

DRAGON USER

International edition

The independent Dragon magazine

60p US\$2.60

July 1983

**Brain-teasing
software
reviewed**

**Stepping
Forth**

**Input
and
output
examined**

**Printers
compared**

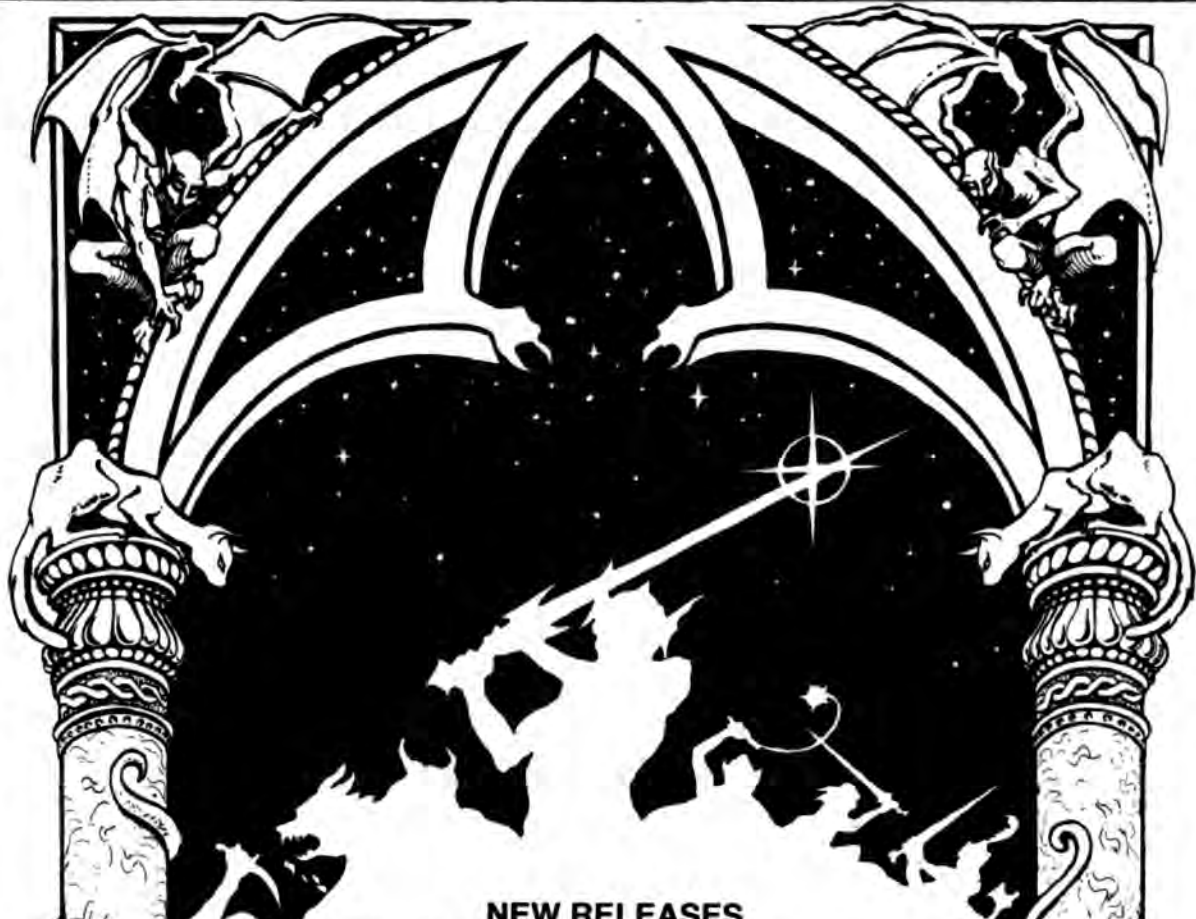
**Play Golf,
Brick Out,
Dragon Blitz**

**Interview: Tony Clarke
of Dragon Data**



**WIN
Powertran
Electronics'
Micrograsp
robot**

WINDOW ON ANOTHER WORLD



NEW RELEASES

STAR JAMMER — Wiping the sweat from my brow, I searched the inky blackness, ahead for signs of enemy fighters. Though Star Jammer was the best ship in the galaxy, my dwindling energy reserves made me doubt I could reach the next stargate. (A one player space arcade game requiring one joystick).

SUPER SKILL HANGMAN — Hangman as you've never played it before! A vocabulary of over 1,000 words, three levels of difficulty and an optional timer make this classic word game a challenge for kids of all ages.

NIGHTFLIGHT — An accurate simulation of flying a single engine light aircraft. Nightflight allows for take-off, landing, and aerial manoeuvres including loops and rolls.

SALAMANDER GRAPHICS SYSTEM — A comprehensive picture drawing system for the home computer enthusiast. Pictures in any mode or colour set, text on the hi-res screens, and storage of pictures on tape. Requires one joystick.

ORIC TREK — A version of our classic Dragon Trek for the Oric-1! Ten levels of difficulty, three sizes of galaxy and more features than you can shake a Klingon at. A must for all Oric owners!

ORIC GAMES COMPENDIUM — Four exciting games for the whole family: Donkey Derby, Kingdom, Viper and Space Station.

Price List: Dragon Trek £9.95. Wizard War £7.95. Golf £7.95. Grand Prix £7.95. Vulcan Noughts & Crosses £7.95. Games Compendium D1 £7.95. Salamander Graphics System £9.95. Super Skill Hangman £7.95. Star Jammer £7.95. Nightflight £7.95.

NOW AVAILABLE AT MAJOR BRANCHES



and



Send SAE for full catalogue with details of new releases.

Cheques or postal orders payable to: SALAMANDER SOFTWARE, Dept. D, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL. Tel: 0273 771942.

Salamander Software

DRAGON USER



July 1983

Editor
GRAHAM CUNNINGHAM
(01-839 2449)

Software Editor
GRAHAM TAYLOR (01-839 2504)

Editorial Secretary
CAROLINE OWEN (01-930 3266)

Advertisement Manager
DAVID LAKE

Advertisement Executive
SIMON LANGSTON (01-930 3840)

Administration
THERESA LACY (01-930 3266)

Managing Editor
DUNCAN SCOT

Publishing Director
JENNY IRELAND

Dragon User, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.
Published by Sunshine Books, Scot Press Ltd.

Typesetting by Chesham Press, Chesham, Bucks. Printed by Eden Fisher (Southend) Ltd, Southend-on-Sea, Essex.
Distributed by S.M. Distribution, London SW9. 01-274 8611. Telex: 261643

©Sunshine Books 1983

Subscriptions
UK £8 for 12 issues
Overseas £14 for 12 issues

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 discoveries 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 be able to discover new tricks and quirks 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 publication 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, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

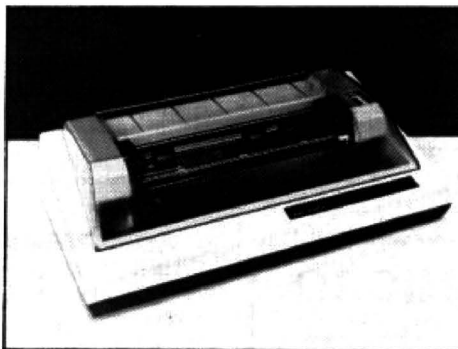
We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

We pay for articles according to the length and the quality — it is worth making that extra bit of effort.

Contents



Letters	5	Cover feature	22
Advice on the Dragon's cassette operating system, graphics and generating characters, plus our blunders corrected		Dragon Data's managing director Tony Clarke interviewed	
News	7	Dragon Blitz	25
All the latest hardware and software developments, including Dragon price cuts and US moves		Destroy the skyscrapers, clearing a space to land	
Clubs	10	Play golf	29
A croupier at an Edinburgh casino is the driving force behind the Scottish Dragon Club		All the joy of the golf course without ever getting wet — detailed instructions on how to program this new game from Philip Brooks	
Software showdown	12	Setting Forth	35
Our man at the tv tests his mental powers on some brain-teasing games. He's recovering now		Fed up with Basic — try Forth, if you can cope with the stacking system. Keith and Steven Brain look at the language and the packages	
Pick a printer	17	Input/output	38
This review looks at six printers compatible with the Dragon, ranging in price from under £100 to over £400		Ian Nicholson guides you through the Dragon's input/output memory — among the most important on the map	



Open File	41
We publish your programs: this month Brick Out, a score routine, label printing, Space Race, Nail and Thread and Reaction	
Dragon answers	49
Bugs, graphics, saving with hex, memory maps — Cathy Hyde solves your problems	
Competition Corner	50
Solve the puzzle to win a robot	

Editorial

DRAGON DATA'S PLANS TO move upmarket this year, launching two bigger machines, will bring it into an even stronger position to attack the educational market. This is one area in which the Conservatives are particularly proud of their achievements, through the micros-in-schools scheme. But how justified is their pride? And, more importantly for Dragon Data, how free and open to attack is this market?

In fact, the Conservative record is less bright than they are willing to acknowledge, and their achievements are tarnished rather than burnished. Many school children are still never getting near a computer, or are finding that their interests are not being matched by the Conservative policies. So far most secondary schools have no more than one micro, and half the UK's primary schools are still left without a machine. The scheme's declared aim is to provide schoolchildren with the instruction and hardware to prepare them for the future. Obviously the Conservatives have a low expectation of schoolchildren's survival — and high hopes of a fall in the birthrate.

The shortage of machines is compounded by divided government responsibilities. The micros-in-schools scheme is sponsored by the Department of Industry but the actual use of the machines is more the responsibility of the Department of Education and Science. The junior Education Minister acknowledged this spring that it was no good having the computers without the right software and admitted that a great deal more was still needed. He also admitted that not all local education authorities had been able to benefit in equal measure. The Industry Department's response was to add small-scale robots to the list of hardware that it is willing to subsidise.

The micros-in-schools scheme is also put forward as a prime example of what the Conservatives call enlightened public purchasing, or what others call buying British. Doubtless Clive Sinclair has some unprintable opinions about how enlightened the scheme was when it excluded his machines. And Dragon Data, by most counts the third most successful British home computer manufacturer, is still excluded. For a party which professes to believe in the virtues of the free market, the Conservatives are remarkably keen to indulge in high publicity persuasion from above, while ignoring surges in popular interest from below.

Bamby
software

We have more new games for
Dragon 32

- Golden Apples:** find the stolen apples, then defeat the warlock. £5.95
- Planetary Trader:** buy your cargo, and lift your ship. The hard part is delivery. £5.95
- Surprise:** a dragon, spells, a magic ring, but this is not another 'Lord of the Rings'. £8.45
- Amazing** series of five graphic mazes, aimed at children under 5. £5.95



BAMBY SOFTWARE, Leverburgh, Isle of Harris
PA83 3TX

Telephone 085 982239



Please send me:

- Golden Apples Planetary Trader Surprise Amazing

I enclose a cheque/postal order for £..... payable to Bamby Software

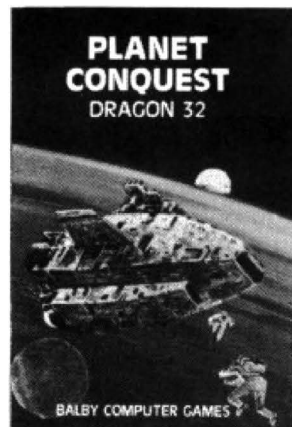
Name.....

Address..... Signed.....

BLABY COMPUTER GAMES

Announce a New Game for the

DRAGON



PLANET CONQUEST

Land your Freighter Ship safely and then you may proceed to your next solar system. (Skill levels etc.)

16K £6.95

BLABY COMPUTER AND VIDEO GAMES

Crossways House, Lutterworth Road
Blaby, Leicestershire

Dealer enquiries welcome

BUFFER MICRO SHOP

310 STREATHAM HIGH ROAD, LONDON SW16 6HG
Tel: 01-769 2887

Open Tues—Sat 10.30 am to 5.30 pm (Closed Mondays)

SOFTWARE FROM ALL THE BEST SUPPLIERS
— OVER THE COUNTER —
PLUS GROWING RANGE OF PERIPHERALS.
SEE IT BEFORE YOU BUY IT.

SAE appreciated for catalogue — but please specify for which computer.

DRAGON ZX81 ZX SPECTRUM

THE DRAGON'S LAIR

New DRAGON SOFTWARE COUNTER just opened
Software demonstrations every day

BBC-ACORN KEYBOARDS CASSETTES
ADD-ONS BOOKS VIC20

NEW! — BUFFER CLUB for regular customers.
Special Offers — Lectures — Foreign Trips —
Software Promotions. Ask for details of membership on your next visit.

MEMBER OF THE COMPUTER TRADE ASSOCIATION — YOUR FAIR DEAL
GUARANTEE

VISA — ACCESS — AMERICAN EXPRESS — DINERS CLUB
ALL CARDS WELCOME

DON'T MISS THIS INCREDIBLE OFFER! 50 GAMES



YES, 50 GAMES! on cassette for all
the following:

FOR YOUR MICRO

COLLECT! ATTACK
SPACE MISSION
LUNAR LANDER
PLANET BUILT
STARTRIP
RADAR LAYDOWN
ATTACKER
GALACTIC DRIFT
ZIGZAG ATTACK
INADVISABLE ACTION
DINO
BRIGADES
PONTON
SKI JUMP
HANGMAN
OLD BONES
FIVE ICE

MAZE EATER
ORBITER
MOTORDASH
KIDNEY FIELD
SIM
TINNY SLAP
HARREL JUMP
CANNIBAL HATTEL
USE MAKE
SITTING TARGET
SYDNEY THE WINDING
SPACE SHIP
JET LIGHT
PHASE 2
INTRUDER
GHOSTS

SUBMARINE
ROCKET LAUNCH
PLANETS
BLACK HOLE
DISMOUNT
DI YOUR SUMS
DIRBY DASH
SPACE SEARCH
UNVERSE
RATS
TANKS
PARACHUTE
JETMOBILE
HIGH RISE
THE FIDLE
EXCHANGE

DRAGON

sinclair

SPECTRUM

ZX81 LYNX

ATARI VIC-20

apple (FOR DISK CASSETTE)

BBC A/B



CASCADE SOFTWARE
CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S. WALES
NP54PA

SUPPLY CASSETTE 50 FOR _____ COMPUTER

I enclose cheque/P.O.

DU/7/83

Name _____

Address _____

Mail order only.

ORDER NOW!

Hex blunders

I WOULD like to congratulate you on the May issue of *Dragon User*. My only complaint is the poor standard of the program listings, particularly Hex. Whilst this was only a slight annoyance for me, I would imagine it could cause some headaches for an inexperienced programmer.

The major faults in that program were as follows:
Line 410 should read STEP-1
Line 430 should read FOR I = 0 TO N
Lines 540, 900, 950, 1060 and 1110 should read PAINT
Line 550 should read PSET (14,1,5)
Line 980 should read PSET (196,169+1,8)

May I also give a small tip to Mr Owen (or any other of your readers who dislike typing): the end of line 210 (after the colon) and the whole of line 340 are unnecessary, also lines 1200 to 1300 may be replaced by:
1200 IF AS<"A" OR AS>"K" THEN 1200
1210 A = ASC(AS) - 64

A lot of the repetitive typing of co-ordinates may be saved by the inclusion of a few FOR . . . NEXT loops.

*P F Grubb,
Oldham.*

Useful advice

MAY I reply to two of the letters in your May issue and pass on some more useful advice? S J Beal is correct in thinking that the Dragon has a delay built in to the cassette operating system. This is part of the PRINT#-1 command.

When a PRINT#-1 command is found, the computer stores this information in the cassette buffer and then continues with the next Basic statement. When the cassette buffer has been completely filled the cassette recorder is turned on and, after a short delay, the data is written to tape. The program then continues with the next Basic statement. If the cassette buffer is partially filled with data it is flushed on reaching a CLOSE#-1 statement.

If some difficulty is experienced in recording and recovering data it is possible to increase the

delay time between the MOTORON and the SAVE routine. The two locations which control the delay time are 149 and 150. Therefore if you POKE these locations with 255 it will delay the saving procedure.

Anthony Edwards explains how to reduce the amount of memory reserved for graphics page 1. What he omits to mention is that the default value for PCLEAR is 4, ie, on power-up the Dragon automatically reserves 6K of RAM for 4 graphics pages whether you need them or not.

Check this by switching off the m/c, switching on again and ?MEM. This will show you that there are only 24,871 bytes free for Basic. If you PCLEAR1 and then ?MEM again you will see that you now have 29,479 bytes free, an immediate gain of 4.5K. This is useful to remember for those large text programs not requiring any hi-res graphics.

I must say that I liked the Character Generator program, seeing lots of potential in this. By using David Lawrence's tip on memory saving I reduced the size of array necessary to store an 8x8 pixel square from A(8,8) to A(2). This allowed me to construct 26 graphic characters (instead of five) and store them in arrays A(2) to Z(2). I PUT these into the third quarter of the screen (page 3) so that I could save them onto tape with CSAVEM" name", 4608, 6144, 1536. I could then load those back from tape with CLOADM" name", GET them from their locations on page 3, and store them back into the arrays A(2) to Z(2) for use in my graphics programs. An extremely useful facility, available on other micros, but not originally available on the Dragon.

Just one tip to others wishing to use these ideas. Occasionally the program will crash with an OM error message. Ignore this and re-enter the program with

GOTO9030, the program will be reinstated, complete with graphic characters and you can carry on where you left off. The reason for this is that the complicated mixture of GOTOs, GOSUBs, RETURNS and jumping out of nested loops results in the build up of stack pointers.

If you have the patience to sort out the logic you can simplify the procedure so that this does not happen. Remember every GOSUB should terminate with a RETURN. Good luck!

*Colin Mackie,
Harlech,
Gwynedd.*

Keys for Pacman

IN THE May issue of *Dragon User* Pacman is a very good game, but the 'I', 'M', 'J' and 'K' keys are hard to use. So I use the cursor keys. To do this change lines 280, 290, 300 and 310 to read:
280 IF QS = CHR\$(94) THEN
M=M-32
290 IF QS = CHR\$(10) THEN
M=M+32
300 IF QS = CHR\$(8) THEN
M=M-1
310 IF QS = CHR\$(9) THEN
M=M+1

Even now it is still hard to keep on pressing the keys for each move of Pacman. So add these lines:

```
271 IF QS 43= CHR$(94) OR QS
= CHR$(10) OR QS =
CHR$(9) OR QS = CHR$(8)
THEN 273
272 QS = CS
273 CS = QS
```

Now just push the arrow that you want and Pacman will move until you turn it in a different direction or it comes across a wall.

*Richard Holt,
Walsall,
Staffs.*

Storing data sets

WITH REFERENCE to David Lawrence's article on file procedures in your May issue, I would suggest that listings 2 and 3 should be modified as follows:

a) Lines 1050 and 1100 be modified:

```
1050 OPEN "O", £-1, Z$
1100 OPEN "I", £-1, Z$
```

b) Two additional lines should be inserted:

```
1045 INPUT "INPUT FILE
NAME"; Z$
1099 INPUT "INPUT FILE
NAME"; Z$
```

c) as a result of b), Line 1020 requires modification at its end to read

```
1020 _____ : ON Q GO
TO 1040, 1099
```

The result of this modification is that more than one set of data can be stored and loaded for the same program, each set being easily identified by its individual file name.

*Seville R Holt,
Chorley.*

The right commands

AFTER READING through the Missile Command program published in June I list below typing errors.

```
1 IF MM<50 OR INT
(MM)<>MM THEN 0
30 CLS : X=128 : Y=96 : TC=4 :
S=0 : N=0
160 PMODE3,1 : SCREEN 1,0 :
PCLS2 : COLOR3,2
220 DRAW "C4,BM118,191;
E10;F10"
Delete line 360
460-500 replace C=C-1 with
TC=TC-1
570 FOR Z=1 TO M
610 IF Y>=MY(Z)-A AND
Y<=MY(Z)+A THEN SOUND
100,1 : MX(Z)=RND(255) :
MY(Z)=0 : N=N+1 : S=S+1
620 IF N<MM THEN 590
```

Also in the section for movement with keys

```
270 MS=INKEYS : IF MS=""
THEN MS=NS
```

The POKE in line 20 (20 POKE &HFFD7,0) will cause some computers to crash and it will be necessary to POKE &HFFD6,0 (or press reset) to CSAVE or CLOAD programs.

*Andrew Black,
Hereford.*

Software Top 10

1	(1) The King	Microdeal
2	(4) Space War	Microdeal
3	(—) Defence	Microdeal
4	(6) Alcatraz II	Microdeal
5	(2) Katerpillar Attack	Microdeal
6	(—) Space Monopoly	Microdeal
7	(—) Mansion Adventure	Microdeal
8	(9) Chess	Dragon Data
9	(—) Typing Tutor	Dragon Data
10	(5) Dragon Trek	Salamander

Chart compiled by Boots

BOOTS, YOUR HIGH-STREET HOME COMPUTER CENTRE.



Do you know that we have a range of 5 leading Home Computer Systems? Plus over 150 programs. Plus peripherals from Joy-Sticks to Disk Drives ... and over 50 books.

If you want more information concerning these AND a voucher worth £3 off your next software purchase, please complete the coupon below.

STOP PRESS

Dragon 64K Upgrade and Disk Drive arriving soon.

Home Computer Centres at larger Boots branches. All items subject to stock availability

WE'LL SEND YOU OUR BOOTS **UPDATE 1** INFORMATION SERVICE

£3 OFF Through the post, FREE - information on the latest developments for your systems. We will also send you a voucher saving £3 on your next software purchase at Boots.**

BLOCK CAPITALS PLEASE Name _____ DU1
Address _____

Postcode _____
SYSTEM (Please Tick) Sinclair ZX81 Sinclair Spectrum
Dragon 32 VIC 20 Commodore 64 BBC Computer
Post to: Boots Update Information Service, PO Box 12, West PD O,
Trophus Road, Nottingham, NG7 2GA. *Offer ends October 31st 1983

INSTANT PERSONAL LOAN

Boots Personal Loan instantly available subject to qualifying conditions. Loans are available in the range £50-£500 A.P.R. 23.9% (variable). Please ask for details from our larger branches or write to Sales Promotion Dept, Boots The Chemists Limited, Nottingham, NG2 3AA. † Credit Broker

Shop into



So much more
to value

Software range increases

SMALL SOFTWARE companies continue to make the most of the Dragon's success.

Devon-based MST Consultants is now offering a range of disk-based business software — running, so far, on Premier Microsystems' drives.

At the other end of the UK — on the Isle of Harris, off the west coast of Scotland — Bamby Software is adding more games to its range. Next in line is Scanner 13 which combines the elements of both arcade and adventure games.

And a new company, Silly Software, is offering advertising spots on its software. Its first release is Film Producer which "encompasses all the trials and tribulations of attempting to make a film".

Microcare offers to double memory

AN EXTRA 32K of memory for about £25 is the promise Microcare is making to Dragon 32 owners.

The company is offering an internal modification which will upgrade users' memory at a cost of about £25, including a figForth implementation.

The modification will only work on some machines — Microcare says most. The company needs to know your

Dragon's serial number to check suitability.

At a later stage other users will be offered a different modification.

One snag is that the guarantee will be voided by the modification.

The service is available by post and Microcare expects to turn round machines in a week. The company can be contacted on (09363) 5695.

Wait continues for OS9 system

DRAGON OWNERS waiting to get to grips with the OS9 operating system will have to pay more than expected and wait until the end of summer.

The first drives available from Dragon Data run its own disk operating system — OS9 will not be available until September when the Dragon 64 is on sale.

Dragon Data had intended to offer a board swap for 32 owners giving them 64K of RAM. These upgraded machines would then have run OS9.

Now the company intends to offer a CPU swap in September giving users 64K of RAM and two ROMs. At the same time service agents will change the bottom half of the Dragon's moulding, adding an RS232 interface.

In effect, this results in a Dragon 64 which can run OS9 on the drives already available.

Pricing on this upgrade has not yet been decided, but it is likely to cost over £100. The Dragon 64 is expected to cost less than £275.

Tony Clarke, the company's managing director, said that software compatibility was behind the "second thoughts". He explained: "This will mean that both our own software and other people's can be run on both machines."

In fact, the US will be getting the Dragon 64 first. It will be sold there from August in a joint venture with Tano Corporation of New Orleans.

"The first few thousand American machines will be made here, the rest in the US," Tony said.

He added that the price of the Dragon 32 was unlikely to fall again following the recent price cuts. "We got the cost of producing the machine down so we passed it on to customers," he explained.

Micro robots link with Dragons

MICRO ROBOTS are arriving for the Dragon 32, beginning with arms from Powertran Electronics and Colne Robotics, followed by floor-crawlers from Colne and Jessop Electronics.

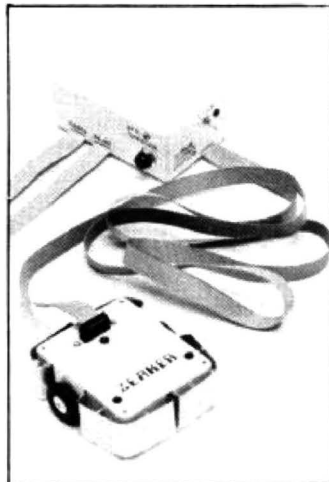
Powertran's Micrograsp has five axes and costs £199 (all prices exclude VAT). It is available now and comes with all the necessary interfaces.

The Micrograsp has an articulated arm jointed at shoulder, elbow and wrist positions. The arm rotates about the base and has a motor-driven gripper and position sensors.

Also available now is Colne's Armdroid robotic arm which has six axes and costs about £400.

Both Colne and Dragon Data have backing from Prutech, the high technology investment division of Prudential Insurance.

Colne's Zeaker Micro-Turtle will be available for the Dragon from the beginning of July. This floor-crawling robot



Robots for the Dragon 32 — Colne Robotics' Zeaker Micro-Turtle and Powertran Electronics' Micrograsp

— at £50 in kit form, £70 built — has sensors, horns and the ability to execute Logo.

A third company will enter the market later this year when Jessop will be offering a Dragon-compatible version of its Edinburgh Turtle. The present price of this floor-crawler is £350.

John Jessop explained that

the higher cost of the Edinburgh Turtle reflected its greater accuracy and ability to handle more complex drawings.

Economats, which manufactures perhaps the most well-known home robot, the BBC Buggy, also has plans to add Dragon compatibility — but not until next year.

First it intends to look at the other machines in the micro-in-schools schemes, from Sinclair and Research Machines, before moving on to the Dragon.

Powertran Electronics can be reached on (0264) 64455, Colne Robotics on 01-892 8197, and Jessop Electronics on 01-739 3232.

MST CONSULTANTS

offer

SERIOUS SOFTWARE for DRAGON USERS

Buy any TWO cassettes at £19.95 EACH inclusive and get the **MST MAILER-ADDRESS BOOK FREE!**

MST Home Accounts £19.95 inc

Don't be caught out again by that unexpected bill or forgotten budget item. Display your household budget estimates and actuals month by month. Automatic surplus/deficit colour plots over 12 months. Printer copies of full financial monthly summaries. Insert projections for months ahead and see the effect in Dragon colour.

MST Database £19.95 inc

Essential card index filing system with sorts, searches, field totals etc.

MST Invoices and Statements £19.95 inc

Prints superb invoices and statements — in daily use. Discount and variable VAT calculations on invoices. Customer/Trader address storage. User-defined messages at foot of documents etc.

MST Stock Control £19.95 inc

Produces stock-evaluation and recorder reports, stock lists, 200 stock items per file.

MST Business Accounts £19.95 inc

Gives up-to-date Debtor/Creditor details and summaries on hard copy printouts. Other reports include Transactions List, Bank Summary, Account Search, YTD.

MST Mailer £19.95 inc

A dedicated database which prints, selectively, formatted address and other labels by Searchkey or Record Range, Search and Print option Browse Records etc. A beautiful program.

Each program comes with descriptive leaflet, operator notes and sample printouts (where appropriate). All of our programs are user-friendly with concise screened instructions. Each customer will receive details of our hot-line link.

I authorise you to debit my **ACCESS** Account with the amount of £.....
Card Number
OR you can telephone your **ACCESS** NAME
order to 0626-832617. SIGNATURE
OR you can send your cheque/postal order to ADDRESS.....
MST CONSULTANTS DEPT DU1
NEWTON ROAD
BOVEY TRACEY
DEVON TQ13 9BB
DATE
CASH WITH ORDER PLEASE DU3

News Desk

01-839 2449

Utility packages coming soon

MORE UTILITIES packages are on their way for the Dragon 32, including a full screen editor from Compusense and an EPROM programmer from Windrush Micro Systems.

Compusense will be adding the screen editor to its Hi-Res package in July, and plans to offer a word processing editor in September.

Users who have bought the Hi-Res package in the past six months can upgrade if they pay the difference in price and a small service fee.

Within the same period, Compusense is also offering free software upgrades to users of its packages.

For the moment the company has shelved its plans to

market a disk drive system, being content with the demand for the cartridges it is offering.

By the end of the year, Windrush intends to add an EPROM programmer to its Mace package, a co-resident editor/assembler/monitor.

The company is not yet sure whether to go ahead with its PL9 system, an editor/compiler/debugger/monitor. The decision hinges on whether to include library routines.

Using cassettes or an OS9 disk system, this would involve a lot of swapping. However, the problem would be solved if the Flex operating system becomes available on the Dragon.

Sales push begins on schools

BIRMINGHAM firm Griffin and George has begun a marketing drive to sell Dragon 32s into educational establishments — and is looking for good software to sell with it.

Roger Blake explained that he expects demand for micros to increase in all areas of education — primary and secondary schools and in higher education.

A Department of Industry scheme to bring micros to

schools only offers a discount on the first purchase of specified machines including the BBC B.

Schools buying more than one micro will have to look more carefully at prices. Roger commented: "The BBC B is a fine but expensive machine while the Dragon is good value."

Griffin and George is the largest firm in Europe in this market and already handles the Spectrum, so its experience is considerable.

The company will support the Dragon with whatever software meets its "high specification", and is looking for good packages to sell. Griffin and George is on (021) 236 2552.

Elkan answers memory questions

DRAGON 32 OWNERS wanting to know more about their machines' memory will find their questions answered in a reference booklet due out this summer from Elkan Electronics.

Called *The Dragon 32 user reference*, the booklet contains three pages mapping out

the machine's memory.

For users who want to get more involved with machine code, the booklet also details system commands, string and numeric functions, inverse graphics, mathematical functions and keyboard addresses. The booklet has 18 pages and will cost £2.95.

ABACUS ADVENTURE ABACUS BUSINESS

**21 UNION STREET
RAMSBOTTOM LANCs
Tel Bolton 52726 \ 383839**

NEW * NEW * NEW
Excellent Value 8 GAME PACKS
Each pack contains a selection of games. Adventure, Educational, and just good Fun
Utilizing the Dragons superb Graphics, Colour, Sound.

GAME PACK 1	GAME PACK 2	GAME PACK 3
<ol style="list-style-type: none"> 1. TEN-PIN BOWLING. 2. MUNCHER. 3. MICROPOLY. 4. MASTERMIND. 5. ADVENTS & CROSSSES. 6. WILLS OF OMCIRON. 7. SIMON. 8. KING OF THE VALLEY. 	<ol style="list-style-type: none"> 1. RACE-CHASE. 2. BATTLESHIPS. 3. MOTOR CROSS. 4. GLORIOUS 12th. 5. CANYON BOMBER. 6. 10000. 7. HAUNTED PARK. 8. HANDMAN/ANAGRAM. 	<ol style="list-style-type: none"> 1. TANK BATTLE. 2. REACTION TIME. 3. BLIND MAZE. 4. ONE MAN & HIS DOG. 5. LIFE. 6. KNIGHT'S TOUR. 7. DESERT PATROL. 8. UFO.

ADVENTURE

DEVILS TRIANGLE
Fight Sea-monsters, find treasures but avoid the DEVILS TRIANGLE on your trip to Bermuda. Based on the Bermuda Triangle.
£5.00

EARTH RESCUE
Search the universe, fighting Aliens and space storms for a rare mineral needed for Earth's survival.
£5.00

PENDRAGON SPACE TRADER
PENDRAGON SPACE TRADER. Set up an interstellar trading company, land on planets and trade in order to pay off your 10,000 bank loan.
£5.00

UTILITY

GRAPHITEXT
TEXT ON HIGH-RES GRAPHICS
A 2.5k sub-routine that produces text of all sizes and colours in any mode of high-res graphics. Allows full use of INKEY, PRINT AT and numeric variables.
£7.95.

EDUCATIONAL

MATHS TUTOR
A set of programmes for teaching maths to children (3-10yrs).
£5.00

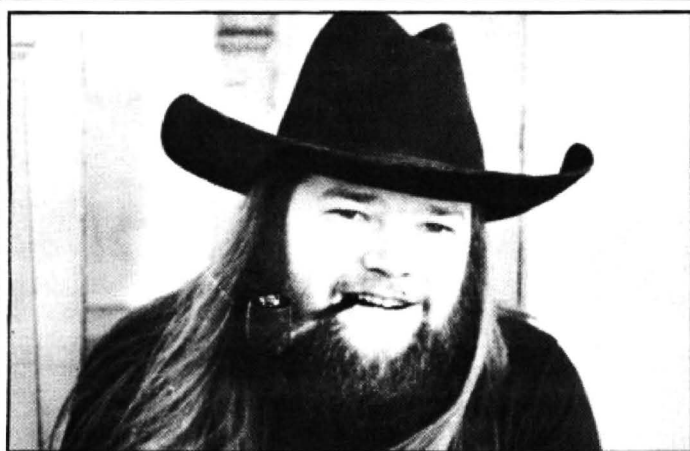
WANTED URGENTLY
We require high quality Dragon software. Good royalties paid. Send your samples today for fast evaluation.

ABACUS SOFTWARE GAMES

GENEROUS DEALERS DISCOUNT AVAILABLE

News Desk

01-839 2449



SALAMANDER SOFTWARE is moving into adventure and role-playing games, beginning with *Franklin's Tomb* and following up with *Castle Baron* in the autumn. However, arcade players will not be forgotten: *Laser Zone* is set to follow *Grid Runner* and *Everest* on to the market. In *Vic20 form Grid Runner* had a long run in the software charts, and *Laser Zone* has an equally high reputation. The adventure games have no graphics on the screen but come with a 20-page manual including more than 20 illustrations. Salamander's Pete Neal explained that putting the graphics on paper leaves much more room in the memory for a complex adventure. The manual also contains clues, balanced by a sprinkling of red herrings. *Castle Baron* is a role-playing game which will have add-on modules allowing users to move from one module to another, developing the same character.

