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INDEPENDENT PET USERS GROUP

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EDITOR'S NOTEBOOK

May I extend on behalf of IPUG a welcome to the 119 new members that joined us at The PET Show and say a special 'thankyou' to Clive Booth and Pete Gerrard of Commodore for the stand facilities and assistance given. This sharp increase in membership at a time when most of the Committee are suffering from the holiday season has resulted in a back-log of Committee work in processing members' enquiries and availing them the facilities provided.

Back numbers of the Newsletter were on sale at the show at £ 1.00 each (some issues sold out and are being re-printed). Volume 1, numbers 1-3 are not available, but the 'meat' of their content appeared in the 1980 'IPUG Compendium'. If you were not a member in 1980 and therefore did not receive one, they are on sale from the Secretary at £ 3.50, cheques payable to IPUG.

As required by our constitution we are starting to take the VIC under our wing. We will be forming local VIC groups as required, either separate or in combination with regional PET groups. Contact Eli for details of regional groups that exist, or to form one in your area. Starting with this issue, we have a regular VIC column in the newsletter until the day comes when perhaps it will justify a separate national user group publication.

Now all these good things mean that there is extra work to be done. We need someone to handle publicity. We need more assistance with the Newsletter. We need help at exhibition times. Volunteers should contact the Secretary, or to help with the Newsletter on a regular basis, contact the Editor.

Don't blame me, the editorial Spinwriter has now decided to print semi-colons in triplicate [;;;], must have it serviced one day...

R.D.G.

--oOo--

EIGHT-SLOT ROM EXPANSION

By John Bickerstaff

Every day the technical press heralds yet another ROM that makes programming easier or has to be fitted to enable another piece of software to be operated. That is just what I need, you say until you see the almost hidden remark that it goes in slot X which you already need for that other ROM you fitted last week. However, you can now have up to eight ROMs in any specified slot by using the JCL ROM Pager with a single POKE command. ROM selection is obtained by the single command, 10 POKE 36863,N where N is the slot number containing the next required ROM.

The unit comprises a neat PC board with a jumper cable to the ROM slot and eight sockets plus two fly-leads for connection to the memory expansion port. The board is designed to be fitted, with the 'feet' provided, at the front and to the left of the main PET board. This neatly stows your PAGER, but you can fix the board to the outside of your PET or stand it at the side especially if you wish to play around at first.

The PAGER can be used in any of the 'empty' ROM slots and costs only £45. It is, per ROM, much cheaper than the Spacemaker and similar devices. In addition, there is a FOUR + FOUR PAGER on the way so hang on to your Toolkit and plan your future on these 'expandable' ROM boards.

Richard Leman of JCL Software Ltd will be pleased to answer any questions should you not be convinced already that this product is the one that you have been waiting for.

--oOo--

TO UPGRADE OR NOT ?

M.R.Todd

Users of 2000/3000 series PETs or Commodore disk units are faced with a difficult decision — do they upgrade their machine and instal the latest version of BASIC or Disk Operating System (DOS)?

There are currently 3 versions of BASIC around: BASIC 1 — fitted in very early 4k & 8k PETs and generally a bit of a disaster! Arrays limited to 256 elements, IEEE bus (and hence the disk unit) incorrectly handled, cassette files unreliable without including some awkward coding into programs, and no ROM machine language monitor available. BASIC 2 — fitted to the 3000 series as standard. The array problem is solved, the IEEE bus is handled correctly, cassettes files are now reliable and a machine language monitor is included. With IEEE output, a line feed is sent following the carriage return at the end of the PRINT# statement causing minor irritation which had to be programmed around. Also, the clearing up of unused string space (garbage collection) can cause the PET to stop operation for seconds or even hours!

BASIC 4 — the latest BASIC available. Disk handling has is very much simpler with several new dedicated disk commands. The garbage collection problem has been solved, as has the spurious line feed problem.

As far as the disk drives are concerned there are basically 2 versions of DOS around: DOS1.2 — this is the DOS installed in 2040 and 3040 drives. It is not terribly reliable — the rename command doesn't always work, replacing files using "@" is said to be unreliable and your disks are prone to being erased without warning if errors occur during some commands.

DOS2.1 — the latest release version — the erasure problem has been completely cured. The other bugs appear to have been improved upon although it is difficult to say with any certainty that they are cured! However, the inconvenience of initialising on every disk change has been

eliminated — the disk initialises automatically as soon as a different disk ID is detected. Also the format has been made very much more reliable (at the expense of losing 1.5k of disk storage). One of the big features of DOS2.1 is that it allows true random access files to be created — possible using DOS1.2, but unbelievably clumsy and unreliable! For those who have not met random access files — whereas sequential files always read back data in exactly the same order they were written (and cannot be modified once written without reading back, scratching the file and then rewriting), random files allow any single entry to be read at will and modified individually. It's just like having a giant array available, but on disk!

Well that's the current scene — now comes the big question. Do you upgrade or not? Well, if you've got BASIC1 then I would suggest that you upgrade to BASIC2 unless you really are totally satisfied with BASIC1 and don't ever want to use disks. Unfortunately, many BASIC1 owners will not be able to upgrade to BASIC4 because of hardware differences (in terms of ROM types etc.).

If you are a BASIC2 user, then BASIC4 can look very attractive, especially if you are plagued by the garbage collect problem or want to make disk programming easier. However, it is possible to simulate nearly all BASIC4 commands with BASIC2, albeit clumsily!

As far as DOS is concerned, very early disk units (2040) have a hardware difference and I'm afraid that, as far as I can tell, you are stuck with DOS1.2 (unless you change the board inside — an expensive option). 3040 disk users have the option of upgrading to DOS2.1 — and my advice is DO IT! I did so some time ago and have had no disk problems since (except for a handful which have always been attributable to my own carelessness!). If you want to take advantage of the full range of BASIC4 commands then DOS2.1 is a must since it is DOS2.1 and not BASIC4 which allows random access file handling!

Of course, compatability of software is a nagging problem whenever you upgrade. At least pure BASIC programs

will work with no problems. Most of those using PEEK & POKE will upgrade from BASIC2 to BASIC4 without any modification - but BASIC1 programs using PEEK & POKE will usually need modifying. Machine code programs will generally need fairly extensive modifcation if they access any of the ROM routines (unless of course they're written with compatability in mind!). And if you're using the $B000 ROM slot and don't want to give it up then forget BASIC4 - it uses an extra ROM which needs the $B000 slot!

All DOS1.2 commands are available on DOS2.1, but whichever DOS you use you mustn't try to write to a disk formatted with the other DOS. However disks can be read using either DOS and it is fairly easy to convert existing DOS1.2 formatted disks to DOS2.1 thus allowing you to write to them.

It goes without saying that BASIC4 programs using the new disk commands are totally incompatable with BASIC1 & 2 - similarly random access files created with DOS2.1 will not be readable by DOS1.2.

So to sum up - BASIC1 owners, upgrade to BASIC2. BASIC2 owners - it depends what you want to do, but BASIC2 is nothing to be ashamed of! And if you've got a 3040 with DOS1.2 then upgrade as a matter of priority (unless of course you don't really use the disk that much).

Before you decide, bear in mind that there are rumours of a BASIC5. This should be a significant enhancement of BASIC4 and should include high precision arithmetic and is aimed at business users. And what about DOS3 . . . .

Finally, it is worth documenting the differences between BASIC2 and BASIC4.

The first is the provision of easy to use disk commands and two new reserved variables (DS and DS$) which return the disk status (ie error number) and error message. In BASIC2, if you try to LOAD a program which is not on the disk, or the disk fails to respond correctly after looking for the program, the LOAD command will hang in a "STOPpable" loop. BASIC4 returns the message "FILE NOT FOUND ERROR".

A line feed is added in BASIC2 to the automatic carriage return in PRINT# statements necessitating the termination of PRINT# with CHR(13); — BASIC4 only outputs a carriage return (the CHR$(13); is not necessary). However, a line feed can be output if required.

