

Your

# COMMODORE

YOUR BEST INDEPENDENT COMMODORE MAGAZINE

Now Incorporating

**YOUR  
64**

**CREATE YOUR  
OWN NIGHTMARES  
WITH ADVENTURAIID**

**C-16/PLUS-4: SOUND SYNTHESISER**

**C64 WORD PROCESSOR**

With A  
**ROBOTIX**  
TEST





MAY 1986

VOLUME 2  
NUMBER 8

**Editor**

Stuart Cooke

**Assistant Editor**

Maria Curry

**Advertisement Manager**

Mike Ingman

**Advertisement Copy**

Control

Laura Champion

**Group Editor**

Dave Bradshaw

**Group Managing**

**Editor**

Wendy Palmer

**Managing Director**

Peter Mathan

**Origination**

Alamy Typesetting

**Design**

Argus Design

**Editorial & Advertisement Office**

Box 1 Golden Square,  
London W1P 3AT  
Telephone: 01 437 9026  
Telex: 8011856

Four Commodore is a monthly magazine appearing on the first Friday of each month.

Distribution by Argus Press  
Sales & Distribution Ltd, 11-15  
Fleet Street, London EC2A 4JE.  
Printed by Argus Press  
& Sons Ltd, York, Yorkshire,  
York.

Subscriptions rates upon  
application to: Post  
Commodore Subscriptions  
Department, British Post  
House, 179 The Malvern,  
Hemel Hempstead, Herts. HP1  
1BB.

The contents of this publication  
including all articles, designs,  
plans, drawings and programs  
and all copyright and other  
intellectual property rights  
herein belong to Argus  
Specialist Publications Limited.  
All rights reserved by the Law  
of Copyright and other  
intellectual property rights and  
by virtue of international  
copyright conventions are  
expressly reserved to Argus  
Specialist Publications Limited  
and any reproduction requires  
the prior written consent of the  
Company. © 1986 Argus  
Specialist Publications Limited.

## FEATURES

- **Adventure Aid** ..... 12  
Type in Allen Webb's adventure creator.
- **Telephone Exchange** ..... 24  
Part two of our communications program.
- **Basic Training** ..... 34  
Take a productive computer weekend break.
- **Mastertronic - on the Piste** ..... 44  
Budget word processor reviewed.
- **Word Proak** ..... 62  
A CBI word processor for you to type in.
- **Programmer of the Year** ..... 72  
Discover the Arctic wastes with Polar Pete.
- **Laser Show** .....  
Open Laser programs under the microscope.
- **C-16 Assortment** ..... 84  
The best of the rest in the C-16 software market.

## SERIES

- **Programming the C-16** ..... 17  
Musical moments.
- **Froggy** ..... 32  
Arcade games dissected by Daryl Bowers.
- **Welcome to the Machine** ..... 40  
Teach yourself machine code — made easy.
- **Top Draw** ..... 56  
Graphics on your C64.

## REGULARS

- **Data Statements** ..... 4
- **Sprite Mess** ..... 10
- **Game of the Month** ..... 38
- **Action Replay** ..... 48
- **Teacher's Pet** ..... 32
- **Software for Sale** ..... 54
- **Scratch Pad** ..... 61

## COMPETITION

- **US Gold Competition** ..... 8  
Win a copy of Kung Fu Master.

C  
O  
N  
T  
E  
N  
T  
S

# DATA STATEMENTS

## Soft in the Head

The software scene this month is as crowded and diverse as ever.

Plunging straight in at the deep end with the reviews staff we have four new productivity programs from Autodesk, all brought in from across the Atlantic.

PaperClip, HomePak and The Consultant are all from the Canadian software house. Batteries included.

PaperClip is a word processor with a barely number one piece of software in the States. Autodesk describes it as professional and comprehensive and it features full screen editing. It's available on disk and side two contains an enhanced CDS version.

HomePak is a three module package and includes: HomeText a word processor; HomeFind, a data manager; and HomeForm a telecommunication program which communicates with databases and other computers.

The Consultant is a database management system designed to organize, sort and retrieve records, find exact terms and execute a variety of search and analysis procedures.

The final package in the latest batch of launches from Autodesk is called Cut and Paste. It's an easy to use word processor from Electronic Arts and it features include automatic word wrap, dynamic menus and full cut and paste editing.

Autodesk's Ashby Gray said: "Autodesk has taken great care to ensure that these new productivity titles are exactly right for the home and small business user, both in terms of program quality, price and distinctive UK packaging."

Autodesk is also launching new products for the serious user. Two new music systems were due to be launched at the latest Home Exhibition as we went to press. They are a complete Music System including a Commodore 64 for under £300 and a Music Expansion system for under £150.

Starting with the more serious aspects of a Commodore user's life, Mochtar, a Nottingham based software house, is promoting its range of exam revision software as we come around once more



Nick Alexander of High clears up success

to the time of 'D' and 'A' levels. The revision aid programs cover French, German, Spanish and Italian CSE, SE and

A level examinations and concentrate on verbs and vocabulary learning. Prices start at £19.95 and they are all available on the CD.

Now to games. Fans of the Rocky Horror Show who also own a CDS will be pleased to hear that CBI is to bring out an all new version of its Rocky Horror game specially for the 128. Redefined graphics, brand new sprites, new animation and even more locations are promised together with some stunning effects. No price has yet been announced for the game but it should be available in May.

There's also good news from CBI for C-16 and Plus/4 owners. The Binks trilogy is now available on one cassette priced at £9.95. It features the original game, Binks plus Major Bink (Binks 2) and Binks 3 an arcade adventure in which you really penetrate the Binks city and steal their treasure.

Wings has recently launched the official Football Association system game — FA Cup Football. The game is mainly text based and places you in the difficult position of managing your team through all the rounds of the FA Cup.

Tony Williams, author of the League Club Directory, upon whose extensive research the game is based, said: "The FA Cup is football's most exciting competition and this game reflects that excitement. We've had a great deal of fan

putting it together and I'm sure people will have as much fun playing it." It cost £7.99 on the CD.

Imagine has entered the Kung Fu games market with a new release called *Yin An Kung Fu* — a very violent game by the sound of it. Set in Japan, you take the part of Oobong who is attempting to become a Kung Fu grandmaster in order to honour the memory of his late, deceased father. Success depends on mastering the technique of the 16 different kicks and punches. You've got 18 opponents to beat and when you've knocked out Blue, the resident Grandmaster then the title is yours.

There are two interesting CD4 releases from Ocean. *Green Beret*, a contemporary war drama from Konami — makers of some up-and-airs games — is due for release in May at £8.99. There is also to be a computer game based on that good ol' superhero Batman which is scheduled for a May launch and will retail again at £8.99.

For those who would rather have the satisfaction of creating their own programs without a lot of rental, there is a new *Graphic Adventure Creator* for the C64/128 from Incentive Software. It is an adventure generator with a built in graphics editor and Incentive claims that it allows you to produce professional adventures with ease and does not require any knowledge of computer programming. It's due for release on 1 May.

In the shops now should be Miles Power's *Doctor Who* game, which has been in the pipeline for many months. The game contains about 130 screens and has three different tunes to keep you amused while you tackle the problems it represents. One of these is, of course the classic *Doctor Who* theme, the price — £11.99, CD, and look out for the programmable droid cut. The what?

If you want to be king of the grooves, or you just want to find out who about the intricacies of groove culture then *US Gold's Time Tunnel* might be the game for you. You have been chosen as the next groove king but you need to complete the inevitable tasks to prove your worth. An ancient game manuscript has been ripped up and scattered through the ages by an evil octopus — a weird mix of *Scandinavia* and *Garth* folklore! When you've got the seven pieces you can perform the magic spell which will free all the grooves in the forests of *Scandinavia* and allow you to become their supreme leader. It's £8.99 on cassette and £14.99 on CD.

Yet another well known hero has been transferred to the big screen and thence to the computer monitor. This time it's *Bigger and More* and Microsoft has acquired the rights to produce the game of the life of the books. It should be out at the beginning of May so heading air air watch out for it.



Mind Games join the Force



Comic Bakery



Kung Fu

Moving from the air right down to earth into the realms of the ludicrous you come to a new release from Imagine called *Comic Bakery*. You are the baker in charge of your high tech loaf producing plant, and you must stop the scavenging rooibos dogs eating all the loaves. It's in the shops now at £5.99 on cassette.

If you've always wanted to find out what it's like to be one of the boys in blue in a city police force then maybe *Mind Games* latest offering will give you some idea of what it's like. Allegedly produced in consultation with some of "Britain's top policemen" it's a complicated game which requires you to keep law and order without losing your popularity. Impossible! Try it and see. It's £9.99 and patrolling the streets now.

For C-16 owners there is now a version of *Elite's* very popular title *Cometwails*. Originally an arcade coin-up game it has been available for the C64 for some time. Now C-16 users can have a taste of excitement themselves.

## Touch Line

**Abolsoft:** 8 Westminster Palace Gardens, Artillery Row, London SW8T. 01 232 8833.  
**US Gold:** Unit 10, The Parkway Industrial Centre, Hoarage Street, Birmingham. 021 359 8020.

**Elite Systems:** Anchor House, Anchor Road, Aldridge, Malsall W59 8PW. 0992 15812.

**Atial Games Liberty House,** 233 Regent Street, London W1R 7DB. 01 499 0666.

**Imagine:** 6 Central Street, Manchester M2 3PL. 061 834 3935.

**Wave Plans:** Northwood House, North Street, Leeds LS7 2AA. 0532 495680.

**Imaginix:** 54 London Street, Reading, Berks RG1 4BQ. 0734 599876.

**Domus:** As Imagine.

**Vigra:** 21-23 New Yard, Portobello Road, London W11 2JQ. 01 732 8078.

**CR1:** CR1 House, 9 King's Yard, Carpenter's Road, London E15 2HD. 01 551 2916.

**Mindlab:** City House, Maid Marian Way, Nottingham NG1 4BH. 0602 411126.

**Commodore:** 1 Hunter's Road, Welton, Corby, Northants NN17 9GX. 0336 305225.



The Commodore holiday offer

## Generally Speaking

A plug-in adapter to get rid of mains interference is now available from Dorseyco. It fits directly into a standard socket and provides a continuous monitoring of the electrical supply to a plugged-in appliance.

Computers are apt to suffer from voltage surges and the adapter will clean this up so that your printer won't print weird gobbledegook.

It's available from high street shops for £17.95.

Another of the smaller software houses in this country has joined together with one of the big boys to make distribution faster and more reliable.

English Software has signed an agreement with US Gold to make the American firm and sole distributor of English software's new products. If you've ever had any trouble getting hold of the latest English software then perhaps it will be easier from now on.

If you live in London or you come to town to do the occasional bit of shopping or business then you might like to pay a visit to the Commodore centre at Calfour in Tottenham Court Road.

Calfour decided to open the centre to meet a growing demand for Commodore products. Calfour's Sam Telford said: "The Christmas season was very busy this year and our major problems were supply and not demand. Commodore products are of a high standard with a good range and the company is stable, that is why we decided to invest in the centre."

He continued: "We see continued growth is a good feature in the home computer market as long as people put themselves behind the products."

Following last month's review of CR1's new label we now have some more information on the subject. A company spokesman said: "The Wave has been developed for the computer user who has given up the traditional arcade game and adventure game and is looking for a refreshing alternative. We are confident that Nu Wave will make a great impact on the software market in 1986."

There are no Commodore programs available on the Nu Wave label at the moment but look out for it in the near future.

## Hard Lines

Miracle Technology has just launched the new \$4 Multimodem. It gives access to not only Prestel, Microwave, Mirodisk and Teletext services but also to databases, bulletin boards, electronic mail, telex and user-over-communications.

The \$4 Multimodem is a complete data communications — automodem, attached on it has all software on board in ROM. It is micro-driven and multi-speed and supports HOLLT 9600/24 and Bell 103 standards handling baud rates of 300/600, 1200/75 and 75/300. Features include save and print frame, auto mailbox with add and save and software downloading.

The cost of the new modem is £90.90 (GITL, including VAT and UK delivery).

Commodore is running another holiday offer with purchase of new computers. The Commodore 64 computers and the new OS are just two products which come complete with up to £150 off a holiday for two.

The offer is valid on a full range of Commodore peripherals including the \$4 Commodore, Commodore 126, disk drives, monitors and printers.

Each product contains five £50 vouchers which are redeemable against a variety of holiday from leading tour operators from Club 18-30 to CTC cruises.

Commodore's Chris Bailey said: "Our unique holiday offer last year was an enormous success, so 'Passport to Pleasure' is really a variation on a proven theme. Our readers are absolutely delighted and so, we believe, are our customers. It just goes to show what a little imagination and creativity can do in a so-called shopping market."

The vouchers are valid on any holiday taken before the end of October 1985.

## Touch Line

**Miracle Technology:** St Peter's Street, Ipswich IP1 1BS

**CR1:** CR1 House, 9 King's Yard, Carpenter's Road, London E15 2HD. 01 551 2916.

# Your key to communications!



**PRESTEL**

PRESTEL is a trademark of British Telecommunications

FREE Electronic Mail . . . International Telex . . . 10 National Chatlines (Interactive Bulletin Boards) . . . 70,000 users across the UK . . . Teleshopping . . . Multi-User Interactive Strategy Games

Instant computer news . . . Hardware and software reviews . . . Technical features . . . Hints and tips . . . On-line business advice and features

FREE and discounted quality software to download direct to your micro—24 hours a day

300,000 pages of information on the huge Prestel database

for just 20p a day

*Micronet 800—  
The ultimate  
peripheral*

Micronet 800  
8 Herbol Hill, London EC2R 8EJ  
Telephone: 01-278 3143

To: Micronet 800, 8 Herbol Hill, London EC2R 8EJ  
Please send me a brochure on Micronet 800

Name

Address

Telephone No.

Age  Micro

1-100 L.R.

# COMpetition

**This month CRI and Your Commodore offer you the chance to build your own robot in our Berko competition.**

If you used to have a Mexican lit when you were knee high to a grasshopper then you'll probably be very interested in this month's prize. We got together with CRI to offer you, at first price, a Robotic Master Set. You can use it to build your own robots and you can even make them mobile because there are four motors included.

The runner-up prize will be especially attractive to our rapidly growing number of C-16 and Plus/4 readers. There are 25 copies of the Berko Trilogy from CRI.

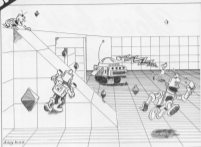
### How to Enter

Study the two cartoons. There are a number of differences between them. Mark the differences which you find on the cartoon attached to the entry coupon. Fill in the coupon clearly and carefully and seal it in an envelope. Write your address on the back of the envelope and send it to: CRI Competition, Your Commodore, No 1 Golden Square, London W1R 3AR. Closing date: Friday 30 May, 1986.

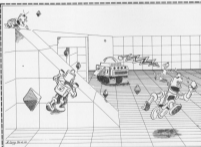
### The Rules

Entries will not be accepted from employees of Argus Specialist Publications, CRI and Alabaster Pastore and Sons. This restriction also applies to employee's families and agents of the company.

The How to Enter section forms part of the rules. The editor's decision is final and no correspondence will be entered into.



1. Day from



2. Day from

### CRI Competition Entry Form

Number of differences found

Name .....

Address .....

.....

.....

post code

Send your entry to: CRI Competition, Your Commodore, No 1 Golden Square, London W1R 3AR. Closing date: Friday 30 May, 1986.

Don't forget to write your entry on the back of your envelope.



# DO YOU WANT TO BE A HERO?



# Biggles

The result of unique co-operation between three ace software developers and the Biggles film production company, Biggles - The Untold Story will knock you right out of the air! It's a multi-part arcade strategy game in which each part must be completed to reach your final goal.

In the air, on the rooftops, on the ground, or in the trenches

## YOU CAN BE A HERO!

Coming in May

Commodore 64  
Spectrum 48K

£9.95 tape, £12.95 disk  
£9.95 tape

Coming in June

Amstrad CPC

£9.95 tape, £14.95 disk

**MICROSOFT**

Purnell Book Centre, Poulton, Bristol BS18 6LQ

# SPRITE IDEAS

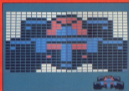
When you are designing a game one of the longest jobs is designing the sprites. If you are good at art then fine, if not your next monster will probably end up looking like a square box with legs.

Now, Your Commodore comes to the rescue once again with Sprite Ideas. If you have designed any sprites for games and you don't mind other people seeing your masterworks then why not send them in now. Each month we will be offering £10 for the best entries.

Your sprites can be anything at all (within reason). If you've designed a series of animated characters then send in the lot. We'd love to have a look at them.

So, next time you are after an Ogerno put in your new game. Have a look in this section of the magazine and you may find just what you are looking for.

This month's sprites are all by Kevin Peppin from Little Neston, South Wirral.



```

100 : ANCRNG 040 : 01871 :
101 0474000,040,040,040,040,040,040,040,040,040
102 0474000,040,040,040,040,040,040,040,040,040
103 0474000,040,040,040,040,040,040,040,040,040
104 0474000,040,040,040,040,040,040,040,040,040
105 0474000,040,040,040,040,040,040,040,040,040
106 0474000,040,040,040,040,040,040,040,040,040
107 0474000,040,040,040,040,040,040,040,040,040
108 0474000,040,040,040,040,040,040,040,040,040
109 : ANCRNG 040 : 01872 :
110 0474000,040,040,040,040,040,040,040,040,040
111 0474000,040,040,040,040,040,040,040,040,040
112 0474000,040,040,040,040,040,040,040,040,040
113 0474000,040,040,040,040,040,040,040,040,040
114 0474000,040,040,040,040,040,040,040,040,040

```

```

115 0474000,040,040,040,040,040,040,040,040,040
116 0474000,040,040,040,040,040,040,040,040,040
117 0474000,040,040,040,040,040,040,040,040,040
118 : 0000
119 0474000,040,040,040,040,040,040,040,040,040
120 0474000,040,040,040,040,040,040,040,040,040
121 0474000,040,040,040,040,040,040,040,040,040
122 0474000,040,040,040,040,040,040,040,040,040
123 0474000,040,040,040,040,040,040,040,040,040
124 0474000,040,040,040,040,040,040,040,040,040
125 0474000,040,040,040,040,040,040,040,040,040
126 0474000,040,040,040,040,040,040,040,040,040
127 : 04001
128 0474000,040,040,040,040,040,040,040,040,040
129 0474000,040,040,040,040,040,040,040,040,040

```

```

130 0474000,040,040,040,040,040,040,040,040,040
131 0474000,040,040,040,040,040,040,040,040,040
132 0474000,040,040,040,040,040,040,040,040,040
133 0474000,040,040,040,040,040,040,040,040,040
134 0474000,040,040,040,040,040,040,040,040,040
135 : 0000
136 : 0000
137 0474000,040,040,040,040,040,040,040,040,040
138 0474000,040,040,040,040,040,040,040,040,040
139 0474000,040,040,040,040,040,040,040,040,040
140 0474000,040,040,040,040,040,040,040,040,040
141 0474000,040,040,040,040,040,040,040,040,040
142 0474000,040,040,040,040,040,040,040,040,040
143 0474000,040,040,040,040,040,040,040,040,040
144 0474000,040,040,040,040,040,040,040,040,040

```











```

1 1=0: 0000 1430
2 1PRINT"SAVE/LOAD": 1=0:
3 1=0:
700 0000 0430PRINT".L. SAVE
8430"
710 11110000 1430
8PRINT".L. LOAD 8430"
720 GET 10=0? 10="M"OR 10="L"
"THEN 700
730 ON VAL(10) GOTO 800,810
800 800
810 800 SAVE DATA
820 800
830 PRINT OBJECT1: 1=0:
1 1=0: 0000 1430
2 1PRINT"SAVE": 1=0: 1=0:
840 800 SAVE TEXT AREA
850 PRINT OBJECT1
1 INPUT ".L. FILE NAME FOR TEXT
AREA?":F1
860 PRINT"CONVERTING TEXT"
870 010 5000 110,10,1,4994,
4110
880 F1=F1+.1"
890 PRINT"SAVING ADDRESS TAB
LE?"
900 010 5000 110,10,1,1100,
1010
910 0010 100
920 800
930 800 LOAD
940 800
950 PRINT OBJECT1:
960 800
970 800 LOAD TEXT AREA
980 800
990 PRINT OBJECT1:"LOAD TEXT
AREA?"
1000 INPUT "CONVERT FILE NAME":
F1
1010 PRINT"LOADING
LOADING TEXT"
1020 010 470,110,10,4994
1030 F1=F1+.1"
1040 PRINT"LOADING ADDRESS
TABLE?"
1050 010 470,110,10,1100
1060 100
1070 800 DEVICE
1080 800
1090 PRINT OBJECT1:"CURRENT
STORAGE DEVICE: 10"00
1100 INPUT"CONVERT OBJECT":O
1110 0010 80
1120 800
1130 800 CHECK UPPER AREA
1140 800
1150 PRINT OBJECT1:
1160 INPUT FILE NAME:F1
1170 PRINT"LOADING
LOADING TEXT TO UPPER ARE
A:1010 470,110,10,1100
1180 F1=F1+.1"
1190 PRINT"LOADING ADDRESS
AND TABLE:1010 470,110,
10,1100
1200 8000PRINT OBJECT1:"TEXT
OF 10 UPPER AREA"
1210 010 470,110,10,1100
1220 PRINT"*****
*****
*****"
1230 0010
1240 GET 10=0? 10="M"OR 10="L"
1250 0000=1:1010 110
1260 0010 80
1270 800
1280 800 INPUT A STRING
1290 800
1300 800**PRINT 80
1310 GET 10=0? 10="M"OR 10="L"
1320 11 10=OBJECT1:1010 110
1330 11 1010 110=1010 110 1010
1340 11 1010 110=1010 110 1010
1350 11 1010 110=1010 110
1360 11 10=OBJECT1:1010 110=
1010 110,1010=11
1370 110
1380 110
1390 110=1010
1400 PRINT OBJECT1:"FREE
MEMORY"1010=1010" 010
11"
1410 PRINT 1010=1010 110
1420 110
1430 110
1440 110
1450 110 SET CURSOR TO 1,1
1460 110
1470 110 1010,1: 1010 1010,1
1480 110=1010 010 4000
1490 110
1500 110
1510 800 *****
1520 800 H TEXT EDITOR 8
1530 800 *****

```



The important features of the example are:

- Line 10 - protects the data base.
- Lines 20-40 - Load the data base.
- Line 50 - Sets up the colours and the location number (X,Y).
- Line 55 - Tells you where you are in, performs LOGO.
- Line 60 - Requests a command
- Line 70 - Checks for an unrecognized command and cleans the command area of the screen prior to requesting a new command.
- Line 80 - Extracts the keywords. Note that the noun number must be decremented to be compatible with the object routine. (Nouns are numbered from 1 to 255 and objects from 0 to 254)
- Line 90 - performs verb

Note how the Take and Drop commands simply change the object position table. Location 1010 is an error flag for the object routine. If it contains 255, then it means that nothing was found (see lines 119 and 120).

I hope this example will show how simple these routines are to use and how compact routines become.

What I've tried to ensure complete compatibility through the three editors, Murphy's law will guarantee that I will have missed something somewhere. To ensure instantly-help work, I remembered the following precautions.

1. Before starting work with an editor and after using another editor: Save your latest database (Reset the machine with 815 64735 Load the machine code 1. Regularly save your data base.
2. Work out what the database will contain before starting work.
3. If you have any queries, study the editors, you should be able to sort them out. If you have any real problems, you can reach me via your Commodore.

```

PROGRAM LISTING 3
10 PRINT OBJECT1:80=0
1000 110
20 1010 110,11 1010 110,11

```

```

PRINT"BLACK?"
30 PRINT OBJECT1:1=1:1=0:8
10000 110=PRINT"OBJECT1
EDITOR"
40 1=1:1=0:10000 110
PRINT". ENTER OBJECT?"

```



Joe Nicholson

continues his series

with a Sound

Synthesizer for the C-16 and Plus/4.

SOME TIME AGO, IN MY ARTICLE on sound, I promised to explain how to simulate the attack, decay, sustain and release functions of a sound synthesizer. At last, tweaked and tuned up to perfection, I proudly present The Sound Synthesizer which incorporates not only these functions, but also a host of other facilities including a second channel, rests, hand-offs, a sound compiler and a waveform editor.

I shall start by explaining the similarities to the PLAY command presented in the article on sound (December 1985). Like the PLAY command it is interrupt driven, meaning that the tune can be playing while the computer is engaged in some other task, playing a game or editing a spreadsheet for instance. It plays the tune by reading along a list of numbers held in memory which contain the pitch and duration of each note, in the sequence that the notes will follow. Commands such as volume, go to channel, return and turn tune off can also be included in the list. Pitch values for a range of musical notes are given in Appendix D of the C-16 User Manual on page 171.

Now for the differences. The main feature is WAVEFORM SOUND. It works by continuously altering the volume of the note once every 1/50th of a second from a list stored in memory. When each new note is played, the synthesizer starts at the beginning of the table setting the volume to the first number. A 1/50th of a second later the synthesizer reads the next byte along the list and adjusts the volume to that number. The process continues for the duration of the note and a new note is played, changing the volume of the note from the very beginning all the way through until it dies away when the process repeats itself. The list

# Programming The C-16

can be stored anywhere in memory, although the table must begin at an address which is a multiple of 256 and must be 256 bytes long.

As the volume is in the range zero to eight, only nine different volume settings are allowed. It is still possible, however, to make a very convincing envelope with attack, decay, sustain and release as shown in the diagram below. The attack part of the waveform covers the rise in volume from zero to peak value. The fall in volume after the peak is called the decay. The mid-range volume is called the sustain level and the final fall in volume from sustain to zero is called the release.

The parameters attack, decay, sustain and release can be applied to any sound. Con-

sider the sound of a piano for instance. When the string is first struck by the hammer, the volume of the note quickly rises to peak level, therefore its attack rate is quite high. The volume then quickly falls to a lower value signifying a high decay rate and then sustains at this level for a while before dying away fairly slowly, which means it has a low release rate. The sound of a clarinet or other woodwind instrument is very different however. In this case the volume of the note rises slowly to peak value meaning it has a low attack rate. The volume then sustains for the remainder of the note and is followed by a rapid release.

The Sound Synthesizer allows more than one waveform to be in memory at the same time and also has the

facility to switch from one waveform to another while the tune is being played thus simulating different instruments. Memory has been set aside for two waveforms, although more can be accommodated by raising the start of the basic area or lowering the top of this area to create extra space for waveform sound (as explained in the September 1985 issue of Your Commodore). Lowering the top of basic by 1K would reserve enough space for four more waveforms. A waveform editor program and a demonstration waveform have also been included.

The other main difference between this program and the PLAY command is the facility to play tunes using both channels. This enables harmonies and backings to be put into the

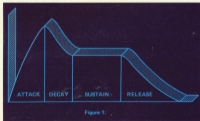


Figure 1:

tune, along with such sounds as hand claps and steam trains if channel two is set to noise! Channel one will set the pace of the tune, with the backing note in channel two being changed at various points along the tune. This will be demonstrated in a tune called Joe's Theme (2) later on.

As well as playing backing notes, channel two can add a chorus effect to the sound. This is done by taking the pitch of the note in channel one and playing exactly the same pitch in channel two but with a small constant value added to the pitch. This has the effect of two notes in 'harmony' by using an effect known as detuning. This effect was used to play God Save the Queen in demo one of my article on graphics modes published in the March 1988 issue. A command to create this effect is provided in the synthesiser. Channel two also has the facility for turning itself off automatically a preset time after it is turned on instead of carrying on indefinitely - useful for hand claps, etc.

The other addition to the PLAY command is the facility for rests and pauses. In the PLAY command all notes tended to merge together and there was no facility for pausing the tune for rests etc. The Synthesiser allows the tune to pause for 1/50th second right up to 20 minutes. It also allows the second (backing) channel to either continue while the first channel pauses or for both channels to be turned off for the duration of the pause with the backing being turned on again after the pause.