Self-centring joysticks

SELF-CENTRING joysticks will be available for the Dragon later this summer, or you can use them now if you buy an interface from Manchester firm Mr Micro.

Flight Link Control expects to have its semi-professional self-centring joysticks available in September. The mechanisms are ready now but casings need to be designed before volume production is begun.

The interface from Mr Micro, called *Dragon Tamer*, allows standard Atari or Atari-type joysticks to be used with the Dragon.

Both firms agree that the demand for professional and semi-professional joysticks is increasing.

But Flight Link Control's Idris Francis added: "It hurts to see American units inferior to our own selling at high prices here."

Flight Link Control does not usually sell direct to end users. It is the source for the joysticks from Microdeal, Mid-

wich and Clares reviewed in last month's *Dragon User*.

Idris said that half-a-dozen dealers were interested in selling upmarket joysticks. If these plans fell through, then Flight Link Control will consider selling direct to users itself.

The joysticks will cost about £20 each. Idris added that they will also be high in reliability and precision, stressing the sensitivity of the potentiometer mechanism they use.

But Jim Gregory of Mr Micro argued that most potentiometer joysticks have their sensitivity programmed out of them. He thinks that the digital switch system used in Atari-type joysticks is ideal for arcade-type games.

The *Dragon Tamer* costs £9.95 and comes with a games tape. Mr Micro also sells joysticks for use with the interface. These cost from £7.50 each.

Mr Micro is on (061) 728 2282, Flight Link Control on (0420) 87241.

NEW

MST BUSINESS SOFTWARE

NOW

DRAGON DISK PACKAGES

BUY NOW! MST DISK BUSINESS SOFTWARE for your standard Dragon 32 with Premier Publications Delta 1 or Delta 2 disk system.

Written by professionals to **FULL AND DETAILED BUSINESS-USER STANDARDS**

AVAILABLE NOW!

MST DISK 1 STOCK CONTROL (STANDARD) £80.00 inc. VAT
All stock details are held on one-sided floppy diskette to produce screen displays and printed reports on stock status, stock movement, stock shrinkage, dead stock, stock sales, stock purchase, re-order costs, and much more. Records may be referenced by number or part description and analysis code gives additional flexibility. 1,000 stock items per disk.

MST DISK 2 STOCK CONTROL (ENHANCED) £99.95 inc. VAT AND POSTAGE
All facilities as for standard disk but on twin-sided disk. Plus hi-res character generator provides upper and lower case characters of 42 x 24 lines of screened text. Capacity is increased to 3,000 items on a separate data disk. Records may be referenced by number or by part description. Description field is increased to some 25 characters.

IMMEDIATE DESPATCH FOR ACCESS CARD CUSTOMERS

AVAILABLE MID-MONTH

MST DISK INVOICES/STATEMENTS/MAILER. WRITE FOR DETAILS.

Standard version (DELTA 1) £80.00 inc.
Enhanced version (DELTA 2) £99.95 inc.

All packages come complete with descriptive handbooks, and out hot-line link ensures that operator problems can be easily overcome.

STARTER PACKAGE

Why lay out thousands on a business computer when you can have a perfectly good system for much less?

TRY THE COST EFFECTIVE WAY TO COMPUTE-RISE YOUR BUSINESS. WRITE NOW for details of our getting started hardware/software deal. **DON'T MISS OUT!**

* UK ONLY

I authorise you to debit my ACCESS Account with the amount of £.....
ACCESS CARD NUMBER

NAME..... SIGNATURE.....

ADDRESS.....

DATE.....

OR you can Phone your Access order to 0626-832617 NOW! 24-hour answering service OR you can send your Cash/Cheque/Postal Order with order to **MST Consultants, Dept DU2, Newton Road, Bovey Tracey, Devon TQ13 9BB.**



B&H Software QUALITY PROGRAMS

FOR THE 32K DRAGON

SUBMARINE COMMANDER * NEW RELEASE* £6.95

Navigate the seas to find the enemy with this colour high resolution simulation. Engage enemy aircraft and ships who will try to ram and torpedo you. Depth charges and minefields add to your problems. You have torpedoes, a periscope display, radar, fuel and depth gauges, ammunition readout and scoring. Realistic explosions and sound effects alongside an identification sheet, homecoming and highscore displays with graphic reward for beating highest score complete this masterpiece. TRY IT!

LUNAR LANDER AND RESCUE £6.95

Our version has all the usual features and much, much more. A second screen is included where lunar engineers must be rescued from a complex cavern. Fuel dump helps but falling stalagmites add to the perils of becoming a hero in one of the best Dragon games available.

"The best version I've seen... difficult!" DRAGON DUNGEON

A WEEK AT THE RACES £6.95

Five skill levels make this game appealing to the kids or a seasoned punter. The most representative version ever produced. Factors include jockeys, form, odds, weight tips and four types of bet. With only five days to make a million you can lose your cool and all your money by backing a horse only to see it fall. The true connoisseur version.

"Not just another donkey derby." DRAGON DUNGEON

BLACKJACK £5.95

We play casino rules and all deals are completely fair. Draw as many cards as you dare to reach the elusive 21. Full colour graphic card display and excellent sound effects.

JACKPOT £5.95

This must be the best version available. Coloured fruits, bars, hold facility, etc. All win lines displayed. On screen scoring. Realistic sound effects. A great program.

GRAPHIC TOOLKIT (UTILITY) * NEW RELEASE* £6.95

Once used you'll wonder how you ever programmed without it. Design, save, edit and then use your graphics in a program. Allows use of all Dragon graphics facilities including circle, line, save, load, mode/screen changing etc. Instructions accessible at any stage or during any command. An invaluable tool which is sophisticated for the kids but user friendly for even adults!

GEOGRAPHY OF GREAT BRITAIN £6.95

Our latest release in this field. Uses multiple teaching approaches and gives graphic/audio rewards. There's no doubt that it works. Dozens of towns, etc. and varying questions. The map is immaculate and a flashing cursor is moved around the screen to indicate or locate landmarks. Enquire about our other educational software.

DEALER → DRAGON DUNGEON, Ashbourne, Derbyshire —DEALER
DEALER → STATACOM, Sutton, Surrey —DEALER
DEALER → THE COMPUTER CENTRE, Hull, E. Yorkshire —DEALER

Cheques/POs to:
Dept. DU
208 KING STREET
COTTINGHAM, HULL
Tel: 0482 446753

* All prices fully inclusive
* Dealers welcome
* All programs B/WTU compatible
* We pay our programmers
25% royalties.

Dragon clan gathering

The Scottish Dragon Club now has more than 500 members — we talk to the man in charge, David Anderson.

WORKING AS A croupier in an Edinburgh nightclub may seem a strange occupation for the president of the Scottish Dragon Club. But it gives David Anderson plenty of time during the day for running the club and exploring the Dragon — and plenty of experience to incorporate into the roulette and blackjack programs he is writing.

David bought his Dragon last summer and started the club with a couple of friends in September. It began with half a dozen people meeting in his flat — "I had the most space," he explains. But the idea mushroomed: each person put in about £20 and a postal club was started. Now there are more than 500 members, "amazingly widespread", ranging from the outer Hebrides to Denmark and "increasing at an accelerating pace". However, David adds that "there is a kind of contradiction — most of the members are in England".

Most of the money was spent on items such as stationery, and a little on advertising. But the organisers decided "it was silly running the club like a business by advertising". Now they rely, successfully, on word-of-mouth with members getting their friends to join.

David reckons that most people who join are more interested in playing games than programming, preferring to develop their own "arcades-in-the-sitting-room". And the club can help them do this. It costs £8



Club president David Anderson

to join and this lasts you forever. In return you receive a newsletter with tips, advice and, most importantly, news about the club's discount offers.

Various software companies sell their games to members at discounts which range from 10 per cent to 20 per cent. Some business packages are also on offer. Firms participating in the scheme include Shards, Wizard Software and DACC. David added that Microdeal is not included "but has always been very helpful to the club". American magazines are also available at a discount — through Elkan Electronics.

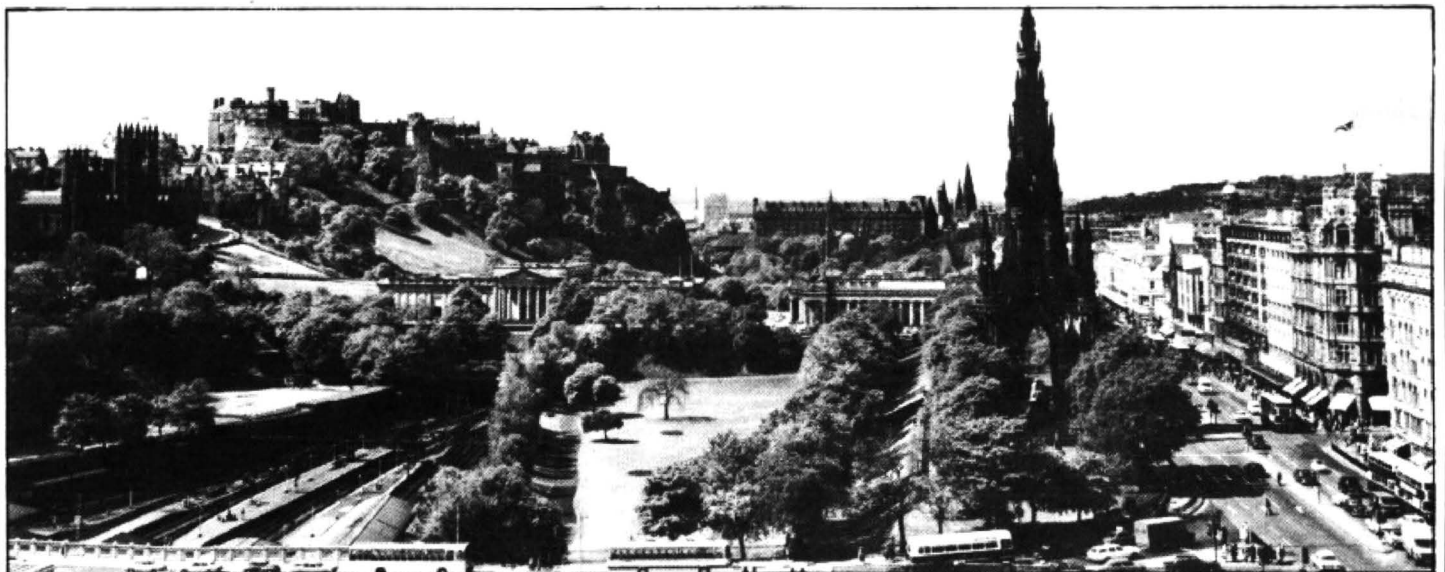
There are also plans to sell joysticks to members at less than £10 a pair, although David said that these have to be tested first. Other possibilities include cheap blank cassette tapes from Hong Kong and a reduction on the Amber 2400 printer. A Dragon repair service at a discount is already on offer and is likely to become more popular as Dragons come to the end of their guarantee periods.

The aim now is to get the newsletter out monthly. New members get a starter pack with the latest newsletter and a list of firms offering discounts. But David explained that there is more to the club than lower prices: "The aim is to search for good software and hardware for the Dragon — because there is so much bad stuff." Everything offered is vetted first by David or one of his co-helpers. Eight people are now involved with running the club, helping with typing, photocopying and answering members' queries. But the club still takes up an "inordinate amount" of David's time.

He himself is a "dedicated games man" and is most impressed by the quality of software coming out now, particularly from Microdeal. He hopes to move into becoming a full-time games author (hence the casino programs mentioned earlier), or maybe even starting his own software company. But he stressed that the club would remain independent whatever his occupation.

David's interest in computers goes back to school, although he dropped the subject at university. The ZX81 revived his enthusiasm, but he got fed up because a "screenfull of program meant you were out of memory". And so he moved on to the Dragon 32 "and fell in love" — in particular with the Draw commands. However, he added that the BBC B was now tempting him to move up again.

Whatever his next machine, the club will continue — its nucleus of eight Dragon enthusiasts will see to that. The club can be reached at 1 Walker Street in Edinburgh.



The Scottish Dragon Club may be based in Edinburgh — but most of its members live in England

Computasolve Ltd.

8 Central Parade, St Mark's Hill
Surbiton

Telephone: 01-390 5135. Opening hours: 9.30—6.30, Mon—Sat

Dragons from stock	£175.00
Dragon joysticks	£19.95
Teletwriter word processor for the Dragon	£49.95
STA510 matrix printer.....	£399.00
Seikosha GP 100A matrix printer	£240.00

Full selection of Microdeal software in stock such as Donkey King, Planet Invasion, Storm, Invaders Revenge, Katerpillar Attack and many more.
Plus Bugbyte software.

All prices including VAT.

Dragontree Programs

All of these pastimes use four colour hi-res graphics with sound and music.

REVERSI. A game of strategy for two — you and a friend, you and your Dragon or your Dragon by itself. It plays a good game, you'll need to think.

BOWLING. For 1-4 players (needs joystick). Choose your ball and bowl: straight or curved, watch those pins fall. Full ten frame scoring.

TANGRAMS. Make a multitude of shapes with your seven pieces. Fifty problems to solve but you needn't stop there.

Each program is well presented and comes complete with full instructions and cassette for only £4.95 (post and VAT paid). Cheques with orders please to:

COPPICE SOFTWARE

7 March Street, Kirton in Lindsey,
Gainsborough, Lincs DN21 4PH



NEW . . . NEW . . . NEW

★ RS232 C INTERFACE ★

Full specification interface enables connection to serial printers, modem, other micros etc:

£49.50 includes manual, sample and test programs

★ 8-BIT DIGITAL TO ANALOGUE CONVERTER ★

May be POKED to. (0 to 255 gives 0 to 5 volts)

£19.95 with documentation

★ STEPPER MOTOR DRIVE INTERFACE ★

Provides pulse and direction lines for 4-stepper motor drivers £19.95 with documentation

★ SUPER-TEXT ★

Enables use of following on HI-RES screens:

Upper and lower case characters, all other keyboard characters, £, µ × signs, underlining, graph axes with ticks. Includes Epson Screen Dump.

£9.95 cassette with documentation

★ EPSON MX 80 III HI-RES SCREEN DUMP ★

Listing with comprehensive documentation and examples
£3.00

★ DRAGON DUST COVER ★

Super quality, colour matching fabric with red edging tape
Looks super £3.50

★ SOFTWARE LIBRARY ★

£8 annual membership, £1 per tape. Our members say we supply good tapes, good service at a good price.

WATCH THIS SPACE

FOR FURTHER EXCITING PRODUCTS

Trade enquiries welcome

COTSWOLD COMPUTERS
PARK HILL, HOOK NORTON, BANBURY
OXON

DRAGON 32 USERS CLUB

**Our Free
Introductory
Offer to 1st 1000
Members Now Closed**



A DRAGON FOR YOUR FRIENDS!

NOW ONLY £175 plus £8 P&P
(inc. 1 year's FREE membership)

An Independent Club run by



THIS MONTH'S SPECIALS

- (A) GAMES COMPENDIUM — 4 tapes, each of 5 games that load in one, with 'Menu' choice All 4 for £10.00
- (B) RS232 INTERFACE £49.50
- (C) SOUND EXTENSION MODULE £34.95
- (D) MICROTAX — Complete Tax System — tape or disk £24.95
- (E) DISC DRIVE AND CONTROLLER SS 40 Track — complete — ready to run £299.95

(P&P please add 95p (E) £8)

(Overseas please check first)

Send 50p for our comprehensive
Software and Hardware Catalogue

JOIN NOW AND RECEIVE

- ★ Free 'Toolkit' Cassette
- ★ Star 'Tape of the Month' details
- ★ The widest selection of Software and Hardware at Discount Prices
- ★ Guaranteed 48-hour Service (subject to availability)
- ★ Monthly Members' Newsletter
- ★ Details of 'Dragonings' — our new cassette-based magazine
- ★ Monthly reviews of the pick of Software and Hardware
- ★ Dragon Pals Corner

ANNUAL MEMBERSHIP

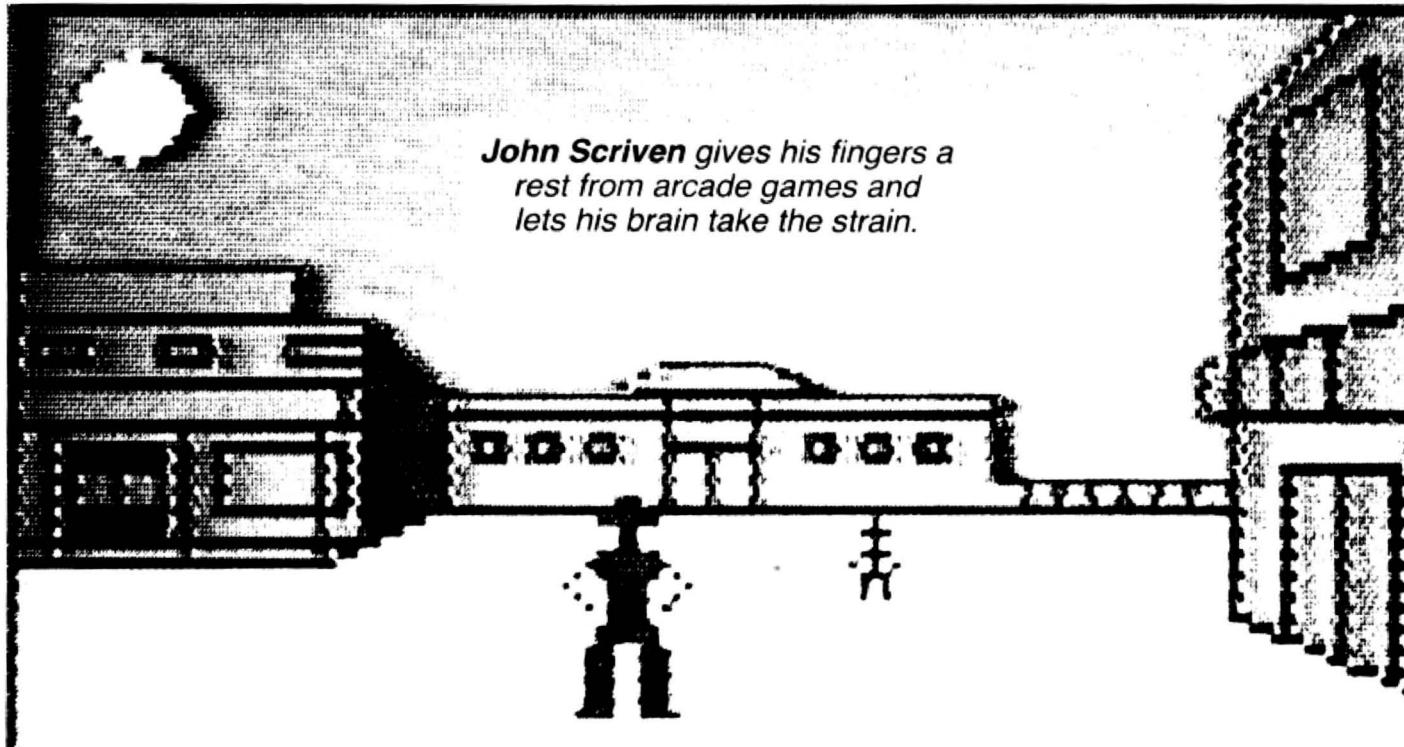
NOW £5.00

6 MONTHS TRIAL £3.00

OVERSEAS (1 YEAR) £8.00

Send subscription now to receive our Software and Hardware catalogue, Newsletter and 'Toolkit' Cassette to:
DRAGON 32 USERS CLUB, 31 North Street, Wareham, Dorset BH20 1AD

31 NORTH STREET, WAREHAM, DORSET, BH20 1AD, UK



John Scriven gives his fingers a rest from arcade games and lets his brain take the strain.

Software showdown

A & F Software's Deadwood – transports you to the Wild West where you can win ranches or saloons and trade in gold

AFTER LAST MONTH'S spell of zapping and high speed alien destroying, this month I shall concentrate on the sort of games that tend to make your brain, rather than your fingers ache.

In general, arcade-type games need to be written in machine code to approach the speed of the original, but most of those that rely on logical processes do not always need this speed and can be quite successfully written in Basic.

Escaping graphics

An exception to this are games that use high quality graphics, and a fine example of this genre is *Escape from Microdeal*. Similar to Sultan's *Maze* and *Phantom Slayer* (reviewed in last month's *Dragon User*), this involves escaping from a three-dimensional maze. At the start, you find yourself trapped on the top floor of a building. There are no hidden monsters waiting to pounce on you, all the inhabitants are friendly, and it is even comparatively easy finding your way to the lift (or elevator as this US game prefers it).

The problem lies in the fact that the elevator provides the only means of escape, and unless the correct code is entered, you will plummet to instant death. "The fall is fun, but the stop at the end is a real killer," as the sleeve notes succinctly put it! To obtain the magic combination, you may enter various rooms and attempt to decode mysterious sayings. This is a pleasant combination of several ideas and is an interesting program to add to any

collection. It is not so easy to acquire the correct code and I now know the inside of the lift shaft most intimately!

Since the recent court case, it appears that there is no longer any monopoly on the name *Monopoly*! A program that uses the format of this popular board game is *Deadwood* from A & F Software. Instead of the salubrious settings of London and Manhattan, you are transported to Wild West frontierland, and you can acquire ranches or saloons rather than Mayfair or the Old Kent Road. If you feel Lady Luck is on your side, you can gamble away your earnings or trade in gold.

The display shows an exceptionally fine introductory picture, but the game is conducted in a lower resolution, the positions of the players being shown by different colours. The explanations are very clear but the screens flash by rather rapidly. One distinct advantage is that you can set the total length of the game at the start. This is an original variation of an old favourite at £6.90.

Those of you who are *Star Trek* fans will probably be pleased to know that there are several versions of this game available for *Dragon* owners. Before I come to these, you may be interested in a game inspired by the TV programme. You probably remember the fiendish games of 3-D chess played by Spock and company. Salamander Software has produced a slightly easier version for us mere earthlings, entitled *Vulcan Noughts and Crosses*. The positions for play are chosen by entering

X, Y and Z co-ordinates on a four by four by four board. (It's a shame that the origin is at the top left rather than the mathematical convention of bottom left.)

Long before the age of the micro-chip, there used to be a board game very popular with children that used the same principle on a four layer perspex board, and it was easy to align your sight along completed rows. On the computer version it is often difficult to see these rows until it is too late, as the four layers are shown next to each other across the screen. This just serves to keep you on your toes. The response times can be rather long as various numbers are selected by the *Dragon*, but in general it's faster than playing against a human opponent. It is reasonably well written, but it appears to get into an endless loop if you enter a co-ordinate that is already occupied by a piece. The instructions are clear, and the game is, like all Salamander's efforts, packaged superbly.

Startrekking

Salamander provides one of the two versions of *Star Trek* both confusingly called *Dragon Trek*. Its version comes complete with a 12-page 'flight manual'. The game originally appeared long before *Space Invaders* launched themselves upon our TV screens. Indeed, until IBM tightened up its internal security, it used to be a very popular pastime for up-and-coming executives!

The mainframe version used to include

all the usual alternatives — short range and long range scans, photon torpedoes, phasers and shields — but did not usually show on-screen movement. This was due probably to the high incidence of line-printers rather than VDUs as terminals. Salamander's version allows use of a joystick to steer round the galaxy (you select the size), and blast to kingdom come any Klingons you discover lurking in your sector. The Wintersoft version is closer to the original game.

I have to admit that I'd rather watch an episode of Startrek on the TV to playing a watered-down computer version, and the Wintersoft one has little innovation to enthral me. The Salamander version, although costing nearly £10.00, uses far more of the screen and is more interesting to play. It also uses characters from the TV series to inform you of your progress. Unfortunately Lt. Uhuru never gave me the message to come to her cabin, as I hoped she would!

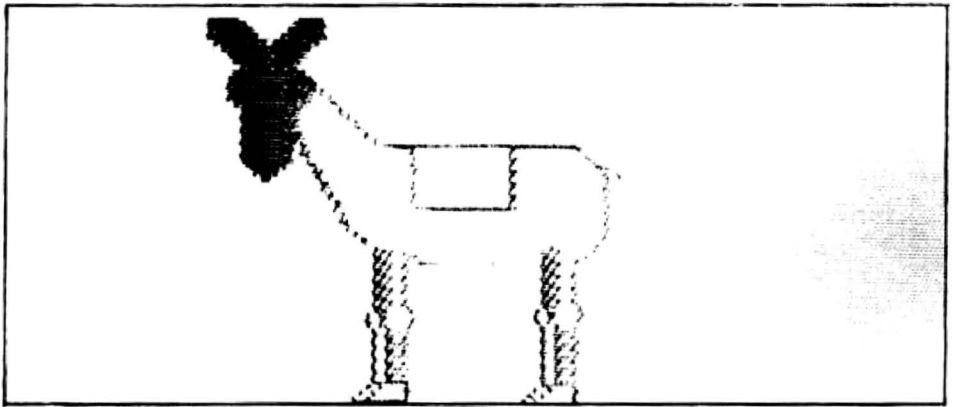
Educational

Although the promised Dragon Data educational programs have yet to make an appearance in my review bundles, one or two other firms supply cassettes that could possibly be considered to be in that category. Gem Software sells a couple of tapes, called Eduquiz I and II. I am somewhat reticent to term these truly educational, as they provide questions on a wealth of subjects without attempting to teach anything. As general knowledge quizzes they are fun, especially as the format is similar to the TV game, Winner Takes All. There are usually five alternative answers offered, and you can gamble your points on different answers. Subjects offered are Geography, Inventions and Kings and Queens on Eduquiz I, with Writers, Painters and Musicians on Eduquiz II. My only criticism is that they are highly priced for text programs at £9.95.

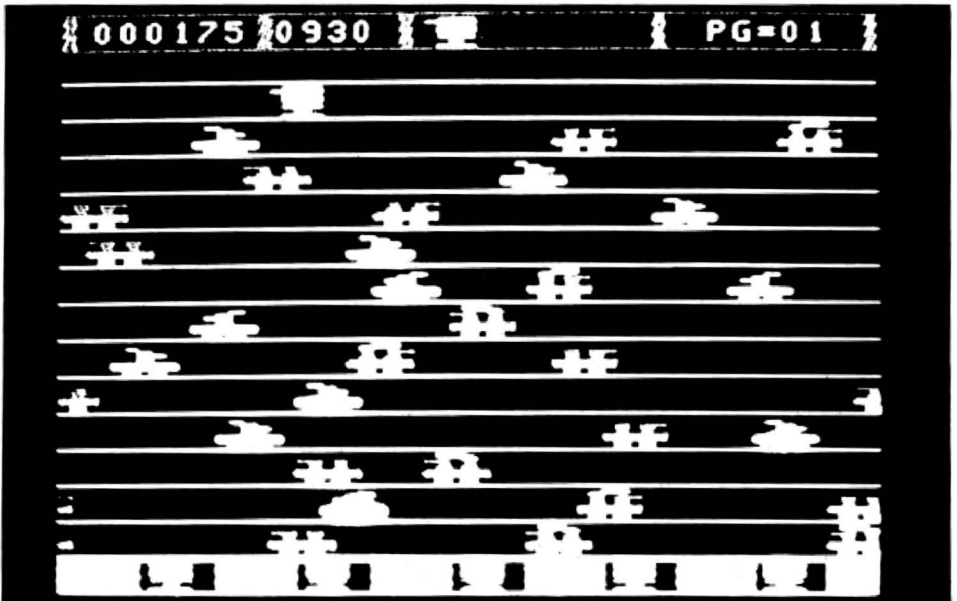
Good educational software is few and far between for the Dragon — simple drill-type programs merely test acquired knowledge and there must be a large market for software that develops thinking skills. I await Dragon Data's efforts with interest. With more quality programs on the market, Dragons could find their way into many classrooms.

There are one or two compendiums on the market at the moment that provide you with a selection of games. I've mentioned before that many of these often contain just one or two mediocre games that give the appearance of being thrown together in a few evenings. When a collection appears that is better value, I try to give it an airing, as I did with B & H Software's Gamestape I last month. This month I was pleasantly surprised by Shards Software's Fun and Games. This contains eight games designed apparently for use at a party.

Crosses is a standard game of Noughts and Crosses and is competent but not out of the ordinary. The graphics, however, are large and clear. The rest of the games improve as the tape progresses. The next one is a version of Mastermind (the colour-



Shards' Fun & Games — fix the tail on the donkey to win



Dragon Data's Rail Runner — a Frogger-type cartridge arcade game

code breaking game rather than the Magnus Magnusson version). Gold involves steering a tiny cross round a minefield collecting pots of gold but offers no lasting challenge. Snap shows a sequence of playing cards and allows you to press the space bar when two consecutive cards are the same. The program gives you less time than the average human and you have to be on the ball to beat it.

Anagram, which follows, presents you with jumbled words which make up the names of UK towns and cities. If you're not feeling too bright, you can get the computer to shuffle the letters at random until they give you more of a clue. There are 200 towns held in data statements, so the game could be used as a versatile educational training exercise. Donkey is a good party game — very close to the original. A realistic and colourful animal appears on the screen, and you steer a tail round the screen with a joystick (supposedly while blindfold!). The closer you get, the higher becomes the note from the loudspeaker, and pressing the button fixes the tail. Points are awarded unless you are spot-on, when you are declared the outright winner. Dice is a poker-type game with dice, and Circles relies on memory and estimation skills.

Artist is a very strange program, and should appeal to frustrated Miros and Kandinskys everywhere. Up to four people can select a choice of colour, shape and block preferences, and the Dragon pro-

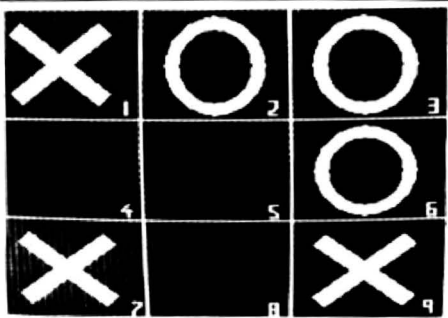
ceeds to draw an abstract random picture. When you are happy with the result, it is stored on a graphics page and the other artists have their turn. At the end, a human or the computer (!) can judge which is the best effort. There is no clue what the criteria for a good picture are, but it seems a little unfair for the computer to judge what is actually its own efforts. It is, however, an amusing concept.

Musical is the last program on the cassette and is essentially just for lazy musical chairs players. It uses the computer to switch on and off a music cassette and keeps track of who falls on the floor. Although by no means the most exciting tape in the review, Shards' Fun and Games does provide for £5.00 a selection of eight entertaining games to liven up a children's party.

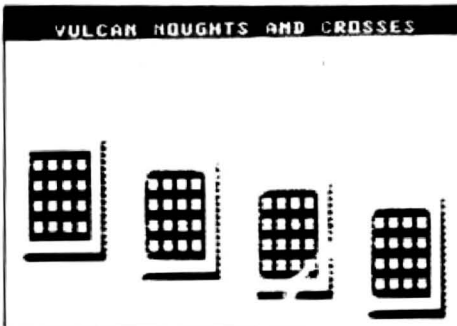
Party closers

Now for two games that you would only produce at a party when you wanted your guests to leave, unless they happened to be war-game fanatics, that is. Some time ago I reviewed the rather blood-thirsty program Samurai Warrior, in which you follow the rules of the Knights of Bushido fairly accurately, ie you can achieve quite a good score by ritually disembowelling yourself — just the sort of game to brighten up a rainy evening.

M C Lothlorien has turned to Ancient Greece for its Tyrant of Athens. Without examining the structure of the games ▶



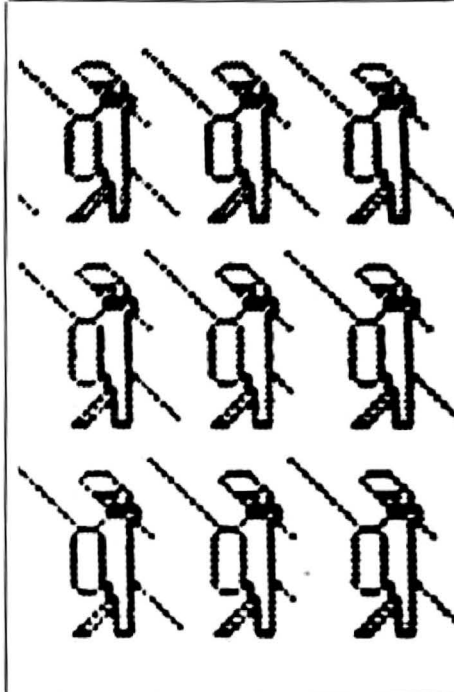
More Fun & Games: Noughts and Crosses ...



... and Salamander's 3-D version

◀ in great detail, Tyrant appears to be similar to Samurai, although it is not quite as gory. You are attacked by various armies and navies from other city states and surrounding countries. You have to balance your forces to defeat them as well as controlling the farming economy. This certainly scores over text-only kingdom/adventure games, in that it uses graphics as well as can be achieved, given the slowness of Basic. There are maps showing you the origins of your enemies and also rather stylised armies or navies bumping into each other. The instructions on the sleeve insert are clear, in fact rather detailed, and the game is certainly not over-priced at £6.95.

Strategic Command from Romik Software is considerably more complicated than Tyrant of Athens. It can, however, be very addictive, and if you happen to be spirited away to Roy Plomley's island paradise, then you could add this program to the Works of Shakespeare and the Bible — it would certainly keep you occupied for hours — if only working out the complicated instructions.



M C Lothlorien's Tyrant of Athens

A map appears on the screen showing the islands upon which you and your opponent do battle. You move land and sea forces with your joysticks until they are close to each other. At this point the forces you have at your command are shown in silhouette on the screen. You don't play against the computer, but it does have the final decision on the state of play. Eventually (two hours later, in my case!) you may reach your opponent's capital and become the winner. I found it the most complicated original computer game I have played, being something like a cross between Diplomacy, Risk and a true war game.