In BASIC2, if an IEEE input only sees a carriage return (ie a null input) the computer will crash and require resetting! BASIC4 ignores such null inputs.

Garbage collection has been improved by adding two extra bytes (pointing back to the string descriptor) at the end of all strings placed in normal string space. This removes the necessity for the garbage routine to repeatedly scan all variables to identify which string is which, and therefore increases garbage collection speed enormously!

The input/output channel flag in $0E is moved to $10 and the spurious flag in $0D is removed. This makes $0D/$0E/$0F available for the disk status string descriptor. Note that $0F and $10 are unused in BASIC2.

Inputting a line of more than 80 characters (eg from the disk unit) caused problems in BASIC2 since the characters overwrote the file reference table (resulting in FILE NOT OPEN errors thereafter!). BASIC4 aborts with a "STRING TOO LONG ERROR" if more than 80 characters are INPUT.

Well that's the story so far — the decision, I'm afraid, has got to be yours alone!

--oOo--

GAMES MODIFICATIONS

Conversion of Space Invaders from BASIC 2/3 to BASIC 4: The following locations should be altered using the PET's monitor or POKEd from BASIC.

Address		New Contents	
HEX	DECIMAL	HEX	DECIMAL
0512	1298	55	85
0517	1303	E4	228
0A52	2642	58	88
0A53	2643	E4	228
0BA6	2982	94	148
0BA7	2983	F6	246
19A6	6566	58	88
19A7	6567	E4	228
1A0B	6667	35	53

Once altered, the program can be SAVEd to disk/cassette in the normal way.

Modification to Cosmic Jailbreak to provide cursor movement as in Space Invaders i.e. 4,6 (left,right) and A (fire): Essentially, the program looks at location 151 ($97) - keyboard scan - to see which key has been pressed during the last interrupt. A full list of all matrix co-ordinates is on page 51 of the IPUG COMPENDIUM. The following locations should be altered using the PET's monitor or POKEd from BASIC.

Address		New Contents	
HEX	DECIMAL	HEX	DECIMAL
118F	4495	29	41
11C2	4546	2A	42
11F5	4597	30	48

Once altered, the program should be SAVEd in monitor by typing SYS64785 then,
.S 'JAILBREAK 2',01,033A,2007 (for cassette) or,
.S '0:JAILBREAK 2',08,033A,2007 (for drive 0 on disk)
The instructions for the above program should be altered accordingly.

K.Viney

--o0o--

WRITING FOR IPUG

To reduce the work-load in preparing the Newsletter articles are preferred in machine - readable form. For postal reasons, cassette storage is preferred and cassettes will be returned once I am satisfied that the content is suitably transcribed. To guard against the occasional 'READ ERROR' problem, hard copy should accompany the cassette.

Text may be in a number of forms, such as program REM statements or PRINT#1,"String", or the "String" could be printed to cassette (don't forget to CLOSE). Do use both upper and lower case, as appropriate. Programs are best SAVEd in program format. I can then test or modify the program where desirable before using one of the Newsletter utilities which will format the listing to the requirements of the magazine.

BASIC programs which contain machine code should be accompanied by an explanation of the machine code and state which BASIC version(s) apply. Routines which are predominantly machine code are preferred in assembler format with object code and comments as an ASCII text file. If impracticable, then even a hex dump will suffice.

Finally, copy for a specific issue should arrive not later than during the first week of even months.

R.D.G.

--oOo--

ODD BIT

Never use GET after CMD to an IEEE bus or all files will be closed. eg:

```
10 OPEN 4,4:CMD4
20 PRINT"TEST":REM TO PRINTER
30 GETA$:REM TURNS OFF COMMAND
40 PRINT"THIS":REM TO SCREEN !
50 END
```

By Tom Cranstoun

--oOo--

THE CHIP SWITCH

Reviewed by John Bloore

Since the introduction of the 'NEW ROM' PETs, software writers and machine code users and programmers have been be-devilled with the problem of conversion of programs to run on both 'NEW' and 'OLD' machines. With the introduction of BASIC 4 the problem is now further complicated. It is possible to buy and fit replacement ROMs but then, all those beautiful machine code programs beloved of kids (and some adults too) won't work any more. Given time and providing you are a machine code genius, you might, just might, be able to convert them to BASIC 4. Alternatively, you could purchase the BASIC 4 versions at a price. So, rather than face the trouble, maybe you prefer to leave the ROMs well alone. However, if you are writing software or are acting as a consultant for someone else who wants his business program adapting to take advantage of the improved facilities, you need to test the program on the version of BASIC it is to run on.

An answer to the problem has been developed by a new company, GHI Electronics, for the 2000 and 3000 series PETs, although the units developed also have possible uses in the 4000 and 8000 series PETs. Here, for each of the BASIC 2 ROM sockets, they have developed an expansion board, normally fitted with two sockets, each board accepting a BASIC 2 and its equivalent BASIC 4 ROM. Note:- a 3-socket board is also under development. The board is then plugged into it's appropriate socket on the PET's printed circuit board and the expansion boards 'daisy-chained' together to operate from a single two way switch. The standard basic kit supplied comprises four dual socket boards to fit into the $F000 to $C000 (UD6,7,8 & 9) sockets. The fifth BASIC 4 chip is plugged direct into the socket on the PET board (UD5). The kit also includes the interconnecting cables and a control box which, it is suggested is fixed to the side of the VDU with the self adhesive pads provided.

The control unit has been designed to give a flexible and expandable system. Three control switches are provided,

one to control the BASIC 2 to 4 changeover and the other two - three position switches to allow for future expansion. The control box also includes a pair of switches to provide a warm reset facility. The reason for this facility will be discussed later. The basic kit suffices if the machine does not have other ROM utilities such as TOOLKIT fitted. If the spare sockets are utilized, additional boards can be obtained for use in the UD3, 4 and 5 sockets to be daisy-chained in with the original four supplied. Alternatively, the last two can be individually controlled from the spare switches with all BASIC 4 chips if required. Further, the expansion can be carried out with the triple socket boards. It should be noted that only one socket on a board is active at any one time and it must be de-activated before another can be accessed if a crash is to be prevented (due to the different link addresses).

There is another reason for providing the individually switched facility. It is possible to use a modified version of the expansion board in the character generator socket so that up to three character generator chips can be utilized. As this socket is continuously accessed but not memory mapped, it is possible to switch these chips during program execution without problem. Sounds ideal so far, but what are the problems in use ? The first problem lies with the PET power supply. The original 2001 series PETs were fitted with static RAMs and a dual 3 amp. 5 volt power supply unit. Early versions of the 'NEW ROM PETs' continued to have the same PSU although the power requirement was reduced by fitting dynamic RAMs with a lower power requirement. Later PETs were, however, fitted with a dual 1.5 amp 5 volt PSU. This PSU is perfectly adequate for a 32K RAM with all the spare sockets filled with expansion ROM. It is inadequate, however, when more than four dual expansion boards are fitted, fully equipped with all ROM chips.

There are two solutions. The first is to use a seperate PSU for the additional ROMs. GHI Electronics are producing such a PSU to fit inside the PET to supply the chips in the top half of the expansion boards independant of the bottom chips. It will also have spare capacity for

other expansion if required so they say (hint of other
goodies on the way ?) This PSU was not used in the review
machine as the PET had a 2x3amp PSU. The alternative is to
replace the 4K ROMs with 2532 EPROMs ! One characteristic
difference between a 4K ROM and an EPROM is in the standby
current requirement when not being accessed. The EPROM in
standby mode only takes a fraction of the current taken
when being accessed with a resultant reduction in the
overall power requirement. This does not apply, however,
with 2K EPROMs.

