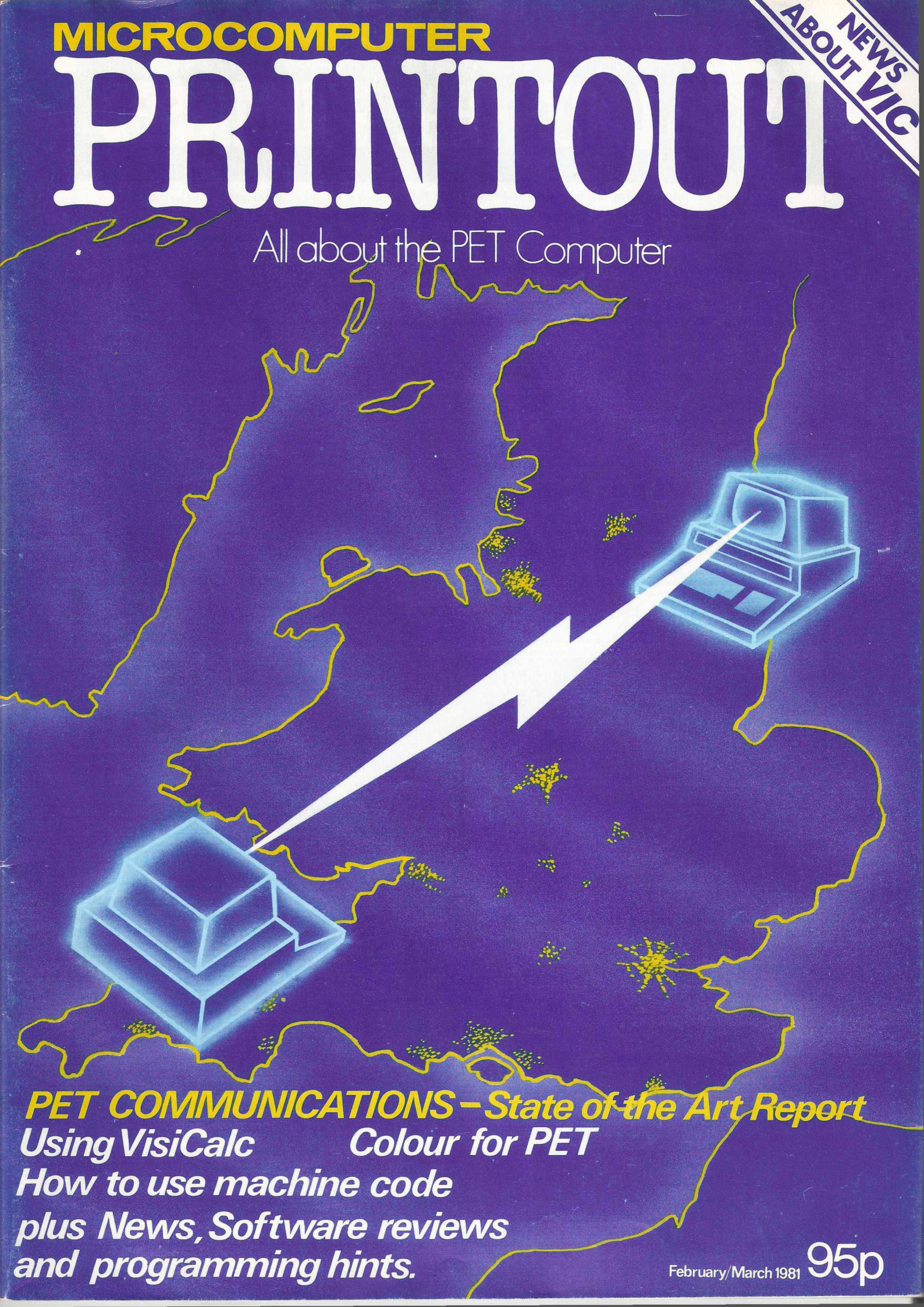
MICROCOMPUTER

PRINTOUT

NEWS ABOUT VIC

All about the PET Computer



PET COMMUNICATIONS – State of the Art Report

Using VisiCalc

Colour for PET

How to use machine code

plus News, Software reviews and programming hints.

February/March 1981

95p

LOOK WHAT YOU MISSED

Have you missed any of the back issues of PRINTOUT? If so, there is still time to complete your collection.

Back issues cost just £1 each including postage (see below for overseas rates)

If you missed out on Volume 1 1980, you can buy all ten issues for only £9.50 post free (overseas rates below).

And we can supply smart binders in a deep brown, simulated leather with 'PRINTOUT' gold blocked on the spine. Each binder holds ten complete issues. The cost? Just £3.50 inc. VAT and postage.

Please enclose your cheque, money order or your credit card number. We accept Access/Mastercharge/ Eurocard and Barclaycard/Visa. Be sure to tell us your account address when ordering by credit card. We also accept credit card orders over the telephone on 0635-201131.

BACK ISSUES

An issue by issue guide to the principal features of each of the ten issues in PRINTOUT Volume 1.
Regular features and columns are marked with a star and mentioned only in the contents of the* first *issue in which they appeared. For full list of topics covered, see the Index.*

1. December 1979
PET in education – Survey of Business Software – Double Density Plotting – Jim Butterfield Interview – Photography Course review – The Changing Face of Commodore – Read/ Write : Your questions answered* – Hotline News & Products* – Pets & Pieces column* – Peeks & Pokes : gossip*

2. January 1980
PET in Public Relations – A Visit to the Commodore – CompuThink Disk Drive evaluation – Survey of Programing Aids – PET's Video Logic – WordPro II review – Modular Programming (article & listing) – Basic ROM addresses.

3. Feb/March 1980
Speech Synthesis on PET – HitchHiker's Guide to PET : review – Commodore 3040 Disk Drive evaluated – PET Games : report – New Approach to Subroutines – Tokens in Basic – Petaid review – Analogue to Digital devices – The PET Keyboard.

4. April 1980
Commodore Printer evaluated – Commodore's New Technology : report from USA – Kit Spencer Interview – PET as Secret Agent – Assembly Language programming aids – Commodore Assembler reviewed – 6502 Assembly Language Programming : Book review – Tommy's Tips* : Software problems solved.

5. May 1980
Personal Electronic Transactions* : Formatting numbers – Hardware Repeat key : review – High Resolution Graphics : Review and User Report – CompuThink 800K disk drive : test – The Game of LIFE – PET User Groups – Educational Software reviewed.

6. June 1980
PET Show Guide – 8050 SuperPET : full evaluation – Book review* – Fantasy Simulations reviewed – Interview with Commodore's founder – PET Tokens for text – Hanover Fair Report.

7. July/August 1980
PET Show : Report – Space Invaders : Review – Programming Style & Technique – Keyboard Tutor : Review – Reader Survey : analysis of results – Using PET Graphics – Warm Starts.

8. September 1980
Colour for your PET – Jim Butterfield's Amazing PET seminar – How to Write Better Programs – Is PET Logical? – PET has a Light Pen – Disk Lockouts and Protecting Passwords.

9. October 1980
Petaid : A do-it-yourself database? – SuperChip : evaluation – Sorting Out Sorts – Screen Display Aids : review – What's Wrong with WordPro? – Data Pointers – Improving Other People's Programs – Little Genius - Not Proven! : review – Reversing the Screen.

10. Christmas 1980
Bolt-On Goodies : A Critical Guide to PET peripherals – PET Music : Report – The Pronto PET – Basic Mailer : Mailing list program with listing – Animated Graphics – How Basic Stores Variables – Auto Line Delete – A Better Cassette Deck.

plus News, Letters and Regular columns.

SUBSCRIPTION RATES

Subscriptions are for the ten issues for the current volume; back issues to the beginning of the year will therefore be sent unless otherwise requested. The following rates apply both to new subscriptions and to the complete set of Volume One.

U.K. £9.50	[ ]	Eire £12 punts	[ ]
Europe (surface) £14.50	[ ]	Europe (airmail) £18.00	[ ]
USA (surface) $36	[ ]	USA (airmail) $45	[ ]
Rest of World (surface) £14.50	[ ]	Rest of World (airmail) £25.00	[ ]

BACK ISSUES

U.K. £1	[ ]	Eire £1.25 punts	[ ]
Europe (surface) £1.25	[ ]	Europe (airmail) £1.50	[ ]
USA (surface) $3	[ ]	USA (airmail) $5	[ ]
Rest of World (surface) £1.25	[ ]	Rest of World (airmail) £2.50	[ ]

BINDERS

U.K. £3.50	[ ]	Eire £4.50 punts	[ ]
Europe £5	[ ]	Overseas (airmail) £7.50 [ ]	(surface) £5.00 [ ]

SEND TODAY!

Name. . . . . .

Address: . . . . . .

. . . . . Postcode: . . . . . .

I enclose cheque/postal order/money order/ made payable to PRINTOUT for . . . . . .

Please charge my Access/Mastercharge/Eurocard/Barclaycard/Visa account No. . . . . .

To: PRINTOUT, P.O. Box 48, Newbury RG16 0BD, Berkshire, U.K.

Contents

9 **READ/WRITE** Your letters & Listings — covering every PET topic you can think of - and several you can't!

13 **HOTLINE** Hot news about the new VIC, Business programs, Software Piracy and the PET's Inventory

17 **THE CASE OF THE MISSING RAM** Julian Allason investigates the great VIC mystery

18 **VISICALC — How & Why** Why more businesses have bought VisiCalc than any other program, and how to use it

21 **TOMMY'S TIPS** We let our resident software Superman lose on your programming problems

22 **TURNKEY ROMS — Do They Open the Door?** Terry Hope examines a solution to those Commodore disk problems

24 **COMMUNICATIONS SUPPLEMENT** — a special State of the Art report compiled by Dennis Jarrett, includes:
Instant Intro to Comms All you need to know about PET-to-PET and PET-to-mainframe communications
Commodore and the Communications Dealers Commodore's strategy in the communications market
Product reports Individual reports on the eight hardware/software communications products now available

33 **CHROMADAPTOR: Colour for the PET** Terry Hope tests the device that gives full colour display for the PET

36 **PETS & PIECES** You need never buy another printer ribbon — plus other amazing facts from Gavin Sanders

37 **INCREDIBLE UNWORDPROCESSOR** A two-line word processing program - impossible! Or is it asks Lindsay Doyle.

39 **SOFTWARE REVIEWS** We test the Trader Stock Control package and an assembler chip

43 **PERSONAL ELECTRONIC TRANSATIONS** PET Master, Gregory Yob, invites you to dip a toe into machine code

46 **INDEX TO VOLUME I** Instant access to the hundreds of items of PET information we published last year

50 **PEEKS & POKES** More outrageous gossip from Inside Trader, plus a hilarious review of the Commodore Panto

PRINTOUT is published 10 times a year. No part of this magazine may be reproduced in any form whatsoever without the prior permission of the publishers. The publishers do not necessarily agree with the views expressed by contributors, nor do they accept any responsibility for errors of interpretation in the subject matter of this magazine or for any results arising therefrom.

PET is the trademark of COMMODORE SYSTEMS.
All material copyright (c) PRINTOUT Publications 1981.

PRINTOUT
Vol.2, Number 2 Feb/Mar. 1981

Editorial Office
P.O. Box 48, Newbury,
England RG16 OBD
Tel: 0635 201131 Telex: 8951672

Publisher
Julian Allason
Editor
Terry Hope
Technical Editor
Tommy Turnbull
Art Editor
Denis Appleby

Contributing Editors
Gavin Sanders
Gregory Yob
Lindsay Doyle
John Nuttall
Robin Bradbeer
European Correspondent
Richard Pawson

Assistant to the Editor
Wendy Cheetham
General Manager
Jessica Allason
Advertisement Manager
Jonathan Horne

Advertisement Office
PRINTOUT, North Warnborough,
Basingstoke, Hants RG25 1PB
Tel: Odiham (025671) 2724

Editorial

London recently played host to a remarkable conference called 'Business Opportunities in Small Business Computing'. It was intended for entrepreneurs and others interested in setting up in the microcomputer business. But, to the surprise of the organisers and the alarm of the speakers, it was the established data processing companies who packed the audience. After two days of being told that small is beautiful, they were in blood thirsty mood, and the panel of speakers, myself included, found themselves facing some extremely hostile questioning. Much of it was self-serving stuff about the need for support and the impossibility of providing it for less than a five figure sum. The word 'cowboy' was bandied about pretty freely, too. One was left with the irresistible impression that the Data Processing establishment was not prepared to sully its collective fingers with these new-fangled micro things.

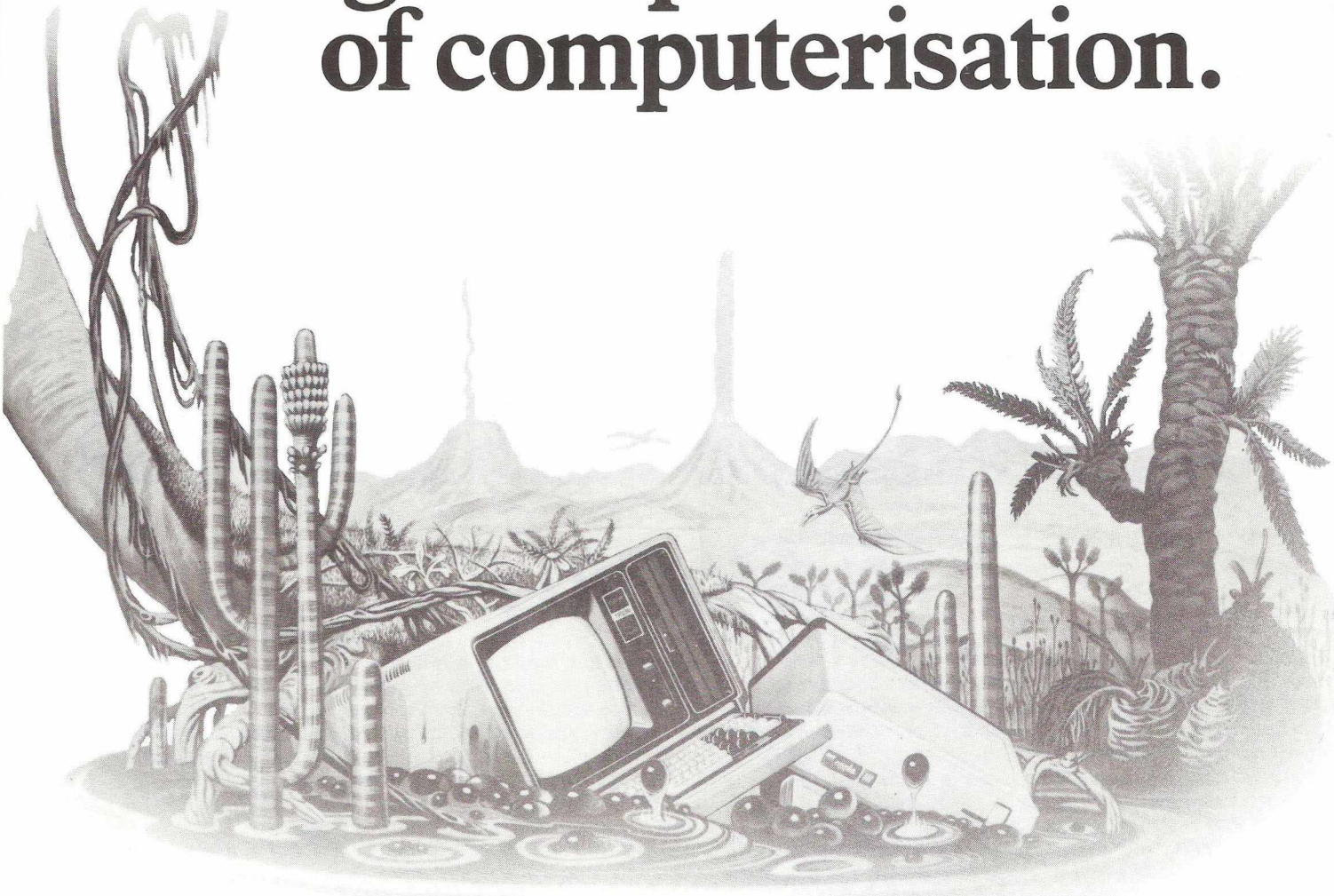
Now, this is probably unfair, but then the micro dealers present weren't too happy about the blanket aspersions cast on them either. It did, however, set me thinking about the problems of support, because the blue chip computer companies are correct in pointing to a general weakness in this area. The question is whether the customer can enjoy both low prices and support. At this point I would like to introduce Mr. Cyril Grant, who opened his Micro Computer Centre in South West London two years ago. If the big computer people are right, he should be out of business by now. But he isn't. In fact the Micro Computer Centre has just moved to much larger premises with an increased staff roster of 24. Customers pay standard prices, get twenty-four hour backup and customized software. So how is it done?

Firstly, the Micro Computer Centre will only deal with you if you live within fifty miles, preferably much closer. Grant stresses that he is interested in providing a local service. Most of his business comes via word-of-mouth recommendation. Consequently he never exhibits at shows. He concentrates on one system, the CBM/PET, which the staff are expected to know inside out. More surprisingly, not a single salesman is employed. Any extra money that customers spend above the normal hardware price tends to be on having standard software packages tailored, or on a maintenance contract. "And" says Grant, "we never discount."

Could it be that the key to having your cake and eating it is cost control?

Julian Allason

The Commodore PET offers you a safe passage through the primeval swamp of computerisation.



The miracle of microchip technology has made the main-frame computer seem like a dinosaur. But how many microcomputers will go the same way?

Without good software and support a micro-computer is less capable than your office calculator. So as competition grows amongst manufacturers in this industry, only those with the finest software and the best supporting facilities will survive.

SHARE A SECURE FUTURE WITH A COMMODORE PET

We at Commodore have been producing high technology products for over 20 years. And unlike most other manufacturers of micro-computers, we make everything ourselves (including the silicon chips) to keep our costs to a minimum.

These cost savings are passed on to you in excellent value for money. So you can now buy a self-contained Commodore PET microcomputer for **£450**, or a complete business system (including Floppy Disk Unit and High Speed Printer) starting from as little as **£2000**.*

However, computer hardware can only be as good as the software available. That's why, to maintain our position as

Britain's most popular micro-computer, we have made sure that the quality and versatility of our software is second to none.

LARGEST, FINEST CHOICE OF SOFTWARE...

To complement our microcomputers, we have the finest and most comprehensive range of programs available in the U.K. today. This covers everything from such important business applications as Payroll, Stock Control, Accounting, Filing, Mailing; to our series in the field of Education. Each program is thoroughly tried, tested and tailored to BRITISH needs. You won't catch us palming you off with an irrelevant American version!

...AT SURPRISINGLY LOW PRICES

With over 30,000 Commodore PETs employed in Britain, the demand for programs is tremendous. And through mass-production we are able to keep our costs to you surprisingly low. So you can buy a Petpack program (on cassette) for between £5 and £50, while business programs (on disk) range from between £50 and £500.

OUR OWN UNIQUE TRAINING COURSES

Commodore programs are designed with operational simplicity in mind. Commands are in plain English and guidance is built into each package. So that even a stranger to computers can quickly feel at home with a PET.

Nevertheless, to maximise the potential of your Commodore system, you will find a certain amount of training of immense value. Of the well-known names in microcomputers, Commodore is the only one to offer a range of training courses and seminars. And these have already proved of great benefit to thousands of PET users.

KEEP IN TOUCH WITH THE PET USERS' NEWSLETTER

Another unique way in which Commodore helps you get the most out of your microcomputer is by publishing the regular PET Users' Newsletter. For an annual subscription of only £10 you can keep up-to-date with developments and share new ideas and applications with over 3,000 PET users.

WORDPROCESSOR AS WELL AS COMPUTER

In addition to Commodore's own high quality range of hardware and software, there are compatible products of other manufacturers which have gained our official stamp of approval.

Look out for this sign.

You'll find it on such famous programs as WORDPRO and WORDCRAFT, which turn your PET into a first-class wordprocessor; as well as on hardware like the MUPET system, which allows a number of PETs to be run with a single letter-quality printer.

PROFESSIONAL DEALER SUPPORT COUNTRYWIDE

When you consult a Commodore dealer, you won't find yourself talking to a typewriter salesman. Our dealers are qualified to examine your needs, and to demonstrate which hardware and software will suit you best. Trained engineers are at hand and a 24-hour field maintenance service is available countrywide.

LONDON AREA

Adda Computers Ltd, W13, 01-579 5845
Advanced Management Systems, EC2, 01-638 9319
C.S.S. (Business Equipment) Ltd, E8, 01-254 9293
Centralex – London Ltd, SE13, 01-318 4213
Computer Sales & Software Centre Ltd, ILFORD, 01-554 3344
Cream Computer Shop, HARROW, 01-863 0833
Da Vinci Computer Shop, EDGWARE, 01-952 0526
Henderson Bennett, SE25, 01-654 5609
Home and Business Computers, E12, 01-472 5107
L & J Computers, NW9, 01-204 7525
Logic Box Ltd, SW1, 01-222 1122
Merchant Systems Ltd, EC4, 01-353 1464
Micro Computer Centre, SW14, 01-878 7044
Micro-Facilities Ltd, HAMPTON HILL, 01-979 4546
Sumlock Bondain Ltd, EC1, 01-250 0505
Sumlock Bondain Ltd, EC4, 01-626 0487

HOME COUNTIES

Millhouse Designs Ltd, ALTON, 84517
H.S.V. Ltd, BASINGSTOKE, 62444
MMS Ltd, BEDFORD, 40601
D.D.M. Direct Data Marketing Ltd, BRENTWOOD, 214168
Amplicon Micro Systems Ltd, BRIGHTON, 562163
T & V Johnson (Microcomputers Etc) Ltd, CAMBERLEY, 20446
Cambridge Computer Store, CAMBRIDGE, 65334
Wego Computers Ltd, CATERHAM, 49235
Dataview Ltd, COLCHESTER, 78811
Amplicon Micro Systems Ltd, CRAWLEY, 26493
S.M.G. Microcomputers, GRAVESEND, 55813
South East Computers, HASTINGS, 426844
Bromwall Data Services Ltd, HATFIELD, 60980
Alpha Business Systems, HERTFORD, 57425
Commonsense Business Systems Ltd, HIGH WYCOMBE, 40116
Kingsley Computers Ltd, HIGH WYCOMBE, 27342
Brent Computer Systems, KINGS LANGLEY, 65056
Computopia Ltd, LEIGHTON BUZZARD, 376600
South East Computers Ltd, MAIDSTONE, 681263
J.R. Ward Computers Ltd, MILTON KEYNES, 562850
Sumlock Bondain (East Anglia) Ltd, NORWICH, 26259
T & V Johnson (Microcomputers Etc) Ltd, OXFORD, 73101
C.S.E. (Computers), READING, 61492
Slough Microshop, SLOUGH, 72470
Business Electronics, SOUTHAMPTON, 738248
H.S.V. Ltd, SOUTHAMPTON, 22131
Super-Vision, SOUTHAMPTON, 774023
Symtec Systems Ltd, SOUTHAMPTON, 38868
Stuart R Dean Ltd, SOUTHEND-ON-SEA, 62707
The Computer Room, TUNBRIDGE WELLS, 41644
Orchard Computer Services, WALLINGFORD, 35529
Photo Acoustics Ltd, WATFORD, 40698
Microchips, WINCHESTER 68085
P.P.M. Ltd, WOKING, 80111
Petalect Electronic Services Ltd, WOKING, 69032
Oxford Computer Systems, WOODSTOCK, 812838

MIDLANDS & S. HUMBERSIDE

C.B.S. Consultants, BIRMINGHAM, 772 8181
Computer Services Midlands Ltd, BIRMINGHAM, 382 4171
Marchant Business Systems Ltd, BIRMINGHAM, 706 8232
Micro Associates, BIRMINGHAM, 328 4574
Peach Data Services Ltd, BURTON-ON-TRENT, 44968
Jondane Associates Ltd, COVENTRY, 664400
Davidson-Richards Ltd, DERBY, 366803
Allen Computers, GRIMSBY, 40568
Caddis Computer Systems Ltd, HINCKLEY, 613544
Machsize Ltd, LEAMINGTON SPA, 312542
Arden Data Processing, LEICESTER, 22255
Roger Clark Business Systems Ltd, LEICESTER, 20455
Lowe Electronics, MATLOCK, 2817
A.J.R. Office Equipment Services Ltd, NOTTINGHAM, 206647
Betos (Systems) Ltd, NOTTINGHAM, 48108
PEG Associates (Computer Systems Ltd), RUGBY, 65756
Walters Computer Systems Ltd, STOURBRIDGE, 70811
System Micros Ltd, TELFORD, 460214

YORK & N. HUMBERSIDE

Ackroyd Typewriter & Adding Machine Co. Ltd, BRADFORD, 31835
Microprocessor Services, HULL, 23146
Holdene Ltd, LEEDS, 459459
South Midlands Communications Ltd, LEEDS, 782326
Yorkshire Electronics Services Ltd, MORLEY, 522181
Computer Centre (Sheffield) Ltd, SHEFFIELD, 53519
Hallam Computer Systems, SHEFFIELD, 663125
Holbrook Business Systems Ltd, SHEFFIELD, 484466

NORTH EAST

Currie & Maughan, GATESHEAD, 774540
Elfton Ltd, HARTLEPOOL, 61770
Dyson Instruments, HETTON, 260452
Fiddes Marketing Ltd, NEWCASTLE, 815157
Format Micro Centre, NEWCASTLE 21093
Intex Datalog Ltd, STOCKTON-ON-TEES, 781193

S. WALES & WEST COUNTRY

Radan Computational Ltd, BATH, 318483
C.S.S. (Bristol) Ltd, BRISTOL, 779452
T & V Johnson (Microcomputers Etc) Ltd, BRISTOL, 422061
Sumlock Tabdown Ltd, BRISTOL, 276685
Sigma Systems Ltd, CARDIFF, 34869
Reeves Computers Ltd, CARMARTHEN, 32441
A.C. Systems, EXETER, 71718
Milequip Ltd, GLOUCESTER, 411010
Jeffrey Martin Computer Services Ltd, NEWQUAY, 2863
Devon Computers, PAIGNTON, 526303
A.C. Systems, PLYMOUTH, 260861
J.A.D. Integrated Services, PLYMOUTH, 62616
Business Electronics, SOUTHAMPTON, 738248
Computer Supplies (Swansea), SWANSEA, 290047

NORTH WEST & N. WALES

B & B (Computers) Ltd, BOLTON, 26644
Tharstern Ltd, BURNLEY, 38481
Megapalm Ltd, CARNFORTH, 3801
Catlands Information Systems Ltd, CHESTER, 46327
Catlands Information Systems Ltd, WILMSLOW, 527166

LIVERPOOL

Aughton Microsystems Ltd, LIVERPOOL, 548 7788
Stack Computer Services Ltd, LIVERPOOL, 933 5511

MANCHESTER AREA

Byte Shop Computerland, MANCHESTER, 236 4737
Computastore Limited, MANCHESTER, 832 4761
Cytek (UK) Ltd, MANCHESTER, 872 4682
Executive Reprographic Ltd, MANCHESTER, 228 1637
Professional Computer Services Ltd, OLDHAM, 061-624 4065

SCOTLAND

Gate Microsystems Ltd, DUNDEE, 28194
Holdene Microsystems Ltd, EDINBURGH, 668 2727
Gate Microsystems Ltd, GLASGOW, 221 9372
Robox Ltd, GLASGOW, 8413
Thistle Computers (Macmicro), INVERNESS, 712774
Ayrshire Office Computers, KILMARNOCK, 42972
Thistle Computers, KIRKWALL, 3140

N. IRELAND

N. Ireland Computer Centre, HOLLYWOOD, 6548

For further information about Commodore services and products, contact your local dealer, or send off this coupon to obtain our free literature pack.
To: Commodore Information Centre, 360 Euston Road, London W1 3BL Telephone: 01-388 5702

Name _____ Position _____

Address _____

05P01

Intended application _____

commodore

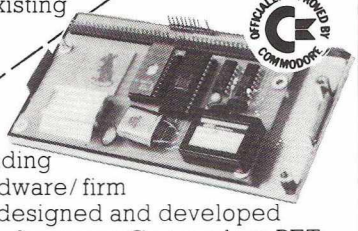
This list covers dealers participating in our advertising. *Prices quoted ex. VAT.

Communications is the name of the game

KINGSTON HAVE THE BEST TEAM

It's a whole new ball game in the field of micro-communications and Kingston, the specialists, have been in the game from the start. Kingston's experience allows them to provide low cost enhancements to make more use of your existing equipment.
Introducing some of the Kingston Team.

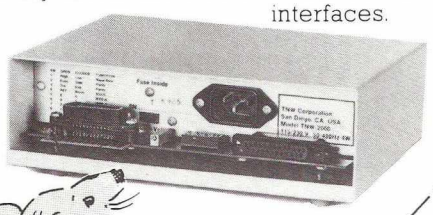
THE NETKIT

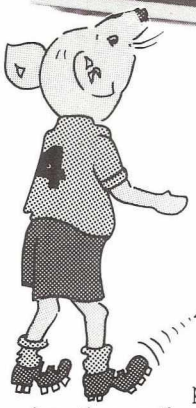


– our leading scorer. A hardware/firm ware package designed and developed by Kingston to transform your Commodore PET into a more powerful yet controllable beast. Allowing high speed transfer of programs and data between a PET and any other RS232 device including MAIN FRAMES.

THE TNW 2000

and TNW 3000 – our international players. Fully addressable bi-directional IEEE 488/RS232 interfaces.





THE KEYNOTE

– our musical player. A hardware/software package which upgrades a PET into a first team player, giving a PET a repeat function on all keys, an automatic keyboard controlled reset, a key click and a music processor for the budding composer or for setting audio limits.
The KEY our low cost player. A hardware addition to the PET for the busy programmer who needs a repeat function on the number pad and cursor movement.
These and many other devices for micro-computers enable the best performances from particular player to be achieved. Join the game, you are bound to be a winner with Kingston.

KINGSTON

Kingston Computers Limited, Electricity Buildings,
Filey, North Yorkshire YO14 9PJ U.K.
Telephone: 0723 514141 Telex: 52642

NAME _____

ADDRESS _____

_____

_____

PO.3.

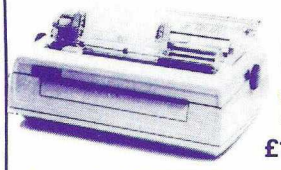
NO FRILLS, NO GIMMICKS, JUST GREAT PRINTER DISCOUNTS!

Epson MX80

9x9 dot matrix. Logic seeking. Bi-directional 96 ASCII characters 64 graphics and 8 International characters Centronics I/P with option RS232 and IEEE 488.

£359+ VAT

NEC Spinwriter



- for the professional word processing system

£1390 + VAT

Model 5510-RS232, Model 5530 Centronics 8 bit par. 128 ASCII chs. 5 copies. Friction or Tractor fed. 55 chrs. per second.

OKIDATA

MICROLINE 80

The small, quiet, light, highly dependable printer with three way paper handling. Single sheet/roll/pin feed. Assured reliability and quality.

£329 + VAT

CENTRONICS 737

– Letter quality printing now available at a substantially reduced cost from the printer experts.

£349 + VAT

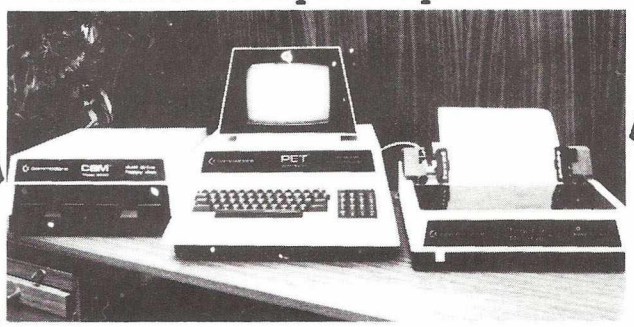
NORTHAMBER LTD

GREAT OAK HOUSE, ESHER, SURREY. KT10 9BR
Phone: ESHER (0372) 62071 & 01-786 2072

Full details on request. Prices exclude VAT & delivery

BUSINESS ELECTRONICS

'The Microcomputer Specialists'



The South's leading Distributor for Commodore, Apple II ITT 2020 and all related products.
AND NOW Commercial Systems Dealers for CBM Series 8000
We believe in SUPPORT for all our users.

We stock	**We also provide**
EQUIPMENT	ADVICE
PARTS	PROGRAMMING
SOFTWARE	REPAIRS
SUPPLIES	EXCHANGES

from all leading suppliers.

