

DRAGON USER

International edition

The independent Dragon magazine

75p US\$3.25 February 1984

Graphics
animation

Getting down
to business

Play Tracker,
Drag Racing
and Chess

Educational
software
under review

**DOUBLE
CHANCE
DOUBLE
PRICE**

Two sets of
extension
modules
from JOC
Microsystems



NEW

MICRODEAL PRESENTS...

RAINBOW WR
RAINBOW WRITER
 RAINBOW WRITER
 Rainbow Writer
RAINBOW WRITER
 RAINBOW H₂O WRITER
 RAINBOW 10² WRITER

RAINBOW- WRITER SCREEN ENHANCER

The ultimate in hi-res graphics text display. Allows your Computer to write text on any graphics screen in *Rainbow* colours

CHECK THESE IMPORTANT FEATURES:



- User definable 224 character set featuring true lowercase with descenders, improved cursor, slashed zero, Greek math symbols, lunar landers, stick figures, tanks, cars, planes, card suits, etc.
- Supplied character generator program allows easy creation of colored, animated figures to save and use in your own character graphics programs.
- Works in all PMODEs.
- Two character sets for maximum clarity produce 12 character densities. 32x16, 42x24, 56x24, 64x24, plus double widths in PMODE 4.
- Pre-loader allows optimum loading in 32K or 64K machines. The 64K detection automatically transfers all ROM (including cartridge) to RAM. Uses 45K of memory.

- ML extension of BASIC completely interfaced and transparent incorporating direct conversion of all keys and commands including PRINT *off*.
- Automatic underline, superscript, subscript, reverse video, top and bottom definable scroll protected options.
- User Handy - easy operation via Status/help screen, simple commands, no messy peeks and pokes.
- Use all day for high-res screen displays, graph labels and listings, or incorporate into your own (marketed) BASIC or ML games, word processors, etc.
- Includes demo program, tape/disk conversion instructions, character generator program, and operators manual.
- Large colored letters for children or video recorders direct from keyboard or program.

YES, I want to easily create dazzling displays with the best SCREEN Enhancer for my DRAGON 32. Please send me the incredible RAINBOW WRITER at the affordable price of: £19.95 on cassette
 £21.95 on disk

Available from Computer Dealers Nationwide
 or direct from: **MICRODEAL**

Name Address

Telephone Credit Card Orders

Tel: 0726 3456

**MICRODEAL**

41 TRURO ROAD, ST. AUSTELL CORNWALL PL26 5JE

DRAGON USER



Telephone number
(All departments)
01-637 4343

Editor
GRAHAM CUMMINGHAM

Assistant Editor
ANDREW BRIGGS

Software Editor
GRAHAM TAYLOR

Editorial Secretary
CLEO CHERRY

Advertisement Manager
DAVID LAKE

Advertisement Executive
SIMON LANGSTON

Administration
THERESA LACY

Managing Editor
DUNCAN SCOT

Publishing Director
JENNY WELAND

Subscriptions

UK 12 for 12 issues
Overseas £14 for 12 issues

0400 0285-8177

Dragon User, 12/13, Little Newport Street,
London WC2E 8LD

US address: c/o Business Press
International, 200 East 42nd St, New York,
NY 10017

Published by Sunshine Books, Scot Press
Ltd (Sunshine Books) 1984.
Typesetting by Clarendon Press, Clarendon
Books, Printed by Alan Fisher (Southend)
Ltd, Southend-on-Sea, Essex.
Distributed by R.M. Distribution, London
SW6 9J-274 8611, Telex: 2611543

Registered at the Post Office as a newspaper

Dragon and its logo are trademarks of
Dragon Data Ltd.

How to submit articles

The quality of the material we can publish in
Dragon User each month will, to a very great
extent, depend on the quality of the
articles that you can make with your
Dragon. The Dragon 32 computer was launched
on to the market with a powerful version of
Basic, but with very poor documentation.

Every one of us who uses a Dragon will
like to discover new tricks and quips almost
every day. To help other Dragon users keep
up with the speed of the development each
of us must assume that we made the
discovery first — that means writing it down
and passing it on to others.

Articles which are submitted to Dragon
User for evaluation should not be more than
3000 words long. All submissions should be
typed. Please leave wide margins and a
double space between each line. Programs
should, wherever possible, be computer
printed on plain white paper and be accom-
panied by a tape of the program.

We cannot guarantee to return every
submitted article or program, so please keep
a copy. If you want to have your program
returned you must include a stamped,
addressed envelope.

Contents



- | | | | |
|---|-----------|---|-----------|
| Letters | 5 | Tapecan | 37 |
| Including this month a professional look at chess. Essential improvements and additions to Connect 4 | | If you've ever wanted to know how to recover from I/O errors to allow faster tape positioning, Pam D'Arcy has the answer | |
| News | 8 | Interfacing | 43 |
| All the latest software and hardware to use with your Dragon | | All you need to know to build an analogue to digital interface for your Dragon — including circuit diagrams and illustrations of connection methods | |
| Educational software | 13 | Open File | 51 |
| Mike Harrison picks the games and winners in this review of educational software for the Dragon (the cover illustration is by Stuart Hughes) | | This month's selection from the best of recent programs — including a chess game which allows pawn promotion and a tic-tac-toe routine generating random circles of all the colours available in high resolution | |
| Dragonnap | 21 | Dragon Answers | 61 |
| If you want to try your hand at educational applications, but don't want to buy any software yet, this is the article for you. Ged Mead explains how to construct a simple maths game | | Help is at hand — learn how to scroll the high resolution screen sideways, use the JOYSTICK command properly, interface to the cassette socket and create delays with the TIMER function, along with advice on linking to the Sinclair printer | |
| Tracker | 25 | Competition Corner | 66 |
| For keyboard athletes — try this fast-paced game which involves keeping all the balls in the tracks for as long as possible | | A double chance to win a double prize — this month there's two sets of prizes to be won, each consisting of two different add-on module. The prizes, from JCG Microsystems, are its sound and speech extension modules, plus an arcade game and utilities program | |
| Animation | 29 | | |
| An introduction to graphic animation on the Dragon | | | |
| Down to business | 31 | | |
| Want to write your own small business program? Margaret Norman explains how using Adtile as an example of data storage and manipulation | | | |

Editorial

FIRST THE BAD news: we've had to raise the cover price of Dragon User from 65p to 75p. The good news is that the subscription rate (save the card board) into the back of the magazine) is still the same — £8.00 for 12 issues mailed direct to you. But from the next issue onwards the subscription rate will also have to go up — to £10.00 for 12 issues. So the message to subscribe now if you want to save £2.00.

But the savings don't end there, so a look at the contents of this issue will show you. We've had a lot of correspondence on educational and business software, so this month we've tackled both these subjects. Ged Harrison, a teacher himself, selects the best educational packages while we offer Gad Mead's Dragonnap, a simple maths game in which two children compete to be the first to spot the answer to simple displayed on the screen. To keep things lively there's also a reward — Ged shows you how to incorporate an arcade-style game into Dragonnap so that the winner gets a few minutes of fun. On the business side Margaret Norman's Adtile shows you how to write a program which any small business will find useful. Understanding how Adtile works will also enable you to reach a better decision if you're considering buying a bigger business package to use in the office.

And for games players, there's Tracker, where you see if you can do British Rail's job any better — it's ideal for experimenting into Ged's Dragonnap. And if you want to improve your games programming, take a look at Dave Wintler's introduction to the basics of animation. More advanced users have Pam D'Arcy's TapeScan to explore — this machine code program allows recovery from input/output errors giving faster tape positioning. And if it's hardware projects you're after, we show you how to build your own analogue to digital interface — complete with circuit diagrams and all the illustrations you need for the connections.

This is the variety we aim to offer in every issue — although our usual software reviewer will be back next month looking at the latest games for the Dragon (and preparing for a utilities special issue). We think Dragon User is a good buy even at 75p — but if you disagree, write and let us know what you think we should be doing.

Dragon Users Club

(An independent club run by GAMES & COMPUTING)



SPECIAL DRAGON CHRISTMAS PACKAGE

- Dragon 32, with all Leads & Manual
- Dragon Magic! or choice of Books
- 20 Games on 4 Games Compendiums tapes
- 1 Year's Club Membership
- 1 Year's Sub. to 'Dragonwing' - The Dragon's own Cassette Magazine.

TOTAL RETAIL VALUE £235

OUR PRICE **£199.95** Plus FREE p.p.

MXT 10 CONTROLLER **NEW!**

To control your Central Heating, Alarm Systems, Train Set, Robot or anything which requires accurate speed control of salient devices.

- Single 5-pin Plug-in Controller, with support
- Up to 4 devices can be controlled at once
- On-screen real-time Clock in Hz, Mhz, Secs
- Easy to program in BASIC, with 7 New BASIC commands: CLOCK, DUBROBT, DUBCRK, SWITCHN, SWITCHO, SWITCHP & MONITOR
- Includes MXT, Manual for your M/C programs
- Comprehensive User Manual with examples

M872 - With 2 Relays & 2 TTL/CMOS lines £29.95

M874 - With 4 Relay Devices £45.95

Page 200 p. 4-5

(Specially developed for the Dragon Users Club)

DRAGON USERS CLUB

31 North Street, Wareham, Dorset, BH20 4AD, U.K.
Telephone: 01929 51383, Telex: 41112 Dyle G.

MCP-40 4 COLOUR PRINTER/PLOTTER

This remarkable printer is an ideal complement to your Dragon. (Price 'shortfall' printed card on request. Send Time and Date of Birth).

OUR PRICE

£149.95

Inc. Cable & FREE p.p.

DRAGONWINGS New Magazine

On Computers, it Issues a year £4.95 each or £37 for 1 year including FREE p.p.

DRAGON DISK DRIVES

Complete system, with 10MB, software & Controller
£275
Plus £10 Carriage

NEW SOFTWARE IN STOCK

FROM MICROCAL
CALCUL 1.0 (1st version)
CALCUL 2.0 (2nd version)
CALCUL 3.0 (3rd version)
CALCUL 4.0 (4th version)
CALCUL 5.0 (5th version)
CALCUL 6.0 (6th version)
CALCUL 7.0 (7th version)
CALCUL 8.0 (8th version)
CALCUL 9.0 (9th version)
CALCUL 10.0 (10th version)
CALCUL 11.0 (11th version)
CALCUL 12.0 (12th version)
CALCUL 13.0 (13th version)
CALCUL 14.0 (14th version)
CALCUL 15.0 (15th version)
CALCUL 16.0 (16th version)
CALCUL 17.0 (17th version)
CALCUL 18.0 (18th version)
CALCUL 19.0 (19th version)
CALCUL 20.0 (20th version)

I would like to join the Dragon Users Club and receive £1 for 1 Year 1 Diskette (DE)

NAME _____

ADDRESS _____

TOWN _____

COUNTY _____

POSTCODE _____

TEL NO. _____

I WOULD LIKE TO ORDER THE FOLLOWING:

ITEM _____ COST _____

NAME _____

ADDRESS _____

CREDIT CARD NO. (000000) _____

TELEPHONE NO. (0000 0000) _____

24 Hour Answering Service



OVER 500 ITEMS IN OUR SOFTWARE & HARDWARE CATALOGUE WITH 10% MEMBERS' DISCOUNT OFF MOST LINES, PROBABLY THE WIDEST RANGE IN THE WORLD.

A rhyme in time

HEPE IS a poetical summary of *Dragon User*.

The name is *Dragon User*.
The computer that breathes
for

Filled with all the articles and
software
That an owner could desire.

It even has a problems page
For newcomers to the sport,
Interested for every age.
And reviews of games whose
schemes are fought.

As for external contributions,
Only the best will the Editor see.
Try your hand! I expect he would
like same.
I did and I know he doesn't
always refuse.

Now for the readers' programs
Here's OpenFile.
To see your work is point must
bring a smile,
And for the letters page I say give
a cheer!

For without it this poet's work
wouldn't be free.

Mike Roy,
Zossen.

Golf loses handicap

MAY I, through your magazine, CONTACT the many people who have written to me concerning my Golf program published in the July issue of *Dragon User*. I'm afraid there were one or two bugs in my original listing, for which I can only apologise and try to make amends by detailing the errors.

1. Line 9045 had got (last) tagged on to the end of line 9046. It should of course be entered as a separate line.

2. Line 9219 should read . . . OP PPOB# (BX, BY+1) = 3 THEN 5190

3. Line 7588 should read . . . :80 = PPOB# (BX, BY+1)

4. If the ball stops on the edge of the hole, it treats the hole as a water hazard. This is cured by adding line 1165 IF GF = 1 THEN 1880

5. The ball may occasionally disappear when it is in a bunker. The cure is to amend line 2130 by inserting PSET (BX, BY, LH) = PSET (BX, BY+1, LH) between

THEN and GOTO 6. When the ball is on the green there are times when it and the figure are in positions and, apparently at random, Amend line 1950 by inserting SF = 9 AND between IF and GOTO.

Finally, users without joysticks may like to try amending this listing. Delete line 1100 to 1150 inclusive and substitute:
1100 G = (PDD*(24)) = 233 — (PEEK (24)) = 233
1100 YJ = (PEEJ*(24)) = 233 — (PEEJ*(24)) = 233
1140 IF PEEJ (233) = 158 THEN GJ = 3*(YJ) = 5*(Y)
1160 IF PEEK (245) = 223 THEN 1630
1610 IF PEEK (245) = 223 THEN 1730

The figure will now move in response to the cursor control keys. Pressing the shift key will increase the distance moved at each step. The backspace is begun by pressing and holding the space bar, and ended by releasing it.

Phil Brooks,
Committer,
Microdeal.

Write on Microdeal

HAVING PURCHASED a Dragon primarily to use as a word processor after seeing an ad for Teletext, I was most interested to read John Schen's article "A look at the serious side of the Dragon".

The feature of missing just added letters, caused apparently by an odd word processing package by the Dragon's way of scanning its keyboard, did originally slow down typing considerably, but in fairness to Microdeal their latest modification to the Teletext program, only just issued, has improved things spectacularly and it is now possible to type quite fast.

One of many excellent features of Teletext is the ease with which it enables one to access characters available on one's printer but not on the Dragon's keyboard — particularly useful, like me, you have to type a lot of stuff in foreign languages, with accents and cedillas.

P Hallett,
London SW8

Hi-res input

IF YOU want to input information while using the high resolution screens, then try the following:

```
100 AS = - - -
110 PEEK 135,0
120 A = PEEK (135):IF A = 0 THEN 120
130 IF A = 13 THEN 150
140 AS = AS + RIGHT$ (CHR$(A), 1) :GOTO 100
150 Now proceed with the program using the input information held in AS
```

If a variable is required then make 150 A = VAL(AS).

W Fisher,
Widnes.

Adding to Connect 4

ONE OF the best games you have published in your magazine was *Connect 4* in the October issue.

I play it all the time, but found that the coding to ensure that there are no obvious moves for the computer to cover in a vertical direction were missing.

I remedied this by adding the following lines:
1141 A=48
1142 A=A-1:IF A = 0 THEN 1141

1143 IF G\$(1,A)=1 THEN 50=50+1:GOTO 1142

Software Top 10

1 (2)	Mixed OUI	Quicksilver
2 (7)	Pettigrew's Diary	Shards
3 (1)	Night Flight	Salamander
4 (5)	Ring of Darkness	Winterarc
5 (9)	Dragonfly Two	Hewson Consultants
6 (1)	Griffhammer	Salamander
7 (6)	Champion	Peacock
8 (1)	Lionheart	Peacock
9 (1)	Frogger	Microdeal
10 (1)	Mosocco Grand Prix	Microdeal

Chart compiled by Boots

1144 A=5
1145 A=A-1:IF A < 1 THEN 1141

1146 IF G\$(1,A)=1 THEN 50=50+1:GOTO 1145

1147 IF 5V > 3 THEN 11=10+50

1148 IF 5V > 3 THEN 10=10+50

This has greatly improved the program and makes the computer much harder to beat.

W Devonport,
Cardiff

Just not cricket

I HAVE just purchased a Dragon 32, and with it *Dragon Chess* from Oxo Software — and I must add I am very pleased with both. But (and there it always is) but isn't there? I cannot beat the computer.

Although at the moment I do not know much about programming I do know how to play chess, but when I get the computer on the run it calls a draw and stops the game — which just isn't cricket (I mean chess is 47) I like to finish my game even if losing.

The reason I have written to you is to ask if you or any readers can come up with something to override this decision.

Maurice Brown,
Preston,
Merseyside.

SOUNDS like a professional foul to us. Either you're Dragon is the best with artificial intelligence — or there's a fault in the software. Try writing to Basil Software, Lower North St, Chesham, Bucks. They should be able to help.

Atari interface

IN RESPONSE to your answer to Stephen Wood in your December issue, there's no need to send off to the ad for an interface connecting two Atari-type joysticks to the Dragon.

Goodwill Computers can supply such an interface at £14.95. We also supply Wood's famous Red Bull joystick at £14.95 and trackball at £35.95 (Trackball does not need an adaptor).

David Nieldman,
Goodwill Computers,
4 Middle Row,
Chipping Norton,
Oxfordshire



Oasis Software present...

The first basic compiler for the DRAGON 32



SPRINT compiler is a subset of standard Dragon Basic which covers arrays, strings, four nest loops, in fact virtually everything except floating point arithmetic and associated commands. All arithmetic is integer and the Dragon sound and graphic commands are fully supported.

SPRINT BASIC COMPILER by Dr. David Gray FOR THE DRAGON 32

The technique used is based on the approach used in GIC B.D. Pascal where the Basic program is first reduced to intermediate code and this is then executed using a run time package which is saved with the rest of the compiled program.

- Programs will run 5-10 times faster.
- Almost the entire Basic is supported, with the exception of floating point commands.
- Code produced will run independently of the compiler (for potential authors).
- Programs are compiled from tape under remote control so that much larger programs can be compiled.
- SPRINT is designed for ease of use and a comprehensive manual is included.
- Free demonstration program with each program bought to illustrate the full power of the Compiler.
- All Oasis products are covered by a lifetime Guarantee.

DRAGON 3200 £14.95 DRAGON PASCAL £14.95

Dragon Pascal is an extended integer subset of the structured programming language Pascal. A few of its many features include:-

- A complete set of structured programming constructs.
- P, THEN, ELSE, WHILE, DO, CASE, OF
- COMPILE, EDITOR and SOURCE simultaneous resident for a rapid development cycle and total ease of use.
- Very rapid compilation. Source can actually be compiled more rapidly than it can be listed.
- Fully recursive.
- Supplied complete with sample programs including routines which demonstrate techniques for simulating floating point functions such as SIN and COSINE.

OASIS SOFTWARE, Alexandra Parade
Westminster, Manchester M4 1JY

Please send me

SPRINT Basic Compiler £14.95

Name

Address

ACCESS orders
taken by phone
24 hours a day --- 0504 412601



DRAGON CHESS £9.95

- Six levels of play.
- All legal chess moves including en-passant, castling and pawn to knight promotion.
- List of previous moves stored which can be displayed or printed.
- Loading and saving of games positions from tapes.
- High resolution graphics which can be flipped round to make black or white play from either end.
- Simultaneous text and graphics.
- Slides can be exchanged at any stage.
- Best move hint.
- Set up from any position.
- Opening move library.
- Moves may be taken back and play resumed from any point.
- Change level of play at any point in the game.
- Will adjudicate games between humans.
- Very high standard of play.
- Professional packaging and life-time guarantee.

Dragonchess is without doubt the best value chess on the market today. . . . MICRODEAL

BACKGAMMON
£5.95

OTHELLO
£5.95

INVADER CUBE
£5.95

DOMINOES
£5.95



The well known game of Backgammon complete with full instructions and computer demonstration for beginners.

At last, Othello on floppy as it's sometimes known running on your Dragon 32! 4 levels of play, full instructions and computer demonstration for beginners.

As well as being one of the best games of skill written for the Dragon 32 it also has some of the best pure machine code graphics we have ever seen.

Two games in one with full instructions. Hours of fascinating fun for the program has 8 levels of play and six higher levels which it'll play to fit assessment of your ability.

Mind Games Compendium — All five games for just £19.95

ALL OUR PRICES INCLUDE VAT AND POST AND EVERY GAME PRODUCT IS PROMPTLY DISPATCHED AND INCLUDES A LIFETIME GUARANTEE.

If your local dealer does not stock these products then let us know his address and we will contact him.

ACCESS ORDERS
TAKEN BY PHONE
24 HOURS A DAY



0934 419921

DRAGON SOFTWARE
41 BRANSON, INFOSYS
WREXHAM, CHESHIRE
WA9 4JH. 0934 419921
TELE 0934 419921

- Please send me:
- DRAGON CHESS £9.95
 - BACKGAMMON £5.95
 - OTHELLO £5.95
 - DOMINOES £5.95
 - INVADER CUBE £5.95
 - MIND GAMES
 - COMPENDIUM £19.95

I enclose cheque/PO for £
NAME

ADDRESS

OASIS SOFTWARE

The Company that specialise in computer utilities.

Shards additions

NEW games continue to emerge from Shards following its success with *Pentagon's Diary and Empire*.

The company launched two games at the end of last year, *Haunted* and *Monster Math*.

At £5.95 *Monster Math* joins Shards' growing list of educational titles. It is a menu-driven mathematical cassette for 8-14-year-olds.

Hooked, on the other hand, is a fishing game presented in three graphics which involves catching and landing as many fish as you can.

Cotswold comms

COTSWOLD Computers can now supply software linking modems to established databases and easing interface communications with the outside world.

Cotswold already markets an RS232 interface at £49.95. Adding the software, written in machine code, will allow Basic commands to go straight out through the interface.

The package, including documentation and tape, costs £150.00, and was developed by software engineer Tony Richards of Richards Systems.

Tony is also interested in writing modern software, enabling links to be established to databases elsewhere. One example quoted is of linking to the *Business Legal Database*.

Tony can be contacted by writing to Cotswold Computers, 8 Middle Row, Chipping Norton, Oxfordshire.

COMPUTER CLUB



"Out of 10000 of our members, only 1000 are using a PC." — Mike Cawley

Adventure fun plus turtles on the way

MORE adventures are on their way from Salamander — along with a Turtle graphics package.

Turtle Graphics costs £9.95 and will be released at the end of January. It has a comprehensive range of Turtle-type commands and a "huge manual".

You can design patterns, manipulate images, repeat shapes and achieve perspective effects by using string handling. The package is compatible with the Tandy four-colour printer/plotter.

The two new adventures, due at the same time, are *Wings of War* and *The Cocklewood Incident*. Each costs £7.95.

Wings of War is similar in style to the *Don Diamond* trilogy. The story-line here is that you're parachuted into France and have to find your way through the mine in a chaotic

Cocklewood Incident takes a more humorous approach to adventuring. You have a choice of six roles to adopt, ranging from Absolute Wally to John Travolta, is your



Salamander's Peter Orison — having fun in Cotswolds

search for the gold.

The game is based loosely on the *Moby Python* (only *Oral* film), and has a similar sense of humour. Your opponents include Wally Grammes and a hail of Foster's lager cans.

Peter Orison, Salamander's projects director, said that the humour made the game particularly attractive.

"There's not many adventures around which are actually amusing while you're playing them," he explained.

Part of Peter's work involves assessing programs sent in by Dragon users. "Some are worth developing," he says, "but it would make my life a lot easier if I was sent a few ideas and maps as well."

Microdeal racks them up

MICRODEAL went into the New Year with more than 50 software titles under its belt, and a range of new releases are being planned for the Easter.

The most recent games from the company are all aimed at arcade fans — with the exception of two simulators, *Pinball* and *Eight Ball* (a version of *Pool*).

The arcade titles include *Space Racers*, which is "a much, much better version of *Space Invaders*"; and two games from US author Ken Ralston, whose past successes include *Cultivar* in the *Jungle* and *Phantom's Revenge*.

New from him are the 3D game *Danger Ranger*, and *Devil Assault* which has three different screens and five levels of play.

Microdeal's list of WR-

written programs is also increasing. Dave Thatcher, who wrote *Cultivar* goes. *Walkabout*, has contributed *Dragon Hawk*. Rick Redman has written a real-time version of *Star Trek* called *Space Fighter*, and Skrambo, with five different screens, comes from Steve Beck, who wrote two earlier *Cultivar* titles.

Each game costs £8.00. The price goes up to £18.00 for the more serious programs such as recent releases *Rainbow Writer*, *Teleforth* (which includes a tutorial) and a *Fort* screen editor and *Filestar* (a strangely spelled file with a familiar application — databases).

Rainbow Writer is similar in concept to the word processing package *Telewrite*, it offers lower case, but this time for normal Basic. It also en-

ables you to define your own alphabet for such things as foreign languages.

Microdeal's John Symes added that "a lot of other programs are on their way for the *Dragon* — probably towards Easter".

The company will have larger starts at this year's PCW and *Carte Court* shows enabling users to try out more games — "possibly 30 more than at each".

Being worked on at the moment is a disk adventure with graphics, while a *Cultivar* follow-up, *Cultivar in the Mines*, is planned for February.

Microdeal is also starting a *Cultivar* Club. Membership is free (entry forms are included with each game cassette) and entitles you to a quarterly newsletter featuring high scores, programming tips, etc.

WINDRUSH MICRO SYSTEMS



MACE
EDITOR
ASSEMBLER
MONITOR
£ 29.95
DRAGON 32 CARTRIDGE

As it goes, so comes the MACE dragon, the editor, assembler, and monitor for the Dragon 32. The MACE dragon is the only software package available for the Dragon 32 which is designed to be used in conjunction with the Dragon 32.

The MACE dragon can be used to edit, assemble, and monitor programs written in Basic, Pascal, Fortran, Algol, and other languages. It is also able to edit programs written in other languages such as COBOL, PL/I, and other languages. The MACE dragon can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages.

The MACE dragon can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages. The MACE dragon can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages.

The MACE dragon can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages. The MACE dragon can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages.

SOFTWARE

PERSONAL COMPUTER CARD £14.95 (includes card and software)
PERSONAL COMPUTER CARD £14.95 (includes card and software)



BUG ZAPPER
MULTI - PROGRAMMER
£ 79.95
DRAGON 32 CARTRIDGE



DESCRIPTION: BUG ZAPPER PROGRAMMER AND MONITOR

Bug Zapper is a multi-programmer and monitor for the Dragon 32. It is designed to be used in conjunction with the Dragon 32 and can be used to edit, assemble, and monitor programs written in Basic, Pascal, Fortran, Algol, and other languages.

Bug Zapper can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages.

Bug Zapper can also be used to edit programs written in other languages such as COBOL, PL/I, and other languages.



D-BUG by Stewart Smith
TRACER
MONITOR
DISASSEMBLER
£ 29.95
DRAGON 32 CARTRIDGE

D-Bug is a software package for the Dragon 32. It is designed to be used in conjunction with the Dragon 32 and can be used to trace, monitor, and disassemble programs written in Basic, Pascal, Fortran, Algol, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

D-Bug can also be used to trace programs written in other languages such as COBOL, PL/I, and other languages.

6809 FLEX (TM) SOFTWARE / HARDWARE

6809 FLEX	£19.95
6809 FLEX HARDWARE	£19.95
6809 FLEX SOFTWARE	£19.95
6809 FLEX MONITOR	£19.95
6809 FLEX TRACER	£19.95
6809 FLEX DISASSEMBLER	£19.95
6809 FLEX EDITOR	£19.95
6809 FLEX ASSEMBLER	£19.95
6809 FLEX MONITOR	£19.95
6809 FLEX TRACER	£19.95
6809 FLEX DISASSEMBLER	£19.95
6809 FLEX EDITOR	£19.95
6809 FLEX ASSEMBLER	£19.95
6809 FLEX MONITOR	£19.95
6809 FLEX TRACER	£19.95
6809 FLEX DISASSEMBLER	£19.95
6809 FLEX EDITOR	£19.95
6809 FLEX ASSEMBLER	£19.95
6809 FLEX MONITOR	£19.95
6809 FLEX TRACER	£19.95
6809 FLEX DISASSEMBLER	£19.95
6809 FLEX EDITOR	£19.95
6809 FLEX ASSEMBLER	£19.95
6809 FLEX MONITOR	£19.95
6809 FLEX TRACER	£19.95
6809 FLEX DISASSEMBLER	£19.95

© 1984 Windrush Micro Systems. All rights reserved. Price includes postage and packing.