The second 'problem' is that, although it is possible
to switch from BASIC 2 to BASIC 4 or vice versa without
powering down, the switch causes the PET to lose contol and
crash! Hence the reason that a reset switch is an essential
part of the control unit. The principle of operation of the
reset is the common type based on an idea by Jim
Butterfield. There is a hard reset facility (similar to
power on reset) by just pressing the red switch
momentarily, or a soft reset where the black switch is
depressed and held while the red switch is flicked. The
soft reset has the advantage of not clearing memory, so in
theory, a BASIC program will run in the new BASIC. This
presupposes that the program does not use the PET's ROM
routines. Providing no utilities such as TOOLKIT, PIC-CHIP
etc. are active, all that is necessary is to reset the
stack pointer in M.L. Monitor mode using the method
detailed in the instructions supplied. If the CHARGET
routines in zero page (locations $0070 to $0087) have been
altered by initializing a utility ROM, it is possible to
replace the contents of these locations with the standard
'POWER-ON' values stored in the PET's ROM. The location of
this mirror copy is at:
                BASIC 2 - E0F9 to E110
                BASIC 4 - D399 to D3B0
By printing these locations to the screen while STILL IN
MONITOR and BEFORE exiting to BASIC and altering the
locations to $0070 to $0087, it may be possible to recover
with the program intact. Because some utilities alter more
than the CHARGET routine, however, it is not always fully
effective. This method is not given in the instructions as

only an experienced machine code operator would fully
understand the results. If all else fails, a hard reset and
reload the program is the only sure method if utilities
were in use.

Full fitting instructions are provided with the kit
together with clear sketches and diagrams to illustrate the
sockets, the method of daisy-chaining the boards together
and the pins on the memory expansion port to be used for
the reset wiring connections. There is no soldering to do
(or even nuts and bolts to tighten!), only an appreciation
that the i.c.'s can be damaged by careless handling or by
static electricity. If in doubt, as to how to handle them,
the instructions advise consulting either your PET dealer
or some other competent person. No doubt your local
computer club would be able to assist in this way.

In conclusion, I have found these boards to be
invaluable. They will save their cost many times over in
the reduction of bent pins on the chips! The whole package,
except for the small control unit is fitted internally
maintaining the concept of the minimum of external wires
required. By the use of additional boards, the system can
be customised to whatever you require. Although designed
for use with the 'new-ROM' PETs, the boards can be used in
the 4000/8000 series to allow the use of up to 6 expansion
chips as well as up to three character fonts. In addition,
it supplies the one thing most noticable in its omission
on the PET as supplied, a RESET KEY!

Suppliers - G H I Electronics, 49, Horden Crescent,
Quarry Bank, BRIERLY HILL, West Midlands.
Tel:- Lye (038 482) 6089

Prices:- Basic kit (4 double socket boards etc) 57.50 + VAT
extra expansion board (double socket) 10.75 + VAT
extra expansion board (triple socket) 15.75 + VAT
character gen. board (double socket) 11.50 + VAT
character gen. board (triple socket) 16.50 + VAT
power supply unit (5 volt 3 amp) 25.00 + VAT

All plus £1.50 per order post & packing.

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THE COMMODORE MICRO-MAINFRAME

By Mike Todd

The latest Commodore brainchild is the new Micro-Main Frame computer the MMF9000 and at a price of around £1500 it promises to be a significant addition to the current range of personal computers.

It is something of a departure for Commodore since it no longer relies entirely on the traditional 6502 micro manufactured by MOS Technology, part of the Commodore empire, instead there are two processors inside - the 6502 and the Motorola 6809§. The 6809 is much more powerful than the 6502 - as well as having such instructions as single byte multiply and extra registers, it allows manipulation of 16-bit bytes on some commands thereby saving considerable time and effort. Not only that (yes there's more !) the 6809 is capable of supporting more than the usual 64K of addressable RAM using extended addressing techniques.

The MMF9000 also has the advantage that several companies outside Commodore have been involved both in the hardware and software development. The hardware consists of 36K ROM and 96K RAM, and each 4K RAM block can be allocated its address through software thus allowing chunks of RAM to be moved around at will. The 6502 is not forgotten, and it appears that the user can gain access to either micro as he wishes - although I suspect that the 6502 will not see much service since the range of software available for the 6809 will be very significant. Written by the University of Waterloo in Ontario, Canada this will include a completely standard implementation of APL, a slightly enhanced PASCAL with facilities for text file manipulation, a powerful (but non-standard) implementation of FORTRAN with enhanced error diagnostics and debugging facilities, a structured BASIC with many extra facilities (not least of which is the ability to recognise long variable names) and in the not too distant future there will be COBOL available.

§ [6502-Micro Journal now covers the 6809 processor - Ed].

There will be a line oriented text-editor with many useful edit features and for the machine code programmer a full facility 6809 Assembler and Linker package allowing macro definitions and producing relocatable object code. To complement all this, there is a monitor facility within the Supervisor providing the usual monitor facilities including a disassembler. Included in the Supervisor are routines to set up the communications facilities and a set of library subroutines to handle input and output as well as giving access to arithmetic functions and utilities.

The communications facilities are based upon a standard RS232 interface which can be configured up to 9600 baud. Together with a terminal emulation facility this will allow access to mainframe installations, and since source code is generally held as ASCII files, it will allow programs to be developed on the MMF9000 and then transferred to larger machines with little effort especially as some mainframes also run Waterloo implementations of the languages!

What of the usual range of Commodore peripherals — disks, printers etc? Well all these are supported, although if you want to use the cassette, forget it — it is the only one that is not supported.

Finally, the machine is very similar in its external specification to the 8032 and 8096 with an 80x25 character screen and a 73-character keyboard supporting upper and lower case.

This new horse from the Commodore stable could well prove a winner in both the educational and business stakes and it is expected to be available in the UK towards the end of the year.

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REMINDER...

Don't forget the AGM on September 26th at the North London Polytechnic, Holloway Road, London, N7. Time 2.00pm.

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SHOP WINDOW

Is your PET old, tatty, scratched, decrepid, or simply looking the worse for wear ? Give your bodywork a complete facelift with a tough epoxy cream splutter finish for £ 30.00. Panel beating and shipping are extra and only complete stripped cases are acceptable. Contact Stage One Computers, 6, Criterion Arcade, Old Christchurch Road, Bournemouth. Tel (0202) 23570.

Teleprinter Equipment Ltd. have produced a plug-in interface card which enables all three model Paper Tiger printers (445, 460 and 560) to be fully compatible with the PET. Tel: Tring (044-282) 4011.

Millenium Professional & Technical Services offer a low-cost interface between bit parallel or bit serial source to an IEEE-488 bus. The board is a Eurocard with 6800 processor and MC68488 interface controller chip. Address: Boulton Road, Stevenage, Herts, SG1 4QX. Tel: Stevenage (0438) 726661/3.

A range of interface boards to fit an expansion card frame which links with the memory expansion bus comes under the name Databoard 4680 from Microtech. The list is too numerous to detail here, but includes a 1K CMOS RAM with battery back-up and a colour video RAM. The graphics mode for this is Viewdata/Prestel standard. A 6809 single-board computer is also available as is a cross-assembler. Details from Microsystems Technology (Microtech) Ltd., P.O. Box 5, Knutsford, Cheshire, WA16 9DU. Tel: (0565) 52911.

If you don't like the type-font produced by Commodore's character generator, try the one from ACM Software. It includes both pound '£' and omega symbols. If this doesn't suit your requirement, you can have a customised character set for the same price of £ 19.99. Also available is a switchable chip selector for £ 8.00 both from ACM Software, 214, Church Hill Road, North Cheam, Surrey. SM3 8LA. Tel: 01-644 4535.

Interface 80 is a robust frame containing an IEEE-488 decoder, power supply and five pre-wired slots to accept DIN41612 connectors on cards 8 1/4" x 5". Separate 8-bit talk & listen busses coexist with an LED to indicate which is active. Price complete is about £350, details from Duncan Smyth at Machsize Ltd., York House, Clarendon Avenue, Leamington Spa, Warwickshire, CV32 5PP. Tel: (0926) 312542 & 32399. (See photo spread).

Another interface unit comes from Feedback Instruments Ltd. Aimed at the educational market, the interface connects to a range of application modules to demonstrate the action of say a stepper motor, a diesel generator, traffic light control and others. Details from Feedback Instruments Ltd, Park Road, Crowborough, Sussex, TN6 2QR. Tel: (08926) 3322.