We have over 40 years' accumulated experience in Computers, Electronic Engineering and Systems.

We can supply all the proven hardware and software accessories for your PET, APPLE and ITT . . . call us NOW!

Discounts for C.W.O., Educational Establishments and cash purchase.
Call us on Southampton (0703) 738248.

Business Electronics
Rownhams House, Rownhams, Southampton, Hants

THE PET™ REVEALED

CONTENTS

SECTION 1. The PET System Hardware

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

SECTION 2. The 6502 Microprocessor.

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

SECTION 3. The PET operating system.

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

SECTION 4. The User Port.

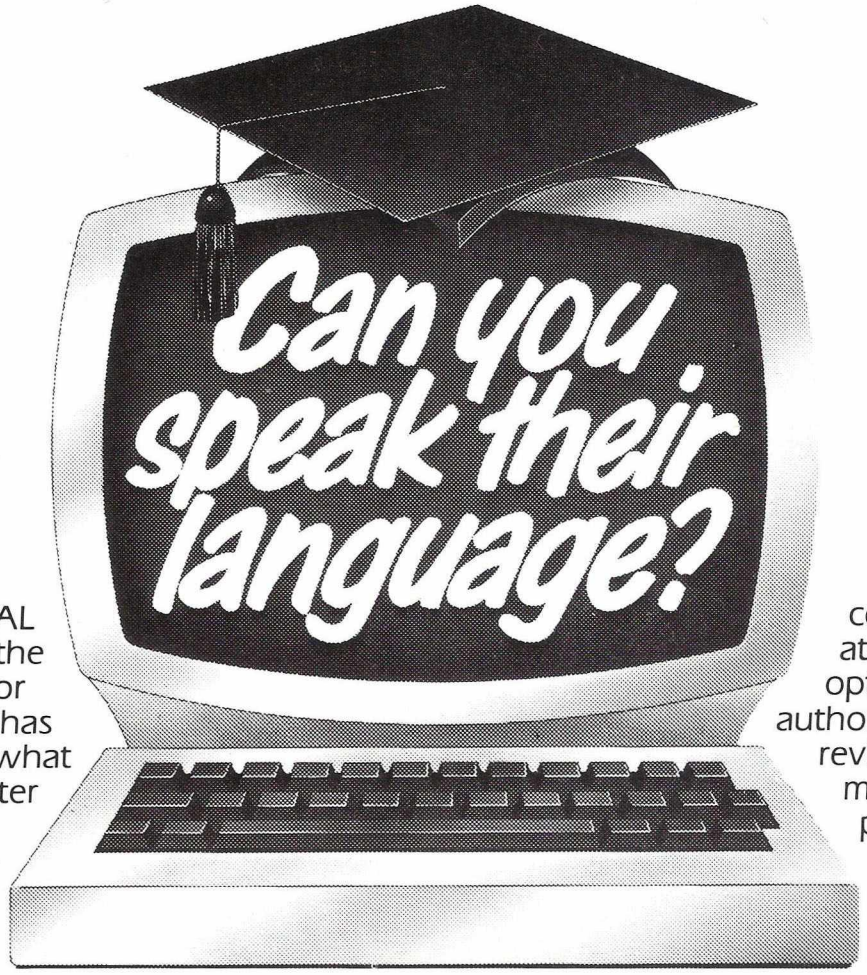
User port connections — Video output circuit — Parallel user port — The 6522 VIA — User port memory map — Programming the user port — Handshaking on the 6522 — Serial I/O — I/O port expansion — Communication between processors — KIM to PET data handshaking — Summary of 6522 registers.

SECTION 5. The IEEE port and the 6520.

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

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

A NICK HAMPSHIRE PUBLICATION



EDUCATIONAL COMPUTING is the new magazine for everybody who has ever wondered what the microcomputer revolution has meant to education. Here's your chance to find out everything about the use – and study – of computers and their peripherals in schools, colleges and universities.

Computer services have an obvious part to play in the educational process itself. As well as providing important opportunities for your students to learn many skills which could be vital to their futures, you will benefit personally by greater familiarity with the one subject that's undeniably changing everyone's life.

This unique magazine will offer penetrating investigations into the educational applications and implications of data processing systems; full details of available courses, examinations, and career options; and an authoritative range of reviews – of equipment, software, programs, and books currently on the market.

And our "Beginners' Guide" really does start right at the beginning, with advice on raising the finance for your hardware, and how to be sure you're choosing the right system for your needs.

Teachers and students alike will want to use EDUCATIONAL COMPUTING to keep them abreast of the latest technological developments. As one of the ECC family of top computer publications, you'd be right to expect a knowledgeable – and entirely unpartisan – editorial approach. This is a complex and challenging new field, where there is always something new to learn. So don't risk being left behind. Send the coupon today.

Please enter my subscription for ten issues at the annual rate of *£6.50*. I enclose a cheque/PO.
Please charge my credit card (delete as applicable).

Name ..... Title .....

School/College/University .....

Address .....

.....

..... Signature .....

Type of card ..... No: | | | | | | | | | | | | | | | | |

Send to: EDUCATIONAL COMPUTING, ECC Publications Ltd., 30/31 Islington Green, London N1 8BJ.

READ/WRITE

Your letters, our replies: are we all being overcharged, and other topics

FREE FOR ALL

My micro is run as a hobby,(NOT fun), and my for pleasure associates have similar interests. The possibility of income from the hobby is not even considered. Neither is what you persistently attack as piracy considered to be as anti-social as you imply.

If I was capable of producing a program that others wanted, then fine. All I would require is an acknowledgement and to recover any actual costs. To sell the suggested 200 copies at even £1 a time would be embarrassing, even after deducting the cost of tape, postage, etc. May I quote from a program by G3A2I, who says: "....this program is not copyright. If it was, you would copy it anyway, so ...."

But to continue. The Database, WordPro and business suites are very, very expensive, and there is no way that I would buy them. So how can anything I do affect the income of the author. To be honest, for me they are not worth wasting tape on so I don't. It would be like chartering Concorde to take you to the loo. And all of the games that I have come across are hardly worth using up tape to copy. Run them once, and do you really want to use them again? If you can run Space Invaders time after time, then I suggest that you want something better to do!

Let's move on to the chance finds. This hobby includes the sharing of information. Use any such chance find in programs and try to sell them by all means. But to pass on such "twists" is an essential and self-rewarding part of the hobby. A very interesting part of PRINTOUT is the collection of such ideas and routines from readers. Do you imply that in spite of asking for them, you think that readers should keep these "snippets" and try to cash in on them?

Now to the businessman. After spending a few thousand pounds on plant, is he likely to risk the effectiveness by copying someone else's tape or disk? Of course not. Most buy a complete system anyway, which includes the software. If this is passed on to other companies, the chances of it being useable directly are slim. The "pirate" could end up paying more to modify, and still have a less than adequate system, as the dealers will quickly tell him!

So where do we now stand? The whole subject of software copying is grossly over estimated, and barely reduces the cash receipts of an author.

Sell software at a realistic price - games at £1 a go - and copying won't be worthwhile. I would suggest that revenue would also increase. Protection has been tried, but I think that this is not practicable.

Finally, if someone wants to copy one of my programs, stop criticising him!

Wilfred Higginson,
Clive Road,
Daisy Hill,
Westhoughton, Bolton

Hang on, Mr Higginson. We are all for the free exchange of public domain software. But our enquiry into illicit tape copying (January PRINTOUT) showed that the practice is now so wide spread that it is affecting the supply of new programs. The fact is that royalty payments to software authors are a fraction of what they were this time last year. And copying is not without its hazzards - see Hotline. But first read the following letter from a leading software supplier.

MAILING LIST PROGRAM

Lines 330-370 of your Mailing List program in the Christmas issue are unsatisfactory because the variables are lost, hence L=0. The cure is to amend line 360 to:

```
360 PRINT"L=";L+10":GOTO140
```

L.G. Feingold,
Vine Street,
Salford

Woe is us – a bug in line 360! Mr Feingold is quite right. We sentance ourselves to write out "we must always quadruple-check what has already been triple-checked" at least a thousand times.

Pooper Scooper Pirates

I can't help smiling wryly at your Editorial in the Christmas issue concerning the much vexed subject of copyright etc. There are a number of other aspects which I think are relevant.

1. In my experience, the educational sector is one of the worst offenders as they somehow do not all understand what money and investment are all about - nor for that matter does the rest of the State sector.
2. I understand that many a dealer will see "a free copy of a program" as a useful inducement to make a hardware sale.
3. Until the dealer and end user can understand what software is, the situation will not improve.
4. Laws i.e. copyright etc. in this day and age do not seem to act as a deterrent, as everyone knows how complicated and expensive, and frequently ineffective, it is to enforce them.
5. Manufacturers do little to assist the authors who assist them. In fact, it is my belief that they manufacture their equipment to make it as simple as possible to "transport" software.

I am afraid that the only way support and control can be exercised is by the following means:

1. Make the end user aware - via magazines etc. - of the very real investments made by the authors. We estimate the development costs of PETAID @ approaching £50,000 and General Accounting Package @ approaching £30,000.
2. Ostracize blatantly immoral dealers - even to the point of manufacturer's campaigns against them.
3. A conscious effort by everyone in the industry to clean up the industry and remove the parasites who take out but don't put anything in.
4. Introduce an effective governing body with a code of practice which will support the legitimate companies trying to be professional and ethical, and endeavour to eradicate the "cowboys".

In closing, I think it is up to us to tidy up our own back yard and I, for one, would welcome participating in "pooper scoopering".

Neil Hewitt,
Stage One Computers,
6 Criterion Arcade,
Bournemouth

We don't know what "pooper scoopering" is, Neil, but it sounds painful. The law is an unwieldy instrument, but we do know of a number of instances where legal action has proved effective. In most cases it has been the pirates who have found it expensive. A Software Producers Association has now been formed and we understand they will be taking prompt action to protect the interests of members. John Butcher MP tells us he hopes to be able to persuade the government to introduce a number of changes in the law.

So where ARE those Stringy Floppies?

I have seen the Stringy Floppy high speed cassette drive (described by Gregory Yob in the last issue) advertised for the TRS-80. Is the PET version available here, and if not, could I modify the TRS-80 model?

D.S. Webster,
Green Road,
Penistone, Sheffield

Good question, Mr. Webster. We asked the U.K. distributor, MBS Terminals who muttered something about being in the hands of Exatron. Their best guess is 'late Spring' at a price of £199. It took Gregory three months to write the PET stringy operating system, and it is not an experience he would wish on anyone else, he says. So it might be better to wait. If your need is urgent you should investigate the Mini Digital Cassette Recorder from Currah Components, Unit 7, Hartlepool Works, Sandgate Industrial Estate, Hartlepool, Cleveland. It stores up to 120K per cassette for fast retrieval and costs about the same. ▷11

25 Ways to use VISICALC Software

on CBM/PET or Apple

1. A Birmingham sales rep. uses VisiCalc to do his sales reports, sales summaries and expense accounts.

2. A farmer in Wiltshire compares budgeted and actual expenditure, analyzes transactions and solves numerous other business problems.

3. A Louisiana shipyard manager does inventory pricing, cost estimating, and stability and tonnage calculations.

4. A City financial analyst, who computes and prints trust fund reports for his clients, says, "VisiCalc is paying for itself over and over again. An excellent money maker."

5. A California real estate and financial planner automated much of his work with VisiCalc's powerful features. For example, he has created an array of 13 certificates of deposit with varying base amounts, term periods, and interest rates, with associated calculations for required "break-even" terms and interest rates when current date and available money market rates are entered. Penalties for early withdrawal are applied and gain/loss shown if proceeds reinvested. Daily compounding of interest is provided for.

6. A ceramic tile manufacturer has "new applications all the time," including costing model, budget preparation, ceramic empirical formula calculations and financial analysis. Says, "VisiCalc is dynamite."

7. The financial director of a Newcastle company does his budgeting and planning.

8. A professional translator using VisiCalc for cost/profitability comparisons, budgeting and income tax, says VisiCalc is the "best microcomputer application program I've ever seen."

9. A chemical research scientist keeps weekly budget planning, tax records (income and deductions), medical expenses and personal inventory.

10. An Australian manufacturing firm manager's uses include factory production reports, labour costing, calculation of recent price increases, and "a race horse selection program that is yet only moderately successful."

11. A Swiss retail food store manager uses VisiCalc for profit centre calculations, enabling him to know the net profit of every store on a monthly basis with the input of only three reference numbers.

12. A life insurance agent, who already prepares client proposals combining insurance and other investments and quotations on small group plans, says, "I can't wait until I really learn how to use VisiCalc - it's outstanding."

13. A Norwich company secretary appreciates VisiCalc's "ease of use" while doing corporate budgeting, sales forecasts, production forecasts, financial report analysis and ratios, and construction cost analysis.

14. A London management consultant's uses include analysing key financial ratios and balance of business planning and modelling business performance, and management training.

15. An electrical engineer does his business plans, balance sheets, cash flow analysis and sales forecasts. Says he likes VisiCalc's "protection from errors and mistakes."

16. An Oregon medical laboratory director does his workload calculations and space forecasting.

17. A New York finance manager does balance sheet forecasting and keeps a five-year income statement.

18. A Surrey teacher likes the built-in formula calculations when doing statistical research, charts, football statistics, classroom marking and home budget projections.

19. An anesthesiologist calculates gas flows on anesthesia equipment, plus a running record of income tax, pending orders and computer hardware and software expenditures.

20. An executive of a major management consultancy explains how they had used an expensive time-sharing service which tied up a programmer/analyst to create and run the models, so there was always someone between their needs and the final results. "We attempted to duplicate what we had at the service bureau and surprised ourselves that we could do it easily and without specialised programming skills. Now we have evolved far more sophisticated forecasting and modelling tools that go well beyond enything we originally envisaged. These analyses are used by us on behalf of our clients or prospective clients and they help us get more business."

21. A Manchester optician took the hand calculations out of his budgets and sales projections.

22. A senior financial analyst does his balance sheet financial analysis (ratios, rates, yields, etc.) and financial modelling such as profit plans.

23. The president of a New York retail business is using VisiCalc to figure out how he can pay for his personal computer. (He should talk to the guy mentioned in number 4!)

24. The co-owner of a Nuneaton restaurant calculates food costs, bar costs and total operation cost projections.

25. A Massachusetts student is crunching numbers at Harvard Business School with VisiCalc....straight to the head of the class.

£125+VAT

VisiCalc is the award winning program from Personal Software. It handles mathematical and financial forecasting — and solves just about any problem that can be represented in tabular form. Try it at your nearest PET or Apple dealer or send for your copy direct from:

ACT MICROSOFT

5/6 Vicarage Road, Edgbaston,
Birmingham B15 3ES
Tel: 021-454 5341 Twx: 339396

PET is the trademark of Commodore Systems. Apple is the trademark of Apple Computers.

[ ] Rush me free details of VisiCalc
[ ] I enclose £125 + VAT for PET/Apple VisiCalc

Name: .....

Address: .....

.....

..... Postcode: .....

Credit card holders may order by telephoning 021-455 8585

Matrix Codes

Here is what I am sure will be a much needed list of keyboard matrix codes (cheers, shouts of "speech" and squashed tomatoes!) For those who need an explanation, here goes. In the location 151 (New ROMs; 547 on old ROMs) a value appears every time a key is depressed, *and it will stay there until the key is no longer pressed*; a very important point. Why? Because this means you can move your laser, spaceship or cowboy as far as you want it to go and then stop it using only one key. See? Good. Now the matrix codes. Most of you would think they would be the same as ASCII codes Are they? They are not! They weren't listed in "The PET Revealed" nor, it appeared, anywhere else. So after lots of hair pulling and head scratching, I worked this lot out.

Keyboard Matrix Code Table

A 48	B 30	C 31	D 47	E 63	F 39	G 46	H 38
I 53	J 45	K 37	L 44	M 29	N 22	O 60	P 52
Q 64	R 55	S 40	T 62	U 61	V 23	W 56	X 24
Y 54	Z 32	@ 15	[7	\ 69	] 14	↑ 59	← 75
Sp. 6	! 80	" 72	# 79	$ 71	% 78	& 77	70
(76	) 68	* 33	+ 17	, 21	– 9	2	/ 49
0 10	1 26	2 18	3 25	4 42	5 34	6 41	7 58
8 50	9 57	: 36	; 28	< 5	= 1	> 12	? 20
CRSR 66 ↓		CRSR 73 →		R 27 E T		DEL 65	
RVS 8		HOME 74		STOP 4			

This serves only for the lower case. What about graphics? They give the same number as their lower case partner. Answer: detect when shift key is in use. The contents of 152 (new ROM; 516 old ROM) is 0 when 'shift' is not pressed; 1 when it is.

I hope you will find them useful.

Au Revoir!
Duncan Batey,
Bvd. Joseph Ricord,
Vence, France

We are not sure about the squashed tomatoes, Duncan, but that looks like useful information. 29,63,55,31,53, as they say!

Press Space When Ready

I am not too happy about the WAIT59410,4,4 technique recommended by Lindsay Doyle in PRINTOUT No.7. If you subsequently employ a line such as:

210 GETA$:IFA$=" "THEN 210

the program sails straight through it. The reason seems to be that there is a spare "space" floating around in the keyboard buffer. No way can I find it, much less get right of it. This vagrant space can be disastrous if one is using a GET routine to avoid INPUT. Where does it come from and how does one get right of it?

R.N. Higinbotham
Cleaver Square
London

Lindsay Doyle replies: My article was prescient when it said, "I am sorry I started this discussion." WAIT59410,4,4 does indeed leave a space character in the keyboard buffer. The effect of this on a subsequent line like:

210 GETA$:IFA$=" "THEN210

is that the GET command sees the SPACE character and reacts, so that the two cannot be used in combination. Another disadvantage is that WAIT 59410,4,4 cannot be used with the Petmaster Superchip as it causes severe psychosis of the cursor with total withdrawal syndrome (so-called because withdrawal of the power plug is the only cure).

Accordingly, I now use:

200 PRINT "PRESS ANY KEY WHEN READY."
210 IF PEEK(151)=255 THEN 210

which determines that no key is pressed. The old-ROM equivalent is 515. To date I have found no ill effects from this approach.

Disgruntled Dealer

QUESTION: Is Commodore's "Dealer Service Kit", available to dealers at £178 (no discount), worth the money?
ANSWER: IT DEPENDS on what you think should be covered for that price. The looseleaf has sections on the "8K", the "16/32K" the Display, the 2040, and the 2022/2023. There is no mention of the 3022/3023, the 3040, the cassette, or any of the subsequent releases.

IT DEPENDS on how many spelling errors per square inch you find acceptable at that price. From Santa Clara we get "moter speed test", "flourescent", "tolerence", "isio-syncrasies", "immediatly", "equivilent". This kind of quality only makes one wonder about how trustworthy the rest of the information is. When it comes to the printer, we are exposed for the first time in living memory to a professional-quality manual from CBM with detailed explanations of operation, beautiful drawings, malfunction possibilities analyzed, and the like. Needless to say, it was not written by Commodore's flacks, but comes from Japan where the printer mechanism, which is officially recognised as the Epson 3110, is manufactured. There is something refreshing about the Japanese turn of English, which can come up with such beauties as "Nature of trouble: become loose the cloth of inked ribbon....", and "disassemdly and assembly of this printer are a relatively easy work...." The schematics for the printer revert to Commodore quality and would be rejects in any drafting room I have ever been associated with.

I would be very interested to hear how other dealers feel about the Dealer Service Kit: whether they feel the price is justified, whether they were pressured to buy it, what mistakes and omissions they find.

Name & address supplied

Ho Hum! All we can say is that the quality of Commodore documentation does seem to be improving. Perhaps other dealers would care to respond.

Tick Tock PET

Here is a machine code routine that constantly displays a 12 hour clock on the top right of the screen, independent of TI$. The time is POKEd into the second cassette buffer and then the routine is activated by SYS 826 and de-activated by SYS 842. Locations 800 and 801 contain tens of hours and hours respectively. Locations 803 and 804 contain tens of minutes and minutes respectively and likewise, locations 806 and 807 contain tens of seconds and seconds respectively. Locations 802 and 805 are separators for hours, minutes and seconds. I prefer to use "/" (POKE value 47), some others may prefer to use " " (POKE value 42).

```
B*
    PC   IRQ  SR AC XR YR SP
.:  0401 E62E 32 04 5E 00 F6
.
.:  033A 78 A9 03 85 91 A9 55 85
.:  0342 90 A9 00 8D 2A 03 58 60
.:  034A 78 A9 E6 85 91 A9 2E 85
.:  0352 90 58 60 EE 2A 03 AD 2A
.:  035A 03 C9 3C D0 6E A9 00 8D
.:  0362 2A 03 EE 27 03 AD 27 03
.:  036A C9 3A D0 5F A9 30 8D 27
.:  0372 03 EE 26 03 AD 26 03 C9
.:  037A 36 D0 50 A9 30 8D 26 03
.:  0382 EE 24 03 AD 24 03 C9 3A
.:  038A D0 41 A9 30 8D 24 03 EE
.:  0392 23 03 AD 23 03 C9 36 D0
.:  039A 32 A9 30 8D 23 03 EE 21
.:  03A2 03 AD 21 03 C9 33 D0 03
.:  03AA 4C BC 03 C9 3A D0 1C A9
.:  03B2 30 8D 21 03 EE 20 03 4C
.:  03BA CD 03 AD 20 03 C9 31 D0
.:  03C2 0A A9 30 8D 20 03 A9 31
.:  03CA 8D 21 03 A2 00 BD 20 03
.:  03D2 9D 20 80 E8 E0 08 D0 F5
.:  03DA 4C 2E E6 00 00 00 00 00
.?
.
```

Mark Valentine
Yorkshire Electronic Services Ltd.,
17 Fountain Street,
Morley, Leeds

Tommy says: Don't forget that PETs POKE codes are 48 higher than the value of the numeral. So for a 1 you would have to POKE a value of 49.
Thanks, Mark. Your routine will spoil one of our best excuses. The one that goes: "I had no idea how late it was...."

PET/CBM Personal Computer Guide

2nd Edition

Everything you always wanted to know about your PET, but didn't know **where** to ask.

Most manufacturers are notorious for not producing clear or sufficient material on their products. but if you own, or are thinking of owning, a PET/CBM personal computer, your problems are solved!

Authorized by Commodore, THE PET/CBM PERSONAL COMPUTER GUIDE is a complete handbook on the use of your PET. Beginning with an introduction to BASIC language, and descriptions of how to operate the PET, it then goes on to cover programming, storing data, preventative maintenance, and assembly language — all carefully and thoroughly explained, and all designed to be completely practical.

For example, Chapter Five describes the features and quirks of the PET, and how to get around the limitations of PET BASIC. Every user will find this section essential if they really want to understand their PET, and how to get the most out of it.

Complete with numerous photographs, diagrams, and programme listings, the PET/CBM PERSONAL COMPUTER GUIDE is an invaluable source of practical information for every PET owner.

1980 430 pages £10.00

Order your copy today! Just send this advertisement (or a copy of it), plus your cash/cheque for £10.00 to:

Direct Marketing Department,
McGraw-Hill Book Co., (UK) Ltd.,
FREEPOST,
Shoppenhangers Road,
Maidenhead,
Berkshire.

ACTION TO COMBAT SOFTWARE PIRACY

Following our report of widespread copying of programs, software houses have formed themselves into a trade association. A dramatic increase in the number of cases brought against alleged 'pirates' is expected. In an exclusive interview John Butcher, Conservative MP for Solihull, told PRINTOUT that he was taking the matter up with the Department of Trade. Butcher, who is the only Member of the House with extensive computer industry experience, is asking the Minister to set out the Government's policy on protection of computer software as a matter of urgency.

PET INVENTOR STARTS AFRESH

As forecast by Inside Trader, Chuck Peddle, creator of the PET, has joined forces with Commodore's former financial supremo, Chris Fish, to start a new computer company. Both men recently resigned from Commodore. The new enterprise will be based in Scotts Valley near Santa Cruz, California. Peddle is understood to be working on a range of dedicated applications desk-top computers. Many of Commodore's technical team have left to join Peddle; they include Bill Seiler, Glen Stark, Scott Patterson plus Peter Sehnal who was responsible for PET's distinctive shape.

CRIMINAL CHARGES IN SOFTWARE CASE

In the first criminal case involving alleged misappropriation of computer software, the Metropolitan Police have laid charges against two men. Vincent Coen, Managing Director of computer book and software distributors, LP Enterprises, and George Potter, formerly a consultant with London based microcomputer company EuroC, have been charged with conspiracy to steal computer disks; conspiracy to defraud Graham-Dorian Software Systems Ltd. and conspiracy to defraud EuroC. It is understood that the first charge relates to 14 floppy disks, some of which carried software applications packages written by Graham-Dorian Software, and supplied to EuroC for resale.

VISICALC IN HIGH COURT

ACT Microsoft Ltd., U.K. distributors of VisiCalc have brought a High Court action against a Mr D.J. Bolton, a mail order software supplier. ACT allege that Mr Bolton was supplying software which enabled copies of the VisiCalc program to be made. After some discussion as to whether ACT had title to the work, Mr Justice Whitford adjourned the case, granting leave for a Short Notice of Motion to be served on Mr Bolton and giving permission for the program's American authors to be joined as plaintiffs.

PET DEALERS FORM ASSOCIATION

A Commodore Dealers Association has been formed under the auspices of the Computer Retailers Association. The CRA presently has a membership of thirty companies, some two-thirds of whom sell the PET. Officially the purpose of the new group is "for the interchange of ideas and information between dealers." However, the real object is to put pressure on Commodore for better terms. Ironically it is the issuing by Commodore of a tough new set of trading conditions that has lent added impetus to the new association. Details from Mrs Gibbons on 0763-71209.

LOW-COST DIGITAL & ANALOG CONVERSION

Machsize have come up with an 8-bit analog to digital converter and an 8-bit digital to analog converter, both priced at a reasonable £69.95. They feature user-selected uni-polar and bi-polar voltage ranges. Each converter comprises a free-standing PC board with flying leads to connect it to the user and cassette ports of the PET. Machsize are at York House, Clarendon Avenue, Leamington Spa. Tel: (0926) 312542.

On the Move

Anadex, who make the popular DP8000 printer can now be found at Weaver House, Station Road, Hook, Hampshire. Tel: (025672) 3401.

VIC 'FIRST MICRO TO CRACK MASS MARKET'

According to a trade survey conducted by PRINTOUT, the new Commodore VIC will be the first microcomputer successfully to penetrate the U.K. home market. Wholesale and retail chain buyers were asked to react to a specification of the VIC. Although some companies expressed concern over Commodore's quality control, the response was otherwise uniformly favourable.

Key factors in its success were identified as price - a recommended retail of £150 by December 1981 had been assumed - compatibility with a broad base of existing software, and ease of use. Although the Acorn Atom and Newbury NewBrain were cited as possible competitors, it was felt that Commodore possessed the financial strength and experience necessary to secure volume production, and the marketing expertise to establish the VIC as brand leader.

Another advantage enjoyed by Commodore over its competitors was an existing network of distribution to High Street outlets.

The project manager for one leading retail chain commented that the VIC was small enough and simple enough to be sold from rack-mounted bubble packs by staff who at present sell programmable calculators.

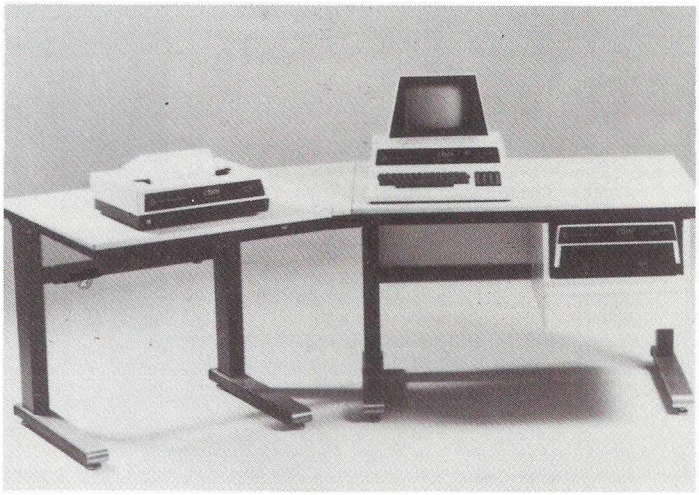
PAIN IN THE NECK 1

If you find yourself keying in long programs or data, you will know that it usually requires a complicated balancing act involving books and gin bottles to get what you are copying from, up to a comfortable height and position in relation to PET's screen. In our case the result is always the same: gin everywhere and a pain in the neck. But our booze bill has been halved since we started using a cunning new device called the Luxo Copyholder. It consists of a David Frost-style clipboard attached to an adjustable arm rather like that made famous by the Anglepoise lamp. This is in turn attached to a clamp that clamps to your desk or whatever. Most copyholders employ an electric motor to drive the line finder bar, and are hideously expensive as a result. The Luxo Copyholder uses an ingenious pneumatic footpad and costs only £44.50. It is available from DN Computer Services Ltd., West Croft Industrial Estate, Manchester Old Road, Middleton, Manchester. Tel. 061-643 0016.

PAIN IN THE NECK 2

Are you ergonomic? Us neither, and a result suffer from the above and worse. Help is at hand from International Data Automation who market a well engineered looking range of PET furniture from Germany. The work stations (desks to you) have a nice solid feel to them, which is not surprising since the frame *is* solid steel. They have noticed that programmers drink gallons of coffee and sensibly provided melamine tops which should resist the worst Maxwell House can do. And they are very ergonomic! You can contact IDA at 11 Station Parade, Virginia Water, Surrey. Tel. (09904) 2838. Prices from £195.

▷15



The PIC-CHIP.... a powerful easy-to-use graphics facility for all New Rom PETs.

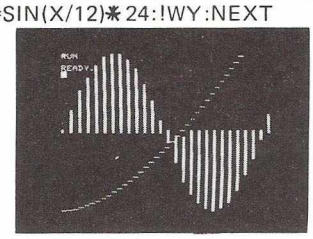
The PicChip is a ROM module which simply plugs into your PET making available immediately over forty new BASIC commands. These commands use BASIC variables as parameters (no PEEKing or POKEing) and enable the graphic possibilities of the PET to be fully exploited - even by beginners! Using an X, Y coordinate system based on an origin specified by program, lines, graphs and drawings of all kinds can be generated on the screen by simple programming. Other commands enable defined areas, or the whole of the screen, to be rolled or shifted up, down, left and right. Images can be stored to and retrieved from any RAM address.

Originally designed for **scientific** and **technical** applications, the PicChip is also being used in **educational projects, games** and **design work** of all kinds. The combination of fast plotting and area manipulation makes the PicChip ideal for the continuous display of real-time data in graphical form.

Just see how easy it is to use PicChip commands: the following examples were all photographed directly from a PET screen.

Picture 1 shows two curves, one drawn in fine-density and one in bar form, produced by two program lines:

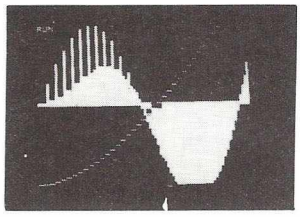
```
10 FOR X=0 TO 39:Y = X↑1.5:!WF:
NEXT
20 Y0=25:FOR X=0TO79 STEP 3:
Y=SIN(X/12)*24:!WY:NEXT
```



(1)

Picture 2 adds a third program line to plot a function as adjacent bars:

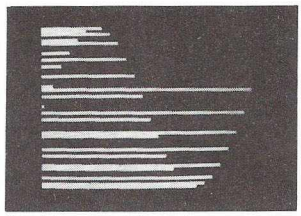
```
30 FOR X = 0 TO 79:Y=SIN(X/12)*
X/2:!WY:NEXT
```



(2)

If we just take the second program line and change !WY to !WX, the bars are plotted horizontally:

```
20 FOR X = 0 TO 79:Y=SIN(X/12)*24:
!WX:NEXT
```

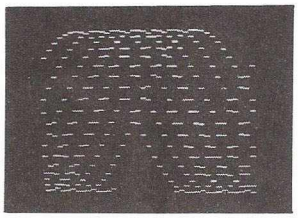


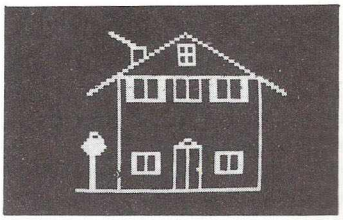
(3)

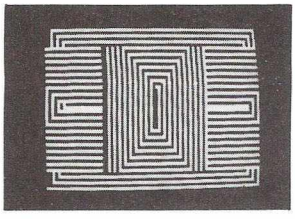
All the other pictures reproduced here were generated by the DEMONSTRATION PROGRAM included in the 20-page Handbook. What we can't show here are the amazing effects produced by shifting or rolling or otherwise manipulating different areas of the screen. There is even a repeat-key function, and commands for reading and setting the cursor position in X,Y co-ordinates.

