

# IPTG

NUMBER 1  
VOLUME 3  
JANUARY 81

INDEPENDENT PET  
USERS  
GROUP



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## EDITOR'S NOTEBOOK

It happens all the time whenever PET enthusiasts meet, so much so that it is killing the goose that lays the golden egg. Most of the recent computer press have carried articles regarding the mass copying of low-cost cassette-based software and although the copiers see no harm in it, the resulting loss of revenue means the gradual extinction of this market.

I am no doubt putting my head on the block (again) by saying that I am not entirely sorry. Most programs that I have seen costing under 10 pounds are utter rubbish - I shall not even elaborate on this bland statement... Programs in the 10 to 30 pound bracket are often poor in that they are not only badly structured, but contain references to non-existent lines and conversely lines that are never executed. They are not all bad of course, who cares if Microchess is well structured? Its quality is apparent from using it. Linker is another notable program. A look at the listing is as enjoyable as reading a good book, and watching it in action is fascinating.

What do the poorer programs lack? Presentation, the manner of confronting the user, should be simple and unambiguous (like not requesting entry of the date without specifying the format). Robustness, the resistance to program and data corruption due to operator abuse (a simple example being a null entry with the INPUT statement). Structure, the manner in which the sections of the program are put together. Whole books are written about programming style and I will not elaborate. What does concern me is that this poor software is predominant in schools where the pupils are presumably learning what programming is all about.

R.D.G.





INDEPENDENT

PET USERS GROUP

Vol. 3, No.1

Newsletter

JAN.1981

Europe's first independent magazine for PET users

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## COMPUTER BULLETIN BOARD

The National TRS-80 Users Group intends to commence operation of a computerised bulletin board system. With the appropriate hardware and software users will be able to access the central system outside working hours and leave or receive messages as required. The Group's software library will be available by down loading from the central system. PET users will also be able to use the bulletin board and may be able to use some of the BASIC programs in the library.

To use the facility, the minimum requirements appear to be a 16/32K PET with RS232C interface with an 'originate' acoustic or hard-wired modem (to CCITT specifications). A suitable modem is the Minimodem 3001, manufactured by Modular Technology, P.O.Box 117, Watford, WD1 4PD. Tel: 01-421 0626. This unit costs £160.00. A suitable RS232C interface is the KC NETKIT, priced at £135.00 from Kingston Computers Ltd. The signalling standard is 300 baud, even parity, 7-bit word with one stop bit.

Initial subscribers will be required to invest £10.00 to cover the initial costs of setting up the central system (purchase of 'auto-answer' modem and FORUM80 software), but a pro-rata rebate will be made as more subscribers contribute. All funds will be kept independent of the TRS-80 Users Group and a financial statement will be maintained at all times on the system.

The system will be available outside working hours and at weekends. Further details from their Chairman, Leon Heller, 8, Morris Walk, Newport Pagnell, Bucks, MK16 8QD. Tel: (0908) 613004, or Secretary, Brian Pain, 40a, High Street, Stoney Stratford, Milton Keynes. Tel: (0908) 566660 (office); 564271 (home). The editor would be pleased to hear any members' experiences in linking to the Bulletin board.

## A DIGITAL CLOCK

The program below comes from the Dutch magazine 'PET Benelux Exchange', edited by IPUG member Johan Smilde. Machine code speed is exploited to update and display the time in 'digital clock' format.

If you do not want the repeated clocks at the screen top and bottom, then omit line 300. When entering the DATA lines, take care with the commas (,, is interpreted as ",0,") . I am indebted to Walter Green for the Dutch translation and Brian Granger for debugging the typographic errors and cleaning up the program presentation.

```

100 REM DIGITAL CLOCK (PBE#0,P20)
110 POKE59468,12:FORI=984T01022:READA:POKEI,A:NEXT
120 QQ=160:DIMA(9),B(6),C(6):B(0)=32:B(1)=160:B(2)=233:
      B(3)=223:B(4)=105:B(5)=95
125 FORI=634T0983:READA:POKEI,B(A):NEXT
130 FOPI=0T09:READA(I):NEXT:FORI=1T06:READB(I):NEXT
140 Q=59409:R=998:S=R+1:T=S+2:U=984:V=52:W=60
150 FORI=1T06:C(I)=10:NEXT
160 PRINT"<clr><3dn><2rt>SET CORRECT TIME BY SCREEN EDITING
170 PRINTTAB(15)"<2dn>";LEFT$(T1$,2);" ";MID$(T1$,3,2);
      " ";RIGHT$(T1$,2)
180 INPUT"<up><13rt>";A$
190 T1$=LEFT$(A$,2)+MID$(A$,4,2)+RIGHT$(A$,2):PRINT"<clr>"
200 POKE33180,QQ:POKE33194,QQ:POKE33340,QQ:POKE33354,QQ
210 S$=T1$:FORI=1T06:A=VAL(MID$(T1$,I,1)):IFA=C(I)THEN230
220 C(I)=A:POKE R,A(A):POKE S,2-(A>3):POKE T,B(I):POKE
      Q,V:SYS U
230 NEXT
300 PRINT"<home>";:T$=S$+" ":PRINT" "T$T$T$T$:POKE216,25:
      PRINT"<up> "T$T$T$T$$;
330 IFT1$=S$THEN330
340 GOTO210
400 DATA162,0,160,0,24,169,7,133,2,169,5,133,1,189,76,3,
      153,98,129,232,200
420 DATA198,1,208,244,152,105,35,168,198,2,208,232,169,
      60,141,17,232,96
440 DATA2,1,1,1,3,1,,,,,1,1,,,,,1,1,,,,,1,1,,,,,1,1,,,,,1,5,1
      ,1,1,4

```



460 DATA ,2,1,,2,1,1,,1,4,1,,,,,1,,,,,1,,,,,1,,1,1,1,1,1  
 480 DATA2,1,1,1,3,1,4,,5,1,,,,,2,1,,2,1,1,4,2,1,4,,,,,1,4,,  
 ,1,1,1,1,1,1  
 500 DATA2,1,1,1,3,1,,,,,1,,,,,1,,1,1,,,,,1,1,,,,,1,5,1,1,1,4  
 520 DATA,,2,1,,2,1,1,,2,1,4,1,,1,4,,1,,1,1,1,1,1,,,,,1,,,,,1,  
 540 DATA1,1,1,1,1,1,,,,,1,1,1,3,,,,,5,1,3,,,,,1,1,1,3,2,1,4,  
 5,1,1,4,  
 560 DATA ,2,1,1,,2,1,4,,1,4,,,,,1,1,1,1,3,1,,,,,1,1,,,,,1,  
 5,1,1,1,4  
 580 DATA1,1,1,1,1,1,,2,1,,2,1,4,,2,1,4,,1,4,,1,,,,,1,,,,,1,  
 600 DATA2,1,1,1,3,1,,,,,1,1,,,,,1,1,1,1,1,1,,,,,1,1,,,,,1,  
 5,1,1,1,4  
 620 DATA2,1,1,1,3,1,,,,,1,1,,,,,1,5,1,1,1,1,,,,,2,1,,2,1,4  
 ,1,1,4,  
 640 DATA122,157,192,227,6,41,76,111,146,181,104,110,118,  
 124,132,138

For old-ROM PETs change 216 to 245 in line 300, and in lines 400,420 change 1 and 2 to 64 and 65.