Yet a further interface system comes with a card racking system and power supply at £ 130.00 and houses A-D and I/O modules at prices around £60 each. Details from Contrology Techniques Ltd., 18, Colvilles Place, Kelvin, East Kilbride, G75 OTF. Tel: (03552) 36358/36222.

A range of mains interference filters is available from Alan Kiddle Associates Ltd., Fairlight House, 729, London Road, Hounslow, Middx, TW3 1SE. Tel: 01-543 0179.

I have received a number of catalogues of sundry products. A range of computer cleaning products is covered for cleaning disks, heads, screens and keytops from Automation Facilities Ltd. Tel: Wargrave (073522) 3012. An enormous range of printer ribbons is included in the catalogue from the Columbia Ribbon & Carbon Manufacturing Co. Ltd., tel: 01-778 6011. The Inmac catalogue includes such gems as IEEE bus cables, cables for DEC, DGC & HP equipment, paper, ribbons, storage media, dust filters, folders & binders, VDU & printer stands. Delivery is remarkably quick. Tel: Runcorn (09285) 67551.

Component distributors Celdis are jumping on the IEEE bus with a range of products from Amphenol. These include a 2-metre cable at £ 37.46, a panel mouting connector at

£2.80 and three Motorola micromodules for the bus. Contact W.G.Hicks, Celdis Ltd., 37, Loverock Road, Reading, Berks, RG3 1ED. Tel: (0734) 586191.

Many 8K users have been discouraged from expanding their memory because of cost. A range of really cheap (in comparison) memory expansion modules is available from Audio Computers. Modules up to 128K are available, either assembled or in kit form or bare board and cheap - like £39 for 16K. Before ordering discuss your requirement with them (Walter Green has successfully upgraded his 8K machine) contact H.Perry, Audio Computers, 87, Bournemouth Park Road, Southend, Essex. Tel: (0702) 613081.

Cheap chips in the form of RAM or EPROM are offered by TDS, e.g. 4116 16K RAM @ £1.32 for 1-9 qty, VAT included, 2532 4K EPROM @ £7.00. TTL & CMOS devices also available as are EPSON printers. Further details from T.D.S., 57, Westmead, Woking, Surrey, GU21 3BS. Tel: (04862) 20435.

A programmable manipulating arm that can be attached to a microcomputer has been launched by Colne Robotics. The arm can lift up to 10 ounces and is to have an electomagnetic manipulator and small paint spray gun. The arm is available in kit form for £199 or £275 assembled. Add £20 for a control box and £45 for software (on cassette). Colne Robotics are London based, but address details are not to hand as I write.

Last issue in this column I briefly mentioned the hard-disk drive for the PET. It now appears that there are two, Mator, based at Hove near Brighton, Sussex has a system to link up to 8 PETs using the Shark Drive and known as the 'Octopus' and the Corvus system which potentially can be accessed by 64 users and is available in 5,10 or 20M-byte models from Small Systems Engineering. The Mator system is about £3,500 for 35M-bytes and the Corvus about £5,100. Commodore are backing the Mator system which appeared at the PET Show.

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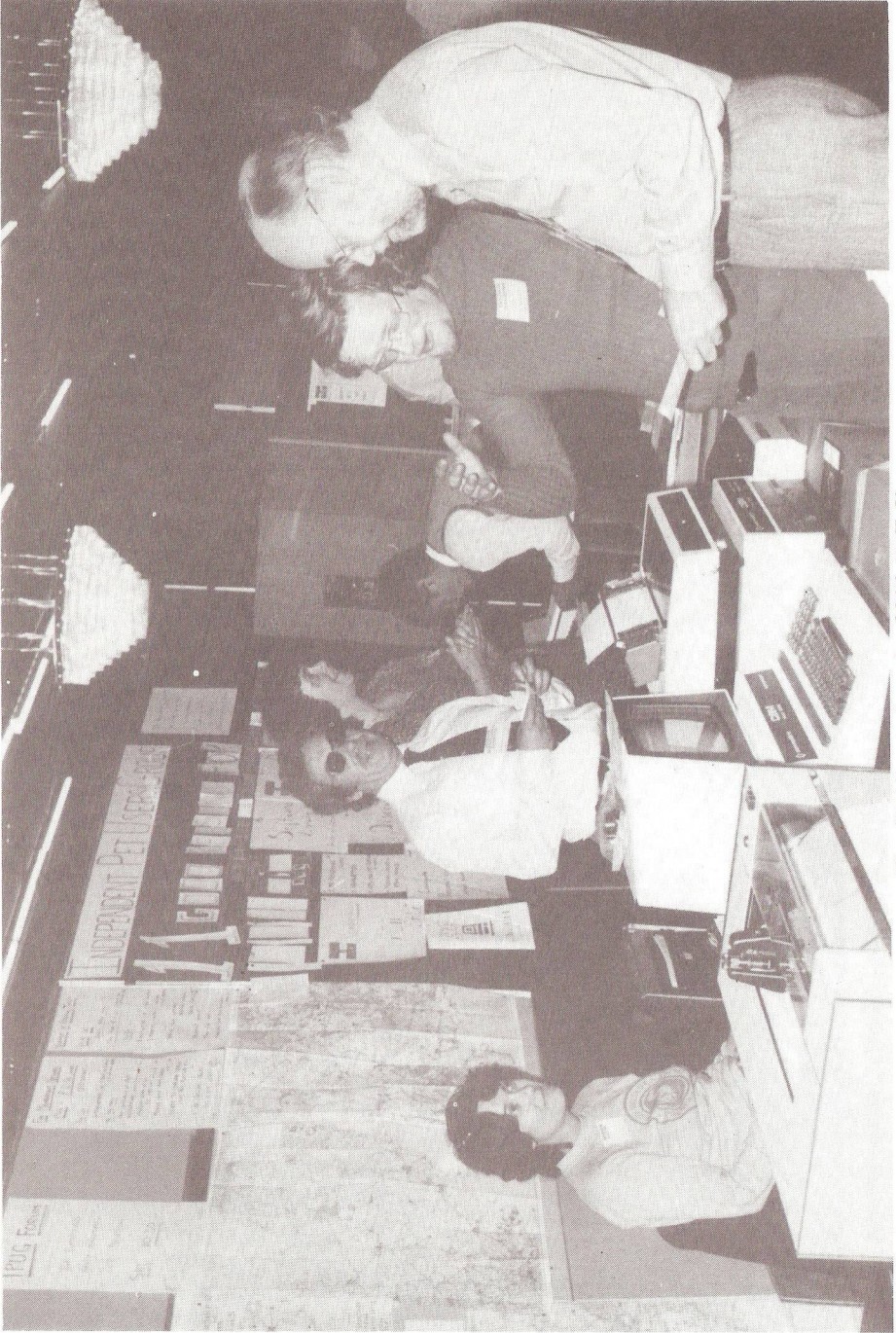
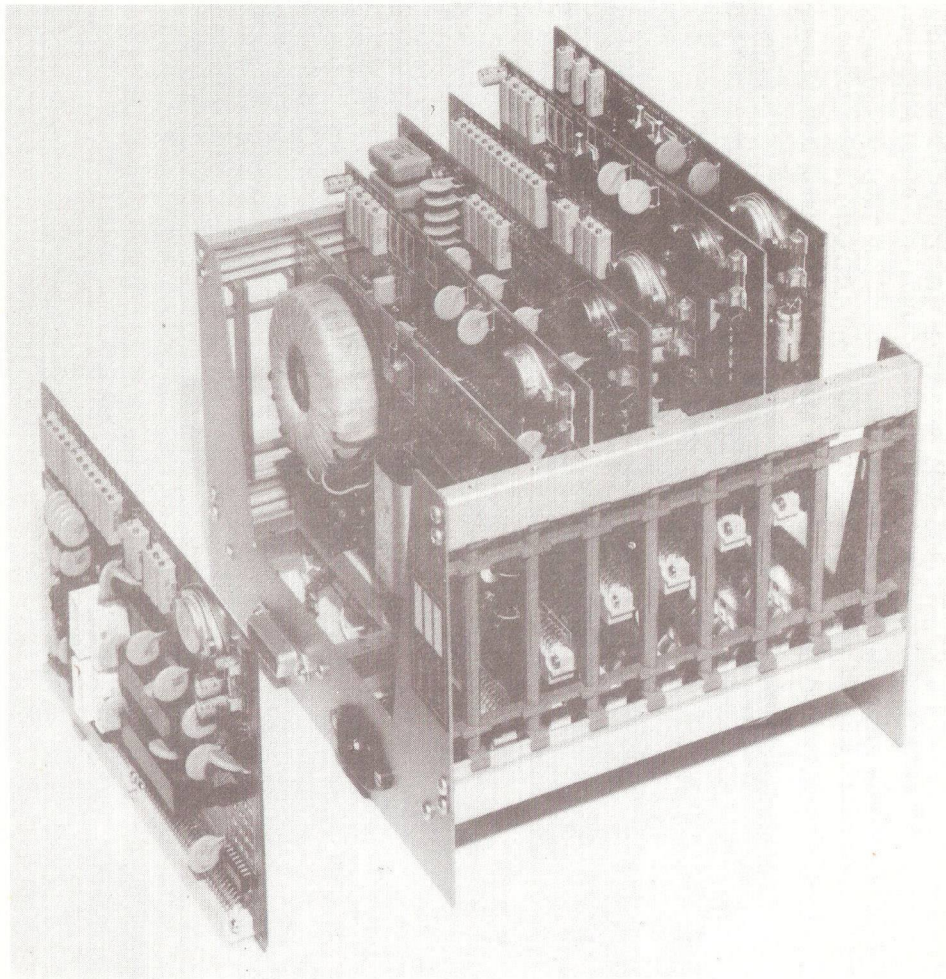The IPUG stand at the 1981 PET Show.