## The Synthesiser

The new assembly language is shown in Figure 2. If you wish to type it straight in use my 'C-8 Assembler' published in the June 1988 issue of *8008 Commodore*. To date this is the only text assembler available for the C-8. If you don't have the assembler, the machine code is shown in DATA statements in Figure 3 complete with a suitable loader. The synthesiser code starts at address 4000 (\$4000 hex) and occupies 512 bytes. The start of Basic should therefore be moved up before loading the assembler or the machine code. If the start of Basic is

Figure 2  
PROGRAM SYNTHESIZER

```

00000 1700 SOUND SYNTHESIZER
00010 1701 1700-1000 1000 10000000
00020 1
00030 000 00000
00040 17000 17000 00
00050 100 001
00060 100 100 0000
00070 070 014
00080 100 0010
00090 070 010
00100 100 0010
00110 070 007
00120 100 0000
00130 070 000
00140 070 001
00150 070 001
00160 070 001
00170 070 001
00180 070 001
00190 070 001
00200 070 001
00210 070 001
00220 070 001
00230 070 001
00240 070 001
00250 000 0070
00260 070 0011
00270 100 0010
00280 100 0010
00290 070 0010
00300 070 0010
00310 070 0010
00320 070 0010
00330 070 0010
00340 070 0010
00350 070 0010
00360 070 0010
00370 070 0010
00380 070 0010
00390 070 0010
00400 070 0010
00410 070 0010
00420 070 0010
00430 070 0010
00440 070 0010
00450 070 0010
00460 070 0010
00470 070 0010
00480 070 0010
00490 070 0010
00500 070 0010
00510 070 0010
00520 070 0010
00530 070 0010
00540 070 0010
00550 070 0010
00560 070 0010
00570 070 0010
00580 070 0010
00590 070 0010
00600 070 0010
00610 070 0010
00620 070 0010
00630 070 0010
00640 070 0010
00650 070 0010
00660 070 0010
00670 070 0010
00680 070 0010
00690 070 0010
00700 070 0010
00710 070 0010
00720 070 0010
00730 070 0010
00740 070 0010
00750 070 0010
00760 070 0010
00770 070 0010
00780 070 0010
00790 070 0010
00800 070 0010
00810 070 0010
00820 070 0010
00830 070 0010
00840 070 0010
00850 070 0010
00860 070 0010
00870 070 0010
00880 070 0010
00890 070 0010
00900 070 0010
00910 070 0010
00920 070 0010
00930 070 0010
00940 070 0010
00950 070 0010
00960 070 0010
00970 070 0010
00980 070 0010
00990 070 0010
01000 070 0010
01010 070 0010
01020 070 0010
01030 070 0010
01040 070 0010
01050 070 0010
01060 070 0010
01070 070 0010
01080 070 0010
01090 070 0010
01100 070 0010
01110 070 0010
01120 070 0010
01130 070 0010
01140 070 0010
01150 070 0010
01160 070 0010
01170 070 0010
01180 070 0010
01190 070 0010
01200 070 0010
01210 070 0010
01220 070 0010
01230 070 0010
01240 070 0010
01250 070 0010
01260 070 0010
01270 070 0010
01280 070 0010
01290 070 0010
01300 070 0010
01310 070 0010
01320 070 0010
01330 070 0010
01340 070 0010
01350 070 0010
01360 070 0010
01370 070 0010
01380 070 0010
01390 070 0010
01400 070 0010
01410 070 0010
01420 070 0010
01430 070 0010
01440 070 0010
01450 070 0010
01460 070 0010
01470 070 0010
01480 070 0010
01490 070 0010
01500 070 0010
01510 070 0010
01520 070 0010
01530 070 0010
01540 070 0010
01550 070 0010
01560 070 0010
01570 070 0010
01580 070 0010
01590 070 0010
01600 070 0010
01610 070 0010
01620 070 0010
01630 070 0010
01640 070 0010
01650 070 0010
01660 070 0010
01670 070 0010
01680 070 0010
01690 070 0010
01700 070 0010
01710 070 0010
01720 070 0010
01730 070 0010
01740 070 0010
01750 070 0010
01760 070 0010
01770 070 0010
01780 070 0010
01790 070 0010
01800 070 0010
01810 070 0010
01820 070 0010
01830 070 0010
01840 070 0010
01850 070 0010
01860 070 0010
01870 070 0010
01880 070 0010
01890 070 0010
01900 070 0010
01910 070 0010
01920 070 0010
01930 070 0010
01940 070 0010
01950 070 0010
01960 070 0010
01970 070 0010
01980 070 0010
01990 070 0010
02000 070 0010
02010 070 0010
02020 070 0010
02030 070 0010
02040 070 0010
02050 070 0010
02060 070 0010
02070 070 0010
02080 070 0010
02090 070 0010
02100 070 0010
02110 070 0010
02120 070 0010
02130 070 0010
02140 070 0010
02150 070 0010
02160 070 0010
02170 070 0010
02180 070 0010
02190 070 0010
02200 070 0010
02210 070 0010
02220 070 0010
02230 070 0010
02240 070 0010
02250 070 0010
02260 070 0010
02270 070 0010
02280 070 0010
02290 070 0010
02300 070 0010
02310 070 0010
02320 070 0010
02330 070 0010
02340 070 0010
02350 070 0010
02360 070 0010
02370 070 0010
02380 070 0010
02390 070 0010
02400 070 0010
02410 070 0010
02420 070 0010
02430 070 0010
02440 070 0010
02450 070 0010
02460 070 0010
02470 070 0010
02480 070 0010
02490 070 0010
02500 070 0010
02510 070 0010
02520 070 0010
02530 070 0010
02540 070 0010
02550 070 0010
02560 070 0010
02570 070 0010
02580 070 0010
02590 070 0010
02600 070 0010
02610 070 0010
02620 070 0010
02630 070 0010
02640 070 0010
02650 070 0010
02660 070 0010
02670 070 0010
02680 070 0010
02690 070 0010
02700 070 0010
02710 070 0010
02720 070 0010
02730 070 0010
02740 070 0010
02750 070 0010
02760 070 0010
02770 070 0010
02780 070 0010
02790 070 0010
02800 070 0010
02810 070 0010
02820 070 0010
02830 070 0010
02840 070 0010
02850 070 0010
02860 070 0010
02870 070 0010
02880 070 0010
02890 070 0010
02900 070 0010
02910 070 0010
02920 070 0010
02930 070 0010
02940 070 0010
02950 070 0010
02960 070 0010
02970 070 0010
02980 070 0010
02990 070 0010
03000 070 0010
03010 070 0010
03020 070 0010
03030 070 0010
03040 070 0010
03050 070 0010
03060 070 0010
03070 070 0010
03080 070 0010
03090 070 0010
03100 070 0010
03110 070 0010
03120 070 0010
03130 070 0010
03140 070 0010
03150 070 0010
03160 070 0010
03170 070 0010
03180 070 0010
03190 070 0010
03200 070 0010
03210 070 0010
03220 070 0010
03230 070 0010
03240 070 0010
03250 070 0010
03260 070 0010
03270 070 0010
03280 070 0010
03290 070 0010
03300 070 0010
03310 070 0010
03320 070 0010
03330 070 0010
03340 070 0010
03350 070 0010
03360 070 0010
03370 070 0010
03380 070 0010
03390 070 0010
03400 070 0010
03410 070 0010
03420 070 0010
03430 070 0010
03440 070 0010
03450 070 0010
03460 070 0010
03470 070 0010
03480 070 0010
03490 070 0010
03500 070 0010
03510 070 0010
03520 070 0010
03530 070 0010
03540 070 0010
03550 070 0010
03560 070 0010
03570 070 0010
03580 070 0010
03590 070 0010
03600 070 0010
03610 070 0010
03620 070 0010
03630 070 0010
03640 070 0010
03650 070 0010
03660 070 0010
03670 070 0010
03680 070 0010
03690 070 0010
03700 070 0010
03710 070 0010
03720 070 0010
03730 070 0010
03740 070 0010
03750 070 0010
03760 070 0010
03770 070 0010
03780 070 0010
03790 070 0010
03800 070 0010
03810 070 0010
03820 070 0010
03830 070 0010
03840 070 0010
03850 070 0010
03860 070 0010
03870 070 0010
03880 070 0010
03890 070 0010
03900 070 0010
03910 070 0010
03920 070 0010
03930 070 0010
03940 070 0010
03950 070 0010
03960 070 0010
03970 070 0010
03980 070 0010
03990 070 0010
04000 070 0010
04010 070 0010
04020 070 0010
04030 070 0010
04040 070 0010
04050 070 0010
04060 070 0010
04070 070 0010
04080 070 0010
04090 070 0010
04100 070 0010
04110 070 0010
04120 070 0010
04130 070 0010
04140 070 0010
04150 070 0010
04160 070 0010
04170 070 0010
04180 070 0010
04190 070 0010
04200 070 0010
04210 070 0010
04220 070 0010
04230 070 0010
04240 070 0010
04250 070 0010
04260 070 0010
04270 070 0010
04280 070 0010
04290 070 0010
04300 070 0010
04310 070 0010
04320 070 0010
04330 070 0010
04340 070 0010
04350 070 0010
04360 070 0010
04370 070 0010
04380 070 0010
04390 070 0010
04400 070 0010
04410 070 0010
04420 070 0010
04430 070 0010
04440 070 0010
04450 070 0010
04460 070 0010
04470 070 0010
04480 070 0010
04490 070 0010
04500 070 0010
04510 070 0010
04520 070 0010
04530 070 0010
04540 070 0010
04550 070 0010
04560 070 0010
04570 070 0010
04580 070 0010
04590 070 0010
04600 070 0010
04610 070 0010
04620 070 0010
04630 070 0010
04640 070 0010
04650 070 0010
04660 070 0010
04670 070 0010
04680 070 0010
04690 070 0010
04700 070 0010
04710 070 0010
04720 070 0010
04730 070 0010
04740 070 0010
04750 070 0010
04760 070 0010
04770 070 0010
04780 070 0010
04790 070 0010
04800 070 0010
04810 070 0010
04820 070 0010
04830 070 0010
04840 070 0010
04850 070 0010
04860 070 0010
04870 070 0010
04880 070 0010
04890 070 0010
04900 070 0010
04910 070 0010
04920 070 0010
04930 070 0010
04940 070 0010
04950 070 0010
04960 070 0010
04970 070 0010
04980 070 0010
04990 070 0010
05000 070 0010
05010 070 0010
05020 070 0010
05030 070 0010
05040 070 0010
05050 070 0010
05060 070 0010
05070 070 0010
05080 070 0010
05090 070 0010
05100 070 0010
05110 070 0010
05120 070 0010
05130 070 0010
05140 070 0010
05150 070 0010
05160 070 0010
05170 070 0010
05180 070 0010
05190 070 0010
05200 070 0010
05210 070 0010
05220 070 0010
05230 070 0010
05240 070 0010
05250 070 0010
05260 070 0010
05270 070 0010
05280 070 0010
05290 070 0010
05300 070 0010
05310 070 0010
05320 070 0010
05330 070 0010
05340 070 0010
05350 070 0010
05360 070 0010
05370 070 0010
05380 070 0010
05390 070 0010
05400 070 0010
05410 070 0010
05420 070 0010
05430 070 0010
05440 070 0010
05450 070 0010
05460 070 0010
05470 070 0010
05480 070 0010
05490 070 0010
05500 070 0010
05510 070 0010
05520 070 0010
05530 070 0010
05540 070 0010
05550 070 0010
05560 070 0010
05570 070 0010
05580 070 0010
05590 070 0010
05600 070 0010
05610 070 0010
05620 070 0010
05630 070 0010
05640 070 0010
05650 070 0010
05660 070 0010
05670 070 0010
05680 070 0010
05690 070 0010
05700 070 0010
05710 070 0010
05720 070 0010
05730 070 0010
05740 070 0010
05750 070 0010
05760 070 0010
05770 070 0010
05780 070 0010
05790 070 0010
05800 070 0010
05810 070 0010
05820 070 0010
05830 070 0010
05840 070 0010
05850 070 0010
05860 070 0010
05870 070 0010
05880 070 0010
05890 070 0010
05900 070 0010
05910 070 0010
05920 070 0010
05930 070 0010
05940 070 0010
05950 070 0010
05960 070 0010
05970 070 0010
05980 070 0010
05990 070 0010
06000 070 0010
06010 070 0010
06020 070 0010
06030 070 0010
06040 070 0010
06050 070 0010
06060 070 0010
06070 070 0010
06080 070 0010
06090 070 0010
06100 070 0010
06110 070 0010
06120 070 0010
06130 070 0010
06140 070 0010
06150 070 0010
06160 070 0010
06170 070 0010
06180 070 0010
06190 070 0010
06200 070 0010
06210 070 0010
06220 070 0010
06230 070 0010
06240 070 0010
06250 070 0010
06260 070 0010
06270 070 0010
06280 070 0010
06290 070 0010
06300 070 0010
06310 070 0010
06320 070 0010
06330 070 0010
06340 070 0010
06350 070 0010
06360 070 0010
06370 070 0010
06380 070 0010
06390 070 0010
06400 070 0010
06410 070 0010
06420 070 0010
06430 070 0010
06440 070 0010
06450 070 0010
06460 070 0010
06470 070 0010
06480 070 0010
06490 070 0010
06500 070 0010
06510 070 0010
06520 070 0010
06530 070 0010
06540 070 0010
06550 070 0010
06560 070 0010
06570 070 0010
06580 070 0010
06590 070 0010
06600 070 0010
06610 070 0010
06620 070 0010
06630 070 0010
06640 070 0010
06650 070 0010
06660 070 0010
06670 070 0010
06680 070 0010
06690 070 0010
06700 070 0010
06710 070 0010
06720 070 0010
06730 070 0010
06740 070 0010
06750 070 0010
06760 070 0010
06770 070 0010
06780 070 0010
06790 070 0010
06800 070 0010
06810 070 0010
06820 070 0010
06830 070 0010
06840 070 0010
06850 070 0010
06860 070 0010
06870 070 0010
06880 070 0010
06890 070 0010
06900 070 0010
06910 070 0010
06920 070 0010
06930 070 0010
06940 070 0010
06950 070 0010
06960 070 0010
06970 070 0010
06980 070 0010
06990 070 0010
07000 070 0010
07010 070 0010
07020 070 0010
07030 070 0010
07040 070 0010
07050 070 0010
07060 070 0010
07070 070 0010
07080 070 0010
07090 070 0010
07100 070 0010
07110 070 0010
07120 070 0010
07130 070 0010
07140 070 0010
07150 070 0010
07160 070 0010
07170 070 0010
07180 070 0010
07190 070 0010
07200 070 0010
07210 070 0010
07220 070 0010
07230 070 0010
07240 070 0010
07250 070 0010
07260 070 0010
07270 070 0010
07280 070 0010
07290 070 0010
07300 070 0010
07310 070 0010
07320 070 0010
07330 070 0010
07340 070 0010
07350 070 0010
07360 070 0010
07370 070 0010
07380 070 0010
07390 070 0010
07400 070 0010
07410 070 0010
07420 070 0010
07430 070 0010
07440 070 0010
07450 070 0010
07460 070 0010
07470 070 0010
07480 070 0010
07490 070 0010
07500 070 0010
07510 070 0010
07520 070 0010
07530 070 0010
07540 070 0010
07550 070 0010
07560 070 0010
07570 070 0010
07580 070 0010
07590 070 0010
07600 070 0010
07610 070 0010
07620 070 0010
07630 070 0010
07640 070 0010
07650 070 0010
07660 070 0010
07670 070 0010
07680 070 0010
07690 070 0010
07700 070 0010
07710 070 0010
07720 070 0010
07730 070 0010
07740 070 0010
07750 070 0010
07760 070 00
```











# Evesham Micros

## THE UTILITY SPECIALISTS



### NEW MK. II VERSION

#### THE NEW GENERATION OF BACKUP METHODS IS NOW EVEN BETTER

MORE THAN HALF THE 'TOTAL COST' OF THE LAST VERSION'S GROUP BACKUP LOGS



**Freeze Frame™** is a revolutionary backup system for the IBM PC compatible. Available in the USA, it has already been chosen by over one thousand of America's top business and educational users.

1. **Freezing™** will create a backup of any program in memory or a subdirectory. When the computer and hardware is right you're done.
2. **Freezing™** will do whatever you want. It can backup the entire hard disk or just the programs you want to backup. It can backup, restore, or delete files.
3. **Freezing™** will save a working version of the program to allow you to copy. The computer is left operational in 100% DOS mode.

Order by 10/15

ALL PRICES INCLUDE POSTAGE AND PACKING CHARGES

**THE MOST POWERFUL SYSTEM**

Save up to 50% when you buy the **FREEZE FRAME** MK. II. Includes 2 floppy disks and a manual. **ONLY £29.95**

**THE COMPRESSOR**

Save up to 50% when you buy the **FREEZE FRAME** MK. II. Includes 2 floppy disks and a manual. **ONLY £29.95**

**ONLY £29.95**

Minimum of 2 floppy disks. See our website for more info and upgrade for £14.95

### DISC DIRECTOR V4.0

Now the world's most powerful and most popular backup and restore utility. It's the only backup utility that can backup and restore any file or directory.

- **Backup** - Backup any file or directory.
- **Restore** - Restore any file or directory.
- **Compress** - Compress any file or directory.
- **Uncompress** - Uncompress any file or directory.
- **Verify** - Verify any file or directory.
- **Free Space** - Free up space on your hard disk.
- **Defragment** - Defragment your hard disk.
- **Format** - Format your hard disk.
- **Partition** - Partition your hard disk.
- **Low Level Format** - Low level format your hard disk.
- **Partition Manager** - Manage your partitions.
- **File Manager** - Manage your files.
- **Directory Manager** - Manage your directories.
- **File Transfer** - Transfer files between computers.
- **File Compression** - Compress files.
- **File Encryption** - Encrypt files.
- **File Decryption** - Decrypt files.
- **File Archiving** - Archive files.
- **File Unarchiving** - Unarchive files.
- **File Backup** - Backup files.
- **File Restore** - Restore files.
- **File Delete** - Delete files.
- **File Rename** - Rename files.
- **File Move** - Move files.
- **File Copy** - Copy files.
- **File Paste** - Paste files.
- **File Find** - Find files.
- **File Search** - Search files.
- **File Sort** - Sort files.
- **File Filter** - Filter files.
- **File View** - View files.
- **File Print** - Print files.
- **File Help** - Help files.

**ONLY £29.95**

Includes user manual and 2 floppy disks. See our website for more info and upgrade for £14.95

All programs are IBM PC and DOS compatible.

**QUICKCHK**

Check your hard disk for errors. **ONLY £19.95**

**DOUBLEIT**

Double the space on your hard disk. **ONLY £19.95**

**ALIGNMENT PROBLEM?**

THE PHYSICAL EXAM

Check your hard disk for physical damage. **ONLY £19.95**

**Quickchk+**

Check your hard disk for errors. **ONLY £19.95**

### QUIET DRIVE STOPS

**ONLY £4.95**

### 3M Floppy Disks



**ONLY £19.95**

ALL OFFERS SUBJECT TO AVAILABILITY

All prices include P&P and VAT. Send cheque, Postal Order or Credit Card No. Credit Card orders accepted by phone. Cash on delivery. Wide range of goods stocked. Trade enquiries welcome. European orders send price as advertised. Outside Europe £2.00 for air-mail. Mail order to Evesham Shop please.

**EVESHAM MICROS**  
BRIDGE STREET, EVESHAM,  
WORCESTERSHIRE  
Tel: 0386 41989

**MICRO CENTRE**  
175A PERDWARRE ROAD,  
COTTRESDALE, BIRMINGHAM.  
Tel: 021-458 4964





















Daryl Flowers adds  
birds and flies to the  
hazards which our  
little frog must face.

# FROGGY

AS PROMISED, THIS MONTH'S exciting installment concerns the FLY and BIRD. These two routines are very similar and therefore I will suffice to explain just one in detail. As usual, the first step is to insert calls to the routines in the main loop at the start. Lines 1540 and 1200 do this.

The first two lines check whether the fly has started to move yet. If not (FLYMOV=0) a branch is made to GETFLY, which we will come to later. FLYXO (the fly's X position low byte), is stored in \$090C (0 position of sprite number six), the next nine lines check FLYXHI, the X position's high bit, and either set or reset bits of \$0200 to most significant bit of the sprite's X co-ordinates.

Stored at \$0200 is 198, the fly's Y co-ordinate, which does not alter (our fly hasn't heard of wind currents yet).

The fly has two frames of animation stored at sprite definitions 219 and 220. WINGFLY is a variable which alternates in value between zero and one. Depending on this value either 219 or 220 is stored in \$0270 (sprite definition pointer). Following this, WINGFLY is 'exclusive Or'd' with one to reverse the value.

The next 10 lines are concerned with the fly's movements. FLYDEL, as its name suggests, is a delay counter. When it reaches zero, the fly's speed, FLYSPD, is restored (into FLYPOS) ready for the next time. Here the X co-ordinate is reduced by one. If it is equal to 255 then the fly has either just come on to the screen or gone off it. The high bit of the X co-ordinate is decreased and if the value is not negative then the fly is on the right side of the screen and nothing needs to be done. If, however, it is negative, then the fly has gone off the left side of the screen and so the high bit is increased up to one again, ready for its next appearance, and FLYMOV is reset to zero.

1540	220 FLY	0470	120 FLYPOS
1550	220 BIRD	0100	270 FLYDEL
0020	:	0710	000 FLYXLO
0030	:	0720	120 FLYXHI
0040 FLY	:	0730	000 WFT
0050	:	0740	000 WINGFLY
0060	:	0750	000 FLYXO
0070	120 FLYMOV	0760	120 FLYXHI
0080	000 GETFLY	0770	000 WINGFLY
0090 WINGFLY	120 FLYXLO	0780	120 FLYXHI
00A0	070 \$090C	0790	120 FLYXHI
00B0	120 FLYXHI	0800	120 W
00C0	000 RESETFLY	0810	070 FLYMOV
00D0	120 \$0200	0820 WINGFLY	
00E0	000 AND	0830	070
00F0	070 \$0200	0840	:
0100	000 JMP RESETFLY	0850	:
0110 RESETFLY		0860 GETFLY	
0120	120 \$0200	0870	120 FLYPOS
0130	000 XOR	0880	000 FLYDEL
0140	070 \$0200	0890	000 WINGFLY
0150 WINGFLY		0900	120 FLYPOS
0160	120 \$0200	0910	120 WINGFLY
0170	000 AND	0920	120 W
0180	070 \$0200	0930	070 FLYPOS
0190	000 JMP	0940	070 FLYPOS
0200	120 \$0200	0950 WINGFLY	
0210	070 \$0200	0960	000 W
0220	000 AND	0970	000 WINGFLY
0230	070 \$0200	0980	1
0240	000 JMP	0990	120 W
0250	120 \$0200	1000	070 FLYMOV
0260	000 AND	1010	070
0270	070 \$0200	1020	:
0280	000 JMP	1030	:
0290	120 \$0200	1040	:
0300	070 \$0200	1050	000
0310	000 AND	1060	:
0320	070 \$0200	1070	:
0330	000 JMP	1080	:
0340	120 \$0200	1090	:
0350	070 \$0200	1100	:
0360	000 AND	1110	:
0370	070 \$0200	1120	:
0380	000 JMP	1130	:
0390	120 \$0200		

The latest section is only called if the fly has not yet started to move. FLYPOS contains the position of the current value in the random number table \$RANDOMTAB, and if FLYXHI has reached zero then this value is checked to see if it is positive or negative. A negative number indicates that the end of the table has been reached, and that FLYPOS

needs to be reset to zero, the start of the table. If the value is positive it is checked to see if it is zero or one. If the value is zero, then nothing happens, and we return to the main loop. If the value is one, however, we store a one in FLYMOV to start the fly moving again.

There are few changes to the above routine involved in printing and moving the bird -

BIRD - such as different sprite definitions and speed of movement. By comparing the two it is easy to see how they differ.

To execute the code, follow the same steps as outlined in the last issue. Here I will provide a routine to update the status panel at the bottom of the screen.



9009	L04 8070V1
9099	802 8070D1
9109	L04 8081C
9110	074 8084C
9120	L04 8084C
9130	802 8077B0
9140	L04 8081P
9150	084 8120
9160	074 8081P
9170	08P 8178B0
9180 8077B0	
9190	L04 8081P
9200	480 8200-020
9210	074 8081P
9220 8178B0	
9230	L04 8100

9240	074 8087
9250	L04 8100B0
9260	802 8080B
9270	L04 8221
9280	074 8077
9290	08P 8100
9300 8080	
9310	L04 8222
9320	074 8077
9330 8100	
9340	002 802401
9350	082 80240
9360	020 8220
9370	074 8240C
9380	020 8100B0
9390	074 8100B0
9400	074 8100B0
9410 80240	
9420	002 80240
9430	082 80240B0
9440	L04 8020D
9450	074 8020C
9460	002 8020D
9470	L04 8020D
9480	08P 8487
9490	082 8020B0
9500	002 8020D
9510	L04 8020D
9520	08P 8020D
9530	08P 8020D

9540	074 8020C
9550	082 8020D
9560	L04 80
9570	074 8020C
9580	074
9590	074
9600 8020B0	
9610	074
9620	L04 8020C
9630	082 8020D
9640	082 8020B0
9650	082 8020B0
9660	L04 8020C
9670	L04 8020C, P
9680	08P 8020C
9690	L04 80
9700	074 8020C
9710 8020	
9720	08P 80
9730	082 8020C
9740	074
9750	074
9760	L04 80
9770	074 8020C
9780 8020D	
9790	074
9800	074 8020C
9810	082

COMMODORE 64 • TRANSFER ALL MAJOR TURBOS • AUTOMATIC • NO USER KNOWLEDGE

# LOOK AT DOSOFT'S NEW OFFERINGS AND SEE WHAT'S IN THEM FOR YOU

## MegaTransfer Disk

The complete collection of software for the Commodore 64... **\$17**

## MegaUtility Disk

Advanced collection of utilities... **\$12.95**

The best transfer utility of the lot! Now 64



AND SAVE MONEY TOO!

## Disk to Tape Plus

Advanced collection of software... **\$12.95**

## MegaBpe

Advanced collection of software... **\$9.95**

**DoSoft**  
You'll Do it Better with DoSoft

FAST DISK UTILITIES • LOADERS • 5-MIN DISK COPY • FAST DISK FILE COPY • FAST FORMAT

NO HARDWARE • TURBO EIGHTHIER • AUTO LOADERS

We sent our roving reporter,

Marie Curry, on a

Commodore computer

weekend. Here's her reaction.

AS ONE OF THOSE UNFORTUNATE people whose education was woefully lacking when it comes to the computer revolution, I reached the stage where I began to feel that I should not let the mark of technology just stamp right over me. I then heard about computer weekends run by a company called Ardmore Adventure — better known for its involvement in children's activity camps. I signed up for a weekend at the Crest Hotel in High Wycombe and it was with no small amount of trepidation that I set off to attend on a freezing cold Friday in February.

The actual course begins on Saturday morning, but I decided to go on the Friday in order to get my bearings and to meet some of the people who have the mammoth task of organizing the weekend's events. All the equipment must be set up in advance and, of course, it has to be shipped in since Crest Hotel's arm's normally provided with enough Commodore computers to keep 30 novice enthusiasts happy for 48 hours.

The site of the course is simple: two should attend with the intention of doing exactly as you please as long as it's connected with computers. If you want to tackle advanced machine code programming then there'll be somebody there to help you. Alternatively, if you're completely computer illiterate, like me, then you can start on the absolute basics of basic and work your way up.

The whole weekend package includes accommodation and meals but if you don't want to stay at the hotel and mix with your fellow victims outside of study hours then you can go somewhere else and pay only the tuition fee.

I decided to go for the all-singing, all-dancing, meals and microchips inclusive version — and I wasn't disappointed.

## The Surroundings

I spent a very pleasant two days in the Crest Hotel in High Wycombe. The accommodation was clean and comfortable and the service was fast and efficient, executed with a lavish amount of goodwill. During a suburban February weekend (you remember those!) there wasn't so much as a hint of a draught.

The course was exceedingly hard-worked and after a whole day's brain drain it was nice to know that there was a decent meal waiting and a good night's sleep.

Two sizable rooms had been set aside to accommodate the huge amounts of

# BASIC TRAINING



electronic equipment which had been brought in to cope with the large numbers of 'students' who were attending that weekend. One room was allocated to the under 14s and the other was for the more mature students. By Saturday evening the jumble of wires, polystyrene cardstock and plastic which had infested the room on Friday evening had been transformed into a very sparse looking set-up with Commodore-64s and tide-stopping tables around the walls.

In the lobby outside there was a plentiful supply of tea, coffee, biscuits and orange squash for those who fell by the wayside and had to have a break for re-socialization. There was a morning break for coffee and an afternoon break for tea, just like those long ago plantines at school. These were quite productive in themselves as everybody was able to get to know each other and compare notes.

## The Mentors

You may possibly have heard of Ardmore Adventure before reading this article, since for some time the company has been involved in running children's adventure holidays.

The first computer weekend was held in April 1985 and more have been run at regular intervals since then. Ardmore had realized — through contact with parents — that many adults were uneasy with computers and suffered from that disease which is common among those of us who are no longer teenagers — incholephobia. It must be very frustrating for parents with school age children to realize that there is one homework subject on which they can give absolutely no useful advice at all.

The weekend I attended was graded with its exceptionally gifted Ardmore staff who come from a variety of walks of life and dedicate their weekends to the alleviation of the sufferings of those who are less hi-tech than themselves.

Doug Grogons, who is a teacher by trade, business operations, and he is ably assisted by Eric Doyle — computer journalist, photographer and experienced programmer. Paul and Keith, both college students studying computer related subjects, take the junior class (commonly referred to by Ardmore staff as the advanced group). Benjamin, like myself, an aspiring futurist who's also involved in education in his other life and who claims to be an estate agent from Monday to Friday. As I said, a mixed bunch but a very well chosen and able group of advisors. The course was running at maximum the weekend I attended but no matter how few pupils sign up there will never be less than two staff.