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#### LCNDOM MEETING

Next meeting: Tuesday, February 17th, 1981, starting 6.30 p.m. INFORMEX-LONDON have been kind enough to loan us the use of their luxurious premises. The address is 12, Lee High Road, Lewisham, London, SE13 5LG Tel: 01-318 4213. Please write or ring Informex to confirm your attendance.

Geoff Wilkinson of N.E.L.P. will speak on the theme: "The PET Revealed Again". His talk will be particularly useful in view of the latest IPUG Compendium.

I will be pleased to hear from anyone who wishes to occasionally lend us premises for future IPUG meetings in the London area. Eliot Khobie.

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## REVIEW

QWERTY CRASH RESTORER  
QWERTY LIGHT PEN

From Qwerty  
Computer Services

There are several 'crash restorers' on the market and the model from Qwerty Computer Services arrived coincident with my local group meeting. It followed therefore that it would be the natural target for the boys...

The device consisted of a sealed 'block' with four wires and a push-button projecting. The review unit had no printed installation instructions, although these were provided in the covering note. There were no problems in fitting the connections to the memory expansion port, after which the unit was operational.

Inducing the PET to crash was fun and several methods were tried. Recovery from each method was successful, but don't expect miracles. If you wipe the operating system variables, nothing can replace them except the initialisation routine which wipes your program.

Recovery involves a press of the button which enters the monitor, enter ';' for the register display mode and change the SP to F8. 'Return' then enables the monitor to be used as normal, 'X' returning to BASIC.

The retail price is £7.50 plus VAT and this includes post and packing.

The Qwerty Light-pen is something of a price break-through. From its appearance it looks cheap, but then it is! The 'pen' part is obvious in its origins and houses the light sensor. The umbilical cable connects to another sealed 'black box'. The review copy had a potentiometer sensitivity control mounted such that the connections were potentially frail and likely to sever with use. I mentioned this and note that later models now have this defect corrected.

The sealed unit is mounted on a connector which plugs in to the user port. The pen is provided with a demonstration program with routines for the incorporation into one's own program. This program had instructions



built-in and was simple to follow. It showed how the pen could be used to make a menu selection, but I cannot imagine many applications where BASIC would suffice to do anything that could not be done with the keypad (but remember the pen is very cheap compared to others). Many things come to mind with faster software plus the high-resolution graphics board and these make the price of £ 15 plus VAT for the pen and demo cassette insignificant.

Qwerty Computer Services are at 20, Worcester Road, Newton Hall, Durham. Tel: (0385) 67045.

R.D.G.

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#### PEEKING & POKING ABOUT

Peter Smith writes that when a LOAD is issued from inside BASIC, the stack of FORs and GOSUBs is cleared and a RUN is effectively done. To prevent this one can load a program from disk by OPEN 1,8,0,"D:any prog,P,R":SYS62272. This has not been thoroughly tested, so caveat emptor.

Many of you may not realise that LOAD"\$0:PROG\*",8 will load only those directory entries starting with PROG. Any pattern matching can be used, and the technique can also be used with DOS Support.

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#### INVADERS ARE HERE....

Home-Tune are to sponsor a national 'Space Invaders' contest. The first heat will be held at Totton, near Southampton, on March, 21st, 1981. The event will be held in conjunction with IPUG and we require not only competitors, but members who will be willing to loan their PETs for the occasion. For details of this first heat, contact Charles White, The Home Tune Shop, 18, Station Road, Totton, Southampton. Tel: Totton 5088.

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## SHOP WINDOW

Claimed to be superior to existing 8-bit converters in that it provides an accuracy of 0.025%, the A-D converter designed by Holdsworth Electronic Developments has 8 channels with differential inputs. All parameters can be under software control. For details contact Holdene Ltd., Manchester Unity House, Rampart Road, Leeds IS6 2NW.

The PPM 8000 data logger, designed for compatibility with the PET, is of rugged, modular construction with numerous options, including 2- or 4-pole input switching. PPM have a service department and offer extended warranty, maintenance agreements, and discount for prompt payment on PETs. In addition they give their PETs and peripherals a rigorous pre-delivery check-out. Contact PPM Ltd., Hermitage Road, St. Johns, Woking, Surrey, GU21 1TZ. Tel: Brookwood (04867) 80111.

The PCI 1000/1 IEEE-488 A-D converter for the PET has 12-bit resolution and 16 channels. The PCI1000 has inputs direct to a CMOS multiplexer (1Mohm input impedance during conversion), whereas the PCI1001 has 16 separate input buffers with differential input and individually set range. Channel selection is by secondary addressing, each having an individual 'Talk' light lit during conversion. Other features include switch-selectable device address and dual PET-type bus edge connectors. Contact CIL Electronics Ltd., Decoy Road, Timberlaine Trading Estate, Worthing, Sussex, BN14 8ND. Tel: Worthing (0903) 200673.

Dyco market a number of PET IEEE-488 peripherals. The PIBI converts RS232C or current loop outputs from peripheral devices into IEEE-488 format and vice versa. 'Talk' and 'Listen' lamps are provided, plus 25-pin 'D' type RS232C connector and 24-pin IEEE-488 connector. The PERC is a programmable relay box which connects with the user port. Available with 6 or 12 relays. PADC is a 20-bit A-D converter cum voltmeter which will interface to either the IEEE or user port. Prices: PIBI £250.00; PADC £350, £400 with display; PERC 6 £175.00; PERC 12 £250.00.



Available from DYCO, Sunderland House, Station Road, Hetton, Houghton-le-Spring, Tyne & Wear, DH5 0AT. Tel: Hetton (0783) 260433. Note DYCO = Dyson Instruments.

The microline 80 series of printers is available at a 'club' discount of 5% from Micro General. Contact Peter Gamble at Micro General, 6, The Birchwoods, Tilehurst, Reading, Berks, RG3 5UH. Tel: (0734) 25226.

Centronics have introduced the model 737 printer which features proportional spacing, true descenders, and the facility to print lines of text right-justified! Not only that, vertical bi-directional paper motion allows the use of super- and subscript printing. The matrix head is N x 9 and creates characters within a standard matrix size, but packed with 18 possible horizontal dot placements, as opposed to the standard nine. The resultant characters are continuous in appearance, rather than 'dotty'.