Left to right, MICHAEL FALTER - Managing Director, SCOTTY BAMBURY - Chairman, DAVID JAMES - Inventor.

THE LAST ONE - D.J.'AI' SYSTEMS LTD. 04605 - 4117

The Machsize Mini-Rack (see Shop Window).

Do-it-yourself computer systems.   Mini-Rack is a new rack unit containing an IEEE decoder, power supply and five pre-wired slots to accept Machsize circuit boards. These circuit boards are designed to interface a microcomputer to industrial instruments.

This equipment is inexpensive, and expected to be welcomed by do-it-yourself systems engineers working on industrial automation.

For further information contact Duncan Smyth at Machsize Ltd., York House, Carendon Avenue, Leamington Spa, Warwickshire CV32 5PP. Telephone: Leamington Spa (0926) 312542 & 32399.

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Julian Allason breathes down the neck of Richard Pawson to produce MicroComputer PRINTOUT on time.

MicroComputer PRINTOUT magazine (launched 18th June) presents a consumer's view of the computer industry. Publisher Julian Allason, right, and Editor Richard Pawson are seen here at the magazine's offices in Newbury.

For further information contact Peter Cunard, Granard Communications Ltd. Telephone: 01-839-6361 or Julian Allason, MicroComputer PRINTOUT. Telephone: 0635 201131.

COMMODORE COLUMN

Commodore has set up a new company headed by Andrew Goltz, former market support manager, to export the best British designed software plus products in the 'approved' list. The Commodore Supply Company will start selling to Scandinavia, France and Germany and ultimately to the US and Canada. The first products will be business and scientific packages for accounting, payroll, wordprocessing and filing from Anagram Systems, Dataview and the Bristol Software Factory. About 20 hardware products will figure in the list, including the new Mator hard disk drive. For the first year the company will be run as a one-man outfit.

Noises are reaching me that it is proposed to hold an Annual PET Convention opposite in the calender to The PET Show. This would put it about November/December - just right for Christmas shopping.

Commodore Semiconductor Group market the MDS6500 Microcomputer development system. Apart from the labels, it looks remarkably like a 3032, 2040 & 2022 set-up. In addition a new range of single board micro modules based of the 6508 have been introduced and feature new chips in the 6500-series.

--oOo--

NEW SOFTWARE SERVICE

Disks of software are now available from the IPUG Library at reasonable prices.
 Disk#1: All current IPUG software.
 Disk#2: Public domain software.
Price:- £6 per disk.

All enquiries should be made to:- Bob Wood, 13, Bowland Crescent, Ward Green, Barnsley, S. Yorks. If a reply is anticipated, please enclose s.a.e. Note also that the cassette-based software is still available.

--oOo--

HEX SEARCH

By Bill Staden

This program scans all RAM & ROM for a specified 2- or 3-byte instruction sequence. It is self-modifying depending whether one elects to search for "byte 1-any byte-byte 2" or "2 consecutive bytes" or "3 consecutive bytes". For example to find every occurrence of $F301 (test for 'STOP'-key, BASIC2), enter option 3, then 20 01 F3 ie hex code for JSR $F301. Option 1 enables one to find, for example JMP $D0xx.

The bytes may be entered singly with <return>, or as a triplet. Faulty input results in a jump to monitor, not a 'crash'. The routine resides in the second cassette buffer and is called by SYS826.

```
1000    *=826                         ;**HEX SEARCH**
1020    33A A9 D0              LDA #$D0
1040    33C 8D BA 03           STA $03BA
1060    33F 8D BD 03           STA $03BD
1080    342 A9 F0              LDA #$F0
1100    344 8D BB 03           STA $03BB
1120    347 A9 C8              LDA #$C8
1140    349 8D BC 03           STA $03BC

1160    34C 20 CF FF           JSR $FFCF
1180    34F 85 10              STA $10       ;OPTION
1200    351 C9 31              CMP #$31
1220    353 D0 0A              BNE OP2
1240    355 A9 EA      OP1     LDA #$EA      ;NOP
1260    357 8D BA 03           STA $03BA
1280    35A 8D BB 03           STA $03BB
1300    35D D0 14              BNE $0373
1320    35F C9 32      OP2     CMP #$32
1340    361 D0 0C              BNE $036F
1360    363 A9 50              LDA #$50
1380    365 8D BC 03           STA $03BC
1400    368 A9 11              LDA #$11
1420    36A 8D BD 03           STA $03BD.
1440    36D D0 04              BNE $0373
1460    36F C9 33      OP3     CMP #$33
1480    371 D0 D9              BNE $034C
```

```
1500    373 20 E2 C9          JSR $C9E2       ;CR/LF
1520    376 A0 02             LDY #$02
1540    378 A2 B1             LDX #$B1
1560    37A 8A               TXA
1580    37B 48               PHA
1600    37C 20 75 E7          JSR $E775       ;O/P HEX
1620    37F 20 3D CA          JSR $CA3D       ;O/P SPACE
1640    382 68               PLA
1660    383 AA               TAX
1680    384 E8               INX
1700    385 88               DEY
1720    386 10 F2             BPL $037A
1740    388 20 E2 C9          JSR $C9E2       ;;;CR/LF
1760    38B 20 F2 03          JSR $03F2
1780    38E 86 A2             STX $A2         ;;;BYTE1
1800    390 20 F2 03          JSR $03F2
1820    393 86 B6             STX $B6         ;BYTE2
1840    395 A5 10             LDA $10         ;;;OPTION
1860    397 C9 32             CMP #$32        ;;;was it 2 ?
1880    399 F0 05             BEQ $03A0
1900    39B 20 B6 E7          JSR $E7B6       ;get 2-byte hex
1920    39E 85 B8             STA $B8         ;;;BYTE3

1940    3A0 20 E2 C9   B11    JSR $C9E2       ;CR/LF
1960    3A3 A9 00             LDA #00
1980    3A5 85 01             STA $01
2000    3A7 85 02             STA $02
2020    3A9 A8               TAY
2040    3AA B1 01     B15    LDA ($01),Y
2060    3AC C8       B16    INY
2080    3AD D0 03             BNE B13
2100    3AF 20 EA 03          JSR $03EA
2120    3B2 C5 A2     B13    CMP BYTE1
2140    3B4 D0 F4             BNE B15
2160    3B6 B1 01             LDA ($01),Y
2180    3B8 C5 B6             CMP BYTE2
2200    3BA D0 F0             BNE B16
2220    3BC C8               INY
2240    3BD D0 03             BNE B23
2260    3BF 20 EA 03          JSR $03EA
2280    3C2 B1 01     B23    LDA ($01),Y
2300    3C4 88               DEY
2320    3C5 C0 FF             CPY #$FF
```

```
2340    3C7 D0 02              BNE B24
2360    3C9 C6 02              DEC $02
2380    3CB C5 B8      B24     CMP $B8       ;BYTE3
2400    3CD D0 DB              BNE B15
2420    3CF 88        B17     DEY           ;'FOUND' ROUTINE
2440    3D0 C0 FF              CPY #$FF
2460    3D2 D0 02              BNE B18
2480    3D4 C6 02              DEC $02
2500    3D6 84 FB      B18     STY $FB
2520    3D8 A5 02              LDA $02
2540    3DA 85 FC              STA $FC
2560    3DC C8                INY
2580    3DD D0 02              BNE B19
2600    3DF E6 02              INC $02
2620    3E1 20 6A E7  B19     JSR $E76A      ;;;O/P 2-HEX
2640    3E4 20 3D CA          JSR $CA3D      ;O/P SPACE
2660    3E7 4C AA 03          JMP B15
2680    3EA E6 02              INC $02        ;ADVANCE PAGE
2700    3EC D0 03              BNE B21
2720    3EE 4C 89 C3          JMP $C389      ;O/P 'READY'
2740    3F1 60        B21     RTS
2760    3F2 20 B6 E7          JSR $E7B6      ;GET HEX & SPACE
2780    3F5 AA                TAX
2800    3F6 20 CF FF          JSR $FFCF      ;GET CHARACTER
2820    3F9 60                RTS
```