As I mentioned earlier, when the course begins you are told that you can really do as you please. This is the only rule which must be adhered to at all times. With such a diverse mixture of staff available, there is always someone who can advise you on any subject under the Commodore sun. I began on Saturday morning as an absolute beginner and I like to think that by Sunday evening I was no longer exactly that.

## The Enthusiasts

The weekends attract an incredible variety of people and the one which I attended was especially diverse since many of those present had actually won their weekend break in a Commodore



spot the ball competition (yes, people do actually win there).

What I found most surprising was that there were people present who had never even touched a computer in their lives before — even I have a certain amount of hands-on experience.

These particular individuals were usually those who wanted to find out a bit about computers before actually investing their hard earned money in one. It seems to me an eminently sensible idea since if you don't know the difference between hardware and software and you're never more sure a disk drive than the task of choosing and purchasing a computer from the enormous variety at present available on the market is daunting at best and terrifying at worst.

At the other end of the spectrum were those who owned C64s, knew their way around the keyboard fairly well, had a

## The Curriculum

The course has no strictly formal structure. Probably the best way to give you some sort of idea about what is available is if I detail how my teaching was arranged and what I was able to get out of it.

It would be impossible to have an inflexible curriculum since the organisers have no idea what sort of span of abilities they will be dealing with, in terms of micro-knowledge, and everyone turns up on the first day.

The initial task for everyone is to declare themselves an absolute beginner or otherwise. I was the former and so I was treated to a well planned and instructive two hour tutorial on Basic. I was sharing a C64 with a brilliant fellow discotee called Leity and together we managed to progress through our tutorial sheets in leaps and bounds.



grasp of Basic, possibly a smattering of machine code and had come to a sort of hub in their self-teaching programmes, the weekend for those types, regarded by myself as the boiler of the group, provided the consolidation of their knowledge and the pointers they needed to set their lagging ahead eyes free.

I have been involved in the computer industry for some time and the individuality of those I come into contact with has never ceased to amaze me. A policeman, a lady who runs an aquatic garden centre and an animal nutritionist were just three of the people who were thrown together for a weekend with nothing in common but an interest in computers. If you were to deal with the weekend merely in human terms, it provided a chance to associate with some very interesting and intelligent people but of course there was much more to it than that. The most important part is still to come.

These sheets were compiled by Doug Gregory and are concise and very well structured. They deal with Basic in simple steps giving practical exercises for illustration. Fundamentally, the sheets are designed to make you feel at home with the computer and also with very simple Basic. They also serve to enable you to become familiar with the 64 which is very important when so many people feel nervous when confronted with a computer keyboard.

After about 90 minutes my partner and I had managed to write and run a simple maths program for testing arithmetic. When we typed it in and it ran first time we felt like geniuses. The greatest asset of the course is that if you do get stuck then there is always someone within shouting distance who will be at your elbow in a few seconds to sort out your problems. This saves much poking over hot keyboards and much ranting over confused listings.

After a scrumptious lunch we returned for more intellectual stimulus and found that we were about to be introduced to Logo.

Logo is a language which is often used in schools to teach young children the type of logical thought which is necessary when working with computers. Logo is very simple to learn as a concept and I found that I was soon guiding my turtle around the screen and happily entering my own commands. I began to feel very self-confident about using it and for someone who has very little experience it is a useful tool, although after about an hour I began to feel slightly wrongly — that its uses are very limited. My fellow attendees also seemed to be getting the hang of it fairly well, although whether this was due to the graphic human turtle demonstration with which the class kicked off will probably never be known.

When you feel that things were getting perhaps just a little bit tedious, one word would see you whisked away to something different but equally instructive. During the afternoon period my fellow students became re-involved in Basic, learnt the wonders of music programs on the 64 or just had a quick go at impossible Mission for some not so light relief.

While I was becoming interested in Basic and Logo, the two other groups were in session. The children's section of the course was held in a next door room and I presume that it was sound-proofed in some way as hardly a murmur was heard from that vicinity all weekend. Most of the under 16s had a vast amount more experience of computers than their adult counterparts and were perfectly at home with the electronic basics. They too could come and go as they pleased in a certain extent although supervision was such that parents had no worries about the welfare of their offspring.

The advanced group, under the guidance of Iric Doyle, were learning more about machine code and having a look at some more complicated programs. Many of them brought their own programming problems with them and these were dealt with in due course so that they were able to go home at the end of the weekend with the necessary knowledge to continue their machine code masterpieces.

Sunday was not a day of rest. It was dedicated to the teaching — in the beginners group — of the use of Easy Script, Commodore's word processing package. This may sound a little odd, to devote a whole day to the use of a word processor, but I think there was a lot of sense behind this. Many of those present were looking into the possibility of buying a computer to help them with either their own small businesses or merely their domestic administration. Using a word processor shows you very quickly and simply what can be done with very little



Save the Galaxy from the evil Alana  
in

# STARSHIP ANDROMEDA

A Strategic Action Adventure in Metaspaces

NOW  
AVAILABLE  
ON CASSETTE  
FOR YOUR  
C64



**SPECIAL FEATURES** include:

- ★ 12 Arcade and Strategy games in **One Program**
- ★ 10,000 Metaspaces locations
- ★ Superb sound and 3D graphics
- ★ A major battle of wits



**STARSHIP ANDROMEDA** The final frontier in space exploration  
**OUT NOW**

Available from all good software retailers — if it's not there, please order it — or in case of difficulty send your crossed cheque/£10, made out to AmigaSoft U.K. Ltd., including your own name and address, to AmigaSoft U.K. Ltd., 68 Long Acres, London W20E 2JH.  
**STARSHIP ANDROMEDA** C130 disk £12.99 — C64 Cassette £9.99

©1989 AmigaSoft. Prices include P&H. Please allow 20 days for delivery.

amiga



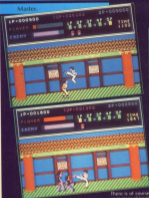
HIGH PERFORMANCE PROGRAMS

Gordon Hamlett has been  
kicking and punching his way  
through US Gold's Kung Fu

Master.

# GAME

of the month



and it requires several blows before you can get his energy level down to zero. If you have killed all the baddies on a particular level and then beaten the guardian, you can reach the next and so on, level to the next level. Beating a level gives you a chance to get your health back, as well as resetting your clock and energy bar.

Points are only awarded if you dispose of your opponent cleanly (i.e. you don't have to struggle to get him off). How much your score depends on how many blows it takes to kill them and what move you used. Punches and flying kicks score more than ordinary kicks.

Your opponents on the second level are of a totally different nature. Falling balls and vases contain snakes and daggos and movie globes explode around you. Falling objects can be destroyed with jumping kicks or you may prefer to run out of the way of the dragon's fiery breath. Snakes can't be killed but must be jumped over. Daggos also appear often, given the chance, like some snake on your back and tap your energy.

The new levels introduce the only other kind of enemy to meet in the game—killer bees. These can be killed with a single kick or punch. The baddies start to appear in combinations now and you will need very fast reactions if you are to succeed.

Kung Fu Master is an addictive, enjoyable game to play. A lot of this is due to the fact that it's easy to get into and I can see it as the sort of game people will load in for a quick half hour of mindless solace. The graphics are colorful although quite chunky. All this to the accompaniment of a relentless tune and good sound effects.

There is, of course a price to be paid for your error of timing. This is in the form of loss of energy. In the top left hand corner of the screen are two bars representing energy levels for you and your adversary. Should your energy drop to zero, you lose one of the three lives.

Each level must be completed within a certain time limit. A clock starts off at two thousand and quickly counts down towards zero. Failure to reach the stairs at the end of the time limit again results in the loss of a life. If you do reach the stairs in time, you receive a bonus based on the amount of time you had left and the amount of energy. Score 40,000 points and you gain an extra life. If you lose a life, you must start that particular level from scratch again but your clock and energy bar are restored to full values.

Most of your opponents on the first level are henchmen who can be easily dispatched with a single kick or punch. Occasionally, you will come across a man throwing knives at you. These you must duck under or jump over and then move in close to dispatch of your enemy, who requires two blows to defeat. First. At the end of each level is a guardian. He may be armed or simply vicious but one thing you can be sure of is that he is tough to beat

SEE ANOTHER PRINCESS IN NEED OF rescue. Using all your Kung Fu skills, you must battle your way through five floors of the wizard's temple in order to rescue her. As it only to be expected, the wizard has arranged a welcoming committee for you to try and ensure that you don't succeed in your quest.

Control of your character is simplicity itself, leaving the joystick buttons alone, you can move left and right, jump and duck. Holding the fire button down puts you into an offensive mode and you can now aim kicks left and right as well as performing a jumping kick and a squaring kick. If you press the space bar this toggles the action between kicking and punching left and right, jumping and squaring punches.

Timing is the essence of successful action. Landing your punch or kick correctly and your opponent will crumple instantly, to the accompanying sound of a very realistic "thwack". But one of the nice things about this game is that you can get away with mistiming a few blows. If that happens, an opponent will attempt to grapple with you. You can break his grasp by wiggling your joystick furiously.

**Listings will be much easier to enter with our new system.**

COMMODEORE LISTINGS ARE RATHER well known for the horrible little black blobs that always abound. Unfortunately the graphics characters which are used to represent graphic and control characters do not reproduce very well and they are also difficult to find on the Commodore keyboard.

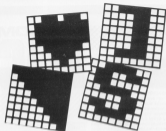
In future all control and graphics commands will be replaced by a mnemonic within square brackets. This mnemonic is not typed out as printed in the magazine but rather the corresponding key or keys on the keyboard are pressed. For example [RIGHT] means press the cursor right key, you do not type in [RIGHT]. All of the keywords, what keys to press and how they are shown on the screen are shown below.

Any character that is accessed by pressing shift and a letter will be printed as [letter].

[SA] shift and A  
[+] shift and +

Any character that is accessed by pressing the Commodore key and a letter will be printed as [Cletter].

[CA] Commodore and A  
[C+] Commodore and +  
[C] Commodore and 1



# LISTINGS

If any character are repeated the mnemonic will be followed by a number. This number is how many times you should enter the character. Any number of spaces over one will also be represented in this form.

[RIGHT10] press cursor right 10 times

[C+10] press Commodore and + 10 times

[SPACE10] Press the space bar 10 times

Any other characters should be easily recognizable for example CTRL-N means press CTRL and N and LEFT-ARROW means press the left arrow.

Any number of mnemonics can be enclosed in brackets for example

[SANSPECIESA10]

means type 10 shift A's 10 spaces and another 10 shift A's.

Mnemonic	Symbol	what to press
[GO/Off]		left/right
[LEFT]		shift left/right
[UP]		Shift & up/down
[DOWN]		up/down
[F1]		F1
[F2]		shift & F1
[F3]		F3
[F4]		shift & F3

Mnemonic	Symbol	what to press
[F5]		F5
[F6]		shift & F5
[F7]		F7
[F8]		shift & F7
[CLEAR]		shift & CLR/HOME
[HOME]		CLR/HOME
[RYSON]		CTRL & S
[RYSOFF]		CTRL & O

Mnemonic	Symbol	what to press
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8

# WELCOME TO THE MACHINE

In part three, Allen Webb adds more to your growing machine code skills.

HELLO AGAIN, READY FOR YOUR NEXT dose of ecstasy? Well, last month's homework was pretty simple, wasn't it?

Question one really followed on from the simple example in the last part. It simply writes CAT in white letters in the top left hand corner of the screen. I won't take much looking, however, for you to notice that it's a rather poorly written routine. By the end of this month's episode you'll be able to write it in a much slicker way.

Listing 1 shows the routine again written using the format of the HYPER Basic assembler (see Your Commodore March issue). Lines 170 to 188 put the "POKE" values of C, A, and T on to the screen. Lines 178 to 200 colour the letters white.

#### Listing 1

```
10 ASSEMBLE 180,1
100 R154 *%C000
110 R154 LDA,5
120 R154 STA %400
130 R154 LDA,1
140 R154 STA %400
150 R154 LDA,20
160 R154 STA %400
170 R154 LDA,1
180 R154 STA %C000
190 R154 STA %C001
200 R154 STA %C001
210 R154 RTS
220 R154 ]
```

Question 2 actually asks you to write a routine. Listing 2 gives one solution. Location 1800 holds a value which is put into the screen colour.

You call the routine with:

```
POKE 1800,COLOR:SYS 49702
```

#### Listing 2

```
10 ASSEMBLE 100,1
100 R0M *%C000
170 R0M LDA 1800
120 R0M STA %C001
130 R0M RTS
140 R0M ]
```

Lastly, question 3 asks you to play games with the border colour. Listing 3 does this. The Y register holds the border colour and is incremented to change the border.

#### Listing 3

```
10 ASSEMBLE 180,1
100 R0M *%C000
170 R0M LDA 12
120 R0M STY %C000
130 R0M STY %C000
140 R0M STY %C000
150 R0M STY %C000
160 R0M STY %C000
170 R0M RTS
180 R0M ]
```

If you try this routine, you will not notice any effect except for the border turning purple. This is simple due to the speed of the routine. If you repeatedly call the routine as with the Basic line:

```
10 SYS 49702:GOTO 10
```

You will see a purple border with intermittent lines.

Again, this is a messy bit of programming. Let us consider a simple loop. In Basic, you loop by testing a variable and branching to a specified line. Machine code uses a similar approach. Consider Listing 4:

#### Listing 4

```
10 ASSEMBLE 180,1
100 R0M *%C000
170 R0M LDA 12
120 R0M LOOP: STY %C001
130 R0M INY
140 R0M CPY 14
150 R0M BNE LOOP
160 R0M RTS
170 R0M ]
```

Line 170 sets the Y register to the initial value. Line 120 sets the border colour. Line 130 increments the Y register and line 140 compares the Y register to four. If the value of the Y register is not equal to four then the code jumps to the label LOOP and continues execution. When the Y register contains four, the routine ends. This is a much better routine than

Listing 3. The instruction CPY 14 assembles to two bytes. The first byte is the code for CPY (ComParE Y), the second byte holds the number of bytes through which the program counter must be adjusted to jump back to the label LOOP (offset). I don't intend to go into how the offset is calculated since most assemblers and disassemblers deal with the problem for you. CPY can be used in three addressing modes:

Absolute, for example CPY %00

Immediate, for example CPY 12

Zero Page, for example CPY \$41

Naturally, there is an equivalent command for the S register:

SPS (ComParE S)

You will still find that the routine is still pretty fast. As is the case with many applications, you may find it necessary to slow down machine code. A crude method is to use the NOP (No Operation) instruction. This instruction does absolutely nothing! Surprisingly enough, it has some uses:

- 1) To deliberately introduce minute delays to fine tune timing.
- 2) To eliminate unnecessary code without reassembling your code.

Persons who write using an assembler based in a machine code monitor will use NOPs often since it's an easy way of leaving space for additions to code. Try inserting a few NOPs in Listing 4 between lines 120 and 130 and see what happens.

Last month I described the simplest addressing modes. Whilst they are invaluable, their versatility is limited. The next mode uses a simple indexing with the X or Y register. Depending on the memory locations position, this acts in either absolute or zero page modes. Here are some examples:

Absolute Y indexing LDA \$100,Y

Zero Page X indexing STA \$00,X

This mode is quite simple to understand. The Y or X register acts as a counter specifying an offset from the specified address. The microprocessor adds the offset to the address and

performs the instruction on the resulting address. Consider the instruction:  
STA 1034, Y

If the Y register contains 8, then the accumulator will be stored in location 1034 (1034+8=1034). If the Y register contains 1, the accumulator will be stored in location 1035 and so on. It therefore follows that we have a simple way of performing actions on a row of locations of up to 256 characters length (Y and X are 8 bit registers - remember!). This can be used to rewrite program one of last month's homework. Consider listing 5:

#### Listing 5

```
10 ASSEMBLE 90,1
90 RIM :=@C000
100 RIM LDY 10
110 RIM LDOP: LDA TABLE, Y
120 RIM STA @4000, Y
130 RIM LDA 11
140 RIM STA @4000, Y
150 RIM INY
160 RIM CPY 10
170 RIM BNE LDOP
180 RIM RTS
190 RIM TABLE: DB 1,2,3,0
200 RIM |
```

Line 90 holds the "POKE" value of CAT in a table of three bytes. We enter the routine with Y containing zero. During the first pass, the accumulator is loaded with the first byte in the table (line 110) and this is put in the top left hand corner (line 120). The colour screen is set to white (lines 130 and 140). The Y register is incremented and loops back to process the second letter, if its value is not equal to three (line 160).

This, I hope you'll agree, is nearer than the original version. Whilst the size is not greatly reduced, once you start writing large routines you'll see the difference.

Before I move on to the next form of addressing, how about a small diversion? It won't take a lot of thought to spot that Listing 5, or something similar, can be used to print blocks of text. There are two ways of printing text:

a) Direct moving of text as in Listing 5, or  
b) Printing it in the same way as printing a string in BASIC.

In the CGA ROMs are two useful routines which can be readily used. First we have a routine starting at location 9F0D. This acts in the same way as PRINT CHR\$(X). To use it you simply load the Accumulator with the character to be printed and call the routine. Rewriting Listing 5, we get:

#### Listing 6

```
10 ASSEMBLE 90,1
90 RIM :=@C000
100 RIM LDA 10
110 RIM LDOP: LDA TABLE, Y
120 RIM :=@F0D
130 RIM INY
140 RIM CPY 10
150 RIM BNE LDOP
160 RIM RTS
170 RIM TABLE: DB CAT
180 RIM |
```

This prints CAT at the current cursor position in the current colour. The text is stored in line 170 as ASCII codes and we don't need to worry about updating the colour matrix. The DB (Dump Subroutine) is the same as GOSUB in Basic.

We can simplify matters further, by using a routine in the Basic ROM at 9A8E. This prints a whole sentence for you. Two requirements must be fulfilled: (i) the sentence must end with a zero byte, (ii) before calling the routine, you must load the Y register with the most significant byte of the start address of the sentence, and the Accumulator with the least significant byte. Do I hear grunts of confusion. OK, here's a quick tutorial. Assume the sentence starts at the address 9C70. This is stored as two bytes, 9C and 70. The high byte, 9C, is called the most significant byte and the low byte, 70, is the least significant byte.

Here is our example again:

#### Listing 7

```
10 ASSEMBLE 90,1
90 RIM :=@C000
100 RIM LDA 10, @: TABLE
110 RIM LDY @: TABLE
120 RIM :=@ 9A8E
130 RIM RTS
140 RIM MESSAGE: DB CAT
150 RIM 0:0
```

Lines 100 and 110 take care of loading the message start address. @: means the least significant byte and @: the most significant byte. Line 120 holds the terminating zero byte. (By writing it and see what happens!)

We now have a very short, but rather slow, routine. It's slow because it uses the rather lengthy print routine in ROM, if you want to write an adventure, see the approach used in Listing 5. If you want to write a fast game with Baker-free graphics

changes, direct data movement will be necessary.

The main drawback with simple indexing is that you specify the start address in the object code and this can only be changed by directly altering the object code when the code is running. In otherwords, like writing a Basic program while it's running. Whilst this is a perfectly acceptable technique, I'm not that keen on it. A better approach is to use an alternative indexed mode called Post-Indexed Indirect Addressing. This is rather a grand name for a fairly simple idea. In simple indexed addressing, you will recall that we specified the address concerned in the instructions, eg:

```
LDA @1000
```

In Post-Indexed Indirect Addressing, we store the address in a zero page location and specify that address in the instructions. Note that we use brackets to signify this mode:

```
LDA (@R1)
```

The action of this instruction is to add the offset kept in the Y register to the address stored in the byte pair @R1 and load the accumulator with the contents of the resulting address. The address is stored with the low byte first as usual. Here is an example:

The equivalent instructions are:

```
LDA @C000, Y and
LDA @R0
STA @R0
LDA @C0
STA @C
LDA @R1, Y
```

If Y contains five, the instruction adds five to the address in @R0, @C giving @C05. The accumulator is then loaded with the contents of @C05.

Consider:

#### Listing 7

```
10 ASSEMBLE 90,1
90 RIM :=@C000
100 RIM LDA @: TABLE
110 RIM STA @R0
120 RIM LDA @: TABLE
130 RIM STA @C
140 RIM LDY 10
150 RIM LDOP: LDA (@R1), Y
160 RIM :=@ F0D
170 RIM INY
180 RIM CPY 11
190 RIM BNE LDOP
200 RIM RTS
210 RIM TABLE: DB CAT
```

Compare this to Listing 5. Lines 156 to 218 correspond exactly to lines 100 to 198 in Listing 5 (except for the different addressing of course). Lines 198 to 218 put the start address of the message into the zero page locations \$F8 and \$FC.

While this routine is more complex than the earlier versions, it has one powerful virtue - it is easier to change the

address processed. You should also notice that this addressing mode uses the Y register only.

I'm sorry that this may appear a little complex, things should be clearer as we deal with further examples in later parts of the series. Here is a summary of the addressing modes described this time.

OK, again time. Two problems for you to consider.

1. Write a routine which draws a line of stars along the top of the screen.
2. Write a routine which puts the character set on the screen.

Next month I'll deal with one more addressing mode and we'll move on to more on looping and other mysteries.

	ABSOLUTELY	ABSOLUTE	ZERO PAGE	ZERO PAGE	INDY
LDX	*		*		*
STA	*	*	*		*
LDD	*		*	*	
STX			*	*	
LDP		*	*		
STY			*		

**WELCOME TO THE  
MACHINE**

For help with Reading and Writing

**01-405 4017**



Since 1975, 350,000  
adults have been helped  
to read and write better.  
If you want help look for  
this sign.

For further information  
Adult Literacy & Basic Skills Unit  
PO Box 213 London WC1V 7ET



# THE FINAL CARTRIDGE

## THE FIRST OUTSIDE OPERATING SYSTEM FOR THE CBM 64\*



**NEW FINAL CARTRIDGE INCLUDING FREEZER**



**£45**

This new operating system built in a cartridge does not use any memory and is always there. Compatible with 98% of all programs.

**DISK TURBO** - 8 times faster loading & 5 times faster saving.

**TAPE TURBO** - 10 times faster even with 800 - normal Commodore commands - compatible with standard buffers.

**ADVANCED CENTRICE INTERFACE** - compatible with all the best known Commodore printers and Commodore printer programs. Prints all the Commodore graphics and colour codes transparent for linkups.

**SCREEN DUMP FACILITIES** - of 16 rows 40 cols and multipoint screenlink. Prints full page with 12 shades of grey for multicolour pictures direct from games and programs like 800cols. Modes and Printing etc. Searching is automatic for the memory address of the Picture. Special version available for the CBM 801 and 803 printers.

**DISK EXTRA RAM FOR BASIC PROGRAMS AVAILABLE.** Ten new commands "Memory read", "Memory write". They move 128 bytes with maximum language speed anywhere in the 64K. None of the CBM 64 can be used with strings and videofiles.

**BASIC 4.0 COMMANDS** - the Direct, Delete, Delpend, Catalog, etc.

**BASIC TOOLKIT** - with Auto, Return, Print, Goto and Control, Find, Help, Del, etc.



Original multicolour full page screen dump print out.

**PROGRAMMER FUNCTION KEYS** - Run, Load, Save, Catalog, Disk commands. List (removes all line protections).

**BEYOND EXTRA** - Allows you to quote part of a line, skip and continue typing, move cursor to lower left-hand corner. Fakes and Scrolls in New Typ command operate your printer as a typewriter.

**COMFORTABLE EXTENDED 80 MONITOR** - with coloured font printing on and down. Background, etc. - does not reside in memory.

**RESET SWITCH** - ready to monitor resets with and down. Background resets every protected program.

**ON/OFF SWITCH** - we hope you never need that one.

### **FREEZER:**

Stops and continues within every program and allows you to make a total back up to disk or tape automatically.

**Spans:** Creates one file on disk or tape. Prints the program. Restores 4 to 8 times faster than dedicated freezers.

Many drivers. Freezer options include full page printing, fore- and background colour changes, reverse printing, jumps to monitor or reset.

Timing mode. Info update collision detection.

14 Days money back guarantee if you are dissatisfied.

12 Months replacement guarantee.

**H.P. COMPUTERS**

Special and reserved colour RGB graphics. © H.P. Computers Ltd. 1985. All rights reserved. Price £45.00 + p.p. + postage.

**U.K. ORDERS** available by the well-known Commodore's Dealers or directly from:  
H.P. Computers  
8 Woodhouse Park  
Wilton House CMR 2 SE England 6.  
Telephone 0326 - 81 14 71.

\* works with C128 in the 64 mode.

Stuart Cooke risks life

and limb reviewing

Mastertronic's Ski

Writer.

# MASTERTRONIC

ON ■ THE ■ PISTE?

Mastertronic is extremely well known for production of out price software. Not a week goes by without a large number of Mastertronic's releases being quite high in the software charts. Well, Mastertronic is about to do it again with a range of out price application software.

The first venture into this market is the launch of Ski Writer. This is a wordprocessor that has been available in the good old US of A for quite a while and has received a large amount of good publicity because of its ease of use. The price for this package even here is a meagre £14.95.

So what does Ski Writer offer? Well it's a full implementation of a wordprocessor with enough features to suit most people, there are however a few times missing that would have made the package experts, but more of this later.

## Documentation

The manual for this package could almost be described as non-existent. It consists of three pages of very small printed instructions, the aim of which is simply to tell you how to load the package and what keys do what.

Mastertronic says the reason for the lack of documentation is that the package is so easy to use that a manual is not necessary. After using the package for some while I'm afraid that I must agree with them.

## In Use

Upon loading the program you are presented with the programs main menu. From here you can select file, this allows you to enter and alter text. Preview allows you to see how your text is going to look on printed paper before you attempt to print. Print will allow

you to check dot lines — more about that later — change the printer type, change paper type and print your documents. File gives you all of the file manipulation commands such as LOAD, SAVE and MERGE together with a few disk commands such as FORMAT. Facilities to use disk or tape for your documents is included.

One of the main reasons for the ease of use of this program is the very comprehensive help function. Whatever you are in you mode help can be obtained on almost all the following subjects:

- New Users
- Typing/editing
- Formatting
- Previewing
- Printing
- Cursor/line
- Dot line

All subjects are covered in quite clear detail so if you have any confusion about a subject then one of the help files should make things clear.

## Dot lines

Dot lines allow you to alter the layout of your finished document. A dot line is entered by placing a dot '.' followed by a one letter command and a number. Obviously it is very difficult to create a one letter letter command so if you select the file menu followed by the format menu all of the available commands will be displayed and you can select the one that you require using the cursor keys. One important thing worth noting is that all the available functions are listed at the bottom of the screen. For

example, when editing text the bottom of the screen reads: F1 HELP, F3 Edit Menu, STOP Main Menu.

Selecting one of these will move you on to another sub menu. For example pressing F3 will display the following: Find, Replace, Format, Mark Copy and Cut.

As you can see everything is always easy to find and you don't have to remember a lot of functions. Anyway, back to the dot commands.

The dot commands available allow you to set up the following:

- The line spacing
- Left and right margins
- Top and bottom margins
- Start page number and page numbering at the top of a page
- Insert comments into your text
- Justify the text

As you can see there are quite a number of formatting options open to you. There are however a few more commands. These are obtained by holding down combinations of keys and you can't get them from any menu. This means that the ones you do not use often are likely to be forgotten.

Don't despair however as they are all documented in the help section. Some of the other commands available include underline and delete functions. Delete takes some time to get used to as it differs from the usual delete on the Ctr. The DEL key instead of deleting to the left of the cursor deletes the character under the cursor and moves the one to the right to that position. If you want to delete in the normal way, as you would when typing a line in Basic, you have to use the left

arrow key. This leads to total confusion and you usually end up deleting the wrong piece of text. Why couldn't delete have been kept as it normally is?

## Omissions

If you intend to use a Microcomputer for serious work then there are a couple of serious omissions, one of these is the provision of headers and footers. If you are given the task of writing a certain number of words, as you would when writing a magazine article then you need a word count. If one isn't present then you have to resort to counting them by hand, not a fun job. Headers and footers are necessary on many documents for example you may need to put your name, the name of the document and the page number on top of each page on a college report, with Ski Writer this cannot be done.

## Verdict

Despite a small number of features you can't really knock Ski Writer at a price of £14.95 is an excellent buy. Not only is it adequate for most tasks it is also very easy to use, this is very important.

If you are looking for your first word processor or one that is easy to use you won't go wrong with Ski Writer.

## Touchline

244 Writer  
Mastertronic  
£14.95

# KILLER GAME

# LIFE AFTER DEATH



Makes the impossible possible

Get to any level and Never get killed

Walk through gunfire without a scratch

ONLY  
**£14.95**

- Q. What is Game Killer?
- A. A revolutionary powerful cartridge that now lets you play all these impossible games without being killed. Walk fearlessly through gunfire, disaster and danger without a scratch.
- Q. Sounds difficult.
- A. It's simple. And plug it in the back of your computer and press a button.
- Q. You mean I can play my games all the way to the end.
- A. I don't believe it.
- A. Yes - incredible but true! It works on all these thousands of games with sprite collision.
- Q. Sounds like science fiction! I suppose it's available in 2001.
- A. It's here now!
- Q. I'll believe it when I see it!
- A. Exactly, so why don't you go to your local computer shop.