I would not recommend this to anyone without a lot of patience to cope with the pages of rules, but if one day, you find yourself on a desert island, who knows ...?

Should your desert island be a reasonable size, you could practise your bunker shots all day. This brings me rather deviously round to the next set of games. There are two golf programs included here (Salamander's rather fine but more

expensive version was reviewed two months ago).

Golf (£7.95) from Gem Software goes for the more traditional game where you have to know your woods from your irons (the explanations are few and far between). Unkind remarks are made when you choose the wrong one! You need to specify the strength rating and the compass direction of your swing. All this is displayed on a clear bird's eye view of the fairway.

Handicap Golf from Computer Rentals is less expensive at £6.00 and uses a different procedure to hit your ball. You have to enter strength and direction to tee off. Unfortunately, the entry routine was not error-trapped and accidental or deliberate out of range inputs caused the excellent map of the fairway to scroll up which means the ball position bears no relation to its on-screen appearance. This results in some strange games — a sort of tactile version of golf which I'm sure wasn't intentional! Of the two, I prefer the Gem version, but it's still not quite up to Salamander's version in spite of its pleasing graphics.

A new game that is much easier on the brain, although it requires fairly fast thinking, is Flag from Dragon Data. A field of hexagons appears on your screen and you can plan a human opponent or the computer. The object is to reach the other side of the playing area and capture a flag. Obstacles appear in your path at random, and the winner is the first player to capture three flags. Although an original computer game, it is reminiscent of a board game I played some time ago, and in spite of being well written, it doesn't really use the potential of the Dragon.

Loading

All these games loaded first time — I'm not sure if manufacturers are improving duplication techniques or whether it's due to my using a new Superscope C190 cassette recorder — although expensive at nearly £40, it's a model I'd recommend to anyone.

In spite of intending to restrict the theme of this review to intellect-testing games, there is a new cartridge from Dragon Data that deserves an honourable mention. Rail Runner is a Frogger-type arcade game that puts you in the role of helping five Herman Hobos across a multi-track rail-yard. You control a figure named Bill Switchman who must cross the busy tracks and rescue the poor unfortunates from the bottom of the screen. Cursor keys are used in this fast-moving game and although I have reservations on the price — like all cartridges it seems over-priced at £19.95 — it is a game that needs fast fingers and a careful strategy to succeed.

There is certainly a wide range of software available for the Dragon at the moment, and a lot of it uses the graphic and sound potential of the computer well. It's good that at long last Dragon owners have a wide choice, almost as wide as that for any other computer. Now I'm off to hide from the editor for the next month while I sample a new collection of adventure games. ■

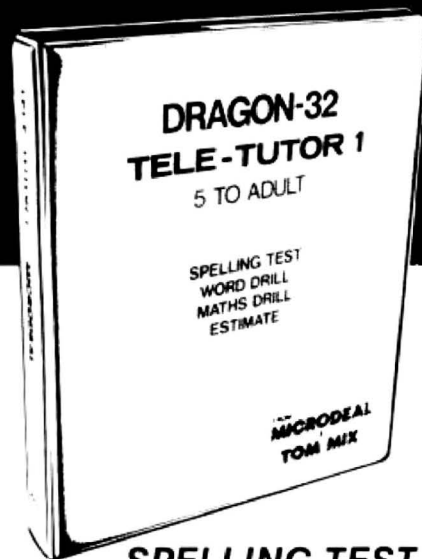
Software reviewed this month

Escape £8.00	Microdeal 41 Truro Rd St Austell Cornwall	Vulcan Noughts and Crosses £7.95	Salamander Software 27 Ditchling Rise Brighton E. Sussex
Deadwood £6.90	A & F Software 830 Hyde Rd Gorton Manchester	Dragonrek £9.95	
Strategic Command £9.95	Romik Software 24 Church St Slough Bucks	Eduquiz I Eduquiz II both £9.95	Gem Software Unit D The Maltings Station Rd Bishops Cleeve Shropshire
Golf £6.00	Computer Rentals 140 Whitechapel Rd London E1	Golf £7.95	Shards Software 10 Park Vale Court Vine Way Brentwood Essex
Flag £7.95	Dragon Data Kenfig Industrial Estate Margam	Fun & Games £6.00	
Rail Runner £19.95	Port Talbot West Glamorgan	Tyrant of Athens £6.95	M C Lothlorien 4 Granby Rd Cheadle Hume Cheadle Cheshire

DRAGON 32 OWNERS

NEW FROM MICRODEAL

The Producers of TELEWRITER



SPELLING TEST

This programme is designed to give a standard oral spelling test, using the sound track of the tape-recorder, to dictate either single words or words and sample sentences. The responses are then typed using the keyboard, which will subsequently be displayed on the screen and, if required, can be kept as a permanent record using a printer.

WORD DRILL

This programme is designed to give a multiple choice vocabulary quiz. Words and their definitions are entered into the programme using the keyboard or from a previously prepared tape file. The computer will then display randomly selected definitions with a choice of eight words. The correct word must be chosen before the preset timer reaches zero. This programme could be used for words and definitions, a geographical quiz, chemical formulae, etc.

Tele-Tutor costs £25 on cassette and is

AVAILABLE FROM DRAGON 32 DEALERS NATIONWIDE OR DIRECT FROM:

MICRODEAL

14 TRURO ROAD, ST. AUSTELL, CORNWALL, PL25 5JE. TEL: 0726-67676.

TELE-TUTOR 1

MATHS DRILL

This programme is designed to help children practise addition, subtraction, multiplication and division.

- Programmed for up to 6 students
- Answers are written as on paper
- Division can be written showing "remainder"
- Ten different skill levels
- "Smiley" face and graphics used as rewards
- Skill levels adjust to ability
- Problems timed
- Correct answers are displayed if error made
- Full report at end of test

ESTIMATE

This programme is designed to help children practice their mental arithmetic. A selection of addition, subtraction, multiplication and division is given.

- Programmed for up to 5 students
- Five skill levels
- Time taken to answer is recorded
- Correct answers are displayed if error made
- Full report at end of test

AN INSTRUCTION MANUAL IS INCLUDED IN THIS PACKAGE SUITABLE FOR CHILDREN AGED FIVE to ADULT

ALONG WITH OUR PRESENT RANGE OF SOFTWARE:

ALCATRAZ.....	£8.00
BACKGAMMON.....	£8.00
COSMIC ZAP.....	£8.00
DEFENSE.....	£8.00
DRAGON INVADERS.....	£8.00
ESCAPE.....	£8.00
FLIPPER.....	£8.00
GALACTIC AMBUSH.....	£8.00
INVADERS REVENGE.....	£8.00
JERUSALEM ADVENTURE 2...£8.00	
KATERPILLAR ATTACK.....	£8.00
MANSION ADVENTURE 1.....	£8.00
PHANTOM SLAYER.....	£8.00
PLANET INVASION.....	£8.00
PROGRAM PACK 1.....	£8.00
PROGRAM PACK 2.....	£8.00
PROGRAM PACK 3.....	£8.00
PROGRAM PACK 4.....	£8.00
PROGRAM PACK 5.....	£8.00
RACER BALL.....	£8.00
SCARFMAN.....	£8.00
SPACE MONOPOLY.....	£8.00
SPACE WAR.....	£8.00
STORM.....	£8.00
TALKING ANDROID ATTACK..£8.00	
THE KING.....	£8.00
WILLIAMSBURG	
ADVENTURE 3.....	£8.00
ULTIMATE ADVENTURE 4.....	£8.00

TELE-WRITER	
WORD PROCESSOR.....	£49.95
TELE-TUTOR.....	£25.00

HARDWARE

JOYSTICKS pair.....	£19.95
LIGHT PEN WITH PROGRAMS	
£12.00	

TELE-TUTOR IS AVAILABLE FROM
SELECTED John Menzies SHOPS



COMPUSENSE

Software for Dragon 32



PO BOX 169, PALMERS GREEN, LONDON N13 5XA
 Telephone: 01-882 0681 (24 Hr) and 01-882 6936
 Offices at 286D Green Lanes (9.45-6.00 Mon-Fri)



HI-RES

upgrade to a 51 by 24 display cartridge £25.30

Just plug this cartridge into your DRAGON, switch on and you have a 51 column by 24 line display with true lowercase characters. This amazing software uses the high resolution mode to draw the characters on the screen and allows you to use BASIC almost as normal. In fact there are a number of extensions to BASIC to allow you to use the many additional features:

- ★ Mix graphics and text on the same screen
 - ★ Select any of nine standard ASCII character sets for FRENCH, SPANISH, GERMAN, ITALIAN, BRITISH, USA, SWEDISH, DANISH or JAPANESE.
 - ★ Redefine any of the 244 characters.
 - ★ SPRITE GRAPHICS MODE enables any character to be an 8 by 8 dot Sprite.
 - ★ A most responsive keyboard with AUTO-REPEAT.
 - ★ Extra shift gives the missing characters on the DRAGON keyboard.
 - ★ Leaves about 19,500 bytes for BASIC.
 - ★ Switch between HI-RES and normal modes at any time.
 - ★ BLACK on GREEN, BLACK on WHITE, GREEN on BLACK or WHITE on BLACK.
 - ★ 32 by 16 compatibility mode for existing programs.
- Hi-res is a must for serious programming.

DASM

an easy-to-use 6809 machine code assembler cartridge £18.95

- ★ Specially designed for convenient use on the DRAGON.
- ★ Does not use a separate editor.
- ★ Ideal for producing machine code routines to be called from BASIC.
- ★ Includes a 6809 Reference Card.

Type your assembler program just as you would a BASIC program and use BASIC to call DASM. When DASM has assembled your program it returns to BASIC where you can check for errors and execute the program immediately if required. The source program is saved and loaded using the normal CSAVE/CLOAD. The assembled program may be saved to tape using CSAVEM (this can easily be done automatically in BASIC when the assembly has finished).

DASM is a two-pass symbolic assembler which allows labels of any length (the first five characters and the last character are used). All the 6809 mnemonics and addressing modes are supported plus comprehensive assembler directives for defining constants, reserving memory, directing output to screen or printer. Errors detected by DASM are reported with easy to understand text messages.

DEMON

Machine Code MONITOR cartridge £18.95

DEMON gives you access to the inside of your computer. It features a real time display of memory locations in both hexadecimal and alphanumeric codes, a full screen editor for memory and register contents and multiple breakpoints. There are twelve commands designed to assist in debugging and running machine code programs (or BASIC programs with PEEK and POKE).

DEMON, unlike inferior products, has its own documented input and output routines which means that it does not interfere with BASIC. DEMON can be called from a BASIC program and will return control to the BASIC program. A user manual and a 6809 Reference Card are included.

DASM/DEMON

cartridge £30.45

Combines DEMON and DASM in one cartridge. The ideal combination for developing machine code programs on the DRAGON.

DECODE

BASIC Converter cartridge £18.95

DECODE converts BASIC programs between TANDY COLOR format and DRAGON 32 format. Simply CLOAD the "foreign" program from tape, EXEC the cartridge and the program is converted. The same cartridge will work on a DRAGON 32 and a TANDY COLOR (Extended BASIC).

GAMES ON CASSETTE

CC POKER £7.95

Join Rocky, Harry and Sam for a captivating game of 5-card Draw. Excellent graphics and sound effects. May turn you into a card sharp overnight. Five levels of difficulty.

SPACE RACE £7.95

A fast action arcade game with 16 levels of difficulty. Chase and destroy the marauding aliens. Use joysticks or keys. Includes a High Score league table.

C-TREK £7.95

An enjoyable and easy-to-play space adventure game with comprehensive instructions.

PIRATES AHOY £7.95

A humorous nautical adventure game. Solve the riddles and direct the pirate to the treasures.

DESERT GOLF £7.95

Play a round on the Nevada course. High-resolution display and good sound effects.

PLEASE ADD 50p POSTAGE ON ORDERS FOR SINGLE CASSETTES

BOOKS NOW IN STOCK

35 Programs for the Dragon 32.....	£4.95
The Working Dragon 32.....	£5.95
Programming the 6809 (Zaks).....	£12.50
Enter the Dragon.....	£5.95
Load And Go With Your Dragon.....	£5.50
The MC6809 Cookbook (Warren).....	£6.25

Postage on books: add 50p per book — maximum charge £1.00

We support our software!

Send SAE for details of our current upgrade details for cartridge software. This service is available direct from Compusense.

SEND LARGE SAE FOR OUR LATEST CATALOGUE
 BY MAIL ORDER — OR ASK YOUR LOCAL DEALER

Picking a printer

Looking for a printer for your Dragon — Stephen Adams gives you a helping hand by examining six of the best.

THE DRAGON HAS a socket on its left-hand side for a 'Centronics' printer. This review looks at six printers which can be used: the Olivetti JP101, Seikosha GP100A, NEC 8023, Amber 2400 and two models from Epson — the FX80 and RX80.

The first thing to understand about the 'Centronics' interface is that all the data is presented in 'byte' form, eight bits at a time over eight wires. There are also some control signals and protective earth screens to be connected up between the printer and the Dragon. On the printer there is a standard 36-pin Amphenol socket, but on the Dragon there is only a 20-way socket, so a specially made up cable must be bought to connect the two.

It also means that some of the facilities of the printer are not available as they are unconnected. These do not affect the operation of the printer, but are warnings — such as paper empty, errors, and an input to restart the printer after an error. The restart can be done by just turning off the mains switch on the printer, so it is not required by the average user.

All of the printers use the ASCII code and therefore have special uses for all the codes under decimal number 32. These can be used to implement such things as graphics, special features of the printer and formatting letters.

A great deal of the features on any printer are implemented by control codes using the escape code. This is CHR\$(27) on any printer and can be followed by any number of codes depending on the application. It is not a printable character and so must be put out as a separate character to the printer. Any other control codes, as they are called, must also use this method as they may confuse the Dragon if PRINTed to the screen.

PRINTING to the printer rather than to the screen is by the command PRINT#-2, followed by the CHR\$(X) or strings you want to print. Page 132 of the Dragon user manual has a brief description. Any number from 0 to 255 can be put out to the printer by using CHR\$(X); and so all of the printer controls are available. The most important of these is the CR code (carriage return) which is set by most printer manufacturers not to print on a new line, but to just return the print head to the start position.

The Dragon, however, requires that the

CR code produces a LF code (LINE FEED) action as well when it LLISTs a listing to the printer. Dragon users must first find out in the manual where the selection switches are so that this can be done. These selection switches contain the way the printer is set up when switching on and also select the character set (English, American, etc), CR action, etc. On the Seikosha model they can also start up on self-test which prints out the entire character set continuously.

The differences between the various character sets is minimal and only requires the changing of a few characters. All the characters are from 32 to 127 in the ASCII character set and printer manufacturers have sometimes used the other 128 characters for other purposes. On the NEC, for instance, there is a set of graphics, Greek letters, etc; on the JP101, though, these codes are unused which seems a pity.

Graphics are available on all the machines reviewed and apart from the Seikosha all eight bits specify eight dots on the printer (either vertically or horizontally). The Seikosha only prints on a 5 × 7 pin format and so can only print seven dots in a column as against the normal eight. The eighth bit is always a '1' to indicate graphics data. The way of implementing the graphics feature varies from machine to machine: it is easiest on the Seikosha and most difficult on the Olivetti.

The printing typeface is obviously very important to the final result and the greater the number of pins used to make up one character, the better the result should be.

Amber 2400

A special cable is needed to connect up the Amber 2400, which has a 25-way 'D' socket instead of an Amphenol. The Amber is one of the cheapest plain paper printers around. It is also quite small (6 × 6 × 3 inches) and its neat black box has only one control on it. This is for paper feeding when not printing — pressing it while printing jams up the printer, so you have been warned! The paper feed also initiates a self-test if the printer is switched on with paper feed pressed. A power on LED is also fitted.

The main problem with the Amber is its greatest asset, namely its size. The maximum number of characters per line is only 24 (18 in graphics mode) and this means that it cannot print more than three-



Amber 2400 — print is clear and paper is cheap, plus no inky fingers

quarters of the maximum Dragon screen of 32 characters. This should make no difference on listings because the characters overrun on to the next line, new lines appearing where they should.

The print is very clear, being blue ink from a cartridge ribbon which is very easy to insert — no inky fingers! The paper is only 2¼ inches wide and is very cheap as it is also used by cash tills. A large reel sits in a recess under the printer's cover.

The printer speed is not great at 18 characters a second, but it is ample if you don't want anything fancy. No fancy scripts and the lower case letters do not have proper descenders, ie the bottom half of the p and y does not drop below the line of characters as in this text.

Double width, double height and an indent of one space are the only special features. Double width characters, of course, mean half the number of characters per line can be printed, a maximum of 12. As I said at the beginning this is a cheap printer, but you also get a great deal of restrictions.

Seikosha GP100A

Seikosha's GP100A is a one-of-a-kind printer as it only uses a one pin head to achieve its 5 × 7 matrix character, thus saving money. It also slows up the printer to only 30 characters a second. The paper used is normally tractor fed, driven along by sprockets on either side of the paper engaging in holes perforated in either side. There is an option to use sheet fed paper rolls, but having tried this option I would not recommend it as it tends to pull the paper from side to side.

The set-up switches for the character set, CR, etc are inside the machine, so a screwdriver must be used to unscrew five screws to set it up. It is a pity that manufacturers cannot mount these switches on the outside of the machine.

Putting in the paper is fully explained with pictures — it slips underneath the platen (the piece the typeface hits) quite easily. The paper can be wiggled around to get it lined up properly over the sprockets. Then the covers (which are just like wings when opened) can be pushed down over the paper holding it securely. The paper can be advanced forward by turning a knob on the top. The ribbon is a 10-inch long band with two capsules on each end, one holding an ink pad which ►

Dragon Dungeon



NUMBER ONE FOR THE DRAGON

DRAGON OWNERS CLUB

The Dungeon is also the home of the largest Dragon Owners Club in the UK (or, since members are scattered through Europe to Africa and the Middle East, should we say "the world!")

The club magazine, *Dragon's Teeth*, is published monthly and includes news, reviews, advice and information exchange for dedicated Dragon-bashers. Free members' adverts, monthly offers (some members have already saved the cost of their subscription), competitions and, for extrovert Dragonards, badges and bomber jackets.

Annual Membership: £6.00
(£8.00 overseas)
Six-month Trial Sub £3.25
(£4.25 overseas)



LATEST DRAGONWARE

ARCADE GAMES: 'Mined Out' (Quicksilver) £5.95, 'Dragonhawk' (Pentagon) £6.95, 'Vultures' (Dragon Galaxians, Morrison) £6.95, 'Droids' (great new action game, Morrison) £6.95, 'Drone' (Tron-type game, Cable Software) £8.75, 'Spider' (Premier) £4.95, 'Bopswizzle' (beat the Gloops, Smoochers and Yerkles!) £5.95, 'Scanner' (an entirely new style of arcade game by Bamby) £8.45, 'Sniper' (Soft Joe's) £6.50.

Watch out for the best arcade game yet — Programmers' Guild's fantastic 'Ninja Warrior' (17 screens!). In stock shortly.

ADVENTURES: 'Alien Odyssey' (the first two parts of a giant 60K-plus saga) £9.95, 'Into the Labyrinth' £7.95, 'Danger Island' £6.95, 'Chateau' £7.95, 'Jungle Search' £6.95, 'Volcanic Dungeon' £5.00.

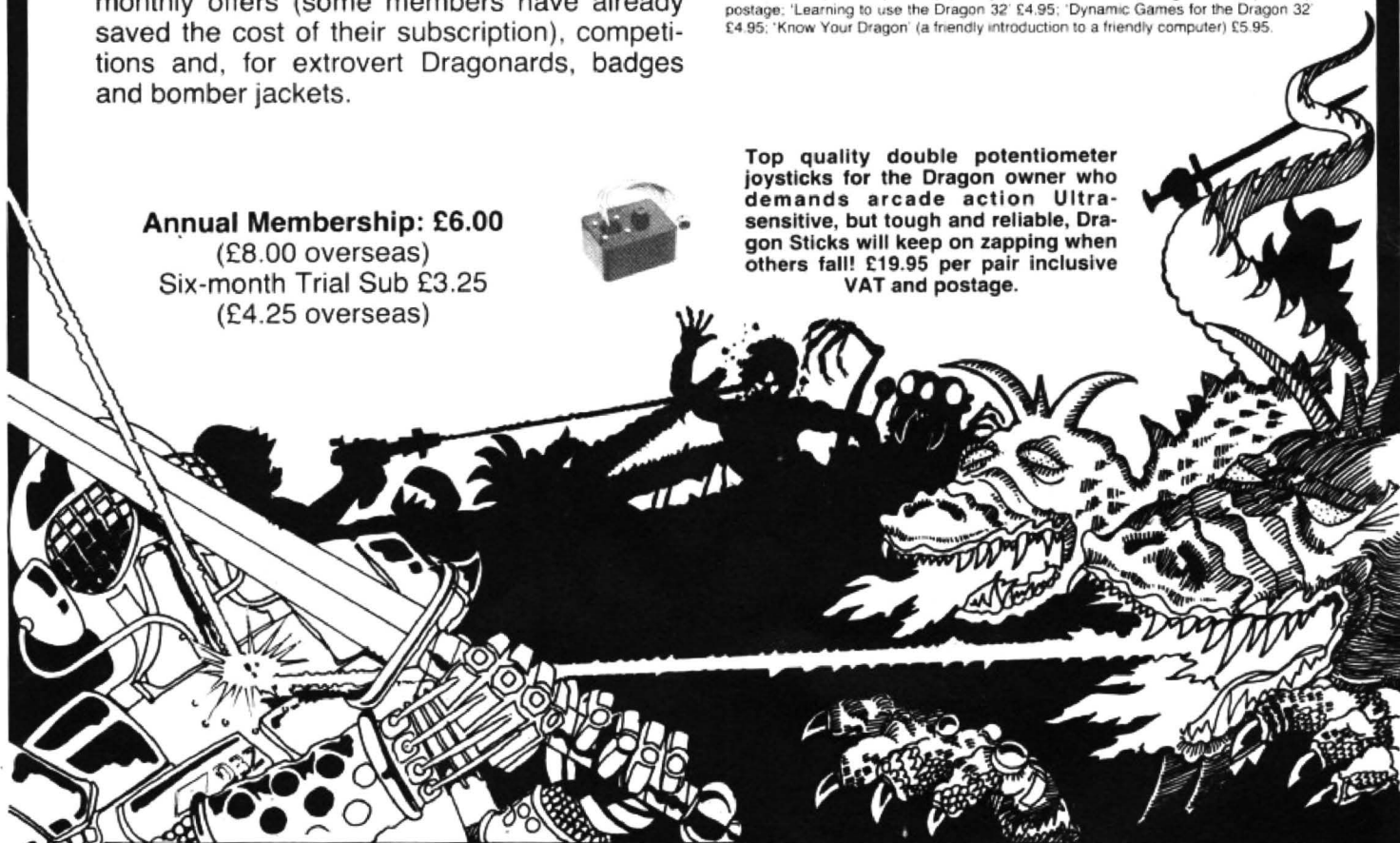
Best-seller still Wintersoft's mammoth 'Ring of Darkness' £10.00.

JUNIOR PROGRAMS: 'Baby Dragon' (Teddy Bears' Picnic and Koko the Clown) £5.95, 'St George and the Dragon' £6.95, 'Pirate' £8.50, Infant Pack (pre-school letters and numbers) £3.95, Action Pack (mazes and simple arcade) £3.95.

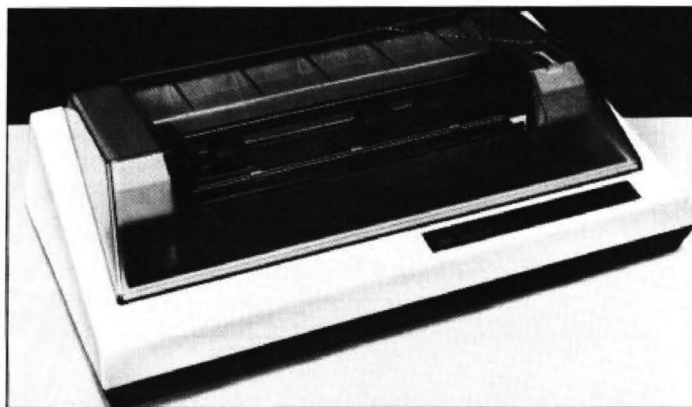
UTILITIES: Editor/Assembler/Monitor cartridges and manuals: Compusense £30.45, MACE £29.95, RS232 Interface Unit £49.50, Monitor Sound Unit £37.50, Salamander Graphics System £9.95.

BOOKS: 'Dragon Extravaganza' £4.95, 'Making the Most of Your Dragon' (highly recommended) £5.95, plus 50p postage; 'The Power of the Dragon' £5.95, plus 50p postage; 'Learning to use the Dragon 32' £4.95; 'Dynamic Games for the Dragon 32' £4.95; 'Know Your Dragon' (a friendly introduction to a friendly computer) £5.95.

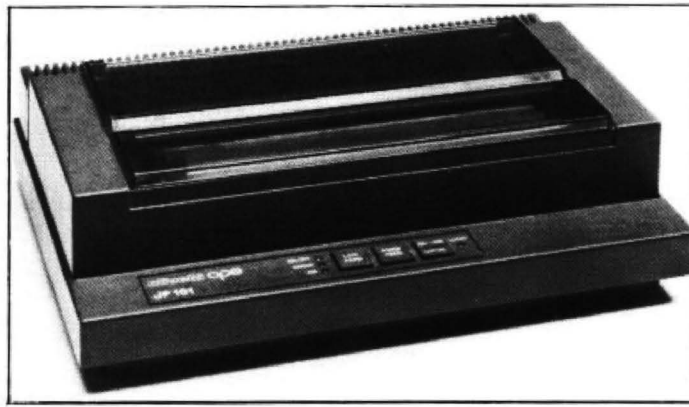
Top quality double potentiometer joysticks for the Dragon owner who demands arcade action Ultra-sensitive, but tough and reliable, Dragon Sticks will keep on zapping when others fall! £19.95 per pair inclusive VAT and postage.



P.O. Box 4, Ashbourne, Derbyshire, DE6 1AQ. Tel: (0335) 44626



Seikosha GP100A – uses a one pin head to achieve its 5 x 7 matrix



Olivetti JP101 – uses a glass tube filled with a graphite rod

◀ inks the ribbon as it goes round in a continuous circle. The two containers have to clip on to two holes at either end of the machine and then you have the fiddly job of slipping the ribbon over the print head between it and the paper. The paper width can be between 10 inches (hence GP100) and 3 inches, making it ideal for most jobs from continuous labels to word processing. The paper comes in boxes of 2,000 sheets; some retailers are, however, giving away 500 sheets free with every printer. Each sheet is 11 inches by 8½ inches, excluding the holes on either side.

The print was very faint on the printer I received due to the ink having dried out in transit — fresher ink capsules can make the print a lot clearer. The characters have no true descenders, but the graphics are easy to use as only one character (a back space, code 08) is required before graphics data is sent. Mixed data and graphics can be used on the same line. No special typefaces or controls are available on this printer, but the foreign characters are available above decimal 128 in the character set. This is a fairly cheap, full-sized, plain paper printer which is easy to use — a good first printer.

Olivetti JP101

The Olivetti JP101 spark ink jet printer is another unique printer as it uses no ink ribbon at all, but a glass tube filled with a graphite rod. This ejects a graphite dot on to the paper via a high voltage spark. This means there is no chance of smudging the paper, no messy ribbon to fit and a faster print rate (50 lines a minute). It also means, unfortunately, a poor print quality — the resulting print looking as if it was done with a HB pencil. A test print is supplied with every machine, using the self test mode of holding down the LF and FF (form feed) switches at power on. The paper is easy to slip on to the tractor which can only move from 8 to 10 inches. An alternative friction feed is built in and works smoothly to cope with smaller widths of paper.

One annoying thing is a cover alarm which goes off in an ear piercing yell every time you want to see what is going on underneath the opaque cover that covers the print head and rollers. In the end a piece of paper jammed in the switch prevented this safety device stopping the printer.

Characters have true descenders and special features can give you up to 147 characters at 18.33 an inch. The other features include horizontal and vertical tabs, three-way underlining, double height and width. The graphics set up is quite complicated, but it can be doubled in size by a zoom feature which prints every dot vertically and horizontally twice. A circuit diagram and layout is also included (which is unusual) as well as plenty of pictures showing how to set up the printer.

There is a built-in 1K of memory which allows faster printing as the Dragon does not have to stop for the slow speed of the printer. Also it prints in forward and reverse directions with a Z80A CPU for skipping over spaces to cut down the time it takes to print characters.

There are four indicators, power, local (printer disconnected from the control of the Dragon), error and ink (which gives a warning that the ink capsule is nearly used up). The three switches apart from the on/off one on the side are local, LF and FF. The last two only work when the printer is in the local mode (LF advances the paper by one line and FF by a whole page of 11 or 12 inches).

Again the set up switches are located inside the printer.

```

10 PMODE4,1:SCREEN1,1:PC
L55:COLOR0,5
20 FORI=1TO1000
30 X=X+L*SIN(R):Y=Y+L*CO
S(R)
40 IFX<-128ORX>128THEN90
50 IFY<-96ORX>95THEN90
60 LINE-(X+128,Y+96),PSE
T
70 R1=R1+60:R=R1/57.2957
8:L=L+0.5
80 NEXTI
90 REM PRINTER ROUTINE
100 OPEN"0",#-2,"0/P"
110 FORY=0TO191
120 PRINT#-2,CHR$(17);
130 FORX=0 TO 17
140 A=0:B=128
150 FORZ=1 TO 8
160 IFPPOINT(X*8+56+Z,Y)
=0THENA=A+B
170 B=B/2
180 NEXT Z
190 PRINT#-2,CHR$(A);
200 NEXTX:NEXTY
210 END

```

The Amber gives 24 characters a line

The JP101 has the facilities, but not the print quality to give the Dragon a decent printer, even with the contrast control on full. When the technique has improved to give a 'blacker' print it may be worth considering.

NEC PC8023

The first thing you notice about the NEC PC8023BE is that it is heavy (8.5Kg) and built to take a lot of punishment. The mechanism is designed on a strong metal chassis and has an enormous print head compared to the other models tested. The PC has friction feed and tractor feed to take paper up to 10 inches in width, the minimum size being 3 inches. The paper is fed in through the top cover at the back of the printer and straight on to tractor sprockets (if used). It is then fed under the platen and is held in place by a very lightly sprung bar.

The ink cartridge is also large and unique to this printer — 4½ inches square it travels on the back of the print head. The ribbon is also twice as wide as normal as it uses the top and bottom as two separate ribbons. It is very noisy even with the clear plastic cover over the printer platen. The switches to control the character set, CR and other functions are included underneath where the printer runs, covered by a clear plastic strip. There are sixteen switches in all, each one explained in a table showing the on and off results.

This speedy machine has a buffer RAM memory. No size was given, but it carried on printing for a good 14 seconds after the Dragon had finished LLISTING. It also prints both ways and uses logic seeking to find the next character to print. The print speed is 100 characters a second.

On the front of the machine are three LEDs: SEL (on line/local), paper empty and power. The three switches on the top are SEL, LF and FF. An on/off switch is located at the side. The only problem I had was getting off the main cover to look at the ink cartridge ribbon as it was very stiff. The paper cover on the other hand comes off very easily. The character set includes Greek and most European languages as one would expect, but it also includes a graphics set. This consists of blocks, lines and curves based on what looks like the Pet character set.

This printer has wide variety of print modes with proportional spacing ▶

ELKAN ELECTRONICS
WE SUPPORT THE DRAGON!
 4 fabulous magazines

Color Computer News
 A companion magazine to "Rainbow" also devoted entirely to Dragon 32 and Tandy TRS80 color computers.

the RAINBOW
 "RAINBOW" A fabulous 200-plus page magazine imported exclusively by ELKAN ELECTRONICS, and crammed full of programs, hints, tips for Dragon 32 and Tandy color computer users.

Color Computer
 Brand-new, glossy, full-colour magazine full of first-class, high quality programs and articles from top writers.

HOT CoCo
Just arrived! Our very latest!
 All our magazines include an exclusive U.K. and European supplement with Dragon compatibility charts and FREE advisory service - and a copy of "Dragon Supermarket".
 Send £2.25 (plus large 57p s.a.e.) or your Access or Visa card number for a sample copy of any of these magazines.

One Stop Shopping

The Dragon Supermarket
 If you own a Dragon 32, there's now no need to search through endless magazines, or contact numerous different suppliers of software, hardware and peripherals for your Dragon. Just a phone call away or a FREEPOST letter (no stamp required) away - is "THE DRAGON SUPERMARKET" an ELKAN ELECTRONICS exclusive service for all Dragon 32 and Tandy color computer users.
 Ask for our free mail order catalogue listing all (well, nearly all) of the very many products we distribute - games, books, software, accessories, etc. - and we add to the list every single day.

ELKAN ELECTRONICS,
 FREEPOST, 11 Bury New Road, Prestwich, Manchester M25 6LZ
 or telephone 061-798 7613 (24 hour service)

DRAGON IN DERBY

SOFTWARE

Microdeal, Salamander, Cosma, Peaksoft, Dragon Data, Compusense, Romik, etc. See the new Telewriter Word Processor from Microdeal

ACCESSORIES

Joysticks, Printers, Dust Covers, Light Pens, Graphics Planners and coming soon - Disk Drives

BOOKS

From the beginner to the machine code programmer we have books to suit everyone

Come to the computer experts at:

FIRST BYTE COMPUTERS



FIRST BYTE COMPUTERS
 10 MAIN CENTRE
 LONDON ROAD
 DERBY
 Tel: DERBY 365280

Next to House of Holland

PRINT OUT



AMBER 2400 MATRIX PRINTER

LOW RUNNING COST USING
 PLAIN PAPER
 USED WITH MANY COMPUTERS
 INCLUDING BBC, UK101, ATOM,
 DRAGON, NEWBRAIN, ATARI,

£ 78

+VAT & £2.95 P&P
 Or for details send a
 large SAE to:

LETHABY NUMBERING SYSTEMS LTD.