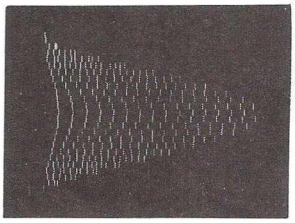
PicChip Functions.

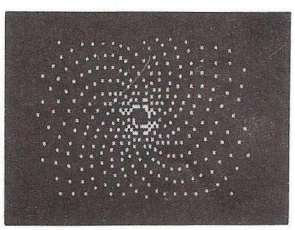
Command	Function
SYS	PicChip On
!RE	Restore screen
!CO	PicChip off
!RP	Repeat-Key on
!RO	Repeat-Key off
!CW	Cursor-position Write
!CR	Cursor-position Read
!AF	Area Fill
!AR	Area Reverse
!AN	Area Normal
!AI	Area Invert
!AS	Area in Shift case
!AU	Area in Unshift case
!AC	Area Case invert
!AF	Screen Fill
!SR	Screen Reverse
!SN	Screen Normal
!SI	Screen Invert
!SS	Screen in Shift case
!SU	Screen in Unshift case
!SC	Screen Case invert
!US	Up Shift
!DS	Down Shift
!LS	Left Shift
!RS	Right Shift
!UR	Up Roll
!DR	Down Roll
!LR	Left Roll
!RR	Right Roll
!WP	Write Point
!EP	Erase Point
!WL	Write Line
!EL	Erase Line
!WC	Write Continuous line
!EC	Erase Continuous line
!WX	Write bar in X axis
!EX	Erase bar in X axis
!WY	Write bar in Y axis
!EY	Erase bar in Y axis
!WF	Write fine Y
!EF	Erase fine Y
!FW	Write fine X
!FE	Erase fine X
!CS	Copy Screen
!PC	Poke Character











The standard PicChip plugs into socket UD4 of the PET, but is also available to fit either of the other two sockets. PicChip is therefore **compatible with other PET ROM packages.** Installation and use are fully described in the handbook.

The PicChip costs just £50 + VAT. To buy the handbook separately costs £5 but this may be offset against an eventual purchase of the chip. State required socket when ordering. **10% discount to educational institutions.**

Mail Order to:–

Insel Computer Ltd.,
7 Bramshill Mansions,
Dartmouth Park Hill,
London N.W.5.

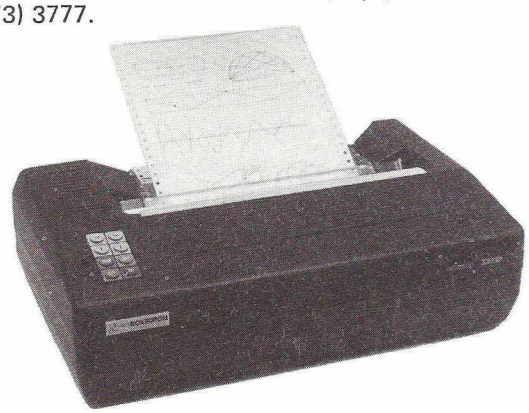
TELEPHONE ANSWERING

Several readers have written to enquire about our new telephone answering system mentioned in the last issue. We tested a number of the machines currently being advertised, and were surprised at the generally poor quality of construction and inadequate back-up service available. Nor did Post Office certification prove a reliable guide. Phonemate and Codaphone models imported from the U.S. were particularly disappointing. The best system we examined was the Recorda-Call 70A from ThornEMI. It is well designed, solidly constructed and easy to use. An unusual feature is Voice Activation; this means that callers are not limited to messages of a certain length. Nor do you have to listen to a minutes worth of dial tone on playback if someone has hung up. Expect to pay around £189 plus VAT for the 70A or a little more for the version which allows playback to be initiated from a remote telephone. We are investigating further to see whether the machine can be useful in PET-to-PET tele-communication.

Full details from RecordaCall Ltd., 119 Gordon Road, London W13 8PR. Tel. 01-991 2201.

BRAINY PRINTER/PLOTTER

After reviewing more than thirty printers for last issue's survey, we felt we had earned a rest from hard copy devices for a while. The arrival of a scruffy photocopied circular changed all that. It was from Mike Davis of Roxburgh, announcing the arrival of their X80SP. What is unusual about it apart from the awful name? This 8x8 matrix printer/ plotter has three character generators each with 128 characters, one of which is fully programmable, bi-directional printing and selectable print direction in steps of 45 degrees. Line length can be 80 or 96 characters. It also has numerous plotting and graphics features, including single dot control, and generators for X and Y axis, vectors, rectangles and ellipses. Print speed is quoted as 100 characters per second. It is also rather handsome. The X80SP costs £795 including PET interface. With luck Roxburgh will have a brochure by the time you read this. Their address is 22 Winchelsea Road, Rye, East Sussex. Tel: (07973) 3777.



BUSINESS SOFTWARE BRIEF

Each month we receive letters from readers in search of software. Our policy is to conduct in-depth evaluations of major packages like VisiCalc and to accord shorter reviews to other programs likely to be of general interest. Unfortunately, space doesn't always permit us to cover some of the more specialized packages. This column is intended to provide basic information about those we have not been able to test. In most cases your local PET dealer will be able to supply the software although you may wish to obtain details direct from the publishers, whose addresses we are given. Software Houses are invited to keep us informed of new releases and updates to existing packages.

Point of Sale Retail System

Ahoy there, owner/occupier retailers with one to six outlets who do purchasing and merchandising centrally. A new system called POS uses a PET linked to a cash drawer with a disk and 40 column receipt printer. The control software handles retail transactions and stock control for up to 3500 lines. In operation it's pretty much like a cash register, but with the added advantages of stock and purchase order control, performance reporting and replenishment orders. For more information contact Whymark Instruments Ltd., 6 Holmesdale Road, Reigate, Surrey. Tel: (07372) 21753.

Solicitors Accounting Systems

Many of the solicitors who purchased PETs as a cheap but powerful source of word processing will have wondered what else their computer could do for them. One answer is to be found in the new Accounting and Time Recording System from Scan, which handles client, office and nominal accounts. Standard details and balances for each account are stored in a ledger file, and posting details in a posting file. Enquiries on account details can be made via the screen, and lists of accounts, selective reports and statements printed on demand. For more information contact Scan Computers Ltd., Chanctonbury House, Church Street, Storrington, West Sussex. Tel: (09066) 5432.

Medical Practice Manager

By sanctioning the use of prescriptions in continuous stationery form, the Department of Health and Social Security has opened the doors for doctors considering the use of microcomputers. Medicom of 14 Broadway, London W.13 have a PET-based system called 'Practice Manager', which offers control over repeat prescriptions and analysis of drugs used. The software is said to comply with the outlines set down by the recent Scicon report, commissioned by the BMA. A Patient Consultation Monitor and Age/Sex register are included as part of the package. For details telephone 01-579 5845.

Electronic Filing Cabinet

Derby based Davidson Richards are an outfit capable of mustering some pretty fair names in the PET programming field, among them Pete Dowson of Wordcraft fame. Latest offering is Filemaster Four, a file handling package for the 8032 by IPUG Chief, Mike Lake. (Why Filemaster *Four?*) The intention is to allow the business user with limited computer knowledge to design and maintain a wide variety of different files. What makes Filemaster Four different from most similar packages is the ability to specify a range of values for a search. So a search could be made for all records from supplier AEI with less than 50 in stock and a selling value of between £50 and £100. The price is £225. For more details call 0332-366803.

Which Side do you Dress ?

In these days of off-the-shelf software it's getting increasingly difficult to get programs made-to-measure. One company who specialize in tailor-made business software is Professional Computer Services Ltd., of Oldham, Lancashire. In addition to Sales, Purchase and Nominal Ledgers they offer Invoicing and Budget/Costing packages. Information from 061-624 4065.

Sales and Purchase

One of the problems with most sales and purchase ledger packages currently available is the restricted number of accounts and transactions they handle. Lancashire based Megapalm Ltd. have come up with packages handling 1170 accounts on an interactive direct access basis running on the 400K CompuThink disks. The suite costs £400. For another £100 they will supply two programs for the simultaneous writing and posting of cheques. Contact Roger Mace on 052473-3801.

Telexing PET

Our faith in telex as a means of communication was somewhat shaken when we tried to telex a major U.S. microcomputer manufacturer and discovered they hadn't got one. Now many of the medium's shortcomings can be overcome with a PETbased telex preparation system. Called Petelex, it combines the PET with OCT's Telex-Mate, an intelligent paper tape reader and punch unit that enables messages to be prepared, checked and edited independently of the telex machine, leaving it free for incoming messages. Details from OCT Ltd., Kimberley House, Vaughan Way, Leicester. Telephone (0533) 28631, or telex their PET on 341838.

Control Software

Mitrefinch should be on your list of people to talk to if you are interested in Timekeeping. Their control system gives instantaneous access to personnel clock data including time of last clocking, total hours so far this attendance period and overtime hours, attendance schedule for the employee, plus the ability to modify that data. Contact Mitrefinch Ltd., at Fishergate, York. Tel: (0904) 52995 for full details.

Incomplete Records

According to Computer Services Midlands there are more than fifty accountants using their Incomplete Records system and by all accounts it is quite straightforward to use. Full final or draft accounts can be prepared. These include Trading Account, Schedule of Overheads, Balance Sheet, Schedule of Fixed Assets, Source and Application of Funds Statement, Statutory P and L Accounts for Limited Companies and Partnership Capital Accounts. Further details from CSM at Refuge Assurance House, Sutton New Road, Erdington, Birmingham. Tel: 021-382 4171.

GAVINS'S DISK is for sale.
CompuThink 800K for new ROM PETs. Cost £1140 six months ago, now it's yours for just £595.00. What a bargain! CAll 0635-201131 or write c/o PRINTOUT, P.O. Box 48, Newbury RG16 OBD.

Better than Adventure?

We reckon that CATACOMBS, our latest game in the Adventure mould, is better than the original! You'll need a 16 or 32k PET with disks to find out if we're right - and £27.

Also for disk owners we've two new games collections, each of six programs on one disk - BRAIN TEASERS (£15) and GAMES PLUS (£12). On a more serious note there's DISK APPEND and DISK MERGE at £15 each, and for £22 MASTER DIRECTORY is a powerful package that will keep track of all your disk files. We are official WORDPRO and VISICALC dealers and we can also offer KRAM for £59!

There are dozens of great PET programs in our free 1981 Catalogue, together with supplies and some nifty gadgets - like the KL-4M four-part harmony music board which comes complete with the excellent VISIBLE MUSIC MONITOR for £34. Also from the States we've PAPERMATE, a really versatile word processor that does everything that most people will ever want - for £25 on tape or disk!

We've the TOOLKIT at £29 (Basic 4 £34), and for £45 you can choose between PIC-CHIP and SUPERCHIP (now also available for Basic 4). Short of sockets ? Then we can offer both in one 4k chip for £90. If you've still got OLD ROMs then how about the OLD ROM PACKAGE - Toolkit, Superchip, and extension board for £75, the price you could have paid for Toolkit alone until recently.

From plug-ins to a plug-on, the PRESTO DIGITIZER, at a Supersoft price of just £18, saving you £24! Back to software with PEP, or PET ENHANCEMENT PACKAGE. For £25 you get a double-density PLOT command, computed GOTO and GOSUB, INPUT with timeout and many more original features. If you fancy writing your own machine code, we have MIKRO and MAKRO assemblers at £50 each.

SUPERSOFT

POST FREE - ADD 15% VAT TO ALL PRICES

1st floor, 380 Station Road, Harrow, Middlesex 01-861 1071

PRO–KIT 1 FOR :– New ROM 32K 40/80 column PET.

THE PROFESSIONAL AID TO BETTER PROGRAMS.

* FULLY VALIDATED INPUT ROUTINES FOR NUMBERS, ALPHANUMERICS AND DATES.
* SEARCH–A STRING–FOR–MATCHING–SUB–STRING ROUTINE'
* STORE SCREEN DISPLAY IN MEMORY AND RECALL THEM IN AN INSTANT.
* ALL WRITTEN IN MACHINE CODE:– BUT CALLED BY SIMPLE SYS COMMANDS FROM BASIC.

PLUS

* 'SCREENS' PROGRAM TO HELP YOU DESIGN SCREEN DISPLAYS THAT CANNOT BE SCROLLED OR ACCIDENTALLY CLEARED.
* SUITE OF 6 PROGRAMS TO DEMONSTRATE AND TEACH THE USE OF PRO–KIT.
* COMPREHENSIVE INSTRUCTION MANUAL.

AVAILABLE ON CASSETTE OR DISKETTE.
FOR ONLY £40.25 INCLUDING VAT & P+P

ORDER FROM

INTEX DATALOG LTD

EAGLESCLIFFE INDUSTRIAL ESTATE,
EAGLESCLIFFE,
STOCKTON-ON-TEES,
CLEVELAND TS16 0PN
TEL: (0642) 781193 (24 HR. SERVICE)
TELEX 58252

PLEASE STATE:–

COMMODORE OR COMPUTHINK

DISK OR CASSETTE

THE CASE OF THE MISSING RAM

Julian Allason investigates the Great VIC Mystery.

It is very odd. The first post in January, which none of us were in any state to open, contained dozens of subscription applications from people who almost certainly hadn't got PETs, and who you wouldn't normally expect to find tucked up with a copy of PRINTOUT. And it's been like that ever since. So I telephoned several of them. Each time the conversation went something like this:

> *"We have heard rumours of this exciting low-cost VIC computer, and we know we can sell hundreds of them, but we need hard information now, and Commodore (surprise, surprise) aren't talking."*

or alternatively:

> *"We have heard rumours of this exciting low-cost VIC computer, and we know our competitors will sell hundreds of them and what that will do to our products, so we need hard information now, and Commodore (no flies on Kit) aren't talking."*

Now confusing the competition is a game Commodore play with great gusto, sometimes to the detriment of their own customer relations. So in the absence of any official information I am going to indulge in a little crystal ball gazing. *(I thought news pages were supposed to deal in facts?* - Ed.)

In our exclusive report in the last issue we published a photograph of the VIC-1001 which had just gone on sale in Japan. Engraved on the keyfronts were a set of Katankana (not Kanjii as the BBC and our semi-literate editor seem to think) characters. I can authoritatively predict that the VIC-20 will not have these when it appears in Europe. Now you may not think that is a very impressive prediction. But the truth of the matter is that the VIC is undergoing many changes, and no one, Commodore included, yet knows exactly what the finished product will look like.

One thing that won't - indeed can't - be changed at this late stage is the architecture. So let's take a look at VIC's internal organization and see what can be deduced from it.

Detective Work

The first step is to contact 'Dusky Dave' Briggs, Commodore UK's technical manager. Due to the high attrition rate amongst senior executives in the company, information is only disseminated on a 'need to know' basis. However, it is rumoured that 'Dusky Dave' (so named by Inside Trader following events which the Editor felt had no place in a family magazine) has by devious means acquired a copy of a copy of a copy of the VIC specification.

At this point I should explain that, contrary to what you may read in the American Press, the VIC was not wholly developed in Japan. A good deal of credit is due to the engineers at MOS Technology, and to Bill Seiler at Commodore Santa Clara, who cleaned it up with advice and assistance from Chuck Peddle, the PET's inventor.* There is something about the style of the spec (which is to say non-existent) that points unerringly towards Bill Seiler.

Be that as it may, Dave Briggs has a surprise in store. It is a VIC-1001, discreetly acquired through "friends" in Japan. Since it lacks a modulator, he has hitched it up to a black & white monitor. Prediction No.2 is that the VIC-20 will have a modulator so that you can connect it to your colour television.

The Video Interface Chip is mask programmable, so conversion from the American NTSC colour TV standard to our PAL system can easily be achieved by changing masks at the production stage. Commodore have thus circumvented the delays in producing European models which have so damaged Texas Instruments' and Atari's chances over here.

Dave also has the same problem we do. He can't understand the manual, although in this instance the incomprehensibility is due to its being printed in Japanese.

The Clues Emerge

Fact: The VIC has a standard BASIC 2.0 plus additional commands to handle 16 background, eight border and eight character colours. 20K bytes of Read Only Memory and 5K of Random Access Memory are present. Problem: At power-on the screen displays only 3583 BYTES FREE. Where are the missing bytes?

Since Dave can't find the machine code monitor - he swears there isn't one - I attempt to construct a primitive memory map. It may reasonably be deduced that the first 1K is used as a scratchpad for the operating system, as with CBM and PET models. Locations between decimal 4096 and 7670 appear to be given over to user RAM. Allowing 1K for the screen RAM, we are still short. The answer may possibly lie in the various buffers, the requirements of which are undocumented. Or not.

There is an oddity about the way in which VIC stores screen information. On PET and CBM computers, memory locations 32768 to 33767 are assigned to screen RAM. On the VIC, the top 1K of RAM is given over to the screen. Add extra memory (as you undoubtedly will), and those screen locations change, as on the Sinclair ZX-80. Another thing: if you do succeed in POKEing a character to the correct screen location, it won't acutally appear until after the cursor has been passed over it. Further investigation will doubtless uncover a 'Reveal' code.

Solutions, Solutions

The mystery of what goes on between locations 1024 and 4096 remains. A possible solution relates to the way in which expansion memory is added.

(Appreciate, if you will, the difficulties of conducting a guided tour of VIC's Input/Output, sans documentaion. Crystal ball in hand, let's try nontheless).

The VIC concept is simple: provide a well-engineered but inexpensive structure onto which many bells and whistles may be attached in varying combinations. That Commodore have chosen a non-standard means of achieving this is in itself worthy of enquiry. The sceptics argue that the company hope to corner the market in peripherals, and point to the cool reception accorded the CompuThink disk. On the other hand, Commodore have consistently produced 'smarter' peripherals than the manufacturers of other mass market micro-computer systems.

Input/Output

VIC has a control port to which joysticks or a light pen may be attached for direct connection to the video controller chip. As you would expect, there is also a User Port, which according to the specification is Centronics parallel. Jack Tramiel has hinted that an RS232 interface will be standard. The spec also refers to an IEEE-488 interface connected to the serial port. My guess is that this will be available as an optional extra. The cassette bus is standard, which is to say compatible with PET casette decks. The expansion port is also described as standard.

I interpret all this to mean that bolt-on goodies will generally be connected via an external expansion module. This will have its own power supply and connect to the aforementioned expansion port. Some add-ons, including the high-resolution graphics card, Programmers Aid (Commodore's answer to the Programmers Toolkit), and expansion RAM will, however, be capable of direct connection to the expansion port; presumably singly. Expect a wide range of plug-in ROM cartridges in due course also.

It was at this point in my musings that Detective Inspector Briggs telephoned to say he had come across a reference to a plug-in 3K RAM. Ha! The missing memory? Perhaps it will be supplied standard on the basic model, no doubt plugged into the expansion port.

I am off to California to find out. I hope they know when I get there.

*See Hotline

VisiCalc

HOW & WHY

Many PET users bought their system for the sole purpose of running the VisiCalc forecasting program. When we first tested it, the results were so impressive that we commissioned a special in-depth report from John Nuttall.

PROGRAM NAME:	VisiCalc
COST:	£125 + VAT
DEVELOPED FOR:	Personal Software Inc.
PACKAGE:	Disk, ROM and manual
SUITABLE FOR:	3000 series (32K) and 8000 series
PRINTER:	CBM or other type (ASCII)
AVAILABLE FROM:	ACT Microsoft & PET dealers

A well-known oil company (keeps you and your car mobile) claims that it saved more than £13,000 p.a. in outside computer bureau costs with VisiCalc. And that's not a bad recommendation for any piece of software. Without a shadow of doubt this program is both practical and versatile. In my humble estimation it is also the best piece of programming that I have yet seen for the PET, making full use of the potential of the machine.

VisiCalc comes with a ROM (which does a good deal more than the CBM security type), and an excellent tutorial manual together with a command summary card. This, together with the disk, are housed in a pleasing folder.

What can it do? It can plan budgets, modify projections, cope with financial analysis, predict tax consequences, develop financial reports and generate proformas and analyse surveys etc. You will, however, need at least 32K memory. Hard copy is available for a range of printers; I wish this latter feature appeared in more programs. Software writers please note that not everyone owns a CBM printer!

Electronic Sheet

The manual describes the program as an "electronic sheet" suitable for anyone who uses a calculator, a sheet of paper and a pencil (and probably a rubber as well!). The sheet is organised as a grid of rows and columns; the top left position is designated A1 whilst the bottom right is BK254. Each cell may be addressed as a co-ordinate which may contain a label or prompt, a number or a formula. PET's screen acts as a window on this matrix and you may scroll this window in any of the four directions or even split the screen to see any two parts of the sheet at the same time. I mentioned earlier that you would need 32K memory; even this is a limitation and there is no way in which you will be able to use the full matrix. Nevertheless, there is a memory indicator at the top right-hand corner of the screen and this normally displays about 10K bytes free after loading the program from disk.

VisiCalc makes use of a dynamically reconfigured memory. This means that space in memory is allocated according to the size of the current array. If you write to the bottom right-hand co-ordinate, the program will pre-allocate room for anything which may occupy an intermediate position. In practical terms this means keeping all your data fairly tightly packed and not putting bits here and bits there. Otherwise you will note an alarming drop in available memory.

What If?

So far, so good. Nothing very special yet! The great strength of VisiCalc is that you can change any parameter in that matrix and watch all the other columns or rows change with it. Let's say you have a model set up which is based on your household budget. It will contain your income and expenditure. The expenses column contains gas and electricity charges, mortgage repayments, food and clothing etc. Expenses are summed and deducted from income to give us a total profit (or loss!), and then we want to calculate a percentage of our profit to be placed in a Building Society. Fine! Now let's imagine that our mortgage payments are going up by 3%. What will the effect be in our balance of account? What changes will we now make to the cash allocated to savings? By simply changing the figure in the mortgage column you are instantly aware of the repercussions right through the model.

It is this relcalculation feature that makes VisiCalc a powerful planning and forecasting tool. What could have taken days or weeks will now only take hours or even minutes, and that has to be good because you'll be right up to date. Full editing facilities are also available and you can insert, change, move or even delete lines, titles or formulae.

Let me say that the above example is rather trite and doesn't reflect the full capabilities of the software. I somehow imagine that our oil company had other things in mind!

Take Time

The first temptation when confronted with an extensive manual is to get the program loaded and then prod around with a few keys to see what happens. Resist the temptation. The manual is well thought out and will lead you and the PET through the intricacies of the program. You may need about five or six hours with the manual, but there are plenty of examples and they all work too.

It's impossible to do justice in a short review to all the features of this package and so I'll split the more important into three sections:-

1. Disk storage
2. Printout
3. Screen: input and format commands

Disk Storage

In one sense this is putting the proverbial cart before the horse, but it's probably the easiest to tackle. Once the sheet is set up, it can be stored on disk, with all the associated data and formatting. A modest sized sheet is going to take around 12 blocks or 3K bytes. File names are permitted on SAVE or LOAD. A very helpful feature on LOADing (especially if you can't remember the file name) is to be able to press Cursor-right and look one by one at the directory entries. When you decide which file you need, simply press RETURN to load it. Mention must be made at this stage of the Data Interchange Format or DIF. This is well documented at the end of the manual, and basically it is a conversion program which allows VisiCalc to talk to other programs and vice versa. VisiCalc seems to be avoiding one of the major pitfalls of WordPro, namely insularity.

Initialisation of the disk is also possible from the program but users should beware that this really means formatting and the loss of previous contents.....anyway, we all make back up copies, don't we?

Printout

All functions are called by pressing a control key ("/") and another key, so at this stage we press control and "P" for printout. A legend appears at the top of the screen:

PRINT: ASCII PET FILE

In fact, the print command will also access the disk unit or any addressable device. Since the matrix will usually be wider than your printer, you may copy the sheet in strips. In any case you must first set up the start and end point, either by cursoring to the desired co-ordinates or simply entering them from the keyboard. Paper can be fed through the printer by holding down the "+" key. A nice little touch of finesse there.

Selecting the FILE option will save the sheet to disk (default Drive 0). The file is then stored in print file format which may then be incorporated into another BASIC program but VisiCalc cannot reload data in this format.

Screen Input

VisiCalc automatically senses whether you are inputting alphabetic data (labels) or numeric data (values). A value entry can be a simple number, an arithmetic expression or may contain entry position co-ordinates, which are termed value references. Thus 1.5 + (D2/B3) will use the current values stored at D2 and B3 as its calculation of the final result. The normal arithmetic operators are available (addition, subtraction, division, multiplication and exponention) but the package performs calculations in the order it finds them, from left to right. You can, however, change priority with brackets.

When a value entry has been made, the program displays the calculated value in the entry position on the sheet, but stores the actual formula in memory. There are some useful function arguments as well:-

@ SUM (list)	adds value of all entry positions in the list
@ MIN (list)	chooses smallest value in list
@ MAX (list)	chooses largest value in list
@ COUNT (list)	returns number of non-blank entries in list
@ AVERAGE (list)	mean of entries making up arguments

Other features include ABS, INT, SQRT and transcendental functions such as @ EXP, @ LN (natural log) and @ SIN. Where the sheet must be set up before data is available, @ NA is used.....if they are merely left blank they would otherwise be evaluated as zero. Graph drawing facilities are included - simple bar graphs are returned from integer values.

The actual format for numbers will depend on the column width and the format chosen (see next section), but the software will switch between conventional and scientific notation as required to display the calculated value to the greatest precision.

Whilst developing a VisiCalc sheet I often found that I needed to insert additional rows or columns. Thank heavens this is available with the INSERT command. The sheet will be opened up from the current cursor position and entry references are automatically adjusted for you.

The Incredible Shrinking Sheet

Once the sheet was finished, I must admit that my first efforts looked rather scrappy with quite a few gaps here and there. Saving the sheet to disk at this stage, clearing the screen, and then reloading, I was amazed to find the sheet had shrunk. Everything was there, but only those labels and numbers actually saved. This is a real bonus and should clear out memory to give you a little more space to play around with.

We'll end this section by looking at an especially useful feature which should save more time and slog. REPLICATION permits an entry or formula to be repeated in a specified location or locations across or down the sheet. It does not, however, allow you to copy a row into a column or matrix. To use the replication facility you must specify two, and sometimes three parameters:-

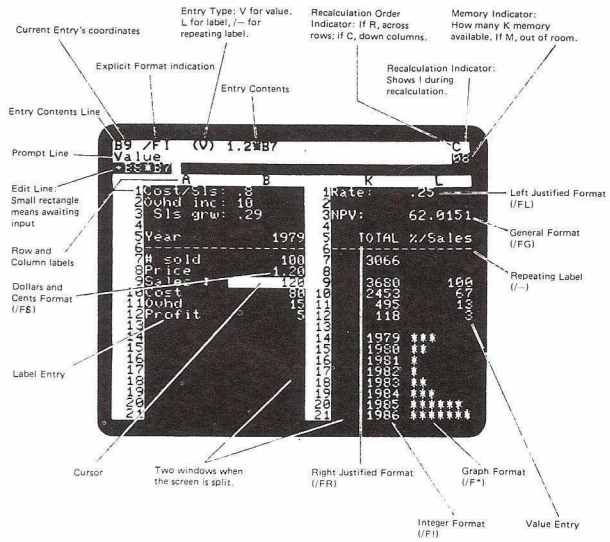
a) the source range
b) the target range
c) relationship of value reference. This tells VisiCalc whether to simply copy each value into a new position or change it relative to its new location.

This feature is very powerful and the manual gives a full and clear description along with worked examples. Again, it's worth spending some time on this section because if you have not grasped this feature, it will impede the rest of your work.

Screen - Formatting

Given the limitations of the 40 character width of the PET screen (and a few other micros), the designers have done their best to be helpful in screen presentation and formatting. It's a fair bet that every sheet will exceed the limits of the screen. To see all the entries you will need to scroll up or down or left/right and this in turn means that some rows and columns will be lost from view. In a small sheet this may not matter because you might be able to remember your entry locations. But on a large sheet this can make life very difficult. Thoughtfully, Personal Software have catered for this; titles may be fixed vertically or horizontally or indeed in both directions.

However, you might also want to make a comparison between columns that are physically too far apart to be viewed simultaneously, and in this case the WINDOW function comes to the rescue. Very neat and clever, and it emulates the 8000 series. Each window may be scrolled independently or together and you may split the screen horizontally or vertically. When the program has been loaded from disk the standard entry position is defined as 9 characters wide. This means that data above that maximum will be truncated in the entry position, but not in memory. The top line of the display (see photo) will still show the full entry of that "cell". But you need not live with this limitation - the column length can be changed with the GLOBAL command.



Layout of the screen in the FORMAT command will also aid presentation, so that columns of figures line up and look tidy. The INTEGER command will truncate the figures, but rounding only takes place on screen; memory retains the figure to eleven significant places. The "$" command displays figures in dollars and cents (all right, pounds and pence then!), whilst the "*" key will display values in a bar-graph format (see bottom right section of photo.) Entries may also be right or left justified so that they fit neatly under a label. In addition, the GLOBAL feature will format to the above standards in the current window. It also permits recalculation, either by row or column, or automatically over the whole sheet, or only locally in the highlighted area. Finally, you may clear the screen of all entries or get out of the program; in each case confirmation is requested in case of accidents. My only quibble is that on making an exit from the program the "Y" is still left on the screen.

Conclusions

A *very well thought-out program* that is *very user friendly.* I am sure this program is going to be a very useful tool in many firms, both small and large. And it's good to see a degree of excellence and professionalism in material for the PET. It has the added attraction that *no knowledge of programming languages is needed for the operator.* All this is available at a *very modest price* and must represent *good value for money.* The facilities available are very good and it is seemingly impossible to crash the system.

Likes

*** crash proof
*** excellent documentation
*** flexible for every type of application
*** DIF allows communication with other programs

Dislikes

*** memory limitation for large sheets
*** possibility of overwriting data by accident
*** ambiguity of Initialise command

FOR FURTHER INFORMATION ON THE COMMUNICATIONS CONTROLLER AND THE PETCM, CONTACT:

Davidson~Richards (International) Ltd.

14 Duffield Road,
Derby DE1 3BB
Tel: (0332) 366803

INTELLIGENT ARTEFACTS LTD.

DISK DEBUG PROGRAM

* *Debug your corrupted Pet disks with the Pet Disk Debug Program*
* *Gain an insight into how the Pet Disk operating system works*
* *See how programs are written onto disk*
* *Even write programs straight onto the disk*

**Join a main program and a subroutine together on the disk allowing the same subroutine to be loaded with more than one program.*

DISK DEBUG £14.95

Documentation on its own £1.98

OR FREE:—

If you buy a Dual Drive Floppy from us at £575

Prices EX VAT

INTELLIGENT ARTEFACTS LTD. Cambridge Road, Orwell, Royston, Herts
Technical Services Department Telephone ARRINGTON (022020) 689

TOMMY'S TIPS

Automatic Deletion of DATA statements

One of my programs works through about fifty lines of DATA, but uses items from only six of them. To prepare and renumber the final version of the program means removing the unused ones by hand — a laborious business. Can you suggest a routine to automatically delete lines that remain unused ?

— R.N. Higinbotham.

I have had fun cooking up the following routine for you. What it does is to remove DATA lines in the range specified in the INPUT statements. Any line beginning with the word DATA will be whipped right out before you can say Chuck Peddle. The routine starts at line 60000 so you should have no difficulty in tacking it on to your existing program. Line 60040 is the one that tests the first character of the line to see if a DATA statement is present. Lines starting with anything else are ignored. Not being a great one for unnecessary work, I have used PET's Dynamic Keyboard method; otherwise it would require special programming to try and close up the gaps that would be left in the BASIC text, and indeed to rejoin all those links.

```
60000 INPUT"□DATA LINE START NUMBER";S:X=1025
60010 INPUT"■LAST DATA LINE";LD
60020 X=PEEK(X)+PEEK(X+1)*256:IFX=0ORLN>LDTHENEND
60025 N=PEEK(55)*256+PEEK(54)
60030 LN=PEEK(X+2)+PEEK(X+3)*256:IFLN<STHEN60020
60040 IFPEEK(X+4)=131THEN60060
60050 GOTO60020
60060 PRINT"□■■■";LN
60065 PRINT"X="X":LD="LD":GOTO";N
60070 POKE158,3:POKE623,13:POKE624,13:POKE625,13:PRINT"■":END
60080 REM OLD ROM LOCATIONS ARE
60090 REM 54=136: 55=137
60100 REM 158=525
60110 REM 623 TO 625 = 527 TO  529
60120 REM LINE 60040 THE NUMBER 131 IS
60130 REM THE TOKEN FOR 'DATA'; CHANGE
60140 REM 131 TO 143 FOR THIS PROGRAM TO REMOVE
60150 REM 'REM' LINES
```

The listing is for New ROM PETs, but, ever considerate of the old timers, I have included a note of the changes necessary for Old ROMs in the REM statements starting at line 60080.