FOR A COMPLETE CATALOGUE OF SOFTWARE AND HARDWARE PRODUCTS, PLEASE WRITE TO: WINDRUSH MICRO SYSTEMS, NORTH WALSHAM, NORFOLK, ENGLAND.

WINDRUSH MICRO SYSTEMS, NORTH WALSHAM, NORFOLK, ENGLAND.

PRICE INCLUDES POSTAGE & PKG VMS (ARMS) PRICE ONLY ACCEPTED

WINDRUSH MICRO SYSTEMS, NORTH WALSHAM, NORFOLK, ENGLAND. NR32 9BA. TEL: (0492) 405820

Welcome to Dragon World

THE Stop Press newsletter from Dragon Data has grown in size and changed its name to Dragon World.

The first issue came out in December, taking over from issue 11 of the newsletter. Subsequent issues will be published once every two months.

There's 16 pages in December's Dragon World, and Dragon

Data expects the February issue to be bigger.

The magazine is mailed out free to users who have returned their warranty cards.

The address for contacting the new magazine is Dragon World, Dragon Data, Family Industrial Estate, Islangam, Poff Talbot, West Glamorgan.

The contents of the first issue are similar to Stop Press's — with a machine code corner, young user pages, readers' letters and a selection of programs.

Additional features are a technical advice column and user club news.

ITL ponders 3 inch Dragon disk drives

ITL HOPES to produce an interface for its Byte Drive 800 three inch disk drive which will make it compatible with the Dragon, despite problems with one of the Dragon's interface chips which may necessitate a swap-out.

The 3 inch disk format is said to offer more "bytes per pound" than the more common 5 1/4 inch type, and may well become the small business market leader after a full range of applications software is available.

ITL's Tom Boyle commented that the potential of the Dragon was such that it would be unfortunate if the technical problems involved could not be overcome.

Then the Byte Drive 800 could compete with the two Dragon disk drives already available, from Dragon Data and Custeria. Tom expected to see three inch drives with one megabyte capacity being available.

Work on the cable interface for the Dragon, which should cost around £100 with the disk drive and manual, should begin once ITL has finished developing Sinclair Spectrum and Commodore 64 versions.

A full range of software, including assembler/disassemblers, text editors, spreadsheets and databases, is now in preparation. ITL also hopes to make several popular games available on three inch disk.

Pick a printer from Tandy



Tandy's DMP-210 — seven colours for £149

MORE THAN 10 Dragon-compatible printers are now available from Tandy — ranging in price from under £100 to over £1,000.

The TP-10 Thermal Printer is the cheapest, at £79.95. It prints at 30 characters a second on 4 1/8-inch wide thermal paper which costs £3.99 a roll. This is the only printer in the range requiring special paper.

The DMP-115 four-colour printer/plotter at £149 is already well-reviewed. More recent is the DMP-220 which adds another three colours (yellow, violet and magenta) and increases the print speed to 40 characters a second in text mode.

These printers are said to be ideal for line listings. Worth considering for low end letter

quality printing is the DMP-130 at £269. This is a 9 inch dot matrix printer with word and data processing modes.

Print speed is 50 characters a second — or 25 for word processing. For better quality look at the DMP-210 which prints at 18 characters a second.

Higher up the range is the DMP-420 which Tandy describes as "excellent for the small business user with big throughput". The company expects the market for such printers to rise as the OS-9 operating system takes off.

Finest paper up to 15 inch wide can be used when this dot matrix model which prints at 140 characters a second.

Top of the range is a daisy-wheel model at £1,359.

First games for the 64

PHOENIX Software is one of the first companies to take advantage of the Dragon 64, offering a package aimed at adventurers and arcade fans alike.

The Emperor Must Die is a twin-cassette package released this month at £8.99 — one cassette features an adventure and the other arcade action.

The story line is that the emperor of the galaxy is corrupt and you are chosen to assassinate him, assuming that you can pass the tests set along the way.

These tests present themselves in the form of three



Phoenix's Gerry Rose

"This" is the action cassette using 221K of memory and two to the adventure plus one brief visit (using 48K).

The Emperor Must Die is Phoenix's first offering for the 64. Previous software from the company, set up last year by Gerry Rose, also featured the twin-cassette concept, but was for the 32 only.

You begin with the action cassette, a space game where you have to reach a randomly arranged sequence of control towers on different planets.

Reaching a third tower gives you the naming code for the first adventure, set on an unknown planet where you have to survive against the native inhabitants, wild animals and an unfriendly terrain. Surviving gives you the

locations of the first five control towers on the action tape and the correct order for reaching them.

Doing this successfully gives you the naming code for the second side of the adventure — in which you recruit personnel and buy equipment to build a rocket capable of defeating the emperor.

Success here takes you back to the second live control towers of the action tape, collecting clues along the way for the third mini-adventure. The clues reveal should then follow on the seventh planet with your assassination attempt proving successful.

Just the thing for these long winter nights

DRAGON 32 FAMILY PROGRAMS	Eight games, games utilities and educational programs . . .	£8.95	FUN TO LEARN	Education for 6-12 year olds. Word drills	£8.95
FLY AND GAMES	A compilation of programs for young and old	£9.95	QUICK MATHS	200 word vocabulary tests and crossword puzzles	£8.95
LIFE AND LEARN	Five educational programs for the elderly child and adult	£8.95	PIZZA PACE	Phonics and education - Counting and alphabets	£3.95
LEFT OR RIGHT	Words crossword words game and puzzles	£5.75	PIZZA PACE	Learn your tables and word recognition the fun way	£3.95
IMPASS	Exciting game of strategy for all ages	£6.95	MONSTER MATHS (New)	Education for 6-11 year olds. Easy learning graphics of adding games for 1 or 2 players	£8.95
PIZZA PACE	Spells, puzzles, grammar - Four games and more levels	£6.95	MONSTER MATHS (New)		£5.75
PITCHER'S BLIND	Two 90% adventures for the whole family	£7.95			



SHARDS SOFTWARE
The family favourites

Available from Boots and all good stockists, or by
sending cheque/P.O. to 189 Elm Road, Ilford,
Essex IG1 2UQ.

1)

WHAT IS THE MISSING NUMBER ?

4 7 10 13 -

An educated look at software

Mike Harrison picks the educational dunces and winners

ANSWER:

<ENTER> TO PASS

<CLEAR> TO TERMINATE

DO YOU remember those heady days when you first got your Dragon? How it was going to amuse, enthuse and educate your family. How your finances and home management problems could be a thing of the past and children's learning be smoothed.

Well, think on. Just how many delivered masters have you received, frogs have you squashed and Kingoms opened? Compare this to the educational use your computer has had. Up to now you've had the excuse of lack of appropriate software. Is that true now? Every advert seems to cite an educational tag so let's see if this excuse still holds up.

Spelling

Talking Speller, for example, is an ideal program to encourage children to learn those school spelling lists. You know, the ones they produce from their pockets for the first time ever breakfast on the day of the test itself. Schools all seem to set these lists but seldom advise on how best they should be learnt. This in the shape of this CB 35 Eurosoft tape is at hand.

The user creates a data file, with careful input controls to ensure a good choice that words on the file are in fact spelled correctly and then helps the child make a word-track on tape for each of the words.

Children can then test themselves using these audio cues in their own account, at their own speed either immediately or at some time later by reloading this data. The strength of this program is also shown in error handling. It tells the user if his

response is too short or contains too many letters and shows children the letters they've got in the right places so they can immediately make some attempt at correction.

The novelty value of the tape as it stands is a strong incentive to learning. The added graphics drawing capability in the version now on offer makes this a good educational program. It is not of course limited to learning spelling lists. I used it as a French-English vocabulary primer and it could be used in any circumstances calling for the Dragon's special ability to translate sounds from tape to TV.

The Dragon 32 missed out on the Department of Industry rictus in schools scheme, possibly because its test is only in capitals. Children's reading is always in lower case and although it is possible to draw these in high resolution many educational programmers have missed this point, even when producing material for infants. It is ironic therefore that Galactic Hangman which is played entirely in lower case capitals claims on the screen. This cassette is also from Eurosoft and costs £7.95.

The unfortunate prisoner is saved from hanging if you can guess the word. In fact a spaceship destroys the whole jail in the event but what happens to the other inmates we never do find out. Quite good fun and in Basic so the data can be accessed, but it is severely educational. It doesn't teach anyone anything. It doesn't reinforce spelling or even teach tactics or strategy because the language is so full of

exceptions to contradictory rules. It has no role in developing language skills, as words need to be taught in the context of their meaning.

Silly Syntax, the third in the Eurosoft series, does do just that job. In Silly Syntax the importance of words is highlighted by the creation of funny stories much on the lines of Consequences, the party game. There are a number of basic storylines with players being asked to provide a plural, or adjective or nonsense word which is then injected into an appropriate part of the story to sometimes hilarious effect.

Many primary school children may have come across procedure exercises in school where every seventh word or so in a story is blanked out and from the context the task is to supply an appropriate word. "Bob Sally and John like chocolate", might encourage replies like milk, hot, three or eating. The basic story can be shared with the "gaps" to be filled in Silly Syntax and there is a creative mode where children can enter their own work which has been stimulated by the game. All options can be subject to a printer. Silly Syntax is £16.95 and 80 further stories ranging from Fairy-tales to K-nives (for adults only) are available.

Skills

Eurosoft's range of educational products also include Alps at £14.95 and Melody Express at £7.95. Alps is a Cecil compatible interpreter which allows easy entry into assembly language programming. ▶

DRAGON 32 OWNERS

Make your Dragon turn into a real computer with the new Double-Density Delta Disk System.

The Delta Disk System Gives You:

- An affordable disk system.
- Powerful Delta disk commands.
- Lets you produce and handle random access files as easily as text files.
- Random sequential and indexed file handling.
- Simple plug into Dragon.
- Uses the no-HARDWARE MODE needed to run DELTA.
- Easily expandable 182K to 1.4 megabyte On-Line storage.
- Full range of business utility and games software AVAILABLE NOW!
- The price you see is the price you pay. NO HIDDEN BARGAIN upgrade costs.
- Uses under 2K of user - RAM as DELTA is held in EPROM.
- Enables programmer to easily produce applications Software which automatically starts up and operates without any intervention from the user.

**DELTA
DISK
SYSTEM**

FULL RANGE OF BUSINESS SOFTWARE AVAILABLE. SEND \$48 FOR DETAILS.

DELTA (SOFTWARE) - contains DELTA disk Operating System, User Manual, demonstration disks... 1100.00	
Delta II - DELTA Cartridge (see Manual) a single-sided 5 1/4 inch 182K drive plus extra... 1200.00	
DELTA II - DELTA II Cartridge (see Manual) a single-sided 5 1/4 inch 360K drive... 1200.00	
Disk interface cable (supplied with DELTA I or II)... 99.99	
DISCOPR (Programmer's Development Editor) - integral with DELTA... 108.95	
HOME ACCOUNTS full home package for DELTA... 154.95	
FORMS - Data Base Management System - customised especially for DELTA Systems... 129.95	

OWNER'S ACKNOWLEDGE NEW TOOLKIT FOR THE DRAGON 32 INCLUDES THE FOLLOWING AWARDED FUNCTIONS -

- Full screen editor allowing printing, constant change line etc. Full screen editor (DRAGON) line editor.
 - User HELPER (HELP) keys - always available on screen.
 - 20 full colour line resolution graphics screens (control with commands for instantly writing to any of them in background). Available graphic resolution of SCREEN CODE (BASIC) a single bit.
 - Full range of 256 character commands with screen EDITOR options.
 - User built table editor (not linked to your DRAGON BASIC) - user file commands.
 - Define custom graphics characters in the highest storage.
 - Enhanced BASIC SOURCE commands allowing access to an entire screen (eg SCREEN END) or BASIC FILES.
 - Special BASIC commands allow users the right of comments. Full screen graphics full screen program modification.
 - BASIC and RELAY commands for screen program modification.
 - Comes complete with documentation at a cost \$29.95.
- Available separately at DELTA enhancement screen \$29.95.

NEW

TOOLKIT FOR DRAGON 32

NEW

- DRAGON 32 FORTH ON DISK FOR DELTA • Executes up to 40 times faster than BASIC • Language extendable by user defined words • Words can even be defined using the FORTH grammar for maximum speed • BASIC and DELTA commands still available from FORTH • Source code stored and can be compiled from disk • FORTH can be saved to disk, including also new definitions • ONLY \$29.95 including manuals • High level printer • Model no. 547

SCREENS FOR THE DRAGON 32

- Easy screen and screen code store from the keyboard.
- Amalgamated 25 or 24 screen display when given 4 screen numbers.
- Full text display on three screens.
- Automatic graphics and screen image.
- 25 or 24 user defined graphics.
- Expansion character position command screen.
- Screen indicators.
- Screen on screen text storage option.
- A new print command extending to 256 full screen double width screen area.

ENCODER BY FOR THE DRAGON 32

ENCODER BY - is a full automatic assembler using internal conversion and branch address tables. Code can be compressed into the BASIC program. The internal branch address commands to allow simple screen modification and expansion. Memory does more random handling, full compatibility and a separate data area at the end of the program. The user friendly commands, comprehensive available for the DRAGON 32. Available quarter on integral DELTA screen on a cartridge. Cartridge \$29.95. Disk - see above.

SPRINT FOR THE DRAGON 32

SPRINT - screen editor
... with output the entire contents of your DRAGON 32 high level printer for a high resolution screen. Can be used for storage, storage etc. Available on screen for screen printers only. Other modules to screen editor.
Model no. DELTA disk \$29.95



PREMIER MICROSYSTEMS
445 University Road, Suite 100, Santa Rosa, CA 95401
Telex and cable orders accepted.

PACKAGE AND PACKING
Items 1-12 - \$3.95
Items 13-15 - \$4.95
Items 16-18 - \$5.95
All items include airtight
disk seal for long storage.
All disk are formatted for
Dragon 32.



CHESHIRE CAT
EDUCATIONAL SERIES
from
AMPALSOFT



CHESHIRE CAT
The First name in Educational Software.

An exciting range of top quality programs
covering all needs from pre-school to 'A' level.

Now available from Boots and other good stores.

Ampal Computer Services Ltd.
21 Woodbridge Road, Garby Green, Blackwater,
Camden, Surrey.
Tel: (02521) 876677

• for 'C' level computer science. *Miscody Express* provides a simple introduction to keyboard skills as an introductory stage to mouse programming.

Tiger Software is another company which advertises "Educational Software — designed by experienced teachers". The Tiger IQ Test is beautifully drawn on the hi-res screen and looks for all the world like the exam paper it's meant to be. The test is filled and is nice touch that the clock only activates when the full page is complete and ready for your answer. There is a great variety of questions such as:

WHAT IS THE NEXT NUMBER IN THE SERIES

4 7 11 16 22 —

WHICH WORD IS THE SUFFIX

S
P
L
B
P

as well as special questions giving an all round test of this sort of reasoning for the hard-thinking the answers are 29 and 841.

The IQ 95 tape contains two 40-question tests. At the end of the test your supposed IQ and an indication of your intellectual worth are announced. If taken as a bit of fun, or even as a practice to give you an idea of what to expect in IQ tests (more commonly called verbal reasoning tests), this program is free but expensive. After all you can get paperbacks at £1.50 with dozens of tests in. Where I take issue with Tiger is in its use of the "Educational" tag of convenience — for this it certainly is not. An intelligence quotient is calculated with reference to a student's age. No request for age is made. I refuse to believe that a 10-year-old and 30-year-old getting the same score on this test have the same IQ. Tiger's test says they do. In fact we are not told if this test is for primary children, 15 year olds or head executives (all properly constituted tests should have a target age range).

If you expect to get better at these tests by studying from the answer page you can forget that too. For although you can compare your list of answers to those of Tiger's this is in isolation from the actual questions which you cannot recall except by taking the test again. Anyway without knowing the reason for the "correct" answer no learning can take place at all.

Child-proofing

My final criticism of this tape applies to many others too, and concerns child-proofing. This means helping the user to show his knowledge and not make mistakes due to the computer's method of working. For example in the question

WHAT IS THE NEXT LETTER?

A C E G —
4 8 12 16 J

some children typed in the letter 'I' which is correct reasoning but not the answer & which was acceptable. It is easy to restrict

returns on a computer — so why not do it.

Child-proofing was also lacking on the £7.95 Tiger Gated Pix which is a racing game for one or two players. The players are assigned cars which go around a circuit by moves dependent on the throw of a die and the answering of a general knowledge question. There are about 500 different questions in 10 data files suitable for five different age ranges from seven to adult. Younger players get questions including simple maths and spelling, and adults need to know obscure items from books of records. As in the IQ test no attempt is made to teach anything and although general knowledge quizzes may be fun, to test them under the guise of "education" is both misleading and possibly harmful to the market.

Not much better is the £9.95 *Educator 1* from Game Software. This takes the form of the TV quiz *Winner Takes All*, so it does limit the value of allowing players to test their judgement by the size of their bets. It is not child-proofed but with questions like "Who was married to the Molester whose reign began in 1422?" we have perhaps gone beyond the age where this is necessary. At a time when children are learning to break state security codes and pull down information from thousands of miles away, it seems incredible that these programs are obscure and useless facts about mountain ranges, long dead rulers and 100-year-old inventions. This program even has a mistake. Islamabad does not exist (the town in Pakistan is Islamabad) and San Cristobal is not the capital of Cuba either.

General knowledge

Perhaps the computer, then, is not the best way of testing general knowledge as misunderstandings cannot be dealt with and multiple choice questions are open to guesswork. The type of quiz that the *Dragon 32* is ideal for, however, has been exploited very nicely by *Gamesend Home Computers*, in its *Teach Type*. This £5.95 program aims to have you teach typing in 18 hours and shows the correct finger for each letter as it is introduced. Visual representation of accuracy and speed encourage you to look at the screen, not the keys as you type. Typing is such a useful skill for teenagers to have in the fields of computers, musicians, further education and clerical work that *Gamesend* deserves to succeed with this program. Those who are learning already may find the absence of some keys a little daunting but will be relieved from ASDP-LKJ boredom. The *Dragon* keyboard being one of its stronger features over its rivals, *Teach Type* ought to be a winner.

Tick Tock is a courageous attempt by the same company to design a program suitable to help reinforce time telling skills in young children. A friendly clock (looking not a little unlike Ivor the Engine's face) is drawn on the screen, and hours, half-hours and quarter-hours are displayed for children to read. The face rewards you with a wink and a smile when right. The display is colourful, chunky and appealing.



Game Software's *Educator Geography*



Dragon Data's *Hire and Rent*



Game Up from *Mindwell*



to children and the ticky ticky dock theme attractive.

The program has however, a few flaws. The key to successful time-telling is to distinguish between the long and short hands and to read the figures clearly. Making the hands different colours is not good enough (some people use maintenance TVs) and real clocks have hands the same colour. The eyes and mouth on the clock face are confusing and distract attention from the real action. One eye makes 10 look like 18. When the child has made a mistake it is not corrected and once a key has been hit it cannot be backspaced. The method of answering requires quarter past two to be entered by 2, colon, 1, 5 or it's wrong.

It is quite possible, if the real purpose of the tape is to teach time, for these difficulties to be overcome by re-programming, but essentially what is needed is an experimental phase to precede these tests. Why not allow children to put in some time and then make the clock show some? Tests could then be tailored to what the child himself had keyed in previously. Lastly children up to six or seven have not learnt 6:45 or 5:30 but still talk about quarter-to and half-past. If revamped this CB's program could possibly be the finest of the bunch, and would be in demand in infant classrooms as well as at home.

Drowning

Baby Dragon (25.95 from Gravesend) contains two programs for young children. Koko does nothing more than any Dragon user could, generating random numbers to be multiplied, divided, added and subtracted. All the action takes place on the text screen and no one has bothered to child-proof it. Letters are bound to be entered by mistake by young children and the consequent REOO? wipes out part of the print (as graphics). The program has to be run again if this happens or if break or clear are touched. The object of the exercise seems to be to drown poor Koko (not very sporting) but when this happens the water rises up against gravity to cover him. This is, of course, graphically easier than having him fall in but difficult to explain to an enquiring six-year-old.

Much better in presentation is the other program Teddy. A number of honey pots seek your help in bouncing past sleeping bears who in turn hope to catch some, and suddenly sit up to do so. The river graphics are very well drawn and the game is lots of fun for little children who only have to control the jumping by use of the space bar. I would say that three and four year olds would learn quite a lot trying to decide when to jump and if a score of successful escapes were displayed it would be a learning situation.

Unfortunately no scores are displayed for the program is yet another sea. The children are supposed to count the honey pots out and count them back in again (perfect for BBC war correspondents?). However they won't be able to read the capitals only questions nor to remember to keep adding on the pots to their running total to satisfy the examiner. So I'm afraid

it's thumbs down for Baby Dragon.

Many people who have recently purchased their Dragon from a large department store will be familiar with Anusabully's *Christine Cat Maths Tutorial*. A package for younger children in the same series is Maths 1. It is a very versatile program. Options on difficulty level, display of players' scores, changing the running order of exercises and the number of different questions per exercise all exist. Each of the 10 different exercises is introduced by a nursery rhyme and difficult reading is avoided as the programmers assume that an adult is around to help out where necessary.

Kangaroos

The players' names (given on hi-res screen but unfortunately in capitals) act as a prompt for their answers. Only numerical answers are accepted and wrong answers are carefully shown to be so. The program is geared to learning rather than just testing and is beautifully designed. Children are asked to count the balls kicked into a tube (of Potters?) by a kangaroo, and asked to make numbers of balls float into harbour in response to numbers shown. Sorting, mapping, sets and simple addition are included in these exercises, including a lovely one towards the end where children have to find the tallest and shortest in a line of flowers.

The package comes with two complete tapes (both double recorded) in a large plastic folder with some documentation. Unfortunately, for security reasons, the programs load additional data when running so breaking the program means the tedious process of re-loading. However, Maths 1 will certainly give young children a good start in practising simple numbers before they start school and despite its £19.95 price it is good value for money.

Other children need practice in tables and numbers too and *Allyn Software* has two £7.95 programs to provide it. *Sums 1* starts with a menu option for the four rules of number and a comprehensive set of instructions. The sums are presented in hi-res and there is graphic representation of score and time left. The sloveness of the basic means that keyboard responses against the clock became difficult. To enter 44 the sequence 4, 4, <ENTER> is too fast and is registered as 4 <ENTER> and marked wrong. (Once you slow down and get the hang of it you run over time too.)

By the time *Allyn Software* produced *Sums 2* it had learned the lesson of lower case and presents seven pages of instructions in a style most children will be able to read. This is wise as the subject matter — manipulation of fractions — is suitable only for children five years older than those for whom *Sums 1* might be useful. Wrong answers are erased and the method for gaining the right one shown. Perhaps future programmers would bear in mind that the computer lends itself easily to showing addition and subtraction of fractions in pictures (of cake for example), and incorporate this in their programs.

However, it is a puzzle to me why anyone wants children to slog up ▶

• their hands with ways for finding $\frac{1}{2}$ of $\frac{2}{3}$, especially when we have machines as cheap as calculators to do it for us. No one expects us to do without our lawnmowers and learn to cut the grass by hand, or to learn how to rub two slides together to roast the Sunday joint. I've been perfectly able to manipulate fractions for 25 years but still am waiting for it to be put to some use. However, some schools do still require pupils to learn these things and if your son or daughter is having difficulty then maybe *Sums 3* might be the answer.

Circus

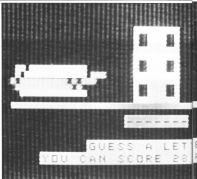
Of course, there is much to learn about computers and the way they work apart from using them to reinforce school work. *Circus Adventure* (Dragon Data £19.95) sets out with the aim of doing just that job for primary school age, incorporating a number of user inputs "to encourage familiarisation with the keyboard" and presenting the child "with a series of choices to be made". The child who is lost somewhere in the circus has to try to find the popcorn stand. Dragon Data adds that "the average playing time is between 10 to 15 minutes", but I couldn't find anyone to persuade that going with such a boring game.

An adventure game, of necessity, should allow the player to reason out some of the moves or at least get the "you're getting warmer" ideas. No such luck with *Circus Adventure*. Educationally it is a disaster for it expects children to opt for left and right, north or south without giving any indication of what such concepts mean. The choices it provides are without consequence and meaning. It asks do you want to go UP or DOWN (presumably underground), and treats UP as a mistake for it only wants the top letter. Now every Dragon owner knows that in this case you would use a redefined **INKEY \$** or use a **LEFT \$** routine after input but such subtleties are beyond *Circus Adventure*.

There is no logic in the game plan either. Starting at the entrance and going east leads you to the Tiger's cage. UP (suspended?) is the lowest balcony, go right, down and north and you are back at the entrance. The only place this is true is at the north pole. Needless to say this program for young children is entirely in last place.

This game bears no comparison to *Quest*, another Dragon Data adventure. *Quest* has no pretensions to be educational yet the consequences of moving H, E, S or W are shown on the map. It involves trading and bargaining, the tactics of building up suitable forces and equipment and strategic planning. It has interesting rewards and is a much better way of introducing adventure games and "computer familiarity". So my advice is to leave *Circus Adventure* to the monkeys.

Hide and Seek from the same stable is an excellent machine code program written by Applied Systems Knowledge. It uses the full potential of the Dragon's graphics capabilities. It consists of a stimulating series of hide and seek-type games



Share Software's Fun to Learn - sure to L&K and offers five games

of the *Fun to Learn* variety. It firstly familiarises children with the objects to be hidden, encourages matching skills and short term memory, and at the end the association of words with the pictures of the objects they represent. Some important pre-reading skills are incorporated in the superb program which is completely in high resolution colour and uses clever case letters throughout.

Value

These are two programs in the package taking over five minutes to load, 39 very good clear detailed pictures are drawn and a small dictionary is supplied to look up spellings for the final stage. A very nice touch is the use of on-screen symbols to prompt the need for the space bar or re-entry of a word. You can also return to the main at any time during any six games. Super value for money at £18.95.

Microsoft's *Teletext* at £25 is the most expensive of this batch of software. It is packaged in a large ring file with two tapes and pages of detailed documentation.

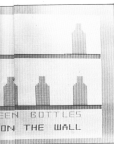
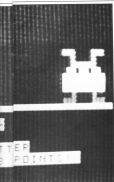
The first program has similar characteristics to *Talking Speller* (reviewed earlier) except that the time for words to be put onto tape can be varied from between three and 30 seconds per word. Hence sentences showing the word in a sentence could be spoken. You can also get a print-out of results. In other respects this version is not as good as *Parsons's*. You get only one chance of each input (although you can alter words when left has been completed), all answers are accepted and incorrect ones are listed



Instant Pack from Share Software

against the true versions at the end of the text.

Word Drill consists of a series of multiple choice questions in which students are asked to find a word to match definitions. The words and definitions may be added and a data file created or taken from a demo file provided with the package. You could of course use this to test yourself on chemical formulae or make up a gen-



can be entered to build up the sum — but without warning no attempt is made to analyse why a wrong answer has been reached. In fact when the correct product is printed the figures do not appear in the right columns. A fabulous reward is offered. It is a glimpse at a hi-res face consisting of a circle line and two dots, the sort of thing you will have first drawn on the hi-res screen when learning.

The fourth program is Estimate which asks a difficult sum and then tells you how far out your guess was.

This set of programs was put together by Tom Mix, the Donkey Kong man and goes to show just how far behind educational software is compared to games. None of the ingenuity which goes to make up an arcade game (a variety of screens, come-again motivation, fast action and simple aims) is present in this package. It is just dull and stale drill and practice. In fact it is the opposite to what people in education and computing hope for from professional programmers. At this price it is exorbitant.

Micro Debug Consultancy's Tables Tutor at £4.95 follows the same pattern of random number generation that we have seen before. It is child-proofed in as much that the break key has been disabled but poor answers can be letters or spurious symbols and these are accepted. In all this is an unenterprising program, children would soon find it boring and it wasn't quite quick enough at displaying question after question to be a real test of tables and skill.

