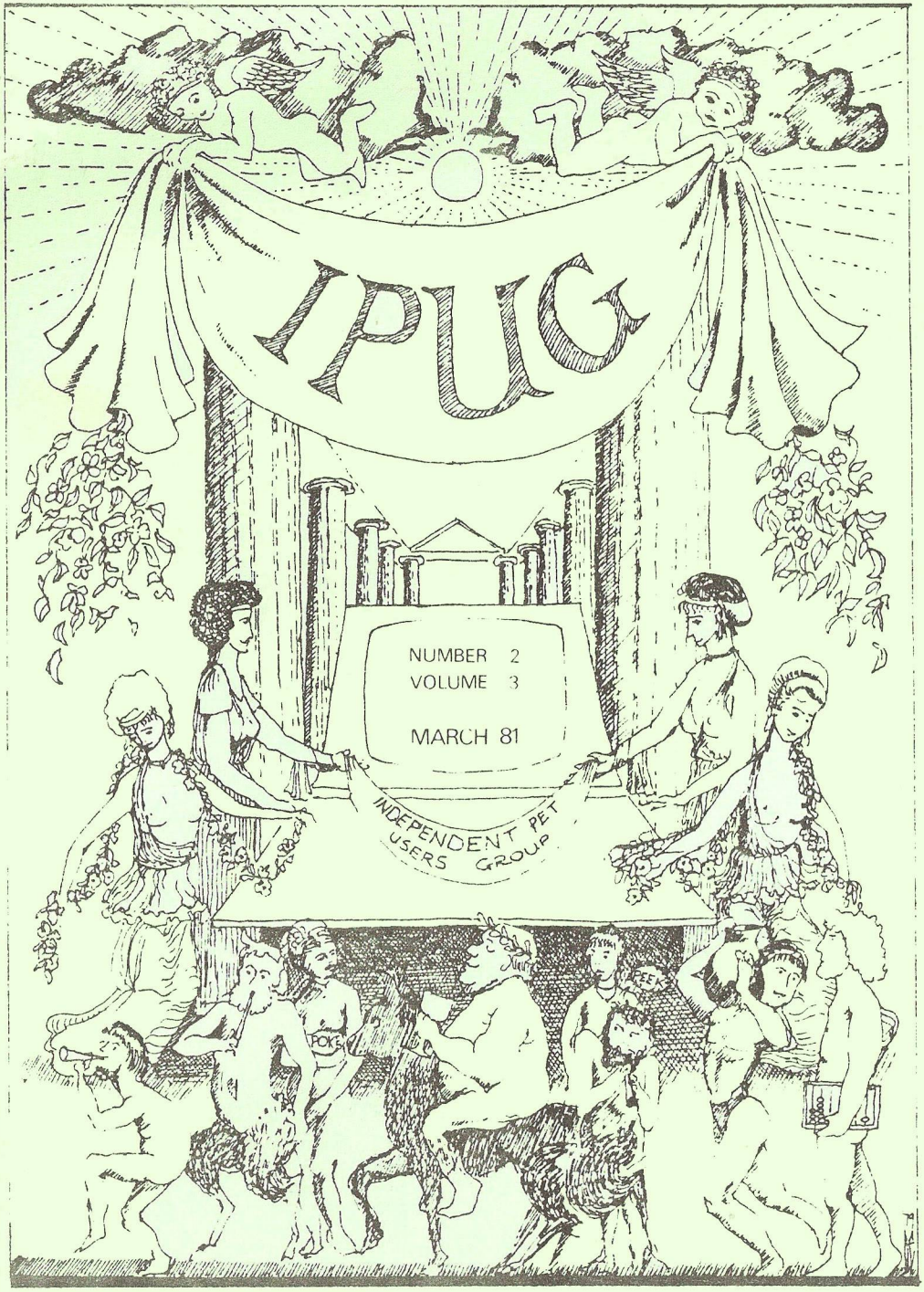
IPUG
NUMBER 2
VOLUME 3
MARCH 81
INDEPENDENT PET USERS GROUP
POKE
PEEK

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ipug INDEPENDENT PET USERS GROUP

Vol. 3, No. 2 **Newsletter** MAR. 1981

Europe's first independent magazine for PET users

Page	Contents
34	Editor's Notebook
35	Matters Arising
35	Tech Tips
36	Review: 2532 EPROM Programmer
38	Peeking & Poking About
40	C4 C4 CQ
40	Software Library Additions
41	Review: The Programmer's Friend
43	Commodore Column
47	Data Packing
48	Review: Sales Ledger Package
49	Shop Window
52	Review: TCL Pascal

The opinions expressed herein are those of the author and not necessarily those of IPUG or the editor. Items mentioned in "Shop Window" are culled from advertisers material and IPUG do not necessarily endorse or recommend such items - *caveat emptor*

EDITOR'S NOTEBOOK

There are a number of 1980 back-issues of the Newsletter available (not the Compendium) for £1.00. Copies may be obtained by sending your remittance to IPUG, 57, Clough Hall Road, Kidsgrove, Stoke-on-Trent, Staffs, ST7 1AR.