A low-cost impact printer aimed at the hobby and educational markets has been introduced by DRG. The Seikosha GP80 measures only 328x172x131mm and is believed to be the smallest plain paper, 80-column printer on the market. The GP-80 from Seiko has a single needle 'matrix', dubbed the 'uni-hammer'. Speed 30 char/sec, full graphics, 80-characters/line, weight a mere 2.5Kg! Moreover the price is £199 + VAT with a Centronics interface. There is a PET interface available and printer prices are around £250. Details from DRG System Supplies, Tel: 0934 415398. UK agents Mitrecrest. Could be a winner this one....

The DIGI-PLOT WX4671 X-Y plotter from Watanabe Instruments Corps is handshake-compatible and costs £850.00. The unit has a range of vector commands and character commands and plots on an area 260x360mm. Available from Environmental Equipments (Northern) Ltd., 64, Welsh Row, Nantwich, Cheshire, CW5 5ES. Tel: (0270) 65115.

If you need to interface the PET to a standard mainframe-type tape deck, the SE 8800 is a micro-processor controlled digital tape transport with powerful self-checking diagnostics. An IEEE-488 interface enables data to be put on tape in one of a variety of standard formats suitable for main-frame analysis. Details from SE Data Products, SE Labs (EMI) Ltd., Spur Road, Feltham, Middlesex, TW14 0TD. Tel: 01-890 1477.

The Kommunikit allows your PET (or AIM-65) to accept external inputs and outputs and perform as a versatile controller. It is powered from an external supply and is capable of 500mA per output channel. Construction from a kit costs less than £150 from Mektronic Consultants, 116, Rectory Lane, Prestwich, Manchester. Tel: 061-798 0803.

If you are looking for a 6502 add-on then possibly the 'CUBIT' can help. It comprises a Eurocard with 4K of RAM and 4K of EPROM plus a long-tailed 40-pin 6502 socket. The socket houses your processor and then plugs into the vacated socket. The memory address blocks are selectable. With the addition of a 6502, a crystal and other items, a stand-alone computer costs £85.00 (check!) from Control Universal Ltd., 11-15, Bush House, Bush Fair, Harlow, Essex, CM18 6BW. Tel: Harlow (0279) 31604. The ROM board costs £75.00, VAT extra, and includes a 6522 VIA, and 8 x 2114 RAM. ROM can be 2316, 2332, or EPROM 2758, 2716, 2516, or 2532. Alternatively 4801 or 4802 RAM may be used.

The 'Omnibus' is a bi-directional IEEE-488 to BCD interface with 13 x 4-bit words. An A-D converter can be included as an optional extra. Price £275.00 from Farnell Instruments Ltd., Sandbeck Way, Wetherby, West Yorks, LS22 4DH.

What is claimed to be the first IEEE-488 compatible ratio transformer, the model PRT10, is by Ailtech and is available from Eaton Ltd. (no further details available).

The BW-100 'bus watcher' is designed to assist with problems of design and diagnosis associated with the IEEE-488 bus. Any bus address can be monitored and separate hex displays are used for address and data inputs. Three speeds may be selected, normal, slow (2-bytes/sec), or single-step.



A mathematics character generator is available for the PET which lets the machine display mathematical formulae and expressions for scientific, technical, and educational use. In the graphics mode the screen is as normal, in lower case all the graphics characters have been replaced by mathematical symbols. The PET can then display super- and subscripts, square roots, integrals, derivatives, sums and others. Foreign language ROMs are also available. Each ROM costs \$75 from West River Electronics R&D, PO Box 605, Stony Brook, New York, NY 11790.

Another maths character set, the same or similar, from ACM Software, 214, Church Hill Road, North Cheam, Surrey, SM3 8LA. Tel: 01-644 4535.

ADAK-1 is a complete analogue interface card containing a CMOS 8-bit D-A converter coupled to a 7kHz 5-pole Butterworth filter. The filter output is available which also feeds a loudspeaker amplifier. In addition the board contains an 8-to-1 analogue multiplexer which feeds a comparator, the other input to which is the D-A output. This configuration enables the board to function as an 8-channel A-D converter. Ideal for sound synthesis, order type ADAK-1-PET which comes complete with PET-compatible connectors, instructions and machine-code routines on cassette, all for the price of £64.95 plus VAT, post & packing £1.00, from AVR Electronic Services, 2, Wharf Street, Shipley, West Yorkshire, BD17 7DW.

Re-inforced floppy disks which reduce the buckling of the centre as the drive comes on are sold by Reprodesign. The disks are top-grade Verbatim and prices for PET/Apple disks are from £1.60 each. SAE for full price list from Reprodesign, Market Street, Chorley, Lancs, PR7 2SG. Tel: 02572-78376, contact Dr. C. M. Hicks.

Finally, if you want personalised letters, circulars, etc. Eagleform will mount small or large volumes of letterheads, forms, envelopes, etc., onto continuous carrier web. Price for 1000 letterheads £27.50. Eagleform are at 63, High Street, Crawley, West Sussex, RH10 1BQ. Contact G.A.Gant, (0293) 513129.

The 'Superchip' has been designed to work in conjunction with the well-known 'Toolkit'. This immediately gives it a bonus, for not only does it reside in a different socket (the seventh), but the 'Toolkit' can be turned on and OFF from the Superchip, something which cannot readily be done with the Toolkit alone. The facility has been provided because both chips use the second cassette buffer as working space. If you attempt to use the buffer it could cause the PET to enter a loop condition.

The functions of the superchip fall into two groups, those operating via the keyboard interrupt, and those that use the CHRGOT routine (as does the Toolkit). A selection of SYS entry points controls the enabling and disabling of each type and for either chip.

A repeat-key function is provided with user defined delay and repetition rate plus the option to apply the repeat only to cursor control keys, including insert/delete and space. The Superchip makes use of PET's special handling of the <STOP> key for use as a Control key. This new use of the key means a slight re-assignment of some of the special keys. <STOP> becomes CONTROL as mentioned, '(' becomes 'stop' and scrolling is slowed not by <RVS>, but by '!' being held down. <RUN> no longer generates LOAD and RUN. Sounds confusing, but it is well explained in the handbook.

The handbook also explains the Superchip limitations. If you are using 'DOS Support' it should be loaded and run before activating the chip, but Computhink disk drives use the same address bank and are therefore incompatible. Some 'Gotchas !' are included which are not bugs, but possibly unexpected results from certain sets of circumstances.