Central Way
 Walworth Industrial Estate
 Andover
 Hampshire SP10 5AL



NEC PC8023 - the mechanism is designed on a strong metal chassis

◀ It prints up to 136 characters and down to 48 characters. Each ESC (code 27) code has a four to 10 line description of what the command does and in the back is a six-page Basic program to demonstrate all the possible modes. These include setting line spacing down to $1/144$ th of an inch, horizontal and vertical tabs, start position and graphics.

The character set has proper descenders and is very clear when printed on its 7×9 matrix (8×8 for graphics). The only problem might arise when programming some commands as the numbers for such things as tab settings and length of graphics bytes are given as decimal. So a setting between 0 and 999 would require three bytes to be sent, one for each number from 0 to 9.

The manual is clear, but brief on most subjects, the only pictures being at the beginning. It was obviously designed to work with NEC PC8000 series of computers and although noisy should last a long time and give good service. The only problem could be spares as everything on the printer is fairly unique and it could be superseded before it reached the end of its working life.

Epson RX80

The RX80 is the latest in a series of dot matrix printers from Epson. It and its brother the FX80 have now taken over the lead set by the MX80 and MX100. These cream boxes contain a very sophisticated printer for the price, with one of the best print qualities I have ever seen on any printer. The RX80 comes with only tractor feed from 3 to 10 inches with no option for friction-fed sheet paper or rolls.

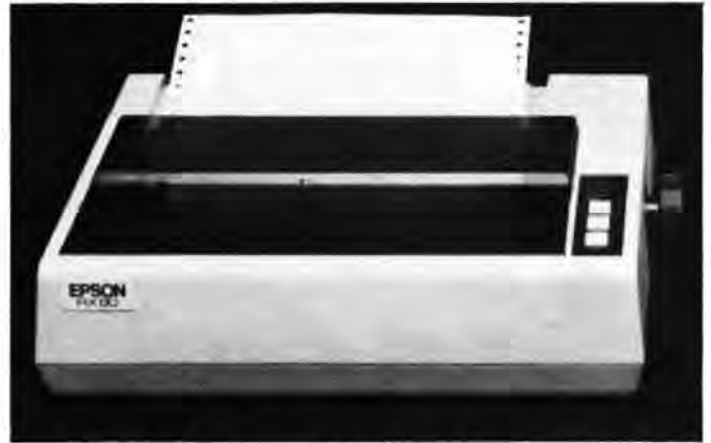
Again the printer setting up switches are buried inside the machine and page iii of the manual warns "the case should only be opened by a service person". Then after showing how to remove shipping screws, insert the ribbon cartridge (which

is as long as the machine is wide) and load the paper, it goes on to explain how to remove the top part of the case! This is not as easy as it looks and may have some people wondering if they are going to rip the case apart before getting the top off.

The settings allow you to change the character set, prevent the end of paper detector stopping the printer (to squeeze every inch out of the paper), CR and, if you want, HX20 graphics characters in the codes 128 to 159. Also it sets the print mode to condensed (132 characters a line) or pica (80 characters a line). The print mode can also be selected by software through the ESCAPE code sequences listed in the manual.

There are six different print modes and most of them can be mixed together to give multiple effects. For instance you can have enlarged, pica sized, italic or double struck characters. All characters have true descenders and when double strike is used the space between the dots printed by the print head is filled in by going over them again. This makes the print look like a fairly decent typewriter. The escape control codes all have a page or more explanation on them, with print examples and a program in Microsoft Basic to try them out. The characters can be printed in super or subscript (as in chemical formulae where tiny letters are mixed with normal ones), and the line spacing can be set to $n/216$ ths of an inch.

Vertical and horizontal tabs as well as form length can be specified, plus the margins on each side. There are 46 different escape commands including six different bit graphics modes. These allow you to draw pictures by specifying the individual dots on the printer. A good example of a computer 'photograph' is also shown in the manual to illustrate the point. The graphics require a lot of escape codes to use them, but you can mix text and graphics on the same line. The



Epson RX80 - six different modes and most can be mixed together

graphics *must* be done without the CR doing a LF, so it's back inside the machine to change the switch setting.

The print quality is excellent, even in the graphics mode which usually shows up errors in the print head movement. The print head can be replaced quite easily by unplugging it from the PCB socket under the platen and pulling the head from the travelling holder. This and general cleaning are all the maintenance required.

If you don't want friction fed paper and have the money, this is the printer to buy.

Epson FX80

The FX80 is more expensive than the RX80, but has all the same features, plus a lot of extras. There is a user definable character set of 255 characters, and 2K of RAM buffer (which allows the computer to be released from printing quicker) if you do not use the user definable characters. Proportional spacing is possible so you get what looks like joined up writing. A higher density graphics print mode, reverse line feeding, friction feed and tractor feed are standard, but the tractors are restricted to $9\frac{1}{2}$ to 10 inch wide paper unless you buy an optional extra. Unfortunately, the paper holders for friction feed are also optional extra.

At least the switches are under a cover which is easy to remove and change.

The RX and the FX80 both have a self test facility and also can dump all bytes received as hex on to the paper for fault finding. The printer has to be switched off before you can get back to text, however.

A smooth worker, the FX80 costs more, but some daisy wheels would have trouble reaching its quality.

Note that the prices quoted in the table are recommended retail excluding VAT. Street prices will be lower. Thanks to the manufacturers for supplying the printers, and to DRG Business Machines for the Seikosha model. ■

Printers reviewed: from £88 to £438

	Characters a second	Tractor	Friction	Dot matrix	Descenders	Maximum characters a line	Proportional spacing	Minimum line space	Price	Telephone contact
Amber 2400	18	No	Yes	5×7	No	24	No	$1/20$	£88	(0264) £5951
Seikosha GP100A	30	Yes	Option	5×7	No	80	No	$1/10$	£215	(0934) 415398
Olivetti JP101	77	Yes	Yes	7×7	No	147	No	$1/8$	£350	01-785 6666
NEC 8023	100	Yes	Yes	7×9	Yes	136	Yes	$1/144$	£395	01-388 6100
Epson RX80	100	No	No	9×9	Yes	137	No	$1/216$	£298	01-902 8892
Epson FX80	160	Yes	Yes	11×9	Yes	137	Yes	$1/216$	£438	01-902 8892

Dragon's giant strides

Tony Clarke talks to Graham Cunningham about Dragon Data's future as the company prepares to attack new markets at home and abroad.

WHEN YOU step into a taxi outside Port Talbot railway station, the driver says: "You must want Dragon Data." A lot of people want the Welsh company at the moment, both at home and in the US, as it expands the range of machines it offers.

By this time next year Dragon Data plans to be marketing four microcomputers, moving up gradually to attack the business market. The first step is the smallest one: a CPU swap for the Dragon 32 giving users 64K of RAM. But after that the steps get bigger and bigger: the Dragon 64 will be followed by a £400 machine and a £2,000 business model next year.

The guiding force behind these moves is managing director Tony Clarke — standing about 6 foot 4 inches tall he expects to be able to take them all in his stride.

A computer enthusiast as well as a businessman

One of the other striking things about Dragon Data's managing director is that he is an enthusiast as well as a successful businessman. While promoting the merits of the company's disk drive system he extols in detail the Western Digital controller chip it uses. Similarly conversation about the £400 machine moves into discussion of the NEC 7220 GDC.

And this enthusiasm spreads further than semiconductors. Talking of the business market, Tony describes network configurations and procedures to provide the

automated office of the future. This includes Mumps, a little known operating system which began life, as its name suggests, with medical applications but has moved into the business market on such machines as Digital Equipment minis.

Also covered are the virtues of easy to use systems such as Apple's Lisa and Xerox's Star incorporating mouse devices. These are desktop controllers which can be used to move items displayed on a screen. Microsoft, whose Extended Colour Basic is used on the Dragon 32, has recently introduced a mouse for use on its Multi-Tool word processing system.

And in the office outside his own sits a range of machines which he will take apart and examine. Elsewhere in the company various models — including micros, minis and computer-aided design systems — are being put through their paces in practical applications.

As far as the business goes, Tony has a personal stake in the success of Dragon Data. The company began life as a subsidiary of Mettoy in the spring of 1982. In November a consortium, including Tony, was formed to purchase the firm which moved to a new factory in south Wales. Since then Dragon Data has become the largest privately owned company in Wales, and is set to grow even faster as the new products are launched and new markets are attacked.

The summer launches—the CPU swap and the disk drive system — immediately move the Dragon 32 into new markets as they introduce the



Tony Clarke — introducing OS9 on the new Dragon Data disk drive system, and OS9 Unix-like operating system from American software house Microware.

This is a multi-user, multi-tasking system for small business users which has a very high reputation in the US — so high that some observers have suggested, tongue-in-cheek, that it is "too good" for home computers such as the Dragon. This hasn't prevented other micro manufacturers, such as Tandy and various Japanese firms, choosing it. Another British company, Positron, uses it on its £1,000+ 9000 system.

As a newer operating system it has less applications software available for it than

more established systems such as CP/M, but a lot of languages are already around, including Basic, Pascal and Cobol. C compilers are also available which provide a high degree of software portability across different languages.

Microware says that "OS9 combines the same friendly system interfaces found in Bell Laboratories' Unix operating system with an efficient, modular design that is eminently practical for use with an advanced 8-bit processor." And it adds: "In the future, there will be upward-compatible versions for the Motorola 68000 processor."



heading west

Microware software is already being used by a wide range of customers, including Eastman Kodak, General Electric, the National Aeronautics and Space Administration (Nasa) and the United States Navy. This is the kind of company Dragon Data is joining.

But not too many Dragon 32 users are expected to be interested in the disk drive system which costs under £300 at entry level and about £500 with two drives. Tony commented: "We think about 10 per cent of Dragon 32 owners will take the double drive option — more on the Continent."



Port Talbot's traditional employer, the steel mill, is struggling while Dragon Data thrives.

Demand abroad for the Dragon is strong and Tony says: "It is fast becoming the biggest selling home computer on the Continent." But he added: "It is a different market, with more home owners using the machine at work." He puts this down to labour costs being higher, so micros are used at work to provide information at little extra cost.

Consolidating the new operating system's launch

The introduction of OS9 will be consolidated with the launch of the Dragon 64 in September Tony is sure that "there is a demand for a small business computer that is relatively cheap" and that the 64 will meet this demand. He expects packages including the micro, a monitor and drives to sell for about £1,100.

The 64 will give 51 columns by 25 lines on the screen and will have an RS232 interface. The machine will involve a retailing change for Dragon Data — some 64s will be sold through high street chains like Boots, but more are expected to be sold by dealers as off-the-shelf systems.

An RS232 interface is also a feature of the American Dragons which will be launched this summer, costing about \$399, in partnership with Tano Corporation of New Orleans. Tony admits: "We're not expecting to sell millions in the US because there are a lot of machines at that price in the market."

But interest is already high. He took the Dragon 32 to an American computer show last

April and about 4,000 dealers made enquiries. Only 400-500 dealers will be involved initially, but this will go up to 1,500 as production rises from a starting figure of 2,000 a week.

The marketing strategy in the US aims to profit from the pricing wars being fought there by the main manufacturers. Tony commented: "We think dealers will be keen because they are losing their profit margins." He added that he expects to lure Commodore, Atari and Texas Instruments dealers.

Tano Corporation, which has 100,000 square feet of manufacturing space, was chosen ahead of five other companies. Its background is in marine automation systems, including a lot of experience using the 6809 chip on which the Dragon 32 is based. And Tano already sells another micro — an Apple look-alike designed in Holland and manufactured in Korea.

Among all this activity, Dragon 32 users are not being forgotten. While plans to launch a printer have been shelved, a cassette recorder guaranteed to work with the Dragon is due out this summer.

Tony explained that "a printer was not very likely at the moment" because good ones were available and the falling value of sterling was creating financial problems when buying from abroad.

Dragon Data's other machines will also be sold in the US. The £400 micro, so far without a name, will be a twin-6809 system stepping up the company's attack on the educational and business markets. In addition to OS9,

the intention is that it will run Flex, a longer established operating system which has more applications software available for it.

At £400 the machine is also aimed at the home user, offering improved Basic and high quality graphics. And it will break away from the Dragon 32 mould, looking different to previous machines.

While Tony agrees that there is an overlap between the machines discussed so far, he argues that each has excellent facilities in terms of value for money.

Aiming to achieve a high level of software portability

The appearance of next year's micro will again be different. Retailing at under £2,000, this will offer "a unique bus structure" giving a high level of software portability. Tony added that it will run "68000-based and 8086-based software either individually or both together".

This avoids the problem suffered by early 16-bit users who found themselves short of easily available software. A lot of the development work is already finished for this machine, which Tony expects to sell more of in the US than in the UK.

Dragon Data is expanding its present factory to cope with these plans and negotiating with the Welsh Development Authority for another site. While Port Talbot's traditional employer, the steel mill, is struggling, the microcomputer manufacturer down the road is thriving. ■



PROGRAMS FOR THE DRAGON 32

MONSTER MINE by W. E. MacGowan

Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. Price £7.95.

GOLF by Pete Allen

Over 20K of Basic giving you full 18-hole golf course with handicaps, choice of clubs. Golfing weakness must be specified. Full colour graphics and sound, including score card. Price £7.95.

SPACE MISSION by W. E. MacGowan

Launch from lurid base, flight your way through the asteroid belt to do battle with the enemy fleet. Multi-level space combat game, sets new standards in graphic excellence and attention to detail. Price £7.95.

CHARACTER GENERATOR by John Line

A program for the programmer, allowing creation and saving of character sets, shape tables and subsequent inclusion into users basic program. Demonstration program and full ASCII character set included. Price £9.95.

GAMES PACK I

SPACE WARS by John Line. A game for two scout ship pilots. SHEEPDOG by Erik Pattison. Pen the wayward sheep, if you can! TORPEDO by Erik Pattison. Sink the enemy fleet. SNAKE by Chris Hunt. Eat the food but not yourself. Price £7.95.

GAMES PACK II

LANDING by Peter Chase. A 3-part flight simulator. HANGMAN by Chris Hunt. The old favourite, with lots of words. SPEEDBOAT by Peter Chase. Hit the markers, but not the bank! BATTLESHIPS by C. Castle. A classic game, with a difference. Price £7.95.

GAMES PACK III

REVERSE! Pit your wits against the Dragon with this easy to learn yet extremely demanding game. Five skill levels from novice to grand master. PONTOON. An excellent implementation of a favourite card game in full colour with sound. Dragon is a mean Banker. Price £7.95.

AND MANY, MANY MORE

Please write or phone for details. All available by mail order from:

GEM SOFTWARE

UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS

Telephone: (0279) 723567

TRADE ENQUIRIES WELCOME - PLEASE RING FOR DEALER PACK
Access orders welcome

GRAVESEND HOME COMPUTERS

The one stop Dragon Shop for Dragons, printers, software, courses, books and backup, also available by mail order.

BABY DRAGON 1

Two programs. NUMBER MAN with variable level arithmetic. Stimulating colourful presentation. TEDDY BEARS, a counting and mental arithmetic game for the under 9s. Rescue the Honey Pots but keep the score. Full exploitation of Dragon Hi-Res graphics and speed. Educational programs need not be boring. £6.95

COLOR COMPUTER NEWS

The 6809 Journal from the USA. Packed with hints, tips and programs for Tandy Color and Dragon users. Single copies £2.45, Subs, 6 months — £14.00, 12 months — £26.00

GAMES TAPE 1 FROM ACTIVE SOFTWARE

8 full games, amazing 200K for £6.25.

WE DON'T SELL ASPIRIN BUT WE CAN CURE YOUR COMPUTER HEADACHES!

Pay us a visit.

If you need help — then just ask, courses available and basic program advice, holiday courses for children. Ask about our new DRAGON LADIES mornings.

All at

GRAVESEND HOME COMPUTERS
39 The Terrace, Gravesend DA12 2BA
Telephone 0474 50677



Are your finances driving you mad?

Do you find that working out your finances makes your head buzz? Do you see red?

Don't worry, now you can have Hilton's **Personal Banking System** on your side, giving you a clear head start and (hopefully) putting you back into the black!

Maintain permanent records and fully detailed statements of your finances including:

★ All cheque book transactions and bank receipts

★ All standing order payments **Automatically Processed**

(monthly, quarterly, six-monthly or annually and for set number of payments)

In addition the ability to search, locate, delete or correct previous entries. List by category facility is included. Additional **Bank Reconciliation** module available to automatically match your Bank Statement to your **Personal Banking System** account. Full instructions included and **guaranteed** after sales maintenance provided.

★ **PBS ZX81 £8.95 (16K)**

★ **ZX SPECTRUM £9.95 (48K)**

★ **DRAGON £9.95 (32K)**

Bank reconciliation (for use with above) £5.

Ask for the PBS at your local computerstore. ORDER by POST (specifying machine) OR at the POST OFFICE using TRANS-CASH ACCOUNT 302 9557



Hilton Computer Services Ltd
(Dept XX) 14 Avalon Road,
Orpington, Kent BR6 9AX

★ YOUR PBS IS NEVER OUT OF DATE ★

Let's face it — the sound from your Dragon 32 wouldn't win any prizes at an Eisteddfod. What you need is a:-

Dragon 32 SOUND EXTENSION MODULE

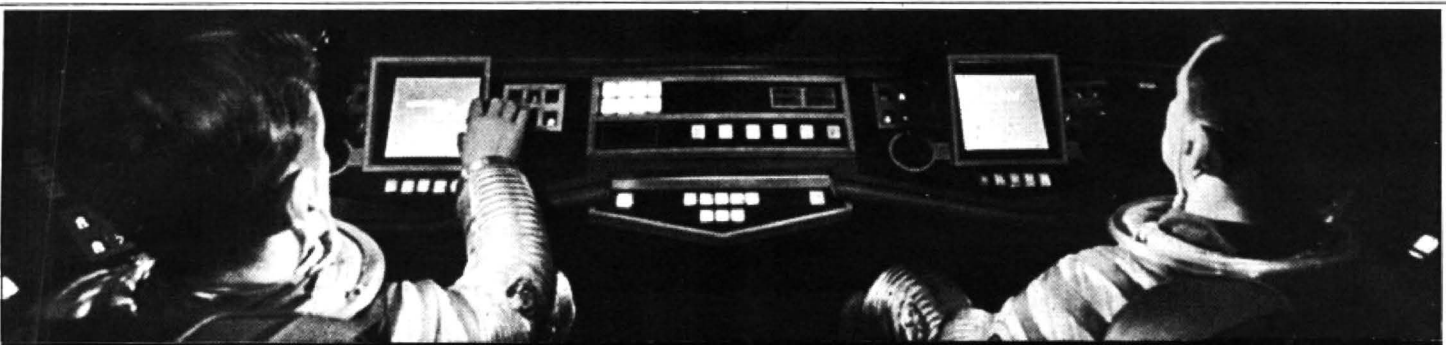
- Fully-cased module plugs into cartridge port
- Provides 3 channels of sound: 3-note chords and harmonies over 5 octaves
- Uses new BASIC command. No need to 'Peek' or 'Poke'
- Many built-in sound effects (e.g. bomb, laser)
- Music and graphics can occur together without loss of speed
- Based on popular, well-proven sound generator
- Two Input/output ports included
- User manual provided, with examples



Cheque/P.O. to
J.C.B. (MICROSYSTEMS)
29 SOUTHBOURNE ROAD
BOURNEMOUTH BH6 5AE
Tel: (0202) 423973

ONLY
£34.95
inclusive

Write or phone for further details



Blitz a landing space at speed

Clear the skyscrapers until you have space to land, using Dragon Blitz from **Damian Clancy**.

THIS IS A machine code game for the Dragon 32. You are in an aircraft flying low over New York with a limited supply of fuel. The aim is to bomb away the skyscrapers until there is a big enough space to land.

You have 50 bombs which you can drop using the enter key. You also have 15 lasers blasts to use. The laser clears a space — it is fired with the clear key.

You can move up using the up arrow

key, but each time you do this you use up one of your 50 fuel units. When you have cleared a large enough space to land, you can descend using the down arrow key.

The published listing must be typed in. When it is run it automatically puts the actual machine code into memory and deletes itself. You must then type in:

POKE 27,&H40

This allows the machine code to be saved

using the CSAVE command as if it was Basic.

This is more reliable than using CSAVEM and allows the machine code to be saved together with the short Basic controller program. It is advisable to save the original Basic program with the data because if any of the numbers are wrong the program will crash the computer when run.

```

1 DATA 86,32,B7,35,52,B7,35,56
2 DATA 86,0F,B7,35,57,86,3F,B7
3 DATA FF,23,10,8E,00,00,10,BF
4 DATA 35,53,10,8E,07,08,10,BF
5 DATA 35,58,8E,11,FF,86,AA,A7
6 DATA 82,8C,05,FF,26,F9,10,8E
7 DATA 01,12,1F,20,86,8C,1F,03
8 DATA 86,20,B7,04,10,8E,11,DF
9 DATA 1F,12,B6,04,10,E6,C6,86
10 DATA 69,C4,3F,5C,A7,20,31,AB
11 DATA E0,5A,26,F8,86,55,A7,20
12 DATA 30,01,7A,04,10,26,E1,8E
13 DATA 07,04,A6,00,81,AA,10,26
14 DATA 02,28,A6,88,20,81,AA,10
15 DATA 26,02,1F,A6,88,40,B1,06
16 DATA AC,10,26,02,15,8C,11,9F
17 DATA 10,2E,02,E2,34,74,0F,87
18 DATA 86,FF,8E,01,51,A7,80,8C
19 DATA 01,5A,26,F9,BD,BB,E5,35
20 DATA 74,81,5E,10,27,00,71,81
21 DATA 0A,10,27,00,96,FD,04,15
22 DATA 1F,10,C4,20,C1,00,10,27
23 DATA 00,89,B6,04,15,81,0D,10
24 DATA 27,00,98,81,0C,10,27,01
25 DATA 56,10,8E,35,53,10,8C,00
26 DATA 00,10,26,00,B4,86,5A,A7
27 DATA 00,86,6A,A7,1F,86,AA,A7
28 DATA 1E,86,56,A7,88,20,86,59
29 DATA A7,88,1F,86,AA,A7,88,1E
30 DATA 86,55,A7,88,40,86,55,A7
31 DATA 88,3F,86,AA,A7,88,3E,30

```

```

32 DATA 01,10,8E,35,58,31,3F,10
33 DATA 8C,00,00,26,F8,10,8E,07
34 DATA 08,10,BF,35,58,16,FF,52
35 DATA 8C,07,60,10,25,FF,AA,B6
36 DATA 35,52,81,00,10,27,FF,A1
37 DATA 7A,35,52,86,AA,A7,1F,A7
38 DATA 1E,A7,88,1F,A7,88,1E,A7
39 DATA 88,3F,A7,88,3E,30,88,80
40 DATA 16,FF,86,86,AA,A7,1F,A7
41 DATA 1E,A7,88,1F,A7,88,1E,A7
42 DATA 88,3F,A7,88,3E,30,88,60
43 DATA 16,FF,6E,10,8E,35,53,10
44 DATA 8C,00,00,10,26,FF,62,B6
45 DATA 35,56,81,00,10,27,FF,59
46 DATA 7A,35,56,1F,12,10,BF,35
47 DATA 53,86,0F,B7,35,55,10,8E
48 DATA 06,A4,10,BF,35,58,16,FF
49 DATA 40,10,8E,35,53,86,AA,10
50 DATA 8C,11,DF,10,2E,00,2A,A7
51 DATA 20,A7,AB,20,31,AB,40,A6
52 DATA AB,20,81,AA,26,30,86,88
53 DATA A7,20,86,A2,A7,AB,20,A7
54 DATA AB,40,10,BF,35,53,10,8E
55 DATA 06,A4,10,BF,35,58,16,FF
56 DATA 14,86,AA,A7,20,A7,AB,20
57 DATA A7,AB,40,10,8E,00,00,10
58 DATA BF,35,53,16,FE,FF,C6,0A
59 DATA 34,04,86,40,B7,FF,24,C6
60 DATA 64,5A,C1,00,26,FB,4F,B7
61 DATA FF,24,C6,64,5A,C1,00,26

```

Continued on page 27

MONSTER SOFTWARE CLUB SOFTWARE LIBRARY FOR THE DRAGON 32

OVER 70 TOP-QUALITY CASSETTES FOR HIRE. ALL TAPES USED WITH THE MANUFACTURERS PERMISSION (WE PAY ROYALTIES)

ANNUAL MEMBERSHIP FEE £8.00
Tape hire £1.50 per fortnight plus 40p p & p (this includes a pre-paid return envelope)

SPECIAL TRIAL OFFER
3 months membership for just £3.00

PLEASE NOTE: Two tapes may be hired at the same time
Further tapes by return post

SAE for details

MONSTER SOFTWARE CLUB
32 LENNOX DRIVE, LUPSET PARK
WAKEFIELD, WEST YORKS

DRAGON USERS

YOU NEED OUR MENU-DRIVEN

PROFESSIONAL FILE HANDLER

PRO-FILE[®] only £9.95

Create, edit, delete, update, etc. your own personal files if you need to keep records then Pro-file[®] will do it for you. If you don't understand files then Pro-file[®] will teach you. Not just a cassette but a complete learning package for the amateur who wants to be professional.

EDUCATIONAL SOFTWARE only £4.95 each

Spelling (Improver 9/99 yrs)
Arithmetic (Practice 7/11 yrs)
Reasoning (11+ revision)
Physics (O Level revision)

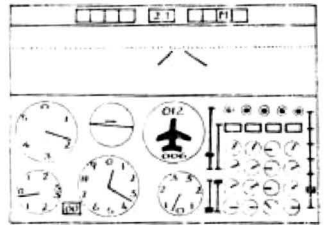
Tables (Practice 7/11 yrs)
Knowledge (Quiz 9/99 yrs)
Maths (CSE revision)
Biology (O Level revision)

MICRO-DE-BUG CONSULTANCY 60 Sir Johns Road, Selly Park
OVERSEAS ORDERS WELCOME Birmingham B29 7ER

DRAGON/32 BBC MODEL/B TRS80 C/C 32K

747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in lifelike simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 25 other indicators (see diagram). Your controls operate throttle, ailerons, elevators, flaps, slats, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joysticks and includes options to start with take-off or random landing approach. "A real simulation, not just another game" (Your computer April 19 83).



Cassette £9.95 (pp and VAT included):

D.A.C.C. Ltd. (Dept. D.U.)

23 Waverley Road, Hindley, Greater Manchester WN2 3BN.

M & J SOFTWARE

DRAGON COMPANION BOOK £4.95

Study the workings of BASIC with the disassembler
Discover seven extra graphics modes
Take complete control of video memory mapping
Increase the processor speed (not a hardware mod)
Append programs from tape
Incorporate useful routines from BASIC in your machine programs
Add commands to BASIC

DRAGON IMPLEMENTATION OF FORTH £10.00

This is a cassette based implementation and is fully documented

FORTH LISTINGS £7.00

6502, 8080 Z80, 6809, 6800, 1802, 8086 8088, 68000 PDP 11 in stock

INSTALLATION MANUAL £5.00

Necessary for implementing FORTH and its editor

All prices inclusive of postage and packing
Cheques and POs made payable please to:

M & J SOFTWARE

34 Grays Close, Scholar Green, Stoke-on-Trent ST7 3LU
Tel: (0782) 517876

Dealer enquiries welcome

DRAGON SOFTWARE all machine code

BONKA

ADDICTIVE Arcade style game in full colour. Climb the ladders and dig holes to trap the "Meanies" before they kill you. 4 selectable speeds and choice of 1 to 9 meanies to start. NO JOYSTICKS NEEDED.

SUPPLIED ON CASSETTE £7.95

DGT2

THREE Fast-moving Arcade style games in full colour, with Hi-Res graphics and sound. "Very addictive" any single one of these is worth a liver, so £6.95 for all 3 is a bargain! (From PCW review) SNAKES, LANDER & INVADERS. (No joysticks)

3 ON ONE CASSETTE £6.95

EDITOR/ASSEMBLER + MONITOR

Two Pass Global type. Supports standard Motorola mnemonics and Addressing modes. Powerful Debug Monitor. Recommended for the serious user.

SUPPLIED ON CASSETTE WITH USER INFORMATION £28.75

DISASSEMBLER

Written in position Independent Machine Code, will run anywhere in RAM. The ideal tool to have around.

SOLD ON CASSETTE £11.85

SPECIAL OFFER

Buy Editor Assembler and Disassembler together and save £5.60.
Cost of both as one purchase £35.00

Cheques/POs payable to

J. MORRISON (MICROS) LTD

(Dept DU1)

2 Glensdale Street, Leeds LS9 9JJ

Tel: (0532) 480987

ALL ORDERS DESPATCHED BY

RETURN FIRST CLASS POST

Callers and Trade enquiries welcome

J. MORRISON (MICROS)

DROIDS — NEW (OPTIONAL JOYSTICK)

Stop the Droids removing lead shields to release the bombs which will destroy the world. Very fast game. Excellent Hi-Res colour graphics and sound.

SUPPLIED ON CASSETTE £6.95

CHESS

Hi-Res display of board and pieces. 8 selectable levels of skill. CURSOR control move selection (No numbers/letters to enter). Supports CASTLING AND EN PASSANT.

SUPPLIED ON CASSETTE £7.95

VULTURES — NEW (uses one joystick)

FAST MOVING GALAXIAN TYPE GAME in full colour with Hi-Res graphics and sound. A flock of vultures guard their eggs. As they swoop towards you try to kill them, but watch out. Just when you think you have killed them all, the eggs hatch!

SUPPLIED ON CASSETTE £6.95



DRAGON 32 SOFTWARE



DRAGON CHESS

- ★ Six levels of play.
- ★ All legal chess moves including en-passant, castling and pawn to queen promotion.
- ★ List of previous moves which can be displayed or printed.
- ★ Loading and saving of games positions from tape.
- ★ High resolution graphics which can be flipped round to make black or white play from either end.
- ★ Simultaneous text and graphics.
- ★ Sides 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 at any point.
- ★ Change level of play at any point in the game.
- ★ Will adjudicate game between humans.
- ★ Very high standard of play.



DRAGON FORTH 4th

- ★ Superset of standard Fig Forth.
- ★ Basic statements can be included in Forth programs to allow full access to the colour graphics, sound, string and floating point commands.
- ★ Full editor.
- ★ Forth code is at least 10 times faster than Basic and uses less memory.
- ★ Programs written in Fig Forth may be marketed by the author.
- ★ 60 page easy to read manual.
- ★ Complete with free demonstration program.

DRAGON 3D O's & X's 3D

- ★ Excellent game of logic.
- ★ 64 possible winning lines.
- ★ 4 plane board display.
- ★ Selectable start option.
- ★ Almost impossible to beat.

PROFESSIONAL PACKAGING AND LIFETIME GUARANTEE

Dragon Chess £14.95
Dragon Forth £18.95
Dragon 3D O's & X's £ 6.95

DEALER ENQUIRIES WELCOME

All prices include VAT + P&P

OASIS SOFTWARE

Lower North Street, Cheddar, Somerset.



ACCESS ORDERS
TAKEN BY PHONE
24 HOURS A DAY



0934 515265



```

62 DATA FB,35,04,5A,C1,00,26,E0
63 DATA CE,01,F4,FF,35,58,7A,35
64 DATA 55,B6,35,55,81,00,10,26
65 DATA FF,9C,86,AA,A7,20,A7,AB
66 DATA 20,A7,AB,40,10,8E,00,00
67 DATA 10,BF,35,53,16,FE,B6,B6
68 DATA 35,57,81,00,10,27,FE,A1
69 DATA 7A,35,57,86,00,A7,01,A7
70 DATA 02,A7,03,A7,04,A7,05,10
71 DATA 8E,00,FA,C6,14,F7,3F,8C
72 DATA 7C,37,8C,F6,37,8C,5A,C1
73 DATA 00,26,FB,86,40,B7,FF,24
74 DATA F6,37,8C,5A,C1,00,26,FB
75 DATA 86,00,B7,FF,24,31,3F,10
76 DATA 8C,00,00,26,DB,86,AA,A7
77 DATA 01,A7,02,A7,03,A7,04,A7
78 DATA 05,A7,88,21,A7,88,22,A7
79 DATA 88,23,A7,88,24,A7,88,25
80 DATA A7,88,41,A7,88,42,A7,88
81 DATA 43,A7,88,44,A7,88,45,16
82 DATA FE,37,2D,00,00,00,31,0E
83 DATA 07,08,10,8E,12,00,A6,A2
84 DATA 81,69,10,27,00,BE,81,55
85 DATA 10,27,00,BD,86,55,A7,20
86 DATA 10,8C,06,00,26,E8,30,88
87 DATA DF,86,FF,A7,00,A7,88,1F
88 DATA A7,88,20,A7,88,21,A7,88
89 DATA 3D,A7,88,3E,A7,88,3F,A7
90 DATA 88,40,A7,88,41,A7,88,42
91 DATA A7,88,43,A7,88,5F,A7,88
92 DATA 60,A7,88,61,A7,89,00,80
93 DATA C6,3C,10,8E,00,01,10,BF
94 DATA 37,8C,1F,98,84,07,81,00
95 DATA 26,03,7C,37,8C,10,BE,37
96 DATA 8C,31,3F,10,8C,00,00,26
97 DATA FB,86,40,B7,FF,24,10,BE
98 DATA 37,8C,31,3F,10,8C,00,00
99 DATA 26,FB,4F,B7,FF,24,5A,C1
100 DATA 00,26,CF,86,EF,10,8E,06
101 DATA 00,A7,A2,10,8C,04,00,26
102 DATA FB,10,8E,04,C9,86,19,A7
103 DATA A0,86,0F,A7,A0,86,15,A7
104 DATA A0,86,80,A7,A0,86,03,A7
105 DATA A0,86,12,A7,A0,86,01,A7
106 DATA A0,86,13,A7,A0,86,08,A7
107 DATA A0,86,05,A7,A0,86,04,A7
108 DATA 20,16,01,2B,86,14,16,FF
109 DATA 45,86,00,16,FF,40,34,12
110 DATA 8E,04,00,86,60,A7,80,8C
111 DATA 06,00,26,F9,35,12,10,8E
112 DATA 04,C9,86,59,A7,A0,86,4F
113 DATA A7,A0,86,55,A7,A0,86,60

```

```

114 DATA A7,A0,86,4C,A7,A0,86,41
115 DATA A7,A0,86,4E,A7,A0,86,44
116 DATA A7,A0,86,45,A7,A0,86,44
117 DATA A7,A0,86,61,A7,20,31,AB
118 DATA 36,86,46,A7,A0,86,55,A7
119 DATA A0,86,45,A7,A0,86,4C,A7
120 DATA A0,86,60,A7,A0,86,4C,A7
121 DATA A0,86,45,A7,A0,86,46,A7
122 DATA A0,86,54,A7,A0,86,7D,A7
123 DATA A0,31,AB,16,86,42,A7,A0
124 DATA 86,4F,A7,A0,86,4D,A7,A0
125 DATA 86,42,A7,A0,86,53,A7,A0
126 DATA 86,60,A7,A0,A7,A0,A7,A0
127 DATA A7,A0,86,7D,A7,20,10,8E
128 DATA 05,14,86,08,B7,37,4D,F6
129 DATA 35,52,4F,7F,37,4E,78,37
130 DATA 4E,58,49,81,0A,25,05,80
131 DATA 0A,7C,37,4E,7A,37,4D,26
132 DATA ED,8B,70,A7,20,B6,37,4E
133 DATA 8B,70,A7,3F,B6,08,B7,37
134 DATA 4D,F6,35,56,4F,7F,37,4E
135 DATA 78,37,4E,58,49,81,0A,25
136 DATA 05,80,0A,7C,37,4E,7A,37
137 DATA 4D,26,ED,8B,70,A7,AB,20
138 DATA B6,37,4E,8B,70,A7,AB,1F
139 DATA 10,8E,98,58,EC,20,84,00
140 DATA C4,1F,1F,01,86,40,B7,FF
141 DATA 24,E6,20,5A,C1,00,26,FB
142 DATA 86,00,B7,FF,24,E6,20,5A
143 DATA C1,00,26,FB,30,1F,8C,00
144 DATA 00,26,E1,31,21,10,8C,98
145 DATA BC,2D,D1,20,02,12,12,10
146 DATA 8E,05,C8,86,41,A7,A0,86
147 DATA 4E,A7,A0,86,4F,A7,A0,86
148 DATA 54,A7,A0,86,48,A7,A0,86
149 DATA 45,A7,A0,86,52,A7,A0,86
150 DATA 60,A7,A0,86,47,A7,A0,86
151 DATA 41,A7,A0,86,4D,A7,A0,86
152 DATA 45,A7,A0,86,60,07,0A,86
153 DATA 7F,A7,A0,39
500 A=&H32CB
510 READ A$:POKE A,VAL("&H"+A$)
:A=A+1
520 IF A<&H378C THEN 510
530 DEL-530
1000 PMODE1,1:PCLS
1010 SCREEN 1,0
1020 EXEC 13000
1030 SCREEN 0
1040 A$=INKEY$:IF A$=""THEN 1040
1050 IF A$="Y"THEN 1000
1060 END

```



CHAMPIONS!