Shards Software has four educational programs ranging from £3.95 to £9.95. Infant Pack purports to teach simple counting and letter recognition skills. In the first program 10 dull looking, unevenly spaced green bottles appear on the screen and are removed one at a time to the accompaniment of that wretched tune. You are then asked 10 times how many bottles remain on the screen (written in capitals), the number being from 1 to 9. The reward for reaching 10 correct answers is much like a nightmare, the screen filling with lines which seem to fill into a murky brown. The reward is best avoided.

On the block

The second program, Alphabet is by far the most appalling educational program I have ever come across. It is supposed to teach letter recognition but draws unrecognisable blocked shapes on the screen purporting to be words. The letters drawn on the screen do not join up at the bottom, the middle being an capital E is three times as thick as any other, and peculiar square shapes appear in the middle of blocked letters. The words themselves have very uneven spaces between their constituent letters and the pictures drawn on the screen to exemplify the words are little short of pathetic. To cap it all the text at the end doesn't deal with letter recognition at all but asks questions on alphabetical order. It would do the credibility of Shards as a publisher of serious educational software much good if it withdrew this tape from the market immediately.

Junior Pack is a better proposition containing probably the best tables-tutor of those on review. You play against the clock and the questions get harder or easier according to your abilities. The accompanying program is more dubious in worth. It is supposed to encourage word recognition skills but the sentences have a random element, eg "Dave is a strange man. He is a cook" and leave a lot to be desired.

Fun to Learn runs to 185 and is aimed at teaching and reinforcing simple skills in an attractive and entertaining way. Menu-driven, the program consists of five games dealing with initial counting, anagrams, simple adding on, a hangman-type game and a series of exercises which encourage word-card skills through notes. This forms a useful package and should do well at £8.95.

Compendium

Live and Learn is a compendium of programs suitable for juniors and early secondary age children. The first program, Graphics takes you step by step through Dragon high resolution graphics giving examples of each command and using them to create a picture on the screen. You can advance and retrace at your own pace. It is disappointing that this is "view only" instruction, no interaction is allowed. It would have been possible to have let the student choose such things as the position of the drawing, the colour of the screen and the size (within limits). This would have been more of a learning experience.

Zoo is a good animal knowledge program. It contains information on 20 animals and for each one a hi-res map can be called on to show its world-wide distribution. There is a "guess the animal" quiz option — you have to be able to spell the names correctly for the computer to recognise your answer.

With Britain the well-drawn map fooled me into high expectations but all it had to offer in the end was a lot of the characteristics of countless towns in England, Wales and Scotland. It offers a good example of the abuse of the scroll function. Imagine 30 or so pages of text and each letter accompanied by a peering breeze. I felt I had been dragged around Britain by the ears.

Live and Learn ends with Survivor which is an interesting and safe method of testing your chances of desert survival (that's the real thing — and Music which consists of a simple tutorial followed by your chance to do a Targetz on the Dragon keyboard.

So how does your excuse of the lack of educational software hold up now? I have looked at some awful programs, some mediocre and a few good ones. Do any of them suit your needs, and how do you choose? Any serious educational publisher should produce some documentation to go with the software. Schools often select packages by sending lists for their literature. They can then make some judgement on its value and decide if it suits their needs. Perhaps parents with home computers should do the same thing. ■

graphical quiz — much in the same way that writing questions on one side of a card and the answer on the other is used as an aid for exam learning. All the words and their definitions can appear on the text screen on command.

Maths Drill allows the digits in answers to competitors to be entered right to left as in pencil and paper exercises. In long multiplication questions, partial answers

★ DRAGON HARDWARE/SOFTWARE ★

HARDWARE

	£
Dragon 32	172.00
Star STX80 80 col printer — (excellent quality)	149.95
GP100A printer 80 col	215.00
Star DP5 15 printer 136 col, 2K buffer	299
Dragon disk drive + controller + DOS	275.00
Box 10 SSD disks	19.55
Dragon 32 dust cover with logo	4.95
Joysticks — pair	15.00
Joysticks (self-centring) — pair	19.95
New! Quickshot joystick — each	12.95
Thermal paper — 100ft roll for STX80	5.50
Datex DX3 computer cassette recorder	29.95

SOFTWARE — LATEST RELEASES!!!

10% off 3 or more tapes

Personal Finance Manager	Juniper	9.99
Word Processor (Tape or disk)	Juniper	17.25
The King	Microdeal	7.95
Cuthbert Goes Walkabout	Microdeal	7.95
Cuthbert Goes Digging	Microdeal	7.95
Cuthbert In The Jungle	Microdeal	7.95
Frogger	Microdeal	7.95
Golf	Microdeal	7.95
Shuttle	Microdeal	7.95
Composer	Microdeal	14.95
Teletutor	Microdeal	24.95
Talking Android Attack	Microdeal	7.95
Crazy Painter	Microdeal	7.95
Galactic Ambush	Microdeal	7.95
Invaders Revenge	Microdeal	7.95
Backgammon	Microdeal	7.95
Intergalactic Force	Microdeal	7.95
Keys of Wizard	Microdeal	7.95
Star Jammer	Salamander	7.95
Dragon Trek	Salamander	7.95
Chess (Cyrus)	Dragon	24.95

This is a small sample of our total range. Send for free list of complete range, including ORIC software, and range of printers.

All our prices are inclusive of VAT and delivery to UK mainland. We reserve the right to amend prices without notice.

Send cheque/PO/ACCESS No to

JUNIPER COMPUTING

8 PEMBROKE GREEN, LEA, MALMESBURY, WILTS. SN16 9PB

Tel 066-622589

Putting some snap into learning maths

God Mead shows you how you can encourage your children to learn their times tables – and have some fun into the bargain

HOME COMPUTERS can be great fun for playing games, but many people buy a micro to use it, among other things, as a teaching aid. It is quite a convincing reason in those early days when you are trying to convince your wife, friends (or even yourself) that you have made a worthwhile investment.

Your micro does have the potential to make learning fun for children, but unfortunately most of the listings in magazines and books are for games. Consequently it can be quite difficult to take advantage of this useful feature of your computer without guidance. This article should help the less-experienced programmer — it shows how to construct a simple maths game in which two children compete to be the first to spot the correct answer to sums displayed on the screen.

Starting . . .

Type in the lines of the program listed with this article in the order they are described here. To help you, the various sections of lines are bolded to show when you should add them to your listing.

Start with lines 40-60 which identify the names of the players and give them their instructions. Line 60 uses the **INKEY\$** function to keep the instructions on screen until the players are ready to move on. As soon as **C** has a value (that is, when any key is pressed) the program can move on to the next line.

Line 110 generates the sums to be answered. The variable **A** will have a value between 0 and 12. "**A=INT(10+2)**" can be thought of as "pick a number from 1 to 10, then add 2 to it", so the sums will be from 3 (ie, 1+2) to 12 (10+2). Similarly, **B** will vary between 4 and 12. **C** is the result of multiplying **A** and **B**.

To produce an "answer" to tempt our young players with, we use the **US\$** statement in line 170 which might need a little explanation. Let us assume, for example, that **A=9** and **B=6**, in which case **C** will of course be 54. Now if you think of "**D=INT(3)+10-37**" as meaning "take a number between 1 and 3 (1, 2 or 3), add the value of **C** to it (making 55, 58

or 57 in our example), then take away 2 from the total, you will see that the three possible numbers produced are either 53, 54 or 55. This will work for any value of **C** that our program generates, producing a number which is equal to, one less or one more than **C** itself.

Line 150 now prints the question, 160 builds in a variable pause and 180 prints the "answer" offered, together with a sound prompt to draw attention to it.

Once the "answer" is on the screen we expect the players to react by pressing a key if the correct answer is being shown. To keep competitiveness and interest at a maximum we will construct our program so that if both children press their key then both presses will be recorded and suitable messages displayed. The quicker child will still win, but the slower one will also earn praise if the right key presses are made.

To achieve this, we have to adopt the **INKEY\$** function to suit our purposes. The standard **INKEY\$** statement (eg **BB=INKEY\$**) alone will only record the value of the last key pressed — and would actually identify the slower player as the winner! So we will employ a string array in which we can store the various key presses made. When a key is depressed, its value (which should be the letter "A", or "L" if the players have followed their instructions) will be stored in the array **BB()**. By this method, the first key press can be stored in **BB(0)** and the second (if any) in **BB(1)**, so we can easily evaluate who was the fastest.

Enter lines 200-240. Line 200 sets up the **INKEY\$** function, and line 210 a **FOR . . . NEXT** loop which effectively scans the keyboard up to 100 times. The first statement in line 220 introduces the string array and means "when a key is pressed, store its value in the next subscript of the array **BB()**". Until a key is pressed **J** will equal 0, so the first key press will be stored in **BB(0)**. In order to keep the program circling through our **FOR . . . NEXT** loop if no key has been pressed, we add the second statement in 220 which reads as "if no letter is yet stored in the current subscript of **BB()** then

go directly to line 240", from where the loop will restart.

If, on the other hand, a key has been pressed since the last time the **INKEY\$** checked the keyboard then **BB(J)** will have a value (the letter pressed) and will NOT equal "" It will therefore ignore the IF . . . THEN statement and drop through to line 230.

If line 230 is reached it must be because **BB(J)** has a value stored in it. As this subscript is now "occupied" we add 1 to the value of **J** so that the next key press made can be put into **BB(1)**. The second statement in this line simply ensures that once two keys have been pressed the program will jump out of the **FOR . . . NEXT** loop, moving the game into the next stage.

Line 250 will only be reached if **J=0** (no keys pressed during the whole run of the **FOR . . . NEXT** loop) or **J=1** (only one key pressed). If **J** does equal 1 the program jumps to line 300. If **J=0** then line 260 will assess whether keys should have been pressed or not. If the answer offered on screen was not the right one the program moves to line 266, gives a short prompt that goes back to line 150 to start the sequence again with a new value for **C**; if the right answer was displayed (ie, **D=C**) then line 270 prints out the missed opportunity to our two budding mathematicians. Line 280 passes, then sends control back to line 100 from where a new series of variables are created.

*** block

The next block of lines from 300-400 cover the permutations when only one key has been pressed. Lines 310-370 apply if the right answer was displayed and will congratulate the quick-witted player who pressed, then go to the appropriate sub-routine in lines 400-440 which keep score. If neither "A" nor "L" were pressed then this is printed up in line 370 and line 750 prints a message accordingly. In all cases, the program then goes back to lines 280 and 180 to restart the sequence.

Lines 400-450 point out the error of his ways to a player pressing when he

```

10 REM ***** BY GD HEAD**
20 E=0:F=0
40 CLS:PRINT# 70,"GIVE PATHNAME: ";PRINT:PRINT
50 INPUT "FIRST PLAYER'S NAME";A$:INPUT"SECOND PLAYER'S NAME";L$:
60 CLS:PRINT"WHEN YOU SEE THE CORRECT ANSWER:PRINT"TO THE SUM PRINTED ON
SCREEN:PRINT"PRESS YOUR OWN KEY once ONLY":PRINT"AS QUICKLY AS YOU CAN!":PRINT
80 PRINT A$;" - USE THE 'A' KEY:PRINT L$;" - USE THE 'L' KEY:PRINT"THE F
IRST PLAYER TO SCORE 25 POINTS WILL WIN THE ROUND"
90 PRINT# 440,"PRESS ANY KEY TO START PLAY";GOTO100:IF C$="" THEN 90
100 B=0
110 A=RND(100)+2:B=RND(91)+3:C=RND
120 FOR J=0 TO 3:GOTO130:NEXT J:J=0
130 CLS:PRINT#12,"score:"PRINT#22,A$:PRINT#40,L$:GOTO 700:PRINT#PRINT#20:GOTO13
0,234)
140 IF C=""=25 OR F=""=25 THEN 840
150 PRINT#100,A$;" " "B$;" "
160 FOR K=1 TO 8:GOTO160:GOTO160:NEXT K
170 D=RND(3)+10-2)
180 IF D<C THEN H=H+1:IF H=4 THEN D=C
190 PRINT#20:3,D;" .....777"POINT# 210,2:PRINT
200 B=B+H*KEY$
210 FOR K=1 TO 100:GOTO210:GOTO160:GOTO160
220 IF B#(10)="A" THEN 240
230 J=J+1:IF J=2 THEN 460
240 NEXT K
250 IF J=1 THEN 300
260 IF D=C THEN 290
270 PRINT"YOU MISSED YOUR CHANCE!":SOUND 1,4:PRINT#1;"is EQUAL TO";A$;" "":B
280 FOR K=1 TO 100:NEXT K:GOTO 100
290 PRINT#440,"READY?...":SOUND 160,4:GOTO120
300 IF D=C THEN 400
310 PRINT"TIME UP!":SOUND 1,4:PRINT"KEY CORRECTLY PRESSED BY:" "
320 IF B#(10)="A" THEN PRINT A$:GOTO160:GOTO160
340 IF B#(10)="L" THEN PRINT L$:GOTO160:GOTO160
370 GOTO 750:GOTO 280
400 PRINT"NO! YOU SHOULD NOT HAVE PRESSED"
410 IF B#(10)="A" THEN PRINT A$:GOTO160:GOTO160
420 IF B#(10)="L" THEN PRINT L$:GOTO160:GOTO160
430 PRINT"OUT IN ANY CASE....."
440 SOUND 20,3:PRINT"WRONG KEY PRESSED"
450 FOR K=1 TO 100:GOTO450:GOTO450
460 IF B#(10)="A" THEN 520
470 GOTO 20,7:PRINT"SAME KEY PRESSED TWICE"
480 IF B#(10)="A" THEN PRINT A$:GOTO160:GOTO160

```

4. **SCORES:** lines 890 and 900 reduce the score. Again, if the key was not "A" or "L", this is dealt with in line 430.

Lines 400-600 come into play when two keys have been pressed (click back to line 230 if you are unsure about this). First of all we have to discourage the smart A&C who might try and get extra points by pressing his own key twice so as to exclude the other player. This is done by line 460-510 which sets the score's key's flashes and then increase the other player's score. Line 600 only resets if the twice pressed key was neither "A" nor "L".

Once this has been checked out, line 520-610 sort through the contents of B\$ to decide who was first (the player whose letter is found in B\$(1), second B\$(2), and whether any other keys apart from A&C were ever pressed. Although lines 520-610 may seem complex at first, if you have played with me so far and understood how the earlier lines 300-450 did their job, you should have little difficulty seeing how this section carries out its tasks too. Lines 530-560 analyse the first press and 580-610 process the second.

In line 620-700 action is taken if both

players pressed when they shouldn't have. In this case it doesn't really matter who pressed first as both players are penalised equally. But as we have the information as to who will display it on screen (Lines 680 and 700 detect if an invalid key was pressed).

Loose ends

Now to tidy up a few loose ends. Line 30 resets the scores to zero at start of play. Line 120 ensures that the array B\$ is empty before each new display is made (if we don't do this, late presses made during one display might be read as a very fast press on the next). Line 140 checks the scores and jumps to the "winner" sequence if either player has reached 25 points.

The sections we have covered so far are the backbone of the program. The remaining lines add some sound and action. Line 120 is a simple screen display of the player's names and scores. Lines 760-790 (P&C) a line of asterisks over Player 1's name if he scores for if the other player is penalised; and line 280 updates the score on screen. Lines 860-890 do the same for

the other player. It also 840-890 the winner is announced with a small fanfare and flashing lights.

Line 180 prevents the game from getting hung up on one sum by counting too many consecutive wrong answers (are generated in line 170). It then ensures that by the fourth display the right answer will be offered. Line 160 resets this counter to zero.

Depending on the choice involved, the pleasure of being the winner may be reward enough — but in my experience this won't last long and more enjoyment may be necessary to keep them at it. One good way of achieving this is to let the winner play a round or two of an arcade-type game before the program returns to the question and answer routine. You can use any game program written in Basic for this (eg. Traker, elsewhere in this issue, as explained below).

Enter lines 600-800, filling in the name of the arcade game. The demand for the winner's name is really only a bit of showmanship for the winner and could easily be by-passed.

Now carry out the following steps

```

490 IF B#(1)="L" THEN PRINT L#;GOSUB 700;GOTO280
500 GOTO430
510 IF B#(1) THEN 430
520 PRINT"FIRST KEY PRESSED WAS..."
530 IF B#(1)="A" THEN PRINT A#;B#;GOSUB 740;GOTO290
540 IF B#(1)="L" THEN PRINT L#;F#;GOSUB 800;GOTO290
550 GOSUB 750
560 IF B#(1)="A" THEN PRINT B304,A#;B#;GOSUB 740;GOTO2610
570 IF B#(1)="L" THEN PRINTB304, L#;F#;GOSUB 800;GOTO2610
600 PRINTB304,"SECOND KEY..."GOTO 370
610 PRINTB416,"WAS THE SECOND TO PRESS"IGOTO280
620 PRINT"END ONE BOTH PRESS"
630 IF B#(1)="A" THEN PRINT A#;GOSUB 750;GOTO2670
640 IF B#(1)="L" THEN PRINT L#;GOSUB 760;GOTO2670
650 GOSUB 750
670 PRINTB304,"AND SECOND PRESS WAS..."
680 IF B#(1)="A" THEN PRINTB416, A#;GOSUB 750;GOTO270
690 IF B#(1)="L" THEN PRINTB416, L#;GOSUB 760;GOTO270
700 GOSUB 790;GOTO280
710 SOUND 15,4;PRINT"ROCK KEY PRESSED";RETURN
720 FOR I=0TODT
730 POKE 1024+I,42;SOUND 200,2
740 NEXT I
750 GOSUB 900;RETURN
800 FOR I=0TODT
810 POKE 1055+I,42;SOUND 200,2
820 NEXT I
830 GOSUB 980;RETURN
840 CLS;PRINT"GAME"
850 FOR I=1TOD4;SOUND 140,3;PRINT"999"
860 PRINT;PRINT;PRINT"AND THE WINNER IS..."PRINT
870 PLAY "1187230468,200306070000F000000000"
880 IF I#I THEN PRINT A#;B#;ELSE PRINT L#;B#;L#
890 FOR K=1TODTOD;NEXT K
900 CLS;PRINT"THE NUMBER OF THIS ROUND";PRINT"HAS EARNED A GAME";PRINT"OF *****
*****";PRINT"TYPE IN THE NUMBER'S NAME TO";PRINT"START THE GAME - OR TYPE I
N THE";PRINT"WORD 'MATHS' FOR ANOTHER GAME";PRINT"OF mathsgame";PRINT
910 INPUT "NAME.....";L#
920 IF B#448 THEN 1000;ELSE IF B#="MATHS" THEN 30;ELSE SOUND 10,7;GOTO 900
930 B#-1;GOSUB 740;RETURN
940 F#-1;GOSUB 800;RETURN
950 B#-1;GOSUB 800;RETURN
960 F#-1;GOSUB 760;RETURN
990 PRINTB72, L#;PRINTB80, F#;RETURN

```

1. SAVE "Mathsgame" on to a tape.
2. LOAD your chosen arcade game.
3. REMEM the arcade game, making the first line number 1000 — see page 43 of *Dragon* for details.
4. SAVE the new renumbered arcade game on tape.
5. LOAD "Mathsgame".
6. Use the immediate mode (i.e. type in these instructions directly without line numbers, then press ENTER). The quotation marks are to clarify only — don't type them in. Type "PRINT PEER25;PEER26" and then press ENTER.
7. Make a note of the two numbers that appear on screen.
8. Type "PRINT PEER26" and ENTER.
9. If the latest number is greater than 1 then type "POKE 25, PEER27" : POKE 26, PEER28) - 2". Otherwise type "POKE 25, PEER27) - 1 : POKE 26, 256 - PEER26".
10. LOAD the renumbered arcade game.
11. In the immediate mode, type "POKE 25," and then type in the first number from instruction 6, ENTER this. Now type "POKE 26," and the second

number from instruction 6, ENTER this.

If you have followed the above instructions exactly you will have merged the two programs into one.

All that remains is for us to add the lines that will ensure that once our timer has had the allotted period on the arcade game the program will return to the maths game. This can be done in a number of ways and I offer you five.

Back to maths

Firstly, find the line in the arcade game (if any) that gives the player the choice of playing again. Alter this line to read INPUT "ANOTHER GAME? (Y/N);IF 25="Y" THEN RUN ELSE END".

Alternatively, use the TIMER function and insert an additional line in the maths program:

```
915 TIMER=0
```

Find a line in your arcade game which is also activated as the program runs (eg. one that updates the score) and insert these two statements in a 11 = TIMER : IF T1 > 7000 THEN 5000. Finally, add new line 5000:

```
5000 CLS;PRINT"TIME UP";MS=FOR K=1 TO 1000;NEXT;GOTO 30
```

It's done by offering game variations. Add the following lines:

```
162 S1=RAND(2);ON S1 GOTO 164,170
164 S2=RAND(3);IF S2=1 THEN
D=C-B;GOTO 180;ELSE IF S2=2
THEN D=C+B;GOTO 180;ELSE
D=C;GOTO 180
```

which will randomly produce a different series of possible "answers". Increase display time (reaction time) by increasing the number in line 210. To have a new sum generated each display, amend the last figure in line 290 from "120" to "100". After display time of screen messages by changing the numbers in lines 280 and 450.

You have then the makings of a first-class competitive maths game — it's over to you now to enhance it with sound and colour, animation and variety. Remember the two key points for a successful children's program — keep it lively and always reward a good effort!

If you want to contact me, write to Thatchover Cottage, School Lane, Middleton Stoney, Oxon OX6 6SE. ■

BEHIND THE SCENES AT PEAKSOFT



WE DESPATCH BY POST UP TO THREE TIMES DAILY. AVERAGE DELAY ON OUR PREMISES IS THREE HOURS.

ossie

PEAKSOFT



ossie THE GAME THAT ALL THE FLAP'S ABOUT!

Totally original arcade action —
100% machine code

It's a tough life for Ossie the Osprey — five hungry chicks to feed, and those pesky poachers keep raiding the nest. Dive for your dinner and plaster the poachers! Increasing difficulty. Hi-score. Joystick optional. **£6.95**

PHOTO-FINISH: Superb new horse-race action. Terrific graphics, authentic race cards, odds based on actual form, **REAL TIME** races from 5f to 2 miles, 'Sporting Life' result cards with distances, times, etc. and an incredible photo-finish feature. 1-4 players. **£7.95**



PEAKSOFT

7 South Colindale Avenue
London NW9 1ES



£6.95

You're the last survivor — and it's a long way home. Can you survive the zombies, the delirious gunships and the armed patients? Who does what?

LIONHEART CLASH — Unique, non-pat. comp. Arcade-style action as you assemble your army, pursued by the ruthless Prince (20%), battles to colourful graphics adventure as you land in the Holy Land to thwart your Crusade against the Sultan Saladin.

DEADLY HEAD HOLE £6.95 — The television crew are assembled at the entrance and your mother has just her story to 'The Sun'. The eyes of the nation are on you! Face the forces of a Madcap police as you lead a mission of mercy to rescue a party of frightened camera. The nation is watching!

POINT BLANK £6.95 — Two classic adventures at an incredible price. Features Towers of Death and The Top Kingdom, Mines and Islands game.

Yes, please rush me...

Name _____

Address _____

RETAILERS: We are represented by major wholesalers, or you can order direct — telephone 0283 84934.

£6.95 CHAMPIONS!

Take your team from the Fourth Division to the European Cup! Features four divisions, promotion, relegation, transfers, bonuses, penalties, set pieces, weekly league and season tickets, an exciting cup, money transfer, and all the fun, drama and excitement of managing a top-flight club.