The Robtek Commodore is available from all good computer dealers.  
Enquiries to Robtek (formerly known as Robcom) Ltd,  
34 Market Place, Fallowfield Way, London NW11 6SP  
Telephone 01-229 0118

Patent and copyright applied for

**COMMODORE**  
**64/128K**  
SOUND CARD  
STANDARD 1541  
DISK DRIVE

Please send me  
I enclose Cheque/PS for £  
My Name is \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_

# ROBTEK

## Mercenary

Navigator: C&A (3.5) (see, 172.95) (64)



### YOUR SPACECRAFT HAS BEEN

forced to crash land on the planet Tang. Unfortunately you soon find out that the inhabitants of the planet, the Polyars and the Mechanoids, aren't as well matched as you are on your own, apart from your brainy computer, whatever you do from now on is your chance, though if you are lucky your computer may advise you.

The main aim of the game is to get yourself enough money and experience to get another spaceship and off the planet. Mind you if you were feeling up to it you could help one of the warring factions out and earn some money as a mercenary. In fact when you start you are given the option of spending some of the money that you have in your possession on a crash that belongs to a player, thus even offer you the

opportunity of some work. Of course it is up to you if you buy the crash or not but it is a very long walk around the planet if you don't.

Most of the action in this strange combination of adventure program and flight simulator, takes place over a very large 3D landscape. Buildings, bridges and other such are all extremely well defined using vector graphics, as stand on the arcade battle room game.

If you accept the Polyar's offer of employment as a mercenary, you must find your way to their briefing room, you are given the location so you should not have too many problems getting there. Did I say no problems? It took me quite a few hours and many games to find the lift that would take me

down into the Polyar complexes.

The flight simulation element of the game comes into play once you are in the ship. The flight simulation is not exactly difficult, you only have a speed indicator, altimeter and compass, but it is great fun especially if you fly close to the ground as you can see the 3D buildings getting larger as they come towards you.

Not all of the action for this game takes place on the surface of the planet, however, when in the city is a bit that will take you down into an underground complex. This section of the game offers nothing really thrilling, in fact it is really just an extension of the old 3D maze type games. There is careful exploration of this extension to the city is vital as you will find many useful items scattered around in the many underground rooms, including some cross hairs that can be added to your craft to help you shoot down enemy craft.

Not only will you come across objects that will help you but you'll also find a great number of puzzles. Locked doors stop you from getting around the complex too easily, you'll need to find a key to get through them. To make matters more worse there are rooms which will move you back upstairs around the complex, this really helps in getting you lost.

As previously mentioned

you are the one that controls the action. If you want to go around checking things up there that's up to you. However, don't be surprised if you find yourself being blown out of the air by enemy gun ships.

Mercenary is certainly a strange game to play as there are no set rules, some people may like this but if you are just after a good shoot 'em up then you probably won't. It is possible to spend quite a lot of time feeling that you are getting nowhere, but exploration is important and it is worth mopping up as much of the city and the underground complex as possible, this will make it a lot easier to find your way around in a hurry, or even your way out of the complex and back to your ship. As mentioned, it's very easy to get lost and you can spend hours just going backwards and forwards in your search for the exit.

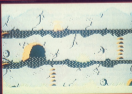
Mercenary is an extremely time consuming game and isn't one that you will load up for a quick five minutes. There is however a save game option so you don't have to worry about getting killed. If you do get killed you will load yourself by a new ship anyway.

If you are looking for a challenge and something to keep you occupied for a number of hours then take a look at Mercenary, it's great fun.

6.C.

## Time Tunnel

3.5 Gold (3.5) ( joystick required)



The Grand KING R. LION...  
ing for a success. In order to

prove yourself worthy, you must travel through space time

zones, finding a page of manuscript in each. If you can decipher the final message you will be able to set free many golden spirits and be elected King.

Starting off in the game mansion, you soon discover how to select a time zone and operate the time machine that will transport you to the year of your choice. Amongst your options are the more advanced Great, the California gold rush and an irregular time machine.

You can only hold one object at a time but can access a storehouse which will hold up to four items. Pressing the fire button performs various

actions according to a list of priorities. It may operate a mechanism e.g. open a door, drop something, pick up an object or fire a lightning bolt.

You can always return from a time zone to the mansion but sometimes time holes appear that transport you to another year. This will generally be useful, though, and you will probably be able to find something in the new zone to help you in the old one.

Time Tunnel is an enjoyable arcade adventure. The graphics are pleasant and there are some jolly tunes and enough puzzles to keep you quiet for a reasonable length of time.

C.B.H.

## Captain Kidd Bug-Byte \$2.95



THIS IS A VERY SIMPLE AND quite addictive little arcade game which bears a slight resemblance to Pac-Man.

You control a little character called Captain Kidd (in reality he's just a head who roams around the board, I don't know what happened to his body!). This poor little disembodied creature slashes around devouring bombs to stop himself getting blown to kingdom come.

There are all of course advantages to avoid and in this particular game they take the form of bombs which are costly and willing to stomp on you at any given moment. At first they're not too difficult to avoid but as you reach the higher levels they multiply drastically as do the bombs. There are also numerous

squares on the board which are marked with a skull and crossbones and if you touch these then you die (or're instantly annu'd).

All the screens are identical except that you get a different background colour each time and of course more skulls and more bombs. There are also lots of little marker flags which can gain you extra points.

It's a very simple and a very old idea. You're probably got a lot of games like it at home. Having said that, I don't think you'll be wasting your money and you get a nice little reminder of The Entertainer in the background.

M.C.

## Ace Cascade £16.95 Plus 4



THE PLANE'S PILOTS SUFFER FROM A severe lack of commercial skill. ACE finds you in control of

an Allied jet, your mission is to stop the advance of enemy units.

Ground forces consist of mobile batteries and helicopters. These are graphically very good, all objects getting larger as you fly past them and the helicopters complete with moving rotors.

In the air you will have to avoid the numerous enemy planes that always seem to come at you from behind, thank goodness you've got a rear view camera. Once you've destroyed all of these then it's on to the ships. You aim and the retreating force.

Obviously all this flying around and being shot at is

going to leave your plane in need of repairs. No problem here, simply call up the map, find your nearest base, and land on the runway. If you're really lucky then you'll find a refuelling plane in your area, catch this up and you can even return in flight.

As previously mentioned this game has some very realistic graphics. If you are slow enough to fly low you will see the hills and even the trees as they whiz beneath your plane.

ACE is a game that no Plus-1 owner should be without, it will keep you occupied for hours.

S.C.

## The Great Game in Wordzler US Gold — \$16.95 — £14.95 plus only



THE FAMOUS MR. PLOT CHANGE, mission to save his friend after. The Great Game is a

the main ingredients in the Swedish chef's soup as you. It's probably an idea to include a warning with this adventure: it's a check-a-block with the most appalling puns in true Maggot style.

It's a joystick operated text adventure in which Gamez is given a series of options in choosing a vehicle for the particular terrain in which he finds himself. You can have a rolling lawn blower, a diving light maker or even a walking bumper. There are several options and you read instructions that you park the correct one for your present location.

The locations have chicken flavoured names, for instance,

the Eggplant Ocean, New York City and the Egg-plant Desert.

You need to amass a minimum of 75 points to reach the castle where Gamez is being held captive. You score points for successfully negotiating hazards and also for conquering the foes you meet on the way, like sharks, eagles and even wild goats.

Some of the screens involve dodging flying birds and locating eggs while others are maze-type settings. It's very entertaining and the instruction booklet also contains a Maggot story. Evidently what the doctor ordered!

M.C.





## Desert Fox US Gold 19/10



EVER SO OFTEN A GAME appears that first impressions would leave you to think that it was a load of rubbish, the only thing is that a few hours later you find yourself still playing it and going back to play it time and time again. Desert Fox from US Gold is one of those games.

Desert Fox is a combination of both arcade and strategy games. You play the part of the Allied forces and must save all your depots before they are taken over by Rooster's army. Save one depot and the game is over.

Upon loading you are greeted with a map of the area in operation, depending on the level of play a varying number of flags are present, these represent the bases that you must rescue from the clutches of the evil Rooster. A number

of icons - small pictures - represent the options that are available to you.

Selecting the **Zoom** icon allows you to find out information on a selected base. The information given is: the number of enemy tanks present, the number of your tanks present, how much fuel and supplies are there and, perhaps the most important, the number of hours before the depot is lost to you. The number of hours of freedom remaining for the selected car is also shown on an indicator at the bottom of the screen, this gives you an indication of just how long you have got to get there and rescue your troops.

The **Radio** icon turns on your tank's radio, this can be directed where you want, pressing the fire button gives you a surprisingly easy to

understand radio message about what lies in this direction.

The more you will rescue your tank, known as **Low Walk**, in the direction that the radio becomes losing. Careful use of this icon together with the radio icon will allow you to travel around the map avoiding the enemy as much as possible.

If you are unlucky enough to fall for one of the enemy's little traps then you will enter the arcade sequence of the game. In all of the sequences the graphics and sound can only be described as adequate but are fairly realistic and surprisingly quick.

If you meet up with a convoy you have to protect it from enemy planes that are trying to blow it up. Your job, shoot down the planes, avoid the allied ones as you will lose points. The more hours for your own rights, automatically more is the position of any planes, simply move the joystick left or right to fire the gun.

Upper levels you under attack from enemy tanks, you can spot them on your radar and fire three missiles remaining towards you. With careful aim you can shoot the enemy shells, if you shoot the tank then their shells disappear as well. Four missiles can be guided so even if the tank is moving you stand a good chance of following him to pieces, not before he has had a good go at you, though. Each hit by the enemy will cause

some damage to your tank, this can be repaired at one of the depots.

In case of you suddenly find your tank completely surrounded by enemy. Your aim is to get out of there alive. You can shoot mines that are in front of you so this helps to clear a path. If you die in a mine then of course you are demerced and you also get stuck in the sand waiting valuable time.

Although a reminiscent of the screen in the Star Wars arcade game, the bit where you are firing down canyon being shot at from the sides. How your tank is going through a canyon, the enemy has gun emplacement on both left and right. You must destroy them before they pass your tank, if you don't then you will suffer damage.

In **Snake Lane Hell** is being attacked by enemy fighters. The section of the game is very similar to the Tiger tank section, shoot the enemy with your guided missiles before they hit you.

Desert Fox offers enough variation throughout its play to keep you interested for a long time. The different levels offer such a varying degree of competition that you start to take the attitude that as soon as one level is finished you must have a crack at the next one. If you're after a good shoot then up there have a good Desert Fox.

G.C.

## Cosmic Bakery

Imaginix LTD joystick required



**BREAD FOR THE ARCADE** Bakery sees you playing the game from Konami, Cosmic part of a Bakery trying to bake

and deliver as many loaves as possible between the hours of nine a.m. and five p.m. As the factory is automated, it ought to be easy but you are hampered in your work by some pesky raccoons.

There are three switches on your conveyor belt which the raccoons delight in turning off. Fortunately, you have a man gun with which you can put them to sleep for a few seconds and kick them out all the way. If you touch them when they are not stunned, you lose one of your three lives. Another raccoon lives above the conveyor belt, making loaves can be stannied by hopping up and being.

A radar at the top of the screen keeps you informed of what's going on. You must also keep your eye on the number of shots you have left although you do regain them in time. Points are scored for stanning and kicking raccoons and switching the machines back on. At the end of the day, you get a bonus for each loaf baked and progress to the next level although there is no increase in difficulty.

The graphics are bright and colourful and the music and sound effects are excellent but the game is far too easy to play and lacks any lasting appeal.

G.C.M.



## Zoids

March 17/95



THE PLANET ZOIDNEAR lies millions of light years from earth. Here the Zoidians manufactured their war machines the Zoids, and the story goes on.

Now there are two types of Zoids, red ones and blue ones. You play the part of Earthman, a man from no games where, who is going to merge mind with the blue zoids (ultimate weapons, Zoidzilla, and take on the evil red zoids from within their own complex).

However, as you descend into the heart of their city your craft is blown up and you see Zoidzilla disperse across the landscape.

Red Patrols find these pieces of Zoidzilla and carry them off to sight of their city domes. Your task now is to find the eight pieces and then destroy the red army.

Of course, as with all good stories, you manage to escape from your ship's destruction with a very special piece of equipment, Tank Zoid (what really exciting name!), you merge minds with it and you become as one.

All of the action in Zoids takes place within the area surrounding the Red Zoids' cities. Your position within this city is depicted upon a small map of the area around your tank, in the middle of your screen. You don't see anything as it really is as you are seeing everything through the eyes of Tank Zoid. If you ask me this is a very good excuse for making what could have been very interesting graphics appear on the screen as simple blocks of colour. Yes, you get used to it, you're blue and the enemy's red.

Around the map you will find a number of icons. These show all of the equipment available to you and its status. Above the map is your gauge, below is that of the tank. Careful monitoring of these will show you what state both are in.

Next you have the Mode or Weapon icons. The Railgun propels electromagnetic pulses at your enemy. You can fire normal missiles and attempt to jam the enemy's signals.

Lastly you have information about your zoid, damage reports and that sort of thing.

Moving your pointer over the map allows you to specify a direction in which you want your Tank Zoid to move. It will continue moving in the specified direction until it can go no further. This allows you to watch the map for lurking Red Zoids as they are bound to take a few pot shots at you as you drive past.

Combat in Zoids is a little strange and not that exciting. If you are using the railgun you are presented with a diamond shaped sight, you have to centre the enemy, represented by another diamond, in your sights and fire. This may sound graphically boring but to be fair it isn't. Martech has done a good job of making all the graphics look pretty even if they are a little basic.

Firing missiles is a bit more complicated. You are presented with two map grids,

the showing your enemy from above the other from the side. You have to select how much fuel to put in your missile, fire it and then guide it to your target. You control the missile on one map at a time, pass the button to move between the maps. Action here is a little fast and I found it took quite a while before I was used enough to the controls to be anything. Again nothing startling but good enough.

An exciting musical piece by Rob Hubbard helps to set the scene for the game. Though I get the feeling that he sets it too well and the game doesn't quite live up to it. To be fair though, even though Zoids is probably not the most visually stunning game around, there is a lot to it and it will probably take a long time to master.

The action is fast and furious, get three or four Red Zoids on your tail and the only option open to you is to run. Of course you don't have to but I bet you'll end up leaving the game from the beginning again.

Zoids is very different to any other game and must be played for quite a while before you get the hang of it and really start to enjoy it. If you can't be bothered to spend a long time on a game then Zoids probably isn't for you. If, on the other hand, you enjoy a challenge then the Red Zoids are waiting.

N.C.

## Ark Pandora

April 15/95



ARCADE ADVENTURES ARE A becoming extremely common type of game that are at the moment.

As with any normal adventure the game must have an aim. In Ark Pandora you must retrieve the sacred scroll which is hidden on the island. While travelling in your search for this mysterious scroll you will meet both friends and enemies. Friends can be persuaded to help you in your task while the enemy will do his best to kill you off.

Nothing unusual here I judge you say, well neither is it. The main difference between this and many other arcade adventures is its presentation. Firstly all of the graphics are extremely colourful and very well animated, the running and jumping action of characters

being one example. Incredibly, most of the action is icon controlled. Pointing to the icons allows you to use objects, pick them up and put them down, select which way you wish to go once you reach the edge of the screen and that sort of thing.

When you get fed up with the game, which will take a long time as some of the puzzles are extremely complex, you don't have to put this game in the box with all your other 'dead' programs. Simply break out the screen designer that comes with the package and create your own new screens.

N.C.



## FA Cup Football Virgin Games £7.95



IT'S QUITE SURPRISING THAT nobody's ever done an official FA Cup program, however Virgin has now rectified that situation with this new test only game.

As a football manager, you are in charge of 10 teams (it's hard work these days in the soccer business). The aim of the game is, of course, to get one of your teams to the final at Wembley and then smash the opposition.

One of the game's strongest points, in my opinion, is that it can be played by up to eight people at once. I've never had a game against the computer alone but I think that would become a little tedious. When there are several people competing it's pretty exciting and you can become very

involved in your team's performance.

You start by choosing your 10 sides from a choice of 124 possible teams. Any ones left over are managed by the computer. It's quite a good idea to pick a few non-league teams since they can surprise you with occasional flashes of brilliance although I've never succeeded in taking one past the fourth round. The league clubs have all been given a real home and away rating based on their performance in the FA Cup over the last few years and also on their current league form. From the little I know about soccer it seems to be fairly accurate, although there is always room for surprise. Non-league clubs have a rating based on FA Cup history and

recent results and attendances.

Once you've chosen your sides then you watch the draw. Two little tokens roll on to the top of the screen and the names of the sides drawn against each other appear at the bottom and scroll upwards. In case you haven't kept a record of your teams, don't worry because each manager's initials appear next to the names of his sides.

Once you've found out who you're playing, a screen appears on which you must indicate your team's tactics. These can be defensive, balanced or attacking. You are given this option for all your teams and in the first two rounds, where only non-league and third and fourth division clubs play, this is the only opportunity you have to guide your team's progress in a particular match. Later when the big boys join in, you are given more opportunities to decide tactics, and these increase as you get nearer the final. Eventually you reach the stage where you can advise your team four times during a match and you are even given the option of bringing on the sub.

There are also news flashes about various events which can affect your team's morale. Your star player is having dodgy dealings with a ticket tout. Your goalie went out on the 122nd night before the match and has

a dreadful hangover. However, good things happen too - I was several times voted manager of the month! Although, once you've played the game a few times, you'll probably find that you've read all the news flashes and you'll begin to give them a miss.

There is a state of play screen which shows how all the teams are doing in their current matches. Ninety minutes is clocked up in an equivalent number of seconds and you can speed this up if you like. It's amazing how many goals seem to be scored in the final minute of the game. I was leading Chelsea to a cup final win against Manchester United and was two nil up. In the final minute my worthy opponents managed to score a staggering three goals! This circumstance detracts a little from the authenticity but certainly adds to the excitement. You can never be sure of a win until the final whistle blows.

When you reach the final you are forced to make quite a few tactical decisions. Whether to agree to transfers for your best players, how to prepare them for the match etc. These all affect the team's performance so choose your answers carefully.

One last point - you don't need to be an avid football fan to enjoy this game. I'm not. Get a few friends together and go out and buy it.

N.E.

## Elektragleide

English Software CMI/IBM £6.95



THIS GAME BENDS OVER backwards to present that it is

not a racing game like Pitstop or Pole Position.

The game has you behind the wheel of a speedy racer which you must steer around the winding roads of Britain, America or Australia avoiding obstacles which appear in your path. Intelligent spheres, boxes, oil patches and electronic columns dropped from overhead rockets. No problems about burning the rubber off your wheels or running out of road. Any oversteering is penalised by a drop in speed and your race is to get from A to B before your time runs out.

Every time an obstruction is hit the car throws to a standstill causing precious seconds to tick by. If the course is com-

pleted within the allowed time, any time remaining is added on to the next, more difficult run.

Although the course never gets to great lengths to dissociate itself from similar 3D simulations, a short period of deep thought will convince you otherwise. Imagine the obstacles are cars, they appear at random turning up from the horizon. Might just as well be a sphere or a box. Sorry about the dogmatic approach but this is not really different to anything already on the market. It is fast, and frantic and recommended for those who are tired of staring up hi-tech exhaust pipes.

L.S.D.



# A Flash Of Genius!

## THE NEW 64 MULTIMODEM

**GIVES YOU DATABASES, BULLETIN  
BOARDS, ELECTRONIC MAIL,  
PRESTEL — ALL ON YOUR  
COMMODORE 64 OR 128**



At last! The perfect modem for your Commodore™ 64 or 128, giving you access to Prestel™, Microweb™, videotex and a host of other services — plus user-user communications. It couldn't be simpler. The 64 Multimodem has auto-dial and auto-answer, with all commo

software on-board in ROM. 64 Multimodem fits your Commodore's cartridge port, and has just one external connection — the telephone lead.

The 64 Multimodem is menu driven and multi-speed, with CDTT V21/23 and Bell 103 standards, handling baud rates of 300/300, 1200/75 and 75/1200.

Functions include save and print frame and auto-roll-back with edit and save.

Buy your 64 Multimodem now and we'll give you free introductory subscriptions to Microweb and Microtek™ in an unbeatable package at an unbeatable price — it's pure genius!

**£98.50**  
(exc. VAT)



Approval applied for

reg'd trade name of the company concerned

From the Communications  
Powerhouse



# MIRACLE TECHNOLOGY

MIRACLE TECHNOLOGY (UK) LTD. ST PETERS STREET. IPSWICH IP1 1XB ENGLAND  
(0473) 216141 8 LINES. TELECOM GOLD 7% KEY 001 (Debitlink 72, DTB 10130)  
946240 CHEASY G 18002985 PRESTEL MAILBOX 916992295

send to:  
Commodore Support, Miracle  
Technology 200 L56 -  
St Peters Street, Ipswich IP1 1XB

please flash me  
64 Multimodem/s   
@ £118.15 (inc VAT & UK delivery)

I enclose cheque/postal order  
please debit my Access/Visa

card no:

Name

Address

Postcode



# Teacher's

As exam time draws near,  
Margaret Webb takes you  
through the latest in revision  
software.

SOON TO LEVEL AND ON EXAM TIME will be with us again. Most exams will have been taken and any areas needing extra work highlighted. Therefore it takes a good time to look at some of the software available and to discuss their various attributes. Several of the leading publishing/software houses have produced revision packs which are all very individual so I shall deal with each one in turn by looking at what they are offering and how it is presented.

## Commodore Software

Commodore has a range of revision software which includes: English language (the only one I've tested); Geography - dealing with relief, climate, farming, industry etc.; 'D' level French - general practice of tenses, verbs, pronouns etc.; Computer Studies - logic, operational procedures, programming, data storage; Physics; Chemistry - basic techniques, reactions, periodic tables; Biology; Maths.

The maths package consists of two separate units. Maths 1 covers arithmetic, algebra, geometry, trigonometry, and problems. Maths 2 covers arithmetic, equations, progressions, functions, calculus and trigonometry. In both programs three types of questions are used. These are true or false questions, multiple choice, in which there are up to four choices and a series of questions in which the answer must be typed in. A booklet accompanying the programs doubles as running instructions and revision notes.

All these retail at £19.95.

## Penguin Study Software

Penguin has a long association with English literature study guides and these programs are a natural progression. They are purely revision aids and should be used in conjunction with the students own notes and a copy of the files being revised. The program takes the form of a database with excellent cross-reference capabilities. If an essay is required on a given subject or image the program will search out all the references on that subject and list them, thus saving the user countless hours thumbing through the text. Titles in the range include *Corso* and *Julliet*, *The Merchant of Venice*, *Twelfth Night*, *Julius Caesar* and *Henry IV*.

# Pet



## Longman's Exam Revision Software

Longman is another publisher which has used its expertise in writing textbooks to good effect in the field of computer software. Each package contains a cassette and a 12 page booklet and revision guides.

Titles available are: French - a 2000 word vocabulary list, revision on regular and irregular verbs, comprehension practice and a section of about France, its regions and specialities; Biology - classification of animal and plant kingdoms, genetics and inheritance, food composition and a test of terms relating to the body; Computer Studies - how logic circuits work, file handling and user's

basic routines; Wordside low level language; Mathematics - transformations, statistics, probability and odds, trigonometry; Physics - key formulae, light, machines and pulleys, circuits and Ohm's Law; Chemistry - the elements, molecular weight, preparation in the lab; Reactivity. All these packages cost £7.95.

## Collins Gem Revision Software

These are packages costing £8.95 each which extend the Gem Base facts books with the addition of a cassette. Each cassette contains four different programs. The first is a random tester which helps determine any problem areas. The next two sections deal with helping the student to learn through a diagram with ordinary questions or multiple choice. The final section tests the student by means of a game against the computer. Four titles are available - Biology, Chemistry, Physics and Computer Studies.

## Pan Course Tutors

An O level glance at the asking price of £14.95 a package seems a little bit on the expensive side. However, it represents a bargain not to be missed. They are the product of an amalgamation between book publishers, Heinemann and Pan, and software house Hill MacMillan. A neatly coordinated package when you add Collinsworth.

Each package contains of two cassettes, a student guide and a copy of the appropriate Pan Study Aid. These books have been around for many years and have all essential parts of the syllabus. They explain how to tackle many questions by giving examples and indicating which areas carry more marks. The books are easy to read and are labelled 'The complete guide to exam success'.

As if to emphasise this the cassettes in this package are used in conjunction with the book. Cassette 1 has a series of diagnostic tests. From these you can assess your performance in one of three ways: A full analysis of your answers; a time analysis; a written report showing any weak areas and suggestions for further work.

Side bars of tape on one and both sides of tape are used in detailed teaching programs designed to help the student as much as possible. Subjects covered are French, Maths, Physics, Chemistry and Biology.

By the time this article reaches possible long running teacher's pay dispute will hopefully be resolved. Should it fail to do then the revision packages will hold even more importance. If it is sorted out, they are still a valuable resource and may ease the difference between a pass or a Grade 1.

# £10,000

# HOLIDAY BONNERS

## SPRING SALE NEW LOW PRICES



International Service, Support, Training  
as from your 4th 1. Commodore agents

WELCOME TO THE WORLD OF COMMODORE

**COMMODORE**

1075 100 Commodore	199.00
1075 100 AUC	229.00
1075 100 500K	219.00
Commodore monitor	71.00

**COMMODORE PACKAGES**

Commodore	
1075 + 80 Disk Encoder + Printer	
Commodore II Storage + Disk Printer	
100 Superdisk	
<b>COMMODORE 107</b>	289.00

**COMMODORE MONITORS**

Commodore 1075	109.00
1075 100 500K	109.00
1075 100 1000K	109.00
1075 100 2000K	109.00

**40 COMMODORE**

Commodore 40	199.00
Commodore 400	219.00

**PERIPHERALS**

1075 100 500K	149.00
1000 1000 Monitor	299.00
<b>PRINTERS</b>	
Commodore Printer	79.00
Printer Cable	19.00
100 Printer 400K Cable	19.00

**Yes its true !!!**

For a limited period we are giving away a **£5.00** Travel Check for spending money on your next holiday with **EVERY £50 SPENT**.

That's not all folks !!

your vouchers could also win you a **FREE** stay **HOLIDAY** for two or four people in our lucky numbers draw.

**ONE ENTRY FOR EVERY £5 VOUCHER**

**SOFTWARE**

Superdisk 100 - 80k	49.00
Superdisk 100 - 500k	49.00
Superdisk 100 - Superdisk 80 - 80k	49.00
Superdisk 80 - 100k	29.00
Superdisk 100 - 100k	29.00
Superdisk 1 Superdisk 100 - 80k	99.00

**COMMODORE 1075**

1075 Commodore	199.00
1075 100 500K	199.00
1075 100 1000K	199.00
1075 100 2000K	199.00

**COMMODORE**

1075 100 1000K	199.00
1075 100 2000K	199.00
1075 100 500K	199.00
1075 100 1000K	199.00

**SOFTWARE**

1075 100 500K	199.00
1075 100 1000K	199.00
1075 100 2000K	199.00
1075 100 500K	199.00
1075 100 1000K	199.00
1075 100 2000K	199.00
1075 100 500K	199.00
1075 100 1000K	199.00
1075 100 2000K	199.00

**COMMODORE**

1075 100 500K	199.00
1075 100 1000K	199.00
1075 100 2000K	199.00

## CHROMASONIC Computer Centres

40 Junction Road, Archway, London N19 5RD  
01-263-9493/5  
238 Muswell Hill Broadway, London N10 2BH  
01-863-2705

**COMMODORE**

1075 100 500K	199.00
1075 100 1000K	199.00
1075 100 2000K	199.00

**GRAND 128 TRADE IN/PART EXCHANGE**



"INSTANT CREDIT"

Terms

"INSTANT CREDIT"

All products are guaranteed for one year unless otherwise stated. Payment may be made by Access, Barclaycard, Bankerscard, Building Society Invoice Card or credit card. Every Chromasonic has a 14 day return guarantee. We reserve the right to change prices without prior notice. All prices are inclusive of VAT. Please check before ordering for carriage charges.

Save your fingers a lot of  
work with our new software  
service.

# SOFTWARE FOR

# SALE

IT'S THREE O'CLOCK IN THE MORNING. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from Your Commodore. Your fingers reach for the keyboard and press the letters R, I and N. You sit back expectantly and... nothing happens.

Well, I'm sure that we have all had problems before now. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unannounced.

Here, at Your Commodore, we pride ourselves on the quality of listing that we print. Unfortunately, this usually means that they are also very long, thus taking longer to type in and leaving more room for errors. All of the listings in Your Commodore are taken straight from a printed set of working programs. It is therefore very unusual for errors to appear in the magazine.