The routine can be changed so that it deletes lines starting with a REM simply by amending the 131 in line 6640 to 143. The other keywords can be deleted by changing the token number in the same way (see Printout Vol 1, Nos 3, 7, & 8) .

Here's what the various lines actually do: 60020 works out the link address of the next line. 60030 calculates the line number, whilst 60040 tests for the token. Line 60065 restores the variable values, since these are lost on line deletion. Line 60025 has been shoplifted from Richard Ross Langley's Data Input program (see Vol 1, No 10, P 8); it allows renumbering.

It's all done with mirrors...

If you have ever looked at those monitor listings (double dutch the first time you see 'em) other magazines sometimes publish, and wondered how they were done, I am here to tell you.

Supposing it was a disassembly listing to a printer that you were after, you would want to load either EXTRAMON or SUPERMON first. These are the Commodore machine code monitor extention programs. To digress for a moment, there is a remarkable fellow in the United States by the name of Carl Moser who is said to have written a better one; much better in fact. But the problem is he simply won't reply to letters or other requests for information. However, they tell me his company, Eastern Software House of 3239 Linda Drive, Winston-Salem, North Carolina 27106, do respond to cheques. Be that as it may, you should meanwhile have typed and executed the following line:

```
OPEN4,4:CMD4:SYS1024
```

Hey Presto! and anything which would normally have been dumped to the screen — like a hex dump f'rinstance — goes to the printer instead. That includes the registers after the SYS1024.

Instant Algebraic Input

Not long ago I received a telephone call from a young lady (happens all the time) who wanted to know how to INPUT a user defined function. What she actually wanted to do was make DEF FNA(X)= accept an input string consisting of an algebraic expression, such as X*3+X*2–48*X+60 .

My solution is to POKE the input buffer. In case you have not been paying very close attention to this column, I will remind you that it starts at location 525 on old ROM PETs, and at 158 on all new ROM models, large screen SuperPETs, and those retrofitted with Basic 4.0. The procedure is to POKE locations 527-529 old ROM (623-625 for the rest) with three Return characters, the code for which is 13, in order to insert a new line into the program. You then carry on as if nothing very exciting had really happened.

The beauty of this method is that it allows you to enter single variable maths functions as an input string — but without having to indulge in 'orribly complicated string manipulation. Here's the routine:

```
NEW & VER 4 ROMS

 10 INPUT"ENTER FUNCTION USING 'X'";S$
 20 PRINT"□■■■100 DEFFNA(X)=";S$
 30 PRINT"RUN100"
 40 POKE158,3:POKE623,13:POKE624,13:POKE625,13:PRINT"■":END
 100 DEFFNA(X)=3*X↑2-48*X+52
 110 PRINT"■■■IT WORKS"

CHANGE LINE 40 FOR OLD ROMS TO

 40 POKE525,3:POKE527,13:POKE528,13:POKE529,13:PRINT"■":END
```

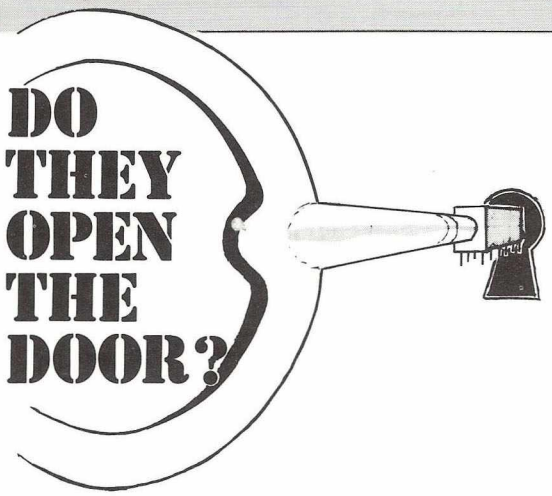
Line 100 appears as it does because that happened to be the formula I entered in response to the request in line10, before listing the program out for you. Remember that X is the only variable that can be used in the input string. Multiplication signs *must* be included; i.e. 3*X is acceptable, whereas the strictly algebraic 3X is not. This is a minor drawback that we can live with until some Clever Clogs writes in with a better method. Seriously though, Friends, keep writing !

Health Warning: This technique causes all variables to be cleared, so use it only at the start of your programs.

```
HEX DUMP

B*
     PC  IRQ  SR AC XR YR SP
.;  0401 E62E 32 04 5E 00 F4
.
.:  033A 00 00 00 00 00 00 44 49
.?



.

DISA$SEMBLY

B*
     PC  IRQ  SR AC XR YR SP
.;  0401 E62E 32 04 5E 00 F2

.

.;  E700 2D 30 00 AND $0030
.;  E703 3E FF 5D ROL $5DFF,X
.;  E706 40       RTI
.;  E707 00       BRK
.;  E708 2B       ???
.;  E709 32       ???
.;  E70A FF       ???
.;  E70B 3F       ???
.;  E70C 2C 4E 56 BIT $564E
.;  E70F 58       CLI
.;  E710 33       ???
.;  E711 31 0D    AND ($0D),Y
.;  E713 3B       ???
.;  E714 4D 42 43 EOR $4342
.?
```

▷47

TURNKEY ROMS



First, we need to be quite clear about the audience at whom these new ROMs are aimed. It's all Commodore disk users with either 16K or 32K recent-model PETs, so if you haven't a CBM disk unit, and aren't thinking of getting one, read the rest of this profile with academic interest only. However, nearly 2 in 3 of PRINTOUT's readers *are* CBM disk users, and we feel they're going to be very interested in firmware (the right name for something in computer-land which isn't a machine and isn't a program) which sets out to provide a better disk operating system (usually called DOS, for short).

There are quite a few of the latter available, but they're all software - that's to say, computer programs - which need first to be loaded, and then to be sealed into a high point in PET's memory, so that they're not disturbed by other programs loaded later. DOS programs then live in high memory until PET is turned off. Subsequently, of course, you have to go through the whole loading process all over again.

Happy Housekeeper

What does a disk operating system actually do? Basically, it manages the operation of disk storage and retrieval processes. Hopefully, it also makes them easier to use by simplifying the instructions which you need to issue to get some desired process actually carried out. Disk units *can* be used without a DOS but it's a terrible hassle, involving opening channels to the disk unit, learning complicated command syntax, and knowing that one tiny mistake on your part will lead to a disk error.

A good DOS does away with all that, or more correctly does it all for you, leaving you with only one or two straightforward things to remember, to save or load programs and so on. The big snag so far with CBM disks is the fact that DOS vanishes the minute you turn off, so you have to load it as a first step every time, and it also uses up some memory too. Not much admittedly, but it's still irritating to lose those precious bytes.

Other disk units (CompuThink, for example) don't have this problem. Their DOS is a permanent part of the firmware which comes with the general disk unit. Thus it's always there as soon as power is supplied, and uses none of PET's existing memory. CompuThink's DOS, still using them as an example, is also very easy to use and has, as an integral part of its structure, several additional routines to make, for instance, file handling (which is all part of running databases) much more straightforward. Alas, CBM's existing DOS doesn't have the latter and, while it's not difficult to learn and remember the few simple commands you need to know, there remains the problem of constantly loading it, and losing some memory while it's in residence.

Turning the Key

Now let's come back to JCL's new firmware, for the fact that it *is* firmware, and thus plugs permanently into PET's main board, is the major reason for thinking from the outset that it's probably going to be an advance on anything else previously available. And, let it be said immediately, our testing has done nothing to alter that initial opinion.

What you get is not one, but two new ROM chips. One of these plugs into an empty ROM socket on the main board in either 40 or 80 column PETs and, to save Toolkit users cringing, there's no clash in 40 column PETs - it's the $9000 socket that's used. This may provide a conflict with some other add-on ROMs (Superchip, for example), of which there are a growing variety available, but a Spacemaker should solve that difficulty, if it proves a serious disadvantage. The other ROM actually displaces one of the Commodore ROMs that came with your PET. Once JCL's two new ROMs are in position, you're in business.

The next thing we should say without delay is that the new ROMs aren't exactly cheap. In fact, they'll cost the average buyer £120 for the pair. This must inevitably lead to the question: what do you get for your money, and is it worth it, against the alternative of continuing with existing DOS systems? Well, we have no hesitation in saying that JCL have packed an extraordinary number of subroutines into the two ROMs, over and above the basic DOS they provide. Whether the possibilities given by the subroutines justify the cost must be a decision for the potential purchaser. What *we* can do is describe what you get, and tell you whether we had problems with any part of the total package.

New Message

First, then the so-called "turnkey" and DOS support facilities. The former results in an entirely new and longer message appearing on PET's screen when you turn the unit on for the first time. In normal use, all you see is the familiar message referring to Commodore Basic and the number of bytes free. With JCL's ROM set, you get this, plus a number of extra lines in plain English which effectively tell you to press the space bar twice to load *and run* whatever the first program might be on the disk in Drive 0.

In other words, two taps on the space bar replaces the need to type and enter LOAD"*",8 - a process which has nearly the same effect, except that it merely loads the first program on the Drive 0 disk, but does not run it.

Disk users will know that they have previously had to ensure that a suitable DOS program was, in fact, the first program on the disk, so that it would be loaded as an initial step to all subsequent disk operations. Thus the "turnkey" function has two advantages: it saves typing and entering LOAD"*",8 and it saves typing and entering RUN. Not a significant advantage, but helpful.

The real advantage comes from the fact that a DOS version is also permanently in the ROMs, and *this* means that it no longer has to be the first program on all or most of your disks. Thus the first program loaded and run is the actual program wanted for the job in hand, and not the irritating, time-wasting, disk-space-using, memory-space-eating DOS stepping stone.

No Problem

We found no problems at all, excepting on one or two occasions when, for some reason or other, the Shift Lock key had been pressed, If you begin like this, you can tap the space bar until your fingers wear out and nothing will happen. But that's a user error, and nothing to do with the ROM set. As we say, the basic "turnkey" operation, and the in-board DOS, worked well at all times. But is that worth laying out £120 to get? Perhaps; perhaps not, and so it's time to examine the extra subroutines which are also integrally provided by the ROMs.

There are five additional stand-alone subroutines, plus a further set of six related subroutines, which is quite a lot to have packed into the space available. In fact, we understand that there are only a few bytes left unoccupied! Users of JCL's previous Screen Aids 2 software program may recognise one or two of the subroutines, since they've included the most popular in the ROMs. All the routines are called by executing a SYS command, and these can be included in programs if required.

First, there's JCL's "bullet-proof" (their phrase, not

SPECIALISTS PET COMMUNICATIONS SPECIALISTS PET

SPECIALISTS PET COMMUNICATIONS SPECIALISTS PET COMMUNICATION

SPECIALISTS PET COMMUNICATIONS SPECIALISTS PET COMMUNICATION

"Communicate" with

SUMLOCK BONDAIN LTD.

NOW!

HEAD OFFICE: 263-269 CITY ROAD, LONDON EC1V 1JX
TELEPHONE: 01-250 0505 Telex: 299844

Quality Colour Printing
Business Forms & Systems
Office Supplies and
Business Machines

Long Lane
Aintree
Liverpool L9 7BE
051-521 5830

The Systems Centre
2 Rumford Street
Liverpool L2 8SZ
051-521 5830

Rockliff Brothers Limited

Rockliff

PET COMMUNICATIONS DEALER

AMPLICON

AMPLICON MICRO SYSTEMS LIMITED

143 Ditchling Road,
Brighton, E. Sussex BN1 6JA
Tel: Brighton (0273) 562163

Kingston House, Stephenson Way,
Three Bridges, Crawley,
W. Sussex RH10 1TN
Tel: Crawley (0293) 26493

IDL

INTEX DATALOG LTD
EAGLESCLIFFE INDUSTRIAL ESTATE
EAGLESCLIFFE,
STOCKTON-ON-TEES,
CLEVELAND TS16 0PN
TEL: (0642) 781193 (24 HR. SERVICE)
TELEX 58252

STOCKISTS OF:–
3000, 4000 and 8000 ranges of CBM systems
and 8010 Acoustic Modem

Holbrook Business Systems Ltd.

Moss House, High Street,
Mosborough, Sheffield
S19 5AE
Tel: (0472) 484466
PET COMMUNICATIONS DEALER

Wego Computers Ltd

PET COMMUNICATIONS DEALER

22a High Street
Caterham, Surrey, CR3 5UA
Tel. Caterham (0883) 49235
Telex 8813791 DSW-G

JRW

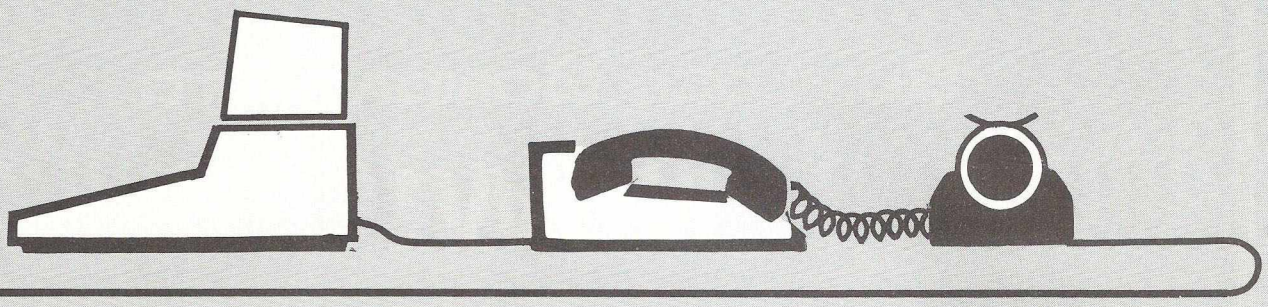
J. R. WARD COMPUTERS LIMITED
35 Potters Lane
Kiln Farm
Milton Keynes MK11 3HG

Telephone No.
Milton Keynes
562850
(STD 0908)

PET COMMUNICATIONS DEALER

SPECIALISTS PET COMMUNICATIONS SPECIALISTS PET

State of the Art Report



The PET can now be used to talk to other PETs, or much bigger computers over the telephone. DENNIS JARRETT, former Managing Editor of Which Computer? and Practical Computing, presents a special PRINTOUT State-of-the-Art report on PET communications.

INSTANT INTRO TO COMMS

The European PTTS, including our very own British Telecom, owns something called the Eurodata Foundation. Its function is to generate information about Europe's telecomms traffic: that means it's really a king-size private market research organisation. Sometimes it lets through snippets of information. One of its latest reports predicts that in the next seven years the amount of data being transmitted around Europe will grow by 750 per cent.

And if you think that's a touch on the optimistic side, you might bear in mind that the equivalent Eurodata prediction back in 1973 was in fact just about half the growth that actually occurred.

The usual way (and the cheapest) of transmitting information from one computer to another or between a terminal and computer is to send it down a cable. That's OK for shortish distances - when you need to go very far it gets expensive, though.

Parallel Versus Serial

Still, over short distances you can use cable — like from your disk to the PET, or to the printer. Short distances normally mean *parallel* communications: that's one wire for each bit in the word, so a word's worth of character code is transmitted and arrives all at the same time. Got to be quicker than sending each bit separately one at a time, hasn't it?

But parallel transmission is only feasible over short distances, and besides the devices at either end of the link must be equipped to deal with the simultaneous arrival of all those bits.

Serial transmission is more economical (like you don't need so many wires per cable, and they don't have to be of such high quality), and generally simpler to implement. So for longer distances you'd send a bit (or a stream of bits) at a time.

The possibilities are however limited by the characteristics of wire transmission which cause the signal integrity to be lost, mainly via capacitance and inductance. For local connection it is possible to transmit over a distance of a few miles at relatively low speed (300 bits per second) or a few hundred metres at higher speeds.

Sync and Async

Data is usually transmitted serially in one of two modes. The simpler is *asynchronous* operation: here a single character sent down the line is framed by one 'start' bit and one or two 'stop' bits - that's why async is sometimes called start/stop transmission. Those framing bits enable the receiving end to synchronise on each character and clock in the bits.

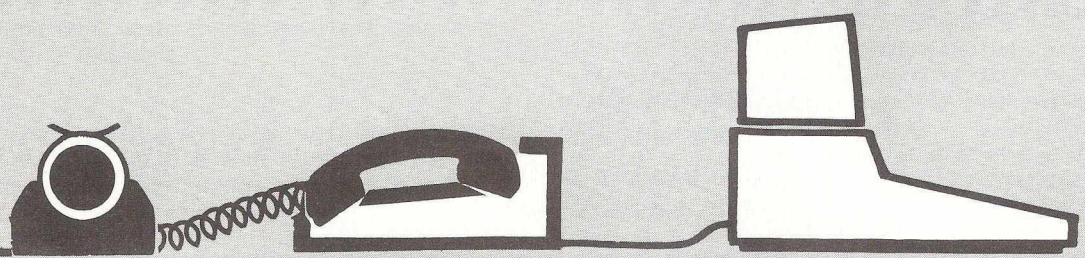
This mode has the advantage of simplifying the terminal interface. But it is relatively inefficient in that at least two extra bits are required for each character.

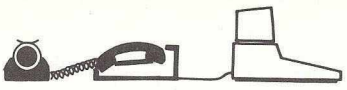
Synchonous transmission means data is transmitted in blocks with header and trailer information. The synchronisation, which is necessary to ensure both ends are reading to and writing from the line in unison, is established at the start of a block, by SYNC characters and usually via a common clock on the carrier. This mode is usually used for high speed transmission (1200bps or more), for it incorporates error checking and retransmission of blocks for maximum reliability. Synchronous communication does, however, require the receiver to have some local storage capacity, though, and that tends to bump up the total cost of this type of communications system.

The simplest types of communications links tend to use async - principally because devices at either end can be the simplest, and hence the cheapest.

But mainframes use synchronous communications. It's quicker and more flexible than good old async: it also helps to sell more expensive terminals for their manufacturers.

Synchronous communications typically operate at up to 9600 baud with fully independent transmit and receive channels and a good many programmable functions. They'll normally include parity checking and special characters: but you will also get a good deal of extra sophistication - more complex and more complete error checks on transmission, automatic requests for retransmission on bad mes-





sages, automatic retransmission on request. You'll also get much more control over screen layouts (protected fields, programmable intensity, mapped cursor control) and local functions: screen print, for instance, is usual.

But there is no universally accepted standard for synchronous transmission formats, and all manufacturers have tended to develop their own - often more than one. If you want to displace the manufacturer's standard terminal with a microcomputer, you have to convert the micro's standard message format into whatever protocol the particular mainframe expects.

The PET as Terminal

Why bother? Well, the synchronous-communications solution meets the main requirements for a whole new type of computing - the PET is available for local processing when required but may be connected to the mainframe in order to use any of the normal interactive systems that may be available at it: and no special software needs to be written for the mainframe to handle this, as the PET responds in the same way as normal synchronous terminals and obeys all the protocols expected by the host.

On top of that, the range of PET peripherals available means that a local workstation may be built up at a considerable cost saving over the mainframe manufacturer's own equipment.

So the mainframe user can gather data on the PET, check it and preformat it before sending it down to a mainframe - doing everything that a standard manufacturer-supplied terminal can do, but at far less total cost and while retaining the ability to run local programs.

It requires no massive leap of the imagination to try to make the most use of both systems; use the PET as well to access your mainframe database and extract the data you require for local storage, where it can be processed to produce the reports you need. By minimising connect time and processing charges, a user could save enough from that alone to pay for the PET. But when it is not connected the PET can still be used for financial, engineering, word and data processing, or whatever: and files from those could be passed as required to another site via the mainframe connection.

Why the PET?

Now, there's nothing unique about the PET as a microcomputer participant in this kind of system. But what makes the PET highly attractive these days is a combination of factors - it's still cheap, it's inherently user-friendly, there's now a good corpus of proven and well-supported off-the-shelf packages for it, it's widely available (and so is maintenance and other expertise).

What's new is that the required software is at last starting to appear. But it's early days yet, and the two synchronous-communications packages on offer have only a handful of users.

They both take the same hardware-plus-software solution. Emulation of a particular terminal can consume a lot of PET memory; not only do you have to look like a particular terminal, you also have to keep an eye on the communications line to cover all activity. It's much more efficient (not to say simpler) to offload that housekeeping on to a separate front-end comms controller, a black box. And that's what bumps up the price. Still take a look at the Davidson Richards offering: ICL will charge you £6,000 for something that can only be an ICL terminal - versus £1,000 for the Davidson Richards comms software plus, say, £2,000 for the PET system itself, and that can be an ICL terminal *and* a real computer in its own right.

Most of this applies equally to asynchronous communications — except that the much simpler control required, particularly the comparatively primitive error-checking, make for a more economical and more easily implemented solution. Actually persuading a PET to read from and write to a serial communications line isn't too hard: it's not even particularly difficult to convert from the IEEE connection to RS232. The trick comes in tweaking the system, in providing a degree of security and reliability while matching your PET's behaviour to as many of the functions available at the other end of the line as possible.

COMMODORE AND THE COMMUNICATIONS DEALERS

Commodore's interest in communications is just about as circumspect as it could possibly be. The company clearly couldn't afford to let a huge market slip by — at this stage it is more interested in the use of CBM kit communicating with other computers rather than multiple-PET systems.

But equally it didn't want to screw up. The major market is in blue-chip customers, big industrial or commercial outfits that will buy by the ton if they like the PET for communications-plus-local-processing use.

Only slightly smaller in terms of potential is the introverted world of education, where a few high-scoring installations means word-of-mouth reference selling to beat any amount of formal marketing.

And then there's a third vital area, the big and well-organised computer bureaux. They're looking for something to offer clients who are tending to defect *en masse* to the stand-alone micro: they too like the idea of a low-cost multi-function system. And if they like the PET, they'll try to convert all their customers.

So Commodore has gone gently into that good night. It fostered the birth of Communicator 1 with a contract to Cortex in April 1980: it polled its existing distributors in the summer to set up its 'Communications Dealers' network and appointed the first only in September: it actually went into comms without a top-level specialist, and at the New Year still hadn't appointed a Communications Systems Manager — let alone acquired any on-board support staff.

Some Truths about Selling

"It's not totally in our interest to be too near the sharp end of product development" declares Commodore's Keith Hall with all the insouciance of a marketing man. Commodore's long-term strategy is clearly to train dealers (presumably when it gets some staff to train them *with*) and to some extent to 'deskill' the products, simplifying their implementation. Someone else can look after the provision of most of those products, just as happens in other Commodore-approved areas.

Besides, maybe others can do it better. The Commodore modem is announced — and at £225 it looks quite cheap. Actually, it's an acoustic coupler and as such is restricted to 300-baud communication, which isn't very fast. It is also proving somewhat recalcitrant about operating to spec: "a few hiccups" as Keith Hall puts it. It works in half-duplex, but you get errors in full-duplex mode. Apparently it's an IEEE problem rather than anything inherent in the coupler, so it should be soluble.

Meanwhile the dealers are being offered that Commodore-designed product along with Commlink (an IEEE device handler written by Taylor Wilson) and Communicator One (async DEC-compatible communications from Cortex). They will probably get Commodore's packaging of the Davidson-Richards synchronous communications offering, too.

Kingston is being quite active in finding outlets for its interesting NETKIT, and several 'official' dealers have it. Cortex, with the go-it-alone async/sync products, has a handful of dealers and claims it wants no more just yet.

Dealers' Hands

As for the 40 or so dealers already signed up by Commodore, Hall says he was surprised to find the level of skill among them. Dealers get very little other than some sales leads, perhaps some advance info, and above all the cachet of Commodore's approval: but it seems that their get-togethers will become a major forum of PET comms ideas.

The first of them was held by Commodore early in December, and the attendees were treated to presentations by everyone with a product (except Cortex). They left with two main impressions: that there's a lot of strong product potential around — and that comms is not a quick-in-and-out market with easy solutions to simple problems. The punters will need qualified support at commercial rates, maybe four or five days at £150 to £200 per day if they have any kind of complication in their configuration. And one effect of that will be to drag the cost of a communicating-PET solution up nearer the cost of a mini or a conventional terminal .....

THE PRODUCTS

COMMODORE – COMMUNICATOR 1

Communicator 1 really signalled the arrival of PET communications products. It started life as a modest enough demonstration system, commissioned by Commodore from Cortex for the PET Show. Commodore wanted to ease a toe into the fast-moving waters of data comms: and for that job Cortex happened to be the most experienced bunch of PET-based programmers around, with many one-off systems to its credit and a lot of in-house knowledge and skill.

Cortex implemented an asynchronous RS232C communications package for the Show, and a PET there was able to send to and receive from a PDP-11/70. The original version was simply a 'dumb Teletype' emulation, the crudest form of communications: but Digital Equipment's PDP-11 line of minis does utilise a more refined version, the protocol which drives the VT52 video terminal, so Cortex went ahead and developed that improved version of the standard Teletype-type protocol.

The VT52 has actually been superseded as a DEC terminal, but its protocol has basically been retained for the PDP-11. So Cortex and Commodore thought they might as well try to pick up some sales of PETs to the many people who have access to the PDP-11, the world's best-selling mini-computer family.

DEC and Others

The main difference between standard TTY and the VT52 is the provision of X-ON/X-OFF control codes. This neatly provides for flexible control of a communications link, effectively allowing one device to tell another that it's temporarily busy: so local actions like software scrolling or disk accessing, which would lose the bus with a handshaking Teletype-style protocol, do not necessarily mean the automatic closure of the link.

Communicator One as a VT52 emulator in practice allows a PET to operate principally as a remote data collection and validation device on batch RJE to a PDP-11. Commodore says it can be adapted with "some" modifications to work with other minis, but that is likely to be as a simple Teletype emulator: still, Commodore does point out that mods may be relatively easy for some machines – where only the ESCape sequences differ from DEC definitions, for example. Top speed quoted is 4800 baud for the DEC version.

The package is menu-driven, which means the user can select the actual line speed. Other parameters are output and input device numbers, delete character, 'clear screen' character, local echo, auto line feed, parity, and disk device number.

The package costs £250.

Meanwhile, the current situation on support (and especially future development) is a trifle confused. When we spoke to the company just before Christmas, Cortex described its relationship with Commodore as "extremely strained" – basically because it is expecting royalties from sales of the package, and you don't get royalties until you have some sales, and Commodore hasn't been promoting the package or paying royalties with the vigour Cortex says it expected. Ah well.

CORTEX COMPUTER SYSTEMS – INTERCOMM

When Cortex had written the DEC emulation Communicator 1, it extended the exercise into a general-purpose async comms package called Intercomm. This will interface to "any" asynchronous RS232/V24 link and will send and receive files using all standard CBM peripherals and RS232 printers. It will transfer standard seven-bit ASCII codes with options on upper, lower or mixed cases; or it can do eight-bit PET-code program or data files directly to or from the required peripheral.

The essential points made by Cortex (and its modest network of Adda, Stack, HB Computers and "no more than four or five others") are that Intercomm is genuinely easy to use: and it is genuinely a general-purpose system. Says Howard Johnston of Cortex: "We found it impossible to make Communicator 1 as versatile as we wanted it, as modifiable as it could have been. So we redesigned and got a program that's half as big again. But it is configurable."

The Configurator Trick

Intercomm runs to about 12K of BASIC and another 6K of machine code. It provides the user with a transparent interface; no specialised programming is required. All host handshaking and terminal protocols are supported internally, thanks to the development of a 'configurator' which enables Intercomm to be structured to "the exact requirements" of the link.

The Configurator produces a parameter file which is intercepted by Intercomm as a particular interface link.

In addition, there are some parameters which may vary from one interface to another but which won't vary once a particular link has been set up: those can be preconfigured via menus actually within Intercomm, so you do not have to reconfigure the package every time you use it - even though you'll reset the interface via the Configuarator.

Cortex describes parameters set up by Configurator as 'hard' options, and they would include definition of padding characters, the delete mark, tabbing codes, and send or receive X-ON and X-OFF. Other 'hard' options are code definitions for ESC and control sequences received from the host.

Soft Options

Menus in Intercomm set up 'soft' options. Among those would be definition of the send and receive file devices (type, filenames, secondary addresses): and whether seven or eight-bit data codes are being communicated.

Most of the options available can, however, be set as hard or as soft options. So typically you'd preconfigure the system for parameters like start- and end-of-file identifiers, letter case, and parity selection: then if you wanted to alter them for a particular transfer, you'd get into the Intercomm menus to make the change.

Cortex lists a total of 27 hard and/or soft options, which indicates the versatility of the package. That means it can communicate with a variety of computers - many mainframes, most minis, and several types of micro (including other PETs). Cortex is building up a library of standard pre-set Configurator formats that will provide quick and easy implementation of specific protocols – you just fill in the blanks on the configuration menus with information supplied. It's still not exactly load-and-go: but it's nearly there. Very soon the library will include async interfaces for Prime, Honeywell, and IBM as well as Teletype, DEC (*pace* Communicator 1) and the EEC's Euronet network.

Intercomm is just picking up its first users, having half a dozen signed up by the New Year. It costs £350; that includes free installation "while we're getting the library established" and there's a 50 per cent discount on additional copies. Cortex is concerned to limit its availability, at least for a while: "we think this type of communications must involve a degree of support from the vendor," which means Cortex won't overload itself with distributors all demanding expensive and time-consuming education or assistance.

For more information contact Cortex Computer Systems Ltd., Tavistock House, 34-36 Bromham Road, Bedford, tel: (0234) 213571.

KINGSTON COMPUTERS LTD. – NETKIT

Kingston has a fair reputation for importing and, more recently, devising and manufacturing clever add-ons for the PET. NETKIT is one of the cleverer.

It's a solid black box – "low-profile steel case" as the leaflet has it – which sits on the memory expansion bus. It's connected to the outside world by a length of ribbon cable that terminates in a 25-pin female plug: that fits into the memory expansion port.

KC says it will take about five minutes to set up a NET–KIT – you get some pretty detailed documentation and things are simplified because there's no separate power supply, but cabling is at extra cost. The price through dealers is £135, there's a 12-months warranty, and Kingston claims it's more interested in market share than quick profits – so John Chew declares that he went for a year's R&D, really robust and reliable construction, and relatively low profit margins per unit to ensure a relatively low price.

Block Heads

So far, so good. So what are you buying for your £135? The short answer is that you're getting a communications building block. NETKIT is an interface plus 2K of machine-code firmware that simplifies external communications – in that it gives you lots of extra facilities. It is **not** a plug-in-and-go product: or as John Chew puts it, "It's not a defined end system. You just find out what you need to do, and NETKIT allows you to write those functions in BASIC."

NETKIT gives you ten new BASIC commands, prefixed by an exclamation mark. These cater for direct PET-to-PET communications, for easy and direct attachment of extra peripherals like lab instruments or fast printers, for code conversions that could, for instance, automatically output telex or numerical control tapes, and for using the PET as a terminal connected to a larger computer.

The on-line character conversion is neat. You plug in a paper tape punch, say: conversion tables for seven- and eight-bit codes are built into NETKIT, so you can automatically present PET's eight-bit codes to a seven-bit device like an NC tape punch.

Conversion Tables

It gets better, too. Say your program includes commands for cursor control – CHR$17 and CHR$145 for up and down. Sending them to an intelligent printer could be very dodgy: NETKIT provides a !LIST command, though, which provides direct conversion to whatever you reckon the equivalents to be – probably print-head movements in this case.

The conversion tables mean that you, the programmer, do not really have to be aware of what's happening when, why, or how. You can extend this by use of the !READ command, which might automatically refer an output file to a prefabricated tokenised conversion table: "PET to Apple conversion is thus possible," says John Chew roundly.

Here's another neat wrinkle. Control of line termination and carriage return is important on a printer lacking an automatic line feed. The presentation of 'overrun sickness', dropped or garbled characters is normally remedied by reducing the baud rate, but all that is necessary is the addition of 10 nuls to each typical 80-byte string. NETKIT's capability to add up to 127 nuls automatically to strings can often double the system's capacity.