Leading on the right track

N Breeze lead your skills as a keyboard athlete

100
101
102

```
10 ***** TRACKS *****
11
12 14 COPYRIGHT (C) 1984 BY N BREEZE
13
14 *****
15
16 TRACKS.BAT
17
18 *****
19
20 *****
21 *****
22 *****
23 *****
24 *****
25 *****
26 *****
27 *****
28 *****
29 *****
30 *****
31 *****
32 *****
33 *****
34 *****
35 *****
36 *****
37 *****
38 *****
39 *****
40 *****
41 *****
42 *****
43 *****
44 *****
45 *****
46 *****
47 *****
48 *****
49 *****
50 *****
51 *****
52 *****
53 *****
54 *****
55 *****
56 *****
57 *****
58 *****
59 *****
60 *****
61 *****
62 *****
63 *****
64 *****
65 *****
66 *****
67 *****
68 *****
69 *****
70 *****
71 *****
72 *****
73 *****
74 *****
75 *****
76 *****
77 *****
78 *****
79 *****
80 *****
81 *****
82 *****
83 *****
84 *****
85 *****
86 *****
87 *****
88 *****
89 *****
90 *****
91 *****
92 *****
93 *****
94 *****
95 *****
96 *****
97 *****
98 *****
99 *****
100 *****
101 *****
102 *****
103 *****
104 *****
105 *****
106 *****
107 *****
108 *****
109 *****
110 *****
111 *****
112 *****
113 *****
114 *****
115 *****
116 *****
117 *****
118 *****
119 *****
120 *****
121 *****
122 *****
123 *****
124 *****
125 *****
126 *****
127 *****
128 *****
129 *****
130 *****
131 *****
132 *****
133 *****
134 *****
135 *****
136 *****
137 *****
138 *****
139 *****
140 *****
141 *****
142 *****
143 *****
144 *****
145 *****
146 *****
147 *****
148 *****
149 *****
150 *****
151 *****
152 *****
153 *****
154 *****
155 *****
156 *****
157 *****
158 *****
159 *****
160 *****
161 *****
162 *****
163 *****
164 *****
165 *****
166 *****
167 *****
168 *****
169 *****
170 *****
171 *****
172 *****
173 *****
174 *****
175 *****
176 *****
177 *****
178 *****
179 *****
180 *****
181 *****
182 *****
183 *****
184 *****
185 *****
186 *****
187 *****
188 *****
189 *****
190 *****
191 *****
192 *****
193 *****
194 *****
195 *****
196 *****
197 *****
198 *****
199 *****
200 *****
201 *****
202 *****
203 *****
204 *****
205 *****
206 *****
207 *****
208 *****
209 *****
210 *****
211 *****
212 *****
213 *****
214 *****
215 *****
216 *****
217 *****
218 *****
219 *****
220 *****
221 *****
222 *****
223 *****
224 *****
225 *****
226 *****
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 *****
261 *****
262 *****
263 *****
264 *****
265 *****
266 *****
267 *****
268 *****
269 *****
270 *****
271 *****
272 *****
273 *****
274 *****
275 *****
276 *****
277 *****
278 *****
279 *****
280 *****
281 *****
282 *****
283 *****
284 *****
285 *****
286 *****
287 *****
288 *****
289 *****
290 *****
291 *****
292 *****
293 *****
294 *****
295 *****
296 *****
297 *****
298 *****
299 *****
300 *****
301 *****
302 *****
303 *****
304 *****
305 *****
306 *****
307 *****
308 *****
309 *****
310 *****
311 *****
312 *****
313 *****
314 *****
315 *****
316 *****
317 *****
318 *****
319 *****
320 *****
321 *****
322 *****
323 *****
324 *****
325 *****
326 *****
327 *****
328 *****
329 *****
330 *****
331 *****
332 *****
333 *****
334 *****
335 *****
336 *****
337 *****
338 *****
339 *****
340 *****
341 *****
342 *****
343 *****
344 *****
345 *****
346 *****
347 *****
348 *****
349 *****
350 *****
351 *****
352 *****
353 *****
354 *****
355 *****
356 *****
357 *****
358 *****
359 *****
360 *****
361 *****
362 *****
363 *****
364 *****
365 *****
366 *****
367 *****
368 *****
369 *****
370 *****
371 *****
372 *****
373 *****
374 *****
375 *****
376 *****
377 *****
378 *****
379 *****
380 *****
381 *****
382 *****
383 *****
384 *****
385 *****
386 *****
387 *****
388 *****
389 *****
390 *****
391 *****
392 *****
393 *****
394 *****
395 *****
396 *****
397 *****
398 *****
399 *****
400 *****
401 *****
402 *****
403 *****
404 *****
405 *****
406 *****
407 *****
408 *****
409 *****
410 *****
411 *****
412 *****
413 *****
414 *****
415 *****
416 *****
417 *****
418 *****
419 *****
420 *****
421 *****
422 *****
423 *****
424 *****
425 *****
426 *****
427 *****
428 *****
429 *****
430 *****
431 *****
432 *****
433 *****
434 *****
435 *****
436 *****
437 *****
438 *****
439 *****
440 *****
441 *****
442 *****
443 *****
444 *****
445 *****
446 *****
447 *****
448 *****
449 *****
450 *****
451 *****
452 *****
453 *****
454 *****
455 *****
456 *****
457 *****
458 *****
459 *****
460 *****
461 *****
462 *****
463 *****
464 *****
465 *****
466 *****
467 *****
468 *****
469 *****
470 *****
471 *****
472 *****
473 *****
474 *****
475 *****
476 *****
477 *****
478 *****
479 *****
480 *****
481 *****
482 *****
483 *****
484 *****
485 *****
486 *****
487 *****
488 *****
489 *****
490 *****
491 *****
492 *****
493 *****
494 *****
495 *****
496 *****
497 *****
498 *****
499 *****
500 *****
501 *****
502 *****
503 *****
504 *****
505 *****
506 *****
507 *****
508 *****
509 *****
510 *****
511 *****
512 *****
513 *****
514 *****
515 *****
516 *****
517 *****
518 *****
519 *****
520 *****
521 *****
522 *****
523 *****
524 *****
525 *****
526 *****
527 *****
528 *****
529 *****
530 *****
531 *****
532 *****
533 *****
534 *****
535 *****
536 *****
537 *****
538 *****
539 *****
540 *****
541 *****
542 *****
543 *****
544 *****
545 *****
546 *****
547 *****
548 *****
549 *****
550 *****
551 *****
552 *****
553 *****
554 *****
555 *****
556 *****
557 *****
558 *****
559 *****
560 *****
561 *****
562 *****
563 *****
564 *****
565 *****
566 *****
567 *****
568 *****
569 *****
570 *****
571 *****
572 *****
573 *****
574 *****
575 *****
576 *****
577 *****
578 *****
579 *****
580 *****
581 *****
582 *****
583 *****
584 *****
585 *****
586 *****
587 *****
588 *****
589 *****
590 *****
591 *****
592 *****
593 *****
594 *****
595 *****
596 *****
597 *****
598 *****
599 *****
600 *****
601 *****
602 *****
603 *****
604 *****
605 *****
606 *****
607 *****
608 *****
609 *****
610 *****
611 *****
612 *****
613 *****
614 *****
615 *****
616 *****
617 *****
618 *****
619 *****
620 *****
621 *****
622 *****
623 *****
624 *****
625 *****
626 *****
627 *****
628 *****
629 *****
630 *****
631 *****
632 *****
633 *****
634 *****
635 *****
636 *****
637 *****
638 *****
639 *****
640 *****
641 *****
642 *****
643 *****
644 *****
645 *****
646 *****
647 *****
648 *****
649 *****
650 *****
651 *****
652 *****
653 *****
654 *****
655 *****
656 *****
657 *****
658 *****
659 *****
660 *****
661 *****
662 *****
663 *****
664 *****
665 *****
666 *****
667 *****
668 *****
669 *****
670 *****
671 *****
672 *****
673 *****
674 *****
675 *****
676 *****
677 *****
678 *****
679 *****
680 *****
681 *****
682 *****
683 *****
684 *****
685 *****
686 *****
687 *****
688 *****
689 *****
690 *****
691 *****
692 *****
693 *****
694 *****
695 *****
696 *****
697 *****
698 *****
699 *****
700 *****
701 *****
702 *****
703 *****
704 *****
705 *****
706 *****
707 *****
708 *****
709 *****
710 *****
711 *****
712 *****
713 *****
714 *****
715 *****
716 *****
717 *****
718 *****
719 *****
720 *****
721 *****
722 *****
723 *****
724 *****
725 *****
726 *****
727 *****
728 *****
729 *****
730 *****
731 *****
732 *****
733 *****
734 *****
735 *****
736 *****
737 *****
738 *****
739 *****
740 *****
741 *****
742 *****
743 *****
744 *****
745 *****
746 *****
747 *****
748 *****
749 *****
750 *****
751 *****
752 *****
753 *****
754 *****
755 *****
756 *****
757 *****
758 *****
759 *****
760 *****
761 *****
762 *****
763 *****
764 *****
765 *****
766 *****
767 *****
768 *****
769 *****
770 *****
771 *****
772 *****
773 *****
774 *****
775 *****
776 *****
777 *****
778 *****
779 *****
780 *****
781 *****
782 *****
783 *****
784 *****
785 *****
786 *****
787 *****
788 *****
789 *****
790 *****
791 *****
792 *****
793 *****
794 *****
795 *****
796 *****
797 *****
798 *****
799 *****
800 *****
801 *****
802 *****
803 *****
804 *****
805 *****
806 *****
807 *****
808 *****
809 *****
810 *****
811 *****
812 *****
813 *****
814 *****
815 *****
816 *****
817 *****
818 *****
819 *****
820 *****
821 *****
822 *****
823 *****
824 *****
825 *****
826 *****
827 *****
828 *****
829 *****
830 *****
831 *****
832 *****
833 *****
834 *****
835 *****
836 *****
837 *****
838 *****
839 *****
840 *****
841 *****
842 *****
843 *****
844 *****
845 *****
846 *****
847 *****
848 *****
849 *****
850 *****
851 *****
852 *****
853 *****
854 *****
855 *****
856 *****
857 *****
858 *****
859 *****
860 *****
861 *****
862 *****
863 *****
864 *****
865 *****
866 *****
867 *****
868 *****
869 *****
870 *****
871 *****
872 *****
873 *****
874 *****
875 *****
876 *****
877 *****
878 *****
879 *****
880 *****
881 *****
882 *****
883 *****
884 *****
885 *****
886 *****
887 *****
888 *****
889 *****
890 *****
891 *****
892 *****
893 *****
894 *****
895 *****
896 *****
897 *****
898 *****
899 *****
900 *****
901 *****
902 *****
903 *****
904 *****
905 *****
906 *****
907 *****
908 *****
909 *****
910 *****
911 *****
912 *****
913 *****
914 *****
915 *****
916 *****
917 *****
918 *****
919 *****
920 *****
921 *****
922 *****
923 *****
924 *****
925 *****
926 *****
927 *****
928 *****
929 *****
930 *****
931 *****
932 *****
933 *****
934 *****
935 *****
936 *****
937 *****
938 *****
939 *****
940 *****
941 *****
942 *****
943 *****
944 *****
945 *****
946 *****
947 *****
948 *****
949 *****
950 *****
951 *****
952 *****
953 *****
954 *****
955 *****
956 *****
957 *****
958 *****
959 *****
960 *****
961 *****
962 *****
963 *****
964 *****
965 *****
966 *****
967 *****
968 *****
969 *****
970 *****
971 *****
972 *****
973 *****
974 *****
975 *****
976 *****
977 *****
978 *****
979 *****
980 *****
981 *****
982 *****
983 *****
984 *****
985 *****
986 *****
987 *****
988 *****
989 *****
990 *****
991 *****
992 *****
993 *****
994 *****
995 *****
996 *****
997 *****
998 *****
999 *****
1000 *****
```

THIS NEW game for the Dragon is written entirely in Basic but it's fast enough to outpace the best purely keyboard athletes. It is compatible with both colour and black and white televisions.

Tracker is a game loosely based on a railwayman's tracker board and evolved from a simulation-type program. The tracker board maintains the positions, speed of trains and the status of the junctions along each railway line. Here trains are represented by blue dots and the railway lines as a grid system of yellow tracks. Your objective is to keep all the trains on the tracks for as long as possible.

A train moving towards a junction with a break in the track ahead implies the points are set against it and only the skillful use of the arrow keys will prevent the pending disaster. Points are reset by pressing an arrow key in the direction you wish the train not to travel. For example, there's a train moving down the screen with the points set against it, you press any arrow key other than up to stop a derailment.

When an arrow key is pressed the simple graphic signman will pull his lever and the points reset. But just to make life difficult, each time one set of points are changed, all the others change in a similar manner. There are two derailleurs, though, trains may overtake and pass from opposite directions. I didn't want to make the game totally impossible.

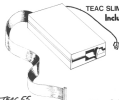
A record of time, in approximate seconds, is kept and constantly updated on the screen as well as the current best time (labelled BT).

The program begins with a colourful Tracker logo display followed by a brief text of instructions. The user is requested to select between two and six trains or opt for the demonstration mode. I suggest you select two trains at first until you are familiar with the method of resetting the points. In the computer demonstration mode the computer plays using five trains and never loses track of any of them. ■

**YOU CAN
ALSO DO IT
IN 5 SECONDS!**

Replacing your Cassette with a Disk Drive, means DATA ACCESS in less than 5 seconds!

If you are looking for a guaranteed Disk Drive, fully BBC compatible, at a price that includes VAT, formatting disk, user manual, cases and leads, then just look at our all-inclusive prices!



TEAC SLIMLINE DRIVES
Including VAT



TEAC 55

SINGLE DRIVES CASSETTE

	Incl. VAT	Excl. VAT
40 TRACK 100K	£195	£164.50
40 TRACK 200K	£220	£182.00
40/80 TRACK SWITCHABLE 200K	£295	£243.00
40/80 TRACK SWITCHABLE 400K	£357	£293.48

TEAC 55

DUAL DRIVES CASSETTE

	Incl. VAT	Excl. VAT
40 TRACK 200K	£330	£278.28
40/80 TRACK SWITCHABLE 400K	£405	£340.57
40/80 TRACK SWITCHABLE 800K	£520	£432.18
DPS KIT	£75	£65.22
P.S.U.	£32.20	£28

MITSUBISHI DRIVES

400K SINGLE DRIVE	£310.04	£245
800K DUAL	£379	£305.85
800K & POWER SUPPLY	£396	£323.85

*These drives are fully compatible with other Computers and can be used should you change your computer.

*Check our special terms for Educational Establishments and Government Departments

CALL TO ORDER
BY POST

To complete any of the items on this list your requirements listed above in this advertisement. Enclose your cheque/PO to our post office or Mitsubishi. Please make cheque payable to VIGLEN COMPUTER SUPPLIES and post to address below. Allow 7 to 14 days for delivery. A add £ 8-00 (postage & insurance on all orders). BY TELEPHONE 081 842 9800. Credit Card orders (Access/B Barclay Card) can purchase by telephone. Please give Card No, Name, Address and the term indicated.

*Enquire About our 40 week
Guarantee
Delivery Service!*

Viglen

COMPUTER SUPPLIES UNIT 7 BRIMBURY WAY
HAMELL, WY 2GA
Tel: 031 842 9800

DEALER ENQUIRIES WELCOME!

Post to: VIGLEN COMPUTER SUPPLIES UNIT 7
BRIMBURY WAY - HAMELL - WY 2GA

Please send me the following items:

I enclose Cheque/PO for £ _____

I prefer to pay Access/B BarclayCard
(Delete whichever not applicable)

CARD No _____

SIGNATURE _____

NAME _____

ADDRESS _____

Tel (Day) _____ Tel (Eve) _____

ORDER FORM (To be filled in by customer)
NAME _____
ADDRESS _____
POSTAL CODE _____



Games that come from...

BEYOND

CHALLENGING SOFTWARE

UP PERISCOPE

PROTECT the convoy using SONAR + Depth charges to seek out and destroy the enemy below!



Try and pick off your Enemy from below the waves!



Here comes the first flakes of snow and out of it - their Tanks!



...How much longer can we hold this town...?



KRIEGSPIEL:
A thrilling game of strategy to be played against the Dragon or any of their deviant opponents.



PLEASE SEND ME ...

Dragon £6.95

UP PERISCOPE £6.95

Send this page in a sealed envelope to...

QUANTITY

TOTAL

£ _____

I enclose a Postal Order - Cheque payable to BEYOND. OR charge my credit card.

Card Number

Visa Access (Delete as necessary)

Name

Address

Signature

Postcode

D40

Easy animation

MOST OF THE home micros available now are capable of some form of animation, the Dragon 32 being one of the leaders in the field. On all micros there are various ways of achieving animation, although the Dragon has more than most. In this article we will concentrate on two methods of obtaining movement.

The simplest way

The first of these is the simplest way possible—using the text screen. Although written for Dragon 32 machines, the set of programs should run on most computers, with only slight changes.

Let us start by displaying on screen the "star" of our epic:

```
10 CLS
20 Y=8
30 PRINT Y;" "
```

If we now add the lines 40 Y=Y+1 and 50 GOTO 30 we have a line that flashes across the screen. By adding a space before the " " in line 30 we can blank out the last " " and give the illusion of movement (line 30 should now read 30 PRINT @ Y;" "). All this happens rather quickly, so let us rewrite our program to slow things down.

```
10 CLS
20 FOR Y=1 TO 20
30 PRINT Y;" "
35 FOR X=1 TO 100:NEXT X
40 NEXT Y
```

The star's comeback

Our next problem is to bring our " " back again. This can be done with the loop:

```
30 FOR Y=30 TO 1:STEP -1
60 PRINT @ Y;" "
70 NEXT Y
80 GOTO 80
```

Dave Windle introduces the basics of animation for the Dragon and shows just how easy it can be

The program, as it stands, deals fully well with movement in the horizontal plane, so how about vertical movement? This is quite possible on the TEXT screen, if slightly more complicated. Using our original program, altered to read:

```
10 CLS
20 FOR Y=440 TO 0:STEP -20
30 PRINT Y;" "
40 FOR X=1 TO 100:NEXT X
50 NEXT Y:GOTO 10
```

We have to stop. However this time, our empty SPACE will not work. So we have to find another means of removing the last " ". Using CLS will work, of course. Try changing line 50 to 50:CLS: NEXT and we now have vertical movement. Using CLS is not much good, though, if you have anything else on the screen that you need to keep. Add the lines

```
5 CLS:PRINT @ 20;"gone"
7 FOR X=1 TO 500: NEXT X
35 PRINT @ 20;"BLINK"
```

for a demonstration of some of the problems. We need then to find another way of erasing our " ". What we need to do is print a space immediately below the NEXT print position, in other words in the space occupied by our " " before the current cycle of the loop.

To do this we need to alter our program once more:

```
10 CLS
20 FOR Y=440 TO 0:STEP -20
30 PRINT Y;" "
```

```
40 FOR X=1 TO 100:NEXT X
50 PRINT @ Y;" "
60 FOR X=1 TO 100:NEXT X
70 NEXT Y
```

Now we have achieved movement in both planes. Let us now finally rewrite the program to demonstrate a bit more graphically what we have learned.

```
10 CLASSIFY=204:"MIDDLE"
20 FOR Y=440 TO 0:STEP -20
30 PRINT @ Y;" " :GOSUB 80
40 PRINT @ Y;" " :GOSUB 90
50 NEXT Y
60 FOR Y=0 TO 30
70 PRINT @ Y;" " :GOSUB 80
80 NEXT Y:GOSUB 90
90 FOR X=1 TO 100:NEXT X
```

As you can see from running the program it is not finished. Using the information contained in the earlier listings see if you can complete the movement around the screen.

Method No. 2

Let us now look at another method of animation. This time we will use Dragon's excellent DRAW command.

The following program DRAWS a figure on the screen, clears it and then DRAWS a slightly different figure a few points forward. The program is quite simple and the following notes will help you to understand its workings.

Program notes

- 10-30 Sets MODE and SCREEN
- 40-60 Creates STRINGS TO DRAW figures.
- 60-110 Makes SOUND and controls DRAWINGS.
- 120 Loops back to start. ■

```
5  "MALCOMMAN" DAVE WINDLE"ADD"
10 PRODDA,1:SCREEN1,1:PCLS:DIM A
   OC(2,1)
20 DIMLA(20,30) 30 Y=120
40 RS="S6U9R209R2U9L2U2R2L4U2L1R
   112R4H4L2D30S6S5D14L18U6R3P6L3"
50 LS="S6U9R209R219L2U2R2L4U2L1R
   102R4H4L2D30S6S5D14L18U6R3P6L3"
60 M="U5R2D5R2U9L2U2R2L4U2L1R10
   2R4H4L2D3011G6L3R3S6P6L3"
70 DRAW"0"220,90"+L4
80 SOUND,1
90 FOR X=1 TO 200:NEXT
100 PCLS
110 DRAW"0"220,90"+R5
110 SOUND,1
120 FOR X=1 TO 200:NEXT
130 PCLS
140 DRAW"0"140,90"+R8
140 SOUND,1
150 FOR X=1 TO 200:NEXT
160 PCLS
170 DRAW"0"140,90"+L4
170 SOUND,1
180 FOR X=1 TO 200:NEXT:PCLS
200 DRAW"0"140,90"+R5
200 SOUND,1
210 FOR X=1 TO 200:NEXT:PCLS
230 DRAW"0"140,90"+R5
230 SOUND,1
240 FOR X=1 TO 200:NEXT:PCLS
260 DRAW"0"140,90"+L4
260 SOUND,1
270 FOR X=1 TO 200:NEXT:PCLS
290 DRAW"0"140,90"+R5
290 SOUND,1
300 FOR X=1 TO 200:NEXT:PCLS
330 DRAW"0"140,90"+L4
330 SOUND,1
340 FOR X=1 TO 200:NEXT:PCLS
370 GOTO 0
```

What's your best source of information on color computing?

HOT! CoCo

Now you can improve your color computing skills... and it's easy to do. HOT CoCo gives you more practical information on the Dragon* than any other publication. Nearly 150 pages a month!

Every issue is packed with exciting new things for you to do. We won't waste your time with filler stories. You'll get instructive columns:

- Editor's Arcade**—enjoy old-fashioned arcade style games on your computer
- The Basic Beat**—learn everything you need to program in Basic
- The Educated Guest**—discover how to use your computer as a teaching tool
- Doctor ASCII**—get answers to your technical questions
- Graphically Speaking**—create eye-catching designs that add appeal to your programs

You also get a dozen easy-to-understand articles every month. Games... utilities... programming techniques... tutorials... graphics... education... hardware projects. They'll help you expand what you can do. And complete program listings show you how to use what you learn.

That's not all. HOT CoCo saves you money too:

- Careful reviews help you make every purchase a sound investment.
- Informative ads let you comparison-shop from home.
- New-product announcements tell you what's available before it reaches the store.

With all this at your fingertips, your subscription could pay for itself with one wise purchase.

And HOT CoCo is risk-free. If you don't like your first issue, just write "cancel" across the invoice and return it to us. You won't owe a thing.

Subscribe to HOT CoCo today. Twelve big issues are only \$44.97 (US funds drawn on a US bank). Simply fill out the coupon below and return it right now to: HOT CoCo Subscription Dept., PO Box 905, Farmingdale, NY 11737, USA.



REG

*Dragon is a registered trademark of Dragon Data Ltd.

YES! Help me improve my computing skills. Send me 12 issues of HOT CoCo for \$44.97 (US). I understand that with payment enclosed or credit card order I will receive a FREE issue, making a total of 13 issues for \$44.97 (US).

Get a 13th issue FREE when you enclose payment or charge it on your Mastercard, Visa, or American Express.

CHECK/MO MC VISA AE

CARD# _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____

POST CODE _____ COUNTRY _____

HOT CoCo • 90 Pine Street • Peterborough, NH 03458 • USA

73DFDU

Getting down to small business

There's more to the micro than playing games — Margaret Norman explains some of the methods and applications of data storage and manipulation

MOST HOME computer games bought their micro in the belief that they would be able not only to play games on them, but also use them to keep track of their bank accounts, look after their files and so on. Here is a program which I hope will make it easier for you to do some of these things, by showing you how to store and manipulate data.

This program has been written to hold the names of a number of items, further brief descriptions (eg the category to which each belongs) and an associated numeric value. It can calculate the total numeric value of various numbers of different items for you. There are several possible applications for a program like this: it could be used to calculate the value of stock in a small shop, by entering the names of items stocked and their prices, or even to calculate the calorie content of a meal, by entering names of foods and their calorie values.

File structure

It could also be used just as a simple file for site names, addresses and telephone numbers — you can just ignore the part of the program which performs the calculations, or remove it by deleting lines 260 and 280 to 510, changing the number 5 in lines 270 to 290 to 4, and erasing the number 5000 from line 300.

The first stage in writing such a program is to determine the structure of the file to be used, the number and type of data fields and the maximum number of records that can be handled. The number of records which can be held in memory at once obviously depends on the number of fields in each: the more fields, the less records you can have. The data is held in arrays; here a string array is used for the first two fields, and a numeric array for the third. It would be possible to hold all the data in a string array, using the VAL function where calculations are to be performed, but if it is known that calculations will be required it is more efficient to use one numeric array.

Alphabetical order

If you are unsure how many records your file will hold, you can find out by trial and error; put a fairly large number in the GET statement at the start of the program, then keep entering data until you get an END error. PRINT N will then give you the number of records it took. If you do this, remember to record the data at regular intervals so you don't lose it all.

The records are arranged in alphabetical order by the sort routine in lines 2050 to 2100. A very simple sort has been used, which will place records in the file fastest if they are entered already in alphabetical

order. For data which is likely to be entered in a random order, a more complex sort routine, such as a binary sort, would be quicker. It would be a simple task to change the routine so that records are filed according to the numeric value rather than the name of the item — just change every occurrence of ABS(I) in this section to AXI.

Deciding options

Once you have structured the file, the next job is to decide which options you want to have available to the program user. Obviously you will need to be able to enter new data, to save the data on tape and to load it again (there is little point in having a file if you cannot also examine it). An option to delete entries is also fairly essential — here it has been combined with the examine data option. If your records are fairly long ones it may be desirable to include an option to alter the data in individual fields — here, changes can only be made by deleting that re-entering a complete record. You may also want to be able to search for all the records containing a given string; use the INSTR function for this.

The option to load an existing file from tape is given at the beginning of the program, as this can only be done at the start. All other options are presented in ■

```
10 REM:ADDFILE
20 REM BY MARGARET NORMAN
30 CLEAR:CLS:RAM 50000
40 DIM A$(400),D$,A(4000)
50 CLS
60 PRINT@204,"ADDFILE"
70 FOR DL=0 TO 1000:NEXT
100 CLS
110 INPUT"DO YOU WISH TO LOAD EXISTING DATA FILE FROM TAPE";D$
120 IF D$="" THEN 100
200 REM:PRINT D$
210 CLS
220 PRINT@37,"OPTIONS AVAILABLE:";PRINT
230 PRINT"1) ADD NEW DATA TO FILE"
240 PRINT"2) EXAMINE/DELETE DATA IN FILE"
250 PRINT"3) SAVE FILE ON TAPE"
260 PRINT"4) CALCULATION"
270 PRINT"5) STOP"
280 PRINT:INPUT"ENTER NO. BETWEEN 1 AND 5";OPT
290 IF OPT=1 OR OPT=5 THEN 380
300 ON OPT GOTO 3000,3000,4000,5000,350
350 CLS;PRINT@36,"RECORDS";END
1000 REM:LOAD FILE FROM TAPE
1000 CLS;PRINT"BEGIN TAPE IS READY,PRESS ENTER";GOTO INPUT 0#
```

Deltas for Dragons



Complete control at your fingertips.

The smooth control of a Voltmace DELTA sprung return joystick is now available to Dragon owners. Called the DELTA 3D it is a cut down version of our DELTA 148 handset.

The same robust ball and socket jointed joystick but with the keypad blanked off to leave a choice of one of three fire buttons.

- Nylon encased — Steel shafted joystick with ball and socket joint
- Fast spring return to centre
- Graphite wiper linear potentiometers

**DELTA 3D joystick £18.00 each
or £19.50 per pair**

Voltmace Ltd

PARK DRIVE, BALDOCK, HERTS, SG7 4E
Tel: (0482) 894119

Callers welcome at the factory — Monday to Friday
Made in England. Trade terms available.

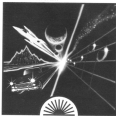


Voltmace *delta 3d*

advanced sound & graphics for the Dragon computer

Including machine code subroutines

keith & steven brain



Dragon book from Sunshine

Advanced Sound & Graphics for the Dragon computer
by Keith and Steven Brain (25.95)

Advanced Sound & Graphics uses a carefully structured approach to show you how to develop routines in your own Dragon programs.

All the major aspects of the sound and graphics capabilities are covered in detail and are fully illustrated. The book takes you from first principles through to bar charts, maps, 3-D projections, movement, animation, direct drawing, screen saving and printing and many other features. Customised sound effects and movement in detail involving keyboard sound synthesis, the graphic display of music and the integration of sound and graphics.

In addition to dealing with the operation and applications of the BASIC commands the book explains the internal organization of the sound and graphics facilities. It also shows you how to use machine code routines to improve your programs.

Keith and Steven Brain have already published the best selling book *Dragon 3D Game Master*.

Sunshine
Please send me copies of *Advanced Sound & Graphics* at £5.95 each

I enclose a cheque/postal order for £ payable to Sunshine, 12-14 Little Newport Street, London WC2R 2LD

Name

Address

Signature

or ring 01-734 2424 to order by *Rooney/Walshford*

We can normally deliver in four to five days

Sunshine — publishers of *Dragon* (Mag, Popular Computing, Manuals, books and software)

```

1020 OPEN "1",E-1,"MODE"
1030 INPUT E-1,N
1040 FOR I=1 TO N
1050 INPUT E-1,A#(I,1)
1060 INPUT E-1,A#(I,2)
1070 INPUT E-1,A#(I):NEXT I
1080 GOTO 200
2000 REM ADD DATA TO FILE
2010 IF N=400 THEN CLS:PRINT#255,"FILE IS FULL",FOR DL=0 TO 5000:NEXT DL:GOTO 200
2020 CLS:INPUT#NAME OF ITEM:A#(N+1,1)
2030 INPUT "DESCRIPTION":A#(N+1,2)
2040 INPUT#VALUE:A#(N+1)
2050 IF N=0 THEN 2120
2060 FOR I=N TO 1 STEP -1
2070 IF A#(I+1,1)=A#(I,1) THEN 2120
2080 T#(I)=A#(I+1,1):S#(I)=A#(I+1,2):A#(I)=A#(I+1)
2090 A#(I+1,1)=A#(I,1):A#(I+1,2)=A#(I,2):A#(I+1)=A#(I)
2100 A#(I,1)=T#(I):A#(I,2)=S#(I):A#(I)=T#(I)
2110 NEXT I
2120 N=N+1
2130 CLS:INPUT#ANY MORE NEW DATA (Y/N):Y,N
2140 IF Y="Y" THEN 2010 ELSE 200
2000 REM EXAMINE/DELETES DATA
2010 CLS
2020 PRINT"DO YOU WANT:"
2030 PRINT"(1) THE WHOLE FILE"
2040 PRINT"(2) A PARTICULAR ENTRY"
2050 PRINT:INPUT"ENTER 1 OR 2":I
2060 IF I=1 AND I<=2 THEN 2090
2070 IF I=1 THEN I=1:GOTO 2140
2080 REM FIND ENTRY
2090 CLS:INPUT"ENTER NAME":S#
2100 FOR I=1 TO N
2110 IF S#A#(I,1) THEN 2140
2120 NEXT I
2130 CLS:PRINT"THIS ITEM IS NOT IN FILE",FOR DL=0 TO 10000:NEXT DL:GOTO 200
2140 CLS:PRINT#A#(1,1):PRINT A#(1,2):PRINT#VALUE:A#(1)
2150 PRINT:PRINT"DO YOU WANT TO:"
2160 PRINT"(1) DELETE THIS ENTRY"
2170 PRINT"(2) EXAMINE NEXT ENTRY"
2180 PRINT"(3) SELECT NEW OPTION"
2190 PRINT:INPUT"ENTER 1,2 OR 3":Y
2200 IF Y=1 OR Y=3 THEN 2190
2210 ON Y GOTO 2240,2250,200
2220 IF I<N THEN I=I+1:GOTO 2140
2230 CLS:PRINT#255,"END OF FILE",FOR DL=0 TO 5000:NEXT DL:GOTO 200
2240 REM DELETE ENTRY
2250 IF I=N THEN 2280
2260 FOR J=I TO N+1)
2270 A#(J,1)=A#(J+1,1):S#(J)=A#(J+1,2):A#(J)=A#(J+1):NEXT J
2280 N=N-1
2290 CLS:PRINT"ENTRY DELETED":PRINT
2300 PRINT"DO YOU WANT TO:"
2310 PRINT"(1) EXAMINE NEXT ENTRY"
2320 PRINT"(2) SELECT NEW OPTION"
2330 PRINT:INPUT"ENTER 1 OR 2":I

```

■ a menu, to which the program returns when each task has been completed.