$033A=system restore, $034C inputs option
Option 1 puts NOP at $03BA & $03BB if first byte found.

--oOo--

MEMBERS SALES & WANTS

Evening-operating CBM servicing expert wanted for 8032, 4040 and 8026 to maintain the system on call-out for appropriate fee (inc VAT and tax where appropriate). Ideally the person would live in SE London or North Kent and be technically competant. The system involved is used regularly with Wordcraft 80 by a business user. Contact: Frank J. Pycroft, PI-COPY, 70, Parkview Road, London SE9 3QW. Tel: 01-850 5975 (Ansafone).

--oOo--

32K PET, 2040 disk drive and 3022 tractor printer for sale, offers to Pete Smith, 48, Woodham Waye, Woking, Surrey, GU21 5SJ.

'Toolkit' (for BASIC 2) £20, and KRK hardware repeat key £25, both include manual. Also 2008 PET with manuals. Contact John Bromfield, 12, Grasmere Ave., Harpenden, Herts. Tel: Luton 423885 (day).

--o0o--

WORDPRO MODIFICATIONS

By K Viney.

Users of Word Pro who would like to interface to their own files, may find the following of some use. The first two bytes of a Word Pro file are the load address ($5108) with each line occupying 40 characters and all text containing embedded control commands stored exactly as displayed on the screen. The value for any character is the same as in screen RAM (lower case mode).

To read a Word Pro file: OPEN1,8,1,'0:NAME,S,R' ignore the load address and use say GET#1,D$. Then translate back into normal ASCII if desired.

To write a Word Pro file: OPEN1,8,1,'0:NAME,P,W" add the load address [PRINT#1,CHR$(8);CHR$(81)] followed by your data.

To change the enhanced printing mode to reverse field for the CBM 3022/3 printer on Word Pro 3 the following bytes should be altered from monitor or BASIC:

Address		New Contents	
HEX	DECIMAL	HEX	DECIMAL
36B0	14000	12	18
36CF	14031	92	146

Once altered, the program can be SAVEd to disk/cassette in the normal way.

--o0o--

Your editor attended a recent press conference on that controvertial program called 'The LAST ONE'. Commodore even went as far as to deny the existence of the program. After all the publicity what are the facts ?

I'VE SEEN THE LAST ONE

Over six months of advance publicity and claims bordering on the outrageous have given rise to scepticism, mystery and disbelief in some quarters and at the other extreme, great acclaim for a masterpiece of software - a program that can write programs for you 'bug free'. Followers of the latter school of thought have committed $5.3 million in advance orders. The disbelievers chose to ignore it and even slate it.

Does it exist ?? Er, well yes & no. If you were to send off your £ 260.00 + VAT, don't expect to receive anything by return. 'The Last One' is the product of the work in artificial intelligence by David James, creator of the program. A team of experts on different machines were commissioned to produce versions for the respective machines. Tandy were believers and loaned equipment for program development. Alas, Commodore were not and the PET version, although more exotic than for other machines, is still not 'user friendly' and requires some work before completion. Now it just happens that Marck Pearlstone, their PET expert, is also the expert on other machines and the project leader. Demand for his time has put the PET version to the back of the queue. We will know when it exists, I shall be reviewing it. Until then....

Watching the Tandy version was interesting. The program is slow - at present written in BASIC, and the Tandy is a slow machine compared to PET and Apple, and is a code generating program, producing BASIC on disk. So what do you have to do to get a program to write a program for you ? 'The Last One' starts you off with a menu. It was interesting to watch a total novice kick off and go round a complete loop, but to be fair without reference to the handbook. Eventually, by a continual series of menu

selections and prompts a high level sequence of statements is produced which is your flowchart. While doing this the disk unit has been quietly stashing away your resultant equivalent in BASIC, syntactically correct, with input validation. The completed program can be refined, revised, listed as a 'flowchart' or as BASIC.

The program is not without its limitations, but is at its best in writing business programs. It has inherent features such as file handling and sort routines and will produce code at some 200 lines per hour. It is claimed that by hand a professional programmer typically creates 3000 lines per year. For more information contact D.J. 'AI' Systems Ltd., Station Road, Ilminster, Somerset, TA19 9BQ. Tel: (04605) 4117. [Footnote: the US price is $600].

Just as we closed for press, the Last One looks like being stopped by an injunction.

--oOo--

DISK LOAD ERROR

If you persistently get a 23 LOAD ERROR on any track/sector except 18/0, it is possible to recover the data very simply. However, the data will more than likely be corrupted either by a single, or many bytes ! With disk in drive 0 (and no write protect !) and the disk initialised:

```
OPEN1,8,15:OPEN2,8,2,"#"
PRINT#1,"U1";2;0;TR;SE
```
This will read the corrupted track and sector, but will abort to an error condition (i.e. checksum error), but the sector will be in the buffer ! So:-

```
PRINT#1,"U2";2;0;TR;SE
```
will re-write it, correcting the checksum as it goes ! (If there is a media fault, however, the write will fail). It is then up to you to find what corruption occurred and put it right. If it is 18/00 which is corrupt, life is difficult (the disk will not initialize); there are ways, but more of this anon.....

Mike Todd

--oOo--

THAT 'INPUT' BUG

Most PET users will be aware of a bug in the INPUT command which can result in the response having the INPUT prompt included. This can occur under two different circumstances. The first (and most publicised) is when INPUT is taken from the very bottom line of the screen and the typed response extends beyond the end of the line resulting in the screen scrolling up. The other condition is if the cursor is moved off the prompt line and then back again for any reason.

Both these events occur fairly infrequently, but it can cause problems — although I'm afraid there is no solution to the problem. However it might be some consolation to know why the problems occur, the reason being very simple.

In order to prevent the prompt (i.e. anything to the left of the "? ") being included as part of the user response, the interpreter remembers the position of the cursor immediately following the "? " prompt — the line number of the prompt is saved in $A3 and the position on the line in $A4. When return is hit, only characters to the right are read from the screen.