Superchip contains a number of screen handling routines which I will mention in total for comparison with the Pic-Chip, (reviewed on p 19). Each function may be accessed in BASIC from a SYS command, or in direct mode by the Control key and one other. They comprise:

1. Erase Begin erases the current line up to, but not including the cursor position.

2. Erase End erases the current line from the cursor to the end of that line.

3. Delete Line deletes the screen line at which the cursor is positioned.

4. Insert Line inserts a blank line at the current cursor position and moves the lower part of the screen picture downwards. The bottom screen line is lost in the process.

5. Scroll Up is the normal scrolling direction. A blank line is introduced thereby at the bottom of the screen.

6. Scroll Down is obviously the converse of Scroll Up.

7. Scroll Window enables up to nine lines at the top of the screen to be protected whilst scrolling up the remainder under keyboard control. Using SYS under program control, the number of protected lines may range from 0 to 24.

8. Graphics/Lower Case Toggle flips the screen character generator from one mode to the other using Control shift-G. No SYS command is provided, the normal POKE command (59468,12 or 14) being sufficient.

9. Escape gives a ready means of exit from the programmed cursor mode using control-quote to flip from one mode to the other. (I use quote or quote & delete to do this !).

'Single-key' entry of 26 of the BASIC keywords is provided, although 'single-key' is a misnomer. The Control key has to be depressed together with one other alphabetic key. I personally find little use for this function because I prefer to use the abbreviation used by the BASIC interpreter, rather than learn a set peculiar only to PETS fitted with the Superchip. Never-the-less Supersoft provide a quick reference chart on the back of the handbook for those who prefer this facility.

Two debugging aids are provided in the Superchip. The Retrace facility and the Hold function. 'Retrace' surprises me somewhat. One is constantly reminded of the complementary nature of the 'Superchip' and 'Toolkit' (they can even be purchased as a 'special offer' pair), yet I am surprised to find the existence of the Retrace facility so similar to that in the 'Toolkit'. The 'Superchip' can recall the previous 10 line numbers executed, as opposed to the Toolkit's six. The 'Hold' facility suspends all PET functions, including the time-clock, until <RETURN> is pressed. Program listing or execution can be temporarily suspended with this facility.

SHRINK modifies the program and should only be called as a direct command. Calling SYS38500 will remove all unnecessary spaces and REMark statements. Consequently avoid GOTO or GOSUB references to lines containing only REMarks or only a single delimiter (:).

REVERSE inverts the video of any area of the screen previously defined in size and position and the MOVIT routine will copy an area of PET's ROM or RAM to any area of non-overlapping RAM. As with the REVERSE routine, the parameters used may be stored in working space, where they are modified, or in a buffer area where they may be re-used.

The two remaining features are user-definable. First a message from the 1st cassette buffer can be displayed by using Control <HOME>. Secondly the keys 0 to 9 may be used to call a user's own machine language routine.

The 'Superchip' comes with a well written handbook detailing the chip's use and memory requirements. As with the 'Toolkit', I found that only a limited number of the routines were of value. However, different users will attach a different value to the usefulness of these routines, so I will not single out any specific examples. The chip is a useful addition to the innards of one's PET and I experienced no nasties in its use. Full credit to Peter Calver, the author.

R.D.G.



## PET ROM SETS

By Mike Todd

Since the PET/CBM computers were released in 1978, there have been several different BASIC ROM sets released, and it is the purpose of this article to clarify what seems to be a rather confusing situation.

First of all, there are three types of ROM used by Commodore. The 6540 (28 pin) was used in early models of the PET and is numbered either as 6540-xxx or by its part number which is 901439-xx. Later models used 2316B (24 pin) ROMs and these are always referred to by their part number 901447-xx. Both these ROM types are 2k ROMs (16kbits). Newer PETs (those with dynamic RAM instead of the older static RAM) utilise the 2332B (24 pin) ROMs which are 4k ROMs (32kbits). However, in the \$E000-\$EFFF slot there is a conflict since the input/output chips are located at \$E800-\$EFFF and so a 2316B is used for \$E000-\$E7FF. The 2332B is also referred to by its part number 901465-xx.

There have also been 5 releases of BASIC and these are as follows:

- BASIC 1.0 - in the very early PETs. Contained bug in the software causing intermittent crash.
- BASIC 1.1 - as BASIC 1.0 but with one ROM different to cure the edit bug. This BASIC has array limit of 256 elements - unreliable cassette files - IEEE problems as well as one or two other bugs.
- BASIC 2 - as BASIC 1.1 but with many bugs corrected. This appears to be the standard BASIC for PETs with graphic keyboards.
- BASIC 3 - as BASIC 2 but for the business CBM machines. There appears to be a lot of confusion as to which BASIC is the "new ROM" BASIC, since references exist to both BASIC 2 & BASIC 3. I would suggest that the difference is accounted for by the difference between graphic PETs and

business CBMs. The only difference between the two is one ROM containing the keyboard decoding routines.

**BASIC 4** - This is the new "Disk Basic" only just arriving on the scene.

The following table shows the actual ROM numbers which have been released. Note that two lines are given for the 6540 since these are numbered with two numbering systems.

It is also worth noting that there are two fundamentally different types of PET around. The first uses 6550 or 2114 (1K x 4-bit) static RAMs. The second, and current, types use the newer (and more reliable) 4108 (2K x 4-bit) or 4116 (4K x 4-bit) dynamic RAMs on the 16K and 32K machines respectively.

STATIC RAM	H1	H2	H3	H4	H5	H6	H7	LOCATIONS	
1.0	6540	011	013	015	016	012	014	018	24-pin early PETs
	901439	01	02	03	04	05	06	07	Part #'s
1.1	6540	019	013	015	016	012	014	018	24-pin - no edit bug
	901439	09	02	03	04	05	06	07	Part #'s
2.	6540	020	022	024	025	021	023	026	
	901439	13	15	17	18	14	16	19	
2.	901465	01	02	*24	03	---	---	---	*24 is 901447 (2316)
3.	901465	01	02	*01	03	---	---	---	*02 is 901447 (2316)
<hr/>									
DYNAMIC m/c	D6	D7	D8	D9	D1	D2	D3	LOC'S	Last 2 ONLY

As well as BASICs, there are also two graphic generators. The difference between the two is only apparent when the POKES9468,14 command is issued and the lower-case portion of the ROM is switched in. The early (lower-case) ROMs generate lower-case characters when the shift key is pressed, whilst the later ROM (upper-case) generates upper-case and behaves in the same way as a typewriter. These ROMs are as follows:



LOWER CASE - 6540-010 or 901439-08 or 901447-08 (2316)

UPPER CASE - 901447-10 (2316) N.B. no 6540 version was made

It is hoped that this explains the current situation, however with the introduction of BASIC 4 as well as the 8000 series, life is going to get even more complex !