The routines which handle the saving and loading of data on tape have been simplified by making the first entry in the tape file the number of records in the file; this means there is no need to use an end-of-file marker. The program pauses at the start of these routines (wait for CTRL-C) to be pressed to give the user time to position the tape and put the recorder in the correct mode. You could if you wish insert a MOTOR ON command to facilitate the positioning of the tape.

The section of the program which performs the calculations is also very simple.

You are asked for the name of an item; the appropriate file entry is found, then the description and value are printed and you are asked for the number of these items. The computer then calculates the value of this number of items and gives you this figure and a running total. If the name you have entered is not in the file you are informed of this and asked to enter. This is important as the filed names are only checked for an exact match with the word you have entered, so if you spell the name differently the appropriate entry will not be found.

All programs involving the use of data files should be crashproofed as well as

possible, to minimize the risk of data being lost. Every request for input should be accompanied by a clear indication of the form in which it is required, and followed by a check to see that it does fall within the required range, especially if it is to be used in an GOTO ... GOTO statement. There are plenty of examples of how to do this, eg lines 250-280 check the selection of an option from the main menu. All selections of options in this program are checked in this way, but no checks are made here on the actual data in the files. If you are writing, say, a financial program where typing an extra zero by mistake could prove costly, it is obviously worth ■

SUPERIOR SOFTWARE

EDIT +



- **EDIT+** is a Full Screen Editor and Programmer's Tool Kit. It's an excellent aid for writing programs in BASIC and is easy to use for the novice as well as the experienced programmer. **EDIT+** includes all the facilities of **H-RES**. Up to 23 lines of your program are displayed on the screen and can be changed by overtyping, inserting, or deleting characters. Functions include: Find String, Change String, Copy Text, Goto Specified Line, Scroll Up/Down, Append From Tape and Enter Basic Command. No Dragon is complete without an **EDIT+**. £34.95

HI-RES



- Plug the **H-RES** cartridge into your **DRAGON** and you will immediately see the improvement. The screen displays 24 rows of 51 characters with proper lower case and BASIC codes as normal but with extra features: Selectable character sets (English, French, German, Danish, Swedish, Italian, Spanish), **SPRITE** Graphics, Redefinable Characters, Improved keyboard action with autorepeat allows faster typing. Graphics and text can be moved on the screen. Suitable for educational and business use. £25.50

SOURCE TAPES



The following programmes contain both source and object code. They can be used in conjunction with **DASM** or on their own as individual programmes. It's a great way to build up your software library. Each tape represents excellent value at only £5.99 each.

1. **DISASSEMBLER**
2. **GAME OF LIFE**
3. **H-RES SCREEN DUMP FOR EPSON**
4. **H-RES SCREEN DUMP FOR SBC803A**

DASM



DASM is a versatile assembler, designed especially for ease of use on the **DRAGON** and allows you to assemble machine code while still retaining the full use of BASIC. Supports all 6809 instructions and modes. Allows any length for labels (the first 5 and the last characters are used). Full support for output to printer. Recommended for the beginner. £18.95

DEMON



A powerful machine code monitor which allows you to delve into the internals of your **DRAGON** as well as helping you to debug your machine code programs (and BASIC programs using **PIER** and **PCARD**). Includes: Examine/Change memory, Examine/Change registers, Print Screen, Set Breakpoints, Test Memory. An essential tool for all machine code users. £28.95

DASM/DEMON



- It has all the features of both **DASM** and **DEMON** in one package. **DEMON** is the natural partner to **DASM**, complementing each other perfectly. Write, test and use your programmes without the bother of relocating. It is extensively featured in the new book by Ian Sinclair on Dragon Machine Code. It is the ideal combination for the machine code user. £30.45

VISIT YOUR NEAREST STOCKIST OR FOR FAST MAIL ORDER SERVICE CONTACT

SOFTWARE

GRAPH DRAWER



For HRES or EDP4, draws bar charts direct to screen and printer. Print module for Epson MX or FX printer included. Introductory offer of £14.95 if purchased with HRES or EDP4 £19.95

EXTRAS



- DUST COVER** inc P&P £2.99
PRINTER LEAD inc P&P £14.95
MONITOR/SOUND LEAD inc P&P £3.99
- Super inexpensive 14 inch Colour Monitor with integral sound ideal for DRAGON and most other applications only £275.00
- DRAGON DISC DRIVE** complete inc P&P £269.00

BOOKS



Books and Extras
 Introducing Dragon Machine Code by Ian Sinclair £7.95
 Advanced Sound and Graphics £5.95
 The Working Dragon 32 £5.95
 Programming The 6809 Z80 £12.50
 6809 Assembly Language Prog. £12.50
 Leventhal
 Postage on books: 50p per book except Z80/Leventhal £1 maximum £1.50

BUSINESS SOFTWARE



The following MST programs are now available for use on cassette with the HRES 50 by 24 Screen:
 Database, Business Accounts, Stock Control, Invoices/Statements, Mailer/Address Book.
 Also available: Home Accounts, MST Calc. £19.95

- BSDFSD**
 Software Centre, 13a Beaman Road (0293) 64703
- BRUNNHAM**
 The Computerware Corporation, 1st Floor, 129 High Street, Gillingham (0242) 389809
- BSFCO**
 Bristol Computers Ltd, 24 Park Row (0272) 29488
- BSHFDHRE**
 Dragon Dungen, Millen House, St. John's Street, Ashbourne (0437) 43527
- First Rate Computers**, 31 Race Centre, London Road, Berk (01235) 955260
- DOREIT**
 Garry D Computers, 3 North Street, Newton (0206) 54331
- DSO**
 The Service Users Software Centre, 41 Bringtons & Berrys, High Street, Chesham (0494) 58171
- EDP4PRINT**
 Commercial & General Supplies Co., 35A York Road, Epsom (0253) 542525
- HERFORDSHIRE**
 C.J. Computers, 21 West Square, Stretton (0438) 65553
- HELAND**
 Data Bank, Water Wood, Dunham Road, Cuxton (0202) 988294
- HEIT**
 Melissa Computers, 14 Pine Road, Dabham (0134) 830050
- Mobile Computer Ltd**, 20 St. John's Road, Tonbridge (047) 52955
- LAKESHIRE**
 Great Victorians, 21 Bury New Road, Haverhill, Macclesfield (0252) 798163
- Home Computers**, 214 Church Street, Walsley (0204) 22342
- LONDON**
 Balfie Micro-Shop, 88 Stratford High Road, SMO (0203) 767387
- Striving Micro Systems Ltd**, 211 Bower Street, WY1 (01924) 7611
- MELBURN**
 Micro-Communications, 125 High Street, Foston (015) 9111434
- NET 360th (MILAN)**
 B&B Electronics, 26, 75 London Street, Luton, Co. Amers (0525) 421384
- NET 360th (ST)**
 Computer World, 27 Goringham Hooley (0202) 984914
- NOTTINGHAM**
 Computer Computer Centre, 27 The Mall, Loughborough, North Leicesters (0533) 38979
- SHIRE**
 Computronics Ltd, 8 Central Parade, St. Marys Hill, Sutton (020) 2901525
- Sturminster Newton**, 233 High Street, Sutton (020) 6422964
- SUSSEX**
 Inform, 24 Gousson Road, Brighton (0273) 668474
- WALSLEY**
 Micros Ltd, 21 Colindale 21 Park Street, Astonbury, Duxley (0202) 68202
- WILT (MILAN)**
 Progressive Computers, West Street, Wootton (0202) 642943
- WILTSHIRE**
 Inform Ltd, Thornhill House, Lutteridge, Bedford (05274) 648890
- WILTSHIRE (ST)**
 Inform Ltd, 21 Colindale 21 Park Street, Astonbury, Duxley (0202) 68202
- WYCOMBE**
 The Computer (Westhampstead) Centre Ltd, 3-Heaven Street, Berkhamstead (02924) 648890
- WYCOMBE (ST)**
 Inform Ltd, 21 Colindale 21 Park Street, Astonbury, Duxley (0202) 68202
- WYCOMBE (ST)**
 Inform Ltd, 21 Colindale 21 Park Street, Astonbury, Duxley (0202) 68202

```

3340 IF Z=1 AND Z<2 THEN GOTO
3350 ON 2 GOTO 3320,300
4000 REM SAVE FILE ON TAPE
4010 CLS;PRINT"WHEN TAPE IS READY,PRESS ENTER" ;:INPUT "M
4020 OPEN"O",E-1,"APP"
4030 PRINT E-1;M
4040 FOR I=1 TO N
4050 PRINT E-1;A(I);:PRINT E-1;R(I);:Z
4060 PRINT E-1;A(I);NEXT I
4070 CLOSE E-1
4080 GOTO 300 5000 REM CALCULATION
5000 T=0;CLS
5010 INPUT"NAME" ;F$
5020 FOR I=1 TO M
5030 IF F#A(I); THEN S100
5040 NEXT I
5050 PRINT"THIS ITEM IS NOT IN FILE";GOTO 5130
5100 PRINT"R(I);:Z";PRINT"VALUE" ;A(I)
5110 INPUT"NUMBER" ;N
5120 PRINT"TOTAL VALUE" ;R#A(I);:T=T#R#A(I);PRINT"RUNNING TOTAL" ;T
5130 PRINT"INPUT ANY MORE ITEMS (Y/N)";R#
5140 IF R#="Y" THEN GOTO 5100 5150 GOTO 200

```

4 checking that data fits within certain limits or asking for additional confirmation of very large items.

A short program like this, adapted to suit your needs, will deal with a wide range of minor tasks but obviously it has its limitations. If your requirements are much more complex than it is well worth looking at some of the business programs on the market. A clear understanding of how this program operates, though, should make it much easier to get in grips with its big brothers. ■

Program structure

Lines	initialisation, file load file option main options menu end load file from tape enter new data examine data; delete data option delete data save file on tape calculation
10-70	
100-120	
200-300	
300	
1000-1060	
2000-2140	
3000-3030	
3040-3050	
4000-4060	
5000-5150	

Variables used

Variable	Description
A(I);	name of item I
A(I);	description of item I
A(I)	value of item I
CL	delay loop counter
M	no. of records on file
Q1;R1	Y/N inputs
OPT;X;Y;Z	options selected
I;J	loop counters
S1	search string (name of item)
T	total (in calculator)



of the hill!

The RAINBOW is the biggest and best magazine available for the TRS-80[®] Color, TDP-108, MC-18 and Dragon-3D Computers.

And no wonder! It's over 300 pages thick each month... pages brimming with programs, product reviews, tutorials, columns, party and tips about your computer. Yes, it is considered "the" Color Computer magazine to buy.

Don't delay. For only \$28 you can get the Rainbow every month of the year. Then your CoCo will be King of the Hill too!

U.K. Subscription rates
U.S. \$80 surface rate
U.S. \$100 air rate

© 1984 Rainbow Computer Co. All rights reserved.

For Rainbow, 8200 E. Highway 10
55128A, Tulsa, Oklahoma, 74116

Write request within 1000 miles of the Rainbow.

Name _____

Address _____

City _____ State _____ Zip _____

Payment Enclosed Bill Me

Check VISA MasterCard American Express

By Mail Order International Bill Order

Signature _____ Card Expiration Date _____

RAINBOW
COMPUTER

RAINBOW
COMPUTER

RAINBOW
COMPUTER

Subscription to the RAINBOW on
\$24 a year in the United States
Outside the United States
U.S. \$45, plus postage per
year. U.S. \$60 per year.
U.S. \$80 per year
U.S. \$100 per year
Surface rate only
Add \$10 per year
air rate
Outside the U.S.

1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030

Recovering from i/o errors

Pam D'Arcy shows how to sort out your tapes with Tapescan

IN PRACTICALLY EVERY issue of any computer magazine we commonly read complaints about the lack of a really facility on the Dragon. I have not worried too much about this as there are means of recovering it. The lack of a tape catalogue facility makes me although, again, SPOFF can be used to check that the tape content matches one's records.

My pet outrage is the way that everything grinds to a halt on detection of an I/O error. The biggest drawback for me is that this thwarts most attempts at cutting down on loading time by fast-winding tapes to an approximate position. Brief encounters on a BBC machine show that all blocks within their files are numbered, the blocks are identified as they are passed/loaded and, having been informed of an I/O error, you are allowed to reposition the tape so as attempt a re-read of the problem block if it occurred during loading.

The Dragon gives you no idea of how far you are through the current file, be it one being loaded or stopped, so my usual trick of "SPOFF" until the tape reaches the start of the next file may need to be typed in only a few times — or so many times that I give up and rewind the whole tape back and start again anyway!

Having received the Dragon Data "Information for Machine Code Users" leaflet (and armed with tape layout information in CoCo's Technical Reference Manual), I set about writing a tape listing program with two main criteria:

1. Recovery from I/O errors to allow faster tape positioning.
 2. It should be machine coded so that it could be permanently resident in the Dragon and be used without affecting any other program currently loaded (notably, Basic).
- The resulting machine code listing,

Tapescan, is published with this article. It doesn't assist with LOAD/SPOFF and program re-reads errors in that it is not intercepting any of those routines — but it is there to assist with checking the tape(s) alongside other programs when you may be experiencing problems.

Tapescan can be entered directly using the TOPSY program featured in the June issue. My initial entry took only about 20 minutes, including checking out my own coding routines.

Or you can use the Beta card loader which is also published here.

Best details of its use and technical details now follow. Information on the tape file formats can be ascertained from the listing.

Between files, the cassette motor is switched off for approximately three seconds. If no key is pressed in this time, the run continues; if **Q** is pressed, the run is terminated. Pressing any other key leaves the motor switched off until another key is pressed (**Q** will again quit the program), enabling tapes to be changed or the screen display to be studied.

If a read error is detected, the program resumes by hunting for a file header block. As data blocks containing binary information (eg CSAVE, CSAYROM files) are stored without inter-block gaps, obviously, depending on where within a file the

```

1 REM SETSCAN - ©1984 PAM D'ARCY
2 REM JUNE 1983
3 CLEARCDB, CDRFC, PADDR=C28FC, PBY
  TER=413
4 CLRPRINT"SETSCAN PROGRAM"
5 PRINTPRINT"SETSCAN LOADS THE
  TAPESCAN MACHINE CODE FROM
  AN AREA IN STORED NEXT ON THE
  A TAPE THEN ALLWS YOU TO COPY
  BOTH PROGRAMS TO ANOTHER TAPE
  "
6 PRINTPRINT"ENTER SAVING THE
  PROGRAMS, A NOTION OPTION IS
  AVAILABLE TO ENABLE THE RECO
  RIVING TAPE TO BE POSITIONED CORR
  CTLY BEFORE COMMENCING SAVING"
7 FOR N=1 TO 7999:NEXT
8 PRINTPRINT"LOADING TAPESCAN"
9 CLEARP:TAPESCAN
10 PRINTPRINT"TAPESCAN LOADED"
11 CLRPRINT"SETSCAN PROGRAM"
12 PRINT
13 PRINT"PRESS Q TO QUIT, R TO R
  OTCDB LTD POSITION TAPE PRIOR
  TO SAVING PROGRAMS); ELSE
  ANY OTHER TO COMMENCE SAVING"
14 R=INKEY:IF R="" THEN 4
15 IF R="Q" THEN THEN CLS:END
16 IF R="R" THEN 22
17 ROTCDB
18 PRINT,PRINT"ROTATION IS NOW ON";
  PRINTPRINT"PRESS Q TO QUIT PROG
  RAM, ELSE ANY OTHER KEY I
  S WILL RETURN"
19 R=INKEY:IF R="" THEN 17
20 ROTCDB
21 IF R="Q" THEN THEN CLS:END
22 CLRPRINT"SETSCAN PROGRAM"
23 PRINTPRINT"PRESS Q TO QUIT &
  LIST FILE RECORDS INTO RE
  CORD MODE AND PRESS ANY OTHER I
  S COMMENCE SAVING"
24 IF R="" THEN IF R="" THEN 26
25 IF R="" THEN THEN CLS:END
26 CLRPRINT"SETSCAN PROGRAM"; P
  RINTPRINT"SAVING PROGRAMS NOW"
27 CSAVE"SETSCAN"
28 CSAYROM:TAPESCAN, ADDR, ADDR+
  65535-1, ADDR
29 PRINTPRINT"PROGRAMS JUST SAV
  ED"
30 PRINTPRINT"TAPE RECORDED OUT
  OF RECORD MODE"
31 PRINTPRINT"VERIFICATION OF S
  AVE REQUIRED"; CLS; PRINT N;
  SPRINT N; ELSE SAV="" THEN 22
32 IF R="" THEN THEN CLS:END
33 IF R="Q" THEN THEN 11
34 CLRPRINT"SETSCAN PROGRAM"
35 PRINTPRINT"VERIFICATION OF S
  AVE READING"
37 PRINTPRINT"TAPESCAN WILL NOW
  BE ENTERED; POSITION TAPE AND
  A YOU HEAR THE ROTOR CODE ON;
  PRESS Q AT THEN C
  ONCLUSION OF THE REQUIRED VERI
  FICATION TO QUIT TAPESCAN PRO
  GRAM"
38 FOR N=1 TO 7999:NEXT
39 ELSE
40 PRINTPRINT"BACK ON SETSCAN
  PRESS Q TO QUITOR ANY OTHER TO C
  ONTINUE"
41 R=INKEY:IF R="" THEN 41
42 IF R="Q" THEN THEN CLS:END
43 GOTO 1

```

Setscan loader - for loading Tapescan

Action Packed 100% Machine Code Arcade Software for DRAGON 32

100% Machine Code

MICROS Braids



BRIDS: Only the finest braids and styles to match the finest when you choose Braids.
£3.95

100% Machine Code

MICROS Chess



Chess: It's a classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
£7.95

100% Machine Code

MICROS Crusader



CRUSADER: Knight of the Holy Land, you will help to save the Holy Land. You will help to save the Holy Land. You will help to save the Holy Land.
£3.95

100% Machine Code

MICROS Multitronics



MULTITRONICS: A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
£3.95

100% Machine Code

MICROS Snake



SNAKE: Only the fastest and the most cunning can survive. Only the most cunning can survive. Only the most cunning can survive.
£3.95

100% Machine Code

MICROS Dragon 2



Dragon 2: A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
3 games for £9.95

MICROS WING

Out for your first job in your Micros Wing when you automatically transfer on to a new track and the pursuit of a machine of a kind like. To be made against the other cars would be worth. The only thing to do is get your teeth. It's the wheel, but your first drive would be for the learning and safety. If you can avoid the other cars and get on track, then you get more about controlling the cars in front. Can you make it before you see false trophies? Another superb arcade like game with excellent high resolution colour graphics and sound. Requires one floppy.
It only has when with a computer, management, time, an hour of technical of time.
SUPPORTS DRAGON 32
£3.95

All orders despatched by return for class post
Catalogue and Trade enquiries welcome
Available from SPECTRUM and other good software dealers

100% Machine Code

MICROS Dragon 1



Dragon 1: A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
3 games for £9.95

J. Morrison (Micros) Ltd

DEPT D284, 2 GLENDALE STREET 1, LEEDS LS9 9JH
TELEPHONE (0532) 488987

TOP QUALITY DRAGON 32 PROGRAMS FROM B&H SOFTWARE

SPECIAL OFFER FOR THE NEW YEAR
Any programme for the IDEAL PRESENT!



FUE CRASH (NEW RELEASE)
A 100% Machine Code and 100% Hi-res graphic game

FUE CRASH - NEW RELEASE £3.95
This is a new release from the top quality software for the Dragon 32. It's a classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
"Another superb Dragon 32 game" - *Micros Magazine*

AND ALL BECAUSE... £3.95
We proudly present our latest series. A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
"A highly entertaining game for all the family" - *Home Computing Weekly*

FIVE FINGERS £3.95
The fantastic action of the new release series. A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
"A highly entertaining game for all the family" - *Home Computing Weekly*

SUBMARINE COMMANDER £3.95
Navigate the seas to find the enemy and destroy them. A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
"A highly entertaining game for all the family" - *Home Computing Weekly*

LUNAR LANDING AND RESCUE £3.95
A classic game of wit and strategy. It's a classic game of wit and strategy. It's a classic game of wit and strategy.
"A highly entertaining game for all the family" - *Home Computing Weekly*

ALSO AVAILABLE £3.95
A WEEK AT THE RACES £3.95
GRAPHIC TOOLKIT £3.95
GEOGRAPHY OF UK £3.95
GEOGRAPHY OF EUROPE £3.95

B & H SOFTWARE
Dept HP
201 King Street, Cottingham, Hull
Tel: 0432 202222

TOP DEALERS
SLEETON - *Surfer*
DRAGON DRAGON - *Surfer*
JARAC 241 241 - *Surfer*
SUNCOPT - *Surfer*
WORTHINGTON COMPUTER CENTRE

All prices fully inclusive
Excellent prices on stock/white brochures
Free delivery within 48 hours
Cash/credit order terms
99-offer 25% discount for programs

Address	Object code	Op	Hex	Label
7000 00 00		BRK	17000	
Present data area file				
7001 04 41 00 40	001	STP(1,1,1,1)		
7002 00 40 41 40	000	STP		
Program, clear screen				
7003 00 00	LDX	#000		
7004 00 00 00	LDX	#000000		
7005 00 00	STX	#00		
7006 00 00	STX	#00		
7007 00 00 00	CPY	#000000		
7008 00 00	BRK	17007		
Screen cleared, display 000				
7009 00 00 00	LDX	17007,00		
7010 00 00	LDX	#00		
7011 00 00	STX	A,0		
7012 00 00	CPY	#0000		
7013 00 00 00	JSR	#0000		
7014 04 00	CPY	#0000		
7015 00 00 00	CPY	#0000		
7016 00 00 00	CPY	#0000		
7017 00 00 00	CPY	#0000		
7018 00 00 00	CPY	#0000		
7019 00 00 00	CPY	#0000		
7020 00 00 00	CPY	#0000		
7021 00 00 00	CPY	#0000		
7022 00 00 00	CPY	#0000		
7023 00 00 00	CPY	#0000		
7024 00 00 00	CPY	#0000		
7025 00 00 00	CPY	#0000		
7026 00 00 00	CPY	#0000		
7027 00 00 00	CPY	#0000		
7028 00 00 00	CPY	#0000		
7029 00 00 00	CPY	#0000		
7030 00 00 00	CPY	#0000		
7031 00 00 00	CPY	#0000		
7032 00 00 00	CPY	#0000		
7033 00 00 00	CPY	#0000		
7034 00 00 00	CPY	#0000		
7035 00 00 00	CPY	#0000		
7036 00 00 00	CPY	#0000		
7037 00 00 00	CPY	#0000		
7038 00 00 00	CPY	#0000		
7039 00 00 00	CPY	#0000		
7040 00 00 00	CPY	#0000		
7041 00 00 00	CPY	#0000		
7042 00 00 00	CPY	#0000		
7043 00 00 00	CPY	#0000		
7044 00 00 00	CPY	#0000		
7045 00 00 00	CPY	#0000		
7046 00 00 00	CPY	#0000		
7047 00 00 00	CPY	#0000		
7048 00 00 00	CPY	#0000		
7049 00 00 00	CPY	#0000		
7050 00 00 00	CPY	#0000		
7051 00 00 00	CPY	#0000		
7052 00 00 00	CPY	#0000		
7053 00 00 00	CPY	#0000		
7054 00 00 00	CPY	#0000		
7055 00 00 00	CPY	#0000		
7056 00 00 00	CPY	#0000		
7057 00 00 00	CPY	#0000		
7058 00 00 00	CPY	#0000		
7059 00 00 00	CPY	#0000		
7060 00 00 00	CPY	#0000		
7061 00 00 00	CPY	#0000		
7062 00 00 00	CPY	#0000		
7063 00 00 00	CPY	#0000		
7064 00 00 00	CPY	#0000		
7065 00 00 00	CPY	#0000		
7066 00 00 00	CPY	#0000		
7067 00 00 00	CPY	#0000		
7068 00 00 00	CPY	#0000		
7069 00 00 00	CPY	#0000		
7070 00 00 00	CPY	#0000		
7071 00 00 00	CPY	#0000		
7072 00 00 00	CPY	#0000		
7073 00 00 00	CPY	#0000		
7074 00 00 00	CPY	#0000		
7075 00 00 00	CPY	#0000		
7076 00 00 00	CPY	#0000		
7077 00 00 00	CPY	#0000		
7078 00 00 00	CPY	#0000		
7079 00 00 00	CPY	#0000		
7080 00 00 00	CPY	#0000		
7081 00 00 00	CPY	#0000		
7082 00 00 00	CPY	#0000		
7083 00 00 00	CPY	#0000		
7084 00 00 00	CPY	#0000		
7085 00 00 00	CPY	#0000		
7086 00 00 00	CPY	#0000		
7087 00 00 00	CPY	#0000		
7088 00 00 00	CPY	#0000		
7089 00 00 00	CPY	#0000		
7090 00 00 00	CPY	#0000		
7091 00 00 00	CPY	#0000		
7092 00 00 00	CPY	#0000		
7093 00 00 00	CPY	#0000		
7094 00 00 00	CPY	#0000		
7095 00 00 00	CPY	#0000		
7096 00 00 00	CPY	#0000		
7097 00 00 00	CPY	#0000		
7098 00 00 00	CPY	#0000		
7099 00 00 00	CPY	#0000		
7100 00 00 00	CPY	#0000		
7101 00 00 00	CPY	#0000		
7102 00 00 00	CPY	#0000		
7103 00 00 00	CPY	#0000		
7104 00 00 00	CPY	#0000		
7105 00 00 00	CPY	#0000		
7106 00 00 00	CPY	#0000		
7107 00 00 00	CPY	#0000		
7108 00 00 00	CPY	#0000		
7109 00 00 00	CPY	#0000		
7110 00 00 00	CPY	#0000		
7111 00 00 00	CPY	#0000		
7112 00 00 00	CPY	#0000		
7113 00 00 00	CPY	#0000		
7114 00 00 00	CPY	#0000		
7115 00 00 00	CPY	#0000		
7116 00 00 00	CPY	#0000		
7117 00 00 00	CPY	#0000		
7118 00 00 00	CPY	#0000		
7119 00 00 00	CPY	#0000		
7120 00 00 00	CPY	#0000		
7121 00 00 00	CPY	#0000		
7122 00 00 00	CPY	#0000		
7123 00 00 00	CPY	#0000		
7124 00 00 00	CPY	#0000		
7125 00 00 00	CPY	#0000		
7126 00 00 00	CPY	#0000		
7127 00 00 00	CPY	#0000		
7128 00 00 00	CPY	#0000		
7129 00 00 00	CPY	#0000		
7130 00 00 00	CPY	#0000		
7131 00 00 00	CPY	#0000		
7132 00 00 00	CPY	#0000		
7133 00 00 00	CPY	#0000		
7134 00 00 00	CPY	#0000		
7135 00 00 00	CPY	#0000		
7136 00 00 00	CPY	#0000		
7137 00 00 00	CPY	#0000		
7138 00 00 00	CPY	#0000		
7139 00 00 00	CPY	#0000		
7140 00 00 00	CPY	#0000		
7141 00 00 00	CPY	#0000		
7142 00 00 00	CPY	#0000		
7143 00 00 00	CPY	#0000		
7144 00 00 00	CPY	#0000		
7145 00 00 00	CPY	#0000		
7146 00 00 00	CPY	#0000		
7147 00 00 00	CPY	#0000		
7148 00 00 00	CPY	#0000		
7149 00 00 00	CPY	#0000		
7150 00 00 00	CPY	#0000		
7151 00 00 00	CPY	#0000		
7152 00 00 00	CPY	#0000		
7153 00 00 00	CPY	#0000		
7154 00 00 00	CPY	#0000		
7155 00 00 00	CPY	#0000		
7156 00 00 00	CPY	#0000		
7157 00 00 00	CPY	#0000		
7158 00 00 00	CPY	#0000		
7159 00 00 00	CPY	#0000		
7160 00 00 00	CPY	#0000		
7161 00 00 00	CPY	#0000		
7162 00 00 00	CPY	#0000		
7163 00 00 00	CPY	#0000		
7164 00 00 00	CPY	#0000		
7165 00 00 00	CPY	#0000		
7166 00 00 00	CPY	#0000		
7167 00 00 00	CPY	#0000		
7168 00 00 00	CPY	#0000		
7169 00 00 00	CPY	#0000		
7170 00 00 00	CPY	#0000		
7171 00 00 00	CPY	#0000		
7172 00 00 00	CPY	#0000		
7173 00 00 00	CPY	#0000		
7174 00 00 00	CPY	#0000		
7175 00 00 00	CPY	#0000		
7176 00 00 00	CPY	#0000		
7177 00 00 00	CPY	#0000		
7178 00 00 00	CPY	#0000		
7179 00 00 00	CPY	#0000		
7180 00 00 00	CPY	#0000		
7181 00 00 00	CPY	#0000		
7182 00 00 00	CPY	#0000		
7183 00 00 00	CPY	#0000		
7184 00 00 00	CPY	#0000		
7185 00 00 00	CPY	#0000		
7186 00 00 00	CPY	#0000		
7187 00 00 00	CPY	#0000		
7188 00 00 00	CPY	#0000		
7189 00 00 00	CPY	#0000		
7190 00 00 00	CPY	#0000		
7191 00 00 00	CPY	#0000		
7192 00 00 00	CPY	#0000		
7193 00 00 00	CPY	#0000		
7194 00 00 00	CPY	#0000		
7195 00 00 00	CPY	#0000		
7196 00 00 00	CPY	#0000		
7197 00 00 00	CPY	#0000		
7198 00 00 00	CPY	#0000		
7199 00 00 00	CPY	#0000		
7200 00 00 00	CPY	#0000		

7096 00 00	BRK	17062		
End from program requested				
7097 00 00	STP	#00		
Wait for another key to be depressed before processing				
7098 00 00 00	JSR	#0000		
7099 00 00	STX	#0000		
7100 00 00	STX	#0000		
7101 00 00	STX	#0000		
7102 00 00	STX	#0000		
7103 00 00	STX	#0000		
7104 00 00	STX	#0000		
7105 00 00	STX	#0000		
7106 00 00	STX	#0000		
7107 00 00	STX	#0000		
7108 00 00	STX	#0000		
7109 00 00	STX	#0000		
7110 00 00	STX	#0000		
7111 00 00	STX	#0000		
7112 00 00	STX	#0000		
7113 00 00	STX	#0000		
7114 00 00	STX	#0000		
7115 00 00	STX	#0000		
7116 00 00	STX	#0000		
7117 00 00	STX	#0000		
7118 00 00	STX	#0000		
7119 00 00	STX	#0000		
7120 00 00	STX	#0000		
7121 00 00	STX			

SCREENPLAY



134 St. Vincent Street, Glasgow G2 5JU. Telephone 041-248 2481

MAD MONTY

IT'S MEALTIME FOR MONTY
AND FROGS ARE ON THE MENU !!