Because of the length of our programs we receive a large number of requests from readers who would like us to put specific

programs on tape or disk for them. Obviously this is very time consuming and means that we can't spend as much time working on the magazine as we would like.

We are therefore proud to announce the start of the 'Your Commodore Software Service'. Most of the programs from each issue of the magazine will now be available on a single cassette for a price of just £4.00. We will not be making disks available since they would have to be a lot more expensive and more difficult to post. This shouldn't cause you any

problems though as none of the programs will be protected and it will be a simple matter to save the programs to disk yourselves.

All programs on the cassette will be saved using a tape turbo routine. However, we cannot guarantee that all programs will work correctly with this turbo routine program. We therefore recommend that before you use any of the programs you make a copy of the programs on your own cassette or disk and use this version of the program not the original.

## PLEASE COMPLETE IN BLOCK CAPITALS

## ORDER FORM

All cheques/postal orders should be made payable to:  
ARGUS SPECIALIST PUBLICATIONS LTD

I would like to order the following quantities (please tick box)

MARCH '86	YCMAR61	£4.00	<input type="checkbox"/>
UTILITY SPECIAL	YCMAR62	£4.00	<input type="checkbox"/>
APRIL '86	YCAPR86	£4.00	<input type="checkbox"/>
MAY '86	YCMAR86	£4.00	<input type="checkbox"/>

I enclose a cheque/postal order for £.....

NAME.....

ADDRESS.....

POSTCODE.....

All orders should be sent to:  
YOUR COMMODORE SOFTWARE, READERS SERVICES, ARGUS SPECIALIST PUBLICATIONS,  
WOLSEY HOUSE, WOLSEY ROAD, HEMEL HEMPSTEAD, HERTFORDSHIRE HP2 4SS.

Please allow at least 28 days for delivery.





## Allen Webb puts 3D

### graphics in focus.

UP TO NOW, I'VE TRIED TO give routines which will be of use to the widest possible range of readers. I now plan to give a few which will be of use mainly to game writers. The idea is to try to remove the problem of graphics from the user leaving him time to concentrate on the logic behind the game.

I've always been keen on 3D games so it's with this area that I wish to start. The use of 3D effects to depict movement down corridors or mazes is frequently used in arcade adventure type games. If you've seen Arkolovoff's *Scarabees* or Supernat's *Super Glasses*, you'll know what I mean.

The idea behind the routine is that you define the maze as a two dimensional array in RAM. You call the routine specifying the co-ordinates of your position and the direction you're looking and the routine shows the view through the maze.

The maze is considered as an array of square cells. Each cell can have walls in any one of the four cardinal directions. If we assign a bit to each direction such that north uses bit zero, each uses bit one etc. we can calculate a number between zero and 15 which defines the cell. These are summarized in Table 1.

Table 1

bits	Cell Value
None	0
N	1
E	2
N & E	3
S	4
N & S	5
E & S	6
N & E & S	7
N	8
N & W	9
E & W	10
N & E & W	11
S & W	12
N & S & W	13
E & S & W	14
all	15

Figure 1 shows the maze used in the demonstration listing. The only restriction is that all passages are limited to one cell wide.

# TOP DRAW TOP DRAW

```
6 10 14 10 14 10 12
-----
3 10 11 10 11 10 13
-----
6 10 10 10 10 10 10
```

## FIGURE 1 A SAMPLE MAZE

### PROGRAM: 3D MAZE

```
10 REM *****
```

```
110
```

```
20 REM 3D MAZE (SEE USER
```

```
30
```

```
40 REM *****
```

```
500
```

```
2000 FOR L=0 TO 145:GOTO
```

```
2050 G=0 TO 75:GOTO 4
```

```
2100 G=0 TO 75:GOTO 4
```

```
2200 G=0 TO 75:GOTO 4
```

```
2300 G=0 TO 75:GOTO 4
```

```
2400 G=0 TO 75:GOTO 4
```

```
2500 G=0 TO 75:GOTO 4
```

```
2600 G=0 TO 75:GOTO 4
```

```
2700 G=0 TO 75:GOTO 4
```

```
2800 G=0 TO 75:GOTO 4
```

```
2900 G=0 TO 75:GOTO 4
```

```
3000 G=0 TO 75:GOTO 4
```

```
3100 G=0 TO 75:GOTO 4
```

```
3200 G=0 TO 75:GOTO 4
```

```
3300 G=0 TO 75:GOTO 4
```

```
3400 G=0 TO 75:GOTO 4
```

```
3500 G=0 TO 75:GOTO 4
```

```
3600 G=0 TO 75:GOTO 4
```

```
3700 G=0 TO 75:GOTO 4
```

```
3800 G=0 TO 75:GOTO 4
```

```
3900 G=0 TO 75:GOTO 4
```

```
4000 G=0 TO 75:GOTO 4
```

```
4100 G=0 TO 75:GOTO 4
```

```
4200 G=0 TO 75:GOTO 4
```

```
4300 G=0 TO 75:GOTO 4
```

```
4400 G=0 TO 75:GOTO 4
```

```
4500 G=0 TO 75:GOTO 4
```

```
2000 DATA 14,173,214,2,122,
```

```
167,173,217,2,122,168,175,
```

```
219,2,209,17,2127
```

```
2050 DATA 24,165,167,169,212,
```

```
2,173,167,165,168,169,8,
```

```
132,168,174,200,200
```

```
2100 DATA 27,24,162,167,169,
```

```
214,2,173,167,165,168,169,
```

```
8,132,168,74,200
```

```
2150 DATA 173,222,2,200,7,164,
```

```
4,173,222,2,76,128,128,173,
```

```
224,2,1731
```

```
2200 DATA 141,114,155,74,162,
```

```
2,168,14,24,22,200,225,173,
```

```
226,2,161,1617
```

```
2250 DATA 124,2,169,200,22,
```

```
214,225,162,4,168,24,24,22,
```

```
248,225,173,2072
```

```
2300 DATA 225,2,141,124,2,169,
```

```
67,200,128,22,20,171,76,
```

```
162,2,168,1712
```

```
2350 DATA 18,24,22,200,225,
```

```
173,224,2,141,124,2,169,
```

```
207,22,214,225,2111
```

```
2400 DATA 167,207,22,210,225,
```

```
162,2,168,18,24,22,200,225,
```

```
173,22,2,210
```

```
2450 DATA 141,124,2,169,164,
```

```
168,128,22,24,171,74,162,1,
```

```
168,2,24,225
```

```
2500 DATA 22,200,225,173,224,
```

```
2,141,124,2,168,207,22,210,
```

```
225,169,207,2022
```

```
2550 DATA 22,214,225,168,207,
```

```
22,210,225,162,2,168,2,24,
```

```
22,200,225,225
```

```
2600 DATA 173,225,2,141,124,2,
```

```
169,167,200,128,22,20,171,
```

```
76,162,2,168
```

```
2650 DATA 168,14,24,22,200,
```

```
225,173,224,2,141,124,2,
```

```
169,200,22,210,200
```

```
2700 DATA 225,162,4,168,17,24,
```

```
22,200,225,173,225,2,141,
```

```
124,2,169,1700
```

```
2750 DATA 11,168,229,22,20,
```

```
171,76,162,2,168,22,24,22,
```

```
200,225,173,229
```

```
2800 DATA 224,2,141,124,2,169,
```

```
207,22,210,225,169,207,22,
```

```
210,225,162,2412
```

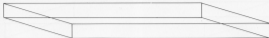
```
2850 DATA 2,168,22,76,207,124,
```

```
162,2,168,24,24,22,200,225,
```

```
173,224,2000
```

```
2900 DATA 2,141,124,2,169,207,
```

```
22,210,225,169,207,22,210,
```



The graphics use multi-colour redefined characters. In that you have the maximum amount of RAM, a setup routine is used to shift the screen and characters to the area between the ROMs. The screen's new position is from 32000 to 32095. The views use the characters from Shifted A

to Shifted S leaving you with a reasonable number for the creation of objects or monsters to put in the maze. You can specify the colour scheme by poking the following locations: location 994 - Wall colour 1 location 995 - Wall colour 2 location 996 - Ceiling colour location 997 - Floor colour

location 998 - Background location 999 - Border

The floor and ceiling colours have the multicolour mode and must therefore be in the range eight to 15 giving only eight colours.

If you wish to use sprites, the sprite pointers are now located from 52216 to 52223.

Usable sprites are numbers 48 to 64 and 128 to 254 and are located according to the equation:

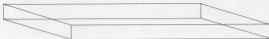
Sprite Address = 52224 + (Sprite Number - 48) \* 8

The screen and character set limit the area available for sprites but there is plenty of room below the kernel ROM.

200,149,281,280	8,177,087,140,222,3,41,1,249,2,1627	2548 0478 22,219,159,173,222,3,41,8,288,3,76,211,154,286,179	141,214,1544	2688 0478 3,219,221,3,140,217,3,20,25,158,162,167,140,82,3,163,1739
2178 0478 22,219,221,162,2,164,26,76,222,159,173,22,289,7,16,241,1894	2418 0478 22,219,159,173,222,3,41,8,248,3,21,26,251,173,222,3,1774	2558 0478 219,21,25,65,159,168,8,173,167,140,222,3,41,8,248,2,1622	2698 0478 168,141,83,2,168,8,177,167,41,1,288,2,76,28,225,284,1647	2788 0478 222,3,20,65,158,168,8,173,167,140,222,3,41,8,248,2,1621
2308 0478 22,288,173,226,3,161,24,288,173,227,2,141,35,288,173,228,2280	2428 0478 41,2,288,2,76,152,154,228,214,2,22,65,159,168,8,177,1625	2568 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258	2798 0478 222,3,20,65,158,168,8,173,167,140,222,3,41,8,248,2,1621	2878 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770
2378 0478 3,141,22,288,173,229,2,141,22,288,76,124,222,3,187,113,1739	2438 0478 167,141,222,3,41,1,248,2,22,173,158,173,222,3,41,8,1626	2578 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258	2888 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770	2928 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258
2408 0478 125,122,221,169,125,153,122,224,168,8,74,162,222,162,24,122,2240	2448 0478 248,2,22,25,25,251,123,154,238,1622	2588 0478 3,219,221,141,217,3,20,25,158,162,167,140,82,3,163,1739	2938 0478 167,141,222,3,41,8,248,2,1621	2978 0478 167,141,222,3,41,8,248,2,22,173,158,173,222,3,41,2,4,258
2438 0478 171,165,221,122,178,127,122,24,222,142,221,173,114,222,142,2210	2458 0478 219,2,22,65,159,168,8,173,167,141,222,3,41,1,248,2,1627	2598 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643	2988 0478 222,3,20,65,158,168,8,173,167,140,222,3,40,2,288,2,1621	3028 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258
2468 0478 126,288,173,288,228,76,22,14,152,162,28,140,214,2,162,2841	2468 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643	2608 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258	3038 0478 222,3,20,64,151,173,222,3,1770	3068 0478 22,219,159,173,222,3,41,8,288,3,20,64,2,288,2,1621
2498 0478 22,141,221,2,22,14,152,162,28,140,212,2,22,14,152,162,2844	2478 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258	2618 0478 22,219,159,173,222,3,41,8,288,3,20,64,251,173,222,3,1770	3078 0478 219,2,20,65,158,168,8,173,167,140,222,3,40,8,248,2,1627	3088 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643
2528 0478 28,141,228,1,22,14,152,162,28,140,211,2,22,14,152,162,2845	2488 0478 3,219,221,141,217,3,20,25,158,162,167,140,82,3,163,1739	2628 0478 41,8,288,2,76,152,154,228,215,2,22,65,159,168,8,177,1628	3098 0478 222,3,20,64,151,173,222,3,1770	3128 0478 41,2,288,2,76,152,154,228,215,2,22,65,159,168,8,177,1628
2558 0478 28,280,2,288,2,76,24,122,281,8,288,2,76,184,152,280,17115	2498 0478 168,141,83,2,168,8,177,167,41,2,288,2,76,28,152,286,284	2638 0478 167,141,222,3,41,2,248,2,22,173,158,173,222,3,41,2,4,258	3138 0478 41,2,288,2,76,11,125,76,22,7,159,173,228,3,41,2,4,258	3158 0478 288,2,288,2,150,173,222,3,41,8,288,2,76,211,154,228,1824
2588 0478 3,288,2,76,88,152,281,2,288,2,76,248,222,2882	2508 0478 219,2,20,65,158,168,8,177,167,141,222,3,41,8,248,2,1626	2648 0478 288,2,288,2,150,173,222,3,41,8,288,2,76,211,154,228,1824	3168 0478 222,3,20,65,158,168,8,173,167,140,222,3,40,2,288,2,1621	3188 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643
2618 0478 174,22,228,173,22,247,122,76,22,7,158,173,228,3,41,2,4,25827	2518 0478 22,219,159,173,222,3,41,1,288,3,20,64,151,173,222,3,1774	2658 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643	3198 0478 222,3,20,64,151,173,222,3,1770	3218 0478 22,219,159,173,222,3,41,2,288,3,20,64,2,288,2,1621
2648 0478 1,173,221,3,241,212,3,20,65,158,162,167,140,82,3,163,1739	2528 0478 41,8,288,2,76,152,154,228,214,2,22,65,159,168,8,177,1648	2668 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643	3228 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770	3248 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770
2678 0478 168,141,83,2,168,8,177,167,41,2,288,2,76,28,152,228,168	2538 0478 167,141,222,3,40,4,288,2,22,173,158,173,222,3,41,2,1626	2678 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643	3258 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770	3278 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770
2688 0478 214,2,22,65,159,168,8,177,087,140,222,3,41,1,249,2,1627		2688 0478 22,222,158,173,222,3,40,2,288,3,20,64,151,173,222,3,1643	3288 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770	3308 0478 22,219,159,173,222,3,41,2,288,3,20,64,151,173,222,3,1770







The routines have two entry points:

SYS 30400 - Initialize the colour and multicolour mode.  
 SYS 30401-54, V1, V2, V3, V4  
 V1 - Start address of the maze array  
 V2 - The width of the maze (number of cells)

V3 - Horizontal coordinate of the cell you are in  
 V4 - Vertical coordinate of the cell you are in  
 V5 - Direction of sight

1 = North  
 2 = East  
 3 = South  
 4 = West

In the demo, you may notice a number of points:

- 1) I use the normal screen memory to store the maze. This is handy if your maze is less than 32768 cells in size.
- 2) The routine does not handle your movement. The routine will show you a dead end but will not prevent you from

moving through it. Lines 170-180 in the demonstration handle that.

3) After calling the routine, locations 850 and 851 hold the address of the cell you are in. By PEEKing this location, you can check which exits are open to movement. Line 60 and lines 100 to 160 in the demonstration show this.

#### PROGRAM: 30 321P

```

100 PEEK 59:PRINT
101 PEEK 64:POKE 15627:GOTO 3: PEEK 5675,
    (PEEK 56274 AND 252) OR 8
102 PEEK 640:POKE
103 PEEK 53277:POKE 53277 AND 248:OR 8
104 PEEK 53277:POKE 53277 AND 2108:OR 33
105 PEEK 56234:POKE 56234 AND 254
106 PEEK 1:POKE 11 AND 251
107 FOR L=0 TO 2047:POKE L+(2048*PEEK L)+(22848) AND 21
108 PEEK 1:POKE 11 OR 4
109 PEEK 56234:POKE 56234 OR 8
110 FOR L=0 TO 7:FOR K=0 TO 15:POKE K+(256) AND 255
    :POKE 49670+(15*8)+K AND 255
111 FOR K=0 TO 15:FOR L=0 TO 15:POKE L+(16) AND 255:POKE L+(16)
    :STOP
112 FOR K=0 TO 15:PRINT CHR$(147)+"NEW SCREEN POSITION AND CHANGE
    TOR 8070:POKE 8070:GOTO 3:POKE
113 PEEK 5478:175,178,178,178,178,178,178,178,178,255,255,175,178,
    178,178,178,178,255
114 PEEK 5478:255,255,255,255,175,178,178,178,255,255,255,255,
    255,255,175,178,255
115 PEEK 5478:255,255,255,255,255,255,255,254,178,255,255,255,255,
    254,178,178,178,255
116 PEEK 5478:255,255,254,178,178,178,178,178,178,178,178,178,178,
    178,178,178,178,255
117 PEEK 5478:85,85,85,85,85,85,85,85,85,178,178,178,178,178,178,
    178,178,254
118 PEEK 5478:255,255,255,255,255,255,255,255,178,178,178,178,
    175,175,175,175,254
119 PEEK 5478:178,178,254,254,254,254,254,254,254,255,255,255,255,
    255,85,85,85,254
120 PEEK 5478:255,255,255,85,85,85,85,85,255,85,85,85,85,85,85,85,
    85,254
121 PEEK 5478:254,254,254,254,254,254,254,254,4,175,171,171,171,
    171,255,78,255
122 REM *****
123 REM 30 321P ROUTINE(S) PEEK 11
124 REM *****

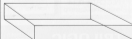
```

#### PROGRAM: 30 303D

```

100 DATA 8,18,18,18,18,18,18
101 DATA 3,18,18,18,18,18,18
102 DATA 8,18,18,18,18,18,8
103 FOR L=0 TO 20:POKE L:POKE 160+(L) AND 255
104 PEEK 192,11:POKE 192,8:POKE 194,4:POKE 195,18
    :POKE 196,8:POKE 197,4
105 SET PEEK 198:POKE PEEK 851+(PEEK 198) AND 255
106 PRINT CHR$(147):POKE 658,120
107 GOTO 30400
108 GOTO 30400,1824,7,8,4,1:PRINT CHR$(147)+"NEW SCREEN POSITION AND
    CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
109 GOTO 8070
110 GOTO 18:IF 18 THEN 180
111 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
112 GOTO 18:IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
113 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
114 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
115 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
116 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
117 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
118 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
119 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
120 IF 18 THEN 18:POKE 851 AND 255:PRINT CHR$(147)+"NEW SCREEN POSITION
    AND CHANGE TOR 8070:POKE 8070:POKE 8070:GOTO 3:POKE
121 REM *****
122 REM 30 303D PEEK 11
123 REM *****

```





# Scratchpad

**Eric Doyle has ruffled up a few useful tips for you this month.**

WE OFTEN GET LETTERS asking how two Basic programs can be merged together into a single program. This is useful for entering old and loved subroutines which can take hours to type in.

The problem with most simple merge routines is that they don't cater for the situation when the two programs share the same line numbers as I have included a routine which does a simple renumber.

List and save the listing and don't worry if you don't understand it, all will be revealed later.

The address of the start of Basic is stored in the two bytes starting at location 43 (hex 2B) and the end of a Basic program in the two bytes at location 45 (hex 2D). Normal loading of a program leaves the pointer at location 45 pointing at the last of the three zero bytes with which every Basic program ends. To merge a second program on to the one in memory we have to fool the computer into believing that the start of Basic is now at the end of the program.

This simply means that the pointer at location 43 is changed to the same value as the pointer in location 45. Unfortunately, that is not quite right because we have to lose the last two zero bytes from our

program in memory first. In practice, we load pointer 43 with the value of pointer 45 minus two.

To get the actual value of the pointer the first byte is added to the second byte multiplied by 256:

```
POKE 43, POK (45) * 256
```

Subtracting two from P:

```
POKE
```

And updating the result into pointer 43:

```
POKE 43, P AND 255: POKE 44, P / 256
```

We can now load our second program in the normal way after which we reload pointer 43 to the normal beginning of Basic in this way:

```
POKE 43, 1: POKE 44, 0
```

Listing the program will now show that both programs have been joined together. Obviously, the above program must be entered in direct mode just as they are written here and not given line numbers because that would really crash the system.

The programs cannot be said to be truly merged until the line numbers have been changed. The point way to describe this dog's dinner of a program is to say that it is simply two concatenated programs. A renumber routine is needed.

Repeating the above procedure would allow a third

renumbering program to be merged but to get it to run would be a nightmare. One solution is to fool the 64 into believing that Basic memory lies elsewhere in memory for the time being.

A likely place is the 'spare' block of memory which is much favoured by machine code programmers and starts at 49152. To alter the memory layout use the following line:

```
POKE 44, 255: POKE 256, 256: POKE 49152, 0: END
```

Now load the renumber routine which you saved earlier using the normal LOAD syntax for your disk or tape.

Type RUN and press RETURN. When the program says press RETURN again and, Hey Presto, there's your renumbered listing ready to be saved once you've changed all the GOTOs and GOSUBs (what do you expect, real magic!).

What happened is that the program followed all of the line links through the program in the normal Basic memory and changed the line numbers to the values selected in the renumber program.

Talking of magic. How I can make your screen wobble. Try this:

```
FOR A=0 TO 255: POKE 53170, A: NEXT A: POKE 53170,
```

How's that for an explosive effect?

If you've ever had a program which uses the GOTO command it may have occurred to you that it would

be nice to have a flashing cursor to indicate that the computer is waiting for something to be input. Memory location 204 enables and disables the cursor, so write your GOTO statement like this:

```
10 POKE 204,0:GOTO A5:IF A5="" THEN A5=20  
20 PRINT A5
```

Well that's the last gem for this month. If you've written a handy little routine which you'd like to see on Commodore around the world, why not send them to Scratchpad, Four Commodore, No 7 Golden Square, London W1R 8AS.

```
ready.  
Are you sure?  
10 INPUT "LINE NO" L  
20 INPUT "LINE INCREMENT" I  
30  
40 L=L+I-1  
50 L=L+I-1  
60 L=L+I-1  
70 FOR J=L TO 255: POKE J, L  
80 L=L+I  
90  
100 L=L+I  
110 GOTO 10  
120 PRINT "POKE 43, " L AND 255  
130 PRINT "POKE 44, " I AND 255  
140 PRINT "POKE 44, " I AND 255  
150 PRINT "POKE 44, " I AND 255  
160 PRINT "POKE 44, " I AND 255  
170 PRINT "POKE 44, " I AND 255  
180 PRINT "POKE 44, " I AND 255  
190 PRINT "POKE 44, " I AND 255  
200 PRINT "POKE 44, " I AND 255  
210 PRINT "POKE 44, " I AND 255  
220 PRINT "POKE 44, " I AND 255  
230 PRINT "POKE 44, " I AND 255  
240 PRINT "POKE 44, " I AND 255  
250 PRINT "POKE 44, " I AND 255  
260 PRINT "POKE 44, " I AND 255  
270 PRINT "POKE 44, " I AND 255  
280 PRINT "POKE 44, " I AND 255  
290 PRINT "POKE 44, " I AND 255  
300 PRINT "POKE 44, " I AND 255  
310 PRINT "POKE 44, " I AND 255  
320 PRINT "POKE 44, " I AND 255  
330 PRINT "POKE 44, " I AND 255  
340 PRINT "POKE 44, " I AND 255  
350 PRINT "POKE 44, " I AND 255  
360 PRINT "POKE 44, " I AND 255  
370 PRINT "POKE 44, " I AND 255  
380 PRINT "POKE 44, " I AND 255  
390 PRINT "POKE 44, " I AND 255  
400 PRINT "POKE 44, " I AND 255  
410 PRINT "POKE 44, " I AND 255  
420 PRINT "POKE 44, " I AND 255  
430 PRINT "POKE 44, " I AND 255  
440 PRINT "POKE 44, " I AND 255  
450 PRINT "POKE 44, " I AND 255  
460 PRINT "POKE 44, " I AND 255  
470 PRINT "POKE 44, " I AND 255  
480 PRINT "POKE 44, " I AND 255  
490 PRINT "POKE 44, " I AND 255  
500 PRINT "POKE 44, " I AND 255  
510 PRINT "POKE 44, " I AND 255  
520 PRINT "POKE 44, " I AND 255  
530 PRINT "POKE 44, " I AND 255  
540 PRINT "POKE 44, " I AND 255  
550 PRINT "POKE 44, " I AND 255  
560 PRINT "POKE 44, " I AND 255  
570 PRINT "POKE 44, " I AND 255  
580 PRINT "POKE 44, " I AND 255  
590 PRINT "POKE 44, " I AND 255  
600 PRINT "POKE 44, " I AND 255  
610 PRINT "POKE 44, " I AND 255  
620 PRINT "POKE 44, " I AND 255  
630 PRINT "POKE 44, " I AND 255  
640 PRINT "POKE 44, " I AND 255  
650 PRINT "POKE 44, " I AND 255  
660 PRINT "POKE 44, " I AND 255  
670 PRINT "POKE 44, " I AND 255  
680 PRINT "POKE 44, " I AND 255  
690 PRINT "POKE 44, " I AND 255  
700 PRINT "POKE 44, " I AND 255  
710 PRINT "POKE 44, " I AND 255  
720 PRINT "POKE 44, " I AND 255  
730 PRINT "POKE 44, " I AND 255  
740 PRINT "POKE 44, " I AND 255  
750 PRINT "POKE 44, " I AND 255  
760 PRINT "POKE 44, " I AND 255  
770 PRINT "POKE 44, " I AND 255  
780 PRINT "POKE 44, " I AND 255  
790 PRINT "POKE 44, " I AND 255  
800 PRINT "POKE 44, " I AND 255  
810 PRINT "POKE 44, " I AND 255  
820 PRINT "POKE 44, " I AND 255  
830 PRINT "POKE 44, " I AND 255  
840 PRINT "POKE 44, " I AND 255  
850 PRINT "POKE 44, " I AND 255  
860 PRINT "POKE 44, " I AND 255  
870 PRINT "POKE 44, " I AND 255  
880 PRINT "POKE 44, " I AND 255  
890 PRINT "POKE 44, " I AND 255  
900 PRINT "POKE 44, " I AND 255  
910 PRINT "POKE 44, " I AND 255  
920 PRINT "POKE 44, " I AND 255  
930 PRINT "POKE 44, " I AND 255  
940 PRINT "POKE 44, " I AND 255  
950 PRINT "POKE 44, " I AND 255  
960 PRINT "POKE 44, " I AND 255  
970 PRINT "POKE 44, " I AND 255  
980 PRINT "POKE 44, " I AND 255  
990 PRINT "POKE 44, " I AND 255  
1000 PRINT "POKE 44, " I AND 255
```