Turning now to the disk unit, there is even more confusion here. All ROMs used are 2332 types (part number 901468-xx), although there is a 2316 ROM (901467) used for data coding/decoding as well as the ROM inside the 6530 interface chip which contains the disk controlling software.

The early 2040 disk units used ROM numbers 901468-01 to -05 and the 6530-01. The later 2040's and the 3040 use ROMs 901468-06 & -07 with 6530-02 together these contain DOS 1.2.

There is now the upgraded DOS which uses three ROMs and was first released as DOS2.0 in ROMs 901468-08, -09 & -10. However, there appears to be very few of these about, and current upgrade sets (also to be put into the 4040 disk drive) consist of 901468-11, -12 & -13 with 6530-034. This is DOS 2.1.

Note that DOS2.5 is also available, but only on 8050 disk units. This gives a total disk capacity of 2083 blocks (ie 533248 bytes), whereas DOS1.2 gives a total capacity of 690 blocks (176640 bytes) and DOS2.1 gives 683 blocks (174848 bytes). These figures indicate TOTAL capacity and do not account for directory, link bytes etc. It is this difference in capacity which prohibits writing to DOS2 formatted disks (format type - 2A) using DOS1 (format type - 1). DOS2.5 disks are in format type 2C. These format types are displayed as part of the directory when using DOS2.

Finally, a quick look at the ROM used in the CBM printer. This is a 2332 (part number 901472-xx) and has been released in two versions. 901472-03 was the first

release and contained several bugs although most were difficult to detect. However, 901472-04 was released (and is the current ROM) and this had a couple of the bugs corrected as well as having a new secondary address to force the printer to work in lower-case mode at all times (instead of having to include cursor down at the start of each line - thus allowing programs to be LISTed in lower case). This is done by OPEN7,4,7:PRINT#7:CLOSE7. There is no way of undoing this, and the printer will sometimes flip into lower case mode all on its own if a certain sequence occurs in the timing of incoming data !

There is no doubt that Commodore will release different versions of all their ROMs in the future and it is hoped that these will be sufficiently well publicised to keep PET/CBM users totally informed - although I somehow doubt it !

--oO--

#### MATTERS ARISING

Peter Smith writes that the machine code routine to perform a computed GOTO/GOSUB by Tom Mead (p146, July '80) contains a serious bug. The author has not dealt with the RTS address left by the SYS command on the stack. This means that if this routine is called within a GOSUB or FOR routine, BASIC will attempt to search the stack and will come up with 'RETURN WITHOUT GOSUB' or 'NEXT WITHOUT FOR' error. Note also that the last JSR (\$C6C4) should have been JMP.

The CBM assembler (p171) has a few operating constraints, i.e. bugs, for example the loader in the GD001 package cannot always handle the assembler output, and the assembler itself trundles out into the great unknown if a package also cannot handle the 'multiple of 254-bytes' disk problem.

--oO--



## REVIEW

The PIC-CHIP

From Insel Computer Ltd

The 'PicChip' is a set of ROM-based routines designed to simplify the handling of pictorial information on the PET's screen. It contains numerous routines accessible from BASIC programs using a two-character code following an exclamation mark. The chip is activated by a SYS command which saves the top screen line at locations 903 to 942, and replaces it with the copyright message.

The PicChip comes in three standard versions to fit the ROM socket of your choice. The handbook is well produced and explains fully the function of each command. Those commands which use additional parameters make use of standard variables. In practice this simplifies the production of some quite dramatic effects, since several commands can be called in sequence to act on the same set of values.

The PicChip contains the inevitable repeat-key function and I was surprised that no apparent ill-effects occurred since I had no fewer than three simultaneous repeat-key functions of different origins enabled at the time! The command !RP turns the repeat on and !RO off. The repeat function must be off before attempting a LOAD or SAVE command.

!RE replaces the top screen line which was saved after execution of the chip initialisation SYS command. Don't get caught though, if you are using the second cassette buffer for machine code, 903 to 942 still contain the top screen line, not your code.

The command !CW puts the cursor position to the co-ordinates X,Y relative to the user-defined origin XO,YO. !CR returns the cursor position to the co-ordinate parameters X,Y relative to XO,YO.

Most parameter values are of normal character graphic density, but there are some which are double-density and these are indicated in the command list.

!PC will POKE a single character value C to Location X,Y, whereas !AF will fill the area defined by X1,Y1,X2,Y2, the values being relative to X0,Y0. !AR will set all the characters in that area in reverse field, !AN reverting them to normal. !AI simply inverts the video in that area. The commands !AS, !AU, and !AC act on bit 7 to give case shift, unshifted, and transposed respectively in the specified area. If the required area is the whole screen, the special commands !SF, !SN, !SR, !SI, !SS, !SU and !SC could be used instead of those above, thereby preserving the parameter values for the smaller area.

One would expect to find a scroll (or 'shift') up or down routine, and PicChip excels in this type of manipulation. Not only do we have !US for upwards shift and !DS for downwards shift, but !LS and !RS for left and right shift, in addition to which there are !UR, !DR, !LR and !RR for up and downwards roll plus left and right roll ! In the 'shift' set of commands, where one row or column is lost, the opposite row or column appears filled with the character specified by the value of C.

Double-density graphics and plotting are possible with the following set of commands: !WP and !EP write or erase respectively a point at co-ordinates X,Y, where the screen limits are 79 x 49 and values are relative to the X0,Y0 origin. !WX, !WY, !EX and !EY write or erase a line from X,Y to the X or Y axis, and !WL and !EL will write or erase a line between X1,Y1 and X2,Y2. !WC and !EC are write and erase continuous. These two are similar to the !WL/!EL pair, but X1,Y1 is updated with the value of X2,Y2 ready for another call of the command with a new X2,Y2.

The PET graphic set allows really fine resolution plotting, but only in one axis at a time. PicChip capitalises on this with the commands !FW and !FE to write or erase an X value with 320 steps across the screen, with a character density Y value. !WF and !EF are as above but relate to the 200 steps along the Y axis.



The final command is !CS, copy screen, which transfers 1000 bytes starting at address A1 to RAM starting address A2. Unless the user ensures that the area to be written is reserved, it is possible to overwrite wanted memory space. An example illustrates use of this facility.

Now back to the handbook. Routines in BASIC are included to illustrate the use of the PicChip and are written in such a way that the demonstration program for each routine could be appended to form a continuously running demonstration program for the Chip. I did this and it beats watching TV (what doesn't, I hear you mutter !). Despite trying a few illegal values at no time could I induce a 'crash' condition.

I vote the PicChip one of the most useful chips for the programmer with the artistic touch. Don't forget to specify the required socket location when ordering. Price to IPUG members £40.00 + VAT, include proof of membership, UK orders to Insel Computer Ltd., 7, Bramshill Mansions, Dartmouth Park Hill, London, NW5.