The smash hit
FOOTBALL GAME

for the

DRAGON 32

available on cassette for

£6.95

by return of 1st class
post from

PEAKSOFT

7 HAWTHORN CRESCENT
BURTON-ON-TRENT
(0283) 44904

**COULD YOU BE THE
NEXT BRIAN CLOUGH?**

Take your team from the 4th Division to the European Cup! Features 4 divisions, promotion, relegation, transfers, injuries, suspensions, weekly results and league tables, reserve team, crowd trouble, and all the fun, drama and frustration of managing a league club.

If you don't give two hoots for football, you'll be hooked. If you're a fan, you'll be playing all night! One of the most entertaining games currently available — it's the one that we play!

DEATH'S HEAD HOLE £5.45 — The television crews are assembled at the entrance and your mother has sold her story to *The Sun*. The eyes of the nation are on you! Face the terrors of a Mendips pothole as you lead a mission of mercy to rescue a party of frightened cavers. The realism is astounding! "Breaks new ground in home computer simulations" — *Dragon's Teeth*. "Very realistic and enjoyable . . . challenging and fun . . . recommended to all role players" — *Popular Computing Weekly*.

LIONHEART £5.45 — Unique, two-part romp. Arcade-style action as you assemble your army, pursued by the ruthless Prince John, switches to colourful graphics adventure as you land in the Holy Land to mount your Crusade against the Sultan Saladin.

DON'T PANIC! £3.45 — Two classic adventures at an incredible price, to launch our new Bargain Bytes series. Features Towers of Death and The Ice Kingdom. Villains and hazards galore.

HANG IT! £5.45 — 1,000 (yes, 1,000!) posers on British place names in this family word game. Set your own problems option.

All prices include post and packing. We GUARANTEE same day despatch by first-class post. Clip the coupon, or simply note your name, address and programs required on the back of your cheque.

Please send me

Name

Address

● IMMEDIATE DELIVERY ●

COMPUNTA

RACING FORECASTER

A tried and tested program.

Simple to use — no records to update.

Tape contains data for flat races at any of 34 principal courses.

High success rate.

DRAGON 32, SPECTRUM 48K, TANDY COCO 32K,
ZX81 16K

Only £4.95 inclusive

RED ROM DATA

72 LAMBERT ROAD, GRIMSBY DN32 0NR

ZX81, SPECTRUM, DRAGON
BBC AND VIC

SOFTWARE LENDING LIBRARY

We have for hire from 50p (including postage) programs for your computer.

£5 for life membership (less than the cost of a single game) brings you the Software Lending Library membership kit including catalogue, newsletter.

Program of the month: Pimania.

All tapes lent with full manufacturer's permission.

Send a cheque or postal order for £5 to **Software Lending Library**, PO Box 3, Castleford, West Yorks, stating name, address, and computer type.

FOR A LOT OF FUN ON YOUR DRAGON JOIN OUR CLUB

Members' program listings, competitions, special offers, jokes and snippets of news and comments.

We have a vast selection of games, utility and business software . . . Over 100 titles currently in stock!

THE STACOM TOP 10

Donkey King (Microdeal)	Wizard War (Salamander)
Planet Invasion (Microdeal)	Golf (Salamander)
Telewriter (Microdeal)	Pimania (Automata)
Strategic Command (Romik)	Chess (Dragon Data)
Warlord (Lothlorien)	Banking/Bank Rec. (Hilton)

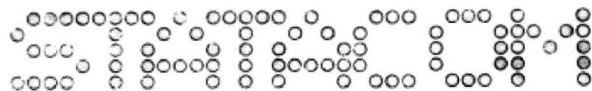
Also: DEMON, DASM and DECODE from Compusense.

NEW TITLES: Cosmic Zap, Galactic Ambush, Talking Android Attack, Ring Of Darkness and more on the way!

PRINTERS: Oki Microlines a speciality, also Epsoms & Seikoshas.

MONITORS: Portatel's Luxor colour monitor/TV (14").

ACCESSORIES: Printer/monitor cables, dust covers and "The Plug".



AMERICAN EXPRESS



DINERS CLUB

STACOM LIMITED

234 HIGH STREET,
SUTTON, SURREY SM1 1NX

Telephone/Mail Orders welcome.

01-661 2266

Play golf

Learn how to make the most of the Dragon's graphics commands by playing **Philip Brooks'** game of golf.



THIS PROGRAM IS a simulation of a round of golf for up to four players. Over the first nine holes, the last nine or all 18 holes each player takes a turn at controlling an individually coloured figure to drive a ball from the tee to the green and then into the hole. Hazards include rough, bunkers, trees and water. Each player's score is updated and displayed at the end of his turn.

The program begins by requesting details of the number of players taking part, and whether they wish to play the first nine, the second nine or all 18 holes. It then calls for the first player, and displays details of the hole to be played, including its length. The display then changes to a high-resolution map of the fairway, bounded by the rough (the red area). Lakes and streams are drawn in blue, bunkers are solid yellow areas, trees are yellow with red trunks (!), and the green is a hollow yellow circle with somewhere in it a flag. The position of the flag changes each time the game is played. The ball is shown as a yellow spot, and somewhere near the ball is a figure, coloured differently for each player.

The figure may be moved around the display, passing in front of the hazards, by means of the joystick control. Incidentally, despite what it says in the Dragon handbook, my machine interprets JOYSTK(0) and JOYSTK(1) as referring to the *right* joystick. When the figure is near the ball and is stationary it produces a club and 'addresses' the ball. The club will flash alternately blue and yellow, so that it can be seen against any background. The position of the figure can then be adjusted until the club just covers half of the ball, and the shaft of the club is at a right angle to the direction the ball is to go in, remembering that the club is always swung anti-clockwise to strike the ball.

The backswing is begun by pressing the joystick firing button. The figure then 'winds up' one notch at a time until the button is released, or until it reaches the full swing of twenty 'notches'. It then swings and strikes the ball. A full strength swing from the fairway normally travels about 200 yards, plus or minus anything up to 40 yards, though just occasionally a

shot falls considerably shorter. It is important to remember that the fairway maps are not all drawn to the same scale, and the hole length displayed at the start of each turn gives an indication of how far across the screen a shot is likely to go. A shortened backswing produces a proportionally shorter shot. If the ball is not correctly addressed then a hook or slice shot may result, the ball travelling off line and with reduced carry. If the club head does not contact the ball then an 'air shot' results and the ball won't move.

In flight the ball passes over lakes and bunkers, and through the tops of trees. Over yellow background areas it changes colour so that it may be seen. If it enters the rough it stops immediately, and must be played directly back on to the fairway. If it strikes the trunk of a tree in its flight then it may bounce off in almost any direction, or continue its flight.

If, at the end of its flight, the ball is over water it disappears in a circle of ripples. After the figure has shown his displeasure the ball reappears on the bank on the side from which it entered, and the player's score is increased by one penalty stroke. If the ball lands in the top of the tree it drops vertically for a short distance until it is clear. When the ball finally comes to rest if it is in or close to a yellow area of the map it changes colour to blue. The figure is then repositioned to be close to the ball for the next shot. This procedure is omitted if the ball is already close. A shot from the rough is subject to considerable variation in its distance of travel. Shots from a bunker are also unpredictable to a certain extent, and may, on occasions, not move at all.

On the green

Eventually, the ball lands on the green. The display then changes to show a circular green, the hole, the figure and the ball. The ball can now be putted into the hole. It is possible to hole out directly from off the green, but I have never yet managed it. There are no random factors in putting, all greens are to the same scale and all putts are predictable (eat your heart out, Jack Nicklaus). Slice and hook shots are still possible, however, and if the ball is struck too firmly it will overrun the hole. If

the ball is played off the putting surface then the display reverts to the fairway map and the ball must be chipped back on to the green.

When the ball is finally holed the player's score for the hole is displayed, and, if more than one hole is completed, his running score. The next player is then called, and the fairway map reappears. After each player has completed the hole the entire procedure is repeated for the next hole, and so on until the end of the game, when a full list of total scores is displayed.

A complete listing of the program is printed with this article. It loads in about 12K of memory, and when running leaves about 1.5K free. By deleting REMs and spaces it should be possible to create enough room for additional routines. Some ideas that come to mind are a handicapping system or a dance of joy and a fanfare for a hole in one!

The rather complex routine by which the figure is moved over a varying background without flicker makes full use of the Dragon's graphics commands. Both the high-resolution memory areas available in MODE 3 are employed, with the picture stored in one being displayed while the other is modified. For the purposes of the following, I shall refer to the memory area called by PMODE 3,1 as area 1, and that called by PMODE 3,5 as area 2.

After initialisation and introduction routines, control passes to the 'player count' loop starting at 4000. A message is written to the text screen, giving details of the next hole and player. While this is displayed subroutine 6500 is called. This draws the figure in the player's colours and stores it in arrays BD, WL and SL (body, walking leg and standing leg). Lines 4110 to 4250 now draw the fairway map in area 1. Line 4260 calls subroutine 100, which copies area 1 into area 2, so that both areas contain the fairway map minus the figure. Control then passes to line 1000.

Line 1000 switches the display to high-resolution area 1, which contains the fairway map. Before the figure is PUT into position, line 1020 stores the details of its background in arrays B1, B2 and B3. The figure, made up of BD and two copies of SL, is positioned. Lines 1010, 1070 ►



TIGER SOFTWARE DRAGON SOFTWARE

THE TIGER GRAND PRIX

Soon to become available, more subject areas for use with the Tiger Grand Prix and a sister program that will allow you to adapt the Tiger Grand Prix to your own specific requirements so that it can be used for any age and ability, even adults.

Tiger proudly announce the first of a new exciting range of educational software. Designed by experienced teachers and already approved by top educationalists, the Tiger Grand Prix re-imposes all areas of learning in a fun and exciting way. For one or two players it is a race to the end, if the gremlins don't catch you first! Full sound and colour with superb entertaining graphics, continuous scoreboard etc. Subject areas cover Maths, English, General Knowledge and Fun Quizzes for all ages and abilities to the age of 16+ (later to be expendable). Supplied on cassette containing **10 minutes** of quality software (normally you are lucky to get two minutes of any other type of software!) Joysticks not required ... **£7.95.**

MISSILE DEFENDER

Undoubtedly the finest adaptation of Missile Command available for the Dragon. Save the world if you can! Superb graphics, authentic sound, continuous score. Hi score and laser energy displays. Detailed scoreboard after each round. Five difficulty levels from easy to near impossible! "More colourful than Microdeal's Defense, with cities wall to wall, any missile getting through is certain to zap you" ... *Dragon's Teeth.*

Joysticks required ... **£5.75**

Dealer enquiries welcome. Please add 50p P&P

TIGER SOFTWARE

63 Devonshire Street, Monkwearmouth, Sunderland, Tyne & Wear
Tel: (0783) 484592

TYPEWRITER CENTRES



for HOME COMPUTERS

COMMODORE 64

ORIC-1

DRAGON 32

VIC20



SINCLAIR ZX81 and SPECTRUM 16K A 48K

LARGE SELECTION OF PRINTERS etc.
SOFTWARE, GAMES — BUSINESS —
EDUCATIONAL
TYPEWRITER CENTRES

BIRMINGHAM 52-53 Bromsgrove Street tel. 021-622 5385 7	BIRMINGHAM 92-94 Dudley Road (opp. Dudley Rd. Hospital) tel. 021-455 9111	SUTTON COLDFIELD Knights House Gracechurch Centre tel. 021-355 6789
ERDINGTON 52 High Street tel. 021-382 0185	WALSALL 7 Leicester Street tel. 92 27589	KING'S HEATH 46 High Street tel. 021-444 7349
COVENTRY 128 Far Gosford Street tel. 0203 28799	LEICESTER 34 Rutland Street tel. 0533 538745	WOLVERHAMPTON 68 Worcester Street tel. 90 27627
BOURNEMOUTH 75 Seamoor Road Westbourne tel. 0202 766997	All our branches OPEN ALL DAY SATURDAY	Access and Barclaycard welcome. Instant Credit also available

WEST DEVON ELECTRONICS

STATION ROAD, HORRABRIDGE,
YELVERTON, DEVON (0822) 853434

DRAGON APPOINTED SERVICE CENTRE

DRAGON 32 **£169.90**

Incl. VAT

DRAGON DISC DRIVE

COMPLETE **£269.00**

Incl. VAT

SEND FOR LIST OF OTHER
DRAGON ITEMS, SOFTWARE, ETC

FREE POSTAGE AND PACKING

Wizard Software

FOR THE DRAGON 32



SMASH

£7.00

A super "break out" type game in high resolution graphics. Features include a demonstration mode, 9 bat angles and walls of increasing difficulty from a single wall up to a full three walls. Continuous display of score, best score and balls remaining. RECOMMENDED BY THE MICROCOMPUTER SOFTWARE CLUB.

ALIENS +

£7.95

A machine coded Arcade game presented in high resolution graphics. Features 48 invaders, mother ship, 4 defenders per wave, 4 shields + bonus shields. Continuous display of score during game.

DRAGON STARTREK

£8.45

A real-time version featuring a 10x10 galaxy, shield control, photon torpedoes, status reports, signals received, galactic search, scanner control, warp drive, star bases with docking, black holes, planets and planet landfall, pulsars, novas, stars, asteroids, meteors, shuttles and shuttle docking, automatically converging and attacking Klingons. Four levels of difficulty, comes with instruction manual.

All prices inclusive, mail order, cheques or postal orders to:

WIZARD SOFTWARE, DEPT DU, PO BOX 23
DUNFERMLINE, FIFE, KY11 5RW

Also available from software retailers
Send large SAE for full program catalogue
Royalties paid for superior quality DRAGON software

◀ and 1080 are relevant if the fairway has been drawn as a result of the ball leaving the putting green. Lines 1100-1230 sample the joystick and process the values returned into acceptable incremental values for the figure position co-ordinates. Among the test in lines 1240-1260, line 1250 tests that the joystick is not centred, ie that the figure must move.

If the joystick is not centred, subroutine 1300 is called. While area 1 is still displayed, area 2 is modified as follows. The background arrays are PUT into their original positions, blanking out the figure. Line 1320 then stores the background to the new position in these arrays, and the figure is then PUT into its new position (lines 1330-1360). As an added refinement, one of its legs is raised as though walking. WK in line 1330 is used to ensure that alternate legs are raised each time the subroutine is called.

With the figure finally in its new position, but not yet displayed, line 1370 calls subroutine 110, which copies this revised picture almost instantaneously into area 1, the display. After a short pause the raised leg is lowered by PUTting SL into both leg positions (line 1390). The running co-ordinates of the figure position are then updated, and the program returns to the joystick sampling loop.

Line 1240 can provide an alternate subroutine to append to this loop. If the figure is close to the ball, and the joystick is centred, then subroutine 1500 is called.

Lines 1500-1550 are concerned with drawing the club in the right direction and with constant length, with the colour alternating at each pass. The club is drawn in line 1550 and after a short delay is blanked out by subroutine 110. This is preferable to a simple PRESET as it restores the club background to its original colour or colours, instead of leaving a line in whatever is the current background colour (usually

green). Control then returns to the joystick loop.

Line 1260 provides the only exit from this loop. If the joystick fire button is pressed then control jumps to line 1600, and the backswing commences. The number crunching in lines 1600-1650 determines the angle the club is being presented at, with 0 being straight up. The backswing routine is similar to the club drawing routine, except that at each pass the values of CX and CY are recalculated from the angle AN, which increases by PI/12 each time. The previous club is blanked out by subroutine 110, and the new club is drawn, normally in yellow unless the club head coincides with a yellow area, when it is drawn blue.

Backswing

The 'shot distance' counter SD and the swing counter SW are both incremented, after which lines 1800 and 1810 check for the end of the backswing. At the end of the backswing the distance between the shaft end and the ball is checked. If this is greater or less than the length of the club the ball angle AB and shot distance SD are modified to produce 'hook' or 'slice'. Shots from the fairway, rough or bunkers are further modified by lines 1890-1920. The swing routine is a repeat of the backswing, except that the magnitude of the steps is increased and their number decreased, although note the addition of a constant to the count to provide 'follow through'.

At the end of the swing line 2080 tests for an air shot. If one is found then the player's score is increased and control returns to the 'figure movement' routine, if not then the ball is blanked out and the loop at 3000 is entered. This moves the ball in steps across the screen, checking the background colour and if necessary adjusting the colour of the ball. When on the fairway map a check is also made in

line 3070 that the ball is not in the rough or has hit a tree. On the green the check at 3090 is that the ball has not left the green.

When line 3070 detects that the ball is in a red area the program jumps to 3300. Lines 3300-3320 check for striking a tree. If no tree is struck then the ball is in the rough and control is passed to the 'figure movement' routine. If a tree is struck, and it is the first time this has happened this shot, then the ball angle AB and shot distance SD are altered randomly, and the program loops back to 3000. The ball angle is modified in such a way that the ball can never rebound in the direction of the figure. Having the ball come to rest in the figure's midriff could be disastrous!

When the ball finally comes to rest several checks are made. These are all documented within the listing, and should be self explanatory. With the ball successfully in the hole the player's score and running score are displayed before the next player is called.

The program run begins with the by now familiar POKE 65495,0 to increase running speed. This has the effect of tying up the input/output circuitry, and programs can be neither loaded or saved until it is reset, either by the reset button or by POKE 65494,0. If you break out of the program before the end don't forget to reset before trying to load another program. It is probably advisable to replace line 6000 with a REM until loading and debugging is completed. It is very easy to save an amended program on tape, then discover later that you have overlooked the reset and recorded a load of garbage over your only copy! I speak from bitter experience.

If the prospect of all this keyboard bashing puts you off, I can supply the program on tape for £3. If you have any comments, or queries, I shall be pleased to have them. My address is: 104 Bargates, Leominster, Herefordshire HR6 8QT. ■

```

10 REM **golfr**
20 REM **COPYRIGHT P.P.BROOKS**
30 GOTO 4000
100 FOR N=1 TO 4: PCOPY N TO N+1: NEXT N: RETURN
110 FOR N=1 TO 4: PCOPY N+1 TO N: NEXT N: RETURN
999 REM **place figure**
1000 PHOE 3,1: SCREEN 1,0
1010 IF BF<3 AND BG<3 THEN GOSUB 7500
1020 GET (NX,NY)-(NX+9,NY-18),B1,G: GET (NX,NY+1)-(NX+2,NY+8),B2
,G: GET (NX+7,NY+1)-(NX+9,NY+8),B3,G
1030 PHOE 3,1
1040 PUT (NX,NY)-(NX+9,NY-18),B0,PSET
1050 PUT (NX,NY+1)-(NX+2,NY+8),SL,PSET
1060 PUT (NX+7,NY+1)-(NX+9,NY+8),SL,PSET
1070 IF BF=3 OR BG=3 THEN GOSUB 100: GOSUB 5000: GOSUB 100
1080 IF TF=1 THEN 3000
1090 IF SQR((BX-BX)*2+(BY-BY)*2)<GR THEN 4500: REM **on green**
*
1100 SI=NX+4: SY=NY-3: CX=NX-2: CY=NY-10
1110 I1=0: Y1=0
1120 I1=FIX((JOYSTK(0)-32)/4)
1130 Y1=FIX((JOYSTK(1)-32)/4)
1140 IF ABS(I1)>4 THEN I1=2*INT
1150 IF ABS(Y1)>4 THEN Y1=2*INT
1199 REM **init movement**
1200 IF NX<14 THEN I1=14-NX
1210 IF NX>1235 THEN I1=235-NX
1220 IF NY<25 THEN Y1=25-NY
1230 IF NY>180 THEN Y1=180-NY
1240 IF I1=0 AND Y1=0 AND SQR((BX-(NX+4))*2+(BY-(NY-4))*2)<21 TH
EN GOSUB 1500: REM **draw club**
1250 IF I1<0 OR Y1<0 THEN GOSUB 1300
1260 PK=PEEK(65280): IF PK=126 OR PK=254 THEN 1600: REM **start b
ackswing**
1270 GOTO 1120: REM **sample joystick again**
1299 REM **draw walker**
1300 PHOE 3,5
1310 PUT (NX,NY)-(NX+9,NY-18),B1,PSET: PUT (NX,NY+1)-(NX+2,NY+8),B
2,PSET: PUT (NX+7,NY+1)-(NX+9,NY+8),B3,PSET
1320 GET (NX+1,NY+1)-(NX+1+9,NY+1-18),B1,G: GET (NX+1,NY+Y1
+1)-(NX+1+2,NY+Y1+8),B2,G: GET (NX+1+7,NY+Y1+1)-(NX+1+9,NY+Y1
+8),B3,G

```

```

1330 IF MK=1 THEN MK=0 ELSE MK=1
1340 PUT (NX+1,NY+Y1)-(NX+1+9,NY+Y1-18),B0,PSET
1350 IF MK=0 THEN PUT (NX+1,NY+Y1+1)-(NX+1+2,NY+Y1+8),SL,PSET
ELSE PUT (NX+1,NY+Y1+1)-(NX+1+2,NY+Y1+5),SL,PSET
1360 IF MK=0 THEN PUT (NX+1+7,NY+Y1+1)-(NX+1+9,NY+Y1+5),SL,PSE
T ELSE PUT (NX+1+7,NY+Y1+1)-(NX+1+9,NY+Y1+8),SL,PSET
1370 GOSUB 110
1380 FOR TI=1 TO 10: NEXT TI
1390 PHOE 3,1: PUT (NX+1,NY+Y1+1)-(NX+1+2,NY+Y1+8),SL,PSET: PU
T (NX+1+7,NY+Y1+1)-(NX+1+9,NY+Y1+8),SL,PSET
1400 NX=NX+1: NY=NY+1
1410 SOUND 36,1
1420 RETURN
1499 REM **address ball**
1500 SX=NX+4: SY=NY-4: CC=INT(SQR((BX-SX)*2+(BY-SY)*2)): GOSUB 1
00
1510 IF CC<3 THEN CX=SX: CY=SY-17: GOTO 1530
1520 CX=SX+(17*(BX-SX))/CC: CY=SY+(17*(BY-SY))/CC
1530 IF CF=0 THEN COLOR 3,1: CF=1: GOTO 1550
1540 IF CF=1 THEN COLOR 2,1: CF=0
1550 LINE (SX,SY)-(CX,CY),PSET
1560 FOR TI=1 TO 200: NEXT TI
1570 GOSUB 110
1580 RETURN
1599 REM **determine angle**
1600 IF CX<SX AND CY<SY THEN AN=PI/2-ATN((SY-CY)/(CX-SX))
1610 IF CX<SX AND CY>SY THEN AN=PI/2+ATN((CY-SY)/(CX-SX))
1620 IF CX>SX AND CY<SY THEN AN=3*PI/2-ATN((CY-SY)/(SX-CX))
1630 IF CX>SX AND CY>SY THEN AN=3*PI/2+ATN((SY-CY)/(SX-CX))
1640 IF CX=SE AND CY<SY THEN AN=0
1650 IF CX=SE AND CY>SY THEN AN=PI
1699 REM **backswing**
1700 SD=0: AB=AB: SW=0: GOSUB 100
1710 SI=NX+4: SY=NY-4
1720 PHOE 3,1
1730 AN=AN+PI/12
1740 CX=SI+17*SIN(AN): CY=SY-17*COS(AN)
1750 GOSUB 110
1760 IF PPOINT(CX,CY)=2 THEN COLOR 3,1 ELSE COLOR 2,1
1770 LINE (SI,SY)-(CX,CY),PSET
1780 SD=SD+1: SW=SW+1
1790 SOUND 36,1

```

```

1800 IF SW=19 THEN 1820
1810 PK=PEEK(65280): IF PK=126 OR PK=254 THEN 1730
1820 SD=INT(SQR((BX-SX)*2+(BY-SY)*2))
1830 SW=INT(SQR((BX-SX)*2+(BY+1-SY)*2))
1840 IF CY<SY AND SW<17 THEN AB=AB-PI/10: SD=SD+0.8
1850 IF CY>SY AND SW<17 THEN AB=AB+PI/10: SD=SD+0.8
1860 IF CY<SY AND SW>18 THEN AB=AB+PI/10: SD=SD+0.8
1870 IF CY>SY AND SW>18 THEN AB=AB-PI/10: SD=SD+0.8
1880 IF BF=1 THEN 2000
1890 SD=SD+PF*(0.8+0.4*AND(0))
1900 IF AND(0)<0.1 THEN SD=0.8*SD
1910 IF BF=4 OR BG=4 THEN SD=SD*(0.2+0.4*AND(0))
1920 IF SF=1 THEN SD=SD*(0.4+0.4*AND(0))
1999 REM **swing**
2000 FOR CT=1 TO 0 STEP -1
2010 AN=AN-PI/4
2020 CX=SI+17*SIN(AN): CY=SY-17*COS(AN)
2030 GOSUB 110
2040 IF PPOINT(CX,CY)=2 THEN COLOR 3,1 ELSE COLOR 2,1
2050 LINE (SI,SY)-(CX,CY),PSET
2060 SOUND 150,1
2070 NEXT CT
2080 IF SD>20 OR SW>20 OR SW<15 OR SW<15 THEN SC=SC+1: GOSUB 110
: GOTO 1100
2090 PHOE 3,5: PSET (BX,BY,BF)
2100 PSET (BX,BY+1,BG)
2110 PHOE 3,1: GOSUB 110
2120 SC=SC+1
2130 IF SF=1 AND AND(0)<0.1 THEN GOTO 1100
2999 REM **save ball**
3000 FOR CT=1 TO SD STEP 3
3010 PSET (BX,BY,BF)
3020 PSET (BX,BY+1,BG)
3030 BX=BX+3*COS(AN): BY=BY+3*SIN(AN)
3040 BF=PPOINT(BX,BY): IF BF=2 THEN PSET (BX,BY,3) ELSE PSET (BX,B
Y,2)
3050 BG=PPOINT(BX,BY+1): IF BG=2 THEN PSET (BX,BY+1,3) ELSE PSET (
BX,BY+1,2)
3060 IF BF=1 THEN 3090: REM **skip if on green**
3070 IF BF=4 OR BG=4 THEN 3240: REM **check for rough or tree**

```



DRAGON 32 OWNERS



Now you can buy a professional disk system to turn your Dragon into a real computer!

DELTA DISC SYSTEM

THE DELTA DISK SYSTEM gives you

- * An affordable disk system
- * Powerful DELTA disk commands - see right
- * Random, Sequential and Indexed file-handling
- * Simple plug-in to DRAGON - unlike other systems there are NO HARDWARE MODS needed to run DELTA!
- * Easily expandable 100K to 1.6 megabyte storage
- * Full range of business, utility and games software close to release
- * The price you see is the price you pay - NO HIDDEN RAM upgrade costs
- * Uses under 2K of user-RAM as DELTA is held in EPROM



DELTA contains the following powerful new words, all accessible directly from BASIC:-

SAVE"	SAVEM"	LOAD"
LOADM"	RUN"	RUNM"
CHAIN"	APPEND"	DIR
INIT	CONFIG	KILL
ASSIGN	VERIFY	SELECT
COPY	BACKUP	CREATE
FLUSH	OPEN	CLOSE
FILES	END#	RESTORE#
DIM#	BOOT	INPUT
PRINT	FIND	BUILD
DO		IF EOF(x) THEN

DELTA CARTRIDGE - contains DELTA Disk Operating System, User Manual, demonstration diskette.	£99.95
DELTA 1 - DELTA Cartridge, User Manual, a single-sided 40 track (100K) drive plus free cable	£299.95
DELTA 2 - as DELTA 1, but with a double-sided (200K) drive	£345.95
Disk Interface cable (supplied free with DELTA 1 or 2)	£9.95
ENCODER 09 assembler/disassembler/editor - integral with DELTA	£34.95
INFORM - Data Base Management System commissioned especially for DELTA systems	£39.95

SCRIBE - true lower case on DRAGON!

Below is a live 'screen dump', generated by our HIPRINT program. It clearly shows the features and display potential of SCRIBE!

SCRIBE for the DRAGON 32

- 1 FULL UPPER and lower case direct from the keyboard
- 1 An enlarged 42 x 24 screen display which gives a superb READABLE text
- 1 Full text display on hi-res screen
- 1 Automatic underline & reverse image
- 1 Up to 255 user-defined graphics
- 1 Precision character position command giving super/subscripts
- 1 Black on white text display option
- 1 A new PRINT# command extending to 1000 thus almost doubling screen area

Cassette £13.95

DELTA disk £14.95

ENCODER 09 - is a full symbolic assembler using standard mnemonics and pseudo op-codes. Source code can be incorporated into BASIC programs. The monitor section contains commands to allow memory display, modification and execution. Memory block move, breakpoint handling, full disassembly and a full editor are only a few of its many features. The most powerful assembler/disassembler/editor available for the DRAGON 32. Available as either an integral DELTA fitment or on cassette.
Tape £29.95. Disk - see above

HIPRINT - screen dumper

- will dump the entire contents of your DRAGON 32 high-res screen to a high resolution printer. Can be used for design, display etc (see left). Available at present for EPSON printers only. Other modules to follow shortly.
Tape £13.95 DELTA disk £14.95

POSTAGE and PACKING
Software 95p. DELTA systems £4.50.
ALL PRICES INCLUDE VAT.
Send SAE for full catalogue.