Many dealers are prepared to offer favourable terms to IPUG members and for a number of reasons we have not been able to be too specific in print. Consequently some local groups have been able to make their own arrangements with local dealers while others have been less fortunate. In order to extend the facility to all members we are starting a 'procurement' department run by Luke Gardiner and Bob Wood. Bob already supplies cassettes at a price that would be difficult to match elsewhere, perhaps we can extend this to disks and also hardware. Some items such as printers have a price break-point of two or five. Let us know your requirement, we will find a price. When requested, you forward the money which goes on to the dealer who then effects delivery. Warranty arrangements remain effective via the dealer. Contact Bob Wood at 13, Bowland Crescent, Ward Green, Barnsley, South Yorks, S70 5JS.

In addition to the above we will be shortly appointing a publicity officer to handle advertising, not only for dealers ads in the Newsletter but to publicise IPUG. Furthermore have we a member in the legal profession who would be prepared to offer advice to members on such items as Sale of Goods Act, Warranties, legal rights and the like.

Confusion may have occurred when reporting that the 1981 subscription was unchanged. I had in fact omitted to mention that the overseas subscription is ten pounds.

R.D.G.

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MATTERS ARISING

Avid readers of this magazine will have noted the small print at the foot of the contents page, so now to the Centronics 737 mentioned on p9. The claim that the 737 will do its own right-justification appears to be a misrepresentaion. It won't. In theory one can program the inter-letter spaces to produce a right-justify effect, but the printer will not do it without the appropriate software. In addition the solid character font only occurs in the 'proportional' spacing mode - great except that any formatting or tabbing by the program is screwed up on printout. In the 'mono-spaced' mode, 10cpi gives similar print quality to most other matrix printers.

The CBM Assembler requires the '#' symbol when declaring an address of a label in immediate mode when using the symbols '<' and '>' - two of the examples given in the manual do not use a '#' symbol. David Pocock of CBM states that the GD001 assembler was renamed GD1100 some months after release. The 16K version mentioned in the manual was never released. 16K versions are now available together with the 32K version for 4000 and 8000 series machines. The 16K version is available to people who require it who can produce a letter from Mike Whitehead which was sent with early versions. Without this letter however, no free update is possible as the update is to cover only the 16K version.

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TECH TIPS

H.M.H.Given writes that he cured a contact problem on a large-keyboard PET by carefully dismantling it and gently cleaning the conducting rubber contacts. Unplug, unscrew and remove the keyboard entirely. Then unsolder the shift-lock wires and unscrew the circuit board. Nothing leaps out and you need not remove the keycaps.

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REVIEW

By Ray Hunt

2532 EPROM Programmer — G.R.Electronics

Have you ever considered locating your own machine code routines permanently within your PET ? - Yes ? - Well there exists a package to use your PET to program the 2532 type EPROMs so that those pet (sorry) routines may be available on power up.

The package consists of a small (16x5 cm) printed circuit board and a cassette which has been designed to run on old and new ROM machines.

The printed circuit board plugs directly into the back of the PET via all three of its edge connectors, taking data from the IEEE port, control signals from the user port, and power from the cassette port. These edge connectors are not reproduced on the back of the circuit board, but component arrangement on the board is well planned, with all the component locations suitably marked. A 24-pin d.i.l. socket is provided on board, to accomodate the EPROM which may be a master to be copied or a blank to be programmed. At extra expense a plinth mounted 'Zero Insertion Force' socket is available. This z.i.f. socket will ensure no damage is done to the EPROM during insertion or removal, and it also places the chip location adjacent to the PET's keyboard. The printed circuit board is uncased, the rear edge of the board being supported by pillars which conveniently rest on the flat surface which supports your PET. Only one control is provided here, an eight-contact d.i.l. switch which has the eight switch positions set according to the type of EPROM in use. The software for the system is written in PET BASIC, with a number of machine code subroutines for faster operation. When the program is loaded PET displays the required switch settings for each EPROM type, and when instructed takes 25 seconds to load the subroutines and display the menu.

The menu consists of 7 selections:-

0 BLOW PROM
1 READ PROM
2 FILL RAM
3 SEQUENCE IN RAM
4 VERIFY
5 PROM ERASED
6 READ/MODIFY/WRITE RAM

In use, the system requires the 4K to 7K area of the PET's memory for the storage of data which is either read from a previously programmed EPROM or loaded from the keyboard using instruction '6'. Data is loaded in hexadecimal, and it is possible to add to, alter or increment without change any of the memory locations. It is also possible to load this memory area with a previously saved m/c program from cassette or disk before the circuit board is connected.

In order to check if an EPROM is blank, instruction '5' is used, but as a precaution an automatic check is carried out every time instruction '0' is selected. PET takes 3 minutes 40 seconds to produce a fully programmed EPROM which if it is a '2532' will be pin-compatable with your PET's expansion sockets. While programming takes place your PET will count for you in octal ! - perhaps to keep you amused ? - (but more likely to let you know it has not forgotten what it should be doing).