1578 0478 104,172,177,201,  
261,183,248,224,280,22

1580 0478 248,280,281,287,  
248,228,280,241,287,173

1582 0478 248,287,286,2,178,  
245,287,25,184,172

1584 0478 177,201,281,287,  
248,280,281,177,288,288

1586 0478 281,22,248,211,281,  
259,248,287,24,85

1588 0478 194,24,75,177,185,  
8,183,248,287,183

1590 0478 281,287,173,182,2,  
81,2,198,28,10

1592 0478 228,208,248,216,  
281,127,288,4,228,10

1594 0478 288,24,75,177,281,  
128,198,8,228,10

1596 0478 288,24,75,177,281,  
127,288,1,76,20

1598 0478 192,228,229,287,76,  
75,187,175,282,0

1600 0478 41,8,288,2,76,21,  
175,127,228,287

1602 0478 288,2,76,112,198,  
281,8,288,8,189

1604 0478 1,83,248,287,123,  
288,76,281,28,288

1606 0478 18,189,1,121,288,  
18,2,181,248,287

1608 0478 281,21,288,12,  
172,128,2,172,227

1610 0478 287,241,128,2,148,  
227,287,76,25,187

1612 0478 280,28,288,18,189,  
8,241,288,287,189

1614 0478 1,121,288,76,281,  
18,288,25,281,8

1616 0478 248,75,281,19,248,  
27,281,2,248,21

1618 0478 281,2,248,19,281,  
28,248,12,281,18

1620 0478 248,12,128,12,248,  
1,281,2,248,2

1622 0478 24,121,194,24,182,  
182,24,18,197,10

1624 0478 228,222,280,2,76,  
112,198,281,188,288

1626 0478 2,76,112,198,281,  
248,288,2,188,12

1628 0478 26,19,177,280,172,  
280,2,189,88,76

1630 0478 19,189,289,12,288,  
2,189,179,76,17

1632 0478 197,281,181,288,2,  
181,179,76,17,187

1634 0478 281,177,288,8,22,  
221,198,76,75,187

1636 0478 281,17,288,12,182,  
8,22,179,179,212

1638 0478 224,48,288,248,76,  
75,187,281,182,288

1640 0478 182,182,22,221,  
198,222,224,48,288

1642 0478 248,76,75,187,281,  
247,288,14,172,228

1644 0478 287,182,1,288,2,  
124,124,248,248,288

1646 0478 287,76,75,187,281,  
75,288,25,172,228

1648 0478 287,182,1,288,2,  
124,124,248,248,288

1650 0478 287,76,75,187,281,  
75,288,25,172,228

1652 0478 287,182,1,288,2,  
124,124,248,248,288

1654 0478 287,182,1,288,2,  
124,124,248,248,288

1656 0478 287,182,1,288,2,  
124,124,248,248,288

1658 0478 287,182,1,288,2,  
124,124,248,248,288

1660 0478 287,182,1,288,2,  
124,124,248,248,288

1662 0478 287,182,1,288,2,  
124,124,248,248,288

1664 0478 287,182,1,288,2,  
124,124,248,248,288

1666 0478 287,182,1,288,2,  
124,124,248,248,288

1668 0478 287,182,1,288,2,  
124,124,248,248,288

1670 0478 287,182,1,288,2,  
124,124,248,248,288

1672 0478 287,182,1,288,2,  
124,124,248,248,288

1674 0478 287,182,1,288,2,  
124,124,248,248,288

1676 0478 287,182,1,288,2,  
124,124,248,248,288

1678 0478 287,182,1,288,2,  
124,124,248,248,288

1680 0478 287,182,1,288,2,  
124,124,248,248,288

1682 0478 287,182,1,288,2,  
124,124,248,248,288

1684 0478 287,182,1,288,2,  
124,124,248,248,288

1686 0478 287,182,1,288,2,  
124,124,248,248,288

1688 0478 287,182,1,288,2,  
124,124,248,248,288

1690 0478 287,182,1,288,2,  
124,124,248,248,288

1692 0478 287,182,1,288,2,  
124,124,248,248,288

1694 0478 287,182,1,288,2,  
124,124,248,248,288

1696 0478 287,182,1,288,2,  
124,124,248,248,288

1698 0478 287,182,1,288,2,  
124,124,248,248,288

1700 0478 287,182,1,288,2,  
124,124,248,248,288

1702 0478 287,182,1,288,2,  
124,124,248,248,288

1704 0478 287,182,1,288,2,  
124,124,248,248,288

1706 0478 287,182,1,288,2,  
124,124,248,248,288

1708 0478 287,182,1,288,2,  
124,124,248,248,288

1710 0478 287,182,1,288,2,  
124,124,248,248,288

1712 0478 287,182,1,288,2,  
124,124,248,248,288

1714 0478 287,182,1,288,2,  
124,124,248,248,288

1716 0478 287,182,1,288,2,  
124,124,248,248,288

1718 0478 287,182,1,288,2,  
124,124,248,248,288

1720 0478 287,182,1,288,2,  
124,124,248,248,288

1722 0478 287,182,1,288,2,  
124,124,248,248,288

1724 0478 287,182,1,288,2,  
124,124,248,248,288

1726 0478 287,182,1,288,2,  
124,124,248,248,288

1728 0478 287,182,1,288,2,  
124,124,248,248,288

1730 0478 287,182,1,288,2,  
124,124,248,248,288

1732 0478 287,182,1,288,2,  
124,124,248,248,288

1734 0478 287,182,1,288,2,  
124,124,248,248,288

1736 0478 287,182,1,288,2,  
124,124,248,248,288

1738 0478 287,182,1,288,2,  
124,124,248,248,288

1740 0478 287,182,1,288,2,  
124,124,248,248,288

1742 0478 287,182,1,288,2,  
124,124,248,248,288

1744 0478 287,182,1,288,2,  
124,124,248,248,288

1746 0478 287,182,1,288,2,  
124,124,248,248,288

1748 0478 287,182,1,288,2,  
124,124,248,248,288

1750 0478 287,182,1,288,2,  
124,124,248,248,288

1752 0478 287,182,1,288,2,  
124,124,248,248,288

1754 0478 287,182,1,288,2,  
124,124,248,248,288

1756 0478 287,182,1,288,2,  
124,124,248,248,288

1758 0478 287,182,1,288,2,  
124,124,248,248,288

1760 0478 287,182,1,288,2,  
124,124,248,248,288

1762 0478 287,182,1,288,2,  
124,124,248,248,288

1764 0478 287,182,1,288,2,  
124,124,248,248,288

1766 0478 287,182,1,288,2,  
124,124,248,248,288

1768 0478 287,182,1,288,2,  
124,124,248,248,288

1770 0478 287,182,1,288,2,  
124,124,248,248,288

1772 0478 287,182,1,288,2,  
124,124,248,248,288

1774 0478 287,182,1,288,2,  
124,124,248,248,288

1776 0478 287,182,1,288,2,  
124,124,248,248,288

1778 0478 287,182,1,288,2,  
124,124,248,248,288

1780 0478 287,182,1,288,2,  
124,124,248,248,288

1782 0478 287,182,1,288,2,  
124,124,248,248,288

1784 0478 287,182,1,288,2,  
124,124,248,248,288

1786 0478 287,182,1,288,2,  
124,124,248,248,288

1788 0478 287,182,1,288,2,  
124,124,248,248,288

1790 0478 287,182,1,288,2,  
124,124,248,248,288

1792 0478 287,182,1,288,2,  
124,124,248,248,288

1794 0478 287,182,1,288,2,  
124,124,248,248,288

1796 0478 287,182,1,288,2,  
124,124,248,248,288

1798 0478 287,182,1,288,2,  
124,124,248,248,288

1800 0478 287,182,1,288,2,  
124,124,248,248,288

editor, turning the computer into a typewriter on the screen. All the standard upper and lower case letters are available, as well as the graphics characters accessed via the Commodore logo key.

Text will appear at the flashing cursor as in the normal screen editor. A small check square character (SQ) indicates the end of the line. To exit from the editor, hold CTRL and Press " ". On re-entering the editor from the main menu, the cursor will be in the position it was in when the exit was made. To display the help facility, hold CTRL and press " ". These messages are also displayed at the foot of the screen throughout editing. The help facility gives an on-screen summary of the screen editor functions and control characters. These are as follows:

- CTRL - R** Return to main menu.
- CTRL - F** Print on-screen help messages. These are printed on the screen one page at a time, then control is returned to the editor.
- CTRL - E** Enter search/replace mode. This allows you to search for specific text in the file, and replace it if required. The search string is repeated (along with a replace string if required). Both strings must contain at least two characters, and not more than 40 characters. The search routine then finds the next occurrence of the search string in the text starting from the current cursor position, and displays this. Pressing SPACE will find the next occurrence of the search string. Pressing R if replace was selected will replace the word found with the replace word, and find the next occurrence of the search string. Pressing RETURN will return control to the editor.
- CTRL - A** Automatic line repeat on/off toggle. This allows all keys to auto-repeat or not.
- CTRL - H** Move cursor to next character.
- CTRL - B** Move cursor to previous character.
- CTRL - U** Move cursor back 40 characters.
- CTRL - D** Move cursor forward 40 characters.
- CTRL - S** Split/merge words. Normally, words are split at the end of a line as the line "wraps-around". Pressing CTRL will automatically throw a line feed before the end of the line, so allowing

the text to be read more easily.  
**ESC@:** The cursor is moved to the top left corner of the screen.

**ESC B:** Tab. Five spaces are printed from the current cursor position.

**ESC C:** Delete word. Text is deleted from the current cursor position back to the line preceding space.

**ESC D:** Cursor back one word. The cursor is moved left to the line preceding space.

**ESC E:** Cursor forward one word. The cursor is moved right to the first space.

**ESC F:** Cursor up one page. The cursor is moved back 256 characters.

**ESC G:** Delete line. The 48 characters preceding the cursor are deleted.

**ESC H:** Insert line. 48 spaces are inserted at the current cursor position.

**ESC I:** Cursor down one page. The cursor is moved forward 256 characters.

**ESC J:** Change background colour.

**ESC K:** Change border colour.

**ESC L:** Change text colour. In addition to these control function keys, several keys add special characters into the text in reverse field. These are used to control formatting during printing and are as follows:  
→ **ESC/BN** character: jumps to next line (line throw).

**CTRL P:** Page three. When printing out, a new page is started.

**CTRL S:** Double line spacing. A line is thrown, and subsequent lines are double spaced (i.e. one blank line appears between each line of text. This is the default spacing).

**CTRL T:** Single line spacing. A line is thrown, and subsequent lines are single spaced (i.e. no space between lines of text).

**CTRL U:** Left justify text. A line is thrown, and subsequent text is printed left justified (i.e. the right margin is aligned, but the left margin is ragged. This is similar to the output from a normal typewriter).

**CTRL V:** Right justify text. A line is thrown, and subsequent text is printed right justified (i.e. the right margin is aligned, but the left margin is ragged).

**CTRL W:** Right and left justify. A line is thrown, and subsequent lines are printed right and left justified (i.e. both margins are aligned. This is the default justification setting).

2478 2479 25A,267,281,21,21,34,  
14,267,22,141,264  
2480 2478 267,241,249,267,  
144,78,140,252,267,141  
2490 2478 25A,267,76,78,297,  
173,229,267,269,1  
2500 2478 76,76,112,174,247,  
1,231,294,149,41  
2510 2478 123,231,247,2,123,  
252,173,247,267,123  
2520 2478 252,173,252,267,  
123,252,164,4,123,252  
2530 2478 269,164,4,123,252,  
4,23,142,273,142  
2540 2478 4,177,252,267,267,  
269,4,147,1,142  
2550 2478 269,267,76,72,252,  
148,144,247,252,269  
2560 2478 229,252,231,44,3,  
269,229,142,252,141  
2570 2478 249,267,142,254,  
142,254,267,267,21,253  
2580 2478 194,249,269,254,  
144,4,10,229,267,21  
2590 2478 76,277,147,4,123,  
269,21,252,252,261  
2600 2478 10,269,14,149,4,  
14,241,267,149,1  
2610 2478 123,269,76,267,21,  
269,2,76,224,147  
2620 2478 72,173,249,267,269,  
4,264,76,44,176  
2630 2478 144,264,267,269,217,  
147,1,123,264,217  
2640 2478 144,2,269,2,249,17,  
261,1,269,17  
2650 2478 46,173,267,4,237,  
44,2,141,273,267  
2660 2478 22,199,273,21,144,  
176,76,224,142,217  
2670 2478 249,176,254,173,44,  
1,179,233,142,3  
2680 2478 141,229,247,21,199,  
176,242,249,254,12  
2690 2478 254,152,174,44,3,  
21,222,199,242,249  
2700 2478 254,76,254,147,173,  
249,247,173,223,173  
2710 2478 254,267,123,254,  
147,149,112,211,149,1  
2720 2478 123,252,144,4,123,  
221,142,252,249,249  
2730 2478 247,2,249,244,76,  
123,72,144,4,123  
2740 2478 247,247,123,221,  
123,252,247,123,252,177  
2750 2478 221,249,142,244,11,  
226,249,247,173,149  
2760 2478 247,249,1,226,254,  
247,144,144,76,123,123

247,144,144,76,123  
2770 2478 72,24,173,254,247,  
147,177,176,71  
2780 2478 249,247,142,224,  
144,21,249,247,247,173  
2790 2478 249,247,249,254,  
249,2,249,249,247,144  
2800 2478 144,76,173,247,247,  
241,199,249,4,149  
2810 2478 1,141,221,247,76,  
26,199,226,244,247  
2820 2478 173,244,247,249,2,  
224,247,247,76,249  
2830 2478 244,247,173,244,  
241,249,252,249,2,244  
2840 2478 247,247,4,147,4,  
174,144,254,22,126  
2850 2478 252,173,44,2,244,2,  
142,45,21,149  
2860 2478 252,144,174,142,  
221,123,252,142,252,  
174,144,254,22,126  
2870 2478 252,173,44,2,244,2,  
142,45,21,149  
2880 2478 252,123,224,22,76,  
147,4,274,144,4  
2890 2478 22,144,252,173,44,  
2,144,2,142,45  
2900 2478 22,149,252,147,4,  
174,247,247,173,254  
2910 2478 247,22,212,252,147,  
22,141,254,247,141  
2920 2478 249,247,147,76,141,  
254,247,144,252,247  
2930 2478 144,22,123,252,147,  
76,123,252,22,249  
2940 2478 199,242,252,141,  
244,247,142,252,141,247  
2950 2478 247,147,142,144,4,  
142,221,76,147,2  
2960 2478 123,221,147,76,123,  
252,147,4,241,249  
2970 2478 247,144,173,221,  
241,174,244,21,241,147  
2980 2478 244,142,249,242,244,  
4,22,254,173,74  
2990 2478 144,199,144,1,141,  
224,247,144,144,4  
3000 2478 144,4,122,141,254,  
247,22,254,173,74  
3010 2478 247,247,247,147  
3020 2478 244,21,249,242,249,  
2,76,252,199,247  
3030 2478 174,173,76,214,177,  
22,124,192,76,147  
3040 2478 44,123,252,144,2,  
123,252,144,4,123  
3050 2478 144,147,26,122,221,  
142,221,123,147,147  
3060 2478 4,123,144,252,  
123,142,147,4,123

3060 2478 144,147,76,123,142,  
22,221,242,144,144  
3070 2478 22,144,252,142,142,  
22,252,252,144,144  
3080 2478 244,144,144,123,  
252,22,142,252,144  
3090 2478 252,173,223,144,  
144,244,22,144,21,126  
3100 2478 244,252,144,252,22,  
244,147,147,22,22  
3110 2478 244,252,22,144,252,  
72,173,142,2,249  
3120 2478 252,144,144,144,  
244,24,174,244,4,22  
3130 2478 214,252,76,44,244,  
144,21,22,214,252  
3140 2478 144,277,244,44,244,  
4,144,4,244,277  
3150 2478 22,44,244,76,144,  
221,241,224,247,142  
3160 2478 252,141,227,247,  
173,174,247,244,24,147  
3170 2478 244,141,24,2,144,  
244,141,24,2,147  
3180 2478 127,141,12,221,147,  
252,141,2,221,147  
3190 2478 4,141,1,221,76,173,  
244,147,4,173  
3200 2478 144,2,12,144,252,  
144,4,12,144,252  
3210 2478 22,192,252,21,126,  
244,21,126,244,147  
3220 2478 4,141,177,247,176,  
147,212,247,252,247  
3230 2478 247,223,254,4,244,  
242,21,144,199,149  
3240 2478 1,144,244,247,142,  
211,247,173,252,247  
3250 2478 244,4,22,199,244,76,  
214,244,22,27  
3260 2478 142,22,22,244,2,  
22,244,144,142  
3270 2478 222,241,144,199,  
247,241,242,247,141,242  
3280 2478 247,242,4,142,244,  
247,142,142,247,144  
3290 2478 247,247,247,147,  
240,2,76,142,247,241  
3300 2478 244,21,142,247,241  
3310 2478 142,244,2,76,147,  
241,241,147,244,2  
3320 2478 76,147,244,24,142,  
44,144,76,173,247  
3330 2478 247,241,244,244,  
144,241,244,244,123,244  
3340 2478 244,244,144,244,  
244,244,144,244,173,244  
3350 2478 144,241,211,244,76,

290, 176, 248, 72, 76  
 3348 0476 281, 289, 171, 287,  
 287, 34, 183, 234, 176, 12  
 3350 0476 173, 287, 287, 24, 183,  
 64, 34, 287, 287, 76  
 3360 0476 187, 281, 173, 287,  
 287, 34, 64, 248, 8, 149  
 3370 0476 76, 84, 287, 287, 76,  
 127, 34, 24, 248, 173  
 3400 0476 188, 27, 173, 287, 287,  
 24, 287, 188, 144, 32  
 3410 0476 173, 287, 287, 24, 183,  
 64, 34, 287, 287, 76  
 3420 0476 127, 281, 173, 287,  
 287, 34, 183, 128, 141, 287  
 3430 0476 287, 173, 287, 287,  
 187, 173, 286, 122, 187, 32  
 3440 0476 127, 173, 286, 226,  
 218, 287, 248, 11, 76, 281  
 3450 0476 288, 147, 1, 141, 282,  
 287, 34, 188, 281, 177  
 3460 0476 221, 284, 21, 198, 17,  
 178, 221, 184, 221, 281  
 3470 0476 221, 286, 21, 178, 222,  
 287, 248, 74, 177, 221  
 3480 0476 281, 22, 288, 227, 128,  
 287, 5, 74, 227, 282  
 3490 0476 142, 286, 287, 173,  
 173, 286, 281, 21, 288, 24  
 3500 0476 173, 183, 286, 281, 22,  
 287, 7, 221, 184, 286  
 3510 0476 281, 22, 248, 22, 145,  
 1, 286, 286, 287, 287  
 3520 0476 173, 286, 288, 127,  
 173, 286, 226, 286, 187, 248  
 3530 0476 287, 222, 222, 76, 213,  
 281, 174, 286, 287, 189  
 3540 0476 173, 286, 281, 22, 288,  
 8, 186, 286, 287, 76  
 3550 0476 122, 281, 142, 8, 228,  
 286, 287, 173, 287, 287  
 3560 0476 248, 22, 173, 286, 287,  
 288, 2, 74, 227, 282  
 3570 0476 127, 288, 287, 281, 2,  
 248, 7, 281, 2, 248  
 3580 0476 1, 74, 147, 248, 173,  
 288, 287, 288, 2, 74  
 3590 0476 147, 282, 281, 2, 288,  
 184, 142, 8, 189, 172  
 3600 0476 286, 286, 22, 198, 4,  
 222, 226, 286, 287, 189  
 3610 0476 247, 76, 147, 282, 142,  
 288, 287, 74, 47, 282  
 3620 0476 189, 172, 286, 281, 22,  
 248, 7, 222, 226, 286  
 3630 0476 287, 288, 241, 76, 147,  
 287, 174, 286, 287, 189  
 3640 0476 173, 286, 281, 22, 248,  
 12, 248, 226, 286, 287

3650 0476 288, 243, 286, 286,  
 287, 74, 76, 282, 282, 142  
 3660 0476 288, 287, 174, 286,  
 287, 189, 183, 286, 222, 127  
 3670 0476 172, 286, 282, 282,  
 22, 281, 287, 288, 243  
 3680 0476 288, 287, 288, 173  
 3690 0476 288, 287, 288, 219,  
 287, 288, 2, 76, 147, 282  
 3700 0476 228, 286, 287, 174,  
 281, 287, 282, 76, 78, 282  
 3710 0476 173, 218, 287, 24, 227,  
 286, 287, 72, 172, 288  
 3720 0476 287, 288, 2, 248, 2,  
 184, 74, 72, 188, 24  
 3730 0476 188, 289, 287, 178, 74,  
 178, 282, 174, 289, 287  
 3740 0476 147, 22, 22, 218, 228,  
 282, 288, 248, 173, 174  
 3750 0476 287, 248, 48, 189, 172,  
 286, 24, 287, 183, 184  
 3760 0476 24, 189, 172, 288, 74,  
 183, 142, 248, 172, 189  
 3770 0476 173, 288, 248, 183, 179,  
 144, 18, 189, 172, 286  
 3780 0476 28, 122, 228, 74, 228,  
 282, 189, 172, 288, 24  
 3790 0476 183, 22, 74, 228, 282,  
 183, 172, 228, 22, 228  
 3800 0476 222, 222, 224, 286,  
 287, 248, 171, 22, 22, 228  
 3810 0476 228, 288, 287, 173,  
 242, 287, 282, 212, 287, 288  
 3820 0476 2, 76, 174, 282, 173,  
 211, 287, 288, 17, 22  
 3830 0476 22, 284, 228, 288, 287,  
 173, 287, 287, 282, 22  
 3840 0476 287, 288, 2, 76, 174,  
 242, 173, 282, 288, 287  
 3850 0476 28, 173, 142, 2, 41, 2,  
 241, 18, 22, 172  
 3860 0476 289, 281, 22, 248, 2,  
 74, 222, 248, 74, 222  
 3870 0476 288, 171, 287, 287,  
 288, 173, 248, 228, 281, 174  
 3880 0476 288, 8, 147, 1, 147,  
 211, 287, 74, 144, 282  
 3890 0476 282, 211, 288, 8, 147,  
 8, 211, 211, 287, 74  
 3900 0476 288, 287, 281, 173,  
 288, 2, 187, 2, 141, 288  
 3910 0476 287, 74, 286, 282, 287,  
 284, 288, 8, 147, 8  
 3920 0476 141, 288, 287, 74, 144,  
 282, 288, 214, 288, 8  
 3930 0476 147, 2, 141, 288, 287,  
 74, 144, 282, 288, 282  
 3940 0476 288, 8, 147, 1, 147,  
 288, 287, 74, 144, 282  
 3950 0476 288, 288, 288, 22, 187,

1, 147, 187, 287, 172  
 3960 0476 288, 281, 288, 212,  
 287, 248, 22, 22, 22, 288  
 3970 0476 228, 288, 287, 24, 121,  
 287, 281, 177, 288, 8  
 3980 0476 287, 1, 141, 281, 287,  
 74, 128, 288, 281, 182  
 3990 0476 288, 248, 172, 187,  
 287, 288, 21, 76, 22, 282  
 4000 0476 22, 22, 284, 22, 22,  
 284, 22, 47, 284, 22  
 4010 0476 22, 284, 22, 22, 284,  
 173, 282, 287, 248, 42  
 4020 0476 286, 214, 287, 171,  
 214, 287, 248, 21, 142, 8  
 4030 0476 288, 219, 287, 127,  
 212, 287, 222, 224, 4, 288  
 4040 0476 288, 287, 1, 241, 228,  
 287, 74, 188, 288, 173  
 4050 0476 176, 287, 288, 12, 187,  
 282, 241, 28, 2, 148  
 4060 0476 241, 241, 28, 2, 76,  
 244, 288, 22, 221, 228  
 4070 0476 172, 226, 287, 122,  
 221, 172, 227, 227, 222, 228  
 4080 0476 288, 172, 222, 287, 248,  
 18, 22, 171, 284, 288  
 4090 0476 22, 248, 2, 76, 222,  
 287, 22, 171, 284, 12  
 4100 0476 22, 228, 24, 228, 288,  
 149, 22, 22, 228, 228  
 4110 0476 172, 174, 287, 248, 2,  
 149, 18, 22, 228, 228  
 4120 0476 84, 173, 222, 287, 281,  
 1, 288, 92, 74, 24  
 4130 0476 288, 171, 222, 287,  
 281, 2, 288, 82, 174, 224  
 4140 0476 287, 187, 22, 22, 218,  
 222, 282, 288, 248, 148  
 4150 0476 42, 22, 218, 222, 148,  
 22, 22, 218, 222, 148  
 4160 0476 1, 289, 22, 287, 281,  
 48, 288, 2, 282, 288  
 4170 0476 244, 187, 212, 287, 22,  
 228, 228, 288, 288, 247  
 4180 0476 228, 22, 67, 287, 172,  
 228, 287, 281, 288, 288, 22  
 4190 0476 147, 48, 141, 224, 287,  
 228, 212, 287, 172, 217  
 4200 0476 287, 288, 24, 288, 8,  
 147, 48, 141, 217, 287  
 4210 0476 228, 218, 287, 149, 22,  
 22, 218, 222, 149, 42  
 4220 0476 22, 218, 228, 22, 22,  
 284, 44, 22, 21, 288  
 4230 0476 74, 222, 282, 142, 4,  
 22, 281, 222, 221, 287  
 4240 0476 222, 41, 128, 248, 2,  
 147, 2, 141, 187, 287

**CTRL-C** Control-verse text on line. A line is thrown, and subsequent lines are printed with the text controlled on the line. This would normally be used to print headings etc.

**CTRL-B** Beginning marker. This sets the beginning of the block for saving, printing and word counting. More than one begin marker may be used, but only the first will be recognized.

**CTRL-E** End marker. This sets the end of the block for saving, printing, and word counting. More than one end marker may be used, but only the first will be recognized. If no end marker is used, the action will continue until the end of the text marker (E) is reached.

**1. SAVE DOCUMENT**  
 This option allows you to save any or all of the text currently in the memory to disk. The text saved is from the first beginning marker (B) to the first end marker (E) or (Z), and the save routine gives an exit option if these markers have not been set up. A filename is then requested, which can be up to 32 characters long. Wild card filenames (i.e. those containing the characters \*, ? or .) are not acceptable. On saving, the suffix .TXT is added to the disk file name to assist in identification of text files. If the markers are incorrectly set, if the disk drive is not available, or if the file exists, an error message is printed, otherwise a successful save message is displayed, and pressing SPACE causes a return to the main menu.

**2. LOAD DOCUMENT**  
 This option allows you to load a text file from disk into memory for editing or printing. Loading will start from the cursor position, and an exit option is given if this has not been set up. A filename is then requested, which can be up to 32 characters long. Wild card filenames are not acceptable. The routine will then search for a file of this name with the suffix .TXT, and if a load error occurs, an error message is displayed, otherwise a successful load message is displayed and pressing SPACE causes a return to the main menu. As loading commences from the cursor position, several files may be obtained into use in memory. When loading is complete, the cursor is set to the start of the text memory.















# PROGRAMMER OF THE YEAR

by [www.commodore.com](http://www.commodore.com)

## Polar problems with this

### month's entry from Ian Potts.

**POLAR PETE IS THE LATEST GAME TO BE** featured in the Programmer of the Year competition. The game doesn't feature really fast, super smooth graphics, but instead Ian Potts has taken a simple idea, added some extremely 'cute' graphics and produced an excellent game. A good game isn't always complicated.

## The Game

Your aim is to guide Polar Pete around his local ice-park collecting the blocks of ice so that he can build his igloo. Oh course life isn't made easy as Pete has to avoid the penguins and polar bears which always seem to be in his way.

Pete is controlled by a joystick in Port 1. To pick up a block of ice you must position Pete just to the right of a block of ice and press the button. Positioning is important and it has been found that it is best to position Pete so that his nose is just above and right of the ice block.

Once the ice block is collected Pete must drag the block back to his position on the right hand side of the screen. Again position Pete to the right and press fire to deposit the block.

After all of the blocks have been collected Pete will build his igloo and go on to the next screen.

The music can be turned off by pressing any key on the keyboard.

Oh, by the way, don't let Pete fall into the water as it's very cold!

## Getting it in

Polar Pete will work on a C64 with either tape or disk.

There are five parts to be entered (PETE LOAD 1-5). Each of the five parts must be typed into your machine separately and saved on to tape or disk. If you are using tape do make sure that you make changes where indicated in the REM statements. Do make sure that you save the programs with the same names as in the magazine or they will not work.

Once all parts have been saved turn your machine off and on and enter the following line:

POLAR PETE LOAD 1-5

Now load PETE LOAD 1 into your machine and type RUN. This will load in each of the parts as required and save them into memory. If you have made any errors while typing in any of the data statements you will now be told which line the error is in. Make the changes needed, SAVE the part again and start again from the POKE instructions above.

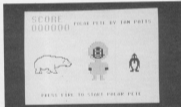
When all of the information has been saved into memory the program will automatically save itself as POLAR PETE. If

you are using cassette then do make sure that you put a clean cassette into the recorder after part five has loaded. If you don't then POLAR PETE will be saved after all of the other parts which are no longer needed.

All you need to do to play POLAR PETE is turn your machine off and on and type

LOAD "POLAR PETE",A,1 to disk or  
LOAD "POLAR PETE",L,1 for tape

Once the program has finished loading type RUN and play the game.