PREMIER MICROSYSTEMS

208 Croydon Road, Anerley, London SE20 7YX.



TELEPHONE 01-659-7131 or 778-1706

Dealer and Overseas orders welcomed




```

3000 GOTO 3110
3090 IF BF=4 AND BG=4 THEN 4700: REM***return to fairway***
3100 IF BF=3 AND BG=3 AND CT>SD-10 THEN 8000: REM ***ball holed**
**
3110 NEXT CT: GF=0: TF=0
3120 REM ***ball stopped, check position***
3130 IF BI=HH AND (BY=HV OR BY=HV) THEN 8000: REM ***ball holed
from off green***
3140 GOSUB 7520: REM ***check if near yellow area***
3150 UN=PPPOINT(BI,BY): UN=PPPOINT(BI,BY+1): RB=0
3160 IF GF=1 THEN 3210: REM***skip if on green***
3170 IF SDR((BI-SI)*2+(BY-SY)*2)<OR THEN 4500: REM***check if on
green***
3180 IF BF=3 OR BG=3 THEN GOSUB 5000: REM ***ball in water***
3190 IF BF=2 OR BG=2 THEN GOSUB 7000: REM***check if treed or bun
kered***
3200 IF TF=1 THEN 3000
3210 PHDE 3,5: PSET(BI,BY,UN): PSET(BI,BY+1,UN)
3220 PUT (HX,NY)-(HX+9,NY-18),BI,PSET: PUT (HX,NY+1)-(HX+2,NY+8)
,B2,PSET: PUT (HX+7,NY+1)-(HX+9,NY+8),B3,PSET
3230 IF SDR((BI-SI)*2+(BY-SY)*2)>30 THEN GOSUB 7100: GOSUB 110:R
EM***move figure to ball***
3240 GOTO 1020
3250 REM ***ball hit tree or rough***
3260 FOR A=1 TO TC
3270 IF ABS((BI-TK(A,1)+5)<=1 AND BY<TK(A,2)+13 AND BY>TK(A,2)
-4 THEN 3290
3280 NEXT A: GOTO 3150: REM***in rough***
3290 IF RB=1 THEN 3000: REM ***only one bounce per tree***
3300 REM ***compute bounce***
3310 PLAY "V311000166FFEE": SD=15*(SD-CT)+0.7*RD(0): RB=1
3320 IF RB=0<0.4 THEN AB=AB+PI*RD(0) ELSE AB=AB+.8*PI*(0.4-RB
B(0))
3330 GOTO 3000
3340 REM ***loop for each player***
4000 FOR PL=1 TO PM
4010 CLS: PRINT @ 75, "HOLE *NH: PRINT @ 149, ML: *YARDS: PRIM
T @ 236, *PH: *PR: PRINT @ 394, *PLAYER *PL
4020 IF HC=1 THEN PRINT @ 454, "SCORE SO FAR:"ISC(PL)
4030 GOSUB 4500
4099 REM ***draw fairway***
4100 NI=NH: NY=NV: BI=BH: BY=BV: GF=0: SC=0
4110 PHDE 3,1: PCLS
4120 DRAM "BHZ5,100C4*FMB
4130 PAINT (3,3),4,4
4140 DRAW LKX
4150 PAINT (L1,L1),3,3
4160 FOR A=1 TO BC
4170 CIRCLE (BK(A,1),BK(A,2)),BK(A,3),2
4180 PAINT (BK(A,1),BK(A,2)),2,2
4190 NEXT A
4200 FOR A=1 TO TC: PUT(TK(A,1),TK(A,2))-(TK(A,1)+10,TK(A,2)+12)
,TR,PSET: NEXT A
4210 BP=PPPOINT(BI,BY): IF BF=2 THEN PSET(BI,BY,3) ELSE PSET(BI
,BY,2)
4220 BP=PPPOINT(BI,BY+1): IF BG=2 THEN PSET(BI,BY+1,3) ELSE PSET(
BI,BY+1,2)
4230 CIRCLE (BI,BY),BR,2
4240 HH=BI+HI: HV=BY+HY
4250 DRAM "BM*STR(NH)*",*STR(NV)*"CZ6R5B2L1"
4260 GOSUB 100
4499 REM *****
4500 GF=1: HH=126+6*HI: HV=96+6*HY: BI=126+6*(BI-BI): BY=96+6*(B
Y-BY): BF=1: BG=1
4510 GOSUB 7100
4520 PHDE 3,5: PCLS: CIRCLE(126,96),6*BR,4
4530 PAINT(3,3),4,4
4540 CIRCLE (HH,HV),4,3
4550 PAINT (HH,HV),3,3
4560 PSET(BI,BY,2)
4570 PSET (BI,BY+1,2)
4580 GOSUB 110
4590 GOTO 1010
4699 REM ***return to fairway***
4700 BI=BI+(BI-126)/6): BY=BY+(BY-96)/6): GF=0: GOSUB 7100
4710 BI=BI-(ISD-CT)/6)*CDS(AB): BY=BY-(ISD-CT)/6)*SIN(AB): PHDE
3,5: SCREEN 1,0
4720 GOTO 4110
4999 REM ***ball in water***
5000 PHDE 3,1: PSET (BI,BY,3): PSET (BI,BY+1,3): PHDE 3,5: PSE
T(BI,BY,3): PSET(BI,BY+1,3): PHDE 3,1
5010 PLAY "T802L1C8AFEDDD"
5020 SC=SC+1
5030 CIRCLE (BI,BY),3,2
5040 CIRCLE (BI,BY),6,2
5050 CIRCLE (BI,BY),3,3
5060 CIRCLE (BI,BY),10,2
5070 CIRCLE (BI,BY),6,3
5080 CIRCLE (BI,BY),10,3
5090 GOSUB 110
5100 PHDE 3,5: PUT (HX,NY)-(HX+9,NY-18),BI,PSET: PUT (HX,NY+1)-(
HX+2,NY+8),B2,PSET: PUT (HX+7,NY+1)-(HX+9,NY+8),B3,PSET
5110 PUT (HX,NY+8)-(HX+9,NY-22),B0,PSET: PUT (HX,NY-3)-(HX+2,NY+
1),M,PSET: PUT (HX+7,NY-3)-(HX+9,NY+1),M,PSET
5120 FOR JC=1 TO 4
5130 PHDE 3,5: SCREEN 1,0: FOR TI=1 TO 50: NEXT TI
5140 PHDE 3,1: SCREEN 1,0: FOR TI=1 TO 50: NEXT TI
5150 PLAY "T5001L486EECCD"
5160 NEXT JC
5170 GOSUB 100
5180 DC=0
5190 BX=BI+2*CDS(AB): BY=BY+2*SIN(AB)
5200 GOSUB 110
5210 IF PPOINT(BI,BY)=3 OR PPOINT(BI,BY+1)=3 THEN 5190
5220 BP=PPPOINT(BI,BY): PSET(BI,BY,2): BP=PPPOINT(BI,BY+1): PSET(B
I,BY+1,2): DC=DC+1: IF DC<3 THEN 5190
5230 RETURN
5999 REM ***initialisation***

```

```

6000 POKE 65495,0
6010 CLS
6020 CLEAR 8
6030 PI=3.1415926
6040 FOR I=1 TO PEEK(275): R=RND(0): NEXT I
6050 DIM BD(9,18),SL(2,7),ML(2,4),B1(9,18),B2(2,7),B3(2,7),SC(4)
,TK(5,2)
6099 REM ***draw trees***
6100 PHDE 3,1: PCLS: CIRCLE(100,50),5,2
6110 PAINT (100,50),2,2
6120 COLOR 4,1: LINE (100,50)-(100,57),PSET
6130 DIM TR(13,11): GET (96,45)-(106,57),TR,6
6199 REM ***setting up***
6200 CLS: PRINT @ 4, "WELCOME TO DRAGON'S DEN"
6210 PRINT @ 42, "COUNTRY CLUB"
6220 PRINT @ 140, "HOW MANY PLAYERS (1 TO 4) ARE TAKING PART?"
,, "PLEASE TYPE IN THE NUMBER, THEN PRESS 'ENTER'"
6230 LINE INPUT RB: PH=VAL(RB)
6240 IF PH<1 OR PH>4 THEN PRINT @ 288, "I CAN'T HANDLE *PM,*PLE
ASE CHOOSE BETWEEN 1 & 4": GOTO 6230
6250 CLS: PRINT @ 64, "YOU MAY PLAY ANY OF THESE: -"
6260 PRINT "1 THE FIRST 9 HOLES", "2 THE LAST 9 HOLES", "3
ALL 18 HOLES"
6270 PRINT: PRINT @ 256, "PLEASE ENTER ONE OPTION (1 TO 3)"
6280 LINE INPUT RB: OP=VAL(RB)

```



```

6290 IF OP<1 OR OP>3 THEN CLS: PRINT @ 64, "TRY AGAIN": GOTO 626
0
6300 IF OP=1 THEN HH=9
6310 IF OP=2 THEN HH=9: GOSUB 8500
6320 IF OP=3 THEN HH=18
6399 REM ***start hole count***
6400 CLS
6410 FOR HC=1 TO HN
6420 READ NH,FH,LX,L1,L1,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY
6430 FOR CC=1 TO BC: READ BK(CC,1),BK(CC,2),BK(CC,3): NEXT CC
6440 FOR CC=1 TO TC: READ TK(CC,1),TK(CC,2): NEXT CC
6450 HX=INT((BR+2*(0.5-RND(0)))^2): HY=INT((BR+2*(0.5-RND(0)))^2)
6460 IF SDR((HX+2)*HY^2)+BR-2 THEN 6450
6470 GOTO 4000
6499 REM ***draw figure***
6500 PHDE 3,1: PCLS
6510 IF PL=1 OR PL=3 THEN PC=3 ELSE PC=2
6520 DRAM "BI80,90C*STR(NH)*",*STR(NV)*"UB3Z3U2R3F203G2F38L7"
6530 IF BI=3 THEN PAINT(182,88),1,PC ELSE PAINT (182,88),(PL+1),
PC
6540 SET(180,90)-(189,72),B0,6
6550 DRAM "BI80,91C2D7R2U7L2": PSET (180,98,3): PSET (181,98,3)
6560 DRAM "BI89,91C2D4L2UR2": PSET (189,95,3): PSET (190,95,3)
6570 SET (180,91)-(183,98),SL,6
6580 SET (187,91)-(189,95),ML,6
6590 PCLS
6600 RETURN
6999 REM ***check if treed or bunkered***
7000 FOR A=1 TO BC
7010 IF SDR((BI-BK(AA,1))<2+(BY-BK(AA,2))<2+(BK(AA,3) THEN SF=1
7020 IF SDR((BI-BK(AA,1))<2+(BY-BK(AA,2))<2+(BK(AA,3) THEN SF=1
7030 IF SF=1 THEN RETURN
7040 NEXT A
7050 FOR A=1 TO TC
7060 IF SDR((BI-TK(A,1)+5)<=1+(BY-TK(A,2)+5)<=1)+5 THEN AB=(3
*PI)/2: SD=5: TF=1: RETURN: REM***tree***
7070 NEXT A
7080 RETURN
7099 REM ***move figure to ball***
7100 IF BY<HV THEN NI=BI+5 ELSE NI=BI-15
7110 IF BX<HH THEN NY=BY-17 ELSE NY=BY+25
7120 IF NY<40 THEN NY=40: NI=BI-15
7130 IF NY>170 THEN NY=170: NI=BI-15
7140 IF NX<10 THEN NI=10
7150 IF NX>225 THEN NI=225
7160 RETURN
7499 REM ***check ball position***
7500 IF BF=2 OR BG=2 THEN GOSUB 7000
7510 IF BF=4 AND BG=4 THEN GOSUB 7610
7520 IF PPOINT(BI,BY)=2 OR PPOINT(BI,BY+2) OR PPOINT(BI,BY-2)
OR PPOINT(BI,BY+2) OR PPOINT(BI,BY-2)

```

```

+1)+2 THEN PSET(BI,BY,3): PSET(BI,BY+1,3)
7530 RETURN
7540 FOR A=1 TO TC
7550 IF ABS((BI-TK(A,1)+5)<=1 AND BY<TK(A,2)+13 AND BY>TK(A,2)
-4 THEN 7570
7560 NEXT A: GOTO 7610
7570 AB=PI
7580 BX=BI-3*CDS(AB): BY=BY-3*SIN(AB)
7590 BP=PPPOINT(BI,BY): BP=PPPOINT(BI,BY+1)
7600 PSET(BI,BY,2): PSET(BI,BY+1,2): IF BF<4 AND BG<4 THEN RET
URN ELSE 7580
7610 PSET(BI,BY,BF): PSET (BI,BY+1,BG)
7620 AB=AB+PI
7630 BX=BI-3*CDS(AB): BY=BY-3*SIN(AB)
7640 BP=PPPOINT(BI,BY): BP=PPPOINT(BI,BY+1)
7650 IF BF<4 AND BG<4 THEN 7670
7660 GOTO 7630
7670 AB=AB+PI: BX=BI-3*CDS(AB): BY=BY-3*SIN(AB)
7680 BP=PPPOINT(BI,BY): BP=PPPOINT(BI,BY+1)
7690 PSET (BI,BY,2): PSET (BI,BY+1,2)
7700 GOSUB 7100: GOSUB 100: RETURN
7999 REM ***ball holed, display score***
8000 PLAY "T1000L3Z86CCCEEEEE": PSET(BI,BY,3): PSET(BI,BY+1,3)
1: FOR TI=1 TO 300: NEXT TI: CLS: PRINT @ 43, "PLAYER *PL: PRINT
@ 132, "SCORE FOR HOLE *NH:"*ISC
8010 SC(PL)=SC(PL)+SC: IF HC=1 THEN PRINT @ 355, "SCORE FOR *HC
* HOLES:"ISC(PL)
8020 FOR TI=1 TO 2000: NEXT TI
8030 NEXT PL
8040 NEXT HC
8050 CLS: PRINT @ 42, "END OF GAME": PRINT @ 75, NH: "HOLES"
8060 PRINT: PRINT
8070 FOR A=1 TO PH
8080 PRINT TAB(6); "PLAYER *NH: TAB(22); SC(NH)
8090 NEXT N
8100 POKE 65494,0
8110 FOR TI=1 TO 10000: NEXT TI: END
8499 REM ***read first nine holes***
8500 FOR A=1 TO 9
8510 READ NH,FH,LX,L1,L1,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY,LY
8520 FOR B=1 TO BC
8530 READ BK(BB,1),BK(BB,2),BK(BB,3): NEXT BB
8540 FOR A=1 TO TC: READ TK(A,1),TK(A,2): NEXT A
8550 NEXT A: RETURN
9009 REM *****
9010 DATA 1,"U10E40R5E20R5F40B30E30L70H20L70H10","BH175,30C3R1
OF40B30E10US4H45R5",180,32,180,80,13,0.75,4,389,3,35,90,32,65,2
9015 DATA 110,90,8,160,75,6,165,95,100,60,140,100
9020 DATA 2,"U0E10R50F50R40F50B50L90H30L40H40","BH125,100C3D10E
5010F5R5E5R5Z0H5L10",127,102,200,150,10,0.82,5,480,2,35,45,32,2
2,3
9025 DATA 88,70,8,127,90,6,100,55,200,120,170,110
9030 DATA 3,"B40R70E60R70U60L70U60L70","BH155,40C3B6R15U44E20L3
5",157,43,192,70,13,2.01,3,156,2,35,130,32,100,3
9035 DATA 208,50,8,210,72,6,120,80,200,85,190,45
9040 DATA 4,"U2E10R50F20R70F10B20E10L90H20L70H10","BH25,100C3U2
0E10R50L020L10SH10",27,100,62,98,10,1.96,3,143,2,200,115,200,1
37,29045 DATA 66,76,6,85,93,7,100,75,75,75
9050 DATA 5,"U7R50F10R30F20B3U20H80","BH74,8AC3R4E6U6R6D6U6I2
L6U6",78,86,70,65,12,0.94,4,339,1,200,155,195,180,4
9055 DATA 50,45,9,90,100,80,130,95,70,105,85
9060 DATA 6,"R0F15E0R25F20D5E80L100H20U60","BH100,130C3D10F10
R30U13H5L35",110,137,200,50,13,0.98,4,382,4,32,111,30,95,3
9065 DATA 100,120,8,150,90,6,180,60,5,183,34,9,130,100,190,70,17
5,42
9070 DATA 7,"D0R50E40R60E50U40L150E50","BH110,130C3H20E20R150Z0
R20E20L15",110,120,50,150,13,0.7,5,517,1,205,60,207,85,5
9075 DATA 60,120,10,150,80,70,100,75,100,72,120,90,70
9080 DATA 8,"U4E20R20F20D50F20R20F20R60F150E10E100H10U20G40L1
0H20U60","BH85,90C3F20R20F20D40L10U40L20H90E5F55",85,92,180,150,
12,1.1,4,362,4,60,50,58,30,2
9085 DATA 55,140,10,160,140,8,160,162,6,199,150,6,120,135,80,125
9090 DATA 9,"U50R30E20H50F60R20F20D50E20L30H35U25H40E15L60","BH85
5,50C3E20R50F60R20F20D30H90L90",59,47,50,80,13,0.97,4,393,2,187,
164,178,150,2
9095 DATA 33,65,7,140,70,6,140,100,70,60
9100 DATA 10,"B0R30E20R30E20R30E20R30E20R30E20R30U150H20L6S0L30E20L3
0","BH155,55C3D10F10R15U20L25",172,57,200,55,13,1.82,3,194,3,35,
120,32,100,4
9105 DATA 180,85,6,210,75,7,225,50,8,120,100,180,100,40,100,
90
9110 DATA 11,"U40R130E50R2070E10L20U50L90H20","BH140,60C3D10F3R
20U25B10L15",147,62,70,75,12,1.96,4,306,3,210,20,212,40,3
9115 DATA 40,120,8,100,80,10,155,85,10,120,70,180,70,170,90
9120 DATA 12,"U5E30R100R40R70R0E40L6W70L30","BH120,100C3U5H10
U10R30F20B20L25H15",125,100,200,100,12,0.7,5,520,3,30,60,28,40,5
9125 DATA 130,120,10,75,65,10,170,85,10,120,45,180,100,100,120,2
00,65,210,110
9130 DATA 13,"U50E30R100F70B0L70U40H30L100","BH170,130C3U5H15L2
0U30R100R20R20U10E10R30B30E20L20",172,128,180,150,13,1,4,385,1,30
,80,28,60,2
9135 DATA 160,90,9,160,130,200,150
9140 DATA 14,"B90R50E50R50E50U50L50E50S0L50E50","BH125,100C3U10E3R
25B15L30",127,138,200,60,13,1.17,4,347,4,40,185,30,165,2
9145 DATA 105,105,10,170,70,10,215,70,7,130,120,7,120,100,180,7
5
9150 DATA 15,"U50R50F20E20R70F30E30L40H20E20L80U50","BH115,70C3D
35F5R5E5U10H5L20L5",117,72,190,100,13,1.93,3,160,2,35,100,32,8
0,2
9155 DATA 185,120,10,175,80,12,75,86,160,100
9160 DATA 16,"U60R100F100D30L50H50L100U20","BH124,40C3B40B60R6E4
0U40L4",126,42,200,150,13,0.98,4,350,2,35,100,32,70,1
9165 DATA 130,130,9,200,130,6,120,9,4
9170 DATA 17,"E30R50F20E60R30F10R90E50L170U60","BH125,90C3D10F10
D20R5U2E5U33E20",130,90,185,50,12,0.98,4,382,1,35,104,30,70,3
9175 DATA 180,75,8,120,115,195,70,150,65
9180 DATA 18,"U60R140F40B50E10L30H20L100H40","BH85,50C3B30F10R15
E20U10H15E2L25",90,35,200,140,12,0.6,5,472,2,32,50,30,35,4
9185 DATA 172,135,10,195,110,10,170,100,83,101,210,120,140,112

```

**THE BEST OF THE
WORLD TO YOU**



**NINJA
WARRIOR
£8.95**

New from Arcade Master Charles Forsythe! The most original game ever produced. 16 levels of breath taking action. Up to 6 players in competition, keyboard or joystick control. Guide your Ninja through boulders, fire, pitfalls, flaming meteors, and Ninja Masters to attain — NINJA GRANDMASTER.

**PACDROIDS
£8.95**

Unlike any other 'PAC' game you've ever seen — Guide your Mk XIX Drone cruiser through the spaceways clearing a path to the power-points to arm your smart-bombs — but beware the mines and the mothership.

★★ **SPECIAL OFFER** ★★ **COURIER PILOT £5.95**

You can almost smell the gasoline as your Vickers Vimy is fueled for the most important flight of your career. The clouds are darkening, lightning is flickering. It's about to rain. You must transport vital dispatches from France to Scotland. Can you manoeuvre your small biplane under these extreme circumstances? Or will you become a victim of fog in the channel? Courier Pilot is a colourful, challenging Graphic simulation of Point to Point flying England's best flight simulation. Dispatch £5.95 for yours today.

Mr EATER £8.95

*FOR THE PUREST PAC-PLEASURE
TRY Mr EATER*

Multi speed, multi level, there's no PAC-man neater with more music and sound and good fun all around, Mr EATER's the Pac-game for you.

Plus lots more! Please include SAE for full list.

Prices include VAT and shipping to anywhere on the planet Earth and her colonies.

Note: Pacdroids and Ninja Warrior carry a 10-day money warranty — if you don't agree they're good — send 'em back!!!



Programmer's Guild (UK)

Ahed House
Sandbeds Trading Estate,
Ossett, West Yorkshire.

Programmer Guild (USA)
PO Box 66
Peterborough
New Hampshire 03458

Finding out about Forth

Keith and Steve Brain introduce the intricacies of Forth.

WITHOUT DOUBT FORTH must be the 'in' programming language for 1983 as the pundits tell us that it's the best thing since sliced bread, and that no computer should be without it. Basic has been dismissed as that tired old lady of micro languages, while the virtues of the speed, structure and portability of Forth have been extolled. And it seems that the ability to make intelligible noises on the subject of Forth is now an essential part of the repertoire of every computer bore.

But does Forth really reach the parts other languages cannot reach, or is this just another example of the king's new clothes, that only a fool cannot see? In this article we will try to separate the myth from the reality and start off by looking at how Forth operates.

The language is unusual in that it was developed originally by just one man, Charles H Moore, as his answer to the deficiencies of Fortran and Algol. If you have tried to work out a logical derivation for the name Forth, tax your brain no more, as it was really an accident. He wanted to call it Fourth, as he thought of it as a fourth generation language, but the machine he was using only allowed five letter names so he just left the 'U' out!

It was initially devised as a control language for astronomy and there are two primary dialects Forth-79 and fig-Forth (fig stands for Forth-Interest-Group), which differ in a number of respects. The version most commonly implemented on micros is fig-Forth.

The official standards for both these Forth versions lay down certain minimum requirements, so that programs written in either dialect can easily be converted from one machine to another, provided that it uses the same dialect.

Benefits

Individual commercial Forth packages differ in the ways that they use the available memory and in the extra facilities which have already been included for the benefit of the user, but we'll come back to the icing once we've looked at the main part of the Forth cake.

One of the major advantages of Forth is that programs are usually executed much faster than their Basic equivalents, but of course there has to be some penalty for this increase in speed. Forth is a more difficult language to master than Basic and it is not altogether user-friendly.

As the whole fundamental concept of programming in Forth is so different to programming in Basic, you really need to

throw your ideas out of the window and start again. The experts extol the virtues of the structured nature of Forth, which they insist helps you write much better programs, but that only holds if you don't get lost or give up on the way. In the short term it really means that you must sort out your ideas very thoroughly and that your programs need to be more carefully planned.

As a Basic-user you will think of programs being organised as statements placed on lines, which are executed in order (except where loops, GOTO or GOSUB are encountered) but Forth is not organised like that at all. It is built up from Forth words which are really just labels for different machine code subroutines which carry out particular single tasks. Every Forth system has a series of these words built in. For example the word [+] will cause two numbers to be added together.

If you want to do something more complicated than adding two numbers you simply write several of the available words consecutively to make a complete program. All the words which are available to the user are contained in what is appropriately known as the dictionary in memory. When you first buy a Forth package this will only contain words pre-defined by the software supplier.

To be able to program in Forth you must understand how a stack works, because most Forth operations involve the stack. Although people often find it difficult to grasp the idea of the stack there is really nothing complicated about it — it is simply an area of memory where numbers are temporarily stored. The stack operates on the last in first out principle and it is often visualised as a pile of plates.

The most important thing to remember is that numbers are always added to the top, and that only the top number can be removed. (If your only experience of dealing with plates is stacking them vertically into your microprocessor-controlled dishwasher then try the alternative 'union rule on redundancy' analogy.)

Another major difference from Basic is that Forth operations use Reverse Polish Notation (RPN). If you want to add 2 and 4 on paper or in Basic you write: 2 + 4. Note that the operator (+) is placed between the operands (2 and 4). In RPN this is written with the operator last:

24 +

This may seem rather Irish to everyone drilled from the cradle to put the operator in the middle (unless they have battled with RPN on a Hewlett-Packard calculator). But it is very logical for a stack-based system,

as you can hardly manipulate a number which is not already identified by being on the stack. In the example above the numbers 2 and 4 are pushed on to the stack and then the [+] tells the system to take the top two numbers from the stack, add these together and then put the result back on top of the stack.

A whole series of other arithmetic operators are also provided in Forth. For example [*] is used for multiplication. [MAX] leaves the higher of two numbers on the stack, and [MIN] leaves the lower of two numbers on the stack. It is sometimes difficult to think of certain Forth words as commands as they look more like punctuation. For example [.] prints out the top number on the stack.

In addition to allowing you to add numbers to the top of the stack and retrieve them, Forth also contains words which allow you to copy and change the order of numbers on stack. For example [DUP] will duplicate the top number on the stack. [OVER] will copy the second number on to the top of the stack. [DROP] will delete the top number on the stack, and [SWAP] will exchange the top two numbers on the stack.

If you combine these operations together you can soon get more powerful functions. Thus [DUP +] will double a number, [DUP *] will square it, and [DUP * DUP *] will quadruple it. Note that spaces between Forth words are absolutely essential, and that missing spaces are one of the main sources of program bugs.

Fetching

Moving numbers in and out of memory locations is accomplished by the fetch and store instructions. The word [@] fetches a number from a specified location in memory and leaves it on top of the stack. Thus [300 @] will put the number at memory location 300 on top of the stack. Of course you will not see this number unless you add a print instruction [300 @ .]. The opposite operation to fetch is store [!] which puts a number, which is first put on to the stack, into a specified memory location. Thus [600 300 !] will store the number 600 at memory location 300.

If you want to find out what is in a memory location without reading the contents on to the stack you can use [?]. Thus [300 ?] will now display the 600 we just stored there. An extension of this is DUMP which will display a specified number of memory locations starting from a defined point. These last two words are very useful when debugging.

There are many occasions when it is useful to be able to copy whole blocks of data from one part of memory to another (eg word and data processing) and this is done with MOVE and CMOVE, which require you to define a source address, a destination address, and the number of items to be moved. Thus [300 500 50 MOVE] will copy 50 numbers from locations 300 onward to 500 onward.

If you have followed the story so far you will perhaps have noticed that Forth looks like a lot of other high-level languages, or may seem even more complicated ►

FOR THE DISBELIEVERS . . .

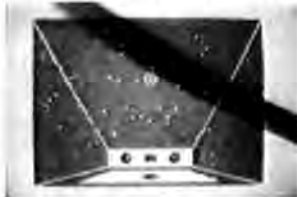
8 game Dragon 32 cassette

Dear Sir, I have recently received your 8 program cassette for the Dragon 32 computer. Having received similar cassettes from other software companies I was not expecting the programs to be up to much either in quality or performance. However, I must write to you and say "simply marvellous". Every program on the cassette was brilliant and of a very professional standard. I am not a person to write readily to anyone in praise of a product as I have very high self-imposed standards. The whole family loved all your marvellous programs especially Wumpus Mansion, Execution and Snail Pace. I would choose Interplanetary Trader which is unbelievably addictive. Finally, I would like to wish your company the very best of luck with this games tape as it deserves to be a winner. I honestly feel that this is a tape which is a must for every Dragon 32 owner and it is a software cassette that all other games tapes should be judged by. Should you wish to use this letter for any advertising or commercial use, please feel free to do so. No praise is high enough for your product, which is simply marvellous entertainment at an absolutely unbelievable price! Mr D. R. Airs.

8 GAMES FOR JUST £6.90 AN INCREDIBLE 200K OF PROGRAMMING!!!!!!

Interplanetary Trader

A massive 30K of real time adventure trading in the year 2283. Encounter the hazards of space flight: pirates, meteor storms, energy loss, etc. Comprehensive on-board computer gives status reports, damage reports, warnings, etc. Definitely a challenge.



Execution

Superb hi-res moving graphics game. Play the computer or an opponent. Features inexhaustable data base, continuous scoring, overall rating, 1-4 players and good sound effects. Hours of fun guaranteed! A massive 30K.



Wumpus Mansion

Incredible fun! Outwit the Wumpi (if you can . . .) and raid the mansion. Collect treasures, and Wumpus Blasters and escape through the maze of tunnels, but don't trigger the TIME BOMB. Different each time you play. Uses 29K!



Wipeout

Challenging game of fast reaction that begins easy but gets progressively harder. 1-4 players, on-screen scoring good sound effects and 4-colour graphics. Be warned — this is not easy!



Hi-lo

Is it skill or luck? Turn £50 into £1,000,000 with this simple, yet highly-entertaining game. Brilliant sound effects and 4-colour hi-res graphics. Uses over 20K!



Snail Pace

The graphics are excellent — the excitement is almost unbearable. 1-8 'racing snails' whizz up the racecourse to the finishing line. Computer calculated odds and form that really works. A superb piece of complex programming ensures hours of entertainment. A massive 26K!



Atom Hunt

95 per cent full-colour graphics! Another superb feat of programming to stretch your mind and your Dragon's memory chips to the absolute limits! 1-4 players, individual ratings. Includes a unique repeat game facility. Uses over 20K!



Air Assault

A simple yet addictive game in full 4-colour hi-res graphics. Attempt to blast the skyscrapers to make a space and land your crippled helicopter. Uses sound and realistic movement of helicopter. COMPREHENSIVE 3-PAGE INSTRUCTION SHEET IS INCLUDED



GAMES TAPE 1

8 game cassette. Just:

£6.90

which includes postage, VAT and an UNCONDITIONAL REPLACEMENT guarantee.

JOYSTICKS NOT NEEDED

In the unlikely event of our product failing to load just return it to Active Software for an immediate replacement.

Active Software
117 Ickneild Street,
Birmingham
B18 6RZ. *compendium category

ALL ORDERS DESPATCHED WITHIN 48 HOURS OF RECEIPT.

Why not put a first class stamp on your order and we will despatch your cassette within 48 hours of receipt.

Post coupon now to:

Active Software
117 Ickneild Street,
Birmingham, B18 6RZ.

Please rush me a copy of GAMES TAPE 1

I enclose a Cheque/P.O. for

£

Name: _____

Address: _____

and unintelligible than most. But we have not yet described the main advantage of Forth which is the ability to define and compile your own words for new tasks which can then be added to the dictionary.

The only limitations on defining new Forth words are that they must be built up from existing Forth words (original or user-defined), and that you must have enough space in the dictionary to hold them. It is the great flexibility which this introduces that sets Forth apart from other languages.

In fact defining new words is one of the easiest operations in Forth. All you need to do is to place the name of the new word you want to define, and the sequence of existing words to be followed, between a colon and a semi-colon. For example [SQUARE DUP * ;] defines a new word SQUARE. Once this definition has been compiled then every time you use [SQUARE] the sequence [DUP *] will be followed. Of course your new words can be much more complicated than that!

One of the main reasons Forth is faster than Basic is because Basic is an 'interpreted' language but Forth is 'compiled'. Of course the CPU can only actually work with machine code, and all high-level languages must translate your instructions into a suitable form which the CPU can understand.

To illustrate the fundamental difference between a compiled and an interpreted language think of writing a program to boil a kettle. First, the Basic version:

```
10 PUT KETTLE UNDER TAP
20 TAP ON
30 IF LEVEL<LIMIT THEN 30
40 TAP OFF
50 KETTLE ON
60 IF TEMP<100 THEN 60
70 KETTLE OFF
```

When RUN, the CPU goes to its own dictionary (the Basic interpreter) to find the meaning of PUT. If this is a valid command then it will jump to a corresponding machine-code subroutine in the ROM, which it will use to act on the variables KETTLE and TAP. It now finds ON and goes through the whole process of interpretation once again, before it can act on the variable TAP.

Next it finds IF and <, which it looks up to find that it must compare the variables LEVEL and LIMIT and branch according to which one is higher. The execution of the program therefore proceeds in fits and starts as each command is searched for in the interpreter and then acted on in turn. This process of interpretation is gone through every time the program is run.

In Forth, on the other hand, you can define a new word [BOIL-KETTLE] which contains all the instructions on how to boil a kettle, but nothing else. Initially you must define exactly how to boil the kettle but, once you have got all the instructions together, you can COMPILE them into a new word.

During this compilation process your instructions are converted into a new pseudo-machine code sequence which is stored in memory. This machine code routine contains the complete instructions on how to boil the kettle which are now

```
VLIST
RPT-OFF      RPT-ON      EDIT
WHERE        EDITOR     GOTOXY ~
COPY         FLUSH      ENDCASE
ENDOF        OF         CASE  CLS
2SWAP       2DUP        2DROP  LINE
TEXT        WHILE      ELSE   IF
REPEAT      AGAIN      END    UNTIL
+LOOP       LOOP       DO     THEN
ENDIF       BEGIN      BACK   NEXT
USER        VARIABLE   CONSTANT
TRIAD       INDEX      CSAPEM HDR
P-OFF       P-ON       DUMP   DLEN
VLIST       LIST       FORGET
?          ?R          ?D     ?S
#          SIGN      -->  ?*  SPACES
.LINE      -->      LOAD  MESSAGE
BUFFER     R/W       HI     LD
EMPTY-BUFFERS  USE  UPDATE
+BUF       PREV     MOD    M/MOD
*/         */MOD    MOD    M/MOD
*          M/        M*    MAX  /MOD
DABS      ABS       D+/-  +-    COLD
ABORT     QUIT      CR
?TERMINAL <        DEFINITIONS
FORTH     VOCABULARY
IMMEDIATE INTERPRET
?STACK   DLITERAL  LITERAL
?COMPILE CREATE    ID.
```

Excerpts from Teleforth's dictionary

followed at high speed (with no wait for interpretation), every time you call the word [BOIL-KETTLE].

Printing out all the words in the Forth dictionary is done by [VLIST]. To get rid of an existing word you [FORGET] it. But this must be used with great care as it also deletes every other word above the defined word in the dictionary (ie every word defined after the word you want to delete). It is possible to redefine existing words, but if you forget to [FORGET] the old versions before you compile the new ones your dictionary soon fills up!

Of course any new definitions you make will only be retained until you power-down, unless you save them on cassette or disk. Originally Forth was written to operate with disks and even the non-disk systems currently available for the Dragon operate using areas of RAM as simulated disks.

Rather than saving the compiled versions in the dictionary it is more useful to keep a copy of the source code (the complete definition) so that you can modify it, using an editor facility, at a later date. Forth organises source code on a series of numbered screens, but the details of these, and the editor commands, vary from one implementation to another. When you are satisfied with your source program you compile it into the dictionary using [LOAD]. Thus [2 LOAD] will compile the words on screen 2 and add them to the dictionary.

Basic equivalents

The Forth equivalent of the Basic FOR ... NEXT control structure is the [DO ... LOOP] which causes a given sequence of words to be executed a number of times. It increments the loop count by one with each execution, but [DD ... +LOOP] increments by a specified number (rather like STEP in Basic). An extension of the DO ... LOOP is [BEGIN ... UNTIL] which is really a DO ... LOOP of unspecified length which repeats until a flag on the stack becomes true.

Instead of the Basic IF ... THEN ... ELSE, we have the slightly scrambled [IF ... ELSE ... ENDIF] where only the words between IF and ELSE are executed if the flag is true, and only the words after ENDIF are executed if the flag is false.