At the end of execution of any of the possible instructions the system is equally entertaining in that it generates a display of the graphics of the first 40 characters resident in RAM, along the bottom of the screen. Most of the system instructions are self evident, the least useful and most 'dangerous' are probably instructions '2' and '3'. Dangerous ? - Yes! - Selecting '2' or '3' when you have a full RAM erases it - forever !

The associated documentation may be described as sparse, but it contains sufficient information to enable the system to be exploited to the fullest extent. This documentation gives further indications of the ease with which it may be used:-

1. Selecting instruction '1' with no EPROM in the socket fills the memory area with 'FF', i.e. it clears the memory.
2. Although it is not possible to program 2K devices, it is still possible to read and verify them.

Assuming that you understand a little about machine code programming it should take much less than an hour to become fully proficient with this EPROM programmer. (If you can write your own machine code then you can use this system).

In conclusion then, this unit is very well constructed, is relatively easy to use and the software contains no bugs to cause any problems. To make full use of this unit I believe that you may require an assembler which will relocate your routines for ROM operation and at the same time save a copy of the relocated code in RAM.

If you're interested then you can get them from A.R.Electronics, Fairoak House, Church Road, Newport, Gwent. 2532 EPROM programmer - £92.00, Z.I.F. socket - £4.25 (inc VAT and postage). Note ! - a 2516/2716 programmer is also available.

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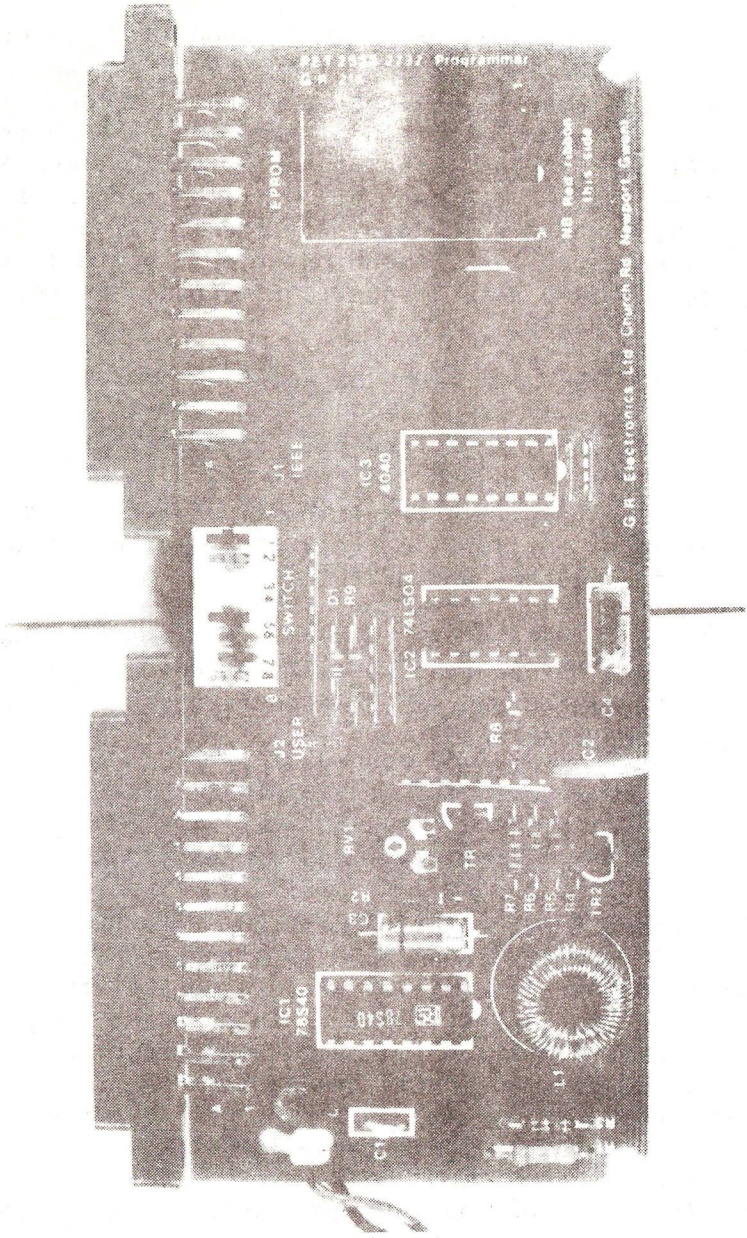
PEEKING & POKING ABOUT

Don't get caught as some do when 'shrinking' a program by removing spaces if the program contains IF ST AND 64 for example. Without spaces, PET sees it as IF S TAN D64 which is not what was intended. The cure is to use IF ST1 AND 64. Since ST1 is stored as ST, it is interpreted as the status byte and the '1' prevents the TAN being seen.

Ken Williams needed to know the duration of the Interrupt Service Routine (ISR), something believed to be hitherto unpublished. His measurements come to a fraction over 1.5 milliseconds. Enthusiasts can wade through the code and tot up the average number of machine cycles for more accuracy.