### PROGRAM: PETE LOAD 1

```

2000 FOR L=0 TO 255:POKE
:FOR B=0 TO 255:POKE A
:(C=C+4)*POKE 2000+L*16+
4,B:NEXT B
2010 READ A:IF A=0:THEN PO
187:GOTO 2010:IF
2040:GOTO 2010:STOP
2020 NEXT L
2030 DAT# 11,0,18,0,128,44,
30,56,77,24,41,0,0,0,179,
204,947
2050 DATA 204, 204, 204, 204,
204, 204, 204, 204, 204, 204,
204, 204, 204, 204, 204,
204,

```

```

2060 DATA 204, 204, 204, 204,
204, 204, 204, 204, 204, 204,
204,
2070 DATA 204, 204, 204, 20, 61,
0, 31, 177, 0, 71, 20, 0, 16, 0,
180, 0, 1071
2080 DATA 0, 0, 0, 0, 0, 0, 31, 0,
20, 204, 0, 204, 0, 1, 128, 677
2090 DATA 0, 11, 0, 0, 18, 171, 0,
21, 20, 0, 48, 20, 0, 170, 0, 0,
204
2100 DATA 170, 0, 0, 77, 204, 0,
41, 0, 114, 0, 0, 180, 0, 0, 0,
0, 0
2110 DATA 0, 0, 0, 0, 16, 0, 0, 16,
0, 0, 31, 0, 0, 124, 0, 0, 177

```

P



16,721  
 2979 0070 7, 21, 19, 173, 8, 228,  
 45, 3, 200, 24, 149, 3, 141, 53,  
 3, 109, 1327  
 2980 0070 3, 34, 53, 3, 149, 147,  
 140, 258, 7, 33, 144, 32, 32,  
 147, 14, 76, 1379  
 2981 0070 32, 34, 173, 8, 228, 41,  
 1, 388, 24, 149, 3, 141, 53, 3,  
 149, 3, 1282  
 2982 0070 141, 35, 3, 147, 138,  
 141, 258, 7, 33, 144, 32, 41,  
 14, 74, 33, 1321  
 2983 0070 14, 149, 8, 141, 53, 3,  
 148, 4, 142, 8, 292, 289, 231,  
 134, 288, 248, 1768  
 2984 0070 173, 8, 228, 41, 14,  
 244, 3, 76, 102, 13, 173, 241, 3,  
 341, 8, 344, 1731  
 2985 0070 11, 39, 34, 248, 71,  
 341, 33, 244, 47, 74, 143, 17,  
 173, 48, 3, 244, 1768  
 2986 0070 3, 76, 102, 13, 147, 1,  
 141, 48, 3, 258, 233, 7, 147,  
 144, 341, 43, 1271  
 2987 0070 3, 144, 144, 141, 44, 3,  
 144, 144, 141, 43, 3, 147, 138,

2988 0070 11, 328, 76, 3, 173, 76,  
 1, 241, 3, 244, 14, 149, 24, 141,  
 71, 3, 1442  
 2989 0070 147, 8, 141, 48, 3, 141,  
 47, 3, 76, 217, 14, 149, 24, 141,  
 71, 3, 14282  
 2990 0070 147, 8, 141, 48, 3, 141,  
 47, 3, 33, 173, 77, 35, 44, 39,  
 147, 143, 1764  
 2991 0070 141, 258, 7, 147, 144,  
 141, 251, 7, 174, 19, 3, 33, 29,  
 33, 243, 288, 1027  
 2992 0070 258, 149, 8, 141, 222,  
 3, 142, 8, 144, 8, 124, 288, 233,  
 292, 288, 248, 1779  
 2993 0070 288, 232, 3, 173, 222,  
 3, 288, 232, 76, 92, 13, 288, 37,  
 3, 244, 1, 1424  
 2994 0070 94, 147, 14, 141, 57, 3,  
 148, 134, 141, 258, 7, 173, 233,  
 7, 241, 13, 1442  
 2995 0070 248, 173, 288, 133, 248,  
 32, 147, 1, 141, 38, 3, 147, 133,  
 140, 231, 7, 1732  
 2996 0070 76, 147, 8, 141, 38, 3,  
 147, 132, 141, 258, 7, 94, 173,  
 38, 3, 244, 1737

14, 141, 57, 3, 173, 231, 7, 241,  
 173, 248, 1779  
 2997 0070 13, 241, 144, 248, 33,  
 147, 3, 141, 38, 3, 147, 144,  
 140, 231, 7, 94, 1794  
 2998 0070 147, 8, 141, 50, 3, 147,  
 148, 141, 23, 7, 94, 173, 38, 3,  
 244, 8, 1422  
 2999 0070 147, 133, 141, 251, 7,  
 94, 147, 141, 141, 231, 7, 94,  
 244, 42, 3, 244, 3177  
 3000 0070 3, 74, 147, 7, 141, 42,  
 3, 173, 8, 244, 341, 144, 244, 4,  
 234, 8, 1731  
 3001 0070 244, 76, 147, 211, 141,  
 24, 244, 147, 211, 23, 244,  
 173, 42, 3, 141, 2319  
 3002 0070 221, 7, 133, 7, 244,  
 241, 121, 244, 14, 4, 244, 9,  
 244, 74, 232, 2448  
 3003 0070 3, 244, 76, 147, 3,  
 141, 7, 244, 147, 178, 141, 8,  
 244, 74, 244, 42, 2477  
 3004 0070 3, 244, 1, 76, 147, 3,  
 141, 42, 3, 173, 8, 244, 241,  
 134, 244, 8, 1442  
 3005 0070 244, 8, 244, 74, 232, 7,  
 244, 74, 147, 211, 141, 24, 244,  
 147, 227, 141, 1347  
 3006 0070 23, 244, 173, 44, 3,  
 141, 252, 7, 173, 4, 244, 241,  
 131, 244, 8, 48, 1787  
 3007 0070 227, 244, 7, 244, 74,  
 147, 121, 141, 4, 244, 147, 121,  
 141, 8, 244, 76, 2172  
 3008 0070 244, 42, 3, 244, 1, 74,  
 147, 3, 141, 42, 3, 173, 8, 244,  
 341, 173, 1749  
 3009 0070 144, 8, 133, 4, 244, 74,  
 147, 192, 141, 24, 244, 147,  
 241, 141, 23, 244, 1021  
 3010 0070 173, 48, 3, 140, 173, 3,  
 173, 8, 244, 241, 174, 244, 14,  
 48, 4, 244, 1737  
 3011 0070 4, 244, 74, 234, 8, 244,  
 74, 147, 173, 141, 4, 244, 147,  
 174, 141, 8, 1424  
 3012 0070 244, 76, 244, 42, 3,  
 244, 1, 94, 147, 3, 141, 42, 3,  
 173, 7, 244, 1448  
 3013 0070 241, 147, 144, 4, 244,  
 4, 244, 8, 144, 192, 140, 29,  
 344, 147, 141, 141, 1348  
 3014 0070 23, 244, 173, 44, 3,  
 141, 252, 7, 173, 8, 244, 241,  
 174, 244, 144, 1924  
 3015 0070 4, 244, 8, 244, 74, 234,  
 8, 244, 74, 147, 147, 141, 7,  
 244, 147, 174, 2421

3016 0070 141, 8, 244, 74, 144, 8,  
 141, 42, 17, 141, 231, 244, 173,  
 4, 244, 244, 2174  
 3017 0070 24, 144, 231, 149, 138,  
 131, 231, 149, 232, 149, 4, 173,  
 232, 144, 8, 149, 234  
 3018 0070 49, 17, 142, 231, 244,  
 173, 4, 244, 244, 34, 143, 231,  
 145, 134, 132, 241, 2324  
 3019 0070 145, 232, 149, 4, 173,  
 232, 144, 8, 149, 232, 17, 145,  
 231, 244, 173, 4, 2174  
 3020 0070 244, 244, 24, 143, 231,  
 145, 134, 132, 241, 149, 231,  
 149, 4, 133, 232, 144, 2374  
 3021 0070 8, 145, 23, 17, 145,  
 231, 244, 173, 4, 244, 244, 74,  
 3, 4, 7, 8, 1427  
 3022 0070 9, 14, 14, 11, 12, 14,  
 14, 15, 14, 15, 14, 17, 148, 4,  
 147, 19, 241  
 3023 0070 17, 145, 231, 244, 173,  
 7, 244, 244, 24, 143, 231, 149,  
 134, 132, 231, 149, 2348  
 3024 0070 232, 149, 4, 133, 232,  
 144, 4, 149, 144, 17, 143, 231,  
 244, 173, 3, 244, 231  
 3025 0070 244, 74, 8, 17, 24, 21,  
 21, 23, 4, 14, 8, 4, 4, 4, 4, 24,  
 449  
 3026 0070 134, 14, 173, 133, 145,  
 34, 217, 241, 243, 244, 144,  
 173, 117, 133, 133, 127, 1374  
 3027 0070 134, 132, 133, 133,  
 144, 8, 149, 231, 17, 145, 231,  
 244, 173, 4, 244, 244, 2321  
 3028 0070 24, 144, 231, 149, 138,  
 131, 231, 145, 232, 149, 4, 173,  
 232, 144, 8, 149, 234  
 3029 0070 132, 17, 145, 231, 244,  
 173, 4, 244, 244, 34, 143, 231,  
 145, 134, 132, 241, 2327  
 3030 0070 145, 232, 149, 4, 173,  
 232, 144, 8, 149, 232, 17, 145,  
 231, 244, 173, 4, 2174  
 3031 0070 244, 244, 24, 143, 231,  
 244, 244, 244, 244, 244, 244,  
 244, 244, 244, 244, 244, 2374  
 4444 PRINT "01234567"  
 \*PRINT "000001"  
 LOAD \*ORIG-CIA+\*PTE LOAD  
 2\*ORIG-CIA+\*P  
 4444 END \*\* ORGNO THE JB  
 14 MOVE LOAD TO , 1 17  
 744 444 44444 THE JB  
 4444 PRINT "000001000"  
 4444 PRINT 42, 13\*ORIG 421, 12  
 \*PTE 421, 13\*ORIG 174, 1  
 \*PRINT "00001"

SCORE  
 000000



141, 44, 3, 134  
 3044 0070 24, 142, 133, 145, 174,  
 133, 231, 145, 234, 145, 3, 133,  
 232, 33, 173, 47, 1394  
 3045 0070 23, 44, 34, 32, 232, 37,  
 33, 231, 27, 74, 145, 13, 174,  
 44, 3, 244, 1344  
 3046 0070 3, 76, 102, 13, 147, 8,  
 141, 48, 3, 244, 232, 7, 147,  
 142, 141, 43, 1337  
 3047 0070 3, 147, 145, 141, 44, 3,  
 147, 147, 141, 43, 3, 147, 147,  
 141, 44, 3, 1374  
 3048 0070 32, 17, 24, 234, 48, 3,  
 173, 48, 3, 244, 71, 3, 244, 3,  
 74, 145, 1327

3049 0070 4, 147, 133, 141, 231,  
 7, 94, 144, 132, 141, 231, 7, 94,  
 244, 37, 3, 1444  
 3050 0070 244, 3, 74, 147, 14,  
 141, 27, 3, 147, 144, 141, 254,  
 7, 173, 231, 3, 1424  
 3051 0070 241, 232, 244, 17, 241,  
 134, 244, 32, 147, 1, 141, 54, 3,  
 147, 131, 141, 2444  
 3052 0070 251, 7, 94, 149, 4, 141,  
 54, 3, 145, 134, 140, 231, 7, 94,  
 173, 24, 1734  
 3053 0070 3, 244, 4, 147, 132,  
 141, 231, 7, 94, 145, 137, 141,  
 231, 7, 94, 244, 2422  
 3054 0070 57, 3, 244, 3, 94, 147,  
 141, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794

3055 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3056 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3057 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3058 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3059 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3060 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3061 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3062 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3063 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3064 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3065 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3066 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3067 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3068 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3069 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3070 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3071 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3072 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3073 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3074 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3075 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3076 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3077 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3078 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3079 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3080 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3081 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3082 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3083 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3084 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3085 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3086 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3087 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3088 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3089 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3090 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3091 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3092 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3093 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3094 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3095 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3096 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3097 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3098 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3099 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3100 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3101 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3102 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3103 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3104 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3105 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3106 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3107 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3108 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3109 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3110 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140, 231, 7, 94, 1794  
 3111 0070 147, 145, 141, 231, 7,  
 241, 231, 7, 173, 231, 7, 241,  
 140







2268 DATA 248,2,76,167,8,141,  
52,3,177,51,1,289,15,167,  
187,141,1649

2269 DATA 4,260,167,176,141,  
5,260,76,77,26,281,1,260,  
15,167,16,1624

2270 DATA 141,4,260,167,151,  
141,5,260,76,77,26,281,2,  
260,5,167,1614

2271 DATA 178,141,5,166,76,  
77,26,167,144,141,5,260,  
167,151,141,21,1922

2272 DATA 260,167,142,141,  
260,7,167,8,141,66,27,20,  
120,26,166,8,1666

2273 DATA 242,8,261,260,251,  
124,260,260,76,62,15,167,  
21,141,15,212,1647

2274 DATA 167,176,141,16,212,  
167,17,16,15,212,76,177,  
66,27,260,1,1676

2275 DATA 76,260,167,27,260,  
1,76,176,76,27,141,187,27,  
167,2,141,1,658

2276 DATA 260,27,176,166,27,  
167,67,27,260,27,252,166,  
27,260,22,167,166

2277 DATA 97,27,41,250,160,  
162,27,252,8,212,158,16,  
178,20,29,27,2512

2278 DATA 248,29,172,166,27,  
172,166,27,165,167,27,166,  
27,29,27,152,1666

2279 DATA 8,212,22,27,27,152,  
1,22,27,4,166,27,167,17,  
27,8,1,1276

2280 DATA 152,4,212,260,166,  
27,16,166,76,21,166,27,  
167,66,27,166,1629

2281 DATA 217,167,76,27,167,

218,261,217,260,260,152,  
217,260,2,264,218,2719

2282 DATA 216,217,166,252,  
172,260,27,167,166,27,165,  
167,27,166,167,8,260

2283 DATA 152,8,212,152,1,  
21,2,260,262,246,21,260,2,  
276,276,162,217,260

2284 DATA 76,167,8,141,66,27,  
162,3,178,16,166,24,165,  
7,27,252,167

2285 DATA 1,152,267,8,165,77,  
27,252,8,152,268,8,262,16,  
251,167,167

2286 DATA 1,141,166,27,141,  
161,27,141,162,27,140,167,  
27,140,66,27,252

2287 DATA 94,8,1,1,2,112,  
41,40,41,44,20,14,20,176,  
8,14

2288 DATA 8,8,8,2,14,8,8,172,  
97,27,261,16,260,21,167,  
79,1622

2289 DATA 141,5,212,160,26,  
141,12,212,167,140,141,12  
212,167,140,141,2608

2290 DATA 97,27,166,15,141,  
264,264,264,264,264,264,  
264,264,264,264,264,212

2291 PREFIX "123456789"

2292 PREFIX "123456789"

2293 PREFIX "123456789"

2294 PREFIX "123456789"

2295 PREFIX "123456789"

2296 PREFIX "123456789"

2297 PREFIX "123456789"

2298 PREFIX "123456789"

2299 PREFIX "123456789"

2300 PREFIX "123456789"

2301 PREFIX "123456789"

2302 PREFIX "123456789"

2303 PREFIX "123456789"

2304 PREFIX "123456789"

2305 PREFIX "123456789"

2306 PREFIX "123456789"

2307 PREFIX "123456789"

2308 PREFIX "123456789"

2309 PREFIX "123456789"

2310 PREFIX "123456789"

2311 PREFIX "123456789"

2312 PREFIX "123456789"

2313 PREFIX "123456789"

2314 PREFIX "123456789"

2315 PREFIX "123456789"

2316 PREFIX "123456789"

2317 PREFIX "123456789"

2318 PREFIX "123456789"

2319 PREFIX "123456789"

2320 PREFIX "123456789"

2321 PREFIX "123456789"

2322 PREFIX "123456789"

2323 PREFIX "123456789"

2324 PREFIX "123456789"

2325 PREFIX "123456789"

2326 PREFIX "123456789"

2327 PREFIX "123456789"

2328 PREFIX "123456789"

2329 PREFIX "123456789"

2330 PREFIX "123456789"

2331 PREFIX "123456789"

2332 PREFIX "123456789"

2333 PREFIX "123456789"

2334 PREFIX "123456789"

2335 PREFIX "123456789"

2336 PREFIX "123456789"

2337 PREFIX "123456789"

2338 PREFIX "123456789"

2339 PREFIX "123456789"

2340 PREFIX "123456789"

2341 PREFIX "123456789"

2342 PREFIX "123456789"

2343 PREFIX "123456789"

2344 PREFIX "123456789"

2345 PREFIX "123456789"

2346 PREFIX "123456789"

2347 PREFIX "123456789"

2348 PREFIX "123456789"

2349 PREFIX "123456789"

2350 PREFIX "123456789"

2351 PREFIX "123456789"

2352 PREFIX "123456789"

2353 PREFIX "123456789"

2354 PREFIX "123456789"

2355 PREFIX "123456789"

2356 PREFIX "123456789"

2357 PREFIX "123456789"

2358 PREFIX "123456789"

2359 PREFIX "123456789"

2360 PREFIX "123456789"

2361 PREFIX "123456789"

2362 PREFIX "123456789"

2363 PREFIX "123456789"

2364 PREFIX "123456789"

2365 PREFIX "123456789"

2366 PREFIX "123456789"

2367 PREFIX "123456789"

2368 PREFIX "123456789"

2369 PREFIX "123456789"

2370 PREFIX "123456789"

2371 PREFIX "123456789"

2372 PREFIX "123456789"

2373 PREFIX "123456789"

2374 PREFIX "123456789"

2375 PREFIX "123456789"

2376 PREFIX "123456789"

2377 PREFIX "123456789"

2378 PREFIX "123456789"

2379 PREFIX "123456789"

2380 PREFIX "123456789"

2381 PREFIX "123456789"

2382 PREFIX "123456789"

2383 PREFIX "123456789"

2384 PREFIX "123456789"

2385 PREFIX "123456789"

2386 PREFIX "123456789"

2387 PREFIX "123456789"

2388 PREFIX "123456789"

2389 PREFIX "123456789"

2390 PREFIX "123456789"

2391 PREFIX "123456789"

2392 PREFIX "123456789"

2393 PREFIX "123456789"

2394 PREFIX "123456789"

2395 PREFIX "123456789"

2396 PREFIX "123456789"

2397 PREFIX "123456789"

2398 PREFIX "123456789"

2399 PREFIX "123456789"

2400 PREFIX "123456789"

2128 DATA 8,141,64,2,238,75,  
1,172,62,3,261,16,260,1,  
66,167,1646

2129 DATA 8,141,62,3,238,76,  
3,172,64,3,261,16,260,1,  
66,167,1644

2130 DATA 8,141,64,3,238,75,  
3,172,63,3,261,16,260,1,  
66,167,1626

2131 DATA 8,141,61,3,238,75,  
3,172,62,3,261,16,260,1,  
66,167,1626

2132 DATA 8,141,61,3,238,75,  
3,172,62,3,261,16,260,1,  
66,167,1626

2133 DATA 8,141,61,3,238,75,  
3,172,62,3,261,16,260,1,  
66,167,1626

2134 DATA 8,141,61,3,238,75,  
3,172,62,3,261,16,260,1,  
66,167,1626

2135 DATA 8,141,61,3,238,75,  
3,172,62,3,261,16,260,1,  
66,167,1626

2136 DATA 8,141,61,3,238,75,  
3,172,62,3,261,16,260,1,  
66,167,1626

2137 DATA 128,167,162,141,28,  
1,149,26,141,21,2,60,76,  
167,1,141,162

2138 DATA 25,260,141,16,166,  
34,66,234,167,1,162,22,  
260,167,8,141,162

2139 DATA 21,260,167,252,160,  
21,260,167,252,160,27,260,  
167,252,141,21,252

2140 DATA 260,167,66,141,1,  
260,141,1,260,167,66,141,  
8,260,167,66,1924

2141 DATA 141,2,260,167,15,  
141,2,260,141,48,260,149,  
15,141,44,260,1666

2142 DATA 141,62,260,167,66,  
141,26,260,141,16,141,27,  
260,167,8,141,162

2143 DATA 260,260,167,26,141,  
26,260,162,126,142,260,7,  
252,142,267,7,252

2144 DATA 167,21,22,218,252,  
167,147,22,218,252,167,27,  
141,17,260,167,252

2145 DATA 8,141,21,260,172,  
97,27,41,250,141,97,27,  
172,66,27,81,252

2146 DATA 254,141,76,27,172,  
97,27,41,250,141,97,27,  
141,8,141,8,1647

2147 DATA 212,141,12,212,141,  
26,212,168,142,141,250,7,  
167,149,141,250,7,167

2148 DATA 141,7,260,167,22,  
141,16,260,167,8,141,44,  
260,167,167,8,141,44

2149 DATA 252,7,167,166,141,  
2,260,167,157,260

2150 DATA 141,7,260,167,22,  
141,16,260,167,8,141,44,  
260,167,167,8,141,44

2151 DATA 252,7,167,166,141,  
2,260,167,157,260

2152 DATA 260,141,5,260,167,  
126,142,240,7,167,126,141,  
249,7,142,17,252

2228 DATA 142,267,7,252,142,  
254,7,167,66,141,12,260,  
167,70,141,14,2629

2229 DATA 260,167,166,141,12,  
260,140,25,260,167,21,142,  
40,260,141,44,2604

2230 DATA 260,252,167,27,24,  
162,16,262,5,22,260,260,  
162,8,167,252,1664

2231 DATA 29,25,260,252,252,  
234,25,260,267,26,166,7,  
162,22,22,260,2160

2232 DATA 152,162,167,167,16,  
26,22,218,252,167,16,  
26,22,218,252,167,16,  
26,26,173,8,2604

2233 DATA 228,61,16,260,260,  
165,8,141,17,260,141,16,  
260,167,251,141,252

2234 DATA 26,260,167,252,141,  
22,260,76,167,176,152,251,  
167,114,252,252,260

2235 DATA 162,8,168,8,167,27,  
26,142,261,252,260,162,27,  
260,240,252,260

2236 DATA 252,252,162,126,252,  
252,142,252,142,8,152,252,  
254,176,260,254,2419

2237 DATA 26,260,25,26,26,66,  
67,74,62,66,75,66,79,76,  
62,62,112

2238 DATA 22,66,16,64,66,22,  
66,67,22,21,65,76,22,66,  
79,64,1664

2239 DATA 64,62,66,62,66,62,  
62,22,76,22,62,67,22,64,  
79,22,112

2240 DATA 67,66,62,62,64,22,  
66,79,76,62,62,27,66,67,  
66,66,1664

2241 DATA 8,8,8,8,8,8,8,8,8,  
252,144,142,8,8,8,248

2242 DATA 8,8,8,8,8,8,8,8,8,  
148,148,158,8,151,152,151,  
8,92

2243 DATA 8,8,8,8,8,8,8,8,8,  
154,152,154,152,154,154,  
166,162,166

2244 DATA 162,8,8,8,8,8,8,8,  
162,144,162,144,167,165,  
167,176,1664

2245 DATA 271,172,172,172,8,8,  
8,8,8,174,167,166,167,176,  
171,172,172,174,2622

2246 DATA 172,174,172,172,  
179,260,260,162,162,260,  
262,260,267,260,267,218,  
1764

PROGRAM: PFC LOAD 2

2400 FOR I=0 TO 150:GOTO  
FOR I=0 TO 150:GOTO A  
150:GOTO PFC LOAD 2  
NEXT I

2410 READ A:IF A=0 THEN PR  
INT:GOTO B:GOTO C  
2420 GOTO B:GOTO C

2430 NEXT I

2440 DATA 141,5,212,167,27,  
6,5,212,76,167,15,141,6,  
2,166,16,1627

2450 DATA 141,12,212,167,1,  
141,21,21,167,16,141,97,  
27,76,176,97,172

2460 DATA 2,167,176,29,152,

122,168,91,152,122,142,27,  
22,227,27,174,167

2470 DATA 93,2,166,260,29,  
121,152,142,26,25,157,27,  
174,76,5,166,172

2480 DATA 210,29,121,122,162,  
29,22,227,27,174,97,3,166,  
240,29,152,162

2490 DATA 122,162,91,22,227,  
27,174,91,5,166,218,27,  
152,122,162,91,166

2500 DATA 21,227,27,76,166,8,  
177,122,157,8,22,227,252,  
252,260,157,212

2510 DATA 7,260,142,64,250,  
76,3,172,76,3,260,16,260,  
1,76,167,166

2520 DATA 254,141,76,27,172,  
97,27,41,250,141,97,27,  
141,8,141,8,1647

2530 DATA 212,141,12,212,141,  
26,212,168,142,141,250,7,  
167,149,141,250,254

2540 DATA 7,167,166,141,4,  
260,141,6,260,167,112,141,  
5,260,149,157,260

2550 DATA 141,7,260,167,22,  
141,16,260,167,8,141,44,  
260,167,167,8,141,44

2560 DATA 252,7,167,166,141,  
2,260,167,157,260

2570 DATA 167,166,141,11,260,  
167,8,141,8,1647

2580 DATA 260,141,5,260,167,  
126,142,240,7,167,126,141,  
249,7,142,17,252

2526	8478	211,212,213,214, 215,216,217,218,219,220, 221,222,223,224,225,226, 227	2527	8478	211,212,213,214, 215,216,217,218,219, 220,221,222,223,224,225, 226,227,228,229	2528	8478	227,228,229,230,231, 232,233,234,235,236,237, 238,239,240,241,242, 243,244,245,246,247,248,249, 250,251,252,253,254, 255,256,257,258,259, 260	2529	8478	228,229,230,231, 232,233,234,235,236,237, 238,239,240,241,242,243, 244,245,246,247,248,249, 250,251,252,253,254, 255,256,257,258,259, 260	2530	8478	229,230,231,232,233, 234,235,236,237,238,239, 240,241,242,243,244,245, 246,247,248,249,250, 251,252,253,254,255, 256,257,258,259,260	2531	8478	230,231,232,233,234, 235,236,237,238,239,240, 241,242,243,244,245,246, 247,248,249,250,251,252, 253,254,255,256,257,258, 259,260	2532	8478	231,232,233,234,235, 236,237,238,239,240,241, 242,243,244,245,246,247, 248,249,250,251,252,253, 254,255,256,257,258,259, 260	2533	8478	232,233,234,235,236, 237,238,239,240,241,242, 243,244,245,246,247,248, 249,250,251,252,253,254, 255,256,257,258,259,260	2534	8478	233,234,235,236,237, 238,239,240,241,242,243, 244,245,246,247,248,249, 250,251,252,253,254,255, 256,257,258,259,260	2535	8478	234,235,236,237,238, 239,240,241,242,243,244, 245,246,247,248,249,250, 251,252,253,254,255,256, 257,258,259,260	2536	8478	235,236,237,238,239, 240,241,242,243,244,245, 246,247,248,249,250,251, 252,253,254,255,256,257, 258,259,260	2537	8478	236,237,238,239,240, 241,242,243,244,245,246, 247,248,249,250,251,252, 253,254,255,256,257,258, 259,260	2538	8478	237,238,239,240,241, 242,243,244,245,246,247, 248,249,250,251,252,253, 254,255,256,257,258,259, 260	2539	8478	238,239,240,241,242, 243,244,245,246,247,248, 249,250,251,252,253,254, 255,256,257,258,259,260	2540	8478	239,240,241,242,243, 244,245,246,247,248,249, 250,251,252,253,254,255, 256,257,258,259,260	2541	8478	240,241,242,243,244, 245,246,247,248,249,250, 251,252,253,254,255,256, 257,258,259,260	2542	8478	241,242,243,244,245, 246,247,248,249,250,251, 252,253,254,255,256,257, 258,259,260	2543	8478	242,243,244,245,246, 247,248,249,250,251,252, 253,254,255,256,257,258, 259,260	2544	8478	243,244,245,246,247, 248,249,250,251,252,253, 254,255,256,257,258,259, 260	2545	8478	244,245,246,247,248, 249,250,251,252,253,254, 255,256,257,258,259,260	2546	8478	245,246,247,248,249, 250,251,252,253,254,255, 256,257,258,259,260	2547	8478	246,247,248,249,250, 251,252,253,254,255,256, 257,258,259,260	2548	8478	247,248,249,250,251, 252,253,254,255,256,257, 258,259,260	2549	8478	248,249,250,251,252, 253,254,255,256,257,258, 259,260	2550	8478	249,250,251,252,253, 254,255,256,257,258,259, 260	2551	8478	250,251,252,253,254, 255,256,257,258,259,260	2552	8478	251,252,253,254,255, 256,257,258,259,260	2553	8478	252,253,254,255,256, 257,258,259,260	2554	8478	253,254,255,256,257, 258,259,260	2555	8478	254,255,256,257,258, 259,260	2556	8478	255,256,257,258,259, 260	2557	8478	256,257,258,259,260	2558	8478	257,258,259,260	2559	8478	258,259,260	2560	8478	259,260	2561	8478	260	2562	8478	261	2563	8478	262	2564	8478	263	2565	8478	264	2566	8478	265	2567	8478	266	2568	8478	267	2569	8478	268	2570	8478	269	2571	8478	270	2572	8478	271	2573	8478	272	2574	8478	273	2575	8478	274	2576	8478	275	2577	8478	276	2578	8478	277	2579	8478	278	2580	8478	279	2581	8478	280	2582	8478	281	2583	8478	282	2584	8478	283	2585	8478	284	2586	8478	285	2587	8478	286	2588	8478	287	2589	8478	288	2590	8478	289	2591	8478	290	2592	8478	291	2593	8478	292	2594	8478	293	2595	8478	294	2596	8478	295	2597	8478	296	2598	8478	297	2599	8478	298	2600	8478	299	2601	8478	300
------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	---	------	------	-------------------------------------	------	------	---------------------------------	------	------	-----------------------------	------	------	---------------------	------	------	-----------------	------	------	-------------	------	------	---------	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----	------	------	-----