Instant Interface

The PET-to-PET link can involve what Kingston calls 'active interfacing'. The extra BASIC commands are all available remotely because a break-in sequence can be built into a user program. For that you use the NETKIT's commands !ON and !CLOSE – as Kingston says, they "allow a programmer to double his processing power with a second PET without totally rewriting his suite of programs or buying new peripherals." You write a short break-in subroutine which requests the second machine to stop what it is doing, acknowledge receipt of the interrupt and wait for further instructions. Once the acknowledgement is received "virtually any" command sequence can be transmitted, including a request for relaying back of information.

When things are over the second PET is returned to its own program by using the !PRINT command to send a CONT to it.

The new commands !LIST, !LOAD, and !READ allow whole programs to be transferred to and from external devices. What's more, this can be used to merge pre-written code modules into an existing framework. A program is LISTed as an ASCII file, !LOADed into a buffer area in the receiving PET immediately behind any existing program, and finally !READ from the buffer and MERGEd with the current file. Practically any device capable of issuing an ASCII listing can be used for this – you can !LOAD from paper tape, cassette, disk, a terminal or even a modem.

!LOAD, incidentally, means taking data straight into RAM from the communications line. Importantly, that means the READing program doesn't have to anticipate any file sizes. Simplified communications, see?

PET Net Links

A PET fitted with a NETKIT can be called into terminal mode at any time, using the !OPEN command. You get a choice of four optional statuses: half or full duplex, with or without a cursor. Half duplex with cursor gives current entry echoed directly on the terminal screen, with next point of entry defined by the cursor: full duplex with cursor gives the current entry point on both the host and terminal screen. "The majority of specialist terminal requirements can be met by a PET upgraded with a NETKIT," declare Kingston, enthusiastically.

As a final taster, consider the trusty RS232 interface. NETKIT of course permits high-speed transfers with any RS232 device – at 4800 baud says the brochure, though John Chew told us 9600. Either way, a NETKITted system is much faster than conventional IEEE communications, for the normal IEEE Bus makes the PET into a listener rather than a talker: bi-directional communication is at a maximum. 0f 600 baud in such a configuration, with tedious GET looping. Since the NETKIT bypasses the IEEE bus these limitations are overcome and bi-directional communications at high speed is possible.

Further, the NETKIT offers a wide range of asynchronous speed options, from 50 to 19,300 baud, directly selected at any time: the programmable asyn comms adapter can operate synchronously with an external clock, too: and you get a good choice of character protocol options – word length and parity are keyboard-selectable.

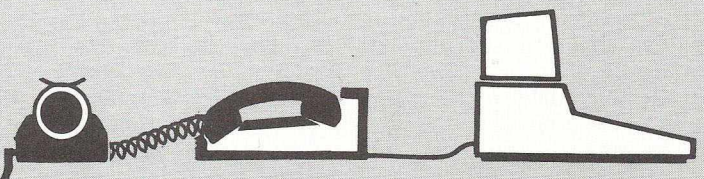
Incidentally, parity checking is generally quite difficult on a PET-RS232 interface. It's not with NETKIT: you get an optional failure indicator CHR$(166), graphic grey, which can be used to highlight validation.

Doubting Dealers?

NETKIT is perhaps a bit too clever for instant comprehension. More than one dealer left the December meeting impressed with its undoubted potential but slightly puzzled to find some applicability. But KC has already sold the first batch of 500: in a few months some sharp definition will be emerging on NETKIT, with areas of top suitability appearing and some off-the-shelf NETKIT-biased software coming to the market.

Meanwhile, Kingston say it is about to remedy its major operational deficiency, the limitation on one external device, by announcing a couple of multiplexers. One will handle up to four input-output lines per NETKIT, the other will do 20.

For more information contact Kingston Computers Ltd., Electricity Buildings, Filey, North Yorkshire, tel: (0723) 514141.



COMMODORE – COMMLINK

"We've had very positive feedback from dealers on Commlink" says Commodore's Keith Hall. "Commlink was rushed out by Commodore to save face when other, independently-available products started to appear," says one of those dealers.

On the other hand, he concedes that "it's good for what it does". And what's that? Well, Commodore bumf enthuses about "a revolutionary new operating system enhancement" which "extends PET BASIC by adding extra commands designed to simplify high speed communication via PET's IEEE port." What's more, "with Commlink, it is a straightforward matter to set up an individual communications protocol which is exactly tailored to the user's specific hardware configuration. Without leaving Commlink BASIC, the systems programmer can gain the advantage of powerful new machine code routines which allow really fast communication between the Commodore PET and almost anything!"

What It Can Do.....

That's really what the dealer was objecting to. Commlink is broadly a machine-code parameter-driven device handler for the IEEE interface, provided with a degree of flexibility and a number of data transfer facilities. It also scores by being yet another opus from the pen of Peter Dowson, who developed it originally for Taylor-Wilson from a well-liked tape handler called Tapeprep.

Now, Tapeprep runs NC and telex tape punches on the PET. And that demonstrated a need to handle devices on the IEEE bus with speed and flexibility – which can't be done in standard BASIC commands.

Dowson's add-on commands illustrate the scope of the package. CMDB is a one-time-per-program command that sets a size for an input buffer: CMDS defines the protocol options: CMDR reads data from a specified IEEE address into the input buffer: CMDP 'prints' a string of up to 255 bytes to the specified IEEE address; and a CMDG (get string input) is used to process the data read into the input buffer by CMDR, providing both serial and direct access to records within the block received.

Defining the Link

The CMDS specifications will define the IEEE device address for all subsequent Commlink operations. You can also control the echo retransmission facility which can be used in CMDR, specify character conversion from PET ASCII to true ASCII, and indicate a character to be sent during a CMDR when the input buffer has only 256 bytes left free. CMDS additionally specifies the code which terminates a transmission block, a record separator, the waiting period between character receipt or transmission before Commlink terminates with a 'timeout' status, and a secondary IEEE address for devices such as the CBM disk.

In practice Commlink does constitute a tool – once more, as opposed to a ready-to-use package – whereby the programmer can define in some detail the attachment of non-standard IEEE-compatible devices. It clearly requires a good deal of effort to utilise most effectively, though.

Commodore are charging £200 for Commlink.

DAVIDSON RICHARDS LTD – COMMUNICATIONS CONTROLLER & PETCM

Davidson Richards produced a combined hardware/software solution when a big insurance company asked it to provide a PET talking to a mainframe. The requirement was for emulation of an ICL terminal, so that the PET would have to handle fast synchronous transfers of data. DRL came up with a black box called the Communications Controller which would actually handle the communications, managing the conversion and transfer of data: and a software package, PETCM, which would live in the PET itself to allow the user to write programs that address the mainframe and actually operate the PET as a terminal.

The DRL Communications Controller is a self-contained microcomputer that uses a 6502 processor with 16, 32 or 48K of RAM and up to 4K ROM. It sits between the PET connected to the user port on one side) and a communications line (via a modem or a direct line on the other side). It handles all the communications functions to run the PET as a terminal: in other words, the PET can be doing other things – such as disk handling or running a BASIC program locally – while the mainframe continues to poll the CC. Only when the PET user wishes to talk to the mainframe does the PET pass information to the CC: that in turn sends it to the mainframe.

Protocol Emulation

Most of the CC's RAM is used for buffering the links to the mainframe and the PET. In practice that means it contains a protocol emulator, and this is down-loaded from PETCM when that package is itself loaded on the PET.

So far, the only emulator software available is for ICL's relatively simple CO1 protocol, enabling the CC to emulate one of the standard ICL 7181/7501 video terminals. But DR says emulation of the fancier ICL CO2 and CO3 protocols is "under development": that should be easier when ICL finally decides to stabilise the specification of those protocols – at present the spec seems to be changing almost from one week to the next for them. Also promised is an emulator for the other really obvious market, the IBM mainframe user, which is getting PET emulation of the 3270 VDU. That's due in Spring 1981, we're told.

LEDs on the front of the Controller show the operator exactly what is happening at any time. LOAD and DUMP switches enable the operating software to be loaded from the PET and for memory dumps to be passed back to the PET for analysis.

The Comms Software

The CC box looks after all the clocking and the poll/select procedures on the line. But the meat of the system is in PETCM, another of Pete Dowson's creations.

PETCM will run with any standard CBM or Compu-Think disks and takes about 8K in the PET. When loaded and run, it puts the PET in normal 'video' mode ready to communicate to the mainframe: anything entered on the PET's screen will be transmitted to the host and anything received in reply will be displayed – with all video controls obeyed. For ICL these controls include screen addressing, protected fields and flashing fields with additional controls for local hard-copy screen print and the forced loading and running of a specified BASIC program.

The operator may drop out of video mode at any time and use the PET for other purposes – writing or running a local BASIC program for example. When communications are again required, a simple command will return you to the video mode.

PETCM actually adds some extra commands to BASIC that enable the PET programmer to communicate with the mainframe. In particular the CGET command will take information from the mainframe, CPRINT will send information: full status information is available to you on demand so that the success or failure of any command may be assessed. If problems do occur, you can ask for a dump of the contents of the Controller and of the buffers inside the PET – these dumps are formatted for easy analysis.

Pricing is a bit tricky, but we were quoted around £1,000 for a PETCM-plus-CC add-on. Currently that's deliverable, and for ICL users compares well with a 7502 and its controller at about £6,000. On-site support for the DR product is "probably minimal", with the user able to do most of the local configuration by selecting from menus. Any DRL assistance needed will most likely be at standard consultancy rates.

For more information contact Davidson Richards Ltd., 14 Duffield Road, Derby, tel: (0332) 366803.

CORTEX COMPUTER SYSTEMS – SYNCOMM

Syncomm is Cortex's answer to the official Commodore line in synchronous communications – effectively, emulation of specific mainframe terminals and thus efficient communication with those large computers.

This product is still in its infancy, and though Cortex claims proudly "we can now offer a range of mainframe synchronous link protocols including IBM, Univac, Honeywell, Burroughs, NCR and others on demand", in fact the first real user went live at Christmas with an IBM 3270 emulator.

Like the DRL offering, Syncomm is intended to allow the PET to operate as an RJE terminal at data rates up to 4800 baud. It supports data transfer with error checking and retransmission requests between the mainframe and the PET's screen and standard peripherals: local processing is, of course, unaffected.

Hardware Conversions

Again, as on the DRL product there is a black box protocol converter which sits on the line. This PCU (Protocol Communications Unit) plugs into the user port on one side and the host (maybe via a modem) on the other. That side actually has two ports which can be set up to handle a variety of synchronous or asynchronous links, only one of which can be used at a time. Either port can handle five- to eight-bit codes, with odd, even or no parity: the PCU can do the three standard block-transmission checks on synchronous links (CRC, LRC, or BCC as applicable). The PCU can also be supplied with a hefty RAM buffer of up to 8K.

The PCU comes from the States. The bit Cortex contributed is the software, of course. It shares the basic specification of Intercomm – selectable link addresses and speeds, data transfer to and from the host mainframe using standard CBM peripherals and standard mainframe programs; it adds the specific terminal emulation and handshaking with the PCU.

Syncomm on disk costs £1,700 including IEEE/RS232 interface, protocol converter unit and installation; additional copies using the same protocol are £1,300.

For more information contact Cortex Computer Systems, Tavistock House, 34-36 Bromham Road, Bedford, tel: (0234) 213571.

MEKTRONIC CONSULTANTS – COMMUNICATOR

The Mektronic Consultants Communicator is a potentially useful black box which can plug stright into the PET user port. It gives you direct, and if necessary, independent access to the eight separate channels of that interface.

It requires some skill on your part but does does mean that you can use some or all of those channels for input from, or output to external devices. Mektronic's examples include input from switches, thermostats and alarms, and outputs to lamps, relays, stepper motors and digital-to-analogue converters.

The Communicator can be used to attach conventional but non-standard computer peripherals – and with a bit of effort, for communication with a terminal or another computer.

Obviously the eight channels can be used for an 8-bit data word. But in addition, the Communicator uses the PET control lines CA1 and CB2, which enables it to perform hand-shaking with something at the other end of a line.

The box itself has status lamps for the eight channels and CB2. At the back is the cable connection to the user port. On the front are the separate input and output sockets for the eight lines plus CA1, CB2 and common Ov inputs.

For full details contact Mektronic Consultants at 116 Rectory Lane, Prestwich, Manchester, tel: (061) 798-0803

SKULL & CROSSBONES

Gower Conferences are organizing a special conference boldly entitled 'Computer Software Protection: Killing the Pirates'. Speakers include copyright specialist and Barrister, Alastair Kelman on legal remedies and Practical Computing's Editor, Peter Laurie on 'The Perils of the Software Entrepreneur'. Mike Gurr will explain the various protection techniques whilst our Publisher, Julian Allason will be offering some characteristically unconventional solutions. The one-day session takes place on Tuesday 3rd March at London's Waldorf Hotel. The £100 cost includes refreshments and a special lunch to be addressed by John Butcher MP (see Hotline this issue). Further details from Gower Conferences, 20 Endell Street, London W.C.2. Telephone 01-240 5931. Special reductions of around 30% on hotels and rail travel are available.

CONTRIBUTING TO PRINTOUT

The Editor welcomes letters and articles on PET-related topics, and documented program listings. We would particularly like to hear from readers with unusual applications.

Contributions should be typed double-spaced with extra wide margins and accompanied by any relevant photographs or illustrations. We prefer listings made on a Commodore or other printer capable of generating PET graphic and other special characters, although this is not essential. Authors should retain their own copy of material sent to us.

Where programs are being submitted, details of the name and address of the author and a brief description should be entered in REM statements, together with a note of equipment used to prepare the cassette or diskette. This information should also be included in the documentation. We ask you to certify that all material is original. Copyright on unsolicited material will remain vested in the author.

PRINTOUT is happy to pay for articles and fully documented programs used at our prevailing rates. In order to avoid duplication of effort, it may be adviseable to write before starting work on an uncommissioned article.

We look forward to hearing from you.

CASSETTE DUPLICATOR FOR SALE

Software house have for sale Pentagon cassette duplicator; this is the Rolls Royce of tape copiers. High speed duplication of three copies from one master. Less than eighteen months fully maintained use. Retail cost over £4,000. Our price **£1,250.** Write to: Mediacopy c/o PRINTOUT, P. O. Box 48, Newbury, RG16 OBD.

SPECIALISTS PET COMMUNICATIONS SPECIALISTS PET

HOLDENE LTD.

FOR COMMUNICATIONS

IN

COMPUTING
CALL OUR ENGINEERS
AT
MANCHESTER UNITY HOUSE, 11/12 RAMPART ROAD, LEEDS
TEL: (0532) 459459 TWX: 556319

OFFICIAL COMMUNICATIONS DEALER

PEACH DATA SERVICES LTD.
COMPUTER SERVICE TO BUSINESS

SPECIALISTS IN DEC/COMMODORE COMMUNICATIONS

USE THE BEST

OUR DEMONSTRATION FACILITIES ARE USED BY MANY COMMODORE DEALERS

5 HORNINGLOW STREET
BURTON-ON-TRENT DE14 1NJ
Tel: 0283 44968

CompUtopia LIMITED
30 Lake Street, Leighton Buzzard, Bedfordshire
Tel: (0525) 376600 24 hour Answering Service

Specialists in microcomputers small business systems and Communications

---

mitrefinch

MIni and Micro Computer Business Systems and Consultants

PET COMMUNICATIONS DEALER

Tower House
Fishergate
York
Tel. York 52995
Telex 57651

PROFESSIONAL COMPUTER SERVICES LTD.

Your specialist communications dealer for Greater Manchester/Lancashire/Yorkshire

143/145 Yorkshire Street,
Oldham, Lancs. OL1 3TH
Telephone: 061-624 4065

---

cytek
COMPUTER APPLICATIONS

PET specialists, Commodore appointed Commercial systems & communications dealers

9 Warwick Road, Old Trafford, Manchester
Tel: 061-872 4682

B&B [Computers] Limited
The Consultants for the North West

Communicating with Prestel

SUITE 1,
124 NEWPORT STREET,
BOLTON BL3 6AB.
LANCASHIRE.
Tel: (0204) 26644, 382741.

CRA COMPUTER RETAILERS ASSOCIATION

Da Vinci Computer Shop
Proprietors Da Vinci Computers Ltd

YOUR COMMUNICATIONS & COMMODORE DEALERS

65 High Street,
Edgware,
Middx., HA8 7DD
Tel: 01-952 0526

CBM Communications

in the Coventry, Rugby or Banbury areas? Contact us for local support.

peg
Peg Associates (Computer Systems) Ltd.
99 Albert Street Rugby
Warwickshire CV21 2SW

Tel: Coventry 29036 Rugby 65756 Banbury 758202

OFFICIALLY APPROVED BY COMMODORE

SPECIALISTS PET COMMUNICATIONS SPECIALISTS PET

TURNKEY ROMS

ours, but we don't disagree with it!) input routine that completely inhibits all the existing keys excepting the Delete; limits the length of response to any desired amount; and assigns the response to any required variable, either by itself or in an array. All this is achieved with one single program line, which would read something like SYS36865,X$,8. In this case, the routine is called, the response given to X$, and the response length limited to 8 characters. The latter can either be specified, as we've done in the example, or it too can be a variable, computed elsewhere in the program.

Repeat Key

Next there's a repeat key function, turned on by one SYS call and turned off by another. We especially liked this (little things *don't* please little minds; you haven't lived until you've programmed and debugged with the aid of a repeat key!), but it must be said that repeat key operations are obtainable in a variety of shapes, forms, sizes and prices, including the totally free method of programming one for yourself. It only takes seven or eight lines. Nevertheless, it's useful to have it included and permanently on tap, and we liked both it and the well-planned speed at which it operated.

Next, there's what JCL call "STOP key muting", by which they actually mean disabling, or even more simply, stopping the lunatic fringe pressing the thing and ruining your beautiful program operation. Using the facility couldn't be more simple. One SYS call turns it on; another turns it off. Both can be in the body of the program if you wish, and that's where the operation would almost certainly finish up, as the first and last lines. It works, of course - there's no way the STOP key will stop anything, once the SYS call has been made.

Quite importantly, especially when one looks at other and apparently similar ways of achieving the same results for repeat key operation and STOP key disablement, neither of these methods has any effect at all on PET's internal clock, callable with TI$. It carries right on silently ticking, just the way it should.

Screen Printing

Then comes what you may think is an especially valuable facility: the ability to print, at any time under either program or direct control, the entire contents of the screen as it stands, *whether it's in upper or lower case*, straight on to the Commodore printer. And there's no great programming hassle to achieve this. It seems to us, in fact, that nothing could conceivably be more simple. You simply open a channel to the printer; use CMD4; make one SYS call, and presto! whatever's on the screen at that time is printed. Naturally enough, one further touch is then needed - closing the print channel in the normal way.

We must confess that we tested and used the function while reviewing an incredibly long game, with a quite separate and almost equally long program containing the rules of play. We'd given up even trying to remember the latter, when we *did* remember the screen print facility in the ROMs. Shortly afterwards, we had a beautiful set of printed rules, just as they'd originally and transiently appeared on the screen. And therein lies the major advantage. Screen displays are, by their nature, transient - even accidentally so! To transfer screen to printer has previously been a very tedious chore, involving either a large-scale rewrite of the program, or a considerable extra chunk added to the end. That's no longer so with this subroutine. We rate it as likely to be useful on a large number of occasions.

Directory Display

Finally, in the initial set of subroutines, there's a clever directory display device. It's useable from within a program, and indeed that's the place it would almost always be employed. As before, a SYS call does it, and the programmer can be selective about what he wants shown, including files that may have only just been created. It has clear applications in a number of business-type programs, when the relatively unskilled operator needs to be given information about other programs available on the disk currently running. And this listing can then, of course, be printed if required.

After all that comes the battery of six inter-related routines, labelled by JCL as "Full Screen Input System". And this is where the inventiveness packed into the two ROMs strides purposefully into the realms of total usefulness, in terms of guaranteeing protection in those programs which depend heavily on input provided by unskilled users.

What if?

Every programmmer has, at some time or other, learnt the need to employ the "what if....?" factor. In other words, to ask what if a user doesn't do as requested when responding to a program's need for input, but does something else entirely. Devising ways and means of avoiding program carnage in such circumstances gets ever more complicated. Which is why this set of six subroutines might well find a big welcome in many places.

Prior to using the first, the programmer sets up his screen, in which questions are printed requiring input responses. In this process, brackets are placed at each end of the positions at which input is to be given by the user. Then a SYS call is included for the first routine.

When the program reaches that point, it automatically positions the cursor where the first response is needed and, after the answer is given and Return is pressed, it moves the cursor down (or across) to the next place at which input is required. And so on, until the last one is reached. The Edit keys all work but, and this is especially ingenious, they will only cause the cursor to move to, or within, the places defined in the program by brackets.

Screen Erase

The next routine carries the process a stage further, for with three or four short program lines (including the inevitable SYS call), all the information just given as input is either converted to a set of variables, or read straight into an array, as required. This is followed by the third routine which, using another SYS call, erases all the screen responses unless the fourth routine is required instead. In this, if a response is checked and found to be nonsense for some reason (an age has been entered as 110, say), the cursor is moved to that field and a query is printed so that the original answer can be corrected.

After that, the fifth and sixth routines can be called if required. The former takes the entire screen content and stores it in the top 1K of memory (or 2K if you have an 80-column PET), while the latter retrieves it from there and redisplays it.

Conclusion

Now we'd like to be totally honest here, and say that when we first read a brief summary of what we've just described in much more detail, we really didn't focus on what was actually being provided by all these subroutines, especially the last six. Frankly, we think it's a lot to take in at one go, especially in writing, without the opportunity of actually trying it out.

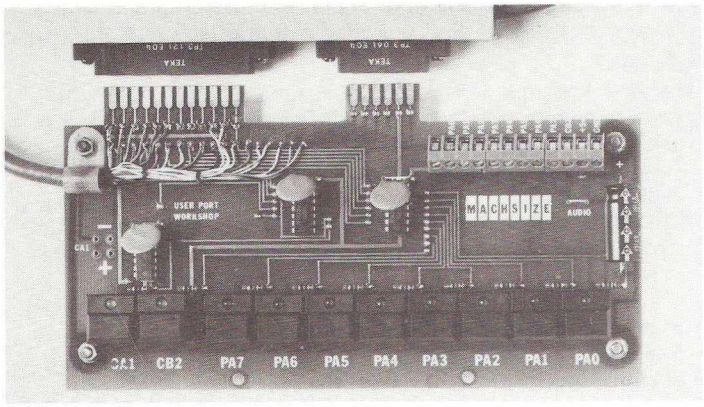
There, of course, we now have the advantage of you, the reader, since we *have* used the ROMs, and tried the subroutines in a variety of ways. That's why we feel able to say that we believe, given the right application, that what JCL have packed into their two chips will be invaluable, and should quickly repay the initial investment involved.

It's important to remember, of course, that any program written using the SYS calls described will be valueless unless it's run in conjunction with the original ROMs employed when it was written; or with another pair *in situ* on some other machine; or supplied commercially as a package deal, including the ROMs.

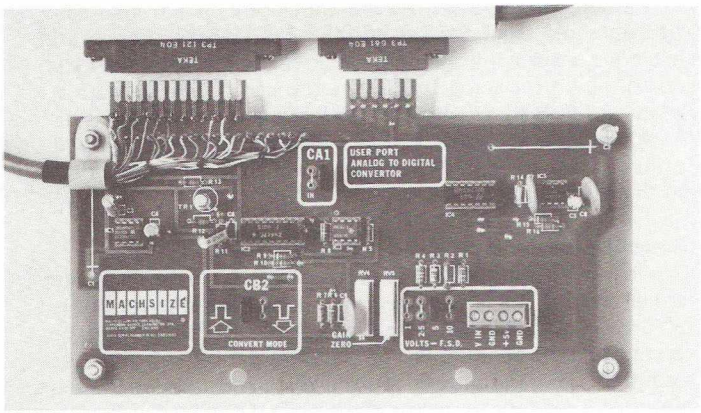
It would be idle to suppose that the average home programmer could reasonably justify an outlay of £120 for purely domestic programs, notwithstanding the permanently resident DOS. In-house programmers, or commercially sold programs, on the other hand, now have the ability to become considerably more sophisticated in their approach, using the inventive concepts which these ROMs employ.

On that basis, we have no hesitation in recommending them very highly.

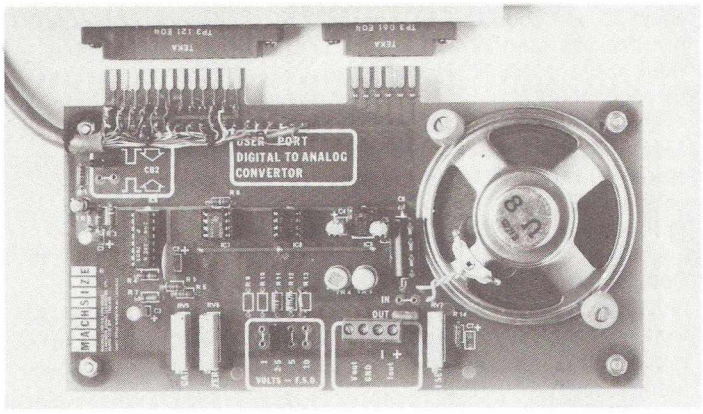
USER PORT INTERFACING FOR PET



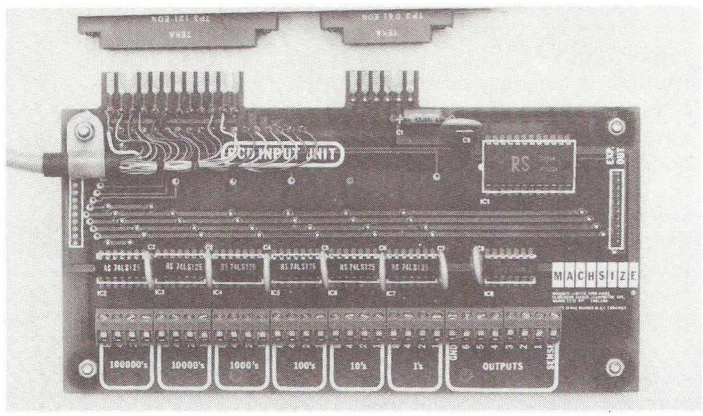
USER PORT WORKSHOP
Eight switches and eight LED indicators are fitted for the Data Lines. CA1 and CB2 have debounced switches and LED's to show the state. 10 programs and full documentation show how to use the PET's User Port. The PET edge connectors are duplicated on the board.



ANALOG TO DIGITAL CONVERTER
A software controlled A/D with 8 bit (1 part in 256) resolution. 15 microsecond conversion time. User selected voltage ranges of 1v, 2.5v, 5v and 10v are provided as standard with the option of unipolar or bipolar operation. 'GAIN' and 'ZERO' controls for fine setting.



DIGITAL TO ANALOG CONVERTER
A software controlled D/A with the input latches controlled by CB2. User selected unipolar and bipolar voltage and current outputs. Separate 'GAIN' and 'ZERO' settings for voltage and current ranges. A loudspeaker is fitted to the board for experiments in synthesised sounds.



BCD INPUT UNIT
A simple system for inputting up to 6 decades of 1-2-4-8 BCD into the PET. Each decade is entered under software control. 6 independent output lines can control the external device for 'READ', 'HOLD' or 'RESET' functions. The comprehensive documentation includes software to control a '1999' Digital Voltemeter.

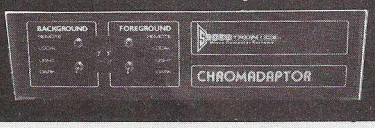
All units are supplied with comprehensive documentation, tape or disk software and with Lead Assembly for connection to the PET.

All units £75.00 each, including software and documentation. VAT, Post & Packing excluded.

MACHSIZE LIMITED, *PET & CBM REG'D TRADEMARK OF COMMODORE (UK)
YORK HOUSE,
CLARENDON AVENUE, LEAMINGTON SPA,
TELEPHONE (0926) 312542/32399 TELEX 312376

CHROMADAPTOR: COLOUR DISPLAY ARRIVES FOR PET

Sadektronic's Chromadaptor plugs into PET and any colour TV to give a full-colour display. How good is it? How useful is it? We report.



Dr. Salah Sadek, the founder of Sadektronics, a Brighton-based microcomputer company, had a long-time dream of providing PET with full-colour display output, similar to that which comes as an integral part of the Apple computer system. Apple users argue constantly that colour is the superior part of their system (plus one or two other goodies, such as high-resolution graphics), and Dr. Sadek saw no reason why PET shouldn't get the same treatment. Converting his ambition into hard reality proved more difficult, however, but he did it and Chromadaptor, the name he's given to the product, is now a fully-fledged reality.

Selling at a basic £295 (the dreaded VAT is extra), Chromadaptor was formally launched recently and off-the-shelf units are available. But how good is it; how exactly does it work; and how easy is it to adapt existing programs to the colour possibilities which Chromadaptor opens up? Even more to the point, perhaps, is the question of how *useful* is it? We've had a Chromadaptor on test for some time now, so we'll try to answer those questions for you.

First, the picture with the article will give you a good idea of what the unit looks like, but not of its size, which can reasonably be described as compact and neat. It's actually a mere 12 inches wide and 3½ inches high, with a front to back measurement of 9". The casing is heavy-gauge metal, and the general 'heft' of the unit conveys a reassuring feel of having been well-made. The front fascia panel is black, with the control labels and general insignia silk-screened in white. Though we've given our test unit fairly heavy usage, no sign of wear has appeared at any point on any of the labelling, so full marks for a carefully-designed and made casing, to start off.

Ribbon Connected

There are three leads which come from the unit, though 'lead' is probably not the right word to describe the third. There's a mains lead, for the unit is separately power-driven, and a UHF lead which goes to the aerial socket of any colour television set (assuming it operates on the PAL system). The third 'lead' is actually a ribbon cable which, on our review unit, was prettily rainbow-coloured, containing a large number of leads. For the uninitiated, ribbon cables contain many separate plastic-coated wires, lying side by side and jointed to each other along the length of the cable via their plastic sleeves, hence the ribbon-like appearance.

They can be a little hard to handle, simply because they *are* wide and flat, but there's no doubt they'd be a lot harder to handle if all the wires were contained within one larger outer cover. Chromadaptor's ribbon cable is a little over 2" wide, terminating at one end in a plug which goes directly into an outlet at the rear of Chromadaptor itself. About half-way down the ribbon, it splits into two (which simply means that one set of wires is separated along its plastic join from the remainder) with the major group going, via a standard plug, to the user port at the rear of PET, and the other group going directly to a special add-on printed circuit board inside PET. This last plugs into a socket normally occupied by a chip linked with PET's video circuitry, which naturally means that the chip in question has to be removed.

Soldering on

Therein might lie one relatively minor problem, for the chip's fixing method varies from PET to PET. With some, it is efficiently plugged into a socket; with others it's soldered directly into the main board. If the latter should be the case, there's little doubt that professional help will be needed to unsolder and remove the chip, but that needn't deter would-be users; in skilled hands, it's a few minutes work. Naturally enough, the chip must be replaced with a socket, for the latter is required for the plug-in circuit board. The only other connection is a single fine wire, which goes from the new circuit board to a point at which it is soldered to PET's main board. Again, however, this may well be something that the relatively unskilled user may prefer to have carried out professionally, though the need will only arise for 16K or 32K users. The wire is not necessary on other models (though we suspect that the majority of the demand for Chromadaptor will inevitably come from and for larger PET models).

We'd be remiss if we didn't say here that the removal of the video chip, if it means unsoldering it, and the attachment of the single wire on 16K and 32K models, may well have repercussions on the Commodore warranty. As this is only good for a mere 90 days, however, and the work is almost certainly going to be done by someone who knows what he's about, whether the dealer selling the unit or the actual purchaser, we wouldn't be unduly alarmed by the warranty implications. It should be remembered though that desoldering chips, fitting chip sockets, and soldering single wires into position aren't normally done free of charge, so an extra cost should be expected for this if the work is necessary, but it shouldn't amount to much.

Clipped in

The smaller part of the ribbon cable passes into PET via any convenient entry point. On our machine, it very easily went in at the side, where the white upper part of PET closes down over the black base. Indeed, Sadektronics fitted two neat clips on each side of the black base's vertical wall, into which the ribbon was placed and held. This seems fairly necessary and a sensible precaution, since the small circuit board is held in position only by the pins plugged into the socket on PET's main board. An accidental tug on an otherise unsecured ribbon cable (always a possibility, because of the rather ungainly nature of ribbon cables) might easily dislodge the board inside PET, without the user being aware of the mishap.