--oOo--



The G R Electronics 2532/2732 PROM Programmer

CC CC CC

Thursday 5th March the Stevenage & District Amateur Radio Society are holding a computer night and anyone with a home computer is invited to bring it along. It is hoped to have a wide selection of machines ranging from Nascoms to PETs and Apples. The meeting starts at 8pm and is held in the staff canteen of British Aerospace Dynamics, Plant B, Gunnels Wood Road, Stevenage. If any IPUG members are interested in attending they should contact Trevor Ludwell, G8KMV, 11, The Dell, Stevenage, Herts, SG1 1PH or phone 0438-54689.

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NEW PET GROUP

Following a recent meeting of five local PET owners it was decided to form a local PET User Group covering the towns of Stevenage and Hitchin.

If any owners of PET/CBM/VIC series of machines are interested in the club they should contact Phillip Mortiboy at the following address: 2 Spurrs Close, Hitchen, Herts. or phone Hitchen 54435.

--oOo--

SOFTWARE LIBRARY ADDITIONS

13. Assembler and Dis-assembler (new ROMs only). Has most of the features found in professional assemblers now available, at a very low price. Some of the features are labels, variables, all addressing modes, cursor insert/delete, supports 80-column printer (IEEE port only), and save assembler programs.
14. Concentration Game (old ROMs only). A card game, which allows you to play against the computer, or other players. Full graphics on all 52 cards.
15. Aircraft Landing (old ROMs only). This program allows you to test your skill at landing an aircraft. 8 control variables are involved in controlling the aircraft. Full graphics.

--oOo--

REVIEW

The Programmer's Friend ACT Petsoft £25.00

After selling over 6,000 'Toolkits' in 18 months, Chris Preston, Petsoft's chief programmer, has produced an upgraded version called the 'Programmer's Friend'. Competition for the ROM slots has resulted in this version being disk-based, and excellent as this idea is, I cannot somehow reconcile it with their recent findings on illicit copying !

A perfunctory glance through the handbook might suggest it is simply the Toolkit on disk, but closer examination reveals several notable improvements. Most of you are familiar with the Toolkit, even if you don't have one, and I make no apologies for comparing the two.

AUTO is essentially the same, it provides line numbers in increments, either from parameter specified or by default from 100 in increments of 10. The subtle difference is that the Friend will accept the default start value with a non-default increment, e.g AUTO ,20.

DELETE appears to be unchanged in deleting a block of lines specified with parameters in the same format as LIST. DUMP, however, has a useful improvement. The Toolkit dumped the variable table to the screen, scrolling being stopped with the SHIFT key, STOP aborting the routine. With the Friend, scrolling does not occur. The display waits at the bottom of the screen for a key press. The space bar clears the screen and continues the dump; any other key aborts the routine.

FIND is also unmodified in operation, with the exception of the same refinement as in DUMP of SPACE clearing the screen and continuing the display and STOP aborting the routine. In addition to printing the line containing the search key, the end character of the search key is displayed in reverse field. If the search key is a keyword, then the whole keyword is reversed. I was disappointed that only the first occurrence in a line was so displayed, for if one has, say, erroneously used a

single variable for two conflicting requirements and wishes to change some occurrences of X to Y, one could overlook an occurrence of X which had not been displayed in reverse field.

HELP appears to be no different in use and presentation, but APPEND (which was cassette orientated) has been replaced by a true MERGE from disk. The format is MERGE "PROG2" TO "1:PROG1" for CBM disk drives, with PROG2 being on the default drive. I found the MERGE failed when the "PROG1" drive number was omitted. Lines in "PROG1" replace lines of "PROG2" having the same number.

Renumber has been shortened to RENUM (although as with all such keywords R with shifted-E will suffice) but the routine will now renumber a program block. RENUM a,b,c-d will renumber the block between lines c & d starting at a in increments of b. Since the program lines are not resequenced, simply renumbered, you can have fun with this one, within the constraints of the error messages... Although a thorough evaluation takes time, I suspect that the Friend does not recognise the GO token, and this may affect FIND and RENUM if a split GO TO is used.

TRACE and STEP are still available but operation in the 'Friend' differs from the 'Toolkit'. The window which displays the executed line numbers, instead of scrolling the last six up, scrolls the last nine down. It took a lot of use to become accustomed to downward scrolling. STEP to the next line is by the SHIFT key. Either function can be disabled by the OFF command.

So what's new ? Well BREAK sets a breakpoint at the specified line number. If in testing you put a STOP in a program line, you can CONTinue, but if you need to remove it, CONT produces CAN'T CONTINUE ERROR. With BREAK, it does not form part of your program, and it is cancelled after use. Additionally it can be cancelled with UNBRK. Also inherent in the 'Friend' is a repeat-key routine, active on all keys. Dwell time and repeat rate can be modified by POKEing the appropriate locations, but these are not published in the instructions.

The Programmer's Friend is fully compatible with DOS Support and resides at $7148 to $7D75. It is activated by SYS29000 ($7148) after which FRE(0) gives 27901 bytes free. It appears to require more working space than the Toolkit, using both top of memory and the second cassette buffer. The version reviewed was for the 3032.

R.D.G.