R.D.G.

--oOo--

NMI AGAIN

When I wrote about Mike Todd's experiences with Petsoft (Sep 80) I little knew of the wrath it would engender in one member of ACT staff.

He was concerned that the article implied that ACT had taken the program (PEP) off the market due to its competition with the Toolkit. This concern was based on a rhetorical question which was never intended to imply this - others to whom I have spoken also agree that this was not implied. His other complaint of factual inaccuracy must be refuted as I have seen all the correspondence between Mike and ACT as well as his notes of phone calls. Mike's claim of unfair treatment is certainly supported by what I have seen and the purpose of my investigation was to warn prospective authors of this one incident.

As Nigel M. Iain is not my real name, it is true to say that ACT staff will not have heard of me, but be assured that I have spoken to them on this matter !

## PROGRAM TRANSLATION FOR THE PET

By Malcolm G. Pritchard

How often have you seen an interesting program for the Apple or TRS-80 computers which contain strange instructions with no meaning in PET's BASIC? The following description of these unfamiliar commands should be of assistance when you are adapting programs in the future. If you should need further details, 'The BASIC Handbook' by David A. Lien (Compusoft Publishing) is recommended.

## APPLE

INSTN	EXAMPLE	MEANING
CALL	CALL 945	Calls machine code routine (= SYS)
COLOR	COLOR=8	Specifies colour for screen output ('8' means brown)
DEL	DEL 5,100	Deletes program lines 5 to 100
GR		Changes to graphics mode and clears screen.
HLIN/AT	HLIN 0,39 AT K	Displays a horizontal line from columns 0 to 39 at row K.
MOD	A=I MOD J	Calculates remainder when I is divided by J.
NOTRACE		Turns trace facility off.
PLOT	PLOT C,R	Turns on a graphics block at column C, row R. The block is turned off by specifying COLOR=0 prior to the PLOT. C and R < 40.
TEXT		Changes from graphics to normal text mode.
TRACE		Turns trace facility on.
VLIN/AT	VLIN 8,22 AT I	Displays a vertical line from rows 8 to 22 at column I.
VTAB	VTAB 13	Moves cursor to line 13 ready for next PRINT statement.
# (hash)	IF X#Q THEN 20	'not equal to', [<>].

The Apple low resolution graphics statements PLOT, HLIN ... AT and VLIN ... AT are based on a grid which is numbered from 0 to 39 on both axes.



## TRS-80

INSTN	EXAMPLE	MEANING
CLEAR	CLEAR 50	Reserves 50 bytes for string storage.
DEFDBL	DEFDBL L	Defines variable L as double precision rather than single.
DEFINT	DEFINT J	Defines J as an integer. (On the PET, variable J% would be used.)
ELSE	IF A\$="Y" GOTO 100 ELSE STOP	Describes the action to be taken after an IF/THEN test fails.
INKEY\$	A\$=INKEY\$	Places single character from keyboard in A\$. Same as GET A\$ on PET.
ON ERROR GOTO	ON ERROR GOTO 2280	Prevents error message and halting of program execution if an error occurs in subsequent lines.
PRINT USING	"##.##";R	Prints value of R in specified format.
PRINT#-1	PRINT#-1,A\$	Output to cassette recorder.
PRINT@	PRINT@845,A\$	Specifies starting position for screen output. Positions are numbered 0 to 1023 (16 lines of 64 characters).
RANDOM		Sets random number generator to an unpredictable starting point.
RESET	RESET (X,Y)	Turns off graphics block at column X, row Y.
SET	SET (X,Y)	Turns on graphics block at column X, row Y.
!	L!=N	X values 0-127, Y values 0-47. Redefines double-precision variable L as single precision.
'	'JULY 1980	Apostrophe is used as an abbreviation for REM.

## BASIC LOADER FOR MACHINE CODE

By Jim MacBrayne

Probably the simplest way of entering a machine code routine in the PET is by means of a BASIC loader program which POKES the values into memory at the appropriate locations. Unfortunately this can mean typing in lengthy DATA statements and is also subject to error.

Where a machine code routine already exists in memory, the following program will automatically convert it into a BASIC loader, then delete itself. One word of warning... the syntax of the program, particularly regarding quotes, is a little confusing, but must be entered exactly as shown. Both old and new ROMs are accommodated.

[Ed's note for the layman: This program makes use of a number of features of the PET not generally realised. Firstly, the screen on the PET is both an output AND an input device. If a 'message' is put on the screen and the cursor put on that line (or line pair), pressing <return> will input that message. If that message begins with a number, it is taken as a BASIC program line and the program modified accordingly. This is the basis for self-modifying programs such as above. Unfortunately, the act of changing a program line wipes all variables and the program is unable to continue - unless they are saved in a reserved area of memory. This could be one of the cassette buffers, or in this case, the screen, where the values are re-entered and execution resumed with a 'GOTO'. The latter is accomplished by writing the GOTO to the screen and putting two 'carriage return' characters in the keyboard buffer, then setting the keystroke counter to two.

A similar technique is then used to delete unwanted lines by simply entering the line number (in this case using Brian Granger's technique, p80 March, 1980) leaving a totally different program in memory. Remember therefore to save the original program before running it !].



```

200 INPUT"<clr>FIRST ADDRESS (DECIMAL) ";L
210 INPUT"<dn>LAST ADDRESS (DECIMAL) ";H
220 IFL>HTHENPRINT"<clr>1ST ADDRESS > 2ND - REDO":FORI=1TO
      3000:NEXT:GOTO200
230 LN=1000:KQ=525:KB=527:IFPEEK(50500)THENKQ=158:KB=623
240 PRINT"<clr><3dn>"LN;"DATA";L;"<ltf>";H
250 PRINT"KQ="KQ":KB="KB":I="L":LN="LN":L="L":H="H
      ":GOTO270<home>"
260 POKEKQ,2:POKEKB,13:POKEKB+1,13:END
270 LN=LN+10
280 PRINT"<clr><3dn>";LN;"DATA ";
290 DT=I+15:IFDT>H THEN DT=H:F=1
300 FORX=ITODT
310 DT$=MID$(STR$(PEEK(X)),2):PRINTDT$;" ";:NEXT:PRINT"<ltf> "
320 PRINT"KQ="KQ":KB="KB":I="I+16":LN="LN":L="L":H="H;
330 IFF=1 THENPRINT":GOTO360<home>":GOTO350
340 PRINT":GOTO270<home>"
350 POKEKQ,2:POKEKB,13:POKEKB+1,13:END
360 PRINT"<clr><3dn>100 READL,H:FORI=LTOH:READDT:POKEI,DT:NEXT:
      ?CHR$(147):NEW"
370 PRINT"KQ="KQ":KB="KB":GOTO390<home>"
380 POKEKQ,2:POKEKB,13:POKEKB+1,13:END
390 SL=200:EL=440:SP=10
400 GO$="":GOTO400"
410 PRINT"<clr><2dn>":FORI=SLTOSL+8*SPSTEPSP:IFI<=EL THENPRINTI:
      IFI<EL THEN430
420 I=SL+8*SP:GO$=""
430 NEXTI:PRINT"KQ="KQ":KB="KB":SL="SL+9*SP":EL="EL":SP="
      SP;GO$;"<home>"
440 POKEKQ,10:FORN=0T09:POKEKB+N,13:NEXTN

```

--o0o--

ODD BIT

The 8096 is the 96K computer expected from Commodore about summer '81.