Before leaving the physical aspects of fitting, and while still on the subject of the ribbon cable, we felt quite strongly that the ribbon cable was not long enough on the sample we had. It seems to us that a not inconsiderable number of potential Chromadaptor users are likely to have a printer and a disk unit also. In the majority of cases, the latter units will be standing in their traditional positions on each side of the PET, and thus Chromadaptor will have to go somewhere else — to the far left or right of either disk unit or printer.

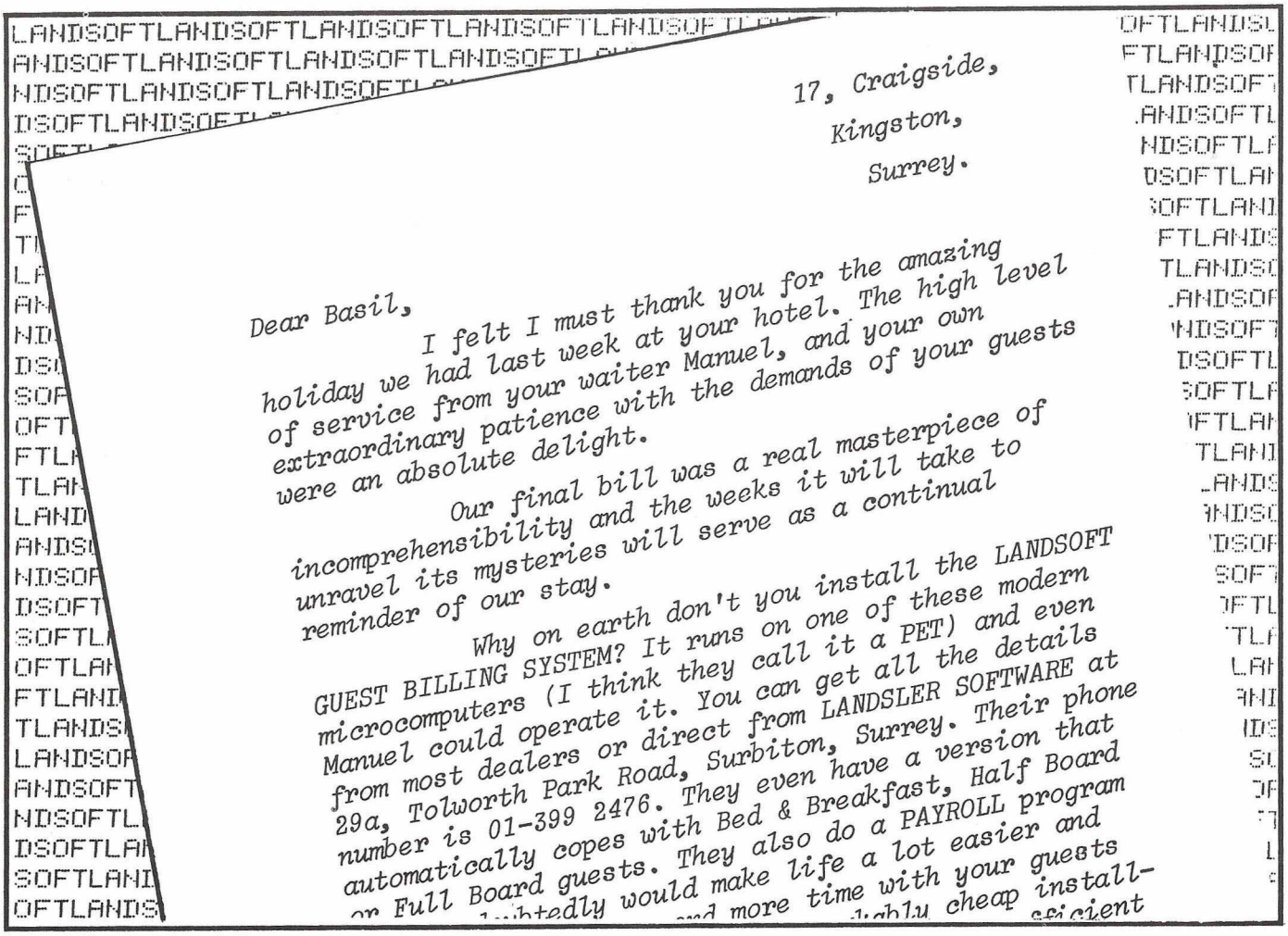
With our unit, this simply wasn't possible, since the length of ribbon cable wouldn't allow it. We therefore fell back on actually building a special shelf unit above the printer, on which our Chromadaptor sat. Buyers would do well therefore to check on the space they have available. If Chromadaptor can sit above and just to the left or right of PET, there's no problem. Equally, if a user has only a disk unit or a printer, but not both, again there's no problem. And, of course, the matter doesn't arise if Chromadaptor is to be used with PET alone.

But where to put it?

Finally, before concluding the general georgraphy of using Chromadaptor, it's important not to overlook the rather important question of the colour TV set which will be needed. It's not so much the fact that one *will* be needed (but it would be unwise to ignore that altogether!); it's more a question of where it's to be put.

PET has scored heavily — though perhaps not many users have thought a great deal about this — because its visual display unit (or TV screen) in plain English is integral with PET, and ergonomically right, just above the keyboard. In other words, it's exactly where you want and expect it to be. Clearly, Chromadaptor's colour TV set must inevitably be somewhere else, and the question is where?

We finally settled for a Sony with a 13" screen (the favourite size for Apple users) to the left of the disk unit, which itself is to the left of the PET. We tried having the TV set immediately above the PET, which put it more or less at eye-level and about 18" away, and found it a little overpowering there. Then we fussed about with other positions, finally settling on the one described, which was as close to PET as we could come. We cannot, in all honesty, say that it



BASIC COMPILER FOR COMMODORE SYSTEMS

- 50-150 times speed of Commodore Basic.
- Any length variable names.
- Single dimension string and integer arrays.
- Full Integer arithmetic & logical (1 byte variables) for extra speed.
- Code & Data can be set to reside anywhere in memory.
- Many facilities for interface with Commodore Basic programmes.
- New commands can be added to Commodore Basic automatically using WEDGE statement.
- Several extra low-level commands for precision I/O programming, eg DELAY, SETBIT, MOVE, etc.
- Automatic insertion of code into interrupt routine.
- Variables can be individually set to reside at any location allowing direct access to page zero I/O ports, etc.
- Full logical file handling.
- Compiling speed of 3 lines per minute.

Suite includes resident compiler, disk compiler, editor, loader and debugger. Editing environment and language similar to Commodore Basic. Produces ready-to-run 6502 Machine Code.

Detailed Manual ..... £7.50 inc. VAT

Compiler: 3000 series ..... £150.00 inc. VAT
8000 series ..... £150.00 inc. VAT

Oxford Computer Systems

5 Oxford Street Woodstock Oxford OX7 1TQ Telephone: Woodstock (0993) 812838

was a success because we simply found ourselves looking much more often at PET's screen than at the colour TV, because the former was so convenient. This did, however, rather seem to destroy Chromadaptor's *raison d'etre.*

Real Time Input

The desire to stay with PET's screen was especially pronounced in real-time programs; those programs, that is, which depended on relatively frequent input from us as users. These ranged all the way from games (in which input was virtually constant) to the initial operation of some business-type programs (in which input was still needed relatively often).

We therefore concluded that Chromadaptor would find its biggest and most valuable use in the running of programs in which a relatively small amount of user intervention was required, and in which the addition of colour was likely to be a positive advantage. The computing world generally, and perhaps the business, educational and scientific worlds especially, are not short of such applications, and in those Chromadaptor might well score heavily.

One example – and it *is* only one – which springs readily to mind is the running of ledger accounts, in which outstanding debtors need to be pin-pointed, along with those who are overdue, but not alarmingly so. What better way than to do this with colour, so programming as to ensure that long overdue accounts show up in red; overdue accounts in yellow; and paid-up accounts in green?

Adding Colour to your Programs

But let's move on to what needs to be done to put colour into programs, the answer to which is actually 'very little indeed'. Chromadaptor uses a nice simple approach, and we had no problems in changing a number of programs to operate in colour. The concept is based on saying that anything which actually appears on PET's own screen is labelled 'foreground', while those screen areas on which there is nothing are labelled 'background'. The colour of the foreground can be chosen at will from 8 quite different colours, each of which is available in two intensities. The intensity difference is sufficiently marked to justify the claim that there are actually 16 colours available.

Any of the 16 'foreground' colours, and any of the 16 'background' colours, can be selected at will from within the program, and all may be used (though the effect would be a little kaleidoscopic) separately in any of the 1,000 screen locations, but simultaneously on the same screen. This is achieved through arranging for each of the colour possibilities to be identified by a unique number. The foreground number is then added to the background number, which again results in a unique figure. This figure, however, is now a code recognised by Chromadaptor as requiring a particular 'foreground' and 'background' hue, which it then provides until such time as the code changes.

How it is done

Changing the code, and indeed alerting Chromadaptor initially to a required colour combination, is done by simply poking the code number into a particular location. Since this can be done as often as may be required within a program, the possible screen effects are virtually endless, and quickly achievable at whatever points are wanted in the program's progression. In other words, Chromadaptor is very easy to use, with absolutely no complicated programming to learn. We agree entirely with the claim that any normal program can quickly be altered to run in colour.

We found that our first attempts to rework programs for colour presentation lacked a certain subtlety of approach, but this stage was passed fairly rapidly, and after a few hours, we were starting to get to the stage of calling out for those close-by to come and see the latest effect we'd achieved.

That, however, tends to bring into sharp focus the problem which Sadektronics face in marketing Chromadaptor – a process in which we sincerely wish them every possible success, since the unit is well-designed, well-built, employs a number of very clever circuit concepts, and is undoubtedly real value for money.

The problem is simply one of finding genuinely justifiable uses to which it can be put, other than the novelty (which quickly wears off) of having what was previously a monochrome screen display now in colour. The addition of colour has to confer a positive benefit, over and above prettiness, which cannot be done without, when its possibility exists. That there are such applications we do not doubt, but we find ourselves hoping that those with them will recognise the possibilities.

The Big Screen Scene

Finally, on a semi-technical note, we must offer a comment on the actual quality of the screen presentation, as far as clarity and colour are concerned. Both, in fact, are excellent – though some careful adjustment of the colour TV controls may be found necessary for the best possible effect. Though the output to the TV is UHF-modulated, the resulting screen quality is very good; we found it to be crisp and clear, unlike some other demonstrations we have seen.

The colour quality is also very good indeed, though some colours are considerably more effective than others. This is especially so as far as 'foreground' colours are concerned; readability of the printed word suffers markedly with certain combinations of 'foreground' and 'background' – but this is not at all surprising, of course.

Conclusion

Summarising, therefore, we found the Chromadaptor to be an exceptionally well-made and designed unit, which did everything claimed for it. Installation is not difficult, though professional help may be required in some instances. It was easy to use, and the end-results were very good. We noted some minor snags in positioning it and its attendant colour TV set, but these may not be a problem in the type of application in which it will excel. This last is likely to be its largest drawback for, though it is very reasonably priced, it is not cheap and there may thus be a problem in isolating the applications for which it is tailor-made.

That said, we have no hesitation in recommending the unit to any prospective purchaser.

Q-com Electronics Ltd.

PET PERIPHERAL SPECIALISTS

PLESSEY MEMORIES 32K WORDS:

PETITE (separate box)	£289
INPET (mounted inside)	£249

IEEE 488 TO RS232c INTERFACES

OUTPUT ONLY

NON ADDRESSABLE	£50
ADDRESSABLE (correct upper/lower case)	£98

BIDIRECTIONAL

TNW2000	Standard	£135
	Current Loop	£150

Q–com Electronics Ltd.,
5th Floor, St. Martins House,
10 Bull Ring, Birmingham B5 5DT

Tel: 021-643 3540

Northern Office:
339 Colne Road,
Burnley, Lancs
0282-25723

GET BACK IN THE BLACK

Those who know more about business than I say the road to instant riches lies in finding a need and satisfying it. For my part, I never seem to get *my* needs satisfied (and to avoid ambiguity in *that* remark, it's computing to which I refer). And I've never found a need which others have, over which *I* could wave a magic wand. Until now, that is. But more of that a bit later.

Back to getting rich, for a moment. There's one other way and that, it's said, is to market something which, by its nature, wears out and must be replaced. Like soap or matches or tyres. Or computer printer ribbons.

If you've got a dot matrix printer, I'll bet you're getting a little weary of watching your printed output fade from blazing black to gruesome grey. Tired, if you take things too far, of peering under a strong light at fanfold paper, to discern exactly where the print actually is. And, of course, realising it's time yet *again* to change your printer ribbon, to stave off blindness for a few more weeks.

Well, I've found something that looks suspiciously like an answer to the problem. No guarantees are offered, but it's worked well so far, so let me pass on (pause for little fanfare) the Tip Of The Month, or How to Avoid Buying Yet More Printer Ribbons For Some Time To Come.

You're going to need a small flask of Stephens Endorsing Ink; a draining board beside your kitchen sink; several paper towels; some cling-film; and a very small amount of patience.

The Endorsing Ink you'll get from your local friendly stationer's shop, where you'll find it comes in a small, black, plastic bottle costing around 85 pence or so. The rest of the things you'll doubtless have at hand - including a generous supply of used printer ribbons which, if you're anything like me, you couldn't bear to throw away.

Right! This is what you do (and I promise you that, if you do it the way I say, any fear you have at this minute about how messy the idea is going to be will positively not be realised).

Take a used printer ribbon and pull it fairly tight on its spool. It's fairly important that each layer is making good contact with the layer underneath. Then spread the paper towels on your draining board, folded back on each other to make one towel-sized piece of several thicknesses.

Your draining board will hopefully, like most draining boards, have a number of groves running down its length to the sink. No matter if it hasn't, but it makes things easier. Stand the spool of ribbon on the folded paper towels, resting it so that it's on, and at right-angles to, one of the grooves in the draining board. This way, it'll stay steadily upright without rolling, while you get ready to go on to the next exciting step.

Heavens, this is thrilling, isn't it!

And what *is* the next step you ask. Ah, this is where we get to the clever bit. You've probably *still* been thinking all this time that a part at least of the process is something indescribably mucky, like soaking the ribbon in the Endorsing Ink.

Not a bit of it. The next (and near final) step is as clean as you like - though you might make a *little* mess on your first couple of tries. After that, you'll be an old hand at the Sanders Ribbon Renovation Service.

Unscrew the cap on the bottle of Endorsing Ink. Slowly and carefully squeeze the bottle until three or four drops of ink fall on the ribbon, at the top of the spool (the spool is standing on edge, remember).

You'll find the first drop takes a second or so to soak in, but the next few will vanish into the ribbon very quickly indeed.

Then turn the spool through 90 degrees. That's a quarter of a turn if you're not geometrically-minded. Repeat the process of squeezing two or three ink-drops on to the ribbon which is now at the top. Repeat this process twice more, and you'll have covered the north, south, east and west, as it were, of the spool.

Now move the spool one-eighth of a turn only, and repeat the inking process at four further points round the spool. This will make eight points in all at which you've inked the ribbon.

And that's the messy part over. If you've been careful, you won't have spilt a drop - which is just as well, because it's quite hard to get off! And why it's called endorsing ink, presumably. The key point is to go slowly and carefully. Do that, and you'll stay clean, and the job will take no more than three or four minutes.

The next stage is to wrap the spool up in a small piece of cling-film, and put the little bundle away somewhere to mature, like a fine cheese. The best place is obviously the original box or tin in which the ribbon came, but if you've no longer got it, the cling-film will keep it airtight.

After a couple of weeks, it's ready to be unwrapped and used, but you should find it will take that long for the ink-drops you applied to creep to all parts of the ribbon. You can, of course, leave it longer if you want, and so the ideal would be to treat three or four ribbons at one go, using them in turn and retreating the old one as you go. Thus you'll never run out of ribbons, and their life will be as long as the nylon lasts.

Which - have you noticed? - is a darn sight longer than the ink which is on it!

NOT ABRACADABRA; J–K–L!

Regular readers (are you still both out there?) will know that (a) I often mention a program that's taken my fancy, but only when it's good *and* useful too; and that (b) I've also tended to mention Peter Calver of Supersoft quite a few times too. This is because he's similarly good *and* useful, mainly because he keeps on thinking up programs that can be labelled like that. I've never met Peter in my life (something we'll have to rectify soon, Pete) so rest assured I'm objective.

One of the latest offerings from the Supersoft stable is something called "J–K–L", which is really quite nifty indeed. It's in machine code, and loads in a trice, even from cassette. It lives in the second-cassette buffer, which means it doesn't vanish when a main program is changed in memory, so it's always available on demand.

And what does it do? It causes whatever might be on the screen to be printed on your Commodore printer.

Now there's nothing terribly unusual in that - there are quite a few programs which will do exactly the same thing. There are even routines on ROM chips for the purpose. The key differences in Peter's program are that the screen-print can be done at absolutely any time at all, even in the middle of a program. If the latter is the case, the program instantly suspends operation while the printout is done, and carries on right from where it left off when the printout is finished.

The other difference is the clincher for me. For the first time, I don't have to remember some obscure SYS number to activate the printout routine. Nope. All that's necessary is to press 'J', 'K' and 'L' simultaneously on PET's keyboard. And in case you think that'll call for some manual gymnastics, forget it. The three letters are right next door to each other. One press of the three of them, and instant screen printout. Clever, eh?

by Gavin Sanders

GOOD LORD, IT'S ALIVE!

I was sitting quite comfortably in the lounge the other evening when a strangled cry came from the other end of the hall. I leapt to my feet and sprinted towards the problem: a figure standing rigidly at the door of my study, pointing at something in the darkness within.

"There's something glowing in the air in there", said my wife faintly, and sure enough, there was. A faint luminous rectangle hung some four feet from the ground in the blackness, right over against the far wall. I goggled at it, and then with a strength I really didn't feel, managed to say airily "You silly girl. It's only PET's screen." Which it was.

It wasn't glowing brightly, mind you. A dim phosphorescent glow would be the best description. Enough to make the hair on the back of your neck stand up.

I immediately assumed that it was the after-glow from the screen after switching off. It wasn't. I'd switched off several hours before. Then I assumed it was because the mains plug, at least, was still in. It wasn't - the glow persisted after I pulled the plug out. Then I assumed that it was simply something I'd never noticed before, and that it would fade after an hour or so more. It didn't. I sneaked down at four o'clock in the morning, and it was *still* doing it.

And it carried right on the next night too, even though I hadn't turned PET on in the meantime, and had kept the mains plug out too.

A bit creepy, it was. And is, come to think of it. Do I have the only PET that's slowing acquiring a life of its own, or does my PET have companions in other people's houses? In which case, is it a nation-wide conspiracy, and will they all rise up together on some night we know not, to zap us where we stand?

Rubbish. Nonsense. Of course not. "Have you locked the study door, dear?". "Yes, my love!"

Gavin

CORTEX

PET INTELLIGENT TERMINALS

The advent of the 80-column screen has made terminal emulation on the PET a realistic propostion. Drawing on our expertise in the data communications field, we have developed two packages which make Asynchronous and Synchronous terminal emulation on the PET a reality. While originally designed for the 80-column machine, these packages will also operate on the 3032/4032.

INTERCOMM

is a general purpose asynchronous communications package which may be configured to communicate as an intelligent terminal with an extensive range of mainframes, minis, micros, and networks, including PET to PET. In addition to its use as a terminal emulator, INTERCOMM allows the user to SEND AND RECEIVE FILES using the standard CBM peripherals. Data transfer may be 7-bit ASCII (upper, lower or mixed case), or 8-bit program/data files, directly to or from the selected peripheral. Communication is possible at speeds up to 4800 b.p.s.

OFFICIALLY APPROVED BY COMMODORE

SYNCOMM

is a hardware/software package which supports a range of synchronous link protocols including IBM, BURROUGHS, UNIVAC, HONEYWELL, NCR and others on demand. The PET together with SYNCOMM can be used as a replacement terminal/RJE station at link speeds of up to 4800 b.p.s. Data transfer, with error checking and retransmission requests, is supported between the host machine and the PET screen/keyboard and peripherals.

DISTRIBUTED PROCESSING

With both INTERCOMM and SYNCOMM, the ability to transfer information between the host machine and the PET standard peripherals results in a DISTRIBUTED PROCESSING SYSTEM, where applications packages written for local operation in the PET may be used to process data files which originated in the host machine, and to modify/create files locally for transfer to the host machine. In this way, the overall computing power of your system is increased, and terminal connect time is reduced.

CONTACT CORTEX NOW FOR FURTHER INFORMATION ON THESE PACKAGES.

CORTEX COMPUTER SYSTEMS LTD.

Tavistock House, 34/36 Bromham Road, Bedford
Telephone: (0234) 213571 Telex: 825633 OTSS-B

INCREDIBLE UNWORDPROCESSOR!

You have a Commodore computer. You have a compatible printer or are thinking of acquiring one. Since the computer has a lovely editor which allows you to write and edit programs with the greatest of ease, it should be easy to write a page of text on the screen, correct it, and then command the printer to write it out, right? WRONG! Before the arrival today of PRINTOUT, the Unwordprocessor, you had two choices: you could buy a word-processing program, or you could write your own. If you chose option one, you would be presented with a multi-branch decision tree, many branches of which could lead to the expenditure of £100 or more for the program alone, not to mention the floppy disk drive likely to be considered mandatory. If you chose to write your own, you would be joining the ranks of many happy hackers who do nothing else, but you wouldn't be processing any words today unless you started work months ago.

NO PEEKIE-POKEY

There is another choice. I shall now show you how you can, sans ado, write text of any length, edit it on the screen, store it on cassette, and print it out at high speed on demand. No, Algernon, this is not another peekie-pokey, one-line-per-minute screen dump. Yes, Bassington, there is a catch or two, but the value-for-money is unbeatable, especially if you are reading someone else's copy of this magazine.

Catch 1: You are restricted to the "Teletype" character set; upper case, numbers, punctuation, and arithmetic symbols (in other words all the characters that are accessible on power up without using the shift key). However, you can print the shifted graphics symbols if you do it within quotes.

Catch 2 (which gives away the secret): Each line of text is preceded by a line number.

SMART IDEA

I believe it is possible that further research will develop ways to overcome both of these problems, if problems they be. One layperson looked at my printout and said: "What a smart idea to number each line! The reader can use it for reference and the writer can use it for word count!" If some reader has found how to POKE the printer into holding lower case mode, I beseech him to contact me and add his discovery to the public domain.

All you need do to avail yourself of PRINTOUT, the Unwordprocessor, is to set up this little program on the screen:

```
0 OPEN 6,4,6: PRINT#6, CHR$(36):OPEN 3,4:CMD3:
  GOTO 10000
100000 LIST 1-9999
```

Then insert your text as a series of numbered lines between 1 and 9999. If you have TOOLKIT, use its automatic numbering feature by all means. I prefer to number my lines from 1, step 1, but you could number them step 16 if you wanted an automatic word-count at 16 words per 80-character line.

SCREEN EDIT

If you have more than 9999 lines of text, change line 10000 to 60000 for all I care. Edit it just as you usually do a program, using LIST to see various parts and applying the cursors, INSERT, and DELETE to modify the text. Save it as you would any program. When ready to print, set the paper and RUN. If you don't want "READY" printed at the bottom of your manuscript, include a few blank lines to get it off the bottom of the page. How do you print blank lines? Insert a colon after the line number. This will do for indenting the text where required. If you want, you can start every line with quotation marks to get the continuous option of graphics symbols and leading blanks. Remember, though, that if you want graphics to be vertically contiguous you will have to change CHR$(36) in line 0 to CHR$(18) and leave blank lines between lines of text.

Finally, when you're through printing, remember to write PRINT#3: CLOSE 3 and hit RETURN to get all your ducks in line again. This and line 0 refer of course to the Commodore printers; owners of other brands will no doubt know how to cope.

Lindsay Doyle

J C L *SOFTWARE*

EPROM PROGRAMMER MKII

This new EPROM Programmer for the PET embodies all the features needed by the serious program developer wishing to use EPROMs of the 2516, 2716, 2532 and 2732 variety. Drawing its power from the PET mother board and effecting data transfer via the User Port, this design allows the full and unrestricted use of cassettes and disk drives.

EPROM Programmer mounted in situ

Comprehensive disk based software includes Menu driven programs for control of the Programmer and a Data/Instruction program to get you started.

Specification in brief:

* Regulated and fused power supplies to ensure glitch free and safe operation from the PET.
* Industry standard 24 pin zero insertion force TEXTOOL socket on front panel.
* Fully cased and free standing, or optionally mounted in PET between VDU and main chassis.
* Software allows PETs RAM to be loaded, from a master EPROM, from Binary Files recorded by the Monitor, or from object code files produced by JCL Software or Commodore Assemblers.
* EPROM Empty, Verify and Transfer commands for quick copying.
* "Uncrasher" buttons for use during program development.
* Access to PET Monitor and return to Menu, facilitating single byte modifications to PETs RAM content prior to programming.

Prices £250 for MkII version described. [For use with 16/32K PETs and SuperPETs.]

£200 for MkI version for 2716/2732 EPROMS only.

Available from:—

Tunbridge Wells 27454

47 London Road, Southborough, Tunbridge Wells, Kent.

Circle Software

QUALITY SOFTWARE FOR YOUR PET

EDITOR	
EDITOR disk compatible	£15.00
***KEYBOARD TUTOR 1** learn to type	£12.00
KEYBOARD TUTOR 2 advanced course	£12.00
COMPACT reduced basic progs.	£ 9.50
SCREEN SAVE stores 5 pages	£ 9.95
DISASSEMBLER with printout	£ 9.95
USER PORT MONITOR	£ 9.95
SCREEN DUMP to printer	£ 4.95

*Reviewed PRINTOUT Aug. 1980

GAMES:	
DEMOLITION fast action for one	£ 4.95
MASTERMIND code breaker	£ 4.95
TOWERS OF HANOI with demo.	£ 4.95
BATTLESHIPS beat the computer	£ 3.95
HANGMAN (why not!)	£ 3.95

any three games for £9.95

Send S.A.E. for full details, or your cheque/P.O. for above amounts to:-

33 RESTROP VIEW, PURTON, WILTS SN5 9DG

L & J COMPUTERS

3 CRUNDALE AVENUE, KINGSBURY NW9 9PJ

01-204 7525

THE "PET" SPECIALISTS

NEW LOW, LOW, 'PET' PRICES!!

Pet 8K (Large keys)	£420*
16K	£499*
32K	£630*
Ext cassette decks (+ counter)	£ 55*
PET Friction Feed printers	£350*
AVAILABLE FROM STOCK	+ VAT

TRY US! YOU WILL NOT BE DISAPPOINTED

PrintersDisc Drives

PET 3023
PET 3022
Centronic 779
Spinwriter

PET 3040
Compu 400K
Compu 800K
Interfaces

Sundries

SUPERPETS NOW EX-STOCK!
Tool kits: library cases
Disks: C12 Cassettes
Paper (roll & tractor feed)
Labels: Dust covers

SOFTWARE

As well as a full range of Petsoft and Commodore Software, we have some highly reliable "Home-Brewed" programs available.

STOCK CONTROL & INVOICING **£60**
(Handles up to 500 items — 32K) (180 on 16K). Stock depleted on invoicing, search etc. Cassette, disk (& print option).

CASH BOOK **£90**
Enter daily/weekly amounts — printout and totals, weekly/monthly analysis, totals and balances.

Plus many more. SAE for free software booklet.

2 FOR JUST OVER THE PRICE FOR 1!
We now have limited stock of NEW CASSETTE DECKS, with built-in COUNTER + SOUND BOX FOR PETs.
AT ONLY £65* EACH.
Orders dealt with in strict rotation

*** PRICES DO NOT INCLUDE VAT**

PERSONAL SHOPPERS WELCOME
Phone & Mail Orders accepted.

BARCLAYCARD VISA

ALL GOODS SENT SAME DAY WHEREVER POSSIBLE
LARGE S.A.E. FOR LISTS ETC.

Don't tear your hair Compufix is there! Thatcham 67983

If your P.E.T. is having a nervous breakdown or your APPLE has bitten it's last byte. Then you need us!!

We are offering fast repairs to faulty systems, 24 & 48 hour maintenance contracts are also available.

COMPUFIX

SOFTWARE REVIEWS

PROGRAM NAME: **Trader**
DISTRIBUTOR: **Bristol Software Factory, St. Michael's Hill, Cotham, Bristol**
AVAILABILITY: **£300**

"Trader is an integrated stock control and invoicing package. Its aim is to provide the operator with rapid access to stock and sales-account information, to maintain accurate and up-to-date records of all stock levels and sales account balances; to provide a fast, efficient and accurate means of producing invoices and to produce reports giving total management and accountancy information."

This is how the Bristol Software Factory describe Trader, one of their Micro Pack range of commercial software packages for the Commodore PET, in the 17-page instruction/reference manual supplied with the system.

Trader is available at £300 + VAT from many CBM dealers as well as the publishers, and runs on a 32K machine with either one or two CBM 3040 dual disk drives and most printers.

We tested the package using one dual drive. An additional drive would have increased the storage capacity but not the number of available facilities. As it is, the stock control section of the program only produces hard copy information for low stock, period sales, stock valuation, ordered stock and total product information.

Maximum capacity is 2,300 records, which may be used for storing either stock or sales account information, thereby allowing the operator to configure his own storage requirements.

This feature was a pleasant surprise since most similar PET programs work from a fixed number of records, which somewhat restricts their use as off-the-shelf business packages. It is, therefore, possible to allocate a record as an account, and at a later stage delete it, freeing the file space for use by a stock item.

It is apparent, however, that priority has been given to having a large number of accounts and products on-line, rather than the amount of information held for each record. This limits the analysis which can be generated and effectively allows the recording, *but not the control,* of stock.

Each account record holds details on the name and address of the customer, the date of the last payment, and a balance representing the sum currently owing. Stock records have fields for product description, the in-stock quantity, bin/warehouse location, code, cost price, selling price, average cost price, a cumulative sales figure and a minimum stock level, which is used to determine whether an item is "Low Stock".

The principal functions of stock control must be to produce the information to enable one to know when to re-order and, if the need arises, when to dispose of unwanted stock. Trader, however, is unable to do this as it lacks the information from which it could sensibly forecast sales trends and stock deficits. Lead times, economic re-order quantities, minimum stock levels, and cumulative and period quantities would have to be held for all product records, in order for the computer to have sufficient data on which to base its calculations.

There are five printed reports available on Trader and a period-end procedure which zeroes sales balances, ready for the next period.

The user should have little problem in understanding and using this software as it is sufficiently similar to most manual methods, and all keyboard entries are logical. It is based on menu selection, from which one chooses the required operation; e.g., generate sales invoices or amend an account.

The raising of sales invoices is the basis of the system, as it allows both the automatic reduction of stock levels and the posting of balances to the sales ledger.

Invoices are produced on preprinted stationery - a definite plus for any system - and the need to change paper has been kept to a minimum, by using only two sets; one for reports, the other for invoices and statements.

The software caters for line and total product discounts, sundries and carriage changes. Invoice totals are added under one of the twenty possible analysis codes, which may be printed-out as part of the daily sales activity list. Facilities to generate statements, grant settlement discounts and post various stock movements are also included.

A drawback of the sales account section of Trader is that only balances are recorded. It is usual, and sensible, for "brought-forward balance" programs to maintain transactions for the current period so that they can appear on statements. A balance without any breakdown is almost useless, and all reference to it would have to be carried out by manually sorting through invoices and credit notes.

First time buyers are likely to find Trader adequate as an introduction to computerized packages. More experienced users will find it lacking in sophistication, and most probably, application.

N.D.

PRODUCT **Monjana Chip**
DISTRIBUTOR **Elcomp Publishing Inc., Chino, Calif,USA**
PRICE **98$**

You might be forgiven for thinking that MONJANA has something to do with either the drugs scene or some new Rock band. In fact, it's a powerful monitor for the PET in ROM It sits on the right-hand free slot in the PET and is accessed by SYS 38000 - you know you are into it by the legend "MONJANA/1 c 1980 G.H.BAUER ". The blurb that arrived sometime after the chip tells you that this is a PET version of the famous JANA monitor. Well, I suppose you learn something every day.