--oOo--

COMMODORE COLUMN

The 8010 modem still has development problems and at the time of writing no release date has been set. The problem appears to be associated with the IEEE-488 interface. Despite this Commodore have put out a pamphlet which somewhat prematurely suggests that all is well with the modem and the communications software.

Received some printer ribbons the other day. On the box it said "For use on Commodore Black Matrix No.4 Primier Nylon 1552" and since it was ordered for the Commodore printer I was somewhat perturbed to find that none of them would fit. The reason was that the spool holder had a two-prong location spigot, the spools having three holes. The previous spool had four holes and the ones supplied as a replacement by the dealer had six holes !

Commodore appear to have tightened the thumbscrews again on their dealers. The latest 'terms and conditions of sale' requires them to set up a special trust fund in a separate bank account. Commodore claims that it is merely protecting itself from possible dealer bankruptcies but certain dealers are not happy at being told how their finances should be handled. I personally would not be happy to have bought a PET from a dealer who subsequently stopped trading.

If the range of new products in the pipe-line come up to expectations, 1981 could be another big year for Commodore and the PET show something not to be missed, 18th - 20th June inclusive.

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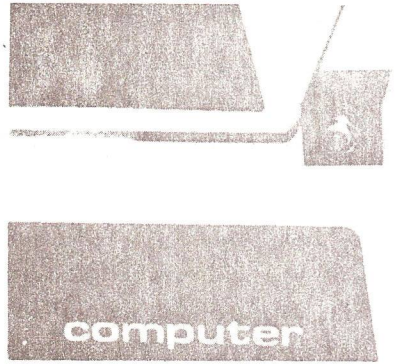
PET OWNERS

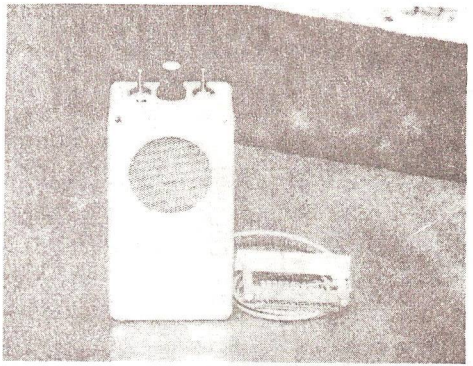
GIGANTIC MINIMUM 25% OFF DIRECT–TO–YOU SALE!!

RESET BUTTON
£7.00



Recover from 'crashes' easily without losing your MACHINE CODE or BASIC program. Simple to instal (3 plug-in connections). For new ROM (not upgrade) machines only. Pin connection at memory expansion connector. Incredible at only £7.00, was £12.50.

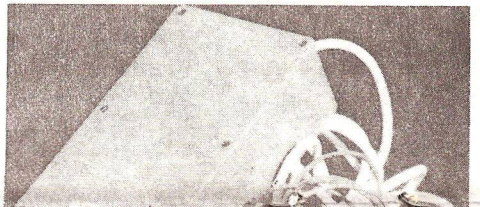
SOUNDBOX
£15.00



On/off switch, volume control and tape cue/listen device switch. PP3/PP6 battery required. Connects to user port. Fantastic value at £15.00, was £20.00.

LIGHT PEN
£15.00

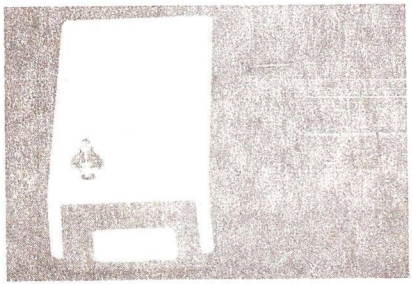
T.V./VIDEO INTERFACE
£31.50



Improve your programs, use light pen input and selection. Simply plugs onto the user port. Demonstration program supplied with the unit. Unbelievable at only £15.00, was £25.00.

Connect PET to a T.V. or to a Video monitor. This unit has its own fully fused power supply included - no need to use your valuable cassette connector. Three picture adjustment controls included. Truly a snip at only £31.50, was £42.00.

SWITCH UNIT



Control external devices using this unit - up to 8 devices can be controlled using the PET. Up to 5 amps can be switched. If mains switching is needed please stipulate when ordering (£1.50 extra per switch).
Single switch unit £11.00 then £5 per extra switch, e.g. 3 switch unit £11.00 plus 2 @ £5 = £21.00 (mains £25.50). 3 switch unit was £30.00.

We will combine interfaces onto single connectors wherever possible thus giving YOU the user more on line devices.

Many programs available at £1.25 each. Send s.a.e. for program lists and details of other devices, e.g. D/A, A/D, keyboards, PET hardware, disks, etc. All prices exclude VAT. Please add 15% to cheques.

WE RESERVE THE RIGHT TO ALTER THE DESIGN AND SPECIFICATION WITHOUT NOTICE.

Tel. [0385] 67095

Qwerty Computer Services

20 Worcester Road, Newton Hall, Durham

Visicalc has now overtaken Microchess sales to become UK's best-selling program, 3,000 copies being sold in the last quarter of 1980. Visicalc allows the creation of a dynamic worksheet with automatic re-calculation of dependent variables should the user change any parameter involved. Visicalc is supplied complete with a comprehensive manual for £125.00 from dealers or ACT Microsoft.