--o0o--

## EXTRA OP-CODES REVISITED

By B. D. Grainger.

Following my article in Vol.2 No.4 on extra machine code instructions further work has been carried out and the following summarises my current thoughts on the matter. First tables of mnemonics and op-codes:-

Inst	Ab	Ab,X	Ab,Y	(X)	(Y)	Op	Op,X	Op,Y
ASO	0F	1F	1B	03	13	07	17	
RLA	2F	3F	3B	23	33	27	37	
LSE	4F	5F	5B	43	53	47	57	
RRA	6F	7F	7B	63	73	67	77	
AXS	8F			83		87		97
AXA			9F		93			
LAX	AF		BF	A3	B3	A7		B7
DCM	CF	DF	DB	C3	D3	C7	D7	
INS	EF	FF	FB	E3	F3	E7	F7	
XAS			9B					
KAX			BB					
SYA		9C						

Inst	Imm
ALR	4B
ARR	6B
XAA	8B
OAL	AB
SAX	CB

In addition to the above new codes it appears that ROR has 2 new extra address modes, 76 gives ROR Op,X and 7E gives Abs,X. It would appear there are some repeats- 0B,2B appear to be repeats of AND#. EB is a repeat of SBC# and 9E is a repeat of the new code AXA Abs,Y.

Finally all the codes 1A, 3A, 5A, 7A, DA and FA appear to be NOP. 0C, 1C, 3C, 5C, 7C, DC, FC appears to be a new code SKW. 80, 82, C2, E2, 04, 14, 34, 44, 54, 64, 74, D4, F4 appears to be a new code SKB.



Now to deal with what all the mnemonics mean:-

ASO= ASL and then OR the result with the Acc  
 RRA= ROR and then ADC the result with the Acc  
 DCM= DEC and then CMP the result with the Acc  
 LAX= LDA and LDX  
 RLA= ROL and then AND the result with the Acc  
 LSE= LSR and then EOR the result with the Acc  
 INS= INC and then SBC the result from the Acc  
 AXS= Store the result of Acc AND X  
 AXA= Stores bit 0 of the result of Acc AND X  
 XAS= Stores the result of Acc AND X in the stack  
 pointer and bit 0 of Acc and X in memory  
 KAX= Store the result of the stack pointer AND memory  
 in the Acc and in the X register  
 SYA= Store bit 0 of the Y register  
 ALR= AND the Acc, with data and LSR the result  
 ARR= AND the Acc with data and ROR the result  
 XAA= Store X AND Acc in the Acc  
 OAL= OR the Acc with #SEE, AND# the result, then TAX  
 SAX= SBC from Acc AND X and store result in X. Note  
 carry is automatically set for the subtraction.  
 SKB= Skip one byte  
 SKW= Skip one word (=2 bytes).

When executing the above codes the flags will be set as if doing each of the individual instructions which constitute the above code.

I should point out that the results in this article are my current impressions of what the codes do. I have not done full complete testing but taken isolated cases to verify my impressions for each of the codes. The codes with LSB B are the ones most likely to be in error. Any corrections found by readers would be welcome.

[Since these codes are not part of the manufacturer's specification, they should not be regarded as universal for the 6502 - Ed].

## COMMODORE COLUMN

Commodore's trading for 1980 has been very successful and has seen a 184% growth in the European market, the UK playing the greatest part. To meet this market production of the PET has started in a new site near Braunschweig, West Germany, and the Company's West German subsidiary expects to triple its sales this coming year.

The Braunschweig plant will produce computers for all markets using 220v supplies, 110v models will remain Californian origin. Initial production will be 14,000/month in the price range up to DM20000.

New products this year will include cash registers and a \$299 small computer. Production facilities for computer products are to be established in both Europe and Japan, and the feasibility of a new semiconductor facility in an overseas market is to be examined.

Mannesman Tally has reached an agreement to supply printers for the 8000 series SuperPETs. The printer, the 8024, is a high quality, 132-column matrix machine and an initial production run of 1,000 units a month is in operation. Print speed is 160 characters/sec on paper from 4 to 15 inches wide using a 9 x 7 matrix. Other features include double-width characters under software control, tractor feed and 1 + 4-copies capability on continuous fan-fold paper. Price £1160 plus VAT, 8024 Printer stand extra £95.00 plus VAT.

The current price list indicates that the 3000 series are now being supplied upgraded to BASIC 4.0 and referred to as 4000 series.

Recent figures indicate that PET sales in Europe now total 50,000 of which 25,000 are in the UK. In Europe Commodore leads over Tandy and Apple, whereas in the US they are third, Tandy being in the lead. In the education market Research Machines lead, with CBM and Apple following - source IDC Europa.



## REVIEW

MTU MUSIC SYNTHESISER PACKAGE

From IJL

Four-part harmony on your PET? Yes it is possible! Just add the MTU 8-bit digital to analogue converter, load up the software (total cost £65.55) and you are ready to make music - not with the usual "buzzes" but genuine smooth waveforms.

Each note is written as a 5-byte event specifying each of the 4 voices and the duration. A sequence table is then built up to define each of the voices, speed etc. which allows easy control with the ability to repeat phrases and redefine voices during a "performance".

Each voice has a waveshape table built up (defined in the sequence table) and the final waveform is built up by sampling each of the tables, adding the samples and outputting the result to the D-A converter. This is a technique described by Hal Chamberlain in Byte Sept 1977. The sample rate is just over 8kHz and the D-A has a hefty cut-off at 3.5kHz to reduce interference. Even so, there is a lot of noise superimposed on the final waveform resulting from the low sample frequency and the limitations of the 8-bit resolution.

The resulting sounds are impressive - and even more so is the "instrument" package which is additional software (£34.50) allowing envelope shaping, not only of individual notes, but also each harmonic within the notes! The sounds produced are similar to those produced by conventional synthesizers except for the large amount of sampling and quantising noise. If only the PET was 16-bit and eight-times faster the results would be startling to say the least!