GUIDE THIS RAVENOUS PYTHON
AROUND THE GARDEN GULPING FROGS
AND MUNCHING MAGIC MUSHROOMS
BUT BEWARE OF THE POISONOUS
TOADSTOOLS.

KEEP YOUR COOL AND YOU MAY CATCH
A SPEEDY MOUSE FOR A DESERT!

PRICE: £7.95

THE ANIMATOR

IS YOUR DRAGON QUICK ON THE
DRAW?
CAN YOU "DO A DISNEY"?
NOW, THE ANSWER IS YES!!

WITH THE FLICK OF A CURSOR YOU
CAN CREATE YOUR OWN FULL COLOUR
CHARACTERS AND WATCH WITH
AMAZEMENT AS THEY SPRING INTO
LIFE IN YOUR VERY OWN USABLE
ROUTINES.

FROM SPREADING PALMS TO SPEEDING
SPACECRAFT . . . THE LIMIT IS YOUR
OWN IMAGINATION!

PRICE: £9.95

Available by Mail Order, from SCREENPLAY, 134 St. Vincent Street, Glasgow G2 5JU.
(Checks payable to SCREENPLAY)

INVADERS
The original Arcade game
brought to life on the Dragon 1
with the usual features of the
series.

TASK-SHIP
This is the ultimate in arcade
experiences for the Dragon G2
Machine - you can obtain, if
you are lucky!

PF
PROGRAM FACTORY LTD
... are pleased to announce that they have acquired
all rights to market Programmer's Guid software for
the Dragon computer. To complement their existing range, Programmer's
Guid is an American-based company producing quality machine-code
programs. We have a wide range of software, including titles for the
Disc II, Color Game, CBM 64, Spectrum, Dragon and TI 99-4A, and they all
come in attractive dustproof video cases. Catch all your local
software dealer to view the games or contact us at the address
below for 24-hour delivery. Send stamped,
addressed envelope for catalogue.
**TRADE ENQUIRES TO YOUR USUAL
DISTRIBUTOR**

**NINJA
WARRIOR**
Classic Arcade game
with two lives, which
sell in the ultimate
video - Ninja
Warrior!

PUCKMAN
Recently introduced to
the UK. Be the first to be
one of the best versions
on the market.

Fill in the order form and send to
**PROGRAM FACTORY LTD, 26, Railway Road, Oswestry, Llanrwst, Lancashire
Tel: (0284) 736077**

Please tick for the following games (tick box). Checks
payable to Program Factory Ltd. All prices include VAT,
postage & packing.

<input type="checkbox"/> DRAC	<input type="checkbox"/> Spectrum	<input type="checkbox"/> Spectrum	<input type="checkbox"/> Spectrum
<input type="checkbox"/> Invaders	£9.95	<input type="checkbox"/> TaskShip	£9.95
<input type="checkbox"/> Treasure House	£9.95	<input type="checkbox"/> Ninja Warrior	£9.95
<input type="checkbox"/> Spectrum		<input type="checkbox"/> Puckman	£9.95
<input type="checkbox"/> Napoleon		<input type="checkbox"/> Y&B	
<input type="checkbox"/> Archer Adapter	£9.95	<input type="checkbox"/> Puckman	£9.95

Telephone orders accepted by credit card

ACCESS VISA

Name (BLOCK CAPITALS PLEASE) _____
Address _____
Signature _____

BRITAIN'S BEST-SELLING WEEKLY COMPUTER MAGAZINE



Still only 35p
— best value for money

POPULAR
Computing
WEEKLY

Each copy of PCW contains all the latest software and hardware news and reviews, programming hints, adventure corner and pages and pages of programs for the Spectrum, Dragon, BBC, Vic20 and Commodore 64 and other popular home computers.

Other features include:

- Charts of all the top selling software and books
- Full listing of all the new software releases each week
- Free computer swap service
- Pages and pages of classified advertisements



Or take out for £19.95 a year's subscription (61 issues) or £9.95 for six months.

Please send this year's subscription to Popular Computing Weekly (written in this column) order for 12 months (6 issues) for £19.95 or £9.95 (6 issues) for 6 months, made payable to Popular Computing, Dept. 1210, 100 The Mall, London WC2R 2JL. Or order through AccessMastercard on 01-407-4343.

Name: _____
Address: _____

cable software

Developed by:

PSL MARKETING

52 LUMBURY ROAD, LUTON, MK4 0DE, UK (UK)
Telephone: LUTON (0298) 521482



TRACE RACE

Run your Light Cycles around the Games Grid. Force your opponent into a Power Trace or into the Grid wall to win. A game for two players with joysticks, or can be played by a single player as TRACE RACE (SOL01) — one joystick required. **£8.75**

- Features:
- "In Progress" Speech and 100% machine code Series
 - Full High Res Colour Graphics
 - Instructions & Presentation Cassette Case

DRAGON RACE/WASP INVASION

Super value action double pack! Two 100% machine code, high-res games available as two cassettes in double size "Book" type package, making an ideal present and great value at only **£9.99**

OTHER GREAT DRAGON GAMES AVAILABLE FROM CABLE SOFTWARE INCLUDE:

BADGUMAT

Bring Casino quality gambling into your living room with BADGUMAT, the game played by the rich and famous. See if you can break the Bank of Monte Carlo!

GAME FIGHTER

An 101% superb 100% machine code "Terminator" type arcade game, complete with fast scrolling, high-resolution colour graphics & sound.

DRAGONRIDER

A highly fun game with a difference. Help our hero Super Stealthy Stevie make as many safe journeys across the canyon as he can, using his Shock & Wreath MK12 to shoot the pesky Laser Droids.

DRONE

A graphics 3D simulation game, taking place inside your Dragon. Equipped with your MK Tyer Gunstank, you must search for and destroy the evil Plum Guardians. At your disposal are Light Cannons, Pure Laser, Plasmaion Destroyers, Throwers, Brakes and an on-board Sighting System.

— TRACE RACE

— BADGUMAT

— GAME FIGHTER

— DRAGONRIDER

— DRONE

— DOUBLE PACK — 2 **£9.99** (incl. P.P. & V.A.T.)

TROJAN LIGHT PER — **£11.50** (incl. P.P. & V.A.T.)

£8.75 each
(incl. P.P. & V.A.T.)

Make
payment
by
P.S.L.
Marketing

Send Order to:
**P. S. L. MARKETING
FREEPOST
LUTON LU3 2DR**
(NO STAMP NEEDED)

Name: _____
Address: _____

The easy way to interfacing

Follow A G Nanson's instructions to build an analogue/digital interface — next month we'll show you how to use the interface to turn your Dragon into a simple storage oscilloscope.

TOP ROW		BOTTOM ROW	
Reading from right to left:		Reading from right to left:	
1	+11 VOLT	2	+11 VOLT
2	HALT	4	000
3	RESET	6	0 10
7	0 10	8	CARD
9	+5 VOLT	10	00
13	00	12	00
13	00	14	00
15	00	16	00
17	00	18	0 10
19	00	20	A1
21	A1	22	A3
23	A5	24	A5
25	A5	26	A7
27	A8	28	A8
29	A10	30	A11
31	A11	32	B0
33	00000	34	00000
35	000	36	00
37	A13	38	A14
39	A15	40	000 000

Diagram 1: showing the pin out of the Dragon's cartridge connector

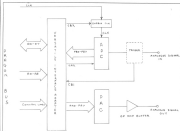


Diagram 2: analogue/digital interface shown as a block diagram

APART FROM THE purely mechanical problem of getting at the cartridge connector (the address, data and control lines are accessed through this connector), interfacing the Dragon 32 is a relatively straightforward affair.

Perhaps it should be mentioned at this point that an indispensable aid to anyone wishing to interface a microcomputer is its circuit diagram. In the case of the Dragon it should be possible to obtain a copy from Dragon Data itself. The TRS-80 Color Computer Technical Reference Manual is also a veritable mine of information, much of which is applicable to the Dragon 32. Another source of useful information are the data sheets for the various integrated circuits used in the construction of the computer, eg the MC68000 CPU, the MC68017/14/13/10 synchronous address multiplexer and the MC6847 Colour Video Display Generator.

The pinout of the Dragon's cartridge connector is shown in Diagram 1.

The interface itself is shown as a block diagram in Figure 1 and in circuit form in Figure 2. The 2N427 ADC and the 2N426 DAC are interfaced to the Dragon 32 with the aid of a 6822 VIA (Versatile Interface Adapter). This device, as well as providing the two 8-bit parallel data ports required by the converters, also provides the means to activate the 2N427, synchronise the clock pulses and detect any triggering signal. Because of the comparative complexity of the 6822 VIA, anyone not familiar with it is recommended to obtain the relevant data sheets.

General purpose

The ADC connected to the B port of the 6822 VIA, the Ferranti 2N427, is an 8-bit successive approximation A-D converter. This is a good general purpose device, relatively cheap, easily obtained, and fairly fast: it has a 10 micro-second conversion time at a clock rate of 600 kHz. The clock signal for the 2N427 is obtained from Pin 4 of the Dragon's cartridge connector; the clock is gated by the 2N427 via a 7418128 tri-state buffer, the purpose of which is to ensure that the incoming clock signal is synchronised to the start of conversion pulses which is obtained from the 6822 VIA's CA2 control line.

The negative voltage for the 2N427 ADC (pin 14) may be obtained from a 7860 voltage converter IC as in the circuit illustrated; alternatively a dual voltage supply could be used. In any case it is suggested that a separate +5 Volt (VCC) supply is used for the board rather than run the risk of overloading the Dragon's PSU.

The 6822 VIA's A port feeds the DAC, a Ferranti 2N426 8-bit digital to analogue converter, the output of which is buffered by a LM258 op amp connected as a voltage follower.

For the home constructor, it is largely a matter of taste and depth of pocket how the interface is constructed. For building experimental circuits I prefer to use breadboards or plug boards. Although the initial cost of these components is quite high, this is compensated for by the ease with which complex circuiting can be

EUROSOFT



AutoRun is a highly popular file in carists, car mechanics and professionals in your area. Now we help you improve your file using AutoRun's graphics ability. The program will auto draw you a unique computerised card and booklet. AutoRun generates one and two page computerised cards and booklets. AutoRun also generates full. AutoRun also generates a check list of items to be checked on a car. AutoRun also generates a check list of items to be checked on a car. AutoRun also generates a check list of items to be checked on a car. AutoRun also generates a check list of items to be checked on a car.



A comprehensive data for use electronic database management system with basic programming facilities. The program contains a large number of data for use in the motorist's manual system. The program contains a large number of data for use in the motorist's manual system. The program contains a large number of data for use in the motorist's manual system.

TMS is a highly popular file in carists, car mechanics and professionals in your area. Now we help you improve your file using TMS's graphics ability. The program will auto draw you a unique computerised card and booklet. TMS also generates one and two page computerised cards and booklets. TMS also generates a check list of items to be checked on a car. TMS also generates a check list of items to be checked on a car.



Inspector Clivia

Inspector Clivia is a highly popular file in carists, car mechanics and professionals in your area. Now we help you improve your file using Inspector Clivia's graphics ability. The program will auto draw you a unique computerised card and booklet. Inspector Clivia also generates one and two page computerised cards and booklets. Inspector Clivia also generates a check list of items to be checked on a car. Inspector Clivia also generates a check list of items to be checked on a car.



PATTI-PAK

Patti-Pak is a highly popular file in carists, car mechanics and professionals in your area. Now we help you improve your file using Patti-Pak's graphics ability. The program will auto draw you a unique computerised card and booklet. Patti-Pak also generates one and two page computerised cards and booklets. Patti-Pak also generates a check list of items to be checked on a car. Patti-Pak also generates a check list of items to be checked on a car.



A comprehensive and essential reference for all computer users. The program will auto draw you a unique computerised card and booklet. Silly Syntax also generates one and two page computerised cards and booklets. Silly Syntax also generates a check list of items to be checked on a car. Silly Syntax also generates a check list of items to be checked on a car.

DRAGON BSA DOCTOR

Dragon BSA Doctor is a highly popular file in carists, car mechanics and professionals in your area. Now we help you improve your file using Dragon BSA Doctor's graphics ability. The program will auto draw you a unique computerised card and booklet. Dragon BSA Doctor also generates one and two page computerised cards and booklets. Dragon BSA Doctor also generates a check list of items to be checked on a car. Dragon BSA Doctor also generates a check list of items to be checked on a car.

EUROSOFT LTD

1 Punch Lane, Limeslade, Swansea
West Glamorgan, UK

Most programs available on tape or disk. (Send SAE for full list.)
 ● Dealer enquiries invited ●

MAKE THE MOST OF YOUR DRAGON 32

Two great books to help you tap the power of your Dragon 32.



MAKING THE MOST OF YOUR DRAGON, by Olive Gilford, leads you through programming the Dragon line first principles, and includes more than 150 complete programs, including major arcade games. **£5.95**

DYNAMIC GAMES FOR THE DRAGON 32 — Tim Hornell and Robert Young. Thirty magnificent games for the Dragon are listed in this 100-page book, to enable your computer to behave just as you hoped it would when you bought it. Programs include MINAC CASTLE, SNAKE ATTACK, SPACE RESCUE, KISS AND POTHELLO, CHECKERS and CLUE'S RUBB. Just **£4.95**.

London Publications Dept, 110 Southampton Way, London W14 9UH
 I am interested in... Please send me the books indicated:
 Making the Most of Your Dragon 32
 Dynamic Games for the Dragon 32
 Making the Most of Your Dragon
 Name: _____
 Address: _____

GRAVESEND HOME COMPUTERS

Your home computer shop for DRAGONS. Disk drives, printers, software, courses, books, backup and service. Mail order also available.

INSURANCE DATABASE. Customised databases for insurance agents and representatives. Basic program **£19.95**. Help with customisation to your requirements.

211 Repeated Dragon Software Titles in Stock.

TEACH TYPE. A new touchtyping program from DCCSoft based on the 150 most frequently used English words. On screen prompting of finger position, speed and accuracy guide. No finger drills, type words from the start. **£9.95**.

KOKOWATTS and **TEDDY**. Two programs with stimulating and colourful graphics. **TEDDY** is a counting and mental arithmetic game for youngsters. **KOKO** is a multi-level maths tester. Both programs can be amended to suit requirements. Instructions for this are included. **£9.95**. **TRICK KOCK**, a learning the line game for under-15s. Excellent graphics, only **£9.95**.

Pay on a visit, if you need help — then just ask. Courses available in the New Year for beginners on micro and BASIC.

We are a registered Dragon service centre.

Gravesend Home Computers Ltd

39 The Terrace, Gravesend DA11 2BA
 Telephone 0474-56677

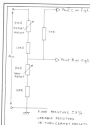


Figure 3: 10-bit DAC circuit

the VLA's 16 8-bit registers are as shown in Diagram 2. Of the 16 registers a total of six are of concern to us: 0, 1, 2, 3, 12 and 13.

First (I'll look at the analogue to digital section. In order to operate this, the computer must perform the following actions:

Initialize the various registers of the 68204. Generally all registers would be initialized at the start of the program, but for the purposes of explanation each register will be dealt with as the need arises. The IIR and the CRA registers must be initialized for input and output respectively. This is accomplished by writing zero to the B Port data direction register (DDRB) at FF42, and by writing FF to the A Port data direction register (DDRA) at FF43.

Disable the clock signal to the ADC and send a start conversion pulse to it. For the Z8427 to operate correctly the clock signal must be synchronized to the start conversion pulse (see Z8427 data sheet for details). One way of doing this is to disable the clock signal while the start conversion pulse is sent to the Z8427, the clock is

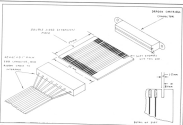


Figure 4: Method for connecting inter-facing circuits to the Dragon



Figure 5: Plugging Figure 4 into cartridge port

then re-enabled. Note that, except for the duration of the start conversion pulse, the WR line of the Z8427 is left high. Referring back to the circuit diagram (Figure 2) it will be seen that the computer clock is gated to the Z8427 via a 74LS125 in-state buffer, whose enable line is taken to CS2 on the VLA. Also, the Z8427's Pin 4 (SR), which receives the start conversion pulse, is

connected to CS2 on the VLA. The four control lines of the 68204 VLA, i.e. CA1, CA2, CA3 and CA0, are manipulated by writing to the peripheral control register (PCR) at address FF4C. The configuration of this register is shown in Diagram 3. To disable the clock CS2 is sent high by writing 111 to bits 7, 8, 5 of the PCR. This means all the 74LS125, CA2 is put in the pulse mode by writing 101 to bits 5, 2, 1. CS0 Interrupt Control is set to active negative edge and CA1 is don't care.

POKE 68FF4C, 6HEB (1110 1100)
And a negative going pulse one clock cycle in length (the start conversion pulse) is sent out on CA2 by performing a write to the VLA's CRA register (see data sheet on the 68204 VLA).

POKE 68FF41, 0
Re-enable clock signal: The clock is re-enabled by writing 110 to bits 7, 8, 5 of the PCR, then sending CS2 low and turning on the 74LS125. At the same time CA2 is sent high by writing 111 to bits 5, 2, 1. The CS0 Interrupt Control line (which is connected to the trigger output) is set to respond to an active negative edge.

Register	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Function
0	1	0	0	0	0	0	0	0	68204 Input Data Register
1	0	0	0	0	0	0	0	0	68204 Output Data Register
2	0	0	0	1	0	0	0	0	68204 Data Direction Register
3	0	0	0	0	0	0	0	0	68204 Data Direction Register
4	0	0	0	0	0	0	0	0	68204 Data Direction Register
5	0	0	0	0	0	0	0	0	68204 Data Direction Register
6	0	0	0	0	0	0	0	0	68204 Data Direction Register
7	0	0	0	0	0	0	0	0	68204 Data Direction Register
8	0	0	0	0	0	0	0	0	68204 Data Direction Register
9	0	0	0	0	0	0	0	0	68204 Data Direction Register
10	0	0	0	0	0	0	0	0	68204 Data Direction Register
11	0	0	0	0	0	0	0	0	68204 Data Direction Register
12	0	0	0	0	0	0	0	0	68204 Data Direction Register
13	0	0	0	0	0	0	0	0	68204 Data Direction Register
14	0	0	0	0	0	0	0	0	68204 Data Direction Register
15	0	0	0	0	0	0	0	0	68204 Data Direction Register

Diagram 2: Addresses of the VLA's registers



Diagram 3: peripheral control register



EDUCATIONAL SOFTWARE DESIGNED BY EXPERIENCED TEACHERS

THE TIGER I.Q. TEST £7.95

Test your own I.Q. (checks both) or practice for job selection tests. Your verbal, numerical and visual abilities are tested in the full or TWO hour I.Q. tests (time-over 20 minutes). Totally in high-resolution. Final I.Q. score and assessment plus correct answer sheet.

THE TIGER GRAND PRIX £7.95

A high-tech education package. The Tiger Grand Prix reinforces learning in Maths, English and General Knowledge for stages 2-5 (and abilities write at year 6) their 500 original questions and answers. Fun, fast and brain-teasing for adults too. Supported on a 6-11" cassette but all software, journals and answer files are working on an additional module that we allow you to use. The Tiger Grand Prix, as a teaching aid for any age, ability (included).

THE USER FILE GENERATOR £5.95

For use with The Tiger Grand Prix. Complete your own sets of questions and answers for use in the game, and make permanent claims on cassette for future use. With this module you can build priority of the questions that you want your children to ask. This control the education in a totally customising program for all ages, subjects and abilities.

•• SMART SO •• We want to market your quality educational games to the Dragon and BBC machines.

See available at participating outlets.



Dealer and computer companies nationwide



TIGER SOFTWARE

Dept 87, 83 Devonshire Street, Manchester M2 2LW
Sunderland, Tyne & Wear, (0753) 482822

LOTHLORIEN



NOW ON DRAGON 32

There's still plenty of time left in the Confederate South and you can enjoy plenty more hours on a full graphics adventure. Play Johnny Reb complete or in chapters and choose from 1 or 2 hours and 15 or 30 American history.

Send for Johnny Reb and three other quality adventures to review yours for free (no post) if you:

PLEASE SEND ME THREE COPIES OF **DRAGON 32** **ISSUE 118** AND A **FREE BOOK**

- | | |
|---|---|
| <input type="checkbox"/> JOHNNY REB | <input type="checkbox"/> FRANKLIN D. ROOSEVELT (one and two hours) (1937-45) (no post) |
| <input type="checkbox"/> ABRAHAM LINCOLN (one and two hours) (1809-61) | <input type="checkbox"/> GEORGE WASHINGTON (one and two hours) (1732-99) |
| <input type="checkbox"/> THOMAS EDISON (one and two hours) (1847-31) (no post) | <input type="checkbox"/> AMERICAN INDEPENDENCE (one and two hours) (1776) |

Money Order/PO for £10. Name printed on it, please.

Postmaster: return to: **Dragon** **Editor**

Name:

Send to: **U.K. (London, only)** **USA/Canada/USA/Canada/USA/Canada**

LOTHLORIEN *the new adventures*

DELTA SOFT PROUDLY PRESENTS THE HI-RES COLOUR GRAPHICS DUMP

You can now copy all High Resolution graphics screens available from BASIC on to paper with a:
Tandy COP 115 (Printer plotter)
MCP-404 Colour printer plotter
CNC printer
Sharp Printer plotter
and the Colour Graphics Dump program.

This program dumps all the graphics screens available from basic, both monochrome and colour. Extensive features include:

- Choice of any two or four colours from a palette of 15
- HALF HEIGHT and HALF WIDTH modes if the graphics modes allow
- Special SLOW MODE for greater accuracy and greater depth of colour
- EXTRA LIGHT mode for dumping more than a full screen and others

Available from DELTA SOFT at
the special low price
of only £4.95 each

Please make cheques and POs out to DeltaSoft and send away today to: DELTA SOFT, 40 Windsor Road, Doncaster, ONS 50T.
Tel: 0522-41115
Trade Enquiries Welcome

Tandy COP 115 £4.95
MCP-40 £4.95

Name:

Address:

Postcode:

Allyn SOFTWARE

7 Skerton Place, North Hill, Plymouth PL4 8HA
Telephone 0752 668415

EDUCATIONAL PROGRAMS

SUMS UP 1 For the 5-12 age group.
Select addition, subtraction or multiplication tables. Select difficulty and time limit then compete against the clock to score 20 before you run out of time. Uses hi-res graphics and 24K of memory.

SUMS UP 2 For age 9 upwards.
Similar to Sums Up 1 but lets you add, subtract, multiply or divide fractions. Shows you how to work out the answer when you make a mistake. Uses hi-res graphics and 22K of memory.

Please send me:
SUMS UP 1 £7.95
SUMS UP 2 £7.95
I enclose cheque/PO for £

NAME:

ADDRESS:

Wizard Software

NEW RELEASES



CLOWNS £7.95
A highly colourful Amiga game pack containing five manipulative and creative games featuring clowns. All these games are presented in high-resolution colour graphics.

RED ALERT £7.95
An original machine-coded Amiga game, presented in high resolution colour graphics using 32-bit colour simultaneously, featuring alien spacecraft, energy fields, falling asteroids and laser attacks.

DRAGON STARTER £8.45
A real-time action featuring a 30 x 30 games, about control, physics, dynamics, status reports, reports, records, statistics, records, scores, and game records, puzzles, mazes, stars, asteroids, features, strategies, and more, including, automatically changing and saving stages. Four levels of difficulty. Games will instruct you manual.

TIME PORT 1 £8.45
The first in a series of five 3D strategy simulation games. Bring your best and acquire the object that the keeper will use for and send a task back to the Time Port.

Also available:

Chess	£9.95	Break	£9.95	Snooker	£9.95
Finance	£9.95	Football	£9.95	Wizard	£9.95
Algebra	£9.95	Trigon	£9.95	Softball	£9.95

SPECIAL OFFER: Any 2 games £14.95 or any 4 games £24.95
Amiga releases, UK only. Cheques or postal orders to:
**WIZARD SOFTWARE, DEPT DU, PO BOX 23
DUNFERMLINE, FIFE KY11 5SW**

Also available from software stores world-wide
Send large SAE (10 x 12) for full program catalogue
Revised postal superior quality 200gsm 100% cotton paper

RWGLS SOFTWARE UK LIMITED

21 STONEY CREST PARK, SOUTH WIMBORNE, HANTS



MATHS TUTOR

A SET OF PROGRAMS, LOGICALLY ORDERED, FOR TEACHING AND REVISION OF: ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION.

£5.00

EDUCATION

ARITHMETIC, LOGIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE.

ARITHMETIC £5.00
ALGEBRA £5.00
GEOMETRY £5.00
STATISTICS £5.00
CALCULUS £5.00

ARITHMETIC AND ALGEBRA £10.00
ARITHMETIC AND GEOMETRY £10.00
ARITHMETIC AND STATISTICS £10.00
ARITHMETIC AND CALCULUS £10.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

ARITHMETIC, ALGEBRA, GEOMETRY, STATISTICS, CALCULUS, AND MORE £50.00

MUSIC TUTOR

LEARN MUSIC BY PRACTISING THE INSTRUMENTS YOU WANT TO PLAY. THE TUTOR WILL TEACH YOU THE BASICS OF MUSIC THEORY AND PRACTICE.