The real attraction of having the monitor on chip is that it is virtually crashproof - I won't admit the number of times I have crashed EXTRAMON. The chip comes with a "quick step" kind of guide, but having said that, it's all there. There are some similarities with the CBM monitor, especially in screen layout. All output lines of MONJANA commence with a "* " in the first position. The second position is used to indicate input and processing errors with a familiar "?", and the third position is marked by the command code, of which more in a jiffy.

The manual describes the chip as using the stack addresses below 60 HEX so that the stack from 61 - FF HEX is available for programs. As far as I can tell there are no clashes with either the PET operating system or other programs.

It's when we begin to look at the various commands available that we get some idea of MONJANA's power and usefulness to programmers in machine code. If you have prodded around with the standard PET monitor, you'll know that sinking feeling as you type "M 0400 - 0800" and the top lines whirl off the top of screen. The command "M" on this chip will page the data for you - waiting for the "C" for continue prompt. This applies on screen or on printer.

On the subject of printers, I personally hate that tedious business of OPEN 4,4:CMD 4: SYS 1024 every time I need hard copy. Well, now my troubles are more or less over - with this neat device you type "P" and "ON" will appear alongside. Now the bus is open, and commands that follow permit dumping to the printer. When finished type "P" again and "OFF" will appear. The only trouble is that the bus is left open although subsequent functions will appear on screen.

Other features on this chip include DISSASSEMBLE available again with the "one screen at a time" feature. An "I" command will allow the user to overwrite instructions, but these will have to be the object code listing and not the mnemonics. TRACE and EXECUTE commands together with JUMP, are very useful in debugging a program; a program can be tested step by step and before each step is executed, the program counter registers and stack point are displayed, and can be changed if necessary. JUMP ("J") will commence running the program with the instruction indicated by the program counter and using the CPU status as shown. If there is a BRK instruction in your program the monitor will take control again, with a "B" for BREAK.

RELOCATE will do just what it says - the memory area to be moved being limited by a start and end address. To

▷41

small systems engineering limited

2-4 Canfield Place London NW6 3BT Telephone 01-328 7145/6

IEEE-488 PET INTERFACES

B200	Bi-directional RS232C serial	£186.00
Type C	Uni-directional RS232C serial	£120.00
AP	Addressable parallel for Centronics or Anadex printers	£106.00
GPI AP	Micro based bi-directional serial interface with buffering Custom GPI software development for special interfacing requirements	£249.00

All serial interfaces incorporate:
- Software or switched Baud rate selection with 16 different rates selectable
- Crystal controlled Baud rate
- Full RS232C handshake
- 20 mA current loop i.o. capability

OFFICIALLY APPROVED BY COMMODORE

All the above interfaces have two modes of code conversion to match print out to the PET screen for either display mode

Non Addressable parallel	£45.00
TV/Video interface	£35.00

We also stock a range of PET connectors.

NEW . . . INTERCOMM

General-purpose Asynchronous Communications package . . .
- Emulates a wide range of terminals
- Sends and receives program & data files
- Permits communication with mainframes, networks, other micros, other PETs

	£350
WORDCRAFT 80	£325
BASIC COMPILER	£200
TCL PASCAL	£120

NEW . . . MUPET

Multi user disk system allows 2 to 8 PETs to be linked together to share a CBM disk unit and printer:prices from £595 for a 3 user system.

RICOH R.P. 1600 Daisy Wheel Printer

- 60 C.P.S. Printing Speed
- 124 character print wheel
- Integral PET Interface
- Full maintenance contracts available

Fully compatible with Wordcraft 80/Wordpro 4 word processing packages.

Phone for latest low price !!

ANADEX D.P. 9500/01 Line Printer

- Bi-directional printing with shortest distance sensing logic
- High density graphics
- 50 to 200 +
- Parallel, RS232C and Current Loop Interfaces standard. PET Interfaces available.

Prices: 9500 – £895 9501 – £995

Full range of PET computers and peripherals

We can offer expert advice on scientific and industrial applications.

commodore PET PACK software DIRECT FROM audiogenic

(WE MANUFACTURE THEM)

The Commodore range of Petpack Software is big and getting bigger! At the moment there are over 60 Petpacks and new programs are being added all the time. Here at Audiogenic we hold stocks of every Petpack and GD series disc, ready for immediate despatch.

For the Businessman we have programs for Stock Control, Filing, Accounts, Payroll, a very powerful Word Processor, and more!

For Eductional applications we have programs to aid in the tuition of Languages, Physics, Maths, English, Pet Programming, Statistics, etc.

For the Scientist or Engineer we have programs on Mechanics of Materials, Harmonic Analysis, Circuit Design, Drawing Load and Die Design, Statistical Analysis, Geometry and Algebra, to mention but a few. Then for the Programmer, there is a selection of Programming Aids on cassette and disc. And, of course, there are the Games Petpacks! Fun for all the Family! There are at present 12 cassettes in the Treasure Trove series, with over 40 different games in all. The Arcade series has 6 games which will be familiar to those of you who frequent pubs, clubs or amusement arcades. The games are PET versions of those popular pastimes like the addictive 'Space Invaders' or the universe-encompassing 3D Startrek.

Get our catalogue for the exciting details.

We also supply for your PET

CONNECTICUT MICRO

A range of analog to digital conversion equipment with up to 16 inputs for the collection of information. Temperature probes and software provided, all at prices starting at around £90.00. Also a range of IEEE to RS232 converters which are addressable and uni- or bi-directional. Prices start at £65.00

A B COMPUTERS VISIBLE MUSIC MONITOR

This unit is absolutely phenomenal. It actually displays music (staves, notes, signature etc.) on the screen and plays it at the same time. It will handle 4 part harmonies and you can add or delete notes with simple keyboard commands. It's a sort of musical word processor. Ideal for computer music freaks, whether rock, classical or budding "Stockhausens". Comes complete with notes, 8 bit D/A converter and some beautiful pieces of music inc. Maple Leaf Rag and some Bach. Excellent value at £39.50 inc. VAT plus 25p P+P.

PROMINICO X-DOS

This litte ROM makes all the difference to using disks, as it gives a range of commands like MENU, which displays the disc directory in the form of pages. It does not lose the program currently resident in the PET, and does away with initialisation. It also incorporates a screen dump to printer, disk copy and scratch routines. See our catalogue for further details.

JCL EPROM BURNERS

An essential device for programmers wishing to incorporate their programs into ROMs. Comes complete with software. Another nice little number from this company is the TURNKEY ROM set, which is suited to business software writers and users. It will load from disk a program as soon as you power up - also features a "BULLET PROOF" input routine. See our catalogue for the details of this versatile little beauty.

BOOKS

Over 15 titles from Prentice Hall International OSBORNE/McGraw-Hill BYTE BOOKS SIGMA, MOS and **COMPUTABITS.** All the titles have been selected with the PET user in mind, and the range includes books on PASCAL, GRAPHICS, PROGRAMS, IEEE BUS, CIRCUITS, HARDWARE, etc. Don't forget the PET/CBM Personal Computer Guide at £9.25 plus £1.00 p+p.

BASIC 4 and DOS 2 CONVERSION

BASIC 4 gives your new ROM PET all the commands of the new 80 column PETs. DOS 2 goes in your disk drive and is necessary when using BASIC 4 or may be used on its own to get rid of initialisations every time you use a disk. Both sets are priced at £43.70 inc. VAT + 50p P+P each.

ACCESSORIES

SOUND BOARDS, DISKS, CASSETTES, ROMS, DISK HOLDERS, PETSET (GETS YOU OUT OF CRASH), DEMAGNETISER, RIBBONS see catalogue for full details.

Now 22 issues of this superb magazine.
All back copies available £3.50
each plus 25p post + package.

CURSOR Programs for PET™ Computers

P.O. Box 88 Reading, Berkshire,
Tel: (0734) 595269 24 Hour.

determine the target area, only the start address is needed - the rest the monitor does for you. A very useful feature this one, and nicely protected by error trapping - if, for example, you attempt to overlap. After pushing data around RAM you have probably messed up your addresses within the program.

LINK ("L") is a rather clever facility which will search through the defined area to test if these instructions contain addresses which relate to the transferred memory area. If it does find such instructions, it will adjust the address and show the change in a "I" line. You are warned that the link area should not contain tables or text, otherwise these might end up mangled.

SAVE will sadly only work with cassette 1 and "X" returns you to BASIC again. One other feature will permit remarks to be output to the printer, such as *N Monjana dissassembled*, which should enable you to keep track of sheets of printout.

All in all, I rather liked this piece of firmware, although it does tend to be no more than a spruced-up dissassembler: I would have liked it to have embodied one or two other features. The manual does state that ELCOMP are working on another monitor (isn't that always the way?) ..... so it might be worth waiting for that! Now if someone were to put EXTRAMON on chip .....

J.N.

The Monjana Chip should be available through PET dealers shortly.

DEALERS
&
NEWSAGENTS

PRINTOUT's circulation is expanding rapidly. If you are not already selling the magazine, contact us for details of our special trade terms. You will be surprised how favourable they are.

Write to the Circulation Manager, PRINTOUT, P.O. Box 48, Newbury, or telephone 0635-201131.

PRINTOUT means PROFIT!

PAGODA

PAGODA is a new exciting fantasy game, different every time! Put your nerve and skill to their ultimate test. Play PAGODA and become an addict like us.
£15 Cassette for 32K PET only.
Alphoid Ltd., 67 Johnson Street, London E.1.

COMMODORE'S NEW SOFTWARE STANDARD

Paul Higginbottom

Almost a year ago the first few 8000 series SuperPETs arrived. Commodore decided to bring together a group of key software authors at regular meetings, to discuss software on the 8000 series. At the first meeting, the subject was software standardisation. In particular, the possibility of creating a 'user interface' for business software packages on the 8000 series machines was discussed, in order to derive a set of operating standards. One straightforward decision was to use the top one or more lines of the screen to title each display. This tells the user what the screen picture is for. It might say "Main menu of options", or "Credit note details" for example. It was also agreed that the bottom one or more lines of the screen should be used as a status report informing the user of either:-

a) What the computer was doing
e.g. "Sort in progress - Please wait two minutes",
b) Indicate any errors
e.g. "Max stock level less than min stock level"
or c) State any operations that the user must complete in order to proceed
e.g. "Enter a shifted return to accept format".

Within Commodore we adopted the practice of having the top and bottom lines highlighted (in reverse video), with the messages centred on the screen.

A harder task was to standardise data entry. Long gone (we hope) are the days of the basic INPUT statement, no matter how many cursor right and other such characters are included in the prompt! Mike Whitehead (the then U.K. Software Manager), and I discussed the design aspects of a utility that we, the manufacturer, could write and distribute to any software house, or dealer developing a business software package for the 8000 series system. The utility I developed was a fixed screen input routine written entirely in machine code which interfaces easily to BASIC (by means of one array). This meant that non-machine code programmers could incorporate a fully fledged data entry editor into their packages.

In operation, the utility allows full editing, using the insert, delete, cursor left, cursor right and the character keys within a field. The insert key will push all of the characters from the cursor to the end of the field up one position, overwriting the last character. When a character is typed into the last position of the field, the character is printed and the cursor remains in the last position of the field. By using the Cursor Up and Down keys, the user can move between fields, editing and re-editing the screen of data until satisfied. If the user presses either the return or the cursor down key, the cursor moves onto the next field. After pressing either of these two keys when editing the last field on the screen, the bottom line prompts:-

PRESS SHIFT RETURN TO ACCEPT SCREEN

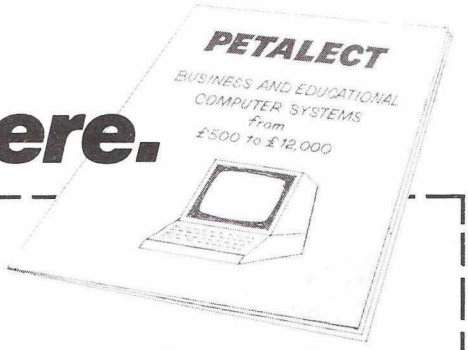
The 'screen accept position' can also be reached by entering a shifted return at any point on the screen. At the screen accept position the user must either accept the data on the screen by entering a shifted return, or by using one of certain cursor movement keys (cursor up, home, clear home) or the run/stop key, he may re-enter or abort the input environment. At any time, the home key will put the cursor into the first field on the screen from the top. The run/stop key provides a help/abort facility at all times, and the clear home (shifted home) will reset the fields to their default values, or perhaps to what they were when the user entered the environment. So if the user were changing a record, and had made a complete mess of it, then he could return to how it was when the special environment was first entered. An error code is returned to the BASIC program dependent on how the user left the environment for the run/stop (help facility), and the clear home keys, because these are taken care of by the programmer.

But what were the standards actually designed for? The main aim was that different software authors should achieve consistency in the operation of their packages. This is an ideal situation for the businessman buying packages from more than one software supplier for use by employees of his firm, who might otherwise be confused by different methods of operation when changing from one package to another.

Software developers interested in obtaining a copy of the standard routines should contact the Software Manager at Commodore Systems, 818 Leigh Road, Trading Estate, Slough

If you don't know where to start with computers...

start here.



Petalect have selected a range of business and educational computer systems that are flexible, quick and easy to programme, available from stock and are above all, reliable.

With our 9 years experience in micro-computers, you'll get objective advice, a convincing demonstration and full after-sales service by our own engineers.

If you want the right computer system and programming to make your business more efficient, call in or send the coupon for full details of our services.

PETALECT
Electronic Services Ltd

Distributors for ACT 800. Dealers for CBM Commodore and Sharp MZ-80K
Dept. PESL 33/35 Portugal Road, Woking, Surrey GU21 5JE
Telephone (04862) 69032-68497

Please send full details of your specialist services and computer systems.

Name _____

Company _____

Position _____

Address _____

_____ Tel. No. _____

3D

Digital Design and Development

18/19 Warren Street · London W1P 5DB Tel: 01 387 7388

CBM PET SHARP MZ-80K Specialist Suppliers of Complete Systems for Industrial and Laboratory Monitoring and Control.

Please note our new address.
Callers welcomed for demonstration and/or discussion.

SHARP MZ-80K INTERFACES

● Parallel Printer Interface	£110
● Serial Printer Interface	£150
● Bi-Directional Serial Interface	£210
● 16-Channel A/D Convertor Unit	£280
● Fast Data Acquisition System – 40,000 readings/sec. 4 analog channels IN and 4 channels OUT.	P.O.A.

PET INTERFACES

IEEE-488 Compatible Units

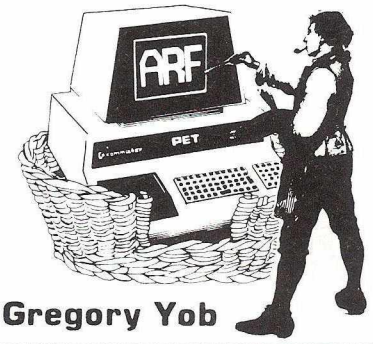
● 16 Channel 8-Bit A/D Convertor	£300
● 8 Channel 8-Bit D/A Convertor	£350
● 8 Channel 12-Bit A/D Convertor	£600
● 12-Bit D/A Convertor	P.O.A.
● X-Y Analog Plotter Interface	£200
● Digital Data Input Unit, 64 Bits	£400
● Digital Data Output Unit, 64 Bits	£350
● 16 Channel Relay Unit	£350
Also....	
● USER Port Convertor A/D plus D/A	£200
● Fast Data Acquisition System 40,000 readings per sec. 4 A/D + 4 D/A	P.O.A.

All units boxed complete with IEEE-488 address internally selectable, with integral power supply, cables, switch, fuse, indicators and illustrative BASIC software.

OFFICIALLY APPROVED BY COMMODORE

TERMS: All prices EX-VAT. P&P extra.
Cheques should be made payable to 3D Digital Design & Development.
All goods supplied under 90 days warranty.
CUSTOM DESIGN UNDERTAKEN

Personal Electronic Transactions



by Gregory Yob

A Case of POKE

I have several requests concerning how to get the lower case letters on a PET. The magic location is 59468. My PET, now graced with the "new" ROMs, uses these values:

POKE 59468,12 — Upper Case Letters & Shifted Graphics.

POKE 59468,14 — Upper Case Letters & Shifted Lower Case.

That is to say, when 14 is in place, the shifted keys will now give lower case letters, and a few of the graphics symbols will now be different. This should also work with the "old" ROM PETS.

For some PETs, you will see exactly the reverse, that is, shifted keys will give shifted letters and unshifted keys the lower case letters. This is especially true of the PETS dubbed "business PETs". Commodore, in its typical fashion, went through the following sequence:

1. Press "A" and you get "A", press Shift "A" and get "a". This was then "corrected" to:

2. Press "A" and get "a", then Shift "A" gets "A". This was done by changing the character generation ROM. After a flood of complaints from software makers who now had *4* kinds of PETs to contend with, Commodore switched *back* to the first way.

(We have yet to mention the various keyboards, that comes later . . .)

Just for fun, let's play with this feature a bit:

```
10 PRINT "clr";
20 FOR J=1 TO 40:PRINT "V";:NEXT     (Shift-V)
30 FOR J=1 TO 22:PRINT "dn";:NEXT
40 FOR J=1 TO 40:PRINT "V";:NEXT
50 GOTO 50
```

This will draw two lines on the screen near the top and bottom made of connected X-like characters. Now, let's do a minor change: (Press STOP to get back from line 50.)

```
50 POKE 59468,14
60 FOR J=1 TO 100:NEXT
70 POKE 59468,12
80 FOR J=1 TO 100:NEXT:GOTO50
```

See if you like the effect! Then change the J counter in Lines 60 and 80 to FOR J=1 TO 20. Then remove the J loops in 60 and 80 entirely.

Going onward, make Line 20: FOR J=1 TO 999:PRINT"V"; NEXT and remove lines 30 and 40. Note the slight ripples on the screen here. Now for a tighter version of this:

NEW — to remove the old program

```
10 FORJ=1TO999:PRINT"V";:NEXT
20 A=59468:B=12:C=14
30 POKEA,B:POKEA,C:GOTO30
```

Enter this *exactly,* without any spaces at all. When this is RUN, you will see bands of X vs v moving up the screen. Basic manages to execute Line 30 about 180 times per second, or three times per each refresh of the screen. This is close enough so we can see the changing bands move comparatively slowly. If Line 30 is changed by the addition of a single space:

```
30 POKEA,B :POKEA,C:GOTO30
```

the bands now move downwards. Note that the bands move slowly enough to see that the individual scan lines of the display are changed rather than an entire line of letters. As you add more spaces between the two POKEs, the bands will move down more rapidly. If colons are used instead of spaces the effect is more drastic. (One colon is worth about 4 or 5 spaces.) This is a nice demonstration of how Basic looks at every character in a line and that extra spaces do indeed waste some time, though less than you would expect. CAUTION: If you are epileptic or sensitive to visually flickering patterns these experiments should be done with some caution. The examples given will not be harmful, but as you add spaces or colons the bands change into a flickering screen.

Different patterns will appear as you try combinations of spaces and colons. My eyes gave out before I could solve the following challenge:

The display with one space in Line 30 gives three bands of each "flavor". Modify Line 30 so the display only has two lines of each "flavor" and that they move at about the same speed. May your eyeballs ache! If you solve this, send me a copy for mention here.

On Machine Language

When this column started, *PRINTOUT Magazine* asked me to not get involved with "bit-fiddling" and other esoterica which are confusing to most PET owners. Though this is very reasonable, now and then some neat things can be done in machine language, and I'd like to share some of them with you. The way I intend to do this is to give you Basic programs which load short segments of machine language into the Second Cassette Buffer and simply used for their wonderful effects. I will explain the effects and will *not* explain how they really work. Those of you who can hack 6502 code are welcome to dissect these and see how they tick. For the rest of us, these morsels will remain black boxes to be simply used.

When converting a machine language program into the POKE values for Basic, I have found the following program very helpful. In fact, of all the programs I have written, I have used this one the most.

The program works by PEEKing the memory for the machine language and then building some DATA statements for the POKE values. When all of the statements are finished, you enter them by pressing RETURN. This is repeated until the entire machine language program is converted and then the program lists its own line numbers for your erasure, again by pressing RETURN. The result is a block of DATA statements holding the machine language.

```
10 PRINT"clr DATA MAKER FROM MACHINE LANGUAGE"
     :INPUT"dn START ADDR, END ADDR";S,E
20 INPUT"dn FIRST LINE #, INCREMENT";F,I
     :GOTO 40
30 READ F,I,S,E
40 PRINT"clr PRESS 'RETURN' TO ENTER DATA"
     :PRINT"dn dn";
50 FORL=1TO20:PRINT F"DATA sp";:FOR D=1
     TO7:PRINT MID$(STR$(PEEK(S)),2);
60 S=S+1:IF S>E THEN 100
70 IF D=7 THEN PRINT:GOTO 90
80 PRINT",";:NEXT D
90 F=F+I:NEXT L:PRINT"RUN 30 hm dn dn
     110 DATA"F","I","S","E"hm";:END
100 PRINT:PRINT"RUN 120 hm dn";:END
110 DATA 1000 , 1 , 826 , 900
120 PRINT"clr PRESS 'RETURN' TO REMOVE
     NON-DATA dn": FOR J=10 TO 130 STEP 10
     :PRINT J
130 NEXT J:PRINT"dn";:END
```

Ugly little monster, isn't it? We make use of what I call "screen gymnastics", or printing Basic lines on the screen and then positioning the cursor so your press of RETURN will enter these lines. Advanced programmers can eliminate the press of RETURN by poking 13, the value for RETURN, into the keyboard input buffer. I prefer to see what's happening and press RETURN manually.

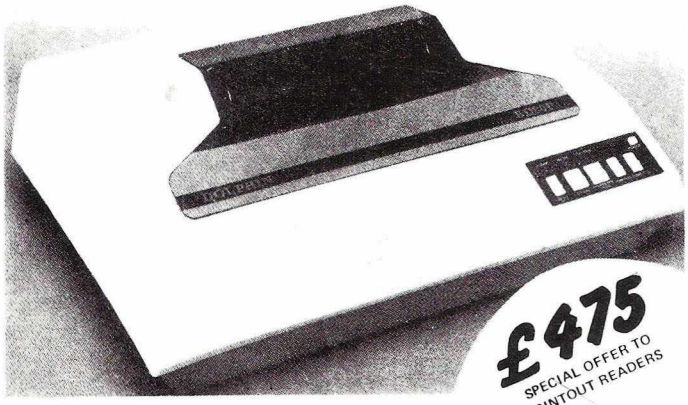
Lines 10 and 20 announce the program's existence and ask for the line numbers and addresses needed. For example, the values 1000,10 and 826,900 will start the DATA statements at 1000 in intervals of 10 (1000, 1010, 1020, etc.) and convert addresses 826 through 900 into DATA. Line 40 prints an instructional line on the cleared screen and line 50 does all of the work.

The line number, F, is printed and then the keyword DATA. The D loop then looks at 7 memory locations and prints their values. I decided that the DATA statements should fit on one screen line, and the worst case, 9999 DATA 255,255, 255,255,255,255,255 will only permit the 7 bytes. Of course your first line number should be larger than 130 to avoid collisions with the program itself. The string expression looks at memory, converts the PEEK number to a string, and the MID$ function is used to remove the blank that always appears at the start of a printed number. Line 60 checks that the location S is within the address range, and Line 70 checks if we are at the seventh byte. This late byte needs a PRINT statement to get to the next line on the screen. Line 80 provides the comma between the numbers in a DATA statement and ends the D loop.

Line 90 adds the interval, I (letter i) to F, the line number and terminates the L loop. L counts the number of lines on the screen and stops everything if a screen full of DATA statements is ready for your

▷45

BIRMINGHAM COMPUTER CENTRE



£475
SPECIAL OFFER TO PRINTOUT READERS

New low cost printer for Commodore
High Speed Matrix 9x7 plus PET Graphics
Plugs Direct into PET-NO-INTERFACE
COMMODORE 3022 PRINTER... Now at a NEW LOW PRICE

Camden Electronics
462 COVENTRY ROAD SMALL HEATH, BIRMINGHAM B10
TEL. 021 · 773 8240

Get Organised!
& be a better programmer.

Treat Yourself to a Prog-Planner from Valsoft.

***RING BINDER** Keep everything together and where you want it

***Programme Sheets** to suit P.E.T. for fast entry.

***Variables Log** Now you can keep touch of constants available—what's used & where.

***Sub Routine Record**

***Screen Layout Grid** Quicker & easier than going direct onto screen this overlay is invaluable

***Clear Folder** holds programme floppy or cassette

* Make the most of your keyboard time by getting it right on paper first.
* Ideal for schools. colleges & all P.E.T. programmers
* Designed & produced by **Valsoft**—*software that works beautifully.*
* Available by post at only **£8.00** inc postage & packing.

SPECIAL Big Discounts on PET Hardware E.G. 32K PET at 16% Discount on equiv rec. retail price! Send large S.A.E. for details.

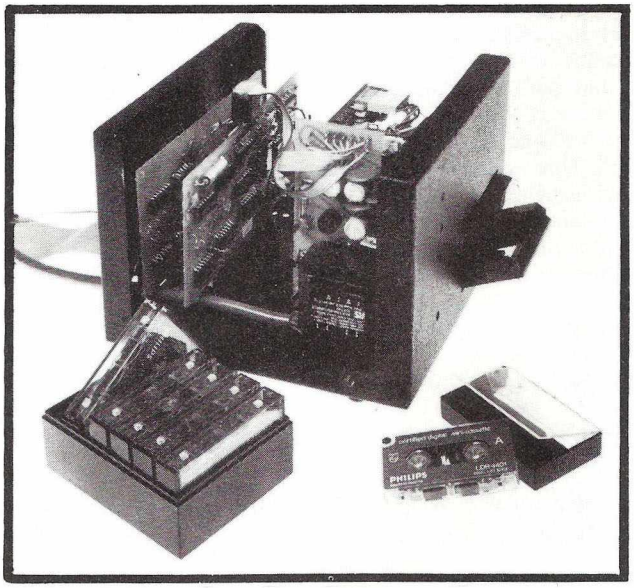
SPECIAL If you've written anything for P.E.T. Send your tape to us with £1 and we'll return your tape. together with a complete PET printer listing + Our experts evaluation of your programme—we may even make you an offer for it. YOUR SECURITY IS GUARANTEED

MR MICRO
78A Partington Lane
Swinton, Manchester M27 3NG

Mini-Digital Cassette Recorder
An alternative to disc for program & data storage

FEATURES

* **The Philips MDCR 220 mechanism of proven reliability**
* **Holds up to 120k Bytes/Cassette with fast data transfer**
* **Extra memory board with RAM and ROM to hold operating software**
* **Will read & write (in blocks from 256 bytes to 60k Bytes), backspace & search for end of data on tape**
* **Compatible with 6502 based systems ie PET, AIM65, OHIO, KIM, COMPUKIT ETC.**



PRICES (INCLUDING MANUAL)

MINI RECORDER MECHANISM	£95.00
INTERFACING BOARD (TYPEA)	£42.50
MEMORY BOARD (WITH ROMS FOR 6502)	£55.00
CASSETTES (BOX OF6)	£15.90
COMPLETE UNIT LIMITED OFFER	£195.00

CARRIAGE £2.25 PRICES EXCLUSIVE OF VAT @ 15%

CURRAH
COMPUTER COMPONENTS
Unit 7 Hartlepool Workshops, Sandgate Industrial Est.,
Hartlepool, Cleveland 0429-72996

entry. When this happens, we land at the second part of Line 90 where the lines:

```
RUN 30
110 DATA .....,.....,.....,.....
```

are placed on the screen in the correct positions.

The program now stops and the cursor is placed on the DATA statement 110. 110 contains the current information to permit a re-run of this program. As you press RETURN, eventually the RUN 30 is entered.

A look at Line 30 shows that the DATA in Line 110 re-enters the program for the next page of DATA. This repeats until the test in Line 60 says we are done. Line 100 is now entered, and the screen display only shows the DATA and a RUN 120. Again, pressing RETURN gets us to Line 120. Now the values 10 to 130 appear on the screen, and by pressing RETURN, the program itself is eliminated. If you do a LIST, only the DATA statements appear. You may now enter your program in the normal manner.

Machine Language Goodie #1

When Darth Vader is approaching and the good ship Twimbly is stricken with a laser blast, you need a good effect to let the captain know something just happened. This little goodie reverses the video for all of the screen. Voila:

```
10 FOR J=826TO858:READB:POKEJ,B:NEXT
20 INPUT "clr INTERVAL";I
30 PRINT"clr COUNTING"
40 FOR J=1TO20*RND(1)
50 PRINT". sp";
60 FOR K=1TO1000:NEXT:NEXT
70 FOR J=1TO20:SYS826
80 FOR K=1TO10*I:NEXT:NEXT
90 GOTO 20

1000 DATA 169,128,141,72,3,141,77
1010 DATA 3,160,4,162,0,189,0
1020 DATA 128,73,128,157,0,128,232
1030 DATA 208,245,238,72,3,238,77
1040 DATA 3,136,208,234,96
```

Line 10 loads the program held in the DATA lines to the second cassette buffer. The screen clears and you are asked for an INTERVAL which controls the time between "screen flips". The rest of the program gives a little drama to this event. Try 10 for the INTERVAL value at first.

Machine Language Goodie #2

Here is a minor variation on Goodie #1. It isn't useful, but is fun to look at.

```
10 FOR J=826 TO 862:READB:POKEJ,B:NEXT
20 FOR J=0 TO 255:SYS 826
30 FOR K=1 TO 200:NEXT:NEXT

1000 DATA 169,128,141,72,3,141,77
1010 DATA 3,160,4,162,0,189,0
1020 DATA 128,73,0,157,0,128,232
1030 DATA 208,245,238,72,3,238,77
1040 DATA 3,136,208,234,238,74,3
1050 DATA 96,0
```

Once this program is entered, clear the screen, do a LIST, and then RUN. As a challenge to the hackers, see if you can figure this one out *without* doing a disassembly!

More Quickie Programs

Thanks for some more "quickie" programs, and please keep sending them in! The Decimal/Hex problem has brought many replys of which I share two:

Matt Ganis & Fred Covitz gave me this little goodie which converts a decimal number to both Hexadecimal and Binary forms:

```
10 W$="123456789ABCDEF":INPUT NU:
     N+NU:FORT=3TØSTEP-1:A=16↑T
20 IF N/A=>1THENWV%=N/A:H$=H$+
     MID$(W$,WV%,1):N=N-WV%*A:GOTO35
25 H$=H$+"Ø"
35 NEXTT:D=NU:FORT=15TØSTEP-1:
     A=2↑T:W=D/A:IFW=>1THEND=D-A
     :B$=B$+"1":GOTO45
40 B$=B$+"Ø"
45 NEXT
50 PRINTNU;TAB(8)H$;TAB(17);B$
     :CLR:GOTO10
```

When entering this monster, pay attention to the line numbers! The valid numbers are from 0 to 65535.

David Harris claims that this hex-to-decimal program takes the least amount of memory for program and storage:

```
10 G=16:A$="0123456789ABCDEF"
20 INPUTH$:FORI=1TOLEN(H$):FPRJ=1TOG
     IFMID$(H$,I,1)=MID$(A$,J,1)THEN
     C=C*G+J-1
30 NEXTJ,I:PRINTC:C=Ø:GOTO20
```

This works for numbers from 0 to FFFFFFF, quite a range! However, David isn't quite correct re size. By changing the NEXT in Line 30 from NEXTJ,I to NEXT:NEXT one byte may be saved. Two more bytes may be saved by another change to Line 30. (Hint — look at the last two statements.)

Dan Rubis sent this exotic program:

```
1 INPUT"MM,DD,YYYY":M,D,Y:K=INT((60+(100
     /M))/100):X=365
2 F=X*Y+D+31*(M-1)-INT(.4*M+2.3)*(1-K)+
     INT((Y-K)/4)-INT(.75*(INT((Y-K)
     /100+1))
3 W=F-INT(F/7)*7:D$="SATSUNMONTUEWEDTHRFRI"
     :PRINTMID$(D$,W*3+1,3):GOTO1
```

When I ran this, the dialog was:

```
MM,DD,YYYY? 4,28,1980        (28 April 1980)
MON                          (was indeed a
                               Monday)
```

Dan explains that a brief formula, Zeller's Congruence, determines the day of the week from the day, month and year numbers for any dates after 1582, which was when our calendar was last adjusted. □

Copyright 1980 Creative Computing 51 Dumont Place, Morristown, New Jersey, 07960, USA.