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DATA PACKING

Disk space is always at a premium; however data has to be kept, often in numeric format. If this is stored in the conventional alpha string it uses up lots of space.

Here, however, are two simple subroutines that can pack numeric data into smaller alpha strings. In this example 999999.99 can be packed into only four bytes of store saving five bytes on the old method.

130-180 is the encoder; 200-250 is the decoder. I'll leave the reader to find the use of lines 160, 170 and 220, 230.

```
100 REM PACKDATA
110 PRINT:PRINT:PRINT:INPUT "INPUT VALUE";X
120 X$="":PRINT
130 FOR I = 1 TO 4
140 XX=INT(X/(100↑(3-I))):X=X-XX*(100↑(3-I))
150 IFI=3THENX=X+.005
160 IF XX<=34 THEN XX=XX+200
170 IF XX=98 THEN XX=198
180 X$=X$+CHR$(XX):NEXTI
190 PRINTX$; "=STRING STORED ":PRINT
200 FOR I=1 TO 4
210 A$=MID$(X$,I,1):X=ASC(A$)
220 IFX>=200 THEN X=X-200
230 IFX=198 THEN X=98
240 V=V+X*(100↑(3-I))
250 NEXTI
260 PRINT"VALUE RETURN FROM STORE ";V:V=0
270 GOTO110
```

[The editor regrets having mislaid the name of the author of this article - Ed].

--o0o--

STOP PRESS
The meeting announced on p.5 (January issue) is on March 17th. not February 17th as printed.

REVIEW

Sales Ledger Package — Anagram Systems Ltd.

Prior to deciding which program we would purchase for use in our Accountancy Practice we looked at several Sales Ledger packages and quite a few of them left certain major points uncovered and appeared to be rather difficult to use. We have been using the Anagram Systems program for the past 9 months and have found it extremely easy to use. Such features which it includes are:

1. Normal print out of various Reports, of Age Debtors Analysis and Statements.
2. The fact that account numbers are not used, but the name of the company and the program can search on any initial letter match means that a register of account numbers to account names does not have to be held and consequently posting of the invoices and cash is greatly facilitated.
3. The usual problems of being able to end a program by the STOP key or even avoiding printing by switching off the printer in mid-routine cannot be achieved as the program will immediately detect the fact that the printer is not operational.
4. Finally, the program is easy to use should one go down an avenue of options and find that one is in the wrong position, it is very easy to move back one option or go right back to the beginning and start again without doing any damage to any of the data. It is also very easy to amend and alter any miskeyings even after an item has been posted to the ledger. At all times correction is possible.

The manual that accompanies the disk is well presented and the instructions are very simple to follow, but the program is menu-driven and after the initial reading and understanding of the manual, one need never refer to it again.

I would also mention that I have found that the personnel at Anagram to be very helpful for when we did manage to corrupt a disk, they corrected this within 48 hours without any loss of data.

Reviewed by J.G.Feingold

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SHOP WINDOW

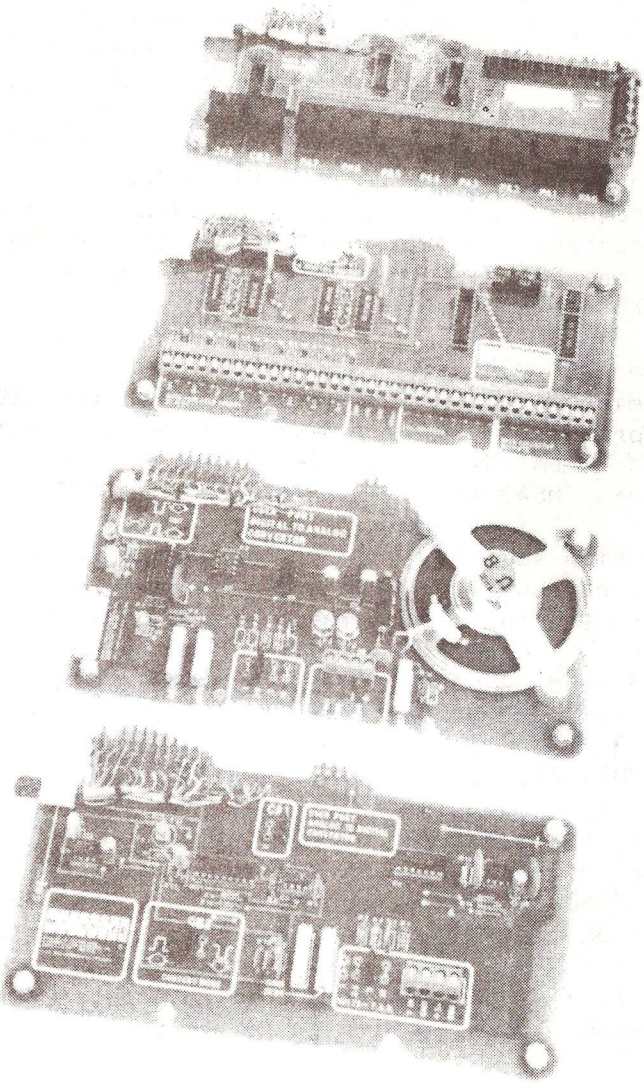
A Tiny Pascal is available from Sapphire Software Ltd., PO Box 244, Milton Keynes, MK14 7BQ. Included is a line editor, a compiler, an interpreter, sample programs and a user manual. The p-code interpreter is in 6502 machine code. For 16/32K new-ROM PETs at an all-inclusive price of £29.00.