£9.95

BUSINESS

ACCOUNTING, FINANCE, MARKETING, AND MORE.

ACCOUNTING £9.95
FINANCE £9.95
MARKETING £9.95

ACCOUNTING AND FINANCE £19.90
ACCOUNTING AND MARKETING £19.90
FINANCE AND MARKETING £19.90

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

ACCOUNTING, FINANCE, MARKETING, AND MORE £59.75

MEMBERS ORDER ACCOUNT

NEW

The complete speech synthesis system

STAY
WITH
THE
LATEST
TECHNOLOGY

SPEECH SYNTHESIS MODULE for the Dragon 32 computer

- Fully fitted module plugs into cartridge port
- Unlimited vocabulary, using allophone-type, dedicated speech chip
- Approximately 250 words predefined: accessed by entering word required
- Complete control using five new BASIC commands
- Speech can easily be incorporated into existing BASIC programs
- Up to 40 words spoken from one command; speech can occur simultaneously with graphics
- £37.95 inclusive

Also available: **SOUND EXTENSION MODULE** for use with the Dragon computer — provides facility to play chords and harmonies over five octaves — easy to use via BASIC — built-in sound effects — music and graphics can occur simultaneously — two I/O ports — user manual — **ONLY £34.95 inclusive**

ACCESS/cheque PO to:
J.C.B. (MICROSYSTEMS)
28 Southbourne Road, Bournemouth, BH6 5AE
Tel: (0202) 423973
Write or phone for further details

WEST DEVON ELECTRONICS

STATION ROAD, HORRABRIDGE
YELVERTON, DEVON (0822) 833434

DRAGON APPROVED SERVICE AND REPAIR CENTRE

DRAGON 32 £174.00
incl. VAT

DRAGON 64 £229.00

Your cheap solution to a small business system.
Ask for details

184K DRAGON DISC DRIVE
Complete with three 5 1/4 inch floppy discs
£274.00
incl. VAT

Four-Colour Printer-Printer for your Dragon. Uses plain roll paper £189.00 incl. VAT. Send for sample print-out.

SEND FOR LIST OF OTHER
DRAGON ITEMS, SOFTWARE, ETC

You can order and pay for any of these and other items we sell at any Post Office. Send for details.

FREE POSTAGE AND PACKING

```

10 REM BEEPBOOBYN ( 333
20 CLS:PRINT@,STRING$(20,"X")
30 PRINT@30,"ADJUST BIPOLAR INPUT" (PRINT@70,STRING$(20,"X")
40 PRINT@40,"PRESS BREAK TO ESCAPE"
50 POKESHFF42,0:POKESHFF43,SHFF
60 PRINT@99,"APPLY -4.98 VOLTS TO 'A' IN"
70 PRINT@163,"ADJUST OFFSET UNTIL READING"
80 PRINT@227,"JUST VARIES BETWEEN 0 AND 1
90 POKESHFF40,6400:POKESHFF41,0:POKESHFF4C,6400:FOR J=0 TO 10:NEXT
100 PRINT@327,"READING=";PEEK(SHFF40)
110 TIMER=0
120 IF TIMER<50 THEN 120
130 POKESHFF4C,SHFF
140 PRINT@335," "
150 REM INKEY% IF IN="" THEN 90 ELSE 170
160 REM INKEY% ADJUST GAIN!!!
170 FOR Z=1120 TO 1375:POKEZ,96:NEXT
180 PRINT@99,"APPLY +4.98 VOLTS TO 'A' IN"
190 PRINT@163,"ADJUST GAIN UNTIL READING"
200 PRINT@227,"JUST VARIES BETWEEN 254-255"
210 POKESHFF4C,SH60:POKESHFF41,0:POKESHFF4C,6400:FOR J=0 TO 10:NEXT
220 PRINT@327,"READING=";PEEK(SHFF40)
230 TIMER=0
240 IF TIMER<50 THEN 240
250 POKE(SHFF4C,SH60)
260 PRINT@335," "
270 REM INKEY% IF IN="" THEN 210 ELSE 290
280 REM INKEY% ADJUST OFFSET!!!
290 FOR Z=1120 TO 1375:POKEZ,96:NEXT
300 GOTO 60

```

Program 1. In use in setting up bi-polar operation of input circuit

POKE(SHFF4C,6400) (130-1111)

Note that the BUSY output and the RD input lines of the ZN4027 are tied together, so that the tri-state outputs of the ZN4027 are automatically enabled when the data is valid. These two lines are also taken to the CA1 interrupt control line, which could be used, if desired, to generate a PIRQ via the IRQ output of the 8252, when conversion is complete. However, for the purposes of this article this is not required and the IRQ output is not connected to the computer, so CA1 is set to don't care.

Process data. After a short delay (approximately 10 micro seconds) while conversion takes place, read the 8 port input Register IN0 and process any data it may contain.

PEEK(SHFF40)

The next thing to look at is getting an analogue input to the ZN4027. For a detailed account of connecting various ranges of analogue inputs to the ZN4027 the reader is referred to the relevant data sheets. The input circuit shown in Figure 2A is for ± 5 Volt full scale bi-polar operation. Before use this should be set up as follows:

1. Once the circuit has been thoroughly checked and all is OK, run Program 1.
2. Apply -4.98 volts to A in and adjust the offset pot until the LSB output just alternates between 0 and 1 with all other bits at 0.
3. Apply $+4.98$ volts to A in and adjust the gain pot until the LSB output just alternates

between 0 and 1 with all other bits at 1.

4. Repeat step 2.

Note that if the analogue signal is connected directly (via a 4 kilo-ohm resistor) to pin 8 of the ZN4027 then the analogue input range is between 0 volts and 2.55 volts.

Now on to digital to analogue conversion. Compared with the ZN4027 DAC, interfacing the ZN406 DAC to the Dragon is quite straightforward. There are no clock signals, start conversion pulses or clock voltage supplies to worry about. The computer outputs data to the DAC through the A port of the 8252. The analogue output signal is taken from pin 4 of the ZN406 and is buffered by the LM358 voltage follower. (An alternative arrangement to the LM358 buffer is shown in the Ferrand data sheet on the ZN406 series.)

If the circuit is OK apply ± 6 volts to the converter and (OP AMP). Although not shown in the circuit diagram (Figure 2), provision should be made to centre off the DAC section of the interface if it is not required. Set the gain control to maximum and with a Volt meter connected across the output run Program 2. Outputting zero should result in a reading of about 0.00 Volts (This small offset voltage can be removed by using one of the circuits illustrated in the Ferrand data sheet). Outputting 255 should result in a reading of 2.55 Volts.

Next month I'll explain how this analogue/digital interface can be used to convert the Dragon into a simple storage oscilloscope. This is where the mysterious "Trigger" in Figure 2 comes in handy — as will be revealed. ■

```

10 REM BEEPBOOBYN (1 333
20 CLS:PRINT@,STRING$(20,"X")
30 PRINT@35,"CHECK OUTPUT OF ZN406 (A) ."
40 PRINT@67,STRING$(20,"X")
50 POKESHFF43,SHFF
60 POKESHFF41,0
70 PRINT@256,"MINIMUM VALUE APPROX 0.00 VOLTS"
80 PRINT@45,"PRESS BREAK TO ESCAPE"
90 TIMER=0
100 IF TIMER<300 THEN 100
110 FOR Z=1280 TO 1311:POKEZ,96:NEXT
120 POKESHFF41,SHFF
130 PRINT@256,"MINIMUM VALUE APPROX 2.55 VOLTS"
140 TIMER=0
150 IF TIMER<300 THEN 150
160 FOR Z=1280 TO 1311:POKEZ,96:NEXT
170 GOTO 60

```

Program 2. In use with a Voltmeter connected across the output


```

510 DRAW*BR154,174*+R8R
520 DRAW*BR112,174*+R8R
530 COLOR1,0
540 DRAW*DR40,174*+BR1*PAINT(00,104),1,1
550 DRAW*BR154,174*+R8R
560 PAINT(144,104),1,1
570 PSET(140,100,0)
580 COL(CR),1:DRAW*BR14,174*+R8R
590 DRAW*BR70,174*+R8R
600 COLOR1,0:DRAW*BR16,175*+BR1*PAINT(100,100),1,1:DRAW*BR70R50COL(CR)2R2*
610 FORI=1TO500STEP20
620 GETI,I:GZI=(I*20,55):PC,0
630 PUTI,I:ZSI=(I*20,43):PC,PRESET
640 GETI,I:SSI=(I*20,175):PC,0
650 PUTI,I:SI=(I*20,21):PC,PRESET
660 NEXTI
670 FORI=1TO0
680 READP=C(I),I)=P(C(I),2)=1
690 FORJ=STOS=C(I),J)=0:NBRTJ
700 READPP=C(I),J)=P(C(I),0)+PP
710 NEXTJ
720 Z=00:Y=00
730 GETI,I:4SI=(I,60):CR,0
740 SCREEND,0
750 I4=INKEY$ IF I4="" THEN GOTO
760 IF I4=CHR(104) THEN Y=Y-20:IF Y<0 THEN Y=0
770 IF I4=CHR(110) THEN Y=Y+20:IF Y>154 THEN Y=154
780 IF I4=CHR(108) THEN X=X-20:IF X<0 THEN X=0
790 IF I4=CHR(116) THEN X=X+20:IF X>154 THEN X=154
800 GET(X+1,Y+1)=(X+21,Y+21):PC,G
810 PUT(X+1,Y+1)=(X+21,Y+21):PC,PRESET:PUT(X+1,Y+1)=(X+21,Y+21):PC,PSET
820 IF P&K<>400=200 THEN GOSUB150
830 IF C(X,PY)=1 AND P=0 THEN GOSUB1140
840 IF C(X,PY)=7 AND P=1 THEN GOSUB1220
850 GOTO940
860 IF RT=4 THEN RT=0:GOTO740
870 IF C(X) THEN X=X-20+16LSECX=1
880 IF Y<0 THEN Y=Y+20+16LSECY=1
890 COL(CR),1
900 GET(X+1,Y+1)=(X+21,Y+21):PC,G
910 IF PP&DNT(X+1,Y+1)=1 THEN PUT(X+1,Y+1)=(X+21,Y+21):CR,PSET:ELSEP(UT(X+1,Y+1)=(X
+21,Y+21):CR,PRESET
920 PUT(200,0)=(220,20):PC,PSET
930 RT=1
940 RETURN
950 COL(CR),1:DRAW*BR1*+STR$(0+20*,"")+STR$(Y+20)
960 IF C(X,CY)=0 THEN GOSUB20,1:IF PP&DNT(X+1,Y+1)=1 THEN PUT(X+1,Y+1)=(X+21,Y+21)
:CR,PSET:GOTO910:ELSEPUT(X+1,Y+1)=(X+21,Y+21):CR,PRESET:GOTO910
970 IF PP&DNT(X+1,Y+1)=0 THEN W=0
980 PUT(X+1,Y+1)=(X+21,Y+21):CR,PSET
990 DRW(C,X,CY) GOTO790,800,810,820,830,840,850,860,870,880,890,900
990 DRAW*BR1*+PAINT(X+10,Y+10),0,0:GOTO910
990 DRAW*BR1*+PAINT(X+10,Y+10),0,0:GOTO910
990 DRAW*BR1*+PAINT(X+10,Y+10),0,0:PSET(X+8,Y+8,1):GOTO910
990 DRAW*BR1*+PAINT(X+10,Y+10),0,0:GOTO910
990 DRAW*BR1*+CR:PAINT(X+10,Y+10),0,0:PAINT(X+10,Y+10),0,0:GOTO910
990 DRAW*BR1*+BR1*+PAINT(X+10,Y+10),0,0:DRAW*BR70R50COL(CR)2R2*:GOTO910
990 DRAW*BR1*+BR1*+GOTO910
990 DRAW*BR1*+GOTO910
990 DRAW*BR1*+GOTO910
990 DRAW*BR1*+CR:GOTO910
990 DRAW*BR1*+R8R
990 IF C(X) THEN X=X-20+16LSECX=1
990 IF Y<0 THEN Y=Y+20+16LSECY=1
990 IF C(X,PY) AND CY=PY THEN W=0
990 C(X,PY)=C(X,CY)=C(CX,CY)=0
990 PUT(200,0)=(220,20):CR,PSET
990 IF C(X,PY)=1 AND P=0 THEN GOTO1140
990 IF C(X,PY)=7 AND P=1 THEN GOTO1220

```

```

980 RETURN          990 COLOR=0          1000 PUT (X+1,Y+1)-(X+21,Y+21),OR,PRESERVE
1010 GNC(CX,CY) GOTO(1020,1030,1040,1050,1060,1070,1080,1090,1100,1110,1120,1130)
1020 DRAW#R1:GOTO#10
1030 DRAW#R2:GOTO#10
1040 DRAW#R3:GOTO#10
1050 DRAW#R4:GOTO#10
1060 DRAW#R5:GOTO#10
1070 DRAW#R6:GOTO#10
1080 DRAW#R7:PAINT (X+10,Y+10),1,1:GOTO#10
1090 DRAW#R8:PAINT (X+10,Y+10),1,1:GOTO#10
1100 DRAW#R9:PAINT (X+10,Y+10),5,1:PRINT (X+8,Y+8),:GOTO#10
1110 DRAW#R10:PAINT (X+10,Y+10),1,1:GOTO#10
1120 DRAW#R11:GNC:PAINT (X+10,Y+10),1,1:PRINT (X+10,Y+10),1,1:GOTO#10
1130 DRAW#R12:GNC:PAINT (X+10,Y+10),1,1:PRINT (X+10,Y+10),1,1:GOTO#10
1140 PER=DRKEYS
1150 IFPER=1 THEN H=1140
1160 CX=FX:CY=FY
1170 IFPER=10 THEN H=MC(CX,CY)=5:GOTO#740
1180 IFPER=9 THEN H=MC(CX,CY)=4:GOTO#740
1190 IFPER=8 THEN H=MC(CX,CY)=3:GOTO#740
1200 IFPER=7 THEN H=MC(CX,CY)=2:GOTO#740
1210 GOTO#140
1220 PER=DRKEYS
1230 IFPER=1 THEN H=1120
1240 CX=FX:CY=FY
1250 IFPER=10 THEN H=MC(CX,CY)=11:GOTO#740
1260 IFPER=9 THEN H=MC(CX,CY)=10:GOTO#740
1270 IFPER=8 THEN H=MC(CX,CY)=9:GOTO#740
1280 IFPER=7 THEN H=MC(CX,CY)=8:GOTO#740
1290 GOTO#120
1300 DATA 4,10,3,9,2,8,5,11,6,12,2,8,3,9,4,10

```

Circles

From *Eden Ard* in *Newcastle-upon-Tyne*. THIS **COLORFUL** AND **slow** program generates random circles of all the colours available in high-res.

```

10 PMODE 3,1:SCREEN 1,1: 30 FOR B=1 TO 5:CIRCLE
PCLS (X,Y),B,RND(8):
20 X=RND(250):Y=RND SOUND#,1:NEXT
(190):S=RND(150) 40 GOTO 20

```

Drag

From *Simon Mundell* in *Reading*. **DRAG** is a simulation of dragster racing using **PMODE 3**. Use of the joystick is not needed (I only put them in to give you a feel of actually racing if you feel that this is not necessary simply delete lines 59 to 63).

The race is calculated on the speeds reached after every 20th of a mile. This is displayed in text and then you are returned

to hi-res. There is the added danger of blowing a tyre. This kills you but you are still free to compete in the next race.

Program notes

- 1-8 Teckliff lists
- 9-19 Instructions (if required)
- 20-25 Sets all variables required and a few more besides
- 26-36 Draws the cars — GETs them into an array and draws the site (with animation too)
- 37-45 Draws the arena and all parts that do not need to be redrawn every time

46-47

The main part — draws everything, PUTs it all — checks if a tyre has burst or if it is time to show the speeds

58-105

The text screen showing of all speeds, times, distances, and the current world record holder

106-114

Replays the bad news to you that one of the cars has blown up — and then carries on regardless

The program, once set, will run and run and run, all time immemorial.

```

1 REM*****
2 REM   B R A G
3 REM*****
4 REM BY SIMON MUNDELL
5 REM*****
6 REM (C) MUNDELLSCRIPT 1982
7 REM   4TH DEPT 1982..
8 REM*****
9 CLS:PRINT#126," WOULD YOU LIKE TO KNOW ABOUT
10 INPUT#126 IF A$="Y" THEN 12
11 IF A$="N" THEN 31
12 CLS:PRINT#2,"DRAG A GAME FOR THE DRAGON 32

```

THE GAME (Y/N) "

Continued on
page 55

BY SIMON MUNDELL..

OPERATION GREMLIN . . .

A very different game that combines the intrigue of adventure with the real time, machine code speed of arcade action. The player must control not one, but **SEVEN** different troopers, each with their own character status, in the search for the weapons that will destroy THE GREMLINS.

DRAGON TREK

Dragon Trek is a new implementation of a classic game, taking full advantage of the Dragons hi-res graphics and sound capabilities. Your ship's impressive armament is comprised of high energy Photon Torpedoes and Missiles, both long and short range and short range and short range (in full screens) enable you to track the Klingons and your onboard computer will give you extra tactical facilities. As commander you will have to use strategy and cunning to defeat the enemy.

THE RING OF DARKNESS

BRITAIN'S No. 1 ADVENTURE GAME FOR THE DRAGON 32 IS NOW AVAILABLE FOR THE IBM SPECTRUM AND ORIC

THE RING OF DARKNESS is a complete role playing adventure in hi-res graphics, featuring a detailed land filled with towns, 3D dungeons, forests and seas, and populated by kings and peasants, evil wizards and other strange creatures. All versions are identical with respect to the adventure. The ORIC version is recorded in fast mode only. Many hours of mystery and suspense await you in your quest to find The Ring Of Darkness.

ORDER WITH CONFIDENCE

All titles in stock are dispatched by return of post.

SEND SAE FOR OUR FREE CATALOGUE.

Talented titles are also available from good software outlets and from Boots.



Complete this order form and post it to: WINTERSOFT, Dept. 00 - 38 Uplands Park Rd., Enfield, Middlesex EN2 7PT.

DRAGON 32	
Operation Gremlin	20.00
Dragon Trek	20.00
The Ring of Darkness	20.00
Author/Designer	50.00
ORIC 1 - ORIC	
The Ring of Darkness	10.00
Operation Gremlin	10.00
SPECTRUM 486	
The Ring of Darkness	20.00

Send in the cheque/PO for £

NAME

ADDRESS

All prices include p.p.h. VAT and the WINTERSOFT guarantee of quality and reliability.

WINTERSOFT
Computer Adventure

WINTERSOFT, 38, Uplands Park Road,
Enfield, Middlesex EN2 7PT.

DEALER INQUIRES WELCOME 01 267 8720

NOW AVAILABLE FROM W.H. SMITH

SUPER SPY 48K Spectrum Dragon 32

Locate the secret island hideaway of the mysterious megalomaniac Dr. Death. Follow his trail across continents, through complex puzzles, coded messages and 3-D mazes. Discover the entrance to his underground lair — but beware — even with your death-defying gadgets his evil henchmen may still win the day!

Saving the world may take some time — so we've included a 'save' routine for part-time secret agents!

Credit Card Hotline
06286 63531



**Only
£6.50**

DEALER ENQUIRIES WELCOME — GENEROUS DISCOUNTS

Adventurous Programs always wanted. Please send sample — generous cash payments!

RICHARD SHEPHERD SOFTWARE

ELM HOUSE, 23-25 ELMSHOTT LANE, OPPENHAM, SLOUGH, BERKS. TEL. (062784) 63531

```
10) RUNDLLOFT 1983*
11 PRINT128," IN THIS A GAME FOR TWO PLAYERS, YOU ARE THE DRIVER/PILOT CREW OF A
FUNNY CAR (A SUB-SECTION OF DRAGSTER RACING CARS).THE OBJECT IS TO COVER THE 1/
4 OF A MILE BEFORE YOUR OPPONENT."
14 PRINT128," HIT [ enter ] FOR MORE":INPUTAM
15 CLR:PRINT128," THE LEFT JOYSTICK CONTROLS THE Blue CAR,THE RIGHT JOYSTCK
18 THE yellow CAR. ON THE RESPECTIVE SIDES OF THE SCREEN ARE BISTA
NCE INDICATORS TO THE FLAG AND ALONG THE BOTTOM IS A GRAPHIC REPRESENTATION OF
THE SPEED*
14 PRINT"EVERY FEW SECONDS A PRINTOUT IS GIVEN OF THE SPEED,TIME AND REMAINI
NG DISTANCE,FROM THESE THE LEAD IS CALCULATED.THE FIRSTONE PAST THE POST IS TH
E WINNER*
17 PRINT" HIT [enter]:":INPUTAM
18 CLR:PRINT128," good luck
YOU'LL NEED IT !!!
19 FOR NH=170:GO:NEWXMM
20 REM*****ADJUSTABLE*****
21 DIMA(28,40):DIMB(28,40)
22 W="SCREEN":H=180
23 G=#:S(1)*20:S(2)*200:U#30:V#100
24 W#100:N#45:DIS#0:R#0
25 LA#90:LB#100:RA#150:RB#110
26 REM**********
27 PROCB3,1:SCREEN#,0:PCLE
28 DRAM"BRI28,75:BM40:OR200:49:EL2#20:EL20:24:40:R20:1:CL20:24:40:R20:2:2E2#20:149:EL2"
29 PAINT(128,75),3,4
30 GET(10,70)-(128,110),A,B
31 PAINT(128,75),3,4:GET(110,70)-(128,110),B,B
32 FOR H=25 TO 45 STEP 5
33 DRAM"BRS0,50:O40:OR10:EL5:CH#8:1:OR#0,+200:U2:1:OF#50:SL,1:OF#M#20,+60:1E2:OR#2E
7:EL2:OR#20,+40:OR10:O#B#8:EL2:EL2"
34 PUT(NS,NS)-(NS+28,NS+40),B,PSET
35 SOUND(100-NA),1
36 NEXTNS
37 REM*****DRAW AREAS*****
38 PCLE
39 FOR NH=170:TO 30 STEP -10
40 LINE(0,NH)-(20,NS),PSET
41 LINE(128,NS)-(128,NH),PSET
42 NEXT NH
43 DATA "O4UPRIPSEZ149:EL2"
44 LINE(128,20)-(128,20),PSET:LINE(0,20)-(20,20),PSET:REAR W:#DRAM"BR240,20":+W
1:DRAM"BR10,20":+W
45 REM*****THE FRAMEWORK*****
46 DRAM"C4"
47 DRAM"C5":LINE(0,170)-(20,170-50),PSET,BF:DRAM"C2":LINE(128,170)-(128,170-50
57),PSET,BF:DRAM"C4"
48 IF DIST=100 THEN SOUND1:
49 LINE(0,0)-(28,172),PSET,B
50 LINE(128,20)-(128,172),PSET
51 LINE(20,20)-(128,172),PSET,B
52 DRAM"BRI1,1:CDTR:80:R180"
53 PAINT(128,100),B,3
54 PUT(LA,LA)-(LA+28,LA+40),A,PSET
55 PUT(RA,RA)-(RA+28,RA+40),B,PSET
56 IF S#1 THEN 50
57 IF SND(10)-B THEN SOUND1,S:G=1:TIMER=0
58 IF S#4 THEN 48
59 LI=JOYSTK(0):RI=JOYSTK(1)
60 IF LI<0 THEN LA=LA-2
61 IF LI>0 THEN LA=LA+2
62 IF RI<0 THEN RA=RA-2
63 IF RI>0 THEN RA=RA+2
64 LINE(61,180)-(61,192),PSET:LINE(61-5,180)-(61-5,192),PSET:LINE(61+5,180)-(6
1+5,192),PSET:LINE(61-3,180)-(61-3,192),PSET
65 LINE(62,180)-(62,192),PSET:LINE(62-5,180)-(62-5,192),PSET:LINE(62+5,180)-(6
```


• and four vertical threads; two of each may be thought of as background colours and two as foreground or contrast. A line in the pattern represents a background element, and this is obtained by bringing the four background threads to the top and retaining them with each other, while the contrast threads are wove together separately underneath.

Conversely, a zero in the pattern means that the four contrast threads are brought to the top. The practical importance of this technique is that it allows large blocks of solid colours to be produced without the threads which are being used having to

make long "jumps".

The simplest patterns use one background and one contrast colour to produce a two-colour result. More complicated patterns use a different contrast colour over the middle half of the pattern (in one direction or both). The colours are chosen from the set green, yellow, blue and red; it would be a simple matter to change the SCREEN statement, and use the colour codes 5, 6, 7 and 8 instead, but if a completely free choice from all eight colours is required, the program would have to be re-written for the low-resolution screen.

Two sizes of pattern are allowed for. Other sizes could be programmed, but it would not be as easy to fit copies of them on to the screen. The randomly-generated option occasionally produces a very striking pattern, using a set of data which one would not have expected to be any good. If you wish to make a note of the data for generating a particular pattern, the last few statements of the program enable the data to be listed. The PRINT messages have been arranged to appear on the 32-column Dragon display without any breaks in the words. This makes them look a little odd in the listing.

```

100 DIM A(256),B(256)
110 PRINT="HELLO DOUBLE TAPSTRY PATTERNS IN FOUR COLOURS. THE
BACKGROUND COLOUR IS USUALLY THE SAME FOR THE HORIZONTAL AND VERT
ICAL THREADS, BUT MAY BE DIFFERENT IF"
120 PRINT="SELECTED. ANY OF THE CONTRAST COLOURS MAY BE USED AS A
THE BACKGROUND COLOUR FOR A TWO-
COLOUR PATTERN. THE SET 1=GREEN, 2=YELLOW, 3=BLUE, 4=RED"
130 PRINT="THE PATTERN MAY BE MADE IN THE
1 LARGE SIZE"
140 GOTO 15
150 IF LEFT$(A,1)="" THEN B=1 ELSE B=8
160 PRINT"DO YOU WANT A RANDOM PATTERN?"
170 GOTO 15
180 IF LEFT$(A,1)="" THEN B=0
190 PRINT"ENTER A STRING OF Y&N:":B$=IN$(0,1):GOTO 15
200 GOTO 15
210 FOR J=1 TO 8
220 GOTO 15
230 FOR J=1 TO 8
240 NEXT J
250 IF B$="Y" THEN B=1 ELSE B=8
260 PRINT"DO YOU WANT A RANDOM PATTERN?"
270 GOTO 15
280 FOR J=1 TO 8
290 NEXT J
300 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
310 GOTO 15
320 FOR J=1 TO 8
330 NEXT J
340 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
350 GOTO 15
360 FOR J=1 TO 8
370 NEXT J
380 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
390 GOTO 15
400 FOR J=1 TO 8
410 NEXT J
420 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
430 GOTO 15
440 FOR J=1 TO 8
450 NEXT J
460 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
470 GOTO 15
480 FOR J=1 TO 8
490 NEXT J
500 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
510 GOTO 15
520 FOR J=1 TO 8
530 NEXT J
540 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
550 GOTO 15
560 FOR J=1 TO 8
570 NEXT J
580 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
590 GOTO 15
600 FOR J=1 TO 8
610 NEXT J
620 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
630 GOTO 15
640 FOR J=1 TO 8
650 NEXT J
660 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
670 GOTO 15
680 FOR J=1 TO 8
690 NEXT J
700 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
710 GOTO 15
720 FOR J=1 TO 8
730 NEXT J
740 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
750 GOTO 15
760 FOR J=1 TO 8
770 NEXT J
780 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
790 GOTO 15
800 FOR J=1 TO 8
810 NEXT J
820 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
830 GOTO 15
840 FOR J=1 TO 8
850 NEXT J
860 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
870 GOTO 15
880 FOR J=1 TO 8
890 NEXT J
900 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
910 GOTO 15
920 FOR J=1 TO 8
930 NEXT J
940 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
950 GOTO 15
960 FOR J=1 TO 8
970 NEXT J
980 PRINT"DO YOU WANT A LIST OF THE DATA JUST USED?"
990 GOTO 15

```

Store print utility

From John Tierney in Blyth
 PRINTS investigating the contents of slots,
 or developing machine-code programs, I
 often find this utility program invaluable. It

displays or sends to the printer the con-
 tents of a range of bytes both in hexa-
 decimal and character form.
 In lines 70 to 120, the range and

destination are set up using INPUTs.
 Validation is limited to whether the first
 number is lower than the second.