The writer of the interpreter now has a dilemma — what to do if the cursor is moved off the line and RETURN is hit? There are two options:
(1) read characters to the right of the logged position as if there were a prompt on that line.

(2) accept input from the whole of the new line ignoring the pointer $A4.

The former isn't logical so option (2) is the one used — if the cursor is on the same line as the input prompt (ie if $A3=$D8, where $D8 is the current cursor line number) then input is read from where the prompt ends (i.e. from position $A4). However, if they're different the entire line is read.

Now to the first problem. If INPUT is requested from line 24 (the bottom line - line 0 being at the top) and the response goes beyond the end of the line, the screen will scroll up. In doing so, the input line is now line 23 (since an 80 character line has been generated and this takes its line number from the first half-line which has just been scrolled up to line 23 !). When the user now hits RETURN, the line log still shows line 24, but the actual line number is now 23. The interpreter now thinks the cursor is on a different line to the prompt and so the entire line is read, prompt and all ! The solution would have been very simple - whenever the current line number ($D8) is decremented after a scroll, $A4 should be decremented at the same time. I have tried this on a RAM based version of BASIC and it solves the problem completely.

Unfortunately this doesn't explain the second bug which results from some messy coding. There appears to be some "left-over" coding (at $E519) which tries to set bit-7 of the line log ($A3) if the cursor moves down to the next line. The coding fails to do this properly and it also shifts $A3 to the right, thereby dividing it by 2. Result - whenever the cursor is moved to the next line (except when normal wrap-around occurs) the logged line number will differ from the actual line number and the whole line read as before.

Since both bugs existed in BASIC1 and BASIC2 it is amazing that they still exist in BASIC4 - but they do - although an attempt appears to have been made in the 40 column version to eliminate the bottom of screen wrap around bug, the other still exists even though the solution is simple and amounts to changing only 6 bytes of code !

Mike Todd

--oOo--

THE VIC-20 COLUMN

Since few of you will have bought a VIC-20 (yet) I could hardly expect members to contribute to the VIC column this issue. Mike Todd will be the contributing editor for this column. Business users among our membership may well regard the VIC as a games machine (it is), but remember that many of you will be developing software and hardware add-ons for the VIC, and that is the object of this column. The VIC is a complex beast and has tremendous computing potential.

The circuit board has about 30 i.c's, the major ones being the 6502 processor, two 6522 versatile interface adapters (VIAs), three ROMs and the VIC chip. The first ROM is 4K of character generator at $8000, the second contains 8K of BASIC, supposedly BASIC 2, but there are differences. The third is the Kernel ROM (more of which later). With screen RAM starting at $1E00 and 24K of expansion ROM or RAM at $2000-up the memory map looks a little odd. However clever tricks are done with pointers in the VIC chip — all will be revealed in these pages.

The VIC chip is the MCS 6560 (actually the 6561 for the UK PAL TV system) and is designed expressly for video games. It handles all screen operations, colour and sound. It has 16 control registers which control four sound sources, two A-D converters, light pen/games gun, plus a few goodies not utilised in the VIC-20. Other registers act as pointers to control the format of the video raster.

The colour arrangements are quite complex and versatile and I will attempt a loose explanation. One can independently control the colour of the border (6 + black & white), the background (14 + black & white) and the character (6 + black & white). Reverse field transposes background and character colour. Now if that isn't pretty enough, there is a multi-colour mode in which character resolution is exchanged for even more colour — 4 per character.

The keyboard layout is different to the PET — there is no numeric pad. Graphics are two to a key and selection of the shifted left or right character is by shift key or a 'CBM' key (it is marked with the Commodore logo). There is a 'Control' key to set character colours and, with expansion, user defined functions in conjunction with the 'function' keys. A 'Restore' key generates a NMI which causes a warm start to BASIC — a built-in un-crasher ! Auto-repeat occurs on cursor control keys, but can be extended to all keys with POKE to a location that eludes me at the moment. Ah, this is it POKE650,0 cursor control keys plus space repeat, POKE650,127 no keys repeat, and POKE650,128 all keys repeat. Location 651 contains the delay before repeat and 652 the delay between repeats. Now on a 27" TV with only 22 characters on a line, it doesn't take much before the cursor has zipped off into the next room ! You may want to slow it down. Finally, pressing 'shift' and the 'CBM' key flips the graphics to lower case.

There is a serial port which is programmable and I/O is handled in software using one of the 6522 VIA chips. The design however allows for the possible replacement by the 6551 ACIA chip to reduce the software overhead. The port is described as RS232C, but does not conform (the PET does not implement IEEE-488 to the standard) the connector is a 6-pin DIN type for the serial port and the modem add-on goes on the user port. The software sequences appear to exist and I will try to hook up an RS232C device in the near future to test it. Certainly the literature talks of modems, Prestel, etc.

Other snippets: After adopting an american redesign, Commodore have settled on a UK price of £ 199 including VAT. The new cassette deck (with counter) is £ 45 and is PET compatible (who's going to pay £ 55 for the C2N ?). The 3K RAM packs are out and there is a 16K expansion with battery back-up to come which is PET/CBM-compatible. By Christmas expect a single floppy drive at <£ 300. There is much more to come — read our next issue....

<div align="right">R.D.G.</div>

--oOo--

BOOK REVIEW

PET INTERFACING   By J.M.Downey & S.M.Rogers
Howard W. Sams & Co. Inc., Indiana.   UK Price £ 11.15
                        (Computer Book Shop, Birmingham)

The addition of this paperback to the range of
PET-related literature restores the balance on the hardware
side. BASIC is used throughout the major portion of the
book, the appendices excepted. 'Hardware' is not so readily
taught as software since it is not so mathematically
perfect. The author therefore assumes a knowledge of
digital electronics, familiarity with the 7400-series
family of TTL, the 4000-series CMOS, A-D & D-A conversion
and the ability to read a circuit diagram.

The user port is described in conjunction with an
add-on breadboard to provide parallel I/O. This is the
inevitable switch-contact input and LED output, but is
useful in explaining how to use the 6522 VIA chip which
controls the port. I feel that the explanation is more
lucid than obtained from other sources that attempt to
describe the complexities of programming the 6522. A series
of 'experiments' familiarises the user with the different
facilities available from the PET's 6522 (not all are
accessible externally).

Expansion of I/O beyond eight bits is described, plus
serial I/O. Little gems occasionally appear such as using
the IEEE-488 SRQ line as a transition-sensitive input and
using the cassette-read line for input.

If not using the IEEE-488 port, the 8-bit data lines
can be used for driving up to 48mA. Several paragraphs
describe the idiosyncrasies of using the DIO lines of this
port.

The 'breadboard' theme continues with descriptions of
interfacing to A-D and D-A converters and to a graphic
plotter with BASIC programs where appropriate.

Perhaps the most useful and yet the most complex
interface is the memory expansion port. Address decoding
schemes are described plus a description of an I/O

breadboard for the memory expansion port. Both types of PET are described, with connector allocations listed for each. The minimum breadboard gives one addressable 8-bit output, plus one addressable 8-bit input, accompanied by LEDs and switches respectively. The text proceeds to elaborate on the minimum circuitry, introducing latching, address decoding, addressable analogue I/O and adding a PIA.

By chapter 8 the book starts to get technical. The hardware nitty-gritty of the IEEE-488 bus standard is described in a more adult manner than in 'PET & the IEEE-488 Bus'. Bit sequences for the different modes of use are tabulated. While the explanations are quite comprehensive this interface is strictly for the advanced worker. A printer interface is described which will replace PET graphic characters with a space (or whatever), send nulls after carriage return, does code conversion and limits line length to 72 or 80. The interface comprises a UART serialiser, a 6502 processor, a 2708 EPROM, and a few sundry chips. The software is given as a hex dump and assembler source listing with comments. The software provides for patches to accommodate ones own requirements. If that isn't enough the appendices provide detailed flow-charts for the IEEE controller and Talker/Listener sequences.

The 262-pages of this book are complete with contents and index and is, recommended to anyone handy with a soldering iron.