The Micro Computer Centre is offering a service and repair scheme for users within a 50-mile radius of London and guarantees a down-time of less than 24 hours, a loan machine being supplied if necessary. Contact Malcolm North, 01-878 7044.

The MSC-9305 universal controller links the Shugart ST-506 micro-Winchester disk drive to the IEEE-488 bus. Aimed primarily at systems designers, details can be obtained from Micro-computer Systems Corps., Sunnyvale, California, USA. Tel: (408) 733-4200, price $700.

A high specification two-channel D-A converter from Hendry Electronics is IEEE-488 compatible and provides 1- and 10-volts full scale. The unit has numerous special features, such as ignoring invalid characters, opto-isolated outputs and zero output on power up. For details of options and prices contact Hendry Electronics Ltd., 2 River Road, Arundel, W. Sussex, BN18 9DM Tel: (0903) 882255.

EDI Electronic Engineering have a £700 hardware and software package that allows software development for Intel's 8080 and 8085 microprocessors to be done on a 32K PET plus 3040 disk drives. The disk-based software can be used with CBM's standard Editor and consists of a two-pass assembler. The hardware is a plug-in module to simulate the 8080 system. EDI are based in Ipswich.



Digital & Analogue conversion circuit boards from Machsize Ltd.

Pete Dowson has been at it again and has developed an IBM to PET interface which will be on sale for £995 from Davidson Richards (DRL). CO1, CO2 and CO3 protocols can be emulated with IBM 2780 and 3780 to follow. Contact Davidson-Richards (International) Ltd., 14, Duffield Road, Derby, DE1 3BB. Tel: (0332) 366803.

A source of cheap memory could be the 6502/6800 DM series. Available with 32K, 16K, or OK (i.e less RAM chips) assembled, or as a mini-kit including the pcb, manual, and the hard-to-get components only, or thirdly, just the pcb and the manual. Most expensive is one-off 32K model at $395 + 15% for outside US. Details from Beta Computer Devices, 1230 W.Collins Ave, Orange, California, 92668. Tel: (714) 633-7280.

Several inexpensive digital and analogue conversion modules are produced by Machsize (see photos). The converters are supplied complete with detailed documentation, as well as tape and disk software. The price of each is £69.95 from Machsize Ltd., York House, Clarendon Avenue, Leamington Spa, Warwickshire, CV32 5PP. Tel: (0926) 312542 & 32399. Contact Duncan Smyth.

General Business Services are offering business members substantial discounts on software. Examples are Compsoft DMS Data Management Program (£170) at £120 and the program to marry the above to either Wordcraft or Wordpro (£30.00) at £25.00, both VAT extra. For a list of discounted software available to members contact Andrew Taylor, General Business Services, 23, Park Hall Road, London, N2 9PT. Tel: 01-444 5104.

Academic establishments may be interested in the range of application orientated training aids which are PET-compatible from Bytronic Associates. The range includes stepper motor drives, a 'sorter', a sequencing unit and A-D/D-A converters, each having available an interactive software package. For details contact B-A at 88, Russell Bank Road, Sutton Coalfield, West Midlands, B74 4RJ. Tel: (0675) 81448.

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REVIEW

TCL PASCAL By B.J.Biddles

Until recently, the only language seriously available for the PET user has been the BASIC supplied with it. Now, however, a full implementation of Pascal has been made available by Transam Components Ltd. This is not a 'toy' language, but is suitable both for learning Pascal and as the main language with which the PET is used. It runs on a 32k PET (BASIC 2) with the 2040/3040 disks. The cost is 120 pounds, and for that you get a 104-page manual, a disk containing the compiler and various programs, and the inevitable security ROM that has to be mounted in the central spare socket on the PET board.

The manual is clearly written and presented, and begins with 60 pages in which the beginner is gently guided into Pascal by numerous little example programs, though it would have helped had the 'syntax words' been distinguished in some way from words freely chosen by the programmer. This is nit-picking however; by some standards this manual is perfection! The remaining 64 pages are a detailed Pascal reference manual, which also includes information on the various extensions to the standard Pascal.