The loop controlling each line output is
 a series 120 to 260. Within the FOR-
 NEXT loop, there are two more FOR-
 NEXT loops. The first gets the contents
 of eight bytes in hexadecimal (always two
 digits), and the second gets the contents of
 the same eight bytes in character form.

```

10 * Print slots in hexadecimal
20 * and characters either to
30 * the screen or to a printer.
40 *
50 * © John Tierney Nov 1983

```

```

60 *
70 GOTO PRINTING
80 INPUT "START,END":A,B
90 IF B < A THEN 30
100 GOTO PRINTING

```



```

100 INPUT "SCREEN(S), PRINTER(P)";C
101 IF C=0 AND D=0 THEN 300
102 FOR I=0 TO 9 STEP 1
103 PRINT I-C, "HEAD(I)"; " ";
104 FOR I=0 TO 7
105 IF PRINTER=1 OR C THEN PRINT I-C, "P";
106 PRINT I-C, "HEAD(PRINTER)";
107 IF C=0 THEN PRINT I-C, " " " ";
108 NEXT I

```

```

200 PRINT I-C, " " " ";
201 IF C=0 THEN PRINT I-C, " " " ";
202 FOR I=0 TO 7
203 IF PRINTER=1 OR C OR HEAD(I)=0 THEN PRINT I-C, "P";
    ELSE PRINT I-C, "HEAD(PRINTER)";
204 NEXT I
205 PRINT I-C
206 NEXT I
270 END

```

Drawing

From Robin Murray in Edinburgh

THIS program is designed to let the user get to grips with the Dragon 32's DRAW command and to help him design and construct larger and more complex instruction combinations.

The program stores the instructions in an array so that they can be easily

manipulated. If you run out of space for your instructions simply change the DIM statement in line 40 and extend the loop, etc where appropriate. The program has elementary error checking for typing mistakes but this will not deal with syntax-type errors (eg 40 instead of 04).

```

10 REM DRAW COMMAND
20 DIM I(100) AS STRING
30 DIM DRAW(100) AS STRING
40 DIM DRAW(100)
50 DIM DRAW(100)
60 DIM DRAW(100)
70 DIM DRAW(100)
80 DIM DRAW(100)
90 DIM DRAW(100)
100 DIM DRAW(100)
110 DIM DRAW(100)
120 DIM DRAW(100)
130 DIM DRAW(100)
140 DIM DRAW(100)
150 DIM DRAW(100)
160 DIM DRAW(100)
170 DIM DRAW(100)
180 DIM DRAW(100)
190 DIM DRAW(100)
200 DIM DRAW(100)
210 DIM DRAW(100)
220 DIM DRAW(100)
230 DIM DRAW(100)
240 DIM DRAW(100)
250 DIM DRAW(100)
260 DIM DRAW(100)
270 DIM DRAW(100)
280 DIM DRAW(100)
290 DIM DRAW(100)
300 DIM DRAW(100)
310 DIM DRAW(100)
320 DIM DRAW(100)
330 DIM DRAW(100)
340 DIM DRAW(100)
350 DIM DRAW(100)
360 DIM DRAW(100)
370 DIM DRAW(100)
380 DIM DRAW(100)
390 DIM DRAW(100)
400 DIM DRAW(100)
410 DIM DRAW(100)
420 DIM DRAW(100)
430 DIM DRAW(100)
440 DIM DRAW(100)
450 DIM DRAW(100)
460 DIM DRAW(100)
470 DIM DRAW(100)
480 DIM DRAW(100)
490 DIM DRAW(100)
500 DIM DRAW(100)
510 DIM DRAW(100)
520 DIM DRAW(100)
530 DIM DRAW(100)
540 DIM DRAW(100)
550 DIM DRAW(100)
560 DIM DRAW(100)
570 DIM DRAW(100)
580 DIM DRAW(100)
590 DIM DRAW(100)
600 DIM DRAW(100)
610 DIM DRAW(100)
620 DIM DRAW(100)
630 DIM DRAW(100)
640 DIM DRAW(100)
650 DIM DRAW(100)
660 DIM DRAW(100)
670 DIM DRAW(100)
680 DIM DRAW(100)
690 DIM DRAW(100)
700 DIM DRAW(100)
710 DIM DRAW(100)
720 DIM DRAW(100)
730 DIM DRAW(100)
740 DIM DRAW(100)
750 DIM DRAW(100)
760 DIM DRAW(100)
770 DIM DRAW(100)
780 DIM DRAW(100)
790 DIM DRAW(100)
800 DIM DRAW(100)
810 DIM DRAW(100)
820 DIM DRAW(100)
830 DIM DRAW(100)
840 DIM DRAW(100)
850 DIM DRAW(100)
860 DIM DRAW(100)
870 DIM DRAW(100)
880 DIM DRAW(100)
890 DIM DRAW(100)
900 DIM DRAW(100)
910 DIM DRAW(100)
920 DIM DRAW(100)
930 DIM DRAW(100)
940 DIM DRAW(100)
950 DIM DRAW(100)
960 DIM DRAW(100)
970 DIM DRAW(100)
980 DIM DRAW(100)
990 DIM DRAW(100)
1000 DIM DRAW(100)

```


Interfacing recorders

I AM having difficulty in deciding what the pins are for the tape socket. I tried to wire up a 5-pin DIN plug to two 8mm diameter Jack plugs (ear and mike) with no success. Can you help?

M. Cameron,
Lickfield,
East Sussex

YET ANOTHER letter about the cassette interface! There have been many people asking for a recommended cassette recorder or details of the cassette recorder for connecting the special interface — even need to read recorders in one case!

The connection is via a standard 5-pin DIN plug which is easily obtainable. The pin connections are as follows:

- Pin 1 — Remote control (the motor switch).
- Pin 2 — Ground (used as one connection for both Ear and Mic).
- Pin 3 — Remote control.
- Pin 4 — Cassette input.
- Pin 5 — Cassette output.

As both input and output use the same common ground connection, some recorders will cause feedback if both Ear and Mic leads are plugged in together. To avoid this, have only one of these plugged in at any one time.

Printing cheaply

I WOULD like to add a printer to my set-up, but I cannot afford or justify something like the Epson. The obvious choice would be an Aster but at £200 plus I will feel this price rather high.

I was wondering, is it possible to run the Sprinter printer on my Dragon? I know the plugs won't fit the socket on my computer, but could you tell me, if it is possible, what adaptors or leads I will need, where can I get them and how much should I expect to pay for them?

A. Nicholas,
Wantage.

A LOT of readers seem to want to use a Sprinter printer from their Dragons, the great advantage of this 80% printer being, of course, its cost. The disadvantages, however, is that it will not connect directly with any



machine other than Sinclair.

What is needed is a special interface which will convert the ASCII codes from the Dragon's printer output to the dot arrangements for the ZX printer. At least, a company is producing just such an interface — Interface 2 is available for £29.95 from Microstatic Computer Systems Ltd, 16 Upland Road, London SE22 (phone 01-893 1127). This will give you a 63-character line output, as well as the usual 8-pin parallel interface that the printer offers.

Proper timing

WHAT IS the proper way of using the Dragon's timer for achieving a delay? I have tried the following which seems to work, but is there a better way?

```
10 TIMER = 0
20 T = TIMER
30 IF T = X THEN FUNCTION
40 GOTO 20
```

This produces a delay of 60 to 11 seconds if X = 500.

Is there an accurate figure as to how many times the timer "pulses" per second?

G. Williams,
Reyton,
Herts.

THE BEST advice use for the timer function is for timing, rather than for creating delays. The timer value is updated by the interval routine, which occurs exactly 50 times a second. Therefore, to get the time in seconds use TIMER/50. As the maximum value of Timer is 65535, this gives accurate values for up to 21 minutes before looping around to zero again, but you won't want 21-minute delay loops anyway!

A line such as that below is a

good way of using the timer for a delay (N is the number of seconds which the program pauses for).

```
10 TIMER = 0
20 IF TIMER = N - 50 THEN 20
30 'rest of program
```

Lower case

I AM writing a certain application program in which it would be desirable to force lower case character input. I wondered if there was some way in which this could be achieved from within a program without manual intervention? At present I use HEXIFY and translate to lower case.

A. Knowles,
Rochford,
Hants.

AS SHIFT 0 is supposed to generate the ASCII code 18, the obvious answer would be to use TORQUE to toggle between upper and lower case. Unfortunately, this doesn't work, of course. There is a simple POKE which can be used to control alpha lock — location 309. Use the following in your program:

```
POKE 309, 250 for upper case
POKE 309, 0 for lower case
```

If you poke any other number (1-254) in this address, you effectively disable lower case only.

Scrolling sideways

I WOULD like to know if it is possible to make everything on the high resolution screen scroll sideways, and if so, how?

I have seen other machine code subroutines to do this with the text screen, and to scroll the video screen up and down, but

never from side to side. This would help me greatly in the programming of my Dragon.

T. Manley,
Dunbar,
Birmingham.

IF YOU want to stick to basic the only way to scroll the hi-res screen sideways is to get the whole screen in an array and use GET and PUT to move it around, for example:

```
10 PMODE 4, 1:COLOR
  0:1:POLYSCREEN 1, 1
20 LINE0,0 - (250,100):PUT,0
30 DIM A(250:GET0,0) - (254,100):A,G
40 PUT(1,0) - (250,100):A:PUT 0 GOTO 30
```

If you try this you will see that it does work, but is rather slow. You could speed it up by not rewriting the whole screen, or something more than one pixel at a time. For most purposes this should be good enough, if, however, it is still not fast enough then you will have to dabble in machine code.

No Joy on games

I HAVE a Dragon 32 and I'm trying to write my own games, but I can't do so with JOYSTICK, I know the bit about A-JOYSTR, (0) or (1) or (2) or (3), but I can't figure out how to use it.

Could you please tell me how it's done?

John Corpe,
London W27.

AS THE Dragon basic manual made such a mess of trying to explain the use of the JOYSTK command, it's not surprising that you are confused.

The command A-JOYSTR(n) will give A a value of between 0 and 63, 0-6 for the left-right of the 8041 joystick and 6-1 for the 8017 joystick. A value of 0 indicates far left or all the way up, and a value of 63 indicates far right or all the way down.

A further complication is that the values of the joystick readings are only updated when 'n' is a zero, therefore sometimes you will need to put the value of JOYSTK(n) into a dummy variable just to get the correct reading for the other values.

There is no command for reading the fire button, this is done with PEEK(8270) and is quite simple.

TROJAN

Micro Computer Software & Accessories

LIGHT PEN

DRAGON 32

Including a **NEW** program for the Trojan Light Pen. This new **ADVANCED** program includes the following graphics facilities:

- Draw Box
- Draw Circle
- Draw Line
- Draw Picture
- Colour Fill Designated Areas
- Store and load pictures to and from tape

All in the **Free Screen** in any of four colours. The following functions are for use on the Text Screen:

- Data entry and processing
- Menu selection and control
- Games playing — the fascinating game of NIM included on cassette

This is a first-class program which gives hints and tips on how to write programs for the pen, basic for many educational uses.

A TOP QUALITY PEN PLUS A FIRST-CLASS PROGRAM FOR ONLY £11.99 (including VAT). THE BEST PEN PACKAGE AVAILABLE

Dealer enquiries welcome.

Send cheque or PO to:

Dept. D 143

Trojan Products, 166 Derlwyn
Dunvant, Swansea
SA2 7PF. Tel: (0792) 205491

DRAGON DATA DISK DRIVES



IN STOCK NOW

AVAILABLE FOR IMMEDIATE DISPATCH

**SINGLE DRIVE £275 inc.
DUAL DRIVE £475 inc.**

Complete with DOS, Power Supply and Manual

**DRAGON 64 £225 inc
DRAGON 32 PACKAGE**

Computer, Compatible Cassette Recorder,

Joysticks **£199.99 inc**

ONLY WHILE STOCKS LAST

DRAGON JOYSTICKS £15.99 inc p&p

Checkers and PCs to:

JAY-DEE COMMUNICATIONS

182A WATER STREET
PORT TALBOT, S. WALES

Cardholder's Hotline
(0486) 895795 (24 hours)

ORDER BY EXPRESS

Large selection of software available
CREDIT DETAILS ON REQUEST



SUNSHINE

The best books for the Dragon 32

Introducing
Dragon 32



The Working Dragon 32

A library of practical sub-routines and graphics. £10.99 (inc. VAT)

- There's hardly a need for books of this kind which provide more than just games! — *Practical Computing*, Sept 1982

- It's a good one! — *Personal Computer News*, May 29 1982

Introducing
Dragon 32



The Dragon Trainer

Written as a combined manual and beginners course on the power of Dragon Basic. It is aimed at the beginner and assumes no previous experience of computing. £10.99 (inc. VAT)

Dragon 32 Games Master

Learn how to write your own top level games. £10.99 (inc. VAT)

- If you can't write a full size program game after this then it will be down to your own lack of imagination. I would recommend the *Books* book as the best of the selection! — *Which*, Sept 1982

Advanced Sounds & Graphics for the Dragon Computer

All the major aspects of the sound and graphics capabilities of this machine are covered in extensive detail. £10.99 (inc. VAT)



Plus

Sunshine Software



Cruising

Quick thinking and creativity are required to master this high speed chase game!

Look out for the Sunshine range in W.H. Smith's, Books, John Bennet, other leading retail chains and through our national network of bookshops and specialist stores.

Dealer enquiries:
01 734 2684

Please send me

The Working Dragon 32

at £2.99 each

The Dragon Trainer

at £2.99 each

Dragon 32 Games

Master at £2.99 each

Advanced Sound &

Graphics at £2.99 each

Cruising at £2.99 each

Include cheque/postal order for £_____ made payable to Sunshine Books, 12-13 Little Hampton Ln, London W4 2P 2D

Name _____

Address _____

Signature _____

We can normally deliver in 4-5 days.

"ADVENTURES INTO IMAGINATION"

AVAILABLE FROM W.H. SMITH, JOHN MENZIES, BOOTS
AND ALL LEADING COMPUTER STORES

Spectrum 48K
Dragon 32



TRANSYLVANIAN TOWER

A spectacular 3-D maze
adventure for the
48K Spectrum and Dragon 32

RICHARD SHEPHERD
SOFTWARE

A spine chilling adventure ... enter via the dungeon ... navigate your way through 500 3-D rooms ... survive the swooping vampire bats ... reach the terrifying top ... confront and kill Count Kreeple, ridding the world of this Transylvanian Terror.

Can you survive the Top of the Tower? 66.50.

RICHARD SHEPHERD SOFTWARE

NEW DEALERS WELCOME — RING JOHN SALTHOUSE ON 04286 62531

DRAGON DR Release Cards Adventure 06. From the treasures without getting caught in the traps. But help try to find the way into the castle. Very good sound effects. Will take days of weeks to solve. If you get stuck, our customer service department will help you out. Send PCBorders to: R. Proctor, 10 Parkwood Road, London SE20 0LN.

Dragon disk software

Save money! Five featured software titles for £199.95. Program great value for £1 for each. Send for 1995 disk software. Add in the tax. Post £4.95. Being better than all our other Dragon disks £11.95. See "Software" by R. Proctor in Paper Dragon, May/June 1984, etc.

AT LAST

An attractive dust cover, custom-made to fit your Dragon. Colour coordinated fabric readily matches the case colour, finished off with a red taped edge and screen printed with Dragon. Looks superb.

Only £3.95 inc p.p.

COTSWOLD COVERS

148005 BOX FRONT FLOOR
COTSWOLD, GLOS, GL66 6JH
Tel: 0456 47370
(see trade discount details)

COMPUTER CORRESPONDENCE COURSES

A complete course in BASIC programming which is tailored specifically to the DRAGON microcomputer. It includes word processing, file-management, document games and educational programmes. Suitable for the complete beginner, school teacher and business person.

Course of 6 courses

£99.00 inc

Please Order £4.00 inc

For all other software correspondence

COMPUTER CORRESPONDENCE COURSES

Dept. D.S.1 Clarendon, West Way
19 Newbury Street, B20 6AA
Tel: (0203) 236

"COLOUR FANTASY" (for Dragon 32)

A unique collection of interesting graphics images and images which will tempt and make it hard to stop. Don't stop at 16 bits and 40K capacity. A 1000-line graphics system is more than you can handle. £9.95.

WINDO LTD

Lymington Road, West Hill
London NW7 2JG

DRAGON WRITER. No text and no less. Different sizes, various angles & sub-titles to begin of your programs. £15.00. Simply Software, 6 Southway, Stone, Cants. Adventure.

JOYSTICKS DRAGON JOYSTICKS

FULLY PROPORTIONAL
WITH 8-UP BUTTON
Now only £12.95
per pair incl.

• £1.00

PERITRON

21 WOODHOUSE ROAD
LONDON N12 9EH

HOUSE CONTENTS insurance program, make checks, deal for rates listed prices. Casper-28, 204 Southway, 19 Woodhouse Road, South Woodham Ferris, Essex CM8 3BB.

COMPUTERS LEAD for the Dragon, 1.5m long to fit all standard Commodore interface printers. £12.95 inc. VAT, postage. Quick desktop Dragon printer to: High Tech Developments, 27 Quendon Road, Weston-super-Mare, Avon BS22 4DQ.

DRAGON WRITER text editor, incorporates 4 to user level programs. £12.95 inc. VAT. • of cassette • •• CIRC Software, 218 Southway Road, Southwood, Barnhampton BT1 1LB.

HAPPY 1984 COMPUTING

Personal Finance 05.50
Budget program offers cassette-tape, printer, automatic monthly payments, tax, loan function and excellent documentation.

Chess 3 07.50
First level on to the PIONEER 3. Superbly your own chess-tape, includes fast machine moves, mouse-in to the printing.

Comprehensive user manual. If you use 16-bit then it's a must! Cassette prices include post and packing.

STYLISH SYSTEMS 17 FIVE, AVON SOUTHAM, GLOS/STOCKPORT SO17 1AB

FREE LISTS OF Dragon software all at lowest prices ever. For complete money saving offers send £20 today to: SCS, PO Box 47 15, Avon, County Avon, BT 11 1J.

CHECK YOUR POOLS EASILY. Dragon tapes for Vectors or Commodore game S&L for Oracle, John, at South Lane, Falmouth, North.

ADVERT INDEX

A	i	R
Abacus Software 46	Interface 44	Rainbow 36
Allyn Software 47		Red Ram Data 50
Ampsoft 15	J	
B	J.C.B. Micro-Systems 48	S
B & H Software 28	Jay-Doc 62	S.P. Electronics 50
Beyond Software 28		Salamanca 67
Brunton Software 40	L	Shards Software 12
C	M.C. Loshley 47	Richard Shepherd 55 & 60
Compuserve 34 & 35	M	Solacom 50
Computative 50	M & J Software 60	Stockade 60
D	M.S.T. Consultants 9	System-Soft 60
D.A.C.C. 60	Moran Microsystems 32	T
Datapen 9	Microbial 2 & 68	Tiger Software 47
Dattasoft 47	Micro-De-Deq 50 & 60	Trojan Products 62
E	Monster 60	Tudor Williams 50
Eurosoft 44	J. Morrison 38	U
G	O	Ultimate Software 60
Games & Computers 4	Oasis Software 6 & 7	V
Graesend 44	Onsoft 60	Viglan 27
H	P	Vintage 32
Hot Co-Co 30	P.S.L. Marketing 42	W
	Peaksoft 24	West Devon Electronics 48
	Premier 14	Westwash Microsystems 10
	Program Factory 40	Winstsoft 54
		Wizard Software 48

Adding sound and speech

A double chance to win a double prize from JCB Microsystems - if you can solve Gordon Lee's puzzle

A NUMBER OF readers wrote in having had difficulty with the puzzle in the September edition of Dragon User. You may recall that the question involved two mathematicians, Sam and Paul, who had been given respectively, the sum and the product obtained from a throw of three dice.

After some time Paul, who had been given the product, stated that at least he could only narrow it down to one of two possibilities. Whereupon Sam, who had the sum, declared that he had narrowed it to three possibilities, but how to know the values of the dice thrown.

Many readers tried to solve the puzzle by working out which dice throws could result in a sum obtainable in only three ways, and then tried to find the correct throw by relating these possibilities with the information given about the products. This failed to provide a unique answer, for there are three dice throws which give the same sum, but how to know the values of the dice thrown.

Products . . .

Here is how it's done. With three dice there are three possible sums (sums), ranging from three (triple one) to 18 (triple six), and products from one (triple one) to 216 (triple six). In the case of the sums it can be readily seen that, with the exception of the very lowest and highest scores, there are many different possibilities. From this it would seem that Sam, who was given the sum, was at a disadvantage. This was not so — as we shall see.

Consider first the case of the products. First, run through all possible throws of three dice, counting the number of times that each different product is arrived at. This can be done with a simple program using the array `Dim P(216)`. If the throws are generated in three FOR/NEXT loops A, B, and C, then `Q = A*B*C`; `P(Q) = P(Q) + 1` will do it. When generating the three throws, if A is always taken as the largest value shown on the dice, and C the smallest, it will eliminate problems caused by duplication of throws. For instance, the throw of two, four and six in any order is only counted the once.

Now, as Paul is unable to provide an answer there must be more than one set of dice throws that can form that product. Ask the computer to print out these values:

```
FOR N = 1 TO 216: IF P(N) > 1 THEN
```

Prizes

THIS MONTH there are two sets of prizes to be won — so we're looking for two winners. Each will receive a package of software from JCB Microsystems of Neumouth consisting of its Sound Extension Module, Speech Synthesis Module, the arcade game Bass Goes Bouncing and Basic Enhancer, a utilities program which speeds up Basic by stripping out REM statements, etc.

Rules

TO WIN the package of software you have to send in the most elegant solution to the puzzle. You must show both the answer to the competition and how to solve it with the use of a Basic program developed on your Dragon. As a talisman, complete the following sentence in 16 words or less: "I want to add speech and sound to my Dragon because . . ."

Your entry must arrive at Dragon User by the last working day in February 1984. The names of the winners, and the solution to the puzzle, will be published in our May issue. You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the final result.

PRINT N: NEXT N

From this we can see that Paul must have been given either 4, 8, 8, 12, 16, 18, 20, 24, 30, 36, 40, 50, or 72 as the product.

The next step is to modify the program to print out the dice values for these products. The results should be listed in table form.

Product	Values of the dice (sums in brackets)
4	2,2,1 (5) 4,1,1 (6)
8	3,2,1 (6) 4,1,1 (6)
8	2,2,2 (6) 4,2,1 (7)
12	3,3,1 (7) 4,2,1 (7) 6,2,1 (9)
18	4,3,1 (8) 4,4,1 (9)
18	3,3,2 (8) 5,2,1 (8)
20	3,2,2 (7) 4,5,1 (10)
24	3,2,2 (7) 4,5,1 (10)
24	4,3,2 (9) 5,2,2 (10) 6,4,1 (11)
30	5,3,2 (10) 6,5,1 (12)
36	4,3,2 (10) 5,3,2 (11) 6,4,1 (13)
40	4,4,2 (11) 6,4,2 (12)
60	5,4,2 (12) 6,5,2 (13)
72	6,4,2 (13) 6,6,2 (14)

While all this has been happening, we assume that Sam, realising that the sum that he has been given is not much use on its own, would be preparing such a table, since he might reasonably suppose that as Paul did not immediately come up with an answer, there must be more than one possibility open to someone who only knew the product.

Sam would then compare his sum with the values on the table. Therefore, once Paul announces that he has narrowed it down to two possibilities, only if Sam's sum was 17 would he be able to make the statement: "I had reduced it to three possibilities, but now I can eliminate all but the correct one." The important clue that many readers missed was that Sam's statement was not made until after Paul had had his fix, and it was made on the strength of Sam having prepared the table of values and not solely on the sum that he had been given. Therefore the three dice thrown were: 4, 4, and 3.

I hope that's put puzzled readers' minds at rest. And in case any readers are also wondering why no winner is announced this month, the answer to that is simple. Because at Christmas this issue of the magazine had to be put together earlier than usual, before all the competition entries had come in. So you'll have to wait for the next issue to find out who's won the Dragon 64 — and how. In the meantime here's the latest competition, which makes the most of a traditional February event.

. . . and pennies

There was an unusual game at the Youth Club Valentine's Day Dance. The prizes were "poetry" chess, and the object was to win as many as possible. First of all some slips of paper were numbered consecutively from 1 to 200 and each player was invited to choose one of these slips. The players had then to line up in front of a table on which were the box of chess and a card with these instructions on it:

TAKE A PENNY CHEW.

IF THE NUMBER ON YOUR SLIP OF PAPER CONTAINS AT LEAST ONE SEVEN, THEN ADD 7, OTHERWISE SUBTRACT 15.

IF YOUR NUMBER FALLS TO LESS THAN 1 YOU MUST RETIRE FROM THE GAME.

GO TO THE BACK OF THE QUEUE AND WAIT FOR YOUR NEXT TURN.

The game continued until all the players had been eliminated. The following statements were overheard: Annabel: "I had the maximum possible number of sweets!" — Brian: "Both Jane and I had 33 sweets each!" — Chris: "I had eight sweets less than Annabel!" — Daniel: "The number of sweets I received was the same as the number on my paper at the start of the game, but with the figures reversed". However, one of the statements was incorrect. Who made it, and what numbers did the others start the game with?

THE DAN DIAMOND TRILOGY

My name is Diamond, Dan Diamond, and this is my story. A story of beautiful mermaids, bored robots and dank, dark dungeons. A story that started one muggy day in New York, and like the Big Apple, it's rotten to the core.

The Dan Diamond Trilogy is three separate adventure games. Each game may be played on its own, but clues may be found in the earlier adventures which may help later on. Each game comes with a lavishly illustrated 20-page case file, and hints (both helpful and misleading) which have been hidden in the illustrations.



Part I, Franklin's Tomb, in which our hero receives a mysterious plea for help which leads him to a hidden tomb and the mystery of the stargate.



Part II, Lost in Space, in which our hero finds himself stranded on a Soviet spacecraft, deemed to travel endlessly through space, or find a way out.



Part III, Fishy Business, in which our hero lands on a watery planet, discovers the source of the plea for help and saves the day.

All three programs cost 49.95 each and are available for the DRAGON 38, BBC MODEL B and 48k ORIC-1 microcomputers. (note: Fishy Business for the BBC and ORIC will be available February 1984).

Cheques or postal orders payable to:

Salamander

SOFTWARE

17 Norfolk Road, Brighton, East Sussex, BN1 3AA.

Look out for Dan Diamond's next Adventure Series "Franklin in Wonderland" Available Spring 1984

It's hard to find the most interesting
adventure games ever played
in any time
or place.

LIFT OFF with



SPACE SHUTTLE



SPECTRUM LAUNCH STAGE



DRAGON 10 AIM STAGE



BBC FINAL STAGE



ATARI FINAL STAGE

MISSION BRIEF

Successfully pilot the Shuttle through Launch, Pitch & Flare. Take off and position Shuttle in orbit. Manoeuvre alongside malfunctioning Satellite. Retrieve - then re-enter to glide without fuel to White Sands Desert.

PREVIOUS SUCCESSFUL MISSIONS

EXCELLENT - "Personal Computer News"

A WELL THOUGHT OUT GAME - "Dragon User"

ALMOST WORTH BUYING A DRAGON FOR - "Which Alone?"



MISSION STATUS Available for
48K CPC 1, ATARI 16K, DRAGON 32, BBC
MODEL B, SPECTRUM 48K, COMMODORE 64,
ACORN ELECTRON, TANDY COLOUR 32K,
CASSETTE 28 DISK 210

Postal Orders to
47, Ivry Road, St. Austell, Cornwall PL25 3AJ
Telephone/credit Card Order
Tel: 0708 3488



MICRODEAL

Available from computer dealers
nationwide or from larger branches at



John Menzies