R.D.G.

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TOOLKIT QUIRK

By Tom Cranstoun

The Toolkit has an interesting bug in it. If one tries to renumber a program in this manner: RENUMBER100,0 then the ROM will actually do this and you have lost your program. It cannot be renumbered either. Try it ! Also, if one types NEW and then proceeds to FIND something on the first line, it will, even though the program is gone as far as Toolkit is concerned.

--oOo--

BOOK REVIEW

PET GRAPHICS   By Nick Hampshire

Coming from the same stable as 'The PET Revealed'
(vol2, pp5 & 93)§ and 'Handbook of PET Subroutines' (vol2,
p167)§ it has a similar style - plenty of useful stuff, but
interspersed with the occasional 'howler' to keep the
reader on his toes. 'PET Graphics' kicks off with the
latter on page 1. The text describing the PETs video format
is vague in parts and erroneous in others. This is
unfortunate because there is currently no reference text on
PET's video standard and it is unique. It does not conform
to any existing international TV standard (I speak with
authority here, for I have designed an add-in board to
split the screen picture between two separate video
monitors). Perhaps this will be remedied in the next IPUG
special publication.

BASIC routines are given to illustrate by example use
of PET's graphics, in some cases complete programs (e.g
'Hangman'). It is noted that BASIC is often too slow for
some purposes and in these cases machine code routines are
given. The routines use BASIC 2 but the example to position
the cursor at specified co-ordinates could have called
the routine at $E25D to do the work. Routines are given to
draw bars of any character, block filling and reversing,
plus an example program to demonstrate their use.

A chapter covers fine-resolution plotting, bar charts
and histograms, both in BASIC and machine-code, followed by
one on screen & character block scrolling. Double-density
plotting is covered both in code and pictorially. Not much
chat, plenty of program material.

Chapter 6 begins the more advanced stuff. It covers
creating large multiple-screen displays and using the
screen as a sliding window over a much larger area of
memory. Chapter 7 treats us to moving graphics, not exactly
'Space Invaders' style, but moving sign-board type.

§ (IPUG Newsletter reviews).

In chapter 8 the construction and operation of a light pen is discussed, however the control unit is not required for 8000-series machines - the CRT controller chip handles the signal directly. The chapter is very hardware orientated and not for the faint-hearted. Software is BASIC with a SYS call to the pen routine.

The Appendices include circuits relating to the video logic (reproduced from the official diagrams), a table of PET codes - decimal & hex to ASCII, tokens, screen poke and 6502 op-code, together with the appropriate graphic symbol. The 6502 instruction set table is reproduced, the book concluding with an index.

I did not test any of the programs for the purpose of this review, but they were reproduced from listings and I would have a high confidence in their operation. The text of the book suffers from the occasional dropped character and Nick's cute spellings (I noted DECIBELL and particularly liked 'periferal'). A page for notes is included at the end of most chapters.

Despite some of my remarks above, this is a useful book which should help improve the presentation of information on the screen in your programs. There are over 200 pages of A-4.

R.D.G.

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8032 DIFFERENCES

By Harry Broomhall

The 'E' ROM in the new 8032 has, by changing it from an '03' to an '04' produced a video o/p to the screen (& userport) that is now to UK tv standards ie 50Hz and 625 lines. This eliminates any line wobble that earlier models sometimes suffered from. TI is still 1/60th second.

The Keyboard matrix on the 8032 is different for the business and the graphics keyboard. Programmers should either allow for this or avoid using this matrix when testing for a key down.

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IPUG DISCOUNT LIST

The following is a list of firms who have offered special rates to members of IPUG. We hope to greatly increase the numbers and have approached several suppliers on your behalf. When writing to these firms be sure to quote your full membership details.

Kingston Computers.

Kingston produce a wide variety of special interfaces for your PET eg, Netkit which allows PETs to be linked together and direct to mainframes, minis, or any RS232 device. High speed transmission of up to 19,200 Baud is possible. Kingston advertise their other products widely in all the main journals and will allow IPUG members a 10% discount on any of them ! Details from - Kingston Computers Ltd. Electricity Buildings, Filey N.Yorkshire YO14 9PJ.

Midwich Computer Company.

This company specialises in the supply of ICs both computer types and TTL, CMOS, D/A converters, etc. They will sell IPUG members any quantity of chips at the 100 off rate. Latest lists etc from- Midwich Computer Company Ltd. Hewitt House, Northgate Street, Bury St. Edmonds, Suffolk, IP33 1HQ. Tel: (0284) 701321.

Micro Peripherals.

This firm are making a special offer to IPUG members of the Epson MX70 9 - 1/2 inch Tractor printer for £ 199 + VAT. It has hi-res graphics, speed of 80cps, pound sign etc. Snag - it's only available with Centronics interface so PET users will need an extra interface ! Anyway it is cheap so for further information contact - Micro Peripherals, 61 New Market Square, Basingstoke, Hants. Tel: (0256) 56468.

Graham Brain.

Graham imports floppy disks and has the following offer to IPUG members - Double density, single sided, 5"

disks, supplied in plastic library boxes, sealed and with full no quibble replacement guarantee:- £14.80 +£1 postage and packing + VAT. These are top grade disks. Double sided disks are £ 20 per box + carr. & VAT as above. Cheques:- G.J.Brain, 81 Rydal Crescent, Perivale, Middx. Tel: 01-997 0986.

Intex Datalog Ltd.

This firm supply edge connectors for the PET at competitive prices. They also sell paper, ribbons and many other general accessories. They will allow IPUG members 10% off published prices. See adverts in the general computing press, or contact: Intex Datalog Ltd., Eaglescliffe Industrial Estate, Eaglescliffe, Stockton-on-Tees, Cleveland, TS16 OPN. Tel: 0642 781193.

That's all this month. If any manufacturer or supplier would like to offer special rates to IPUG members could he please contact - David Annal, 142, Windmere Rd, London, SW16 5HE. Tel: 01-764 4043.

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ROUND THE REGIONS

North Hampshire group were recently treated to a galaxy of colour and sound from two VIC-20 computers. Some interesting experiments were tried POKEing the VIC chip registers with various values. Without fail the <RESTORE> & <STOP> keys recovered the status quo, reset the colour scheme and preserved the program in tact. Wonderful !

The recently formed Stevenage & Hitchin Group had a demonstration of the PIC-CHIP by Brian Granger, followed by the normal program running session.

Details of all local group organisers can be obtained from the General Secretary who is also the regional group co-ordinator. Should anyone wish to form a new group, Eli will be pleased to forward advice on getting started.

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SOFTWARE COLUMN

The 'Stunt Box' (p81) has enabled ACT to offer the MicroModeller for the PET. Priced at £ 920 for the total cost of the package, Commodore reckon it will boost the sales of PET, already totalling over 50,000 in the UK. ACT are now at Shenstone House, Dudley Road, Halesowen, West Midlands, B63 3NT. Tel: 021-501 2284.

The stunt box is made by Unicorn Software who are now contemplating offering Xenix, Microsoft's version of the popular operating system Unix.

Look out for a cheapy word processing package about Christmas from Professional Software. About £ 50 will buy you WordPro 1 PLUS - functional with no fancy frills.

ACT will shortly market a chess program for the VIC. PETChess currently runs only on a 32K PET, but is being adapted. Expect to pay about £14 for cassette or £20 for disk version respectively.

If like me you type with one finger (or two for speed), you could benefit from Microtrainer, a three-module package comprising a) Fingermovement b) Typing exercise and c) Advanced testing. From the product description these modules are quite advanced programs. Details may be obtained from Soakguard Ltd., 4, Greenhalgh Walk, London, N2 0DJ. Tel: 01-455 1539.

No software column would be complete without mention of the Supersoft summer catalogue which contains something for everyone; games, utilities, business packages and sundry hardware. Contact Supersoft, 1st Floor, 10-14, Canning Road, Wealdstone, Harrow, Middlesex. Tel: 01-861 1166.

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IPUG will be at the PCW Show...