ATTENTION NEWBURY/READING PETS

PRINTOUT is looking for an enthusiastic PET owner in the Newbury or Reading area who would be interested in proof reading the magazine before it goes to press. Present proof copy is read twice, but the odd mistake still slips through, and we would like to be perfect. If you are interested, contact Wendy Cheetham on 0635-201131.

BACK ISSUES

We still have a small number of complete sets of Volume 1 (1980) remaining, which are on offer at £9.50 inclusive of U.K. postage. Single copies are available price £1 inclusive of U.K. postage, and binders at £3.50 including VAT and U.K. postage. For overseas rates, see page 2. Send a cheque postal or money order made out to PRINTOUT to us at P.O. Box 48, Newbury RG16 OBD. We accept Barclaycard/ Visa/Access/Mastercharge/Eurocard by post or by telephone on 0635-201131.

KINGS & QUEENS

A history program for children by Adrian Berry, Science Correspondent of the Daily Telegraph. Makes learning about our monarchs fun. Just £4.50 inclusive of postage direct from the author at 11 Cottesmore Gardens, London W.8. Money back guarantee.

Would you like to write about Microcomputers?

PRINTOUT is looking for a staff writer to join our growing team. If you are interested in microcomputers and can write, we would like to hear from you. It is an opportunity to work with nice people at our pleasant offices in the Newbury area, and there are good opportunities for promotion. Write with a C.V. to The Publisher, PRINTOUT, P.O. Box 48, Newbury RG16 OBD.

INDEX

BR = Book Review

	Issue	Page
A		
Aids to Assembly Language	4	22
AIM 161 A/D Converter review	3	21
Analog to Digitial converter	10	31
AND OR & NOT	5	7
AND OR & NOT correction	6	8
Animated Graphics	10	35
Assembly Development System	4	25
Assembly Language programming (BR)	4	26
Auto disk name save	9	22
Auto line delete	10	19
B		
Basic, arrangement in memory	10	42
Basic Mailer	10	32
Basic programs (32) for your PET (BR)	6	15
Basic, ROM addresses	2	22
Binary arithmetic	8	33
Bolt-on Goodies	10	23
Business software survey	1	10
Butterfield in London	8	18
Butterfield, Jim, interview	1	16
C		
Cassette deck, alternative method	10	26
Chromadaptor	8	11
Colour for your PET	8	11
Commodore approved products Show	4	7
Commodore disk review	3	12
Commodore printer review	4	11
Communications Interface	10	24
Computerclub	9	13
Compu-Think disk destruction test	5	17
Compu-Think directory auto load	10	20
Compu-Think disk lockout answer	8	6
Compu-Think disk Lockout answer	8	29
Compu-Think disk protection	7	23
Compu-Think disk reading routine	9	7
Compu-Think disk security	10	20
Cosmic Invaders review	7	25
Cosmic Invaders bugs & mods	10	8
Crash, recovery from	10	17
Cursor plot routine	10	20
Cursor magazine	10	12
Cursor positioning	9	7
D		
Database, Petaid	9	24
Datapad	10	24
Data pointers	9	36
Delete, automatic	10	20
Digital Plotter	10	14
Digitizer Review	4	21
Disk, Compu-Think review	5	17
Disk, 3040 review	3	12
Disk Save	9	22
Double density character set	7	37
Double density plotting	1	13
E		
Educational software review	5	25
End of term report:PET in education	1	9
EPROM Programmer	10	25
F		
Fantasy games review	6	20
Find the file name	8	31
Formatting	5	9
Formatted accounts	10	10
Future shock:System Development Predictions	3	13
G		
Games review	3	13
GET statement	7	26
Graphics, Animated	10	35
Graphic positioning	8	20
Graphics, Hi-res, review	5	14
Graphics, use of	7	32
H		
Hangmath game	9	36
High resolution graphics review	5	14
Hitch Hikers Guide to the PET (BR)	3	7
I		
Incomplete Records program	4	5
Indentation of lines	7	23
Input as a file	8	31
Input becomes Data	9	35
Input becomes Data (2)	10	8
Input/Output	7	37
Input string	8	29
Input statement problem	2	9
Input versus Get	8	31
Instant reversal	9	34
Instructions (writing them)	7	26
In the public eye	2	9
J		
Jack Tramiel review	6	27
Jim Butterfield interview	1	16
K		
Keyboard : how it functions	3	22
Keyboard tutor review	7	25
Key rollover	10	21
Kit Spencer interview	4	17
L		
Library of PET Subroutines (BR)	10	39
LIFE on the PET	5	21
Light pen	8	35
Line Delete	10	19
Line up your money	9	34
Little Genius review	9	40
Local PET user groups	5	23
Logical operators	8	33
M		
Machine code on disk	2	7
Machine code saving	5	19
Mailing List program listing	10	32
Memory expansion, Petite	5	5
Mersey Micro Show	7	17
Meta printing	7	11
Modular programming	2	21
Money formatting	6	25
Music on the PET	10	29
N		
Netkit	9	10
New approach to subroutines	3	15
New ROMs	1	13
New technology	4	14
P		
Pascal by TCL	7	13
Pascal, Tiny	10	14
Passwords, Protection of	8	29
Payroll, Landsler	9	10
PCW Show report	2	5
Peripheral survey	10	23
Petaid review	3	16
Petaid review	9	24
PET & The IEEE Bus (BR)	9	33
PET as a secret agent	4	21
PET/CBM Computer Guide (BR)	8	27
PET graphics	7	32
PET input/output	7	37
PET printer comments	3	7
PET printer pound sign	7	26
PET printer pound sign	7	27
PET Revealed (BR)	8	27
PET show	7	18
PETAL mainframe processing	7	12
Petplan	5	5
Personal Computer (BR)	9	33
Photography course review	1	15
PicChip	8	14
Plotter, digital	10	14
Plotting by poking	8	31
Pointers	10	42
Poking the screen	2	9
Power from PET	10	10
Power-On/Reset	7	23
Prestel Interface	6	8
Presto Digitizer review	4	21
PRINTOUT survey result	7	29
Print to REM change	7	11
Printer: CBM 3022 review	4	11
Programmers Friend	10	14
Programmers Toolkit	10	23
Programming aids review	2	12
Programming, modular	2	21
PROM Programmer	10	25
Pronto-PET	10	17
Protecting passwords	8	29
R		
Reader Survey	7	29
REM statements	7	26
Repeat key review	5	11
Reverse/Clear screen	7	8
Reverse/Clear screen	8	16
Rollover, keyboard	10	21
ROM, revised set	1	13
S		
Sales Ledger by Anagram	9	10
Saving machine code + Basic	5	19
Saving machine code on CBM disk	2	7
Screen display aid program review	9	19
Screen poking	2	9
Screen reversal	8	34
Scrolling	7	27
Small Business Programs (BR)	10	39
Sort program	4	26
Sorting out sorts	9	26
Speech synthesis	3	9
Spencer, Kit, interview	4	17
Subroutines, a new approach	3	15
ST variable explained	10	19
Superchip review	9	14
SuperPET review	6	11
SUPA	6	6
T		
TCL Pascal	7	13
Timing loop using clock	10	19
Tiny Pascal	10	14
Titles	7	26
Tokens	3	16
Tokens	7	14
Tokens	8	11
Toolkit	10	23
Turnkey ROMs	10	23
U		
Uncrash	10	17
Unnew using Toolkit	10	17
User Groups	5	23
User Port Workshop	10	24
V		
Variables, Storage of	10	42
Video logic	2	13
Visit to the Commodore	2	9
VisiCalc, release of	5	5
W		
What's wrong with Wordpro II	9	29
Wordpro II corrections	10	8
Wordpro II review	2	19
Wordpro III, protection of	9	23

To Volume One

TOMMY'S TIPS

Tommy's Choice

I am often asked to recommend off-the-shelf programs, a highly dangerous occupation, unless you are a systems analyst. As I am not, here's a list of the programs I have most *enjoyed* using over the past six months or so. It is not a guide to what's best, merely to those programs that have given me pleasure. It is, of course, highly subjective.

I adore Fantasy Gaming (and if you do too, re-read Vol 1, No 6) so I would have to pick out *Temple of Apshai, Morloc's Tower*, and *Datestones of Ryn* by those masters of the genre, Automated Simulations (distributed here by ACT Microsoft). Commodore's version of *Space Invaders* is still quite unsurpassed. I am told it has now acquired the status of being banned from commercial premises. The most enjoyable public domain program I encountered was *Android Nim,* brought over from Canada by the redoubtable Jim Butterfield; most user groups seem to have a copy.

So much for the games. Some programs are just so well executed that they are indeed a pleasure to use. Into this category I included the superb *VisiCalc* from Personal Software (distributed by ACT Microsoft), Pete Dowson's *Wordcraft 80* word processor which is available from Dataview, and Professional Software's *WordPro 4.* All of these have enhanced the reputation of PET software, and in my opinion every PET owner should have the first, and one or other of the latter two. Finally I nominate *Extramon* from Commodore as my most enjoyable utility, if that is the word.

Now lets hear from you with your nominations.

Compiled Basic Anyone ?

I want to write programs in BASIC with machine code subroutines to handle fast data acquisition from devices interfaced to the PET, and fast screen displays. As I am unfamiliar with assembler, a compiler sounds like the answer; no-one seems to do one however. Any ideas ?

R. Biden

Oxford Computer Systems of 3/5 Oxford Street, Woodstock, Oxon. have just finished one, although I understand that it has a number of limitations. You would certainly need some knowledge of assembly-level programming to get any benefit from it, and even then I am not sure it is the answer to your problem. One of the plug-in chips could handle your requirement for fast screen displays. The PicChip comes immediately to mind, but see also Terry Hope's extensive review of Superchip in Vol 1, No 9.

PUNCH A HOLE IN YOUR TELEX PROBLEMS!

The PETELEX system offers fast, accurate and portable telex tape preparation. No more time wasting interruptions from incoming messages. The on-board word processor allows editing, storage, retrieval and merging of telex messages. Saves time and cuts costs. Available from:-

Microcomputation,* 8 Station Parade,
London N14 5BJ
Tel: 01-882 5104

*Sole U.K. agents

Commodore PET Users Club

The PET Users Club was founded in order to provide news, ideas, applications and programs relating to the PET and to act as an information exchange between Commodore and PET users and amongst PET users themselves. Approximately 8 times a year we send out the Commodore PET Users Club Newsletter to all our members. This contains product news, hints and tips on programming and details of PET compatible hardware and software available from other manufacturers.

Many of our program authors are members and use the programming hints published in the Users Club Newsletter to "tune" their programs to provide maximum performance. For first time PET Users, reading the newsletter is one of the best ways of mastering the powerful capabilities of the PET. Other members are users of PETs owned by companies, Schools and Colleges. Quite a few people "just thinking" about buying a PET join too.

Free entry to the Commodore PET Show, the most important event in the PET calendar where all the latest PET related Hardware and Software developments can be seen under one roof. User Club members also automatically receive the latest Commodore catalogues.

Details of problems encountered and solved by other users are one of the chief benefits of being a User Club member. In order to encourage bashful writers the Commodore PET Users Club offer a "reward" of a £50 voucher (exchangeable for any Commodore Product) to the author of the best applications article or program published in CPUCN. In addition all articles published are eligible for entry in the competition "Best of the Year" with a £250 Commodore Voucher as the prize.

Please send this coupon to:— CPUCN Subscriptions Department, Commodore Systems Division, 818 Leigh Road, Slough, Berkshire.

PLEASE ENROL ME AS A MEMBER OF THE COMMODORE PET USERS CLUB.

Name .....

Address.....

.....

.....

I enclose my cheque/P.O. for £ _____
(please make all cheques payable to:
Commodore Business Machines (UK) Ltd.

PUC Membership for one year.....£10.00
Overseas Supplement.....£ 5.00
(Delete where inappropriate)

_____

_____

commodore

DEALERS

MICRO COMPUTER CENTRE
Virage Holding Co. Ltd.

28 Sheen Lane, London S.W.14.
Tel: 01-878 7044/5/6/7

IBEK SYSTEMS
COMPUTER SYSTEMS
COMPUTER PROGRAMMING
ELECTRONIC DEVELOPMENT
437 Stoney Stanton Road,
Coventry CV6 5EA,
West Midlands. Tel: (0203) 86449

ACS ACS ACS ACS

for the simple computer system that expands with your farming needs

Low cost: Recommended total package around £3000.

ACS agricultural COMPUTER SERVICES
Agricultural Computer Services.
Roundabout Farm, Thurning.
Norfolk, NR20 5QS
Telephone Melton Constable
(026-386) 847 or 827

HSV Limited Microcomputers

May Place
Basingstoke RG21 1NX

Tel: 0256 62444

THE COMPUTER ROOM
for all your PET requirements.
We also stock: SUPERBRAIN
APPLE
VIDEO GENIE
and have a wide selection of software. Full maintenance support. Call in at our Showroom. (We are shortly opening a new branch in TONBRIDGE).

THE COMPUTER ROOM
21 MONSON ROAD,
TUNBRIDGE WELLS Tel: 0892-41644

SMC

SOUTH MIDLANDS COMMUNICATIONS LTD.

Northern Branch: 257 Otley Road,
Leeds LS16 5LQ
Tel: 0532-782326

PETALECT
ELECTRONIC SERVICING LTD.

Chertsey Road
Woking
Surrey
Tel: Woking 21776/23637

AUGHTON
MICRO SYSTEMS
Woodward Road, Kirkby,
Liverpool, L33 7UZ
Telephone: 051-548 6060
Telex: 628681

EXECUTIVE REPROGRAPHIC
and business consultants ltd.
2/4 Oxford Road,
MANCHESTER M1 5QA
Tel: 061-228 1637

THE BUSINESS SYSTEMS EXPERTS...

DEVON COMPUTERS
81 Upper Manor Road PAIGNTON Devon TQ3 2TH Tel 0803 526303

TAL
(TYTHE AVIATION LIMITED)
COMPUTER DIVISION
Suppliers of alternative cassette decks with counter and audio monitor.
11 HIGH STREET LEIGHTON BUZZARD BEDS
TELEPHONE LEIGHTON BUZZARD - 372114

HSV Limited Microcomputers

22 Southampton Street,
Southampton SO1 2ED

Tel: 0703 22131

CSS

Calculator Services & Sales (Bristol) Ltd.
192 Wells Road
Bristol BS4 2AX
Telephone: Bristol 779452 Sales
Bristol 779453 Service

MICRO ASSOCIATES
MICRO COMPUTERS AND BUSINESS SOFTWARE
471 Lichfield Road,
Aston, Birmingham
Tel: 021-328 4574

Preston Computer Centre
6 Victoria Buildings,
Fishergate, Preston.
Tel: 0772- 57684

PROFESSIONAL COMPUTER SERVICES LTD.
143/145 Yorkshire Street,
Oldham, Lancs. OL1 3TH
Telephone: 061-624 4065

MMS
Computer Systems
Registered Office:
26 Mill Street, Bedford MK40 3HH
TEL. 0234-40601

CSM
Computer Services Midlands Ltd.
Complete Computer Systems ● Consultancy
● Programming Service ● Supplies
First Floor Refuge Assurance House Sutton New Road
Erdington Birmingham B23 6QX 021-382 4171

MORE DEALERS ON NEXT PAGE

We are your official DEALERS...

Sumlock Manchester

SUMLOCK MANCHESTER

196/198 Deansgate
Manchester M3 3WE

Tel: 061-834 4233

BUSINESS ELECTRONICS

'The Microcomputer Specialists'.
ROWNHAMS HOUSE, ROWNHAMS,
SOUTHAMPTON SO1 8AH
Telephone:
SOUTHAMPTON (0703) 738248

LOWE ELECTRONICS

Bentley Bridge
Chesterfield Rd.
Matlock
Derbyshire DE4 5LE
Tel 0629 2430 or 2817
Telex 377482 Lowlec G

FOR CBM AND A GREAT DEAL MORE

BUSS STOP COMPUTERS

Photo Acoustics Ltd.

255a St. Albans Road
(entrance in Judge Street)
Watford Herts WD2 5BQ
Tel: Watford 40698

JRW

J. R. WARD COMPUTERS LIMITED

35 Potters Lane
Kiln Farm
Milton Keynes MK11 3HG

Telephone No.
Milton Keynes
562850
(STD 0908)

Dataview LTD.

MICROCOMPUTER SYSTEMS

9, Church Street, Colchester, Essex, CO1 1NF
Tel. 0206 78811 and 63377
Telex: 987562 COCHAC

MICRO FACILITIES

127 High Street, Hampton Hill,
Middlesex TW12 1NJ
Telephone: 01-979 4546 & 941-1197

---

30 Lake Street, Leighton Buzzard
Bedfordshire. Tel. (0525) 376600
24 hour Answering Service

Micro Computer Systems
by
COMPUTOPIA LIMITED

CCS

CCS MICROHIRE
and
CCS MICROSALES
7 The Arcade, Letchworth
Herts, SG6 3ET

Tel: (04626-73301

CSE

C.S.E. (COMPUTERS)

12 WOKINGHAM ROAD
READING RG6 1JG

Telephone: Reading (0734) 61492

WALTERS COMPUTER SYSTEMS LTD.

FIELD HOUSE,
107 WORCESTER LANE,
STOURBRIDGE,
WEST MIDLANDS, DY9 0SJ

Micro Computers - Software packages
Bespoke Programming - Supplies
Tel: 0562-885937/995309

SUMLOCK BONDAIN

SUMLOCK BONDAIN LTD.

263–269 City Road,
London EC1V 1JX
Tel: 01–250 0505

IJJ

HIGH RESOLUTION
GRAPHICS (320x200)
£320 delivery from stock

IJJ DESIGN LTD.
37 London Road,
Marlborough, Wilts
Tel: 0672-54487

---

cytek

COMPUTER
APPLICATIONS

PET specialists, Commodore appointed
Commercial systems dealers
9 Warwick Road, Manchester 16
Tel: 061-872 4682

---

imPETus
Computer Systems

FOR AN INDEPENDENT DEAL
(AND A GREAT DEAL MORE)
plus
Programming software services
PHONE
IMPETUS COMPUTER SERVICES
on 01-202 2726 or 01-202 9630

SUPER VISION

13 ST. JAMES ROAD
SHIRLEY, SOUTHAMPTON
PET EQUIPMENT HIRE SPECIALISTS
Ex-hire machines available.
Tel: Southampton 774023 or 554488

---

c s
ca is
cad dis
cadd ddis
caddi addis
caddiscaddis
caddi addis
cadd ddis
cad dis
ca is
c s

Specialists in micro-computer applications

Caddis Computer Systems Ltd

72-74 Trinity Lane, Hinckley, Leicestershire, LE10 0BH
0455-613544

Megapalm Software

Megapalm Limited,
Halton Road, Nether Kellet,
Carnforth,
Lancashire LA6 1EU
Telephone: 0524-733801

Microchips [Winchester]

MICROCOMPUTERS AND A
GREAT DEAL MORE
66 St George's Street Winchester
Hampshire SO23 8AH Tel 0962 68085

IJJ

MUSIC SYNTHESISER &
FOUR VOICE HARMONY
SOFTWARE £57.00
INSTRUMENT SYNTHESIS
SOFTWARE £30.00

IJJ DESIGN LTD.
37 London Road,
Marlborough, Wilts
Tel: 0672-54487

---

adda

Adda Computers Ltd.
14 Broadway
West Ealing
London, W13 0SR Tel: 01-579 5845/8

Peeks & Pokes

by Inside Trader

Commodore's President, Jack Tramiel was less than amused by the departure of his two star pupils, Messrs Peddle & Fish, to set up on their own. The mass defection of CBM's technical staff to the new enterprise may just prove to be the last straw. Meanwhile the ambulance-chasing spivs of the California Bar are rubbing their hands together at the prospect of a juicy legal scrap.

Ever the Optimist, Peddle intends to call his new company Sirius, after the most brilliant star in the heavens. This will guarantee he receives no publicity in Personal Computer World, where Guy Kewney has been hoaxed so many times by pranksters claiming to represent the Sirius Cybernetics Corporation (corporate stars of the Hitch-Hikers Guide to the Galaxy). Five times bitten, sixth time shy, as they say.

Rival Hacks were astonished to receive invitations to Practical Computing's annual party. Alas, the mystery was soon resolved when they were all struck down with food poisoning. From his bed in the intensive care unit of the Westminster Hospital, former PC editor turned freelance, Dennis Jarrett told me that he had recognized the sausage rolls from the 1978 do.

Hot & Noisy Fastest selling peripheral of the year will be the new combined speech recognition *and* voice response unit now being developed in the US under conditions of the greatest secrecy. What will it sell for ? Less than $250 – say £140 here! The first dealer to send me a case of Roederer Crystal Brut receives an introduction to the Manufacturers. This offer is also open to those oafs (*oaves, surely ?* –Ed.) on the News Desk.

Desperate Personal Computer World's feeble facsimile of this column, entitled 'Chip Chat' or some such, is so hard pressed for material that Desperate Dave Tebbutt has been reduced to inventing not only stories, but people, "Bumper Harris" being but one. Unfortunately for them, the War Office simply teems with Bumper Harrises. I understand they will take it in turn to sue.

Vegas Villainy The Peppermill coffeeshop, famous for the size of its portions, the multiplicity of its fruit machines and the shortness of the waitresses' skirts, has an admirable custom whereby patrons are invited to submit suggestions for improvements to the service. I am sorry to relate that Julian Allason's proposals for larger portions, more fruit machines and shorter skirts stand every chance of being adopted by the management.

The Commodore Pantomime

reviewed by **Inside Trader**

This year's pantomime, Snow White Meets the Space Invaders had a somewhat shorter run than planned following the indisposition of several leading characters after an unfortunate onstage fracas between Tinkerbelle (Ron Geere) and the Ugly Sisters (Nick Green and Andrew Goltz). Apart from that and the unscheduled disappearance of Merlin (Chuck Peddle) through a trapdoor, the production was a great success.

Kit Spencer as Prince Charming, looked fetching in the tightest of tight tights, although he appeared to be experiencing some difficulty with them by Act III. His romantic love scene with Snow White, a radiant but bemused looking Jessica Allason, was only slightly marred by the unscripted appearance of the Sorceror's Apprentice (Tommy Turnbull) from within Captain Hook's sea chest.

Desperate Dave Tebbutt's rendering of Captain Hook owed, it must be admitted, a great deal to John Cleese. However he reacted most convincingly when bitten by the parrot.

Robin Bradbeer was well cast as Buttons, whilst Jack Tramiel's portrayal of the wicked Witch was masterly. The axe scene was particularly convincing. One must also commend Mathew Wauchope for his spirited attempt to play all Seven Dwarves.

On the debit side, it was a pity that the Little Genii (Jonathan Baldachin) was singed emerging from his magic lamp. It was also clear that, tight-fitting tutu and wand notwithstanding, Keith Hall had been seriously miscast as the Good Fairy. Small children and old ladies in the stalls were shocked by the unmagical language that emerged when the Good Fairy danced into the scenery.

I shall look forward to the next production.

For the Xmas Stocking... ...available now

SPACEMAKER makes room for all those ROM goodies. Allows two Roms to address one Rom socket at the flip of a switch. £22.50 + Vat

KRAM Keyed Random Access Method (as if you didn't know!) for all Pets & CBM disks, 3000 to 8000. ! Now at 1981 price ! £75.00 + Vat

PRONTO-PET the hard/soft reset switch for 3000/4000 Pets. Gets you out of a crash, or clears the Pet for the next job without that nasty off/on power surge. Only £9.99 + Vat

For the New Year... ...pre-release news

SUPERKRAM is KRAM's Big Brother. Even faster & with MULTIPLE keyed access, unlimited open files and commands in Basic. £125.00 + Vat

COMMAND-O is a 4K Rom for the 8032 with all the "Toolkit" commands (improved) + PRINT USING + soft key + program scroll-up + control characters on key & lots more. First deliveries at end of January. £50.00 + Vat

DISK-O-PRO Why throw away your Toolkit? This 4K Rom for the 3016/32 has all the 8000 disk commands and more + PRINT USING + repeat key + soft key + program scroll-up & lots more. Available beginning of January. £50.00 + Vat

We are sole UK Distributors for all these fine products. If your CBM dealer is out of stock, they are available direct from us, by cheque/Access/Barclaycard (UK postage paid).

Calco Software

Lakeside House Kingston Hill Surrey KT27QT
Tel 01-546-7256

FOR COMPUTER AIDED INSTRUCTION

MTC PILOT

A NEW MACHINE CODE PROGRAM FOR THE PET, BEING AN INTERPRETER FOR AN EXTENDED VERSION OF COMMON PILOT.

RUNS ON 16 OR 32K PET, WITH CASSETTE OR COMMODORE DISK DRIVE.

- AUTOMATIC EDITING OF USER INPUT
- SOPHISTICATED 'WINDOW STRING' RESPONSE MATCHING
- FIVE TYPES OF CONDITIONAL EXECUTION
- 'EXECUTE INDIRECT' COMMAND ALLOWS STRING CONCATENATIONS TO BE EXECUTED AS PROGRAM LINES
- 'ESCAPE' AND 'GOTO' OPTIONS ALLOW RUN-TIME MODIFICATION OF PROGRAM EXECUTION
- RANDOM BLOCK ACCESS FLOPPY DISK COMMANDS
- ALL NORMAL PET GRAPHICS, PLUS CURSOR POSITIONING AND DOUBLE DENSITY SET,RESET AND TEST
- ALL BASIC FUNCTIONS, PLUS EXTRA STRING EDITING
- CB2 MUSIC AND SOUND EFFECT GENERATION
- PEEK POKE AND USR COMMANDS
- IMPROVED DOS SUPPORT WITH FULL ERROR TRAPPING -ALL DISK ACCESS FULLY COMPATIBLE WITH MU-PET
- FULL PET SCREEN EDIT, PLUS REPEAT,AUTO,RENUMBER, DELETE,PLIST,UPPER,LOWER, AND BASIC COMMANDS

THE MTC PILOT INTERPRETER,MANUAL,SAMPLE PROGRAMS AND MEMBERSHIP OF THE REGISTERED USERS SCHEME ARE AVAILABLE FOR 65 POUNDS PLUS VAT FROM MITAC PUBLISHING LIMITED,MODERN TUTORIAL COLLEGE, KILBURN LANE,LONDON W10.

FURTHER INFORMATION ON 01-960-5899.

COMPUTERAMA

All we discount is the price!

Computers

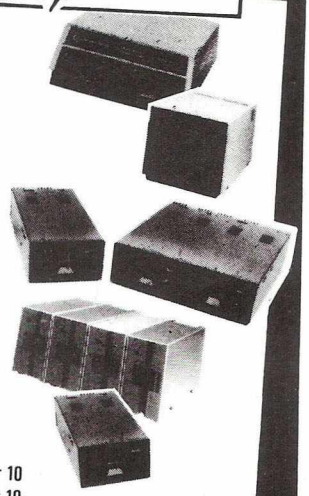
Pet, 40 col, new ROMS green screen, large keyboard	8K	£399
	16K	£499
	32K	£599
Pet, 80 col, new DOS	32K	£840
	64K	POA
TRS-80 system, includes VDU, cassette recorder & P.S.U.	4KLI	£320
	16KLII	£475
TRS-80 CPU, includes UHF TV modulator & P.S.U.	4KLI	£250
	16KLII	£375
TRS-80 expansion interface	32K	£275
Apple II includes BASIC interpreter	16K	£599
	32K	£625
	48K	£649
Colour monitor system		£399
Video Genie includes on-board cassette recorder, output to VDU or UHF TV (TRS-80 BASIC)	16K	£299
Video Genie expansion bus box	S100	£245

Dear Customer,

Our computer products are the best possible value for money. The price you pay is low because we import direct, and sell direct, thus cutting out the retailer. We look after you, our customer with a full year guarantee and after-guarantee servicing. We can give you unbiased advice and take orders with most credit cards over the telephone for despatch the same day. We also do personal financing and company leasing or lease-purchase. You can't get a better deal elsewhere—scan the pages of this magazine and see. Why not order from us now—you'll be glad you did, I promise you.

Alan Brook
Computerama

Disc drives



Pet compatible

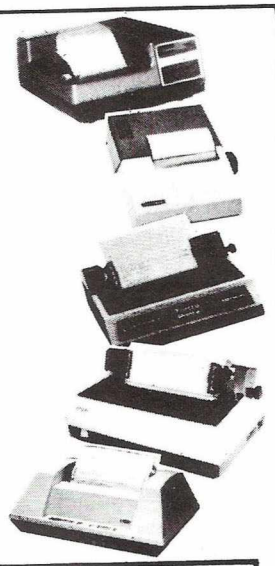
Commodore Dual	£655
Computhink 400K Dual	£595
800K	£795
1.6Mb	£1195

TRS-80 compatible, all with case & P.S.U.

Teac 40 track single	£225
Dual	£399
Quad	£775
77 track single	£325
Dual	£595
Quad	£1155
Shugart SA 400 Single	£229
Apple 11 twin-drive	£456
Controller card	£49

Diskettes 5¼" double sided double density £32 for 10
8½" " " " " £36 for 10

Printers



Electrosensitive Type

Quick Printer II (33 col) (TRS-80, serial & parallel inputs)	£129

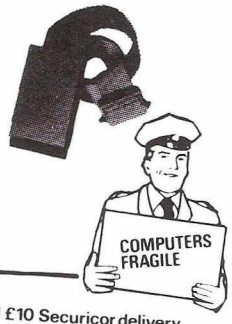
Thermal Type

Phantom 400 (40 col) (with dot graphics)	£229
800 (80 col)	£329

Impact Dot-Matrix

Commodore Tractor 80 col (for Pet) all Pet graphics	£375
Epson Tractor 80 col Pet graphics	£325
Epson Tractor 80 col High Res. graphics	£399
Anadex DP8000	£425
Anadex DP9500	£825
Paper Tiger with 8 char. sizes & High Res. graphics	£595

Interfaces



Pet/TRS-80 to UHF TV	£25
Pet/TRS-80 to RS232 output	£65
Pet to RS232 in/out	£90
Pet to RS232 decoded output	£150
Pet to RS232 decoded in/out	£175
Pet multiplexer for networking up to 20 Pets	£350
Pet/TRS-80 to S100, 4 slot	£112
Pet/TRS-80 to Centronics	£45
Pet to Centronics decoded	£69

Monitors

12"	£69
12" (green screen)	£79

List of programmes available on request.

Cables

Pet/IEEE	£20
IEEE/IEEE	£25
RS232 Plug to socket	£25
RS232 Plug to plug	£25

For others please ring

C12 **Blank Cassettes**
10 for £4
100 for £35

Paper

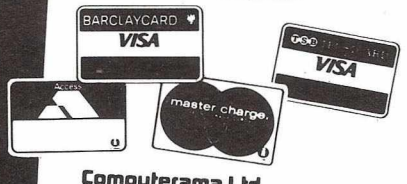
Electrosensitive for QPII	£3.50 per 2 roll pack
Thermal for Phantom 400, TCM 100	£4.10 per 2 roll pack
Phantom 800, TCM 200	£3.90 per roll pack

Impact, single part sprocket punched 9½×11 for Commodore, Epson, Anadex Dolphin & Paper Tiger, fanfold strippable £9.50 per box 2000 sheets

TEL: BATH (0225) 333232

- ☐ Personal credit (same day)
- ☐ Company credit
- ☐ Full year guarantee
- ☐ After-sales service
- ☐ Mail order
- ☐ Export (most countries)

Please add £10 Securicor delivery on computers etc.,
Plus 15% V.A.T. on all prices.



Computerama Ltd.
5 Cleveland Place East,
London Road, Bath, BA1 5DJ

our best advert

is our competition... ask their customers!

FOR TRULY COMPETENT SKILLED SERVICE AND SUPPORT, SPECIALIST DEVICES AND DEPENDABLE ADVICE ON ALL YOUR MICROCOMPUTER REQUIREMENTS

FOR MORE INFORMATION CUT OUT THIS COUPON

I am interested in particular aspects of microcomputing please send me details as new products appear.

Subjects of interest

- ☐ **Pet**
- ☐ **Industrial**
- ☐ **Educational**
- ☐ **Consumables**
- ☐ **Apple**
- ☐ **Commercial**
- ☐ **Service Contracts**

Name _____

Address _____

_____

_____

Please send to **STACK COMPUTER SERVICES LTD**
290-298 Derby Road, Bootle, Liverpool 20.
Telephone 051-933 5511 for all your enquiries.

STACK COMPUTER SERVICES LTD