2159 0476 179,179,179,179, 179,179,179,179,179,179, 179,179,179,179,179,179, 179	284,1201	236,11,647	2,169,936
2160 0476 159,159,162,159, 179,169,159,179,159,1,169, 94,21,62,94,21,169	2526 0475 11,12,11,192,264, 264,264,192,96,192,192,2, 2,11,11,11,169	2726 0475 1,126,11,1,127,19, 2,189,12,2,189,17,2,76,29, 2,76	2926 0475 17,2,76,29,2,26,26, 2,66,21,2,66,21,2,236,11, 297
2161 0476 44,8,8,8,8,8,8,42, 8,8,179,126,8,179,126,2, 169	2546 0475 1,11,2,222,192,264, 192,192,192,96,19,192,66, 6,192,6,192	2726 0475 26,26,2,66,22,169, 21,2,189,17,2,127,19,2, 224,179	2946 0475 1,127,19,2,189,17, 2,189,17,2,127,19,2,236, 21,6,82
2162 0476 42,168,2,42,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0475 40,6,222,262,21,48, 6,12,6,246,15,222,2,21,2, 2,122	2726 0475 1,2,236,21,2,127, 17,6,189,17,2,236,21,2, 127,17,169	2966 0475 226,21,2,236,21,2, 127,17,2,189,17,2,189,17, 2,76,96
2163 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0475 21,2,222,2,2,21,12, 48,48,8,8,8,8,8,2,12,487	2726 0475 1,189,17,2,189,17, 2,76,29,2,26,26,2,66,22,2, 66	2966 0475 29,2,26,26,2,66,22, 2,66,21,2,66,17,2,127,19, 222
2164 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0475 46,192,192,6,21, 264,6,6,6,6,6,222,6,6,6,6, 942	2726 0475 66,21,2,236,21,2, 127,19,2,189,17,2,189,17, 2,127,1697	2966 0475 2,236,21,2,236,21, 2,127,19,2,189,17,2,64,6,6, 6,971
2165 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0475 6,6,6,6,266,12,6,6, 6,6,6,6,6,6,122,66,492	2726 0475 19,2,236,21,6,236, 21,2,236,21,2,127,19,2, 189,17,169	2966 0475 4,236,21,2,189,17, 2,189,17,6,76,29,2,66,22, 2,667
2166 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0475 12,2,2,192,192,48, 48,12,12,8,8,224,224,224, 224,224,1692	2726 0475 2,189,17,2,76,29,2, 26,26,2,66,22,2,66,22,2, 66	2966 0475 66,22,6,236,21,2, 189,17,2,189,17,2,127,19, 2,667
2167 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 224,224,224,224, 224,224,224,224,224,224, 224,224,224,224,224,224, 224	2726 0476 169,17,2,127,19,2, 236,21,2,236,21,2,127,19, 6,184,1694	2966 0476 21,6,236,21,2,189, 17,2,189,17,6,76,29,2,66, 22,718
2168 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0476 224,224,224,21,21, 21,21,21,21,21,21,66,66, 64,64,64,1296	2726 0476 17,2,236,21,2,66, 21,2,26,26,2,26,26,2,76, 29,266	2966 0476 1,66,21,6,189,17, 4,666
2169 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 224,224,224,21,21, 21,21,21,21,21,21,66,66, 64,64,64,1296	2726 0476 2,236,22,2,266,24, 2,266,24,2,236,22,2,66,22, 2,1897	2966 0476 236,21,2,189,17,2, 189,17,6,76,29,2,66,22,2, 66,722
2170 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0476 86,84,86,222,192, 262,264,262,264,192,222, 222,6,192,264,262,2627	2726 0476 26,26,2,26,26,2, 127,19,2,236,21,6,236,21, 2,236,1694	2966 0476 21,6,236,21,2,189,17, 2,189,17,6,76,29,2,236,22, 2,677
2171 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0476 12,6,222,222,6,12, 264,264,262,222,222,2,2, 192,192,2626	2726 0476 21,2,66,22,2,26,26, 2,26,26,2,76,29,2,236,22, 227	2966 0476 66,22,6,189,17,2, 236,21,6,236,21,6,189,17, 6,236,2361
2172 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 1,2,222,66,182,182, 182,182,182,66,24,24,126, 24,24,24,1221	2726 0476 2,236,24,2,266,24, 2,189,17,2,236,16,2,165, 16,2,236	2966 0476 165,21,2,127,19,2, 126,19,6,189,17,2,236,21, 2,66,942
2173 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 126,66,182,6,66,76, 76,126,66,182,6,26,6,182, 66,12,1694	2726 0476 165,21,2,127,19,2, 126,19,6,189,17,2,236,21, 2,66,942	2966 0476 21,6,236,21,2,189,17, 2,189,17,6,76,29,2,236,22, 2,677
2174 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 182,66,66,182,182, 6,6,12,26,24,26,66,182, 182,66,182,1826	2726 0476 21,2,26,26,2,26,26, 2,76,29,2,236,22,2,266,24, 718	2966 0476 2,236,24,2,236,21, 2,66,22,2,26,26,2,26,26,2, 66
2175 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 182,66,66,182,182, 62,6,182,66,224,224,224, 224,224,224,224,224	2726 0476 127,19,2,236,21,6, 236,21,2,236,21,2,266,22,2, 26,1694	2966 0476 21,6,236,21,2,189,17, 2,189,17,6,76,29,2,266,22, 2,667
2176 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0476 224,224,224,2,236, 21,2,127,19,2,189,17,2, 189,17,2,1267	2726 0476 26,2,26,26,2,76,29, 2,236,22,2,266,24,2,266, 24,927	2966 0476 2,236,21,2,189,17, 2,189,17,2,1267,19,2, 19,2,7667
2177 0476 82,168,2,82,168,6, 179,168,21,179,168,92,179, 168,92,179,1267	2566 0476 76,29,2,26,26,2,66, 22,2,66,21,2,236,21,2,127, 717	2726 0476 2,189,17,2,1267,19, 2,182,19,2,162,16,2,127, 19,2,7667	2966 0476 126,19,6,189,17,2, 236,21,2,127,19,2,189,17, 2,667
2178 0476 168,2,16,168,6, 168,8,168,168,8,16,168,6, 16,168,1684	2566 0476 192,264,192,2,48,6, 6,12,192,2,6,2,21,2,264, 264		

20,710	124F BATA 0,0,0,255,12,12,12, 12,12,12,12,240,0,0,0,0, 255	207,1277	120F BATA 241,2,2,12,60,240, 2,2,2,2,2,12,12,60,40,192, 670	120F BATA 12,12,12,12,252,252, 252,240,0,0,0,0,0,0,240, 40,40,1040
124F BATA 2,60,21,0,104,17,2, 20,21,0,230,12,2,120,12, 0,277	127F BATA 0,0,0,192,192,40, 40,40,40,40,42,2,2,2,2,2, 702	124F BATA 192,192,192,252,0, 252,40,192,192,192,192, 252,192,252,2,12,1040	120F BATA 12,12,12,252,2,252, 2,2,2,2,2,192,192,40,12,2, 1040	120F BATA 192,192,192,40,12, 12,40,40,192,0,0,240,192, 192,192,192,2000
124F BATA 104,17,0,230,21,2, 104,17,0,104,17,0,10,29,2, 60,792	128F BATA 12,240,192,0,192, 192,240,40,40,40,21,0,0,2, 2,12,1200	124F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
125F BATA 22,1,60,21,0,230, 21,2,104,17,2,104,17,0, 127,19,197	129F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
126F BATA 0,230,21,0,230,21, 2,104,17,2,104,17,0,19,29, 2,877	12AF BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
127F BATA 60,21,21,60,21,2, 104,17,2,230,12,0,230,21, 0,104,197	12BF BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
128F BATA 17,60,0,0,0,254,0, 0,2,0,0,64,0,0,2,104,240	12CF BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
129F BATA 20,2,41,22,1,120, 46,1,220,46,2,41,22,2,104, 20,792	12DF BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
130F BATA 1,41,22,0,0,0,0,0, 0,252,0,0,0,0,0,0,200	12EF BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
131F BATA 0,192,62,0,0,0,0,2, 15,60,60,200,12,40,192,0, 0,852	12FF BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
132F BATA 192,60,2,2,2,12,12, 12,12,12,252,40,40,12,12, 12,792	130F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
133F BATA 12,12,12,240,12,2, 0,0,0,1,60,192,0,0,0,192, 240,680	131F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
134F BATA 12,12,2,0,0,2,12, 12,40,60,200,240,40,192, 192,192,192,680	132F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192
135F BATA 40,12,0,0,0,2,2,2, 2,2,252,192,192,0,0,712	133F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 12,12,12,12,252,0, 0,0,0,0,0,192,252,12,12,12, 680	120F BATA 192,192,192,192,252, 12,12,12,12,12,192	120F BATA 192,192,192,192,252, 12,12,12,12,12,192

## PROGRAMS: PETE LIND'S

1200 FOR LHM TO 15000  
 1201 FOR TO 150000  
 1202-C16-PRINT 1204F-1000+  
 1,1,00000 0

1203 READ 400F 4000 THEN PR  
 1204-100000 0 10000  
 1205-100000-1000

1206 NEXT 1

1207 BATA 2,2,252,2,0,0,0,0,  
 0,0,0,240,12,12,12,12,252  
 1208 BATA 12,12,12,12,252,0,  
 0,0,0,0,0,192,252,12,12,12,  
 680

1209 BATA 40,40,42,192,0,0,0,  
 0,12,240,40,40,40,40,40,  
 740,1000

1210 BATA 1,2,2,2,2,12,240,0,  
 2,2,12,240,240,40,40,240,  
 1000

1211 BATA 40,40,40,40,40,40,

40,2,0,0,0,0,0,0,2,242

1212 BATA 192,192,21,12,0,0,  
 0,0,0,0,0,0,192,40,12,192,  
 750

1213 BATA 207,192,192,192,  
 192,192,192,0,0,252,2,2,2,  
 2,2,2,1000

1214 BATA 12,12,12,252,12,0,0,0,  
 0,0,0,0,252,12,12,12,12,  
 250

1215 BATA 12,12,12,240,0,0,0,  
 0,0,42,240,40,40,40,40,62,  
 627

1216 BATA 240,0,0,0,0,0,0,  
 192,192,192,192,192,192,  
 200,240,40,1000

1217 BATA 21,21,60,240,0,0,0,  
 192,0,0,0,0,0,0,0,240,224

1218 BATA 12,0,0,0,0,0,0,2,2,  
 252,2,0,0,0,0,0,179

1219 BATA 0,0,200,12,0,0,0,  
 12,12,12,12,252,0,0,0,0,

250

1220 BATA 0,0,12,240,0,0,0,  
 40,40,42,192,0,0,0,0,12,  
 621

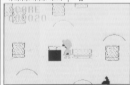
1221 BATA 240,0,0,0,0,0,0,0,  
 0,0,0,0,0,2,252,40,240

1222 BATA 252,252,252,0,0,0,  
 0,40,0,0,170,0,2,170,120,

2,1277

4000 POKE 42,1:POKE 44,0  
 4001 POKE 45,POKE 46,0  
 4002 PRINT"POLAR PETER",0,1

4003 HEX 0: CHANGE THE 0,1  
 10 ABOVE LINE TO ,1,1  
 IF YOU ARE USING TAPE 00



# LASER

# SHOW

Stuart Cooke has been experimenting with two Laser programs from Ocean.

HAVE YOU EVER WANTED TO WRITE your own arcade game but have been put off because of the complexities of machine code? Have you ever wished that the Basic on the C64 allowed you to do more with graphics? Or, have you always found it easy to write programs in Basic but always found them too slow? Well, two new packages from Ocean IQ will solve all of your problems.

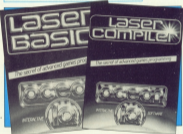
The first of the two programs is Laser Basic. Essentially this is just a Basic extension like many others available on the market. What makes it different from all of the rest is its plethora of graphics commands. In fact, nearly all of the commands in this Basic are geared to making the task of graphics programming easier. Not all of the commands are graphics based, though. There are also many advanced programming commands such as procedures and quite a formidable array of "toolkit" commands such as Poinumber.

The second package is the one that will be of great interest to anyone who has found their latest version of Space Invaders just a little slow when written in Basic. The program is the Laser Compiler. The compiler will change standard Commodore Basic and Laser Basic programs into machine code. Obviously this will give any programs a significant increase in speed.

Laser Basic is an extension of an earlier program called Basic Lightning which has been around for some time. If you already have Basic Lightning then you will be pleased to know that the Laser Compiler will compile most programs written with this package. But more of this later.

## Laser Basic

As previously mentioned, this is essentially a Basic Extension, but a very powerful one. One very nice feature is the inclusion of a tape turbo save option. This will undoubtedly please cassette users who are totally fed-up with the slowness of the Commodore cassette disk. In use the turbo proved itself to be both very fast



and very reliable. Even trying turbo-loaded programs on different cassette recorders presented no problems.

## Documentation

A large manual is supplied with the package which deals with all of the commands in detail. Some sections are a little difficult to understand at first reading but numerous example programs do make things a little clearer. Beginners would be well advised to try all examples and make sure that they understand how they work before they attempt to write any fantastic games program.

## In Use

Programming with Laser Basic is a joy, though, when you get on to using graphics, it is a little complicated to understand at first. The numerous structured programming commands make the Basic great to use. If you've ever

written programs in Pascal or other structured languages you'll know just how valuable are Procedures, Labels and other programming aids. For those who have never come across these commands let's take a closer look.

With a normal GOSUB statement in Basic you would use something like GOSUB 1000. Line 1000 could, for example, be the subroutine that updates the score. Unfortunately the line number 1000 doesn't tell you this. With Laser Basic you could re-write the GOSUB statement like this:

GOSUB update

and line 1000 would become

1000 LABEL update: \_\_\_\_\_

This makes it much easier to follow the flow of a program.

Procedures take the use of labels much further. With a procedure it is possible to have a program that uses a



variable, for example VARI. The procedure, which is similar to a subroutine, can also use the same variable name; however, the two can be treated as completely separate from the value of one not affecting the value of the other.

Other structured programming commands are REPEAT, UNTIL, loop, IF, THEN, ELSE and WHILE, WEND. All of which lead to much clearer and easier programming.

## Identity Crisis

Before we take a look at the graphics commands it is worth taking a close look at what is a new idea.

No doubt you will have already heard about the sprites that are available on the C64. In Laser Basic these have been renamed Hardware Sprites and a new type of sprite has been added, the Software Sprite. A software sprite, unlike a hardware sprite, is of dimensions that are set by the user up to a maximum of 255 character blocks by 255 character blocks.

All graphic commands are operated on Sprites, this may make you wonder how you get things on to the screen until you realise that the lives screen is treated as sprite number zero with fixed dimensions and that the text screen is treated as sprite number 255 also with fixed dimensions.

A sprite designer package is included with Laser Basic, using this it is easy to design extremely large sprites.

Numerous commands are available for sprite drawing. It is possible to plot points on a sprite, draw lines, draw lines. With the POLY command it is also possible to draw polygons and circles. Blank areas, such as those created with the BGR and POLY commands can be coloured in with the FILL command.

## Moving it Around

Sprites can be manipulated in numerous ways. The PUTBLK command is used to place a sprite at a specific place on the lives screen. It is possible to OR, AND or XOR the sprite with whatever is already on the screen. With careful use of these commands the software sprites can be made to appear in front of, or behind, other items on the screen.

Commands also exist for copying sprites, or parts of sprites, into other sprites.

Commands exist for moving sprites around the screen and scrolling them. It is even possible to make a sprite follow the path of another.

Scrolling backgrounds are now extremely easy. All that you need to do is to define your background as a sprite, don't forget that this can be up to 255 characters wide. Place this on the screen - only part of it will show - and then scroll the background sprite with one of the numerous scroll commands. It's as simple as that. It was never as easy as this to write Defender before.

## And There's More

Obviously it is only possible to give a taste of some of the commands available. There are many that I haven't even mentioned. If you are interested in playing around with graphics or just interested in programming then you should rush out and buy a copy of the program. You should be creating works of art in no time at all.

## Speeding Things Up

It's no good writing the world's best intergalactic space flight simulator only to find out that Brian the seal can beat your space ship at full speed. Nonetheless that is exactly what will happen if you write your programs in Basic. The only way to write fast programs is to use machine code like all the top programmers. Or is it?

The Laser Basic compiler will take programs that have been written using Laser Basic (and normal Basic) and turn them into machine code. Obviously the program generated by a compiler is not as compact or as fast as one written entirely in machine code but it will be many times faster than normal.

As can be seen, the Laser Basic compiler provides Commodore 64 users with an excellent programming aid. No longer do you have to study machine code. Simply write your program in Basic and off you go.

Coman IQ will also let you freely market any program that is written using Laser Basic and Laser Compiler as long as you put a mention on the packaging that these programs were used. Perhaps these packages could bring out the budding Minors and Commodore in many people.

The Manual supplied with Laser Compiler is very small, only seven pages, but all necessary information is there. It explains how to compile a program including how to save it. A turbo option is included for tape users. Disk users shouldn't feel left out either as they are provided with a routine that will make programs auto save.

For the many users of Basic Lightning, a small section is included that explains the differences in some of the commands, though most of these are only minor. For example the CUTOFF command now uses numbers in the range zero to 65535 instead of zero to 2547.

A quick glance at the demo program supplied with these packages shows just what is possible with these two excellent programming tools. When the Basic version of the demo is run it is surprising enough what is being done from within Basic, but when you see the speed of the compiled version it looks even better.

If you want to get into graphics programming but don't fancy getting into machine code then take a look at both of these packages they are well worth it.



Eric Doyle guides you  
through some more C-16  
games — new and not so  
new.

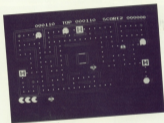
ANY PROGRAMMER WHO IS PLANNING a game for the C-16 always faces the problem of fitting the game into the limited memory space. This does not mean that the quality of the game will suffer, as Commodore proved with the 1.5K file 26. Unfortunately, the compression and economical use of memory is not even software house's forte and the consequence is a plethora of wasteful games. As I have shown there are several houses which take the C16 seriously and this month's collection shows the range of games which have impressed me and the reasons why.

Watching my colleagues in the office engrossed in yet another game of Break-out (and loving every minute) made me realise that complexity is not always the secret of a truly addictive game and to illustrate this I include Pacmania from Mr Chip Software. Pacman was one of the few arcade games to transcend the boundaries of the amusement arcade and capture public interest. The game is not very complex and even a satisfactory Basic game can be written or copied from a magazine. The added speed of machine code allows many more complications to be added and the animation is a lot smoother. Mr Chip has taken full advantage of these benefits to create a game which is recognisably the same as the arcade game, but different enough to give it added excitement.

Pacmania's hero is the familiar gobbler disc who is directed around a selection of eight mazes using up all the dots that litter every passageway. Ghosts emanate from the centre of the maze and set off in hot pursuit of your little muncher. In most versions of this game that I have seen the ghosts quite often wander about aimlessly and they come within sight of Pacman, but not so in Pacmania. The ghosts in this game go straight for the jagular muncher like crazy after your slower moving little man. Relief from this relentless pursuit can only be gained by either using the hyper-maze ports or by eating power pills.

Hyperports are a bit of a gamble because you can never be sure where you will reappear after using them. Assuming you don't end up on top of another ghost, it is an effective way of escaping a hot pursuit but the power pills are more predictable because they mean that the ghosts become vulnerable for a while. This allows Pacman to gain more points by eating the ghosts or a safe period to eat the pills without any interference. The speed of the action increases as you work your way through each level of eight

# C-16 ASSORTMENT



mazes, creating a game which can never be mastered fully and should hold the interest for quite some time.

Cyborg on the Budget budget priced label, from the Alligata pool of companies, is a simple game in programming terms but almost impossible to play unless you are the persevering type. Only action shoot 'em up fanatics should consider buying this one because it makes Pacman look like a senior citizen's picnic.

The rules are simple: blast all the moving aliens and save the distinctive Cyborgs before the enemy kills them. As always the reality is not so simple. In fact it took several attempts to start the first screen, every time my ship appeared an alien would collide with it and zap me back to the title screen minus another life. Eventually I managed to hang on long enough to survive and worry about using smart bombs. The instructions state that clearing the screen in one fell swoop is essential to your survival. What they don't

tell you is how to detonate a smart bomb to achieve this but I found the space bar had the desired effect.

What happens is this, your ship appears and then a random number of aliens appear all over the screen and immediately home in on you. Praying as you grasp the fire button, you blast wildly and try to wipe them all out before another group appears. This goes on until you clear the first wave and then the next onslaught begins. Gradually, several Cyborgs appear and you must collect as many as possible, avoiding all of the second enemy craft. Not much to the game really but it's maddeningly addictive.

Another game from Alligata should satisfy any platform game devotees with its 2D screens to people over. Forward planning and exceptional hand-to-eye coordination are all that is required to

complete Bigger.

Little by little, Roger the Dodger must learn the secrets of each screen as he collects the golden keys which unlock the safe. Banks, traps and houses, nothing can stop a master thief but it could be a long apprenticeship.

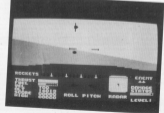
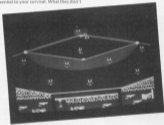
For the earthbound warrior there is US Gold's Beach Head. The limited memory does not allow for all of the screens contained in the C64 version but you do get the aircraft attack, battleship bombardment and the final fortress. Despite the dubious claim to 'amazing sound' emboldened on the cassette in bold capitals, the game displays something of what can be done with the C-70's graphics.

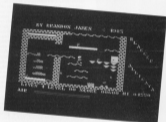
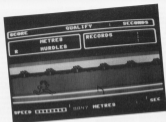
In glorious 3D graphics, your ship must bring down the enemy planes which are in front of the horizon and then fire the big guns to blast on the fleet of warships which block your way. In both cases it is essential to gauge the correct inclination for the guns to hit each target before they land enough shots to finish your ship off.

The final battle brings you in conflict with the enemy's largest and most accurate cannon. There are 10 targets on the fortress beneath the cannon and each target must be hit when it turns white. When all have been destroyed the large cannon begins to rotate towards your ship and you must score a direct hit on the weapon before it fires because it never misses. One hit destroys another of your ships so speed and accuracy is of the essence to succeed. This game lacks the addictive qualities of the others mentioned so far but the quality of the graphic display is so cleverly achieved that it deserves a place in any C-16 collection.

Sports fanatics are also catered for with the C-16. Ocean has converted Daley Thompson's five events for the joystick waggling armchair athletes. The game comes in two parts, side one contains four track events and side two has three field competitions. The track events are the most frantic, partly because they last longer than the field events and therefore require a degree of stamina for success. The events comprise of the 100 metres, 100 metres hurdles, the gruelling 400 metres, with the 300 metres hurdles following close on its heels. The animated graphics are also cleverly done but this is not the sort of game where you spend your time admiring the scenery! Provision has not been made to carry your results through to the events on side two which is a pity. On my tape this side wouldn't load but I'll accept Ocean's word that the long jump, shot-put and javelin events are just as enjoyably challenging.

For sophistication I preferred Imagine's World Series Baseball. Not only do you get a 3D image of the diamond but there is also a giant video screen in the background which shows a close-up view of the action.





Control is complex with all of the joystick positions having a bearing on various nuances of the gameplay. The animation is outstanding and with a little practice any novice can be hitting home runs, stealing bases and pitching fast balls with the best of them. Perhaps after learning the basics by playing this game, baseball could challenge American football as a new spectator sport in this country.

So far some of these games has been particularly demanding on the old grey matter. Rushing in to fill this gap is an adventure game from Bug Byte.

Although Twin Kingdom Valley has been available for the C64 for quite some time now, this C-16 version is pretty new.

The game has been condensed by removing the graphics and some of the less important features of the original.

I've always felt that the graphics in an adventure limit a player's imagination (though I admit that this criticism is often cited in defence of radio drama over television), so I'd rather play a complex text adventure than a limited multi-image game.

A nice touch is that the arrow and function keys are fully utilised to reduce the amount of typing necessary. The vocabulary is a little limited, action commands being selected from a list of 15 words. Not bad considering.

The idea is to wander about the Valley amassing as much treasure as possible. The pathways and caverns are patrolled by a variety of creatures who may turn out to be good or evil. As in life, the only way you can divide the wolves from the sheep

is to cautiously try to befriended everyone you meet. Unlike life, if you die you can always try again.

There is no SAVE facility which means that you must start again each time you begin a session. This is a definite irritation but you can't have everything.

For me the ultimate brain stretcher is chess and my selection here would be Audilogic's Grand Master. Playing against the computer is possible at a wide range of skill levels from novice to Grand Master.

The board is shown in plan view only and you can get the computer to suggest a move if you get really stuck. You can even leave the computer to play itself if you prefer but there isn't a two-player option. This is true of most chess simulators based on the acceptable argument that the two player game is best played on a real board.

If the publicity blurb is to be believed, Grand Master claims to be the best chess game around. Whether you believe this or not is immaterial to me, whatever the truth my brain is well and truly taxed by this game. Well worth checking out.

The final game in this round up is by far the most impressive game I have seen on the C-16. AC1 is a flight simulator (Air Combat Simulator) with stunningly fast-acting graphics.

As a fighter pilot, you find yourself already ripping through the ether at the beginning of the simulation. The control panel has all the necessary indicators to give you a fair chance to stay in the air and the radar displays the enemies' positions.

The aim is to seek out and destroy the enemy planes using the radar as first followed by visual tracking through the cockpit window. Trying to keep a plane in your sights as he dodges and flies at you is not very easy to do and low altitude aerobatics must only be indulged in by experts.

Full control over the jet is possible; climbing, diving, rolling and looping are all covered for and keeping track of the jet's orientation can be extremely difficult in the heat of battle. No collection can be considered complete without AC1.

It's not often that we have good news for Plus-4 owners but Cascade have just brought out a specially expanded and improved version of AC1 for these machines (reviewed in this issue of Your Commodore). Buy it, it's money well spent.

Well that ends this little round up, next month I'll be looking at more serious applications software for the C-16. In the meantime why not drop me a line at the Your Commodore office telling me about your particular favourite game on the good old C-16. If enough people disagree with my selection I'll give your games a whirl and see if I agree. You can reach me care of Your Commodore, 1 Golden Square, London W1R 3AB.











# War Play

# WAR PLAY

Choose your weapons - choose your role. Whose air force will do the victory roll? Whose commander will surrender?

Aerial dog-fights - Tank battles - an elusive commander - The scene is set for a thrilling contest of skill and strategy. One or two player.

£7.95 Cassette  
£10.95 Disc



CBM 64



## 16/PLUS 4 COMES OF AGE!

BONGO

16/PLUS 4

£5.95 Cassette

64 quality graphics and music - 5 high res. graphic screens - 5 skill levels - Menu driven facility to construct your own screens with save/load facility.



*Championship Series Ultimate in sports simulations.*



16/PLUS 4 WATER SPORTS £6.95 Cass.

Experience the sheer exhilaration of POWER BOAT RACING - Negotiate a complex SLALOM COURSE - Rise to the challenge of a SKI JUMP. Three exciting competitive events. ENHANCED PLUS 4 FEATURES



Represent your country in six star events competition including BIATHLON and BOB SLEIGH set against a scenic backdrop.

16/PLUS 4  
£6.95 Cass.



COMING SOON IN THE — *Championship Series* — TENNIS - CHESS - ICE HOCKEY

# ANCO

TRADE ENQUIRIES:  
ANCO MARKETING LTD. 85, THE KENILWAVE, WINDLEY HOLT  
TEL: 080 820071  
AAA GROUP - PAYMENT BY CREDIT P.O. USA OR ACCESS  
24 HR CREDIT CARD SERVICE

# Choosing the right computer is a good start — but can you find the right software?



At SUPERSOFT we're very conscious of the fact that people who spend several hundred pounds on computer equipment are looking to do rather more than play Space Invaders.

Financial planning is a rather grand name for something you've been doing all your life — making ends meet! Perhaps, if Mr Mixer had used **MUSICALC 3** he would have been able to balance the books a little better.

For home, club or small business use **MUSICALC 1** should pay for itself in no time at all; for larger companies we recommend **MUSICALC 3**, one of the few really valuable programs that you can learn to use in a day.

Although your Commodore 64 is a powerful musical instrument you need to be a pretty good programmer to understand how it all works. Unless, of course, you buy **MUSIC MASTER!**

To use **MUSIC MASTER** requires no prior musical knowledge, though in the hands of an experienced musician it will prove an invaluable tool. You don't need to know the first thing about programming either: **MUSIC MASTER** is the musical equivalent of a word processor, remembering the notes you play and allowing you to replay and edit them as you wish.

**INTERDICTOR PILOT** is a space flight simulator. Nowadays simulators are widely used to train pilots and astronauts because — to be frank — it's a lot cheaper (and safer) than the real thing!

Imagine, if you will, life in the 23rd century: space travel is commonplace, and on the outskirts of the galaxy the first war between civilizations is being fought. A short-age of trained pilots has prompted the Federation to develop a computer simulation that allows new recruits to gain experience without paying for their mistakes with their lives. With the aid of your Commodore 64 you too can learn to pilot the Interdictor Mk 3 craft. But be warned — this is no game!

Other SUPERSOFT products include the **MICRO ASSEMBLER** cartridge, the only assembler that's ideal for beginners yet powerful enough for the professional (most of our competitors use 85, the **VICTOR** cartridge adds dozens of commands to Basic including logical and disk commands; on an disk there's **MASTER 84**, a really comprehensive package for the keen programmer.

Of course, we do also publish games programs, and with classics like **STAR GUNNER** and **KAMB-KAZE** in our range we are one of the market leaders. But we most enjoy coming up with the sort of programs that are going to be in use for months and years, not hours and days — the sort of programs that make you glad that you bought a computer — and glad that you bought SUPERSOFT!

You won't find SUPERSOFT products on the shelves of your local supermarket. But need specialise those stock lists from our extensive range (and are prepared to obtain other programs to order). However you can also buy direct by sending a cheque (or postal order) are post free, by calling at our offices, or over the telephone using your ACCESS card.

**SUPERSOFT**

SUPERSOFT, Winchester House, Coombe Road,  
Woolston, Havant, Hants. RG9 7JZ  
Telephone: 01-803 1888