Pascal is a 'semi compiled' language, in contrast to PET's BASIC which is 'interpreted'. The 'interpreter' is a program stored in the PET ROMs which scans your BASIC code continuously during RUN, interpreting it into the machine code required by the 6502 microprocessor within the PET. Every time the program is RUN, this interpretation must be repeated, and if the program contains a loop that is repeated 1000 times, then the code within the loop is interpreted 1000 times! This is why interpreted BASIC is slow ! With Pascal, however, the code is translated only once, and the resulting machine code is held in memory ready to be RUN. The process is called 'compilation', and results in a considerable increase of running speed. Pascal is different from other compiled languages, however, in that it is not usually compiled to the machine code, but to a code called 'P-code', which may be thought of as the machine code of a micro ideally suited to running Pascal,

such as the Pascal Microengine. For other machines, there has to be a small interpreter to convert the P-code into the required machine code. This interpreter is much smaller and easier to write than a full Pascal compiler would be, which simplifies the task of getting Pascal out onto the various machines, but the interpretation slows the running speed somewhat. The result is a language which is 2-4 times faster than BASIC, depending upon which benchmarks you use to measure it (I used Kilobaud Benchmarks 3-8). This is not a great improvement, though it might be significant in some circumstances.

My firm purchased TCL Pascal to evaluate it for use in a scientific instrument application concerned with real time data logging and Fourier Transformation. (The evaluation was carried out on my own PET, since the firm would not buy one unless Pascal proved acceptable. The bad news is that Pascal was not really fast enough for this applicaton, which requires a machine code program. The good news is that I ended up with TCL Pascal legally licenced for use on my PET, free !).

Pascal was developed originally as an academic language, and incorporates the elegant ALGOL-like block structures which suit the methodology known as 'stuctured programming'. The proper use of structures such as DO..WHILE, REAPEAT..UNTIL, IF..THEN..

ELSE, and CASE, and the use of meaningful labels and subroutine names, produces programs which are understandable and have a high probability of being correct. It is even claimed by some that it is impossible to write bad code in Pascal ! This is possibly because the Pascal methodolgy forces a high degree of program planning upon the programmer. All labels, constants, variables and variable types have to be thought out in advance and declared, before programming may begin. It is not the Pascal 'way' to program freely, straight onto the screen, as in BASIC. For some, this reduces the satisfaction to be derived from writing programs, but for a serious application so much pre-planning can only be beneficial.

Another major way in which Pascal differs from BASIC is the number of data TYPES that it can handle. Variables may be INTEGER, REAL CHARACTER, BOOLEAN, RECORD, etc, and may be ARRAYS (of arrays of arrays...if required) or SETS, or ENUMERATED, i.e. a specified list. In addition new TYPES may be defined by the programmer. For example, a variable called WEEKDAY may be defined as the ENUMERATED SET [Monday, Tuesday, Wednesday, Thursday, Friday]. This richness of constructs accounts for the power of the language, but makes it much harder to grasp in its entirety than BASIC. Throw in RECURSION as well, and the result can be quite mind boggling ! Like anything else, however, it may be learned one step at a time, and the manual should prove to be an adequate introduction to the language as well as a reference text.

The first thing to do after opening the box and sending off the licence agreement, signed in blood, is to pull out the PICCHIP or whatever ROM you have in the central socket, and insert the security ROM. (As you pull out the other chip, it rotates at the last minute and sticks into your fingers - that is where the blood comes from!). You then load Pascal and RUN it. This puts you into RESIDENT COMPILER mode, which is very useful for getting started. Pascal programs may be entered and edited, and then compiled and run using the command RUN, without further use of the disks.

Programs are written on numbered lines, as in BASIC. The numbers play no essential part in the Pascal, but are useful for editing, deleting, and inserting, just as in BASIC. In addition, it is possible to FIND and CHANGE strings of characters.

After typing RUN, if the program is incorrect you will hear the disk start up, looking for the appropriate error messages. These are quite helpful, indicating the nature of the errors in detail, as well as approximately where they are to be found. The program may then be LISTed and edited as in BASIC.

If the program is correct (Yes, Son. It will happen

one day) the messages '0 errors', 'compilation complete' appear, and the program is executed. If RUN is typed again, the program will be executed again, but without being recompiled (unless you have made any alterations, of course). The Pascal program may be listed on the printer, or PUT to disk and later retrieved with GET.

While in RESIDENT mode, the usual DOS commands are allowed, as are certain convenient direct BASIC commands. In addition, numbers may be converted between HEX and DECIMAL. Most features of the Pascal implementation are available, but not use of disk files or program linking, and of course the program size is restricted by the continued presence of the resident compiler and of the source code. In DISK mode, entered by the command DISK, programs may be entered and edited as before, but before being compiled they must be PUT to disk, eg PUT 0:PROGNAME. The command COMP PROGNAME will cause the program to be compiled, resulting - if correct - in an object file called PROGNAME.OBJ. This object file may be executed by the command EX PROGNAME, which calls the file PROGNAME.OBJ from disk and executes it. There is a minor inconvenience here in that the object file has to be called from disk every time the program is to be re-executed, despite presumably being somewhere in memory. A number of extensions to standard Pascal, specific to this PET implementation, are provided, including access to the PET clock and to machine code, use of assembly language modules, various i/o conveniences, and program linking.

In summary, a language of great interest and no little power, a full implementation which is as friendly as the language will permit, and a not unreasonable price.

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