My main complaint is that writing music requires learning a messy programming technique (but, with the aid of the detailed manuals, this is quickly learnt) although MTU hope to produce a human interface program to assist in music generation. This will be a great improvement.

A couple of example pieces are provided with each package (76 Trombones/The Entertainer and a some classical pieces) and these sound impressive, if somewhat mechanical. All you need to add is a small loudspeaker (or a Hi-Fi unit) and sit back and listen to your PET sing - with a bit of top cut and bass boost the results are great!

M.R.T.

## MORE RABBIT

David W. Jowett

In the review of Eastern House Software's "PET Rabbit" in Vol.2, No.6, John Bloore mentions problems with VERIFY of which I was not aware. However, the most significant problem for me is that the reductions in loading and saving time are possible on a much more limited range of Commodore cassette decks than is indicated in either the advertising or in the instruction leaflet supplied with the program.

Both of these sources state that the 'Rabbit's' high recording rate will work with the new-style cassette decks on which the lids can be opened via the STOP key, but not with the old-style decks with a lift-up lid. I found that this was not strictly true and, in his reply to my complaint, Carl Moser agreed with me.

There are two different designs of circuit board in the new-style decks. The earlier one is dated 1978 and contains two 8-pin i.c.'s. The more recent (and I think, current) design is dated 1979 and has, in addition, a 14-pin i.c. Only decks containing the board with three i.c.'s will allow the faster LOAD, SAVE and VERIFY operations of the 'PET Rabbit' program.

I have found that, unlike the machine-code monitor, the 'Rabbit' program permits the contents of the first cassette buffer to be saved, but some locations in this area of memory are used by the program itself and so this facility has to be used with caution.

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## MORE PASCAL

Sapphire Software has announced that they have a TINY PASCAL for cassette-based PET systems. The Tiny Pascal is a subset of standard Pascal, and includes a line editor, a compiler, an interpreter, sample programs and a user manual. The p-code interpreter is 6502 machine code. For new-ROM 16/32K PETs at £29 all-inclusive, from Sapphire Software Ltd., PO Box 244, Milton Keynes, MK14 7BQ.

--oOo--



## GENERAL PURPOSE STRING INPUT

By B. D. Grainger

Much has been written about how to stop program exit when responding to an input statement with a RETURN. The usual method is to use INPUT"<2 rt>\*<3 lt>";A\$.

This, however, does not allow a space to be input or stop program exit if the '\*' is deleted. Another problem with INPUT, which I have recently discovered, is that if one attempts to input say 60 characters, where one has to go beyond one screen line the '?' of the input prompt forms part of the input string.

The following subroutine will avoid all these problems by using GET but still allowing all the editing facilities available with INPUT. INPUT of a ":" or "," will be ignored to avoid possible errors when outputting the string information:-

```

50500 PRINTB$;"<sp>?<sp>*<lt>";:A$=""
50510 POKE167,0:GETA1$:IFA1$=""ORA1$=":"ORA1$=","THEN50510
50515 POKE167,1:PRINT" <lt>";A1$:IFA1$=CHR$(34)THEN
                    PRINTA1$;"<lt> <lt>";
50520 IFA1$<>CHR$(13)ANDA1$<>CHR$(20)THENAS=AS+A1$:GOTO50510
50530 IFA1$=CHR$(13)THEN50560
50540 IFLEN(A$)<2THENPRINTCHR$(13);"<up>";:GOTO50500
50550 AS=LEFT$(A$,LEN(A$)-1):GOTO50510
50560 IFA$="" THENPRINT"<up>";:GOTO50500
50570 RETURN

```

To use the routine set A\$ to the input prompt message, then GOSUB50500. The resulting input will be returned as A\$.

--000--

## BUYER BEWARE

Space does not permit a full account of the story of one member who bought his PET from what appears to be an 'official Commodore dealer', but basically the computer had a minor fault on delivery. This appeared as 'screen wobble' initially, but deteriorated to catastrophic failure, i.e. u/s, in a few days. The dealer, Mr. McBride, of Newcastle Computer Services, informed our member some days later that it was fixed. The machine was found to have the following visual faults: screen wobble, pincushion distortion and frame non-linearity. A request was made for a trouble-free machine, or a refund. This was met with hostility and a grudging offer to refer it back to the serviceman. After this, it was no better and the threat of Court proceedings elicited an offer to return the faulty machine to CBM. The offer was accepted, but three weeks later, it was found to be still at the NCS office. By the passing of another four weeks a very abusive dealer refused any further communication and expressed no further interest in the situation. The machine was ultimately left outside (!) the office for collection, our member having been two months in getting a satisfactory machine.

Newcastle Computer Services are better known by their other business activity, a one-man-band carpet cleaning firm called MCS. The 'computer department' has to be specially requested on the 'phone. [Condensed from a factual account from Ben Trotter - Ed]



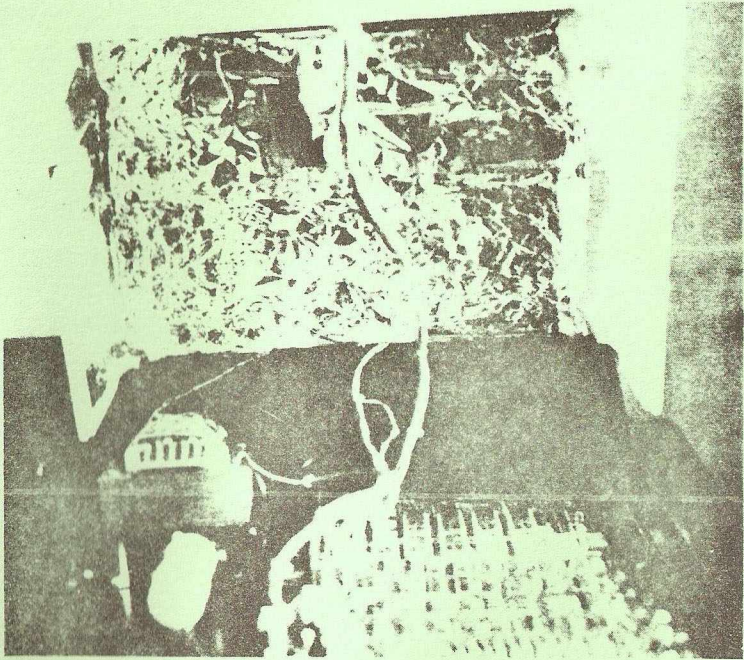


Photo: Ben's 'repaired' PET.

PHOTOCOPIED

Printed, published and distributed by Carlton Press, 10 Bernard Road, Gorleston,  
Gt. Yarmouth, Norfolk NR31 6EG, England, UK. Tel. Gt. Yarmouth (STD 0493) 61331