The main variations between different Forth implementations are in the extra words which are predefined, and in the way the system is organised, so let's

compare the rather different approaches of Dragonforth from Oasis Software and Teleforth from Microdeal.

Dragonforth seems to be aimed very much at the games end of the market as the main features are easy-use of hi-res graphics and the ability to access nearly all of the standard Basic commands in Forth. It is therefore something of a hybrid implementation which is particularly useful to the novice who can't face machine code but wants to use Forth to speed up hi-res graphics programs.

The demonstration program on the reverse of the cassette gives some hi-res examples, although we were surprised to find we could reproduce some of these almost as fast using Basic alone. Presumably the increase in speed was small because the calculations involved in these demo programs were very simple, and because the actual movements were executed at a similar speed in both Forth and Basic. But higher speed gains should be achieved as the complexity of the calculations increases.

Text is organised into blocks of 256 bytes — as eight lines of 32 characters on 20 screens (giving a total of 5K) to fit the Dragon display. A standard Forth line editor is included but the lack of a cursor is a very irritating omission. Basic statements are included by placing them in square brackets and these are also compiled. [GETKEY] is equivalent to INKEYS and [JOYSTK n] reads the relevant joystick co-ordinates.

The user manual is nicely produced and makes some attempt to explain how Forth operates, but regrettably a lengthy addendum of errors is included. In addition we found out the hard way that there were still a number of errors which had escaped notice!

Teleforth is a modification of the Armadillo Colorforth for the Tandy Colour Computer and is rather more a Forth for the serious user. Text is organised into the more normal Forth pattern of 1024 byte blocks — as 16 lines of 64 characters on 10 screens (giving a total of 10K). Graphics are not supported directly but writing and modifying programs is much easier as there is a cursor and a full screen editor, in place of a cumbersome line editor. In addition to the usual fig-Forth words, output can be diverted to the printer with P-ON and P-OFF, a feature which is really an essential, and a cursor (key) repeat can be enabled (RPT-ON and RPT-OFF).

Teleforth also provides the double number (32 bits) extensions [2 DROP], [2 DUP] and [2 SWAP] as well as the useful additional control structures [CASE] — [ENDCASE] and [OF] — [END OF] (roughly equivalent to the Basic ON-GOTO).

We have not seen the final version of the manual (only the original Armadillo Colorforth version) as further modifications were still being made to the Dragon version. If Microdeal can maintain the standard set by the documentation for its Teletwriter word-processor package then it should be first-class. ■

Getting to grips with Dragon input and output

Ian Nicholson guides you through the Dragon's input/output memory locations, among the most important to be found in the memory map.

THE ADDITIONAL INFORMATION booklet supplied with the Dragon labels the memory between FF00 and FF5F rather uninformatively as 'input/output'. Initially the user might think there are 96 useful locations, but since each location occurs eight times there are only in fact 12 — and four of these are reserved for future I/O enhancement. So there are only eight effective locations in the I/O.

These eight locations control the keyboard, sound output, cassette relay, video and screen modes, joystick control, printer control and timer update. It is quite clear that they are probably the most important in the whole memory map, and a thorough understanding of how the I/O works is essential for anyone intent on mastering the 6809 machine language.

The I/O is divided into three sections referred to as I/O 0 (slow); I/O 1 (fast); I/O 2 (fast). Fast and slow refer to the speed at which the microprocessor accesses the I/O when in the address dependent mode (POKE65495,0). This is a very important point to remember since cassette input/output comes under control of I/O 1 (fast); so if the 6809 is running in the fast mode then the cassette I/O will not function properly.

Four locations

Each I/O is managed by a Peripheral Interface Adapter (PIA), though in the Dragon there is no PIA 2 because I/O 2 is reserved for future enhancement. Each PIA takes up four memory locations:

PIA 0: FF00-FF03 repeated seven times to FF1F

PIA 1: FF20-FF23 repeated seven times to FF3F

But what is even more remarkable is that each PIA has six registers, four of which are assigned to two memory locations.

The PIA is really a double PIO, parallel input output chip. And it has two ports A and B. Each port has three registers: a data direction register, a peripheral data register and a control register. These are allocated to the memory locations as shown in *Figure 1*.

Each register should be considered as 8 bits, each bit uniquely important. The contents of each register are examined by peeking to the relevant memory locations and converting the contents to an 8-bit binary number; this then represents the contents of each bit of the register, bits 0 through 7 reading from right to left. In the data direction register each bit 0 through 7 corresponds to data lines PA0 through PA7 (or PB0 through PB7). A '1' in a bit of this register means that that data line is programmed as an output. A '0' means that it is programmed as an input.

For an example, if the data direction register had been selected and you peeked at FF20, you would get FE returned (254). This is represented by 11111110 in binary, which means that since bit 0 is '0' then data line PA0 is an input. Bits 1 through 7 are '1', so data lines PA1 through PA7 are outputs.

As already mentioned, the peripheral data register and data direction register share a common memory address, but obviously the computer can only access the contents of one register — which

register depends on the state of bit 2 of the control register. A '1' selects the peripheral data register. A '0' selects the data direction register. Peeking at the four control registers at FF01, FF03, FF21, FF23 returns B4, 35, 34, 37, respectively. This shows that the peripheral data registers have been selected in all four cases. This would seem sensible, since the computer has no use for the data direction register once it has programmed the various bits as input or output. The contents of the PDR on the other hand may be continuously changing.

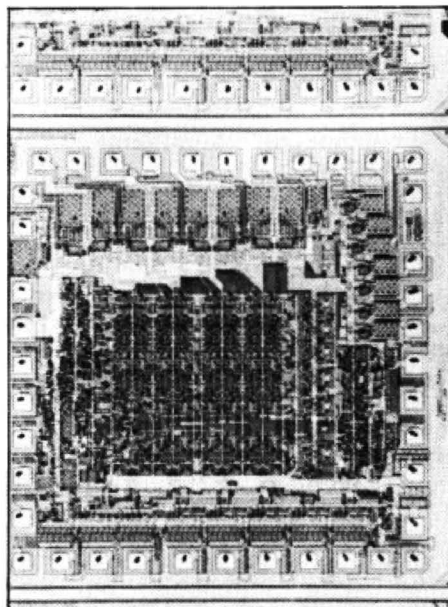
Now more about that control register. This controls the functions that are either on or off — such as audio and cassette motor.

Don't be alarmed by interrupt (*Figure 2*), it is not as complicated as people think. Basically an interrupt is a special subroutine, such as the triggering of a cassette relay, which the computer executes when it receives an interrupt request. When it is told to return from interrupt, it takes up from where it left off. An interrupt flag set to '1' indicates that an interrupt is requested. Interrupts can be disabled, though, so that a request is ignored.

Since there are two control registers in a PIA (A and B), there will be four control lines. They are CA1, CA2, CB1, CB2. Now I shall take a closer look at what each PIA does, starting with PIA0.

Firing

If one selects the DDR-A at FF00 and then peeks, 0 is returned, indicating that all eight bits are set to input, as expected. Bits 0 through 1 indicate whether the joysticks are being fired (*Figure 3*) A '0' in bit 0 indicates that the right joystick is being fired. A '0' in bit 1 indicates that the left joystick is being fired. A '0' in both bits indicates that both joysticks are being fired. A '0' in bits 0 through 6 indicates the row of keys (as connected on the circuit board) containing the key being pressed. Bit 7 is the joystick comparator, normally '1' this only appears to be '0' when JOYSTK(0)<32.



The Peripheral Interface Adapter (PIA) chip

	PIA 0	PIA 1	
A	FF00	FF20	Peripheral data register (PDR-A)
	FF01	FF21	
B	FF02	FF22	Peripheral data register (PDR-B)
	FF03	FF23	

Figure 1: registers are allocated to two ports

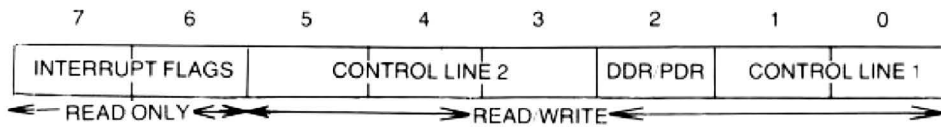


Figure 2: interrupt is not as complicated as people think

NORMAL CONTENTS	1	1	1	1	1	1	1
FF00 PDR-A	JOYSTICK COMP. ARATOR	← KEYBOARD ROW INPUT →				JOYSTICK FIRE	

Figure 3: indicate whether the joysticks are being fired

NORMAL CONTENTS	1	0	1	1	0	1	0	0
FF01 CR-A	RO INTERRUPT FLAGS	CA2 MUX			DDR/PDR	CA1 UNUSED		

Figure 4: it would appear that the Dragon does not use CA-1

NORMAL CONTENTS	0	0	0	0	0	0	0
FF02 PDR-B	KEYBOARD COLUMN INPUT						

Figure 5: deciding which key you are pressing

NORMAL CONTENTS	0	0	1	1	0	1	0	1
FF03 CR-B	RO INTERRUPT FLAGS	CB-2 MUX			DDR/PDR	CB-1 IRQ ENABLE		

Figure 6: control line CB-1 is the IRQ-B enable

NORMAL CONTENTS	0	0	0	0	0	0	0
FF20 PDR-A	DIGITAL TO ANALOGUE CONVERTER					PRINTER STROBE	CASSETTE INPUT

Figure 7: feeding numbers into the D-A converter

NORMAL CONTENTS	0	0	1	1	0	1	0	0
FF21 CR-A	INTERRUPT FLAGS	CASSETTE RELAY			DDR/PDR	PRINTER RELAY		

Figure 8: deals with the printer and cassette relays

NORMAL CONTENTS	0	0	0	0	0	1	0	1
FF22 PDR-B	A.G	GM2	GM1	GM0	CSS	RAM SIZE	SINGLE BIT SOUND	PRINTER BUSY

Figure 9: including video control lines

NORMAL CONTENTS	0	0	1	1	0	1	1	1
FF23 CR-B	INTERRUPT FLAGS	CB-2			SOUND ENABLE	DDR/PDR	CB-1 CARTRIDGE FIRQ	

Figure 10: indicating whether a cartridge is present

It would appear that the Dragon does not use CA-1 (Figure 4). CA-2 is the MUX LSB select and is connected with the X- and Y inputs from the joysticks. When the sound is enabled, a '1' appears in bit 3, but this bit does not exclusively control the sound.

Printing

Checking the DDR-B confirms that all bits are input although they may be set as output when the printer is being used. By now the reader will have realised that if FF00 returns the row of a key being pressed and FF02 returns the column, then a unique key is defined; this is how the computer decides which key you are pressing (Figure 5).

If you press a key then a '0' appears in the two bits which correspond to that row and column. Unfortunately the computer clears FF02 immediately it has noted the contents, so peeking always returns the value 0. FF00, on the other hand, remains uncleared. If you enter the following short program, run it and play around on the keyboard it illustrates the point quite well: 10 PRINT HEX\$(PEEK(65280)): GOTO 10

Back to the PIA: control line CB-1 is the IRQ-B enable (Figure 6). Putting a '0' in bit 0 disables it. If you do this then the functions which rely on this interrupt will also be disabled, namely the timer and the PLAY. The PLAY will play the first note of the string indefinitely; the TIMER will freeze altogether. So POKE &HFF03,&H34 will allow you to get those previously unobtainable high scores in races against time.

Data direction

In the PIA1 the data direction register sets bit 0 as an input as this is the single bit cassette data input. Bits 2 through 7 are set as outputs since these bits are linked to the digital to analogue converter for sound output. Once sound output has been enabled, sound is produced by feeding numbers into the D-A converter (Figure 7).

The control register (Figure 8) deals with the printer and cassette relays; in both cases the relay is triggered by means of an interrupt. For example setting bit 5 to '0' calls the cassette relay interrupt. Bit 3 is the line to the cassette remote — a '1' switches it on. This is used by the MOTORON, MOTOROFF commands.

Bits 3 through 7 (Figure 9) are the video control lines. Bit 2 is the RAM size and is '1' by default. Bit 1 is the single bit sound output used in conjunction with the D-A converter at FF20 to produce sound. These lines are all set to input.

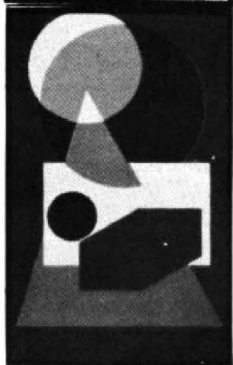
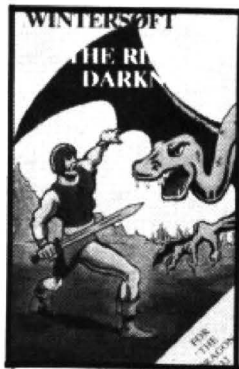
Bits 0,1 (Figure 10) indicate whether a cartridge is present; if it is, then control is transferred immediately. For the technically minded, once the computer is switched on and the computer has configured the PIA then the FIRQ flag goes up and a FIRQ calls the cartridge. Bit 3 is the sound enable bit used by SOUND, PLAY, AUDIO ON/OFF. Sound is output to the TV when this bit is set to '1'. Bits 4,5 must also be '1'. (Much of the notation used in this article is standard notation used by Motorola and is that company's copyright.) ■

DRAGON OWNERS



HAVE A GAME FOR YOU

AT WINTER SOFT WE AIM TO PIT YOU AGAINST THE DEADLIEST ADVERSARIES. KEEP YOU GUESSING, AND STRETCH YOUR CREATIVITY TO THE LIMITS



THE RING OF DARKNESS

The game created to be the most complete, enthralling, addictive and detailed adventure ever written for the Dragon 32. A whole graphic world (of nearly 3,000 travel days) with kings, princesses, mad jesters and dangerous quests will unfold before you. Across ocean, river, mountain and forest you travel to trade in many towns and dare the depths of vast dungeons (more than nine levels deep with over 20 different creatures in hi-res 3D graphics), in search of fortune and the hidden curse of the Dark Ring. Many hours of mystery, suspense and raw excitement await you.

"The most impressive adventure tested ... soon displaced breakfast TV in our house." *Your Computer* (April) **£10.00**

DRAGON TREK

Your starship has just entered quadrant 6-8. You are surrounded by eight battle cruisers of the Klingon Empire. Do you fight or run? They launch a salvo of photon torpedoes. You're HIT! Get a damage report. It's OK, the shields are holding, the next move is up to you, but be quick or they will attack again. Hi-res graphics, onboard computer and lag time interaction will have you zapping Klingons till the stardate 2477.

"Excellent value for money ... the title sequence was magnificent." *Your Computer* **£6.99**

PEPPER'S GAME PACK

Huge blue mushrooms, mad wizards, bouncing bricks, chessboard strategy, doomed space shuttles and mind teasing codes. They're all to be found on this great compendium of six games (Mushroom Muncher, Nad the Necromancer, Pepper's Breakout, Chessboard Tracker, Chameleon Run and MasterBrain) **£7.95**

ARTIST'S DESIGNER

Produce intricate designs in hi-res graphics and save them on cassette. Full list of features include text merging, joystick or keyboard control, circles, paint and shape replication. Ideal for home video captions, education, charts and diagrams. **£6.99**

All prices include p&p, VAT and the WINTER SOFT guarantee of quality and reliability. Available from Boots and good software outlets nationwide, or send cheques PO to:



Dept D, 30 Uplands Park Road
Enfield, Middx. EN2 7PT
Tel: 01-363 0313



DRAGON SOFTWARE

FOR ALL THE FAMILY

COMPENDIUM SERIES ... £6.95 each

FAMILY PROGRAMS

8 games/education/utility programs. Suitable for all the family.

FUN AND GAMDS

games compendium for all ages (10 programs)

LIVE AND LEARN

collection of educational programs for the older child and adult.

ARCADE ACTION ... £5.75

CITY DEFENCE

exciting missile command game for one player with joystick.

TREASURE CHEST SERIES ... £3.95 each

QUIZ PACK. 500 word vocabulary word quiz and crossword puzzle generator.

INFANT PACT. Pre-school education. Learn the alphabet and simple counting.

ACTION PACK. Maze game and Scorpion attack.

What they said

"Good value for money ... professionally presented tapes" — *Which Micro and Software Review*.

"Well thought out programs, made better by professional presentation and full use of Dragon facilities" — *Popular Computing Weekly (Fun & Games)*.

"Excellent for children's parties" — *Your Computer (Fun & Games)*.

"Excellent value for money" — *Dragons Teeth*.
"Good value package" — *Softwords (Family Programs)*.

★★★ EMPIRE ★★★ £6.95

- Defeat the evil Dragon empire before it conquers the world!
- Exciting game of strategy for all ages (no joystick needed).
- 7 world maps, on-screen scoring, partial screen scrolling.
- 100% High Resolution in full colour with effective sound effects.
- 8 levels of difficulty.
- With comprehensive instructions.

GENDROUS DEALER DISCOUNTS

— send now for Starter Pack offer.

All cassettes carry a lifetime replacement guarantee, are despatched within 48 hours and qualify you for future discounts.

(SEND CHEQUES/PO to
or write to us for details
of your local SHARDS
stockist)

SHARDS SOFTWARE

At:
**10 PARK VALE COURT
VINE WAY, BRENTWOOD
ESSEX CM14 4UR**

OPEN FILE FOR DRAGON USERS

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed. Take care that the listings are all bug-free, enclosing a printout if possible. We pay £6 for each bug-free program published, double for the program of the month. If you have any problems with the listings, please send your queries to the appropriate author, *Dragon User*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Lines

From W J Greenall in Bishop's Stortford
THESE TWO PROGRAMS use the line facility of the Dragon 32 in producing curves from a series of straight lines, in much the same way as artists using string

or copper wire and nails on a wooden base.

In each of the programs line 10 sets up the graphics mode and clears the high resolution screen, the FOR ... NEXT loops produce the series of lines required for the given pattern and the final program line holds the display static until the BREAK key is depressed. Without this the display returns automatically to the TEXT

mode. In the second example line 60 paints out the unused portions of the screen.

Finally, after you have run one of the programs, press BREAK and type in NEW and press ENTER. Now enter the following one line program:

```
10 PMODE 4,1:SCREEN 1,0:GOTO 10
Run this. Then try altering the PMODE and SCREEN instructions in this program.
```

```
1 REM LINES BY W.J. GREENALL.
10 PMODE 4,1:SCREEN 1,0:PCLS
20 FOR X=0 TO 191 STEP 8
30 LINE(X+64,0)-(255,X),PSET
40 LINE(X+64,191)-(255,191-X),PSET
50 NEXT
60 FOR X=191 TO 0 STEP -8
70 LINE(0,191-X)-(X,0),PSET
80 LINE(0,X)-(X,191),PSET
```

```
90 NEXT
100 GTC 100
```

```
1 REM LINES 2 BY W.J. GREENALL
10 PMODE 4,1:SCREEN 1,0:PCLS
20 FOR X=192 TO 0 STEP -8
30 LINE(32,X)-(X+32,191),PSET
40 LINE(223,X)-(X+32,0),PSET
50 NEXT
60 PAINT(1,1):PAINT(225,1)
70 GTC 70
```

Scoring

From C Stone in Oldham
THIS PROGRAM CAN be used by any Dragon user to place a score routine on

the hi-res screen. When adding this routine to a program enter the listing from lines 10 to 260. Lines 300 and 380 should not be entered as they are only used to test the program. Lines 300 to 310 are the works of the program, and are entered anywhere a program needs a score, and a score update.

Variables

N\$=Data for drawing numbers.
B\$=Data for blanking numbers.
S\$=Data for drawing score.
A=Units counter.
A1=Tens counter.
A2=Hundreds counter
Lines 300-380 test the program

```
10 REM*****
20 REM**(<C>) C.A.STONE.1983**
30 REM*****
40 CLEAR500
50 DIMN$(11)
60 REM*****
70 REM DEFINE DRAW DATA
80 REM*****
90 N$(0)="C1B0+0,-1FR2EU4HL2GD4"
100 N$(1)="C1B+1,+0U6G"
110 N$(2)="C1B+4,+0L4UER2EU2HL2G"
120 N$(3)="C1B0+0,-1FR2EUHL2R2EUHL2G"
130 N$(4)="C1B+3,0U6G3R4"
140 N$(5)="C1B0+0,-1FR2EU2HL3U2R4"
150 N$(6)="C1B0+0,-2ER2FDGL2HU4ER2F"
160 N$(7)="C1B+2,+0U2E2U2L4"
170 N$(8)="C1B+1,+0R2EUHL2HUER2FDGL2GDF"
180 N$(9)="C1B0+0,-1FR2EU4HL2GD3FR3"
190 REM*****
200 REM B$="BLANK NUMBER"
210 REM*****
220 B$="C0B0+0,-6R20D1L20D1R20D1L20D1R20"
230 REM*****
```

Continued on page 42

```

240 REM S$="SCORE"
250 REM*****
260 S$="C1BM+0,-1FR2EH4ER2FBM+4,+5HU4ER2FHL2GD4FR2EBM+4,+1R2EU4HL2GD4FBM+6,+0U6R
3FDGL3RF3BM+4,+0R4L4U3R4L4U3R4BM+4,+4R4BM+0,-2L4"
270 REM*****
280 REM DRAW NUMBERS
290 REM*****
300 PMODE4,1:SCREEN1,1:PCLS
310 A=A+1
320 IFA>9THEN A1=A1+1:A=0
330 IFA1>9THENA2=A2+1:A1=0
340 IFA2>9THEN A2=0:A1=0:A=0
350 DRAW"BM225,10"+N$(A2)+"BM232,10"+N$(A1)+"BM239,10"+N$(A)
360 DRAW"BM180,10"+S$
370 DRAW"BM225,10"+B$
380 GOTO310

```

Space Race

From Alison Dowey in Lurgan

THIS IS AN Invaders-type game in which you have to shoot all the aliens before your fuel runs out. The more aliens you shoot, the faster your fuel is used up. The

instructions are contained in lines 670-720. Lines 10-150 set up the variables. 160-270 draw the screen, 280-590 are the main movement routine and 600-660 are the end-of-game routine.

```

10 '**SPACE RACE...BY...A.DOWEY
20 CLS:PRINT"DO YOU WANT INSTRUCTIONS(Y/N)"
30 A$=INKEY$:IFA$<>"Y" AND A$<>"N" THEN 30
40 IFA$="Y" THEN GOSUB680
50 POKE65495,0
60 K=0
70 DD=0
80 CLS0
90 '
100 TI=0:TK=0:TL=0:TJ=0
110 A=1024
120 HITS=1
130 B=A
140 SCORE=20
150 G=A+463
160 FORX=3 TO 27 STEP4
170 A=1024
180 FORI=0 TO288 STEP 32
190 POKEA+I,202
200 NEXTI
210 FORI=320 TO 456 STEP 32
220 POKEA+I,186
230 NEXTI
240 FORY=64 TO 320 STEP 64
250 POKEA+X+Y,145
260 POKEA+X+Y+1,153:POKEA+X+Y+2,153
270 NEXTY:NEXTX
280 '*****MOVEMENT*****
290 TI=TI+1
300 B$=INKEY$
310 IFB$="Z" THEN B1=-1
320 IFB$="X" THEN B1=1
330 IF K=1 THEN POKE SHOT,128
340 :FK=1 THEN SHOT=SHOT-32
350 IF SHOT<A THEN K=0
360 IF K=0 THEN 390
370 IF PEEK(SHOT-32)=153 THEN POKESHOT-32,128:POKESHOT-33,128:POKE SHOT-34,128:P
OKE SHOT-31,128:K=0:PLAY"T25503A":SCORE=SCORE+28
380 IF PEEK(SHOT-32)=145 THEN POKE SHOT-32,128:POKE SHOT-31,128:POKE SHOT-30,128
:PLAY"T25503A":K=0:SCORE=SCORE+28
390 '
400 PRINT@481,"SCORE";SCORE;" ";:SCREEN0,1
410 SCREEN0,1
420 IF SCORE=1000 THEN 570
430 IFK=1 THEN POKE SHOT,209
440 IFB$="M" AND K=0 THEN SHOT=G-32:K=1
450 G=G+B1
460 IFG>A+510-32 THEN G=A+510-32
470 IF G<A+449 THEN G=A+449

```

```

480 IF B1=1 THEN POKEG-B1,128
490 IFB1=-1 THEN POKEG+2,128
500 POKEG,231:POKEG+1,226
510 TJ=TI/(30-3*DD):TK=FIX(TJ)
520 IFTK=TL THEN 550
530 TL=TK
540 POKEA-32+32*TK,128
550 IF TL=15 THEN 600
560 GOTO280
570 DD=DD+1
580 POKEG,128:POKEG+1,128
590 GOTO90
600 CLS:PRINT@226,"PLANET DESTROYED.HARD LUCK";:SCREEN0,1
610 PRINT@34,"TOTAL SCORE ";DD*1000+SCORE;
620 HO=DD*1000+SC:IFHO>HI THEN HI=HO
630 PRINT@98,"HI-SCORE IS ";HI;
640 PRINT@484,"PRESS KEY P";
650 SCREEN0,1
660 IF INKEY$="P" THEN GOTO 50 ELSE 660
670 CLS1
680 PRINT@34,"THIS IS AN INVADERS TYPE GAME   IN WHICH YOU HAVE TO SHOOT   AL
L THE ALIENS BEFORE YOUR   FUEL RUNS OUT.   THE MORE ALIENS YO
U SHOOT   THE FASTER YOUR FUEL IS USED   UP."
690 PRINT:PRINT"THE KEYS ARE <-z x-> AND m FIRES"
700 PRINT@482,"PRESS A KEY TO PLAY"
710 IF INKEY$="" THEN710
720 RETURN

```

Brick Out

From Paul Hill in Stevenage

USE YOUR SKILL to break down the wall. Please note that POKE 65495,1 has been used to speed up the ball. If your machine will not run then delete line 900. Also do not break the game until the computer asks "Another game yes or no", as the

poke will stop the cassette recorder working. The listing was printed using a Colour Graphic Plotter 115.

Program notes

Lines

60-130 Set up.
140-240 Ask if joysticks or arrow keys are required.
250-320 Instructions of game.
330 Play a tune.
340-680 Brick wall and score routine.

690-780 Start of main loop and placing of the bat.
790-920 Ball position X and Y.
930-990 Convert X and Y to PRINT@.
1000-1090 Remove brick and play routine.
1100-1130 Random bounce.
1140-1160 Check if all bricks are removed and update on score.
1170-1230 New game tune.
1240-1370 Game over, display score and hi-score.

```

10 ' BRICK OUT LL";
20 ' 270 PRINT@130,"THE BRICKS.";
30 ' * BY P.HILL * 280 PRINT@194,"FOR EACH BRICK HIT YOUR S
40 ' 17-4-83 CORE";
50 ' USING A CGP-115 290 PRINT@258,"WILL BE INCREASED BY ";
60 ' ----- 300 PRINT@322,"10 POINTS.";
70 ' SET UP.. 310 PRINT@450,"PRESS A KEY TO START..";
80 HI=0:F=0:CLS7 320 A$=INKEY$:IF A$=""THEN 320
90 FOR J=0 TO 31 330 GOSUB 1220
100 B$=CHR$(128) 340 CLS0:G=1:S=0:S1=0
110 C$=C$+B$ 350 PRINT@2,"score";+CHR$(128);S1;
120 NEXT J 360 PRINT@17,"hi";+CHR$(128);"score";HI;
130 D$=CHR$(195)+CHR$(195)+CHR$(195) 370 '-----
140 '----- 380 GOSUB 390:GOTO 690
150 PRINT@42,"BRICK OUT!"; 390 ' BRICKS & WALL SUBROUTINE
160 FOR N=74 TO 83 400 FOR N=32 TO 62 STEP 2
170 PRINT@N,"=";:SOUND 50,2 410 PRINT@N,CHR$(159);
180 NEXT N 420 NEXT N
190 PRINT@134,"WHICH WILL YOU USE -"; 430 FOR N=33 TO 63 STEP 2
200 PRINT@194,"JOYSTICK(1) OR ARROW KEYS 440 PRINT@N,CHR$(255);
(2)"; 450 NEXT N
210 PRINT@262,"ENTER ";:INPUT JA 460 FOR N=64 TO 94 STEP 2
220 IF JA>2 THEN 150 470 PRINT@N,CHR$(255);
230 IF JA=1 THEN F=1 480 NEXT N
240 IF JA=2 THEN F=2 490 FOR N=65 TO 95 STEP 2
250 CLS7 500 PRINT@N,CHR$(159);
260 PRINT@66,"USE YOUR SKILL TO REMOVE A 510 NEXT N

```

Continued on page 44

```

520 FOR N=96 TO 126 STEP 2
530 PRINT@N,CHR$(159);
540 NEXT N
550 FOR N=97 TO 127 STEP 2
560 PRINT@N,CHR$(255);
570 NEXT N
580 FOR N=128 TO 158 STEP 2
590 PRINT@N,CHR$(255);
600 NEXT N
610 FOR N=129 TO 159 STEP 2
620 PRINT@N,CHR$(159);
630 NEXT N
640 FOR N=0 TO 448 STEP 32
650 PRINT@N,CHR$(133);
660 PRINT@N+31,CHR$(138);
670 NEXT N
680 RETURN
690 '-----
700 X3=1:Y3=1:X=RND(27)+3:Y=RND(5)+15
710 ' LOOP..
720 ' KEY OR JOYSTICK MOVEMENT..
730 IF F=1 THEN XX=(JOYSTK(0)*.42):GOTO
760
740 IF F=2 AND PEEK(343)=223 THEN XX=XX-
1:IF XX<0 THEN XX=0
750 IF F=2 AND PEEK(344)=223 THEN XX=XX+
1:IF XX>27 THEN XX=27
760 PRINT@449+XX,D$;
770 PRINT MID$(C$,XX+3,27-XX);
780 PRINT@449,LEFT$(C$,XX);
790 '-----
800 ' BALL POSITION X & Y
810 X=X+X3:Y=Y+Y3
820 IF X<3 THEN X3=1
830 IF X>60 THEN X3=-1
840 IF Y<3 THEN Y3=1
850 IF Y>29 THEN G=G+1:PLAY"L4001GFEDC":
IF G>3 THEN 1260 ELSE 700
860 SET(X,Y,0)
870 IF POINT(X,Y)=2 THEN S1=S1+10:GOSUB
950
880 IF POINT(X,Y)=8 THEN S1=S1+10:GOSUB
950
890 IF POINT(X,Y)=5 THEN PLAY"L80C":Y3=-
1
900 POKE 65495,1:' SPEED UP!!
910 RESET(X,Y)
920 GOTO 710
930 '-----
940 ' CHANGE X,Y TO PRINT @
950 IF INT(Y/2)=Y/2 THEN NY=Y*16:GOTO 97
0
960 NY=(Y-1)*16
970 IF INT(X/2)=X/2 THEN NX=X/2:GOTO 990
980 NX=(X-1)/2
990 A=(NY+NX)
1000 '-----
1010 POKE 65494,1:'SLOW DOWN!!
1020 ' REMOVE BRICK..
1030 FOR NN=1 TO 5
1040 PRINT@A,CHR$(159);
1050 FOR N=1TO5:NEXT N
1060 PRINT@A,CHR$(128);
1070 NEXT NN
1080 PLAY"L25505CDEFG04FEDCBA"
1090 D=RND(3)
1100 ' RANDOM BOUNCE..
1110 IF D=3 THEN X3=1
1120 IF D=2 AND Y<>9 THEN Y3=-1:GOTO 114
0
1130 Y3=1:D=0
1140 S=S+1:IF S>119 THEN GOSUB 1310:S=0:
GOTO 1250
1150 PRINT@8,S1;
1160 RETURN
1170 '-----
1180 ' NEW GAME TUNE..
1190 FOR N=1 TO 2
1200 PLAY"L4004ACEG03ACEG04ACEG"
1210 NEXT N
1220 PLAY"L4004CEFGAB05CDEFG"
1230 RETURN
1240 '-----
1250 ' >>- GAME OVER -<<
1260 IF S1>HI THEN HI=S1
1270 POKE 65494,1:'SLOW DOWN!!
1280 CLS6:PRINT@42,"GAME OVER.";
1290 PRINT@74,"===== ";
1300 PRINT@169,"YOUR SCORE:-";S1;
1310 PRINT@265,"HI SCORE:-";HI;
1320 FOR DE=1 TO 400:NEXT DE
1330 PRINT@452,"ANOTHER GAME YES OR NO";
1340 G$=INKEY$
1350 IF G$="Y"THEN 330
1360 IF G$="N"THEN CLS:END
1370 GOTO 1340

```

Loading hex

From Peter Barry in *Wirral*

THIS IS A simple method of loading hexadecimal numbers directly into memory. The program listed is a short machine code routine for 'un-NEWing' an accidentally 'NEWed' program. If this should happen then a simple EXEC 32754 will bring the program back. The routine will not work if you type in a new Basic line or define a new variable before restoring the old program.

```

10 CLEAR 200,32753
20 DATA 9E,19,BD,83,F3
30 DATA 30,02,9F,1B,9F,1D,9F,1F,39
40 FOR I=0TO13
50 READ A$:A$="&H"+A$
60 POKE 32754+I,VAL(A$)
70 NEXT I

```

The key to **PROFESSIONAL SOFTWARE**

NEW
ZM SOFTWARE

for **PERFECTIONISTS**

- N NEWBRAIN
- B BBC
- M MPF - II
- V VIC - 20
- D DRAGON - 32

The Accountant Set of 2 Programmes

- SALES Ledger
- PURCHASE Ledger

Menu driven, Complete Accounts Ledger systems including a Print Analysis - Hard Copy and other functions you only expect on Disc systems. Including a 12 pg. User Manual.
Cassette versions £55.00 each.
Both Programmes £100.00 the set.

Telephonist -
A Directory so comprehensive that it will become a must for all serious users. Sort routines on any field and 3 digit recognition.
Cassette version £20.00

Calc-A-Chart & Analyst
(available soon)

Composer
A Programme with the heart of a Master Composer, giving you a chance to compose a classic, with automatic notation.
Cassette version for Model 'B' £6.95

Dragon Ledger
Either Sales or Purchase, this Programme gives you all you need to run a small Business, includes VAT and Print analysis together with a 12 pg. User Manual.
Cassette Version £49.95

Dealer/Trade discounts available for quantity
Cash with orders for immediate delivery
ACCESS CARD HOTLINE - (0562) 742142.
WE GUARANTEE DESPATCH WITHIN 24 HOURS
All Prices include VAT
P & P 50p

The Librarian -

- KARD Index, is Menu driven, with excellent sort routines and giving you a % of Memory remaining on every entry. One programme being user definable.

Cassette versions £28.95 each.

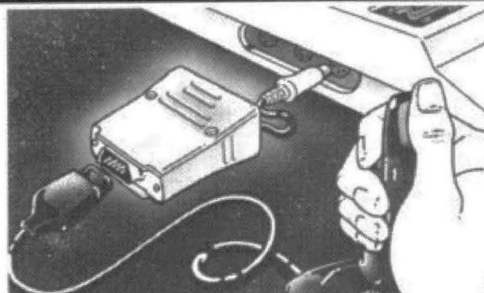
Filing Clerk
The answer to all your worries: A page Filing System with all the menu driven functions you only find on large Databases. Together with a 12 page User Manual.
Cassette Version £30.00.



Tel: (0562) 742142

MICRO HOUSE
GREENHILL
INDUSTRIAL EST
KIDDERMINSTER
WORCS

GIVE YOUR DRAGON SOME STICK!



DRAGONTAMER from Mr. Micro allows Atari type and other digital joysticks such as Pointmaster and Quickshot to be used with your Dragon—giving better response and more control. For the first time your Dragon will be able to reflect your true skills so that you can achieve higher game scores with less frustration.
PLUS
To ensure maximum value, the DRAGONTAMER package includes two original Mr. Micro games for use with digital joysticks.

DRAGONTAMER is available by post direct from Mr. Micro. Send a cheque or postal order for £9.90 to Mr. Micro Ltd., 69 Partington Lane, Swinton, Manchester M27 3AL. Please allow 28 days for delivery. Dealer enquires are welcomed.



Tandy[®]



DRAGON



AUTHORISED DEALER

As DRAGON specialists and TANDY dealers, we are able to advise and supply you with all the DRAGON compatible TANDY products as well as a full range of DRAGON software and hardware.

GRAPHICS GENERATOR

A new program for the DRAGON and TANDY Computers by Tony Worrall.

- * Wish you could produce complex graphics and Text in high resolution?
- * Need an easy to use program to help you?
- * Want to combine your pictures with your own programs?

You need our **GRAPHICS GENERATOR**. Packed with features including routines for inverting, rotating, copying, overlaying, tape saving & loading, printing etc.

Send £9.95 for program & 12 page manual
or £1.00 for manual only (refundable on purchase of the program).

We publish a monthly DRAGON newsletter (£4.50 for 12 months subscription).
Please contact us for all your Dragon/Tandy requirements.



Computer Systems
(Torbay)

TEL: Brixham 6565

Pump Street,
Brixham,
DEVON
TQ5 8ED.

Classified

For Classified Advertising Rates please ring
Simon Langston on 01-930 3840

— DRAGON COPY —
copy machine code cassettes and merge
programs. Send £1.50. P. Kigallon, 14
Hamble Drive, Penketh, Cheshire.

NEW NEW

CHOPPER BLITZ (Destroy the city
and parachute to safety) £7
GOBBLER [+] (A Maze Chase
then thru' the Tunnel to real danger)
£6.50.

SAE and 50p for Catalogue
SAINT GEORGE SOFTWARE (DU)
73 Ling Street, Liverpool 7

DRAGON INDEPENDENT OWNERS ASSOCIATION

Maths program:
MATHS DERBY — Programmable maths race
which children of all capabilities can play on
equal terms. Kids can play dad!
MATHS ADVENTURE — Aimed at 9-11 year
olds. Use your tables to outwit the Maths
Monster and enter his castle.
PLUS BONUS PROGRAMS
D.I.O.A. Members £3.95 inc P&P
Non-members £4.95
Cheques/PO: D.I.O.A. School House, Win-
tergardens, Canvey Island. Send S.A.E. for
membership details.

PROTECT YOUR DRAGON with a
fitted PVC dust cover, only £3.95 inclu-
sive. Sherborne Designs, 'Victory
House', 8a The Rank, North Bradley,
Trowbridge, Wilts. Tel: 02214 4425.
Access and Barclaycard. Covers for all
computers, printers, monitors, etc.
available. Dealer enquiries welcome.

*** THE SOFT SEVEN ***

A collection of seven quality programs for
the DRAGON 32

1. GALACTIC BOMBER
2. HEAR AND SPELL
3. WORDSEARCH
4. GRAPHIX
5. MUSIC MAKER
6. HANGMAN
7. THE GREAT RACE

All on one cassette costing **ONLY £3.50**
incl P&P. Send cheque/postal order to:

T. D. COPSEY
20 Thorington Avenue, Daws Heath
Hadleigh, Benfleet, Essex

COMPUTER CORRESPONDENCE COURSES

LEARN TO MASTER THE DRAGON

A complete course in BASIC program-
ming which is designed specifically for
the DRAGON micro-computer. It in-
cludes word processing, file-
management, stock-control, games, and
educational applications. Suitable for the
complete beginner, hobbyist, teacher,
and business person.

Cost of Course
Including computer **£243.00** (incl)
Excluding computer: **£89.50** (incl)
Price per Module: **£8.95** (incl)

For full details write enclosing sae to:

COMPUTER CORRESPONDENCE COURSES

(Dept. D.U.) Churchway, West Ilsley
Nr Newbury BERKS RG16 0AH
Tel: (06328) 336

COVER YOUR DRAGON. Attractive
two-tone fitted cover, £2.95, including
postage. Covers for all other compu-
ters, printers, monitors, etc. available.
Computacovers, 52 Wolseley Road,
Rugeley, Staffordshire.

DRAGON OWNERS. Why risk losing
your valuable M/C programs. Fast,
reliable copying service, only £2 includ-
ing tape and p&p. C J Fletcher, 22
Leacroft Road, Winster, Nr Matlock,
Derbyshire DE4 2DL.

DRAGON RALLY RACER. The
newest and best game from Video
Software, price £4.50 (inc p&p). Send
cheques to Video Software, 22 Fair-
lawn, Swindon, Wilts SN3 6ET.

DRAGON GAMES. Lines: Surround
your opponent before he surrounds
you. Saviour: Save your last remaining
city. Both with m/c. Only £5 for the two.
Send to Ottawa Software, 34 Oaklands
Avenue, Saldean, Brighton, Sussex.

TERMINAL SOFTWARE

LINE UP 4 — Our first program for the
Dragon 32 — a machine code brain
teaser

Only £4.95!

From all good dealers or by mail order
from

TERMINAL SOFTWARE, Dept. DU,
28 Church Lane,

Prestwich, Manchester M25 5AJ

★ ★ Dealer enquiries welcome ★ ★

★ ★ Machine code programmers! ★ ★ ★ ★
We will offer up to £1,000 for good,
original programs for any of the popular
micros.

WANTED URGENTLY

Games programs for The Dragon.
We pay top royalties or purchase
your program for cash. We have
the organisation to market your
work properly and national dealer
network to ensure maximum re-
ward for your genius.

Write today in confidence to:

**NORTHWISH,
GROUND FLOOR,
RALLI BUILDING,
STANLEY STREET,
MANCHESTER M3 5FD
or phone 061-832 7049**

SWAP UNWANTED SOFTWARE
through our exchange club. Free mem-
bership. Send SAE for details: A & P
Software Services (DU), 142 Broad-
stone Way, Bradford, Yorkshire.

DRAGON GAMES by Brother Soft-
ware. Maze Men, £5. Adventure, £5.
Dambusters, £4. Cat and Mouse, £4.
Cheque/PO to A. Brown, 25 Augustus
Close, St Albans, Herts.

DRAGON USERS. Send your program
on tape which I will return with printed
listing, £2.00. M. Swanson, 5 High
Street, Spilsby, Lincs.

BY RETURN LISTING SERVICE for
Dragon BBC Spectrum Newbrain Oric.
Send £1 per program plus tape, plus
sae to Byte 7, Riverway, Nailsea, Avon
(0272) 851337.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

£0.20	£0.40	£0.60	£0.80
£1.00	£1.20	£1.40	£1.60
£1.80	£2.00	£2.20	£2.40
£2.60	£2.80	£3.00	£3.20
£3.40	£3.60	£3.80	£4.00
£4.20	£4.40		

Please continue on a separate sheet of paper

I make this..... words, at 20p per word so I owe you £.....

Name.....

Address

.....

.....

Telephone.....

Please cut out and send this form to: Classified Department, *Dragon User*, Hobhouse Court, 19 Whitcomb
Street, London WC2

Labelling

From P Williams in Guisborough

THIS PROGRAM UTILISES the good text handling abilities of the Dragon. The idea of the program is to produce, on a printer, leaflets or labels which could be used for advertising, book or record labels, invitations, admission tickets, or any similar use by small clubs or private individuals. The

unique aspect of the program is that each line of text is automatically centred on the line. This produces a professional appearance.

160-220

accept any input.

The printout to the screen. The centralising is done by lines 190 and 200 by deducting the LENGTH of the line string from the width(W) and dividing by two. The INT function is used in order to cater for odd-width lines.

The printout, using similar procedures as above.

This is a facility for modifying various aspects of the format

Program notes

Lines

- 20 Clears enough space for an A4 size printout.
- 50-100 Specifies size and border style.
- 120-150 Input of each line of text. Note the use of line input in 140 to

310-500

630-end

```

10 REM*****LEAFLET*****
15 REM (C)F.WILLIAMS 1983
20 CLEAR5280
30 CLS:PRINTTAB(9) "LEAFLET PRINTER":PRINTSTRING(32,"*")
40 PRINT
50 INPUT "WHAT WIDTH?":W
60 INPUT "WHAT HEIGHT?":H
70 INPUT "WHAT SYMBOL FOR BORDER?":B$
80 CLS:PRINT "WE CAN NOW ADD EACH LINE OF TEXT:"
90 PRINT "IF YOU REQUIRE A BLANK LINE"
100 PRINT "ENTER 0(ZERO) "
110 DIM L$(W)
120 FOR Z=2 TO (H-1)
130 PRINT "LINE ("Z):"
140 LINE INPUT L$(Z)
150 NEXT Z
160 PRINTSTRING(W,B$)
170 FOR Z=2 TO (H-1):PRINTB$
180 IFL$(Z)="0" THEN GOTO 40
190 FOR Z=1 TO INT((W-2)-LEN(L$(Z)))/2:PRINT " " :NEXT Z
200 PRINTL$(Z) :FOR V=(Z+LEN(L$(Z))) TO (W-2):PRINT " " :NEXT V
210 IF (V+Z+LEN(L$(Z)))=W-2 THEN GOTO 200 ELSE PRINT " "
220 PRINTB$
230 GOTO 250
240 FOR Z=2 TO (H-1):PRINT " " :NEXT Z:PRINTB$
250 NEXT Z
260 PRINTSTRING(W,B$)
270 INPUT "IS THIS OK?":A$
280 IFA$="N" THEN GOTO 610
290 IFA$="Y" THEN GOTO 10
300 GOTO 270
310 CLS:PRINT(32+6)+B." IS PRINTER READY?":INPUTR$
320 IF R$="Y" THEN GOTO 340
330 GOTO 310
340 INPUT "HOW MANY PRINTS DO YOU REQUIRE?":N
350 FOR P=1 TO N
360 CLS:PRINT(32+6)."LEAFLET NO. "P": " BEING PRINTED"
370 PRINT:PRINT(N-P) " MORE TO PRINT"
380 FOR Y=1 TO (W-1):PRINT#-2,B$:NEXT Y:PRINT#-2,B$
390 FOR X=2 TO (H-1):PRINT#-2,B$
400 IFL$(X)="0" THEN GOTO 600
410 FOR Z=1 TO INT((W-2)-LEN(L$(X)))/2:PRINT#-2," " :NEXT Z
420 PRINT#-2,L$(X) :FOR V=(Z+LEN(L$(X))) TO (W-2):PRINT#-2," " :NEXT V
430 IF (V+Z+LEN(L$(X)))=W-2 THEN GOTO 440 ELSE PRINT#-2," "
440 PRINT#-2,B$
450 GOTO 470
460 FOR Z=2 TO (H-1):PRINT#-2," " :NEXT Z:PRINT#-2,B$
470 NEXT Z
480 FOR Y=1 TO (W-1):PRINT#-2,B$:NEXT Y:PRINT#-2,B$
490 PRINT#-2
500 NEXT P
510 CLS:PRINT(32+6)+B."LEAFLET FINISHED"
520 INPUT "IS THIS OK?":A$
530 IFA$="Y" THEN CLS:GOTO 560
540 IFA$="N" THEN GOTO 610
550 GOTO 520
560 PRINTTAB(10) "ANOTHER ONE ?":INPUTS$
570 IFS$="Y" THEN GOTO 10
580 IFS$="N" THEN CLS:GOTO 600
590 GOTO 560
600 CLS:PRINT(32+6)+4." THANK YOU HAVE A NICE DAY":END
610 CLS:PRINTTAB(7) "LEAFLET AMMENDMENT"
620 PRINTSTRING(32,"-")
630 PRINT:PRINT "OPTIONS FOR ALTERATION:-"
640 PRINT:PRINT " 1.START AGAIN"
650 PRINT " 2.CHANGE A LINE"
660 PRINT " 3.CHANGE BORDER SYMBOL"
670 PRINT:INPUT "SELECT 1,2 OR 3":S
680 IF S=1 GOTO 10
690 IF S=2 GOTO 270
700 IF S=3 GOTO 800
710 GOTO 670
720 CLS:INPUT "WHICH LINE NUMBER DO YOU WISH TO CHANGE?":C
730 PRINT:PRINT "LINE "C" IS AS FOLLOWS:-"
740 PRINT:PRINT L$(C)
750 PRINT:PRINT "WHAT DO YOU WISH THE LINE TO BE?":LINEINPUTL$(C)
760 PRINT:INPUT "DO YOU WISH TO CHANGE ANYTHING ELSE?":A$
770 IFA$="Y" THEN GOTO 10
780 IFA$="N" THEN GOTO 10
790 GOTO 670
800 CLS:PRINT "EXISTING SYMBOL IS:-":B$
810 INPUT "WHAT SYMBOL DO YOU REQUIRE?":B$
820 GOTO 670
    
```

Reaction

From Nicholas Appleyard in Sheffield

THIS GAME IS intended to test reaction

time. When the program is run, a dot is printed on the screen at a random time and at a random point on the screen. When the dot appears the player presses the space bar and the reaction time then appears on the screen.

20-60

70-74

80

90

95-230

Prints out the instructions.

Prints out the dot at a rnd time and at a rnd point.

Adds up the time if the space bar is not pressed.

Stops time.

Prints out the answers.

The program notes are as follows:

```

5 * * * FOR THE DRAG ON 32 *
  * *
10 * * * REACTI ON * *
11 * * * BY NICHOLAS APPELYARD * A
  GED13 * *
12 * * * 1983 * *
20 CLS2
30 PRINT @64, "THIS IS TO TEST YO
  UR REACTIONS"
40 PRINT "PRESS THE SPACE BAR WH
  EN YOU SEE " CHR$(128 + 48)

50 FOR A = 1 TO 5000: NEXT A
55 CLS4: TIME = 0
60 PLAY "CDEFGAB;B;B;B;B;AGFEDC"
70 CLS
71 Y = RND (3000)
72 X = RND (480)
73 FOR N = 0 TO Y: NEXT N
74 PRINT @X, CHR$(128 + 48)
80 TIME = TIME + 1
90 IF INKEY$ = " " THEN 110

95 IF TIME > 70 THEN 200
100 GOTO 80
110 IF TIME = 1 THEN 170
115 CLS
120 PRINT @32, "YOUR TIME WAS "; T
  IME
130 PLAY "T6L3BL8AL3GL8FL3EL8DL1C"

140 PRINT "PRESS ANY KEY TO TRY
  AGAIN";
150 IF INKEY$ = "" THEN 150
160 GOTO 55
170 CLS: PRINT @32, "CHEAT!! DON'T
  KEEP YOUR FINGER ON THE BAR
  !"
180 SOUND1,50
190 GOTO 140
200 CLS: PRINT @32, "YOU HAVE GRAN
  NY REACTIONS!!"
210 PLAY "AB;AB;B;B;A"
220 GOTO 140
230 END
    
```

SPECIALLY FOR THE DRAGON USER

2 books from Sunshine

Dragon Games Master is a carefully structured book about writing games programs. All major aspects of interactive computer games are considered as you learn how to handle sound, colour, graphics, movement, mazes, detection, decisions, responses, consequences, scoring systems, status displays, economics, skill levels, title sequences and instructions. You will learn how to include these features in all your own games. The book takes you through each step line by line from writing the simplest games right through to the design and construction of first class adventure programs which rival commercial software in their complexity and presentation. (160pp) £5.95

Dragon 32 Games Master



The Working Dragon 32



The Working Dragon is the book for those of you who dream of putting your computer to some practical use. It is based on a collection of solid, sophisticated programs in areas such as data storage, finance, graphics, household management, education and games of skill. Some of the more advanced programs include a Text Editor, which can perform many of the functions of a word processor, and Music Editor, which will let you write long music programs without endlessly repeating similar routines. Each of the programs is explained in detail, line by line. And each of the programs is built up out of general purpose subroutines which, once understood, can form the basis of any other programs you need to write. Advanced programming skills spring out of the discussion explaining each subroutine. The collection also leaves you with a wide range of practical application programs which might otherwise only be available on cassette. (160pp) £5.95

Published June 14



SUNSHINE

(Also publishers of Popular Computing Weekly and Dragon User magazines)

Please send me The Working Dragon 32 at £5.95 each Dragon 32 Games Master at £5.95 each

I enclose a cheque/postal order for £ payable to **Sunshine Books**, 19 Whitcomb Street, London WC2H 7HF

Name _____

Address _____

Signed _____

We can normally deliver in four to five days.

Trade/Dealer enquiries welcome

MACE

EDITOR/ASSEMBLER/MONITOR

by Graham Trott



DRAGON 32 CARTRIDGE

£ 29.95

INCLUSIVE OF VAT & POSTAGE
VISA/ACCESS ACCEPTED

WINDRUSH MICRO SYSTEMS
WORSTEAD LABORATORIES, NORTH WALSHAM, NORFOLK, ENGLAND. NR28 9SA
TELEPHONE (0692) 405600 DEALER ENQUIRIES INVITED

A	Abacus Software	8	L	Lethaby Numbering Systems.....	20
B	B&H Software.....	9	M	M & J Software	26
	Bamby Software.....	4		MST Consultants.....	8 & 9
	Blaby	4		Microdeal.....	15 & 52
	Boots.....	6		Micro-De-Bug	26
	Buffer Microshop.....	4		Micro Mart	45
C	Cascade Software.....	4		Monster Software Club.....	26
	Compusense	16		J. Morrison (Micros).....	26
	Computasolve	11		Mr Micro	45
	Computer Systems.....	45	O	Oasis Software	26
	Coppice Software	11	P	PSS.....	51
	Cotswold Computers.....	11		Peaksoft	28
	Rod Crookes	28		Premier Publications	32
D	DACC	26		Programmers Guild	34
	Dragon Dungeon	18	R	Reel Computers	36
E	Eikan Electronics.....	20	S	Salamander Software.....	2
F	FBC Systems	20		Shards Software.....	40
G	Games and Computers	11		Software Lending Library	28
	Gem Software	24		Statacom	28
	Gravesend Home Computers.....	24	T	Tiger Software.....	30
H	Hilton Computer Services	24		Typewriter Centres.....	30
J	JCB Micro Systems	24	W	West Devon Electronics	30
				Windrush Micro Systems.....	48
				S. W. Winter	40
				Wizzard Software	30

Bugs for no reason

IF I may be allowed to impinge on your space I have a couple of questions on the Dragon.

First, if the computer is awaiting an input and is left for 10 minutes or more, the program develops a bug and is consequently lost. This is most frustrating if the program is home-grown and no hard copy has been made.

Secondly, when entering a program or just running one bugs appear for no reason. Use of the RESET button does not help, the keyboard loses control and strange combinations of letters and figures appear on the screen. Any clues?

*G Webber,
Weymouth,
Dorset.*

THE TWO problems you have described are most probably tied in with each other. As mentioned in the answer to a similar query in the May issue of *Dragon User*, you should first check whether there are large fluctuations in the mains power supply coinciding with the crashes. If this is the case, a good filter may be required.

Also check whether the speed-up poke is used in any of the programs, as this will generally give a similar effect or cause the machine to lock up.

If, on checking both these points, neither can be seen to be causing the problem, you should return the machine to the original dealer for testing.

Other languages

I HAVE owned a Dragon computer for two months and am very pleased with it.

I have seen another language advertised to use with my machine. It is Forth and comes in tape form. Although not dissatisfied with the Basic used with the Dragon, I would like to know if there are any real advantages in using this new language.

*Simon Webber,
Wellington,
Somerset.*

THE MOST obvious advantage of Forth over your existing Basic is that it runs a lot faster. Once familiar with the language you should also find it easier to write



programs and they should also be easier to debug.

Dragon Data will be marketing a version of Forth on cassette which will allow you to access Basic.

Keyboard grievances

AS THE owner of a Dragon 32 computer, which I have possessed for six months, I am pleased with its overall performance. Having said this, however, I have two small grievances: the size of the screen display and the lack of response from the 'cheap' keyboard.

Can the chips containing the screen display be replaced with those for another machine? And do you know of any manufacturer who produces a quality keyboard into which the 'guts' of the Dragon might be transplanted with a few alterations?

*Duncan Rennie,
Cults,
Aberdeen.*

I'M AFRAID I can't help you with either of your questions. The chips can't be replaced, but cartridges for 51 by 24 display are available. The Dragon's keyboard is one of the most expensive components in the Dragon and I don't know of anybody offering alternatives.

Memory details

I AM a fifth-form student at Billericay School, currently embarking on the Youth Enterprise Scheme, in which I plan to sell computer software.

I would be very grateful if you could advise me where I can find

a detailed printout of the Dragon 32 memory map.

*C Stichbury,
Billericay,
Essex.*

WHILE THERE is a basic memory map provided in the additional information appendix to the Dragon manual, this is not comprehensive enough for many users such as yourself.

Dragon Data now has a booklet called information for machine code users which is available on request. This booklet gives a more detailed memory map and some useful locations for those interested in machine code. Also included in the booklet are details on monitor and joystick connections which have proved useful to many users.

Graphics with text

AS EVERYONE is aware, it is not supposed to be possible to print text on a high resolution screen on the Dragon, although I have of course read various methods of drawing characters including the excellent articles by David Lawrence.

However, the higher resolutions take up four 'pages' which are in horizontal bands across the screen. I wonder if it is possible to display only three pages, using the bottom quarter of the screen for captions in normal text. It sounds feasible but I can't work out how to do it.

*F W Hart,
Moulton,
Northants.*

UNFORTUNATELY IT is not possible to mix true text and true graphics due to the fact that the text graphic mode is controlled by bit 7 of SFF22. Therefore, as

there is only one control bit, it selects either graphics (bit 7 set) or text (bit 7 clear).

Saving with hex

I HAVE been using the Tandy manuals *Getting started* and *Going ahead with Colour Basic*. On a Tandy it seems possible to CSAVEM using hex addresses as opposed to decimal. I could not make this work. Can you tell me if it can be done? This is the example:

CSAVEM 'x', 4E, 6F, 5F
If it can't be done, do you know why?

*Pauline Hampson,
Lawton Heath,
Alsager.*

IT IS certainly possible to use the CSAVEM command with hexadecimal addresses on the Dragon 32. All hexadecimal numbers should be preceded by an '&H' to indicate that the following alphanumeric is a hexadecimal number.

Therefore, the example you have noted should read: CSAVEM 'x', &H4E, &H6F, &H5F where &H4E specifies the start address in memory, &H6F represents the end address and, finally, &H5F represents the execute address.

POINT problems

I HAVE had a Dragon 32 now for six months and during this time two major problems have been spoiling my attempts to write programs. I can't get either the POINT or PPOINT command to work.

*M Treanor,
Benfleet,
Essex.*

THE POINT and PPOINT commands may be tested with the following routines:

```
POINT 10 CLS 3
      20 PRINT POINT(20,20)
PPOINT 10 PMODE 3:SCREEN
      1,0
      20 PCLS 3
      30 PRINT
      PPOINT(20,20)
```

These routines should both give the value 3 as the answer.

If your Dragon does not give the correct answer you should return it to the original dealer for testing.

Put robot power on your Dragon

Gordon Lee tests your skill at solving alphametics – Powertran provides the prizes.

ONE OF THE oldest types of mathematical puzzle is the 'cryptarithm' in which letters are substituted for digits, and the solver has to discover the original values. Try this example:

ABCDE * 4 = EDCBA

The answer is 21978 * 4 = 87912

In 1955, J A H Hunter invented the first cryptarithms that actually formed logical sentences. We now hear that:

STARS + RATE = TREAT

FOUR + FIVE = EIGHT

(the alphabetic is correct even if the sum isn't!) — or even

CELLAR + MURDER + CLERIC =
CLEARED

The numeric equivalents of the above alphametics are:

89568 + 6591 = 96159

6057 + 6291 = 12348 and

102263 + 983703 + 120341 = 1206307

In fact the second of the three puzzles has several other alternative solutions that you might like to find.

This month's competition question is also in the form of an alphametic. Let me set the scene: I bumped into Alan the other day outside the newsagents. "Just been for my magazines," he announced, showing me a copy of *Dragon User*, and also one of those word puzzle books.

"You seem to be getting on fine with your new Dragon," I remarked. "But I didn't know that you were interested in word puzzles as well. Here's something for you to try that combines the two."

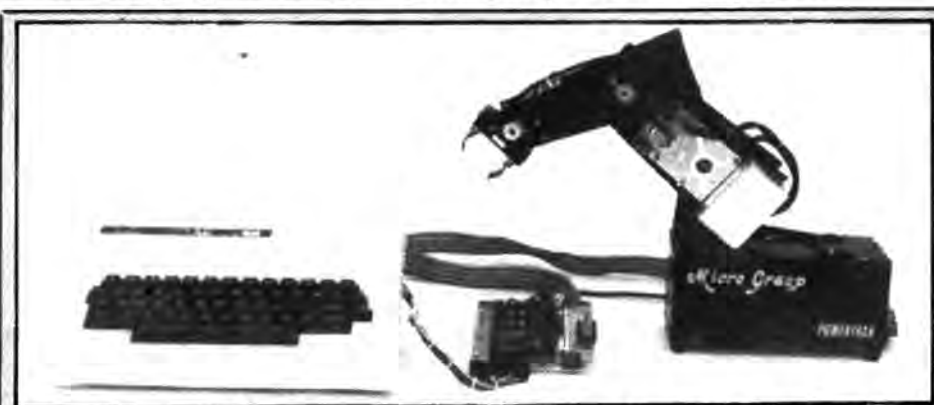
I sketched out the following alphametic based on the words DRAGON USER.

U	
S	
E	
	D
	R
	A
	G
	O
	N

"What you have to do," I explained, "is to substitute digits for letters — each different letter standing for a different digit."

"I see," muttered Alan, scratching his head. "And also both 'DRAGON' and 'USER' are perfect squares." I called after him as he walked away.

Later that day the phone rang. It was Alan. "About this puzzle," he said, "I've been working on it and it seems that there are a number of possible alternatives." "Well," I replied, "in the answer I had in mind, the word DRAGON represents my



Prize

THE PRIZE THIS month is a Micrograsp robot from Powertran Electronics, including all the necessary interfaces.

Rules

TO WIN THE robot, you have to send in the most elegant solution to the puzzle. You must show how the competition can be solved with the use of a Basic program, developed on your Dragon 32 computer.

As a tie-breaker, complete the following sentence in 15 words or less:

phone number, and you've just dialled it."

A few minutes later the phone rang again. "I still haven't enough information," announced Alan plaintively.

"Well let's say that the number represented by the letter 'E' is the same as my house number." As Alan knew my address he was able to solve the problem instantly. Can you?

May winner

In the May competition, the number of terms needed to exceed each successive integer is:

2(4); 3(11); 4(31); 5(83); 6(227); 7(616); 8(1674); 9(4550) and 10(12367).

Note that if the number of terms needed to exceed each integer is divided by the number of terms required to exceed the next smallest integer, the result — as the series progresses — converges on 2.718281828 — the constant *e*.

The winner is Gordon Harris of Middlesbrough who will be receiving his prize of a printer and word processing package from Microdeal.

I want to add a robot to my Dragon in order to

Your entry must arrive at *Dragon User* by the last working day in July 1983. The name of the winner, and the solution to the puzzle, will be printed in the September issue of *Dragon User*. You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the result.

Please send your entries to Competition Corner, *Dragon User*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



Personal Software Services

Presents

Fantasy, Heroes & Realities for DRAGON 32K



TEXTSTAR 12.95

TEXTSTAR ENABLES THE USER TO CONSTRUCT FILES IN ASCII FORMAT WHICH MAY BE RECORDED ON CASSETTE TAPE AND SUBSEQUENTLY RELOADED FOR EDITING, EXAMINATION OR PRINTING.

TEXTSTAR MAY BE USED EITHER AS A WORD PROCESSOR INCLUDING ALL THE USUAL FUNCTIONS OR TO EDIT BASIC PROGRAMS.

TEXTSTAR WILL HANDLE UP TO 21000 BITS OR A 20K PROGRAM ON 32K MACHINES. THIS IS THE EQUIVALENT OF 6 PAGES OF A4 TEXT PER LOADING.

DRAGBUG 12.95

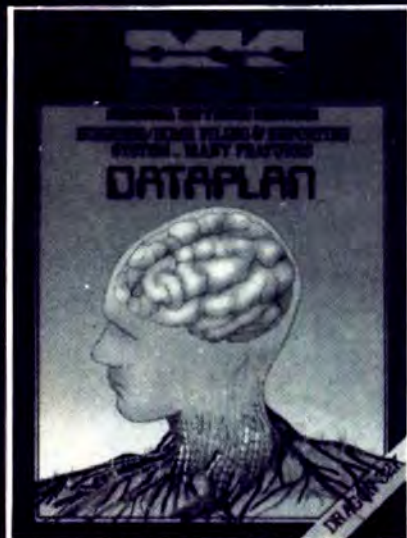
DRAGBUG IS ESSENTIALLY A MACHINE CODE MONITOR FOR THE DRAGON 32K GIVING THE USER EASY WRITING, ENTERING AND DEBUGGING FUNCTIONS FOR MACHINE CODE WRITING. IT INCLUDES ALL THE FEATURES OF PROFESSIONAL MONITORS FOUND ON LARGER MACHINES.



ATTACK 7.95

ATTACK IS A SUPER FAST, ALL MACHINE CODE ARCADE STYLE GAME FOR YOUR DRAGON 32K.

YOU ARE THE CHIEF SECURITY OFFICER ON THE PRISON PLANET 'KOVENTRI' WHERE ALL THE CAPTURED SPACE INVADERS ARE KEPT UNTIL A HUMANE WAY OF DEALING WITH THEM CAN BE FOUND. THERE HAS BEEN A MAJOR BREAKOUT AND IT IS A RACE AGAINST TIME TO STUN THE INVADERS AND CARRY THEM BACK TO THE SECURITY COMPOUND. AFTER BEING IN THE OPEN TOO LONG THEY MUTATE AND BECOME MUCH FIERCER. SEE HOW LONG YOU CAN KEEP THEM ALL LOCKED UP FOR.



DATAPLAN 12.95

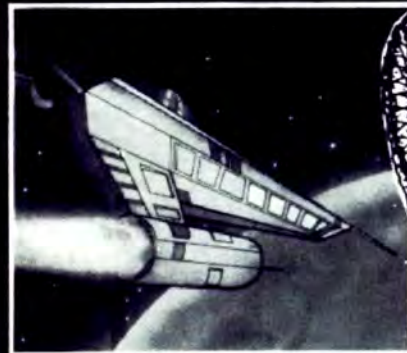
DATAPLAN IS A DATABASE TYPE FILING SYSTEM WHICH ALLOWS THE USER TO ACCESS, SORT AND PRINT INFORMATION AS IT IS REQUIRED.

IT IS ENTIRELY MENU DRIVEN FLEXIBILITY IS ITS STRONG POINT

DATAPLAN WILL STORE UP TO 200 LINES OF INFORMATION EACH OF 64 CHARACTERS OR 100 RECORDS EACH OF 127 BITS.

STARTREK 7.95

THIS VERSION OF THE POPULAR GAME OF STAR TREK PUTS YOU IN COMMAND OF THE SS ENTERPRISE DURING THE WAR WITH THE EVIL KLINGONS. YOU ARE TOLD THAT THE EMPIRE HAS BEEN INVADED AND IT IS YOUR MISSION TO DESTROY THE ENEMY. FEATURES INCLUDE: BATTLE COMPUTER, LONG/SHORT RANGE SENSORS, WARP DRIVE, IMPULSE ENGINES, PHASERS, PHOTON TORPEDOES ETC ETC.



SEND CHEQUE OR PO TO PSS
452 STONEY STANTON ROAD
COVENTRY CV6 50G



DRAGON 32 OWNERS
Shoot your mouth off
in...

Talking Android Attack

Another great game from Microdeal the first of a new generation of fast action, talking arcade games. At the start of each frame the computer warns the androids of an intruder "Intruder Alert"!! Now you can either run for the nearest doorway, escape and be called a "Coward", or chase, shoot and try to wipe out the androids, however, if you hit one it will turn into a GHOST ANDROID, capable of wandering thru walls — which of course are electrified with a fatal effect on you when touched!! Should you clear the screen the computer sneers "I'll get you next time". Will it?



All Cassettes £8 each (including VAT & Postage)
AVAILABLE FROM DRAGON 32 DEALERS NATIONWIDE OR ORDER DIRECT
SEND 1st CLASS STAMP FOR OUR FREE SOFTWARE LISTS
FOR DRAGON 32 & TANDY RANGE OF COMPUTERS.

MICRODEAL

14 TRURO ROAD, ST. AUSTELL,
CORNWALL, PL25 5JE. TEL: 0726-67676.

AVAILABLE FROM SELECTED
and
Boots
